

# WHAT MAKES A HEALTHY CITY?



## White Paper



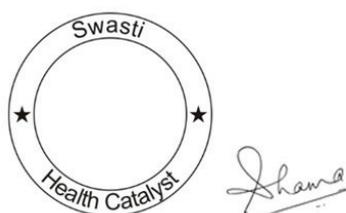
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**Shrirupa Sengupta and The Pen & Mouse**

# WHAT MAKES A HEALTHY CITY?

## White Paper



# Contents

<b>Acknowledgements</b>	<b>1</b>
<b>Readers Note</b>	<b>2</b>
<b>1. INTRODUCTION</b>	<b>3</b>
<b>2. HEALTH CITIES – ORIGIN, EVOLUTION, AND FRAMEWORKS</b>	<b>5</b>
2.1. Healthy Cities: Concept and Relevance	5
2.2. Health City Networks	12
2.3. Experience and Lessons	13
2.3.1. African Region	15
2.3.2. Eastern Mediterranean Region	16
2.3.3. South-East Asia Region	17
2.3.4. Region of the Americas	18
2.3.5. European Region	18
2.3.6. Western Pacific Region	20
<b>3. HEALTH CITIES IN THE INDIAN CONTEXT</b>	<b>22</b>
3.1. Urban and Urban Health Context	22
3.2. Participation of Urban Local Bodies in Promoting Health in Indian cities	26
3.2.1. Governance of health and health-related functions at the city level	26
3.2.2. Operational challenges to achieving health at the city level	27
3.2.3. Expanding financing for Urban Health	30
3.2.4. Convergence of urban stakeholders for health	31
3.2.5. Lessons learned	33
3.3. Linkages Between Smart and Healthy Cities	33
3.4. Proposed Framework for Healthy Cities in India	35
3.5. Operationalizing the Framework for cities in India/Indore	41
3.5.1. Next steps in Indore	42
<b>References</b>	<b>45</b>
<b>ANNEXURE</b>	<b>49</b>

# Figures

Figure 1: Healthy City Framework Proposed by Hancock .....	7
Figure 2: Healthy City Vision of the WHO .....	8
Figure 3: Healthy Setting Examples .....	8
Figure 4: Domain of actions for Healthy Cities .....	10
Figure 5: Increasing urbanization in India .....	22
Figure 6: Proportion of poor households per the socio-economic caste census .....	22
Figure 7: Out-of-Pocket Expenditure on Health: Rural vs Urban .....	25
Figure 8: Convergence mechanism for health in Pune .....	30
Figure 9: Strategic Framework for Cities to approach health .....	36
Figure 10: Operational Framework for Healthy City .....	38
Figure 11: Framework for Governance for Healthy City.....	38
Figure 12: Phasing for Healthy Cities in India .....	42
Figure 13: Average annual source contribution to PM2.5 concentrations in Indore ..	53



# Tables

Table 1: Examples of frameworks that address urban health: Focus areas .....	10
Table 2: A snapshot of comparison of healthy city approaches and challenges .....	14
Table 3: Urban Poor in EAG states (2011 census) .....	23
Table 4: Ranking of states on the proportion of slum households .....	24
Table 5: Critical health indicators among the urban poor (NFHS IV) .....	25
Table 6: Eighteen areas of participation for ULBs.....	26
Table 7: Convergent action plan Pune Municipal Corporation.....	29
Table 8: Leveraging Smart Cities and Digital India Program .....	34
Table 9: NFHS 4 Data for Indore.....	50

# List of Acronyms

<b>Acronym</b>	<b>Full form</b>
<b>AMRUT</b>	Atal Mission for Rejuvenation and Urban Transformation
<b>ANM</b>	Auxiliary nurse midwife
<b>ASHA</b>	Accredited Social Health Activist
<b>BPL</b>	Below Poverty Line
<b>BSUP</b>	Basic Services for the Urban Poor
<b>CAA</b>	Constitutional Amendment Act
<b>CBI</b>	Community Based Initiatives
<b>CDPO</b>	Child Development Project Officer
<b>GDP</b>	Gross Domestic Product
<b>GIS</b>	Geographic Information System
<b>HEART</b>	Health Equity Assessment and Response Tool
<b>HFA</b>	Health For All
<b>HIC</b>	High Income Countries
<b>HMC</b>	Healthy Municipalities, Cities and Communities
<b>ICDS</b>	Integrated Child Development Services
<b>IHSDP</b>	Integrated Housing and Slum Development Program
<b>JNNURM</b>	Jawaharlal Nehru National Urban Renewal Mission
<b>LMIC</b>	Low and Middle-income Countries
<b>MAS</b>	Mahila Arogya Samitis
<b>MAUD</b>	Municipal Administration and Urban Development
<b>MEPMA</b>	Mission for the Elimination of Poverty
<b>NFHS</b>	National Family Health Survey
<b>NUHM</b>	National Urban Health Mission
<b>NULM</b>	National Urban Livelihoods Mission



<b>OECD</b>	Organisation for Economic Co-operation and Development
<b>PHC</b>	Primary Health Centre
<b>PHEDs</b>	Public Health Engineering Departments
<b>PMEGP</b>	Prime Minister's Employment Generation Program
<b>PSI</b>	Population Services International
<b>RSBY</b>	Rashtriya Swasthya Bima Yojana
<b>SDG</b>	Sustainable Development Goals
<b>SDH</b>	Social Determinants of Health
<b>SECC</b>	Social Economic and Caste Census
<b>SHGs</b>	Self Help Groups
<b>SJSRY</b>	Swarna Jayanti Shahari Rojgar Yojana
<b>SUDA</b>	State Urban Development Authority
<b>TRG</b>	Technical Resource Group
<b>UCD</b>	Urban Community Development
<b>UHC</b>	Universal Health Coverage
<b>UIG</b>	Urban Infrastructure and Governance
<b>ULBs</b>	Urban Local Bodies
<b>UNESCO</b>	The United Nations Educational, Scientific and Cultural Organization
<b>UNICEF</b>	The United Nations Children's Fund
<b>UNIDO</b>	United Nations Industrial Development Organization
<b>UPHC</b>	Urban Primary Health Centres
<b>UTP</b>	Urban and Territorial Planning
<b>WHO</b>	World Health Organization

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# Readers Note

## **Relevance of the White Paper**

Almost half of Indians are projected to live in cities in the near future stretching the resources within a limited geographical area. The complex landscape of urban India with its multiplicity of stakeholders will have to work together if we are to ensure the health, wellbeing and the quality of life of the population. The recent pandemic has highlighted the challenges faced by urban populations and has demonstrated an urgent need for multi-sectoral actions and approaches.

## **The Context**

India has in the past decade focussed on urban transformation through programmes such as the National Urban Health Mission, Swachh Bharath Mission, National Urban Livelihood Mission and Smart Cities Mission. While each have contributed to the development of the urban areas, it is imperative to leverage the intersectionality of our efforts to create people-centric and community led models of healthy cities.

# 1. INTRODUCTION

**India is urbanizing at an unprecedented pace.** The 2011 census showed 31.6% Indians living in cities, that is 377.1 million people (Ministry of Housing and Urban Affairs, 2021). By 2030, India's urban population is projected to be around 590 million, which will be 40% of the total population. Consequently, changes to cope with this rapid growth impact the health of urban residents in complex ways: migration, climate change, transitioning disease burden, unhealthy built environments, and inadequate urban systems, including health care.

**Increasing urbanization demands that there is a concerted commitment to establish healthy cities across the country.** 'Healthy Cities' has been WHO's longest health promotion initiative having started in 1986 after the Ottawa Charter. In recent years there has also been increasing recognition of the strong link between (Sustainable Development Goal) SDG 3 (Good Health for All) and SDG 11 (Make Cities and Human Settlements Inclusive, Safe, Resilient and Sustainable). Healthy City planning thus aims to promote the implementation of strategies for improving urban health and solving environmental problems through local government action and community participation (Nakajima, 1996).

Indian cities are growing rapidly, and current health planning approaches have limited coordination across sectors that contribute to making a city healthy. A coordinated healthy city approach helps the city government to develop an overarching vision and focus on all elements that need to be interwoven at an operational level. Our core question was to find an approach to achieving better health for all urban citizens, as envisioned in India's National Health Policy, 2017. In order to develop an approach, we selected Indore as a potential use-case, given its title as India's Cleanest City and one of the first 20 Smart Cities.

Indore - Cleanest City to Healthy City: Indore is the most populous city in the State of Madhya Pradesh, as well as the commercial capital of central India. It has been declared India's cleanest city in an annual ranking exercise four times in a row and is one of India's '20 Smart Cities'. The Department of Health and Family Welfare, Government of Madhya Pradesh, is keen to demonstrate that cities can deliver "Health for All" by coordinating inputs from the different sectors that impact health and thus was chosen to be modeled as a "healthy city." (For a snapshot of the current status in Indore, an interested reader may refer to Annexure 1).

Indore can leverage multi-sectoral actions to become a Healthy City: Indore, Census 2011 shows that Indore has a total population of 1,994,397, of which 27% reside in slums and its outgrowths. It is evident from the data of National Family Health Survey (NFHS) - 4 that Indore has done well in many parameters, specifically in improved drinking water source, sanitation, and institutional births. However, there remain many areas of concern in the various aspects of the health of the population and health services provision. By coordinating inputs from the sectors that impact health, Indore has the potential to develop a model for a 'Healthy City.'

What will it take for Indore/another city to be a Healthy City? This white paper incorporates global examples and local perspectives garnered through multi-sectoral



consultations to inform the efforts to establish Indore as a healthy city. The paper seeks to build the concept of “Healthy City” through examples of various initiatives across the world and puts it in the context of India and a city like Indore. It traverses the determinants of health across sectors like water, sanitation, food, environment, and individual and family health concerns and earmarks the key considerations required for modeling Indore as a healthy city. The paper also explores the various mechanisms and levers needed as an implementation strategy to develop a healthy city.

The remainder of the paper is organized as follows. In the following section, we briefly describe the idea of a Healthy City as conceptualized at various quarters of practitioners, academia, and promoters. We also summarize critical frameworks proposed in the literature that are relevant in the Indian context. Additionally, we describe various implementation approaches adopted across countries in the world and conclude the section by summarizing findings and learnings. In Section 3, we characterize the healthy city concept in Indian settings and suggest avenues for the implementation. We also identify participating stakeholders that can play significant roles in establishing healthy cities in the country. We conclude the section and the paper by proposing implementation frameworks for achieving strategic, operational, and governance-specific targets.

## 2. HEALTH CITIES – ORIGIN, EVOLUTION, AND FRAMEWORKS

*“Many would be surprised to learn that the greatest contribution to the health of the nation over the past 150 years was made, not by doctors or hospitals, but by local governments. Our lack of appreciation of the role of our cities in establishing the health of the nation is largely due to the fact that so little has been written about them.” - Jesse Parfitt, author of A History of Health in Oxford from 1770 To 1974.*

### 2.1. Healthy Cities: Concept and Relevance

The healthy city concept is firmly rooted in an understanding of the historical importance of local governments in establishing the conditions of health and a firm belief that they can play a leading role in health promotion.

The Healthy Cities initiative was conceived with the goal of placing health high on the social and political agenda of cities by promoting health, equity, and sustainable development through innovation and multisectoral change (Tsouros AD, 2015). Its creation was based on recognition of the importance of action at the local, urban level and of the key role of local governments. It thrives at the cutting edge of public health, and this is one of the factors that contributed to its success. Healthy Cities is a strategic vehicle for health development and well-being in urban settings, and actions taken at the city level have a crosscutting relevance to the majority of technical areas of WHO’s work.

The Healthy Cities concept emerged in the 1980s on the basis of a new public health movement, the Ottawa Charter, 1986 and the WHO’s “Health for All” (HFA) strategy launched in 1978 at Alma Ata. The principles of HFA and the strategic guidance of the Ottawa Charter provide the framework for the WHO Healthy Cities initiatives. The Canadian Healthy Cities project (now called the Healthy Communities) and the WHO European Healthy Cities Project initiated in 1986 were the forerunners of this concept. These pioneering projects were built on the pillars of primary health care and health promotion, which included challenging communities to develop projects that reduce inequalities in health status and access to services, and to develop healthy public policies at the local level through a multisectoral approach and increased community participation in health decision making.

The concept involves focusing on the entire community, with its strengths and problems, rather than being established under the rubric of categorical issues such as tobacco, hypertension, cancer, or child abuse. It is not confined to one or more health problems, but “is intended to build health into the decision-making processes of local governments, community organizations and businesses, to develop a broad range of strategies to address the broad social, environmental and economic determinants of health” and to change the “community culture by incorporating health” (Hancock, 1993).

Since then, Healthy Cities have spread rapidly across Europe and other parts of the



world. The programme is a long-term international development initiative that aims to place health high on the agendas of decision-makers and to promote comprehensive local strategies for health protection and sustainable development (World Health Organization, 2018).

More recently, the onset of the COVID-19 pandemic demonstrates the indisputable requirement for the dynamic Healthy Cities concept: the response to the emerging health crisis. The high population density, informal settlement settings, casual employment, presence of low-income migrants and refugees, as well as inadequate access to sanitation, all magnify cities' vulnerability. This underlines the need for Healthy Cities to initiate long-term urban resilience to health risks and crises.

Consequently, WHO's strategy for the five years, 2019-2023, recognizes the crucial role of municipal governments in promoting this approach and recommends that the healthy city goals include themes, such as social determinants of health, healthy environments, Universal Health Coverage (UHC), health literacy, disease prevention, urban planning, green policies, community empowerment and public health services (World Health Organization, 2019).

Healthy Cities has been the WHO's longest health promotion initiative. There is increasing recognition of the strong link between SDG 3 (Good Health for All) and SDG 11 (Make Cities and Human Settlements Inclusive, Safe, Resilient and Sustainable).

The most widely used definition of a healthy city originates from the two founders of the concept Hancock and Duhl (World Health Organization, 1998). "A healthy city is one that is continually creating and improving those physical and social environments and expanding those community resources which enable people to mutually support each other in performing all the functions of life and developing to their maximum potential."

It must be noted that a healthy city is defined by a process, not an outcome.

- ⌘ A healthy city is not one that has achieved a particular health status.

**Box 1: Health City Checklist**  
**What a healthy city strives to provide**

- ⌘ A clean, safe physical environment of high quality (including housing quality)
- ⌘ An ecosystem that is stable now and sustainable in the long term
- ⌘ A strong, mutually supportive and non-exploitive community
- ⌘ A high degree of participation and control by the public over the decisions affecting their lives, health and wellbeing
- ⌘ The meeting of basic needs (for food, water, shelter, income, safety and work) for all the city's people
- ⌘ Access to a wide variety of experiences and resources, with the chance for a wide variety of contact, interactions and communication
- ⌘ A diverse, vital and innovative city economy
- ⌘ The encouragement of connectedness with the past, with the cultural and biological heritage of city dwellers and with other groups and individuals
- ⌘ A form that is compatible with and enhances the preceding characteristics
- ⌘ An optimum level of appropriate public health and sick care services accessible to all and
- ⌘ High health status (high levels of positive health and low levels of disease).

- ⌘ It is conscious of health and striving to improve it. Thus, any city can be a healthy city, regardless of its current health status.
- ⌘ The requirements are a commitment to health and a process and structure to achieve it.

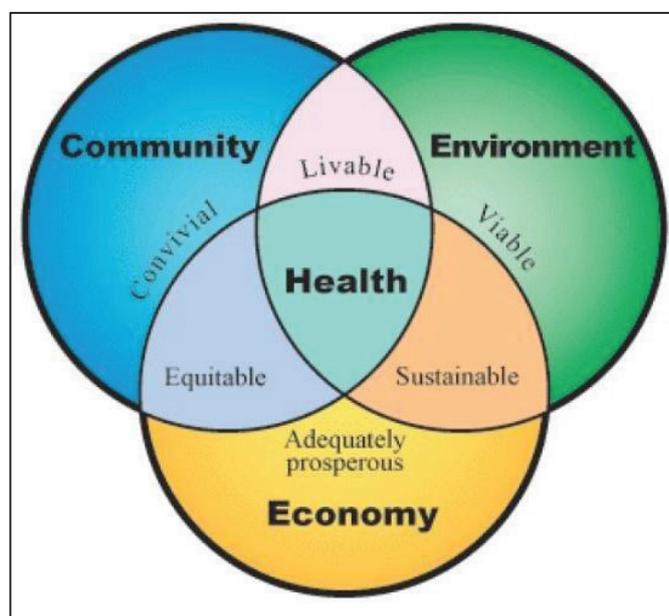
According to the definition articulated by WHO in 1991, “A healthy city is not one which has achieved a particular health status, but is one which is conscious of health and striving to improve it” (Sebastiaan, 2020).

The “Zagreb Declaration for Healthy Cities, 2008” defines it as a city for all its citizens: inclusive, supportive, sensitive, and responsive to their diverse needs and expectations. It provides conditions and opportunities, and a physical and built environment that supports health and well-being, safety and social interaction, accessibility and mobility, and a sense of pride and cultural identity (World Health Organization, 2009).

Reararticulating the concept in the context of sustainable development, in 2020, the WHO states that, “A healthy city is one that puts health, social well-being, equity, and sustainable development at the center of local policies, strategies, and programmes. The key core values of a healthy city are the right to health and well-being, peace, social justice, gender equality, solidarity, social inclusion and sustainable development. These are guided by the principles of health for all, universal health coverage, intersectoral governance for health, health-in-all-policies, community participation, social cohesion and innovation” (World Health Organization, 2020).

**Figure 1: Healthy City Framework Proposed by Hancock**

Source: (Allahyari et al., 2010)



Note: The figure demonstrates the multidimensions and social determinants of health proposed by Trevor Hancock (Hancock, 1993). Reprinted from *Healthy village cooperative: An approach towards rural development* (Allahyari et al., 2010).

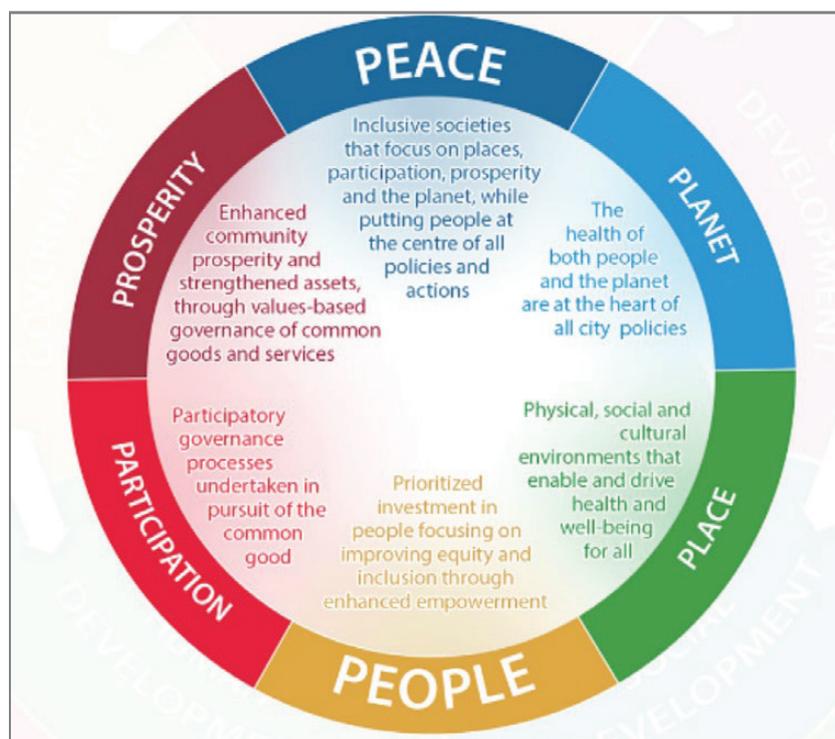
Cities provide a unique opportunity - the aggregation of a large population, the existence of a range of public and private services, to mention a few. It also poses several challenges, including rapid growth outpacing services, overcrowding in some areas, and fluid population. Health indicators generally are getting worse in urban

areas compared to rural areas. The health of citizens is not determined by health services alone.

This is well captured by the framework proposed by Hancock in 1993. A healthy city is seen as an amalgamation of a liveable, viable, and sustainable environment, an equitable, prosperous economy, a community that is convivial (lively), and health being achieved as an outcome (Figure 1).

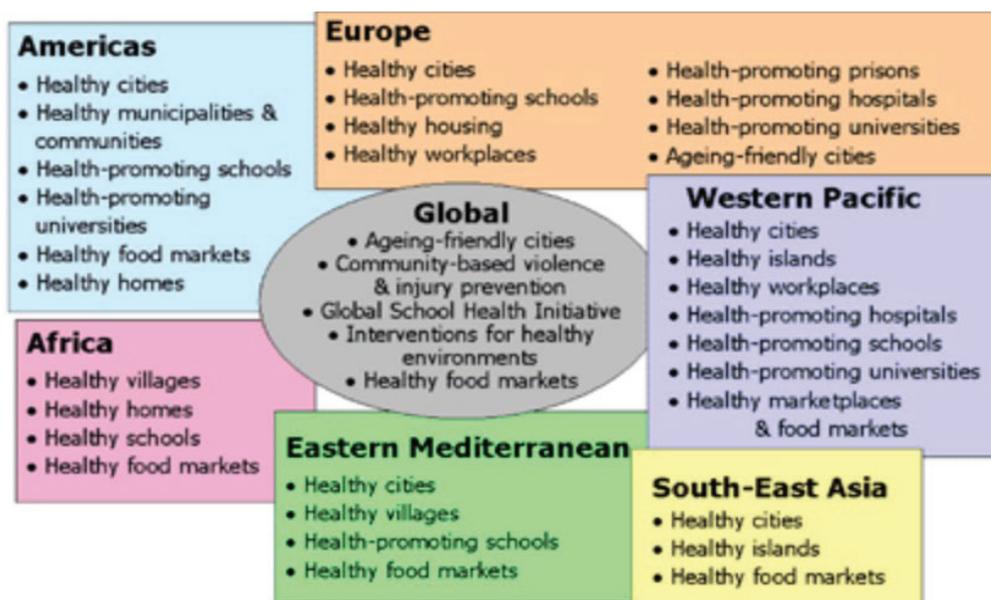


Figure 2: Healthy City Vision of the WHO



The WHO, under its Healthy Cities project in Europe, proposed a vision that is classified under six Ps - People, Participation, Prosperity, Planet, Place, and Peace (Figure 2) (World Health Organization, n.d.). It envisioned a healthy city as one where people are prioritized to achieve equity, places are created to promote health and well-being, prosperity is achieved through participative governance and thus, inclusive societies are promoting the health of people and the planet.

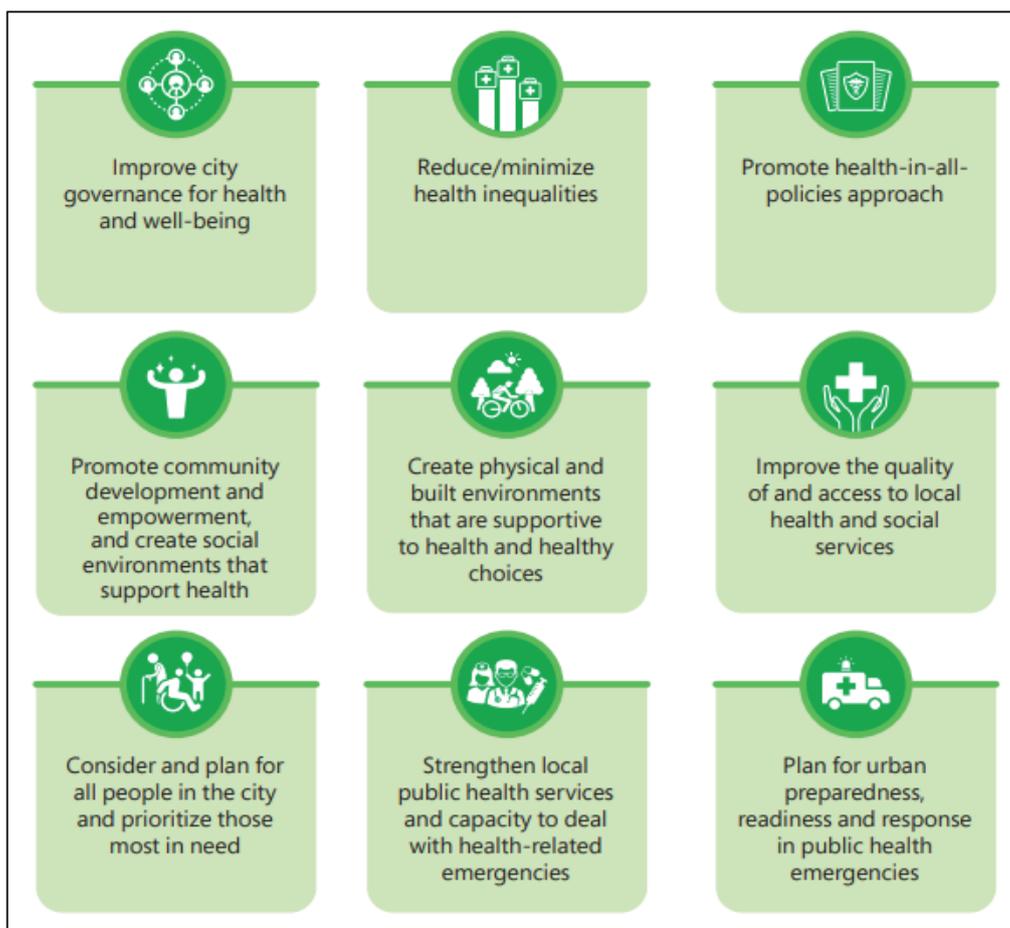
Figure 3: Healthy Setting Examples



Based on the context of the global geography and social constituency, a 'healthy setting'<sup>1</sup> has paved the way for various interpretations and approaches to health within a city. Some examples include the WHO's framework for age-friendly cities and the child-friendly cities framework proposed by UNICEF. The Healthy Settings approach and regional activities as implemented by the WHO in the different regions are presented in Figure 3 (World Health Organization, 2019).

<sup>1</sup> "The place or social context in which people engage in daily activities in which environmental, organizational, and personal factors interact to affect health and wellbeing."





**Figure 4: Domain of actions for Healthy Cities**

Source: (World Health Organization, 2020)

Since its conceptualisation, various other institutions and organizations have proposed frameworks towards the sustainable healthy development of cities. The recommended initiatives are aligned with the healthy city goals and, in some cases, run parallel. The cross-cutting theme among strategies is urbanization, the effects on the environment, and potential methods to tackle specific challenges. The frameworks suggested by various organizations have been summarized in Table 1.

**Table 1: Examples of frameworks that address urban health: Focus areas**

Frameworks	Details
Urban and Territorial Planning (UTP) by UN-Habitat (2018)	<ul style="list-style-type: none"> <li>⌘ Articulates the role of planning and design in prevention of diseases, health promotion and curative dimensions.</li> <li>⌘ Emphasises the relationship of spatial factors on public health.</li> <li>⌘ Views health as an input and an outcome of UTP.</li> <li>⌘ Leverages UTP to promote leadership for transformation in environments.</li> </ul>
Urban Health by WHO- UN-Habitat (2016)	<ul style="list-style-type: none"> <li>⌘ Advances universal health coverage in cities.</li> <li>⌘ Addresses malnutrition.</li> <li>⌘ Leverages the urban advantage to tackle communicable diseases.</li> <li>⌘ Emphasizes reduction in health inequity for sustainable development.</li> <li>⌘ Focuses on designing healthier and sustainable cities.</li> </ul>

Frameworks	Details
Learning Cities and the SDGs by UNESCO (2015)	<ul style="list-style-type: none"> <li>⌘ Proffers a people-centered approach focussed on SDGs 4, and SDG 11.</li> <li>⌘ Focus on environmental sustainability - Green and healthy learning cities.</li> <li>⌘ Promotes individual empowerment through intercultural dialogue and social cohesion - Equitable and inclusive learning cities.</li> <li>⌘ Aims to create economic development and cultural diversity - Employment and entrepreneurship in learning cities.</li> </ul>
Sustainable Cities by UNIDO (2016)	<ul style="list-style-type: none"> <li>⌘ Underlines the need for sustainable planning, investments, and technologies to develop sustainable cities.</li> <li>⌘ Drives the implementation of green technology innovations.</li> <li>⌘ Establishes climate resilience in urban planning and management.</li> <li>⌘ Promotes urban inclusiveness through gender equity and low carbon industrialization.</li> <li>⌘ Forges partnership with diverse actors and developing city networks to foster community engagement and a multi-disciplinary approach.</li> </ul>
Child Friendly Cities Initiative by UNICEF	<ul style="list-style-type: none"> <li>⌘ Uses the UN Convention on the Rights of the Child as a foundation.</li> <li>⌘ Endorses municipal governments in recognising children's rights at the local level.</li> <li>⌘ Focuses on the 12 indicators of health outcomes and SDH</li> </ul>
Resilient Cities by OECD (2016)	<ul style="list-style-type: none"> <li>⌘ Enables people, irrespective of age, sex, ability, race, ethnicity, origin, religion or economic or other status, to have affordable and equitable access to health and social services and economic opportunities.</li> <li>⌘ Identifies four pillars of resilience which include: <ul style="list-style-type: none"> <li>* <b>Economy</b> that is thriving incorporates innovations and provides skills, employment and education to its people.</li> <li>* <b>Governance</b> that is transparent, skilled and adopts strategic approaches to the management of the city.</li> <li>* <b>Environment</b> that protects natural resources, provides basic infrastructure and creates diverse ecosystems.</li> <li>* <b>Society</b> that is cohesive, active, safe and healthy.</li> </ul> </li> </ul>



Frameworks	Details
Resilience Framework City by Rockefeller Foundation (2014)	<ul style="list-style-type: none"> <li>⌘ Approaches the concept of resilience by articulating 12 goals which fall under four broad categories: the health and wellbeing of individuals (people), urban systems and services (place), economy and society (organization), and, finally, leadership and strategy (knowledge).</li> <li>⌘ Acknowledges that resilience results from individual and collective action at various levels, delivered by multiple stakeholders ranging from households to municipal government.</li> <li>⌘ Facilitates a common understanding of resilience amongst diverse stakeholders.</li> <li>⌘ Helps identify where there are critical gaps, where action and investment to build resilience will be most effective, or where deeper analysis or understanding is required.</li> </ul>

To conclude, each framework that highlights health as an agenda within the cities draws upon their envisaged goals, however, each framework emphasizes the need for multi-sectoral action, community engagement, and sustainability. There is a dearth of literature on comparative analysis of the frameworks, which makes it difficult to identify the advantages and disadvantages of one framework over the other.

## 2.2. Health City Networks

Under the healthy cities project the city-level efforts have benefitted from the formation of networks. For 30 years, the WHO European Healthy Cities Network has brought together some 100 flagship cities and approximately 30 national networks. The flagship cities interact directly with WHO/Europe, while the national networks bring together cities in a given Member State. In both cases, the WHO provides political, strategic, and technical support as well as capacity-building.

Together the flagship cities and national networks cover some 1400 municipalities. Their shared goal is to engage local governments in political commitment, institutional change, capacity-building, partnership-based planning, and innovation. The UNIDO framework also emphasizes the need for developing networks of cities.

A network of Healthy Cities exists in the USA and in Quebec, Canada. Countries in Latin American that are working through healthy settings, such as the Healthy Municipalities, Cities and Communities (HMC) Strategy, build consensus and form partnerships through various networks and projects.

The WHO European Healthy Cities Network

- ⌘ promotes solidarity, cooperation, and working links between European cities and networks and with cities and networks participating in the Healthy Cities movement,
- ⌘ plays an active role in advocating for health at the European and global levels through partnerships with other agencies concerned with urban issues and networks of local authorities, and
- ⌘ increases the accessibility of the WHO European Network to all member states in the European Region.

Networks further have sub-networks that work on specific issues. For example, sub-networks in Denmark work on nine issues

- ⌘ Tobacco,
- ⌘ Alcohol,
- ⌘ Nutrition
- ⌘ Physical activity,
- ⌘ Health in all policies,
- ⌘ Healthy workplaces,
- ⌘ Employment
- ⌘ Health

The German Healthy Cities Network, initiated in 1988, works with self-help groups that lead community-based initiatives and projects. The centers of competence in healthy cities in Germany are as follows:

- ⌘ Halle (Saale): Neighbourhood-based, citizen-oriented, urban development
- ⌘ Berlin Friedrichshain-Kreuzberg: Migration, integration and health
- ⌘ Frankfurt am Main: Migration and public health
- ⌘ Herne: Health conferences
- ⌘ Rhein-Kreis Neuss: Health promotion and health monitoring in childhood and adolescence
- ⌘ Stuttgart: Health promotion in childhood and adolescence
- ⌘ Kreis Unna: Community health management and consumer health protection
- ⌘ Cologne: Healthy ageing

The overall objective of the Slovenian Healthy Cities Network is to enable cities and towns to implement multi-sectoral policies for health with a focus on citizen participation, health promotion, disease prevention, healthy lifestyles, social determinants of health and the environment.

## 2.3. Experience and Lessons

### Healthy Cities: Developed versus Developing and Underdeveloped Countries

The **Healthy city approaches** among developed (HIC) and developing and underdeveloped countries (LMIC) vary significantly based on the development levels. Developed countries are inclined to focus on areas such as healthy lifestyle, physical activity, healthy ageing, and non-communicable disease-related issues. Whereas developing countries in a low-income setting center their approach on improving access to fundamental needs such as food, clean water and sanitation, shelter, income safety, poverty reduction, education, and basic infrastructure. The main activities selected by the Healthy city projects in the developing regions were awareness-raising and environmental improvements, particularly solid waste disposal.

The **health services** in developing countries focus on strengthening the primary health care system to ensure comprehensive maternal and child care and controlling communicable diseases. Whereas in the developed countries, the primary focus is on providing patient-centered care to address issues, such as obesity, prevention of alcohol use and substance abuse addiction, mental well-being, healthy ageing innovation, crime and injury prevention, and providing disability-friendly facilities.

**Healthy environments** are a common aspect of all countries involved in healthy city planning. Although, the elements and strategies followed vary widely among the countries. Most of the projects in the developing countries focus on improving effective and efficient drainage and solid waste management systems, promotion of



hygiene and sanitation, reducing air pollution, improving housing conditions among others. In comparison, healthy environments in developed settings constitute features creating resilient communities and supportive environments such as walkable cities, recycling-oriented urban planning, smoke-free cities, and creating urban spaces where citizens can carry out physical activity.

Although priorities for each city may vary, these are incremental actions of the same framework and do not preclude a city in the developing country to commit to financing and implement a comprehensive vision of a healthy city.

**Table 2: A snapshot of comparison of healthy city approaches and challenges in developed versus developing and underdeveloped countries**

<b>Developed countries (HIC)</b>	<b>Developing and underdeveloped countries (LMIC)</b>
<ul style="list-style-type: none"> <li>⌘ Focus on non-communicable disease-related issues and healthy lifestyle</li> <li>⌘ Enhancing patient- centered care and public health capacity to include               <ul style="list-style-type: none"> <li>• Prevention of alcohol use and substance abuse addiction</li> <li>• Healthy ageing</li> <li>• Crime and injury prevention</li> <li>• Providing disability friendly facilities</li> </ul> </li> <li>⌘ Advanced health technology and innovation               <ul style="list-style-type: none"> <li>• Physical activity</li> <li>• Curbing obesity</li> <li>• Mental well-being</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>⌘ Focus on communicable diseases and controlling the spread of epidemics</li> <li>⌘ Improve primary health care systems to include aspects, such as comprehensive maternal and child care (e.g., immunization coverage, malnutrition).</li> <li>⌘ The primary activities are awareness-raising, and environmental improvements, particularly in solid waste disposal.</li> <li>⌘ Interventions to improve basic needs, such as:               <ul style="list-style-type: none"> <li>• Basic infrastructure</li> <li>• Access to food</li> <li>• Clean water and sanitation</li> <li>• Shelter</li> <li>• Poverty reduction</li> </ul> </li> </ul>

The global experience from WHO's six regions and the lessons emanating from their implementation of the health cities initiative is described in the remainder of this section .

## Box 2: Examples of Health City Activities

In Teheran, the project has led to an upgrading of housing in low-income areas of the city. In Lahore, the project has focused on improving environmental and sanitary conditions in crowded informal settlements, using a partnership between the city corporation, local residents and other agencies.

The project in Rio de Janeiro has mobilized human and financial resources to provide drainage of a neighbourhood, stopping the seasonal flooding of low-lying areas.

Healthy City Project partners in Chittagong, Bangladesh, have agreed on a programme of action covering seven main areas: slum improvement, literacy, water and sanitation, drainage and sewerage, health care and nutrition and town planning.

In Accra, training of municipal government staff responsible for environmental services in the city in concepts and practice of health education and promotion has been implemented, so they may undertake health promotion as part of their community level work.

In Johannesburg, the project has developed a comprehensive health and housing programme for townships in the vicinity of the city, with improvements already achieved in areas such as water, sanitation, solid waste management, neighbourhood safety etc.

## Region wise experience and lessons

### 2.3.1. African Region

The International Conference on Health and Environment in Africa in 1997 emphasized the Healthy Cities/ Villages approach as an umbrella concept at the local level to address health and environmental issues. Africa was facing a plethora of health challenges and unhygienic and unsanitary conditions in cities. Overcrowding was leading to social and behavioural changes, family disintegration, homelessness, and crime. Thus, it was imperative to address these challenges through an approach that would take into account the environmental and socio-economic determinants of health.

**Healthy city activities** were first adopted by countries like Ethiopia, Mali and Zimbabwe. Many additional countries, such as Cameroon, Gabon, Mozambique, and the United Republic of Tanzania have initiated pilots. Several countries have chosen to focus on specific environments and/or health issues. Zimbabwe, for example, focuses on housing, waste management, and water supply (World Health Organization, 2003).

Across Africa, progress has been made in preparing city health plans, at least for the capital cities, in all 46 countries. Almost all countries have in place elements of a Healthy Cities programme but,

### Box 3: The Healthy Markets in Togo, Western Africa

Togo, in western Africa, is an example of a city which engaged in the settings approach by introducing its flagship Healthy Markets project.

The market of Sokodé in Togo was chosen due to the sanitary emergency and the increased cases of cholera due to the outbreak. The key components addressed under the project were food hygiene, physical conditions, consumer education, availability of water and sanitation and waste management.

Some of the challenges faced were inadequate finances, implementation of plans with limited funds, Role and responsibilities of mayoral activities and limited space.



in the absence of formal networks, the Healthy Cities model has often been only partially implemented rather than forming a central component of government or city health planning.

**Challenges** being faced in implementing healthy city projects include:

- ⌘ Need for strong advocacy to gain acceptance for the Healthy Cities approach.
- ⌘ Difficulty in incorporating poverty reduction as a core agenda of the Healthy Cities projects, although widespread poverty and the need to promote economic and housing issues predominates the environmental and health issues.
- ⌘ Need for additional financing and lack of mobilization of local resources due to availability of external financial resources.
- ⌘ Competing initiatives, such as Safer Cities and Sustainable Cities.
- ⌘ Need for political will at a local and national level to ensure effective intersectoral collaboration.

### 2.3.2. Eastern Mediterranean Region

The Eastern Mediterranean Region has one of the fastest rates of population growth in the world. The limited availability of safe water and adequate disposal of waste water are major issues. Solid waste management is the most pressing environmental concern in many secondary and major cities in the Region. These problems are coupled with increasing levels of air pollution and a housing shortage.

#### **Box 4: The Healthy Cities Programme in the Islamic Republic of Iran: a role model**

The Tehran Healthy Cities project was launched in March 1992 and became the cornerstone of the Healthy Cities concept in the Eastern Mediterranean Region of WHO. The project initiated a number of innovative themes and activities, which had a major impact on health and social sector. Following the establishment of the project, 55 cities in 22 provinces have initiated similar projects. National Healthy Cities projects have had very impressive results, and have led to the creation of some 60 000 women health volunteers, 5000 community schools and employment opportunities for unemployed young people.

The Healthy Cities programme was formally launched in 1990 in Cairo and since then has expanded to several countries in the Region, where it is at various levels and stages of implementation. It was launched in the Islamic Republic of Iran and expanded to Afghanistan, Bahrain, Iraq, Jordan, Oman, Pakistan, Saudi Arabia, Sudan, and the United Arab Emirates, adapting to different cities' particular needs and interests. Healthy Cities in this Region are particularly focused on issues such as a clean and sustainable environment, the provision of preventive and curative health services to all, and targeting marginalised and impoverished populations (Tsouros, 2009).

Three interrelated approaches have been implemented in the region, they include Community-based initiatives (CBI), Healthy Cities, and Urban Heart. Urban HEART (Urban Health Equity Assessment and Response Tool) combines research, partners' organizational data, and community knowledge to assess urban equity, and seeks to assist decision-makers in identifying the relationship between the health determinants and well-being of the population in comparison with benchmark values at the national level.

The initial **challenges** faced by the region to implement the healthy cities initiatives include:

- ⌘ limitation of resources (financial, human, and material),
- ⌘ deficient technical capacities and supportive infrastructures,
- ⌘ lack of good governance and absence of community development plans,
- ⌘ insufficient political commitment and ownership,
- ⌘ inappropriate community participation and local empowerment,
- ⌘ lack of coordination between intersectoral (and even international) agencies,
- ⌘ lack of realization that health is central to development,
- ⌘ high levels of poverty and scarcity of economic means, and changing lifestyles and cultures, bringing new social and health problems

### 2.3.3. South-East Asia Region

“The WHO Healthy City Project launched in the SEA Region in 1994 covered six cities, Chittagong and Cox’s Bazar (Bangladesh), Bangkok (Thailand), Badulla (Sri Lanka), Kathmandu, Koleshwar (Nepal), and New Delhi (India)” (Sharma, 2017, Aggarwal and Yoosuf, 2010). Progress in Healthy Cities development has been slow owing to a lack of clear concepts among local authorities and a lack of coordinated urban infrastructure to support the process. Despite a slow beginning, there were about 40 Healthy Cities in the Region, involving all member states.

At only 42 %, the South-East Asia Region has the lowest sanitation coverage of all WHO regions, and the situation is far worse in urban slums. Other challenges are poor urban infrastructure and governance and low capacity for intersectoral collaboration. The prevailing mass illiteracy and poverty in many countries of the Region makes it difficult for large segments of the population (the potential recipients of the benefit) to understand the Healthy Cities concept and participate in it. Nevertheless, the increasing trend towards political decentralization seen in the Region is an emerging opportunity for promoting healthy settings at local levels.

#### **Box 5: The Healthy City Project - Wonju, South Korea**

The healthy city Wonju project was launched in March 2004 by establishing a healthy city team and a healthy city advisory committee. The two primary approaches followed were on the individual and socio-environmental factors. The former includes lifestyle, whereas the latter comprises of healthy setting, infrastructure, environment, and health industries.

The project initiated a number of innovative themes and activities, that had a major impact on health and social sector. They included sport and medicine center, culture street projects, climate change response education, environment-friendly theme parks, and walkable cities.

Key features of the healthy city Wonju project included: Strong political commitment of local government, financing the healthy city initiative with tobacco consumption tax, partnerships with universities, well-organized healthy city teams under city administration, coordination with national and regional healthy city alliances, community participation, and involvement in research for evidence-based planning and evaluation.



To make the initiative successful, there is a need to:

- ⌘ generate political mobilization and community participation in preparing and implementing a municipal health plan,
- ⌘ increase awareness of health issues in urban development efforts by municipal and national authorities, including non-health ministries and agencies,
- ⌘ create a network of cities that promotes information exchange and technology transfer, and
- ⌘ facilitate intersectoral action for health.

In 2002, the Regional Office commissioned an evaluation of Healthy Cities projects in 12 cities in India, Nepal, Sri Lanka, and Thailand. Some of the important observations and conclusions of this study indicate that the following factors contribute to successful implementation:

- ⌘ exposure and commitment of decision-makers, particularly local politicians
- ⌘ clarity of vision and mission, with a strong planning and management team
- ⌘ sense of ownership of policies
- ⌘ a high degree of stakeholder involvement, and
- ⌘ institutionalization of Healthy Cities programme policies.

#### **2.3.4. Region of the Americas**

Region of the Americas comprises of 35 member states<sup>2</sup> spanning across North and South America. Since the Healthy Cities movement began in Canada in 1984, two strong provincial networks of Healthy Cities have developed in Ontario and Quebec, representing 200 communities. There are more than 200 self-declared Healthy Cities and Communities at both the state and city level in the United States. Common themes across these two countries for achieving healthy cities are conservation of resources and environmental health, domestic and youth violence, adolescent services, and job and life skills training.

On the other hand, countries in Latin American are working through healthy settings, such as the Healthy Municipalities, Cities and Communities (HMC) strategy, which has been one of the more successful strategies for putting health promotion into practice in the region (World Health Organization et al., 2016). An HMC strives to achieve a social pact among civil society organizations, institutions from various sectors, and local political authorities in order to carry out health promotion actions with a view to providing the population with a good quality of life. Healthy Cities projects have also been initiated in Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, the Dominican Republic, Ecuador, Mexico, Nicaragua, Peru, and Venezuela.

#### **2.3.5. European Region**

Healthy Cities has a 30-year history in Europe. Spanning more than 13000 cities in the countries of the region, the projects have focussed on:

- ⌘ Health and health equity in all policies
  - Raising awareness

<sup>2</sup> *Antigua and Barbuda, Argentina, Bahamas, Barbados, Belize, Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Cuba, Dominica, Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname, Trinidad and Tobago, United States of America, Uruguay, Venezuela*

- Health impact assessment training
- Projects that assess the needs of single-parent families
- ⌘ Caring and supportive environments
  - Projects on ageing and dementia, age-friendly cities
  - Participating in WHO projects related to physical activity
  - Training for member cities on health literacy and healthy ageing
- ⌘ Healthy living
  - Reducing tobacco and alcohol consumption among young (smoke-free cities)
  - Developing a strategic plan for active cities
  - Projects related to children and obesity (awareness on nutrition)
- ⌘ Healthy urban environments
  - Participation of national, strategic groups and partnerships on related issue areas, such as related to ageing and physical activity
  - Creating urban spaces where citizens can carry out physical activity
  - Actions related to mobility and accessibility encompass a range of actions, including traffic calming, eliminating architectural barriers, redeveloping urban furniture, and creating footpaths and cycle lanes

The WHO European healthy city network has been organized into phases, having a time period of roughly five years per phase. The evolution of the phases throughout the years have been described below:

Phases	Timeline	Details
Phase I	1988–1992	Set up of structures (national networks and other platforms)
Phase II	1993–1997	Developing healthy public policies and city health plans
Phase III	1998–2002	Transition from health promotion to integrated city health development plans.
Phase IV	2003–2008	Commitment towards city health development.
Phase V	2009–2013	Built on previous city health planning and focussed on 3 core themes: caring and supportive environments, healthy living, and healthy urban design.
Phase VI	2014–2018	Giving priority to life-course approaches in city policies and plans
Phase VII	2019–2024	Prioritization of the themes presented in the Copenhagen Consensus of Mayors



### **Box 7: Copenhagen: Healthy and Happy City**

The Danish capital ranks high on the list of the world's healthiest and happiest cities. With obesity and depression on the rise worldwide, Copenhagen consistently sits at the very top of the UN's happiness index and is one of the star performers in the Healthy Cities initiative of the World Health Organisation. It joined the WHO Healthy Cities initiative in 1987, a year after the original 11 cities. It's not just about walkable streets, but about forging healthy, sociable, happier communities.

Promoting health in everyday life is the first of the six-pronged approach and includes making it attractive to cycle, serving nutritious lunches in institutions and enabling educational institutions to offer quit-smoking programmes.

An extraordinary 62% of people living in the city cycle to work every day and the vast majority keep it up through cold and wet weather. It is the easier choice as the city is designed for bikes and not cars. Facilities also include smoking cessation courses and free stress clinics.

### **2.3.6. Western Pacific Region**

In the Western Pacific Region, approximately 54% of the population lives in urban areas, therefore, the rapid population growth in the area strains the physical and social environments posing a threat to health and well-being. Since the late 1980s, when Australia, Japan, and New Zealand embarked on their Healthy Cities projects, several more countries in the Western Pacific Region have joined the Healthy Cities movement. These include Cambodia, China, the Lao People's Democratic Republic, Malaysia, Mongolia, the Philippines, the Republic of Korea, and Vietnam .

Currently, over 100 Healthy Cities projects are being implemented in the Region. These projects share some common features, such as intersectoral collaboration and community participation. Nevertheless, they also address a diversity of priority health issues, reflecting the different states of economic development. Broadly, the key domains of healthy cities in the Western Pacific Region are (Leeuw and Simos, 2017):

- ⌘ Empowerment of individuals and communities
- ⌘ Engagement of all sectors
- ⌘ Environmental Sustainability

### **Box 8: Healthy Cities - Healthy Island Programme Johor Bahru, Malaysia**

The programme was adopted by the WHO regional committee in 1994. The objectives for the region are: Minimise health hazard through integration of health and environment protection measures

- Enhance quality of physical and social environment.
- Increase public awareness towards healthier behaviours, lifestyles and habits
- Improve provision of health services
- Upgrade intersectoral coordination and public participation.

The healthy cities initiative is a continuous initiative and requires support from various stakeholders including private organizations, non-governmental institutions and local citizens to achieve the vision of healthy cities.

- ⌘ Energy Efficiency
- ⌘ Equity-based health systems
- ⌘ Elimination of extreme urban poverty
- ⌘ Expression of cultural diversity and spiritual values
- ⌘ Enforcement of safety and security

The Healthy City projects in this region differ significantly from one country to the other, depending on the development levels. In a more developed setting, in the case of Australia or Japan, the critical issues were crime and injury prevention along with the protection of the environment. Whereas, in poorer countries such as Cambodia or Vietnam, the provision of clean water and sanitation and basic infrastructure are the focus areas.



# 3. HEALTH CITIES IN THE INDIAN CONTEXT

## 3.1. Urban and Urban Health Context

India's urban population is expected to grow from 377 million to 915 million in 2050 (UNs' prognosis in 2011). There is a need to plan now to develop innovative strategies to address predicted and emerging challenges (United Nations, Population Division, 2018).

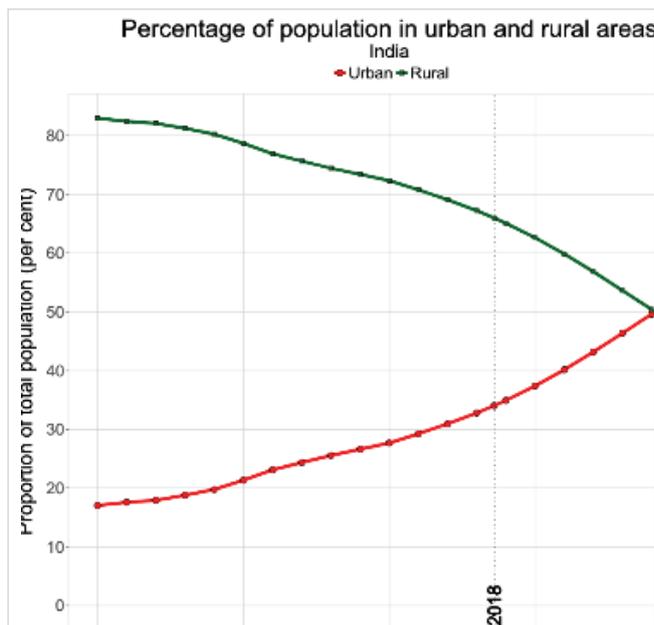


Figure 5: Increasing urbanization in India

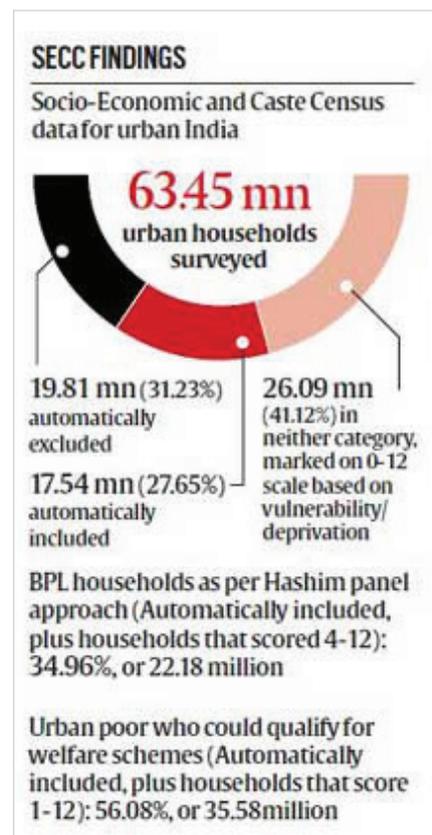
Source: (United Nations, 2018)

The urban population in our country has increased at an annual rate of 2.7% during the last decade and it is estimated that by 2031, there would be about 600 million people living in urban India. The fast pace of urbanization has come to stay with an increasing proportion of urban poor and vulnerable with health indicators much worse than their rural counterparts. The proportion of urban population is projected to increase from 31% (2011) to 46% (2030).

Almost 35% of urban households live below the poverty line (BPL), according to data from the first Social Economic and Caste Census (SECC). An analysis of the numbers and methodology, however, shows that up to 56% of households could qualify to be included in the broader category of 'urban poor.' Of the 63 million households surveyed in 4,041 cities and towns, the panel's BPL definition entitles 22 million households (about 110 million people) to benefits of welfare schemes. Including all urban poor would take the number to 35.53 million households, or 177 million individuals (Indian Express, 2015).

Figure 6: Proportion of poor households per the socio-economic caste census

Source: (Indian Express, 2015)



The proportion of the poor in the urban areas ranges from 13.7 percent (Indian Express, 2015) to 34.96% (Hashim Estimate). Doing away with BPL and extending entitlements meant for the 'poor' to anyone facing one or more kinds of deprivation takes the proportion of urban poor to 56% (Hashim). There is no consensus on how to define urban poverty, and the Tendulkar methodology continues to be applied for targeting urban poor for development programs with the exception of some programs. Based on the intricacies involved in understanding urban poverty, the housing and poverty alleviation ministry in India has decided that the urban poor will now be identified on the basis of social, economic, and occupational vulnerabilities.

An attempt has been made to analyse data for the EAG states as they suffer from the worst maternal and child health indicators (detailed in the ensuing section). Applying the estimates from the Tendulkar and Hashim committees provides the following distribution of the urban poor among the EAG states (Indian Express, 2015).

**Table 3: Urban Poor in EAG states (2011 census)**

EAG States	Urban population(in Millions)	Proportion of urban population (%)	Estimate of urban poor(in Millions)	
			Tendulkar	Hashim
Bihar	11.7	1.13	3.78	6.55
Chattisgarh	5.9	2.32	1.52	3.30
Jharkhand	7.9	2.4	2.02	4.42
Madhya Pradesh	20	2.76	4.31	11.20
Odisha	6.9	1.66	1.24	3.86
Rajasthan	17	2.48	1.87	9.52
Uttar Pradesh	44.4	2.22	11.88	24.86
Uttarakhand	3	3.05	0.34	1.68
West Bengal	29	3.18	4.38	16.24

In India, the higher incidence of poverty in small and medium-size towns has indeed been noticed and has been documented in several studies, notably Dubey et al. (2001), Kundu and Sarangi (2005), and Himanshu (2008). Small and Medium-Size Towns Contain about 70% of India's urban population, and because they are poorer, an even larger proportion of India's urban poor, about 85% (United Nations Development Programme, 2009). Another interesting analysis from the World Bank's India Poverty Report (2008) is that poverty in a town is higher the farther the town is from a large city. The report further finds that not only would poverty reduction in small towns target most of India's urban poor, but evidence indicates that it would have a larger spill over effect on rural poverty (The World Bank, 2008).

Nearly one-fifth of the urban population and by some estimates, a quarter lives in slums. Slums are overcrowded, often polluted, and lack basic civic amenities such as clean drinking water, sanitation, and health facilities. Not all urban poor live in slums, and slum-dwellers in urban areas are not necessarily poor. However, slums do present a marginalized living condition. A study on living conditions in eight cities found that poverty was more prevalent in slum areas than in non-slum areas (Gupta



et al., 2006). However, the study found that a large number of poor in Hyderabad and Indore live in non-slum areas.

Nearly 63% of the urban slum population lives in recognized and identified slums. Almost 61% of the slum households are in cities other than the 46 million-plus-cities<sup>3</sup>. The states which report the highest and lowest number of slum households are presented in Table 4.

**Table 4: Ranking of states on the proportion of slum households (slum census 2011)**

<b>Top States</b>	<b>Proportion of Slum HHs to Urban HHs (%)</b>	<b>Bottom States</b>	<b>Proportion of Slum HHs to Urban HHs (%)</b>
Andhra Pradesh	35.7	Chandigarh	9.7
Chhattisgarh	31.9	Gujarat	6.7
Madhya Pradesh	28.3	Jharkhand	5.3
Odisha	23.1	Assam	4.8
West Bengal	21.9	Kerala	1.5

As per the census 2011, about 90% of the households had access to electricity and another 65.3 to a treated drinking water source. However, only half (56.7%) had a source of drinking water within the premises. Two-thirds (66%) of the households had a latrine facility within the premises. However, two-thirds of the households had open or no drainage system for waste water disposal. About half the slum households (51%) were using LPG as cooking fuel. About 11% of the slum households do not have any of the assets recorded by the census (TV, radio, computer, phone, mobile phone and vehicles).

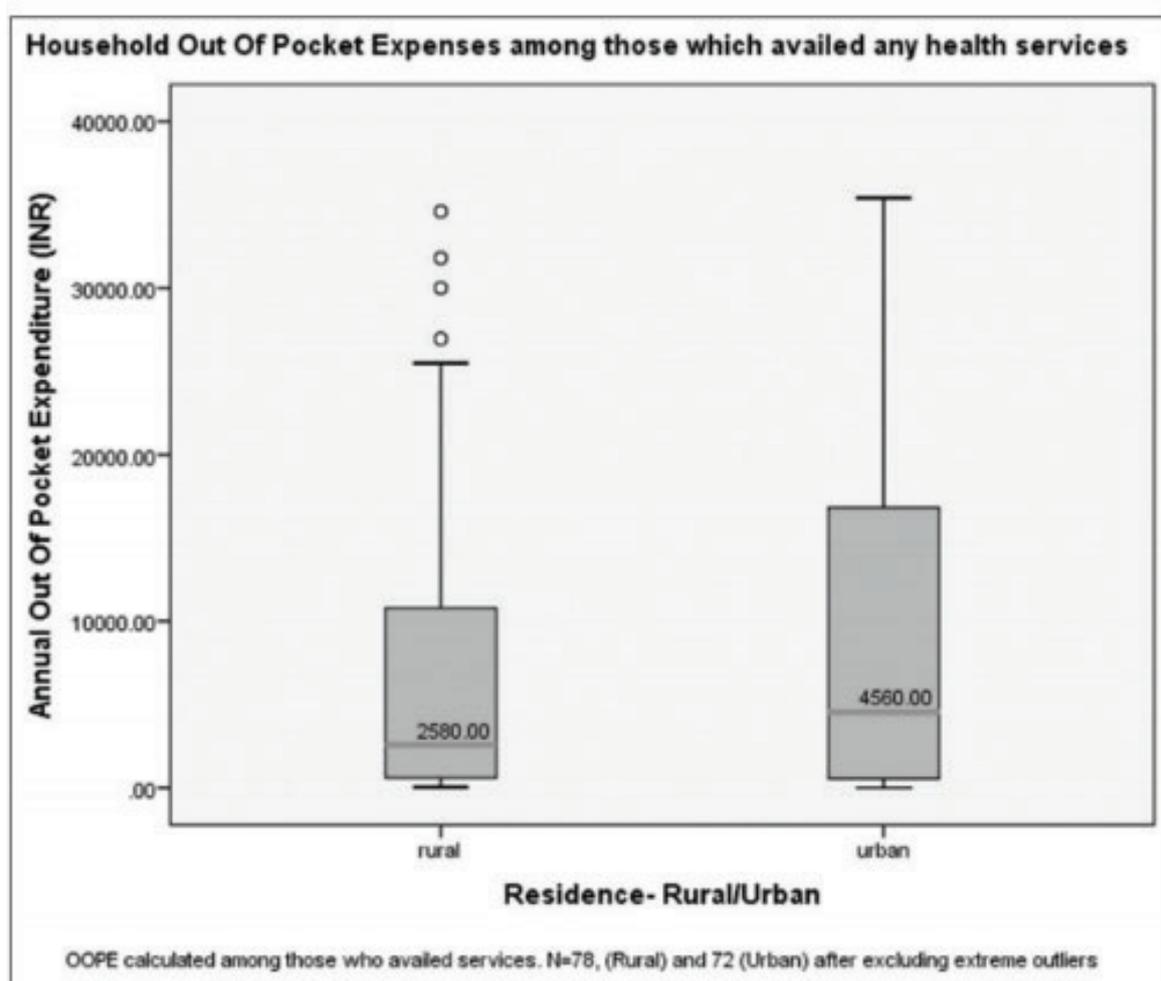
The National Urban Health Mission was launched in 2013 to address the health disparities in urban India. To increase access to and strengthen the delivery of primary care, the government is setting up a network of Health and Wellness Centres under the National Health Policy, 2017. These Health and Wellness Centres, while envisaged for urban areas as urban PHCs, are yet to be fully operationalized.

The urban population contributes to 65% of India's GDP, which will jump to 70-75% in 2020 (Barclays Bank PLC, 2015). The GDP per capita income for urban (Rs. 56,347 per annum) is almost double that of and rural (Rs. 30,342). In spite of this stark difference in economies, the health and nutritional status of urban areas is as poor as that of rural, in fact, the status of the urban poor is worse than rural poor. According to NFHS IV, 38% of urban poor children under five years are stunted. The urban poor, which is 26% of the total urban population, has even worse health and nutrition outcomes as a result of lack of adequate services. Almost 36% of urban children miss full immunization, which is as high as 58% amongst the urban poor.

<sup>3</sup> There are 53 million-plus cities, this data has been analysed for 43 such cities

**Table 5: Critical health indicators among the urban poor (NFHS IV)**

Indicators	Urban	Rural	Total
Children under 5 who are stunted	31.0	41.2	38.4
Children 12-23 months fully immunized	63.9	61.3	62.0
Children under 3 breastfed within the first hour of birth	42.8	41.1	41.6
Pregnant women 15-49 years anaemic	45.8	52.2	50.4
Children 5-59 months who are anaemic	56.0	59.5	58.6
Infant Mortality Rate	29	46	41



**Figure 7: Out-of-Pocket Expenditure on Health: Rural vs Urban**

Source: (Vasudevan et al., 2019)

Figure 7 exhibits the difference in household-level out-of-pocket expenditure on health in rural and urban India. The average expenditure in urban regions is higher than that in rural areas. Additionally, the health expenditure needs in urban areas vis-a-vis rural areas are not only diverse, but they are also disproportionately higher at times.



## 3.2. Participation of Urban Local Bodies in Promoting Health in Indian cities

### 3.2.1. Governance of health and health-related functions at the city level: The envisaged role for the Urban Local Bodies and status of implementation

The Urban Local Bodies (ULBs) in India have increased the attention given to the urban poor as a result of government initiatives, such as Jawaharlal Nehru National Urban Renewal Mission and Rajiv Awas Yojana National Urban Livelihood Mission. ULBs also perform key public health functions such as water and sanitation. Therefore, ULBs are key to enhanced community participation in the urban health care delivery system and for achieving inter-sectoral convergence around public health goals. A Technical Resource Group (TRG) established<sup>4</sup> to understand the urban health status, reviewed the capacities and participation of Urban Local Bodies (ULB) in the provision of urban health and submitted its report in February 2014 to the government of India (GoI) (Ministry of Health and Family Welfare, 2014). Underscoring the importance of ULB participation, the TRG made specific recommendations for strengthening coordination in 18 identified areas of public health importance.

**Table 6: Eighteen areas of participation for ULBs (Technical Resource Group Report 2014)**

<b>Under ULB Municipal Health Officer (MHO)</b>	<b>Under ULB MHO in some cities- but under separate departments in the others</b>	<b>Under other departments always but influences health</b>
Disease surveillance and Epidemic control	Treatment and disposal of sewage	Integrated Child Development Services
Vector control	Solid waste management, including carcass disposal	School Health
Dangerous and offensive trade, licensing (in particular, slaughterhouse management, health safety in cinemas, etc.)	Biomedical waste management	Implementation of welfare schemes for vulnerable populations – especially the homeless
Food safety	Drinking-water supply	Housing schemes
Birth and death registration	Sanitation and Prevention of public health nuisance	Road Safety
	Control of stray dogs / rabies control	Food security programs
	Air pollution control (often under pollution control board)	

<sup>4</sup> Once the NUHM was notified in July 2013, the Government of India issued an order stating the formation of a Technical Resource Group (TRG) on National Urban Health Mission under the Chairpersonship of Mr Harsh Mander. The members of the TRG included Officers of the Ministry, representatives of the state governments and urban local bodies working on urban health issues, and members of the civil society and academics who had been engaged in urban health for long.

The 74th Constitutional Amendment Act (74 CAA) enacted in 1993 was a critical piece of legislation meant to herald a fundamental shift in the philosophy of governance in India by articulating a vision of decentralized power and responsibility through the provision of constitutional status for urban local governments<sup>5</sup>. The ensuing Model Municipal Law, 2003 provides guidance to states towards implementation of the provisions under the 74th CAA. The MML acts as a resource from which states can tailor their own municipal acts. Since local governance is a state matter, the status of devolution of powers to ULBs differs from state to state<sup>6</sup>. A study carried out in 2003 assessed the adoption of these functions by the states. It found that all major states had assigned to their urban local bodies the following responsibilities (Chaubey, 2003):

- ⌘ Public health, sanitation, conservancy, and solid waste management
- ⌘ Burials and burial grounds, cremations and cremation grounds and electric crematoriums
- ⌘ Vital statistics including registration of births and deaths and
- ⌘ Regulation of slaughterhouses and tanneries

Almost all the States had assigned water supply for domestic, industrial and commercial purposes, and with a few exceptions, the states had assigned safeguarding the interests of the weaker sections of society. While some states such as Punjab and Bihar have included all functions listed in the 12th schedule, others such as Karnataka, Kerala, and Madhya Pradesh have amended their municipal laws to add additional functions. Although the 74th CAA clearly delineates a public health role for the ULBs, with the advent of the National Urban Health Mission (NUHM), the provision of primary and secondary health care is being led mostly by the state health departments (except in the mega cities and a few cities selected by the state governments).

### 3.2.2. Operational challenges to achieving health at the city level

The multiplicity of stakeholders poses the challenge of role clarity among different providers of urban development: One of the key challenges in providing urban health for the poor is that it is influenced by multiple agencies, e.g., ULBs, water and sanitation authorities, police, pollution board and urban and transport planners. Currently, in most states of India, the Urban Local Bodies (Municipal Corporation, Municipal Councils, Nagar Panchayats, and Notified Area Committees), Public Health Engineering Departments are responsible for delivering environmental health services. PHEDs or ULBs are often unable to service unauthorized and informal settlements for legal, financial, or managerial reasons. The Department of Municipal

<sup>5</sup> The 74 CAA envisioned that assuring regular and predictable funds flow to ULBs would be critical in enabling them to fulfil their mandate. It proposed the creation of State Finance Commissions (SFCs) every five years to decide on the grants-in-aid for ULBs. In addition, the 74 CAA and enabling state level legislations devolved a set of financing levers – taxes and fees – that could be utilized by the ULBs to generate revenues internally. The 74th Amendment contains the Twelfth Schedule of municipal functions which are 18 in number

<sup>6</sup> The MML classifies municipal functions into three categories, namely: “Core municipal functions”, including water supply, drainage and sewerage, solid waste management, economic and social development plans, transportation systems including construction and maintenance of roads, bridges, ferries and other inland water transport systems, community health, protection of environment, management of markets and slaughterhouses. “Additional functions” assigned by Government, as long as there is appropriate underwriting of the costs, include primary education, curative health, transport, supply of energy, arrangements for fire prevention and fire safety, and urban poverty alleviation. “Other functions”, which have been further sub-classified into six categories, include town planning, urban development and development of commercial infrastructure, protection of environment, health and sanitation, education and culture, public welfare, and community relations.



Administration and Urban Development (MAUD) is responsible for urban planning and development in the states where this has not been devolved in its entirety to the ULBs. The department coordinates with various departments involved in development schemes such as Housing Board, Urban Development Corporations, Industrial and Infrastructure Corporation, Industries Department, and implements environmental improvement schemes as well.

Limited participation of ULBs in providing health care: The NUHM framework clearly emphasizes the importance of ULB in attaining urban health, however operational challenges exist. The decision of several states to have NUHM led by the district health teams has surfaced the risk of undermining the role of ULBs. While the success of NUHM's key strategies will depend on the active involvement of ULBs during planning, monitoring, and implementation, the institutional responsibility for enhancing ULB roles and capacities and achieving convergence around public health functions needs to be further clarified and supported.

However, there has been an expansion of roles being performed by the Municipal Health teams under NUHM. The teams in some cities are participating in carrying out health assessments, developing city health plans, supporting the identification of infrastructure for health facilities as well as monitoring the implementation of the program. This varies from city to city and varies based on inherent capacities. An assessment<sup>7</sup> conducted by the Asian Development Bank, which aimed to understand the role of ULBs in promoting health, found that following the introduction of NUHM, three distinct and incremental models of ULB participation in health can be seen. From very minimal participation in Rajasthan (allocation of land for PHCs), to fulfilling the supportive role under NUHM, to comprehensive urban health provision in Bengal, the ULBs demonstrate varying capacities, resources as well as interest in managing the health of the urban poor. It further looked for an optimal model of participation and exemplified this with the convergent action plan of Pune Municipal Corporation.

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<sup>7</sup> *Ranjani Gopinath. Participation of Urban Local Bodies under NUHM: An Assessment, Submitted to ADB and MoHFW in May 2016*

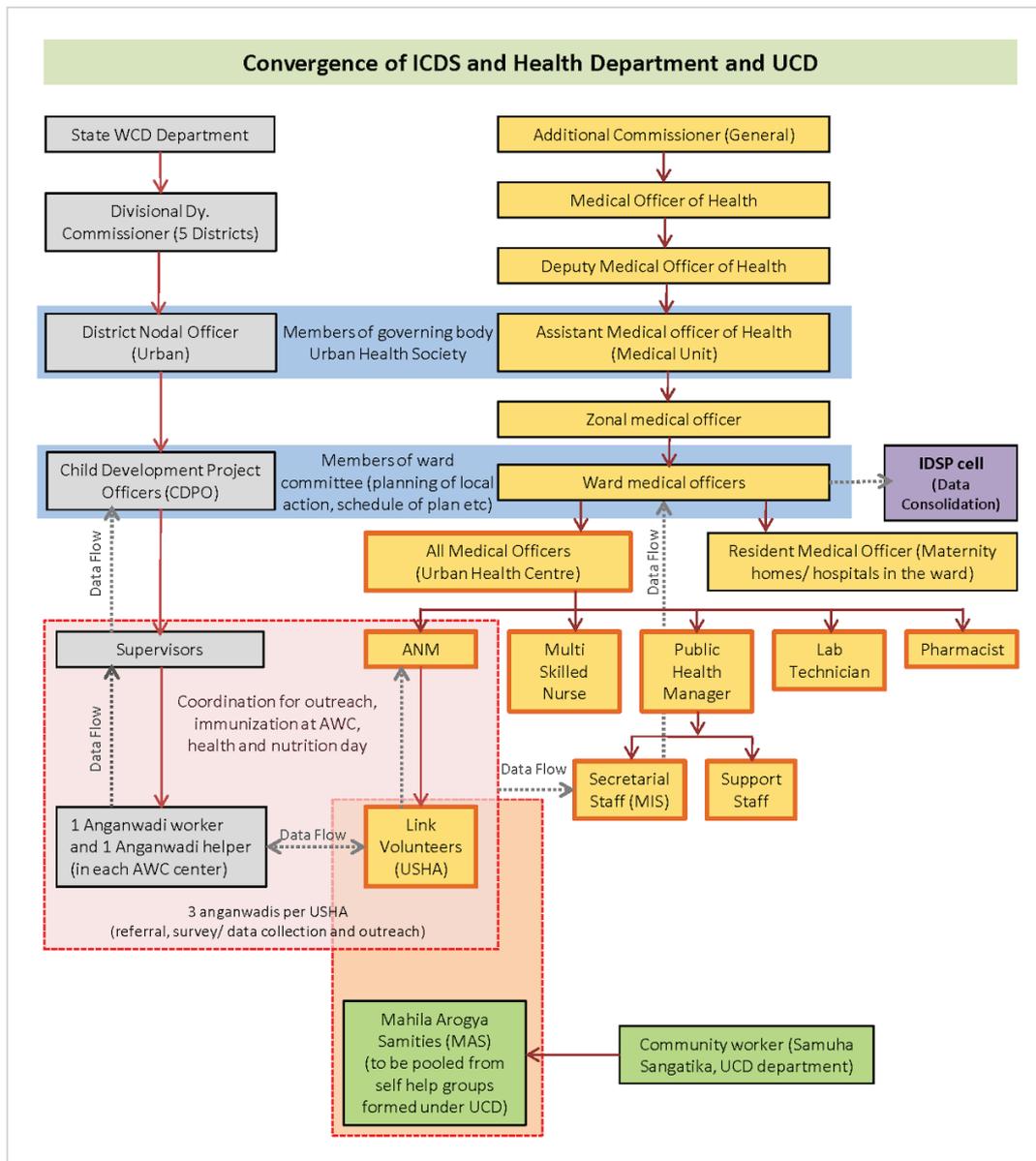
**Table 7: Convergent action plan Pune Municipal Corporation<sup>8</sup>**

Department/ Program	Strategies
<b>ICDS Program</b>	<ul style="list-style-type: none"> <li>⌘ Provide a contact list of ANMs and ASHAs working in slums to the respective Anganwadi staff and supervisors.</li> <li>⌘ Share data being recorded and collected by Anganwadi staff and supervisors with the health department.</li> <li>⌘ Develop a micro plan for routine immunization in slums at Anganwadi centers and other sites in close coordination with the Anganwadi workers, supervisors, and C DPOs.</li> <li>⌘ Conduct a GIS-based spatial analysis to assign primary health care center(s) to each Anganwadi center in the city and establish a strong referral system to U-PHC and other secondary/ tertiary facilities.</li> <li>⌘ Geographically rationalize ICDS projects according to the 15 administrative wards in Pune Municipal Corporation. Invite Anganwadi workers and supervisors to participate in ward-level coordination meetings.</li> </ul>
<b>Urban Community Development (UCD), PMC</b>	<ul style="list-style-type: none"> <li>⌘ There are close to 11000 women self-help groups established in slums with the support of the Urban Community Development (UCD) department. These groups are being federated into Mahila Arogya Samitis (MAS).</li> <li>⌘ The UCD department also has facilitated the construction of several community structures in slum areas which are currently used by the women self-help groups for various activities. This infrastructure is being leveraged for health purposes, such as for conducting immunization camps and outreach sessions. These structures are used as Anganwadis in some slums where space availability is a constraint.</li> <li>⌘ PMC facilitates upgradation of these community structures, such as the construction of additional stories for health purposes.</li> </ul>
<b>PMC Engineering Department</b>	<ul style="list-style-type: none"> <li>⌘ Dedicated civil engineers from the Engineering Department are assigned to the health department of the ULB to monitor regular maintenance of facilities as well as to facilitate upgradation and new construction of health facilities.</li> </ul>
<b>JNNURM cell</b>	<ul style="list-style-type: none"> <li>⌘ The most vulnerable slums with a high number of very poor households and a high rate of water and vector-borne diseases as identified under NUHM are prioritized for the provision of basic services under the JNNURM grant.</li> </ul>

The ULB has developed and implements institutional mechanisms of coordination and convergence at all levels of implementation and has strengthened this further under the NUHM.

<sup>8</sup> Ranjani Gopinath. *Participation of Urban Local Bodies under NUHM: An Assessment, Submitted to ADB and MoHFW in May 2016*





**Figure 8: Convergence mechanism for health in Pune**

Involvement of elected representatives to leverage additional funds for urban health has not been explored: NUHM framework articulates the need to access elected representatives for expanding the urban health envelope. All members of parliament, members of legislative assemblies, and municipal councillors receive an area development fund that can be mobilized for creation of health facilities in underserved urban areas and also for procurement of equipment, mobile medical units, and ambulances. The guidance may vary from state to state and will need to be explored and revised to enable such expenditure.

### 3.2.3. Expanding financing for Urban Health

Achieving true intersectoral coordination requires institutional mechanisms, which include structural mechanisms to pool funds for implementing interventions that address social determinants of health and health. These require policy decisions and structural reforms.

Including all the financial transactions made by different departments of the government in a single pool makes it difficult to analyze the way government funds are being used or expended. Under the JNNURM pooling mechanism for

strengthening resources for the urban poor was attempted through the BSUP (Basic Services for the Urban Poor) Fund. The mechanism provides for the pooling of funds available with ULBs allocated for the purpose of providing services to the urban poor, including the budgetary resources of urban local governments. Internal resource earmarking provides an important channel that is supplemented by other funds. An evaluation study of the Government of Andhra Pradesh directive that required 40% earmarking of funds for urban poor pointed to a lack of understanding of the utilization mechanisms and limited capacities to execute, resulted in ULBs not being able to allocate a higher proportion (Centre for Good Governance Hyderabad, 2010).

ULBs with resources continue to allocate non-NUHM funds for health. However, a structured plan needs to be developed to channel urban development funds for health. For example, funds for behaviour change communication under the Swachh Bharath campaign can be synergized with funds available for capacity building of community groups or outreach efforts under the NUHM to maximize impact. Alternatively, the funds can be utilized for building community capacities in 'point of use' care of water or elimination of open defecation initiatives through the involvement of MAS. Similarly, examples of successful pilots to eradicate open defecation implemented by the State Urban Development Authority (SUDA) are available in Kolkata. The ULB in Durg is leveraging funds under digital India to strengthen reporting of epidemics. As seen from the example of Pune, community-level organizers under the poverty alleviation program are being used to monitor and support the activities of the Mahila Aarogya Samiti (MAS).

### **3.2.4. Convergence of urban stakeholders for health**

India has several programs which cater to the urban poor, which presents an opportunity to develop evidence-based plans and pooling of funds. These include the urban ICDS program, Swarna Jayanti Shahari Rojgar Yojana (SJSRY), Urban Infrastructure and Governance (UIG), Urban Infrastructure Development Scheme in Small and Medium Towns, Integrated Housing and Slum Development Program (IHSDP), Prime Minister's Employment Generation Program (PMEGP), Skill Development Initiative, Sarva Siksha Abhiyan, Mid-Day Meal Scheme, Swachh Bharat Mission, Integrated Child Development Scheme (ICDS), Rashtriya Swasthya Bima Yojana (RSBY), Antyodaya Anna Yojana, National Old Age Pensions Program and Integrated Low Cost Sanitation Scheme to name a few.

Various inter-departmental convergence structures exist in different forms at the city and ward levels. Some are formalized, and some are informal and leadership dependent. Two specific structures of convergence—the city coordination committees and ward coordination committees were implemented by the USAID-funded 'Health for Urban Poor' program in seven states of India (Gopinath et al., 2015). Ward Kalyan Samitis (ward welfare committees) were established in Chhattisgarh as well under the Mukhya Mantri Shahari Swasth Karyakram. While the city coordination committees have become an integral part of the NUHM framework (the city urban health committees), the ward-level committees are not included in the framework.



### **Box 9: Case study of convergence with Poverty Alleviation Mission in Telangana**

The erstwhile state of Andhra Pradesh introduced the Urban Services for the Poor programme in 2000. Urban reforms were scaled up across the state through creation of a Mission for the Elimination of Poverty in Municipal Areas (MEPMA). MEPMA is a nodal agency for convergence of all services targeted towards the urban poor. The state of Telangana and Andhra both continue to have the MEPMA structure following bifurcation. The mission has the following strategy to converge with various programs:

- ⌘ Building organizations of the poor as CBOs
- ⌘ Empowering the poor by building their capacities
- ⌘ Creating highly trained social capital at grass root level in health, education, livelihoods, vulnerability etc.
- ⌘ Access to Credit for the poor by facilitating interface between CBOs and bankers (Town Level Bankers committee with SHGs)
- ⌘ Taking up placement linked livelihood programs on continuous basis; and
- ⌘ Services under 7-point Charter (Security of land tenure, improved housing, sanitation, water supply, health, education & social security system), etc.

The MEPMA in Telangana has organized 137,000 groups, roughly 1.3 million women into slum-based groups in the urban areas of the state. The MEPMA groups have been often leveraged by the health department to generate awareness, improve access and utilization of health services. These groups have been instrumental in sanitation and environmental causes as well across the state. The success of urban convergence in Telangana and Andhra Pradesh perhaps emanates from the fact that MEPMA, a specialized agency, implements the interventions.

The HUP evaluation found that while most platforms at the city level were functioning at a suboptimal level, the structures at the ward level were actively addressing barriers to health. The ward level structures, often composed of representatives of health, ULB, ICDS, schools, and elected officials in these states, are leveraging social groups and community level leadership for promoting health-seeking behaviour, infrastructure, and monitoring of developmental inputs (including WASH) at the ward level. In Pune, where the HUP implemented intensive interventions, the ward level coordination committees are reported to be addressing issues beyond health, such as stray dogs, traffic jams, and electricity connections. Similarly, in Bhilai, Madhya Pradesh, a park was created by the informal ward level group in an area that was being used for open defecation earlier. In addition, Madhya Pradesh has nutrition committees at decentralized levels in Madhya Pradesh. Similarly, there exist other ward level platforms for other developmental areas. These include neighbourhood committees under SJSRY and ward committees under JNNURM. These have the potential for being leveraged for health purposes as well. However, none of the ward-level groups are allocated any funds currently limiting the scope of their function.

Recognizing the need for inter-sectoral convergence, the NUHM established mechanisms to coordinate actions with the NULM and the SBM in 2016. The implementation at the state level is nascent and limited to some coordination between the MAS and the NULM SHGs. The state of Telangana has issued a government order which delineates coordination mechanisms at ward, city, and the

state level. One interesting aspect of this GO is the urban day (meeting) conducted by the District Magistrate with the participation of all urban development and health departments.

### 3.2.5. Lessons learned

- ⌘ There is a huge potential for expanding the participation of ULBs in ensuring the health of the city within the existing policy framework.
- ⌘ The process of convergence and coordination starts with a comprehensive plan developed by multiple stakeholders.
- ⌘ Precedence for pooling funds for effective convergence is available but requires adequate capacity building to execute.
- ⌘ The capacity building of ULBs under the NUHM, which is limited to the orientation of the programme needs to be expanded. Suggested areas are detailed in Annexure 2.
- ⌘ National guidance is available through the NUHM on the establishment of convergence mechanisms at state, city, and ward level and can be adopted by states to begin their journey of creating healthy cities.

## 3.3. Linkages Between Smart and Healthy Cities

While the healthy cities movement advocates holistic and systemic health policy and planning, addresses health and urban poverty inequality, the smart city initiative utilizes information and communication technologies for the design, implementation, and promotion of sustainable development processes. Both projects operate around the notion of **urbanization** to make cities better to live in. Smart cities and healthy cities share integral concepts and components of **city planning and sustainable development**.

The foundation of smart cities is built on the objective to help society to become more connected, networked, and data-driven, along with an aim to enhance physical and digital infrastructure, which is also an essential part of the healthy city concept.

As part of the Smart City initiative in India, launched in 2014, the primary objective is to provide core infrastructure leading to a decent quality of life. The key infrastructural elements are adequate water supply, sanitation, including solid waste management, affordable housing, sustainable environment, safety and security of citizens (particularly women, children, and the elderly), and health and education. The intersectionality that the Smart city project offers has a huge potential to contribute to the building of a healthy city.

In addition, the objectives and strategies of programs such as **Digital India** have immense potential for transforming how healthcare is delivered to our populations, especially in the urban areas, and reach the most vulnerable. Smart healthcare, the new terminology, is defined as the application of new technologies in ways that affect the delivery of health services. These include diagnosis, monitoring patients/populations as well as management of organizations involved in these activities, including key services and digital records.<sup>9</sup>

<sup>9</sup> <https://smartcities.gov.in/themes/habikon/files/SmartCityGuidelines.pdf>



**Table 8: Leveraging Smart Cities and Digital India Program**

<b>Program Strategy</b>	<b>Available Opportunity</b>
<b>Retrofitting, and redevelopment approaches under Smart Cities</b>	Visibility of UPHCs and their surroundings (solar-powered centers), introduction of e-governance, Quality assurance, grievance redressal, and client satisfaction applications at the level of the centre, introduction of smart applications for providing services and preventive care including for WASH and environmental hazards – in specific areas
<b>Green Field development approach under Smart Cities</b>	Establishment of e-UPHCs with telemedicine facilities and technology-driven specialized care to reduce the burden on tertiary level of care, applications for addressing social determinants of health
<b>Pan city approach under Smart Cities</b>	Visibility of UPHCs and their surroundings, introduction of e-governance, introduction of smart applications for providing services and preventive care, management of epidemics/response to emergencies, real-time GIS mapping – across the cities
<b>Digital India</b>	Introduction of applications such as Swasthya slate and mSakhi at the UPHC/ASHA level, cloud-based referral and follow-up system for patients, digitization to track migrant workers and link them to facilities, linkages to blood banks.

The institutional mechanisms under the smart cities program allow for inter-sectoral participation. The process of leveraging these programs can be facilitated by the participation of health leadership on the smart city committee at various levels. For example, under the Smart Health strategy of the smart cities programme, convergence between the department of IT to the Ministry of Health and Family Welfare and the Pradhan Mantri Jan Aushadhi Yojana has been proposed to make affordable doctor consultation and medicines to the urban population. (Ministry of Urban Development, n.d.)

Cities, such as Vizag, New Delhi, Coimbatore, and Kakinada from the first round of winners proposed and implemented e-health care. They have generated interest among various cities to explore digital approaches to health. However, all potential opportunities to leverage technology are yet to be scaled up (Al-Azzam and Alazzam 2019).

### Box 10: Healthy Cities and Smart Cities

Examples of hyperconnected smart cities include Masdar in United Arab Emirates, Songdo in South Korea, over a dozen of cities in China, and many more cities in Europe. In the UK, Bristol City Council is developing a smart city service to monitor the health and well-being of people living at home. Bristol also has a more extensive smart city agenda that goes beyond home tele-healthcare services.

Love Clean Streets is a UK app that enables Internet-connected citizens to use their mobile phones' built-in GPS and camera to document and directly report to their local authorities any environmental or neighbourhood issues or crimes, which is a good example of the active engagement and participation of members of the general public in the day-to-day running and maintenance of their own cities.

Barcelona, has deployed city-wide 'Internet of Things' systems to provide real-time valuable information on the flow of citizens, noise and other forms of environmental pollution, as well as traffic and weather conditions. Barcelona's wirelessly-connected garbage bins are fitted with sensors that monitor trash levels (future versions of the sensors are expected to also detect the presence of hazardous materials that might be dumped in the bin).

## 3.4. Proposed Framework for Healthy Cities in India

Cities have distinct opportunities and challenges to ensure the health of the population. Since most determinants of health are outside the health sector, the urban areas provide an opportunity to focus on them due to the density of their service area and the availability of resources. These include water, air quality, food, sanitation, education, housing, and the quality of urban planning. Any attempt at improving health (and not treating the sick alone) will need to address these determinants through a multi-stakeholder approach. Financial protection for the poor and near-poor is a key concern, given that a major part of total health expenditures is paid out-of-pocket, which can lead to their further impoverishment.<sup>10</sup>

Our vision for Healthy Cities in India is rooted in the 2017 National Health Policy (Ministry of Health and Family Welfare, 2017), which is about achieving “the highest possible level of health and well-being, at all ages...” and “universal access to good quality health care services without anyone having to face financial hardship as a consequence.”

The goal of this White Paper is to describe our thinking and approach to Healthy Cities in India based on an understanding of the Healthy Cities movement globally and locally, as well as our experience and expertise in working with vulnerable populations, primary health care delivery, and health system strengthening in India. Our aim is to support stakeholders in Indian Cities to find a new way to approach and implement programmes and policies to achieve the vision of “Health for All”.

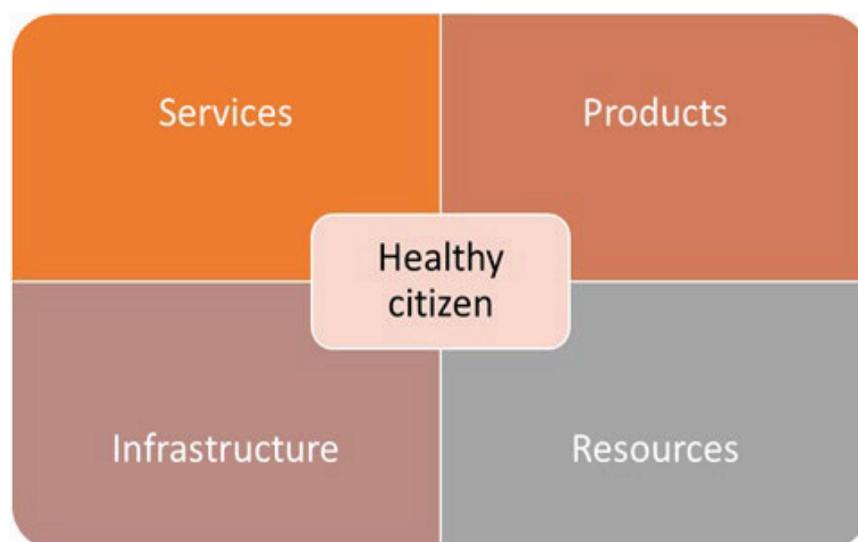
There are diverse determinants of health that uniquely impact the urban populations. The solution for a health city lies in a renewed approach, one which tackles the complex and complicated urban health scenario. The focus should be on extending and strengthening the comprehensive primary care delivery, one which addresses

<sup>10</sup> A study by the National Sample Survey Organization indicates that 5% of urban households fell below poverty line as a result of healthcare expenditure in 2004, mostly due to expenditures on outpatient care (3.8%)



preventive, promotive and curative services as well as determinants of health through intersectoral actions. Unified approaches need to be supported by and coordinated with other non-health sectors, such as housing and urban development, environment, road transport, education, water, and sanitation, among others.

We propose that to achieve desired health outcomes for all within a city, a range of services, products, infrastructure and resources must come together. Irrespective of the sector or department, without these four components coming together, we cannot hope to have healthy citizens and eventually healthy cities.



**Figure 9: Strategic Framework for Cities to approach health**

When a small group of residents of Indore was asked what their city would “look like” once it had achieved the “Healthy City” status (like the Cleanest City status it currently enjoys), the responses were more about the city environments and living conditions, less about the health services that were available. These are listed in the Annexure 3.

We propose the following guiding principles for designing Healthy Cities.

**Citizen focused:** Evident from the framework is the need to be focused on the citizen throughout the various institutional, structural, policy and programmatic requirements of design. The urban population, unlike the rural population, is highly heterogeneous. The informal or often illegal status of low-income urban clusters results in public authorities lacking the mandate to collect data on the urban poor. Strategies to identify and reach the most marginalized poor are inadequate, resulting in limited evidence- or community needs-based health planning. Remaining focused on how people live and can access services, products, infrastructure and other resources, and what is convenient to them, rather than the provider’s convenience is critical, especially in the Indian context.

**Results oriented:** Defining the results we wish to achieve, in the short and long term will be essential for all stakeholders to focus and contribute, while overcoming the boundaries of departments and sectors. Discussion we conducted in Indore allowed us to come up with 5 aspects into which nearly all aspects of urban living can be brought together. These are: Healthy Food, Healthy Water, Healthy Sanitation, Healthy Environment, and Healthy Individuals & Family. Please refer to our summary of desk research on these five areas for more details.

By defining desired outcomes and measurable indicators within each aspect (e.g.,

Healthy water available to all citizens as measured by 80 % of citizens get 10 liters of water a day. Water quality is above average in 90% sample locations, Waterborne diseases show declining trends -even between seasons), we believe that actions can be focused.

**Comprehensive:** Review of the Indian context reveals common challenges across Indian cities including limited coverage of quality health services, inadequate health financing, shortage and inequitable distribution of health workforce, weak health management, particularly at the city level. The need of the hour is to strengthen comprehensive preventive, promotive packages, essential curative packages based on epidemiology and community requirements, seamless referral to higher facilities, and financial protection for health emergencies. However, we must cross all the 5 aspects - Food, Water and Sanitation, Environment and Individual and Family services if we are to achieve our vision. Within each of these aspects, an understanding of what services, products, infrastructure, and resources, at a minimum, at the city, community and individual/family level needs to be developed.

**Integrated:** It is evident that for this vision to succeed, multiple departments and government entities, as well as several private and not-for-profit entities would need to play different roles. Sector strategies to achieve 'Healthy City' status would need to be integrated into one shared plan, implemented by different sectors but unified by a city-wide integration unit for project management, In this context, the ward coordination committees could become formalized to integrate across the 5 aspects but also to provide a platform for citizen engagement. This can also be achieved if all existing resources (people, infrastructure etc) which are working well can be utilised and strengthened with a focus on the results that get defined.

**Evidence based:** Most published data are not disaggregated within urban areas, obscuring marked health disparities among the urban population. Most cities lack epidemiological data and adequate information on the urban poor and illegal settlement clusters. While other departments may have data, information has to be brought together at a city level in order to create a baseline for a city. Only then can current gaps be identified and addressed even as the tracking of new programmes begin so that we know if progress is being made.

**Win-Win-Win partnerships:** With less than nine years left to achieve the 2030 SDGs, it becomes essential for partnerships to leverage existing assets and build on complementarities. Not only will public departments have to work together, the private sector will need to become suitably engaged as will civil society organisations and the media.

While each individual urban body implements strong programmes for urban development, collective actions can create exponential results. In the words of leadership coach Shiv Khera – **winners don't do different things; they do things differently.**

The important prerequisite levers that are necessary to establish a healthy city are political commitment, intersectoral collaboration, and community involvement. These will have to be brought together in different ways, in a meaningful manner so that the desired vision can be achieved. The diagram below brings together the strategic framework, the four aspects of Healthy Cities (reduced to four and renamed) as well the operational imperatives in one image to show the linkage and interplay. We subsequently delve into each of the operational imperatives.



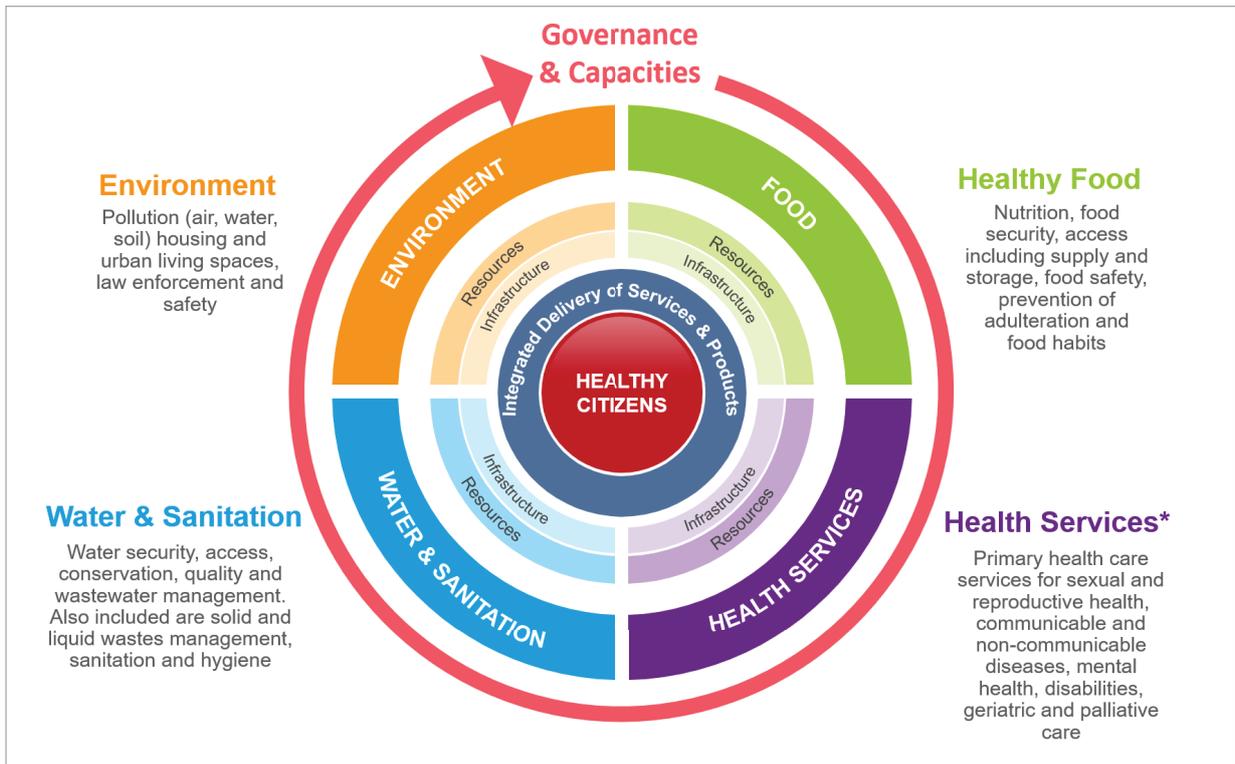


Figure 10: Operational Framework for Healthy City

**1. Leadership and Governance:**

Limited urban health governance to enable multisectoral responses and addressing needs of all segments (Ministry of Health and Family Welfare, 2014) has been identified as one of the challenges to urban health in India and this is the first aspect to be addressed.

Governance for health implies that “health” is featured in all governance activities, going beyond the health sector and creating better conditions for health.



Figure 11: Framework for Governance for Healthy City

We specifically developed a framework for governance in the context of Healthy Cities in India and the 4Ps are:

**People:** These are the people within the various public departments and agencies like the Municipal Corporation, including elected representatives, who are responsible for decision making, coordination and implementation. Since the Governance mechanism selected (City Coordination Committees as formalized in the NUHM) or a new one developed, will require multiple stakeholders across various sectors, it should be structured so that there is clarity in roles, responsibilities, outcomes, and there is accountability. Alignment across sectors along with shared values like health equity is a key factor.

**Policy:** A strategic policy framework must exist for overseeing and guiding the systems in a city towards ensuring health and well being. The policies should be adaptive as well as coherent as they are multi-sectoral and multi-leveled. This will require political will as it will impact all the health as well as non-health sectors including businesses. The agreements with different stakeholders need to be codified in policy which will have long-term effect.

**Participation:** Participation and consensus building among the different stakeholders including the citizens, is important, especially when we aim to affect the whole city and all its residents. Community engagement is often seen only in the context of service delivery but it is important to bring people's participation into the governance process as well. Inclusion of the private sector in its various forms will also need to be structured.

**Practice:** Since the implementation is the key to making the city healthy, strategic planning, and effective execution along with regular reviews and impact assessment are needed. Modeling of innovations can be done before scale-up. Open communication channels and regular dialogue is required among the stakeholders including the civil society also to see what works and what can be improved. This must be demonstrated at the governance level if it is behaviour that is expected at subsequent levels of implementation.

## 2. Resources:

The financial and people resources required to achieve the Healthy City goal will vary from city to city, and over time as they determine the phasing of the activities based on local priorities.

Once a plan is developed at the city level, resourcing gaps can be identified and mobilized through public and private means. From an exercise in Mumbai for the Fast Track City Plan, we found that the additional resources required by the Mumbai District AIDS Control Society could come from the Municipal Corporation of Greater Mumbai's existing budgets (UNAIDS 2019).

While Mumbai may not seem like good comparison, it is our belief that by leveraging available budgets, creating mechanisms for pooling funds with a focus on results and increasing capacities of urban local bodies to utilise available funds, there will be limited need for raising additional resources.

## 3. Infrastructure:

Each city has several facilities available, in the public and private sectors and often the effort required is in rationalising them to ensure accessibility and convenience to the different segments of the urban population. Where gaps exist, new infrastructure



can be created jointly to address multiple health related outcomes. While Smart City initiatives in various cities have focused on infrastructure, sometimes internet connectivity within facilities as well as computer hardware for required staff is overlooked. Technology will be an enabler in the effort to create evidence based city-wide programmes that deliver results.

#### **4. Services and Products:**

The Healthy City plan will need to identify the minimum services and products within each of the four aspects (See Figure 10) as well as phasing of the interventions over time, since there may be multiple needs within each aspect. For example, through review of literature for Indore, in the context of nutrition access and storage, effective communication strategies are required for enhancing the quality of communication and awareness during the pre and antenatal phases, with specific focus on male members in the family. This was important since only 10% of 10.3% of the city's children between 6-23 months of age receive adequate nutrition and about 1/3rd of its children are undernourished.

To determine each of the services and products that will become part of a Healthy City plan, and which ones will be taken up first (versus in subsequent years), technical experts will need to be consulted in the initial development of the plan but then periodically as well when progress (or lack of it) is evident through the monitoring of the interventions.

#### **5. Capacities:**

The limitations of capacities have been identified in section 3.2.2 of this document and the types of capacities required in Urban Local Bodies are summarized in Annexure 2. In the context of creating a Healthy City, it is important to highlight the capacities that will be required:

- a. High quality intervention delivery: Integrated service and product delivery will require that we do things different. Indore has shown that this is possible and the COVID-19 pandemic has made innovation or adaptation a requirement. Quality of the services and delivering them with a focus on citizens is no small feat though.
- b. Community leadership and institutional delivery: Enabling and empowering community participation and leadership, through mechanisms such as ward level committees and using available community institutions (such as Mahila Arogya Samities) will be essential. Investment in their capacities as well as in the larger ecosystem (public and private agencies that will interface with them) will be necessary if collaborative and collective results are to be achieved.
- c. Resource utilisation and mobilisation capacities: Building perspective and understanding of currently available resources and instruments so that they can be better deployed towards results. Subsequently, any gaps in resources will need to be separately mobilized and requires skillful planning and strategic communication.
- d. Communication capacities of key personnel across the City who are involved in the execution of the Healthy City plan will need to be strengthened, from two angles
  - i) Internal communication: With a firm anchoring in the principles described earlier, the internal communication within and across various agencies and mechanisms needs to be consistent and specific, informing decisions,

planning and actions at all levels.

- ii) External communication: The Healthy City plan will need to bring together people from all walks of life in the city to reach its vision. Thus, external communication will have to be ambient in nature, owned and experienced by every individual in the city. This requires messaging, strategies, vehicles and products apt for mass, mid and micro media.
- e. Procurement: Every city requires procurement systems that are swift and allows for localised decision making and these will be called for in the case of a multi-sectoral, multi-partner approach that is proposed. This means that the understanding and internalisation of the procurement process and systems as well as necessary adaptation need to be built within different people across the levels, agencies and mechanisms
- f. Programme management: Programme management in the context of the Healthy City will need to not only coordinate and manage the across the various stakeholders and mechanisms, but also bring in the relevant technical inputs at the appropriate times and support the Governance Mechanism with making evidence-based decisions.
- g. Use of data for evidence-based decision making: Having the right data at the right time and its use in making decisions requires not just the setting up of systems that enable it but also capacities at various levels.

### **3.5. Operationalizing the Framework for cities in India/Indore**

It is evident from the earlier section that the Healthy City endeavour is not for the faint hearted. From the experience of the Healthy City movements in other parts of the globe, phasing out of various efforts enables one to embark on the journey towards achieving the Healthy City vision.

Inspired by the perspectives of Ron Draper's on how long it takes to achieve health in cities (Draper R et al., WHO 1993), we propose the following phases for India, given our faith that we won't have to reinvent the wheel and can adapt the various lessons from the WHO Healthy City movements and networks across the globe.





*Figure 12: Phasing for Healthy Cities in India*

### 3.5.1. Next steps in Indore

This White paper germinated from the interest in Madhya Pradesh and Indore in particular to embark on a journey towards achieving the status of a Healthy City – one which is thriving and constantly working towards generating and maintaining the health of the population - and hence we wish to conclude by providing some direction to the next steps that will shape Phase I (as described in Fig 12) of the work in Indore.

#### **A. Establish the Governance and Management Mechanisms:**

- ⌘ A Government Order to be issued by the Department of Health and Family Welfare, Govt. of Madhya Pradesh on the Indore Healthy City initiative and empowering the District Commissioner to head the Healthy City Task Force
- ⌘ A high-level committee headed by the Chief Secretary which brings together the Principal Secretaries across the various Departments to create the highest level of consensus and alignment.
- ⌘ Convene the Indore City Task Force in the leadership of the District Commissioner to agree on the scope of work, participation and next steps. An initial list of participants can be drawn from the list in Annexure 4
- ⌘ Establish a programme management committee at the City level which will help coordinate and support the Task Force.

**B. Establish a baseline:** A detailed baseline both quantitative and qualitative will be needed a Healthy City Plan can be developed. The baseline will need to:

- ⌘ Discern the key characteristics and functioning of the urban services delivery network across sectors impacting health and their guiding policies (international, national, and state-level).
- ⌘ Understand the current urban environment of Indore, including demography, health, and nutrition data, disease patterns, health-seeking behaviour of the urban population, and social determinants of health.
- ⌘ Analyze the existing urban primary health care network under the six health systems building blocks (service delivery, health workforce, information, medical products, vaccines and technologies, financing, and leadership/governance), health services available in other public sector (railways and defence for example) and the private sector, exploring the linkages and potential synergies between them. The analyses would be comprehensive, focusing on factors that affect the acceptability, accessibility, affordability, and accountability of the primary health care delivery system.
- ⌘ Understand the profile of the stakeholders, their position as relating to policy formulation, and the capacity of the system to implement the policies
  - at health system level including both public and private sectors
  - at the community level, including individuals and not-for-profit entities/self-help groups
  - across sectors (water, food, sanitation, environment, safety), including public and private sectors
- ⌘ Review the current intervention strategies under NUHM regarding service provision, especially to the marginalized and vulnerable groups, assessing their performance and identifying gaps.
- ⌘ Examining other contributory factors and Indian city design leading to better health of its residents, linking it with the National Urban Missions on AMRUT and Smart Cities.
- ⌘ Exploring pathways for intra and intersectoral coordination among various government departments and non-government entities, and identifying potential partnerships.
- ⌘ Identify specific infrastructure and service needs across wards or specific populations

**C. Define the results, indicators, services and products for implementation:**

Based on the baselines, the Taskforce will need to consult with various experts across the 4 aspects of the operational framework (Fig. 10) to determine the results, indicators and the services and products to be taken up immediately or in later years. A series of consultations will likely be required since these consultations will involve experts in Indore and Madhya Pradesh, but also from different parts of India. With inputs from experts, the Task Force and the Programme Management team will identify the programme as well as the monitoring and evaluation design. This will include phasing in interventions based on priorities or strengths, which can yield low-hanging fruits. The decision will also include the geographic or the health setting – for example, will the actions be city-wide, to begin with or focussed on specific populations.



Expected outcomes along with monitoring parameters will become essential parts of the city plan and the road map to achieving the healthy city status.

- D. Finalize a Healthy City Plan:** A pan-city, multi-agency, and well-defined plan that is available for at least 90% of residents of the city will need to be developed and made public. It follows the continuum of care from prevention to treatment and care and includes mechanisms for coordinating care across the city - through partnerships with different organizations -- public and private. It is holistic and addresses determinants of health. It is not limited to a few neighbourhoods or communities, or implemented by only some stakeholders. It is not a catalogue of activities by separate departments but a synchronization and amplification of collective actions.

The city plan will finally need to be costed, and mechanisms for financing the plan identified along with avenues for resource mobilization. Fundraising by identifying potential funders from the pool of stakeholders and establishing regular engagement and accountability through workshops to enable and secure commitments is imperative as well. The road map for the healthy city has to be widely disseminated to create ownership among the key stakeholders and the citizens of Indore.

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# ANNEXURE

## Annexure 1: Indore City – Status of Health

Indore is the most populous city in the State of Madhya Pradesh, as well as the commercial capital of central India. It has been declared India's cleanest city in an annual ranking exercise four times in a row and is one of India's '20 Smart Cities'. Indore, Census 2011 shows that Indore has a total population of 1,994,397, of which 27% reside in slums and its outgrowths.

**3.4.1 Health Sector and Services in Indore:** There are three tertiary care hospitals and five secondary care facilities in Indore. Specialty secondary care is also offered at private sector facilities. Primary care is available at 14 urban primary health centres (UPHCs) staffed by a mix of clinical providers, as well as through 760 Anganwadi centres (which provide services for mothers and children) staffed by Anganwadi workers, auxiliary nurse midwives (ANMs), and accredited social health activists (ASHAs). All services in public facilities are mandated to be provided free of charge.

The assessment conducted by USAID's building healthy cities found that

- ⌘ Many lower-income residents were not aware of the availability of UPHC services
- ⌘ There is a severe shortage of ASHAs and qualified health care providers, especially at public primary care facilities
- ⌘ There are frequent stockouts of medicine, even for essential medicines and vaccines
- ⌘ There is a shortage of qualified allopathic doctors, and some facilities are hiring homeopathic or ayurvedic doctors to fill those vacancies.

The Rural Health Statistics 2018-19 provides data on health infrastructure, and health manpower observed that the following percentage of the shortfall at UPHC level has been observed.

- ⌘ 16.7% of Doctors,
- ⌘ 24.3% of Pharmacists,
- ⌘ 50.9% of Lab Technicians,
- ⌘ 22.2% of Staff nurses

In addition to the existing infrastructure, the state has proposed to introduce Sanjeevani clinics for every 20,000 population to address the needs of the urban population more effectively, reducing the catchment population, providing an expanded range of services, promoting health wellness, and digitizing the services provided for future exigencies. The catchment area of the Sanjeevani clinic shall be coterminous with the area of the ward, and the ward boundaries shall demarcate the areas of Sanjeevani clinics. The numbers of new clinics have been proposed in cognizance with the existing number of facilities, including those of the state government. Thus, Indore will have a network of about 88 such clinics in the near future. The clinics expect to provide comprehensive primary health care with 12 services as per the HWC guidelines and include a component of community engagement through community outreach workers. Linkages with higher facilities will be facilitated by the Referral app which has seamless linkages to the Ayushman Bharat programme to facilitate treatment at higher facilities.

There is a proliferation of private facilities and providers, with high demand across



income levels. According to staff in the office of the Chief Medical and Health Officer, 209 private hospitals and 59 clinics (called nursing homes) also serve Indore. A literature review found that over half of all urban MP residents used the private sector as their usual source of health care (NFHS-4, 2005-06). ASHAs and Anganwadi centres are hubs for promoting healthy behaviours and basic health care and often provide food rations and nutrition services for vulnerable populations, particularly children under 5 years.

**3.3.2 Health Protection:** Nearly one-quarter (23%) of households in urban MP are covered by insurance schemes, with about half of those households covered by the state health insurance scheme (NFHS-4, 2005-06). Only about 5% of urban MP residents have private insurance, though another 7% received insurance through their employers. Over 20 private insurance agencies and 4 public schemes are available in Indore. A recent evaluation of Rashtriya Swasthya Bima Yojana (RSBY) insurance scheme found low utilization nationally by poor households, and the scheme appeared to provide no significant financial protection (Karan et al., 2017).

**3.3.3 Health Indicators for Indore:** It is evident from the data in Table 6 that Indore has done well in many parameters, specifically in improved drinking water source, sanitation, and institutional births (International Institute for Population Sciences, 2017). However, there remain many areas of concern in the various aspects of the health of the population and health services provision.

**Table 9: NFHS 4 Data for Indore**

Category	Indicator	% Urban Households	% Total Households
Household Profile	Households with an improved drinking-water source (%)	99	98.4
Household Profile	Households using improved sanitation facility (%)	78	74.2
Household Profile	Households using clean fuel for cooking (%)	94.4	84.9
Social Welfare	Households with any usual member covered by a health scheme or health insurance (%)	17.7	15.7
Family Planning	Female Sterilization	36.6	37.3
Family Planning	Male Sterilization	0.6	0.5
Maternal and Child Health	Mothers who had full antenatal care (%)	30	27.5
Maternal and Child Health	Average out of pocket expenditure per delivery in a public health facility (Rs.)	1913	1812
Delivery Care	Institutional births (%)	96.1	94.7
Child Immunization	Children age 12-23 months fully immunized (%)	60.5	57.8

Category	Indicator	% Urban Households	% Total Households
Nutritional Status	Children under 5 years who are wasted (weight-for-height) (%)	16.3	17.8
Nutritional Status	Children age 6-59 months who are anaemic (%)	71.4	71.2
Nutritional Status	Women who are overweight or obese (BMI $\geq$ 25.0 kg/m <sup>2</sup> ) (%)	24.3	23.6
Nutritional Status	Men who are overweight or obese (BMI $\geq$ 25.0 kg/m <sup>2</sup> ) (%)	21.4	22.3

A deeper analysis of some of the available data about Indore will be needed, for example, despite a high literacy rate (85.87%), only 17.7% of urban households covered under insurance, or the reasons for anaemia among three fourths (71.4%) of children aged 6-59 months in urban households.

Conscious of considering health in their planning, in March 2018, the Indore Smart City Development Limited, the agency which leads the smart city project, partnered with John Snow Inc (JSI) under the USAID-funded Building Healthy Cities (BHC) project. With support from BHC, the city released the results of its comprehensive NCD risk factor and environment survey on 31 May 2019. The city is now planning to leverage these data – gathered in order to support data-driven decision-making – to establish and refine city policies on NCD prevention. These policies include the effective enforcement of the Cigarettes and Other Tobacco Products Act (COTPA), promoting healthy diets and physical activity, and organizing a periodic screening for common NCDs such as diabetes and hypertension in public health-care facilities (John Snow, Inc., 2018).

Results indicate that inequalities by wealth and gender appear to shape health outcomes for many communities in Indore. Highlights from the Indore NCD Risk Factor and Environment Survey Fact Sheet include:

- ⌘ One in three men used any tobacco products, this figure is six times lower among women.
- ⌘ One in 10 men drank in the last 30 days, this figure is less than 1 percent in women.
- ⌘ Nearly 90 percent of both men and women fell short of their daily five servings of fruits and vegetables.
- ⌘ Approximately one-fifth of men and women always or often added salt or salt products to their meals.
- ⌘ The vast majority of Indore residents failed to meet their daily vigorous activity requirements.
- ⌘ The poorest 20 percent of Indore residents were more likely to use tobacco products and add salt to their meals than those in the richest 20 percent.

**3.3.4 Health Promotion in Indore Schools:** Adolescence has also been identified as a critical time frame for changing health behaviours and instilling healthy habits. In addition, schools and teachers play a critical role in their community and can be leaders in establishing healthy behaviours beyond school walls. The BHC baseline on Indore schools finds that most schools provide a secure social environment and healthy physical environments, including safe drinking water and separate toilets



for boys and girls. But there were deficiencies in food safety practices, deworming services, oral health services, and maintaining health records. Restriction of the sale of tobacco products, alcohol, and illicit drugs near school premises was lacking, less than 30% of schools had a policy/strategy to phase out these products from within the campus and neighborhood. A majority of schools did not have a sports teacher, and approximately one-third did not have spaces for physical education. More than 80% of the schools did not train teachers or students in first aid or infectious disease prevention.

**3.4.5 Social Determinants of Health in Indore:** The city has been adjudged the cleanest city in India four years in a row. The Indore Municipal Corporation has the practice of 3 R's – Reduce, Recycle, and Reuse and plan out activities around this particular theme. More than 50,000 households in the city are managing their own wet waste through the process of composting. Waste management at source is being done through six-bin segregation of waste which includes separate bins for dry waste, wet waste, plastic waste, e-waste, domestic sanitary waste, and domestic hazardous waste. Indore is generating around 5-6 tonnes per day of COVID-19 waste which is being segregated at the source. An App helps the ULB keep track of such households in quarantine to collect their waste in isolation from others. The ULB manages construction waste by converting them to bricks. Indore is also successfully converting waste from two of its biggest vegetable mandis (markets) into bio CNG, which is being further used in public buses in 15 of its Urban Local Bodies (ULBs). Apart from this, plastic waste from the city is being successfully sent to the plastic waste treatment facility, where it is being converted into diesel. Currently, the treatment plant is able to process 8 tonnes of plastic every day and generates 3,500 litres of diesel on a daily basis.

As a result of these initiatives, the city was able to decrease the waste generation from 410 per gram per capita to 402 per gram per capita. Moreover, the city was converted to an 'a no landfill city' by removing 1.5 million tonnes of legacy waste in mere six months' time, reclaiming 100 acres of land.

It is not only waste management that Indore is excelling in the city is also one of India's first city to attain the title of Open Defecation Free Plus Plus (ODF ++), which means total sanitation in terms of solid waste management, improved sewerage lines, stormwater drains, and pucca cement roads, in addition, to open defecation free tag.

The IMC has established several wet waste processing plants, both centralized and decentralized facilities, to process its wet waste, and undertaken an initiative to convert waste into energy with an aim to deal with wet waste and at the time reduce the city's dependence on fossil fuel which causes more air pollution. The Waste-to-Energy plant installed by IMC converts wet waste into 95 percent pure biogas called Methane which is further converted into CNG (Compressed Natural Gas). Along with this, the city is also managing its organic waste through a waste-to-compost plant which was installed in 2009 and has a capacity of processing about 600 tonnes of wet waste per day.

IMC also uses Mobile Composting Units for making compost through waste. These mobile vans can process up to 250 kgs of waste per hour and are being used to cater to wet waste generated from residential apartments or such events that are expected to generate a large amount of wet waste.

Indore has laid an underground closed sewer line in the entire city and has 100 percent treatment capacity for the sewage generated in the city. Currently, the city

generates around 300 Million Litres per day of wastewater. There are no more open drains in the city, and the treated wastewater is being used for various purposes like cleaning of roads, gardening, and agriculture purposes. The city has made efforts to clean its water bodies as well. According to IMC, there are 147 water bodies in the cities, including nine river stretches, nine ponds, and 129 wells, and all of these have been cleaned and made free from floating and suspended waste. The municipal corporation has also been running awareness campaigns around water bodies to educate people to keep those clean.

### Air quality in Indore:

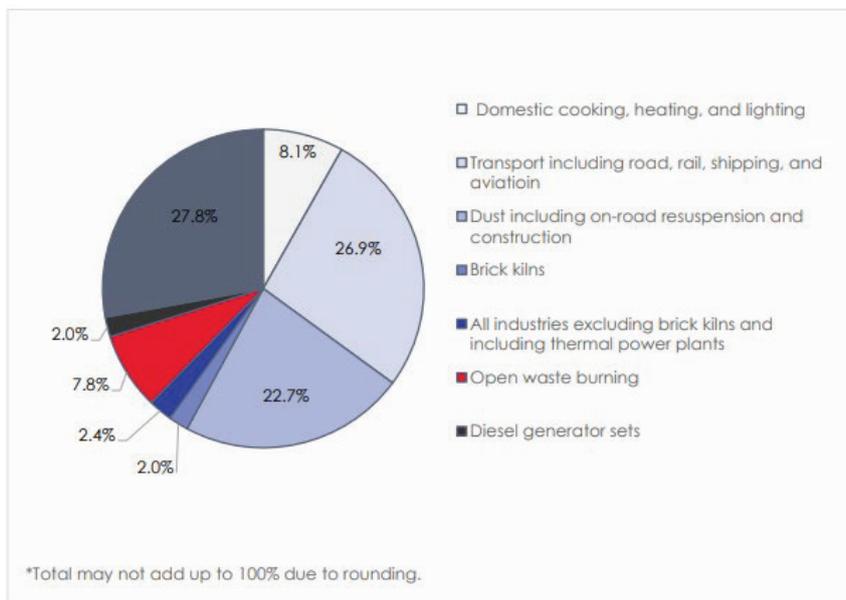


Figure 13: Average annual source contribution to PM2.5 concentrations in Indore

The overall air quality index in Indore is 50, which is fairly good. The level of PM2.5 is 12 µg/m<sup>3</sup>, and that of PM10 is 46 µg/m<sup>3</sup> (IQAir, 2021). The three largest sources of PM2.5 in Indore are outside sources, transport, and dust (Guttikunda et al., 2019). ‘Outside sources’ refers to regional conditions that affect concentrations of PM2.5 in the urban airshed, and are often out of municipal regulatory control. The next two largest sources of PM2.5 are transport and dust, at 26.9 and 22.7 percent, respectively. As such, monitoring the air quality at transport hubs (major bus and train stations, Indore Airport, and along busy thoroughfares) and construction sites is critical for city officials seeking to reduce air pollution.

Understanding the distribution of PM2.5 sources in Indore will allow regulators to place AQSs in areas of greater need.

Sr. No.	Key Performance Indicators (KPI)	Service Level Benchmark as per MoUD	Existing Service Level Benchmark*	Targeted Year for Achievement
1	Coverage of Water Supply	100%	46.65%	2021
2	Per Capital Supply of Water	150 LPCD <sup>##</sup>	97.67 LPCD	2021
3	Continuity of Supply	24 hrs	45 min -1 hrs / alternate day	2022
4	Extent of Metering of Water Connections	100%	0.02%	2020
5	Extent of Non-revenue water	20%	66.82%	2022
6	Efficiency in Redressal of Complaints	90%	No such data	2021
7	Quality of Water	100%	98.06%	2020
8	Efficiency in collection of water related charges	80%	45.76%	2022

\*Source: - Service Level Improvement Plan Report of IMC



**Availability of Water:** The water utility is managed by Indore Municipal Corporation (IMC). In addition to being responsible for all its maintenance, construction, and operation, it is responsible for sewerage collection, treatment and disposal, road service and construction, town planning and all the main utility services to the population. The city gets its drinking water supply from various sources. The water supply is around 323 MLD and the rate of water supply is 97.67 LPCD. Indore water supply network serves a population of 1.96 million. The water services cover 46.65 % of the population. 53.35% of the population lives in uncovered areas. Under the Smart City Project, an effort is being made to provide universal access to water and sanitation through an uncovered area and newly added Area.

### 3.3.6 Key developmental partners and programs in Indore

Although there are a large number of civil society organizations registered in Indore, only a few of them have a strong presence in Indore, especially in most of the thematic areas affecting health. There are about 10 major civil society organizations based in Indore that are working on the five thematic areas identified for the Indore Healthy City Initiative and can be leveraged. In terms of subject experts that the NGOs engage with, most of them are doctors with specializations in Family Planning, TB, etc. since the majority of the organizations are working for aspects identified under the “Individual and Family” pillar. Many of the agencies have worked or are working as implementation partners with different programs of NHM. Some support the Indore Municipal Corporation in the Swachhata Abhiyaan and the Smart City program. The areas of work in which not much presence of civil society organizations in Indore is noticed are Food and Nutrition Security, WASH, and Environment initiatives. Even the large NGOs have a limited number of projects and have also diversified to livelihoods as the Government is actively seeking private partnerships in that sector.

#### Health

- ⌘ Individual and Family Services through PSI’s Samagra Project (started in July 2020)
- ⌘ IPAS supported Family Planning services includes comprehensive contraceptive and abortion care
- ⌘ USAID-funded “SHOP PLUS - Medlife” is an e-pharmacy initiative that home-delivers Tuberculosis medicine.
- ⌘ “Strengthening healthcare system for common cancers in the state of Madhya Pradesh” by CHAI focussed on improving access, building capacities and management of supply chain.
- ⌘ Wish Foundation’s technical support to “Sanjeevani Clinics”
- ⌘ Indore Diocese Social Service Society led the strengthening of community outreach services in 21 slums of Indore city.
- ⌘ Madhya Pradesh Voluntary Health Association led advocacy forum for Tobacco Control
- ⌘ UNICEF, UNDP, and UNFPA led technical assistance for strengthening the RMNCH+A services
- ⌘ GIZ led technical assistance for strengthening PMJAY

#### Water and Sanitation

- ⌘ BASIX – Municipal Waste Ventures (BMWV) collaboration with the Indore Municipal Corporation for Solid Waste Management
- ⌘ UNICEF support to the WASH program through departments such as ICDS,

Education besides Health

- ⌘ Nagrath Charitable Trust collaboration with the ULB on water conservation and rainwater harvesting in Indore.

## **Environment**

- ⌘ JSI's "Building Healthy City" collaboration with the Smart City Project focussed on reduction of air, land, and water pollution, housing, increasing walkable spaces, preserving and developing open spaces – parks, playgrounds, and recreational spaces in order to enhance the quality of life of citizens, reduce the urban heat effects in areas and generally promote eco-balance.
- ⌘ Past projects in the context of a healthy environment for women include "Safe City Initiative" by DFID support, PAHAL's "WeCan" and stopping "Violence Against Women Campaign"

## **Food**

- ⌘ UNICEF ongoing support to the department of woman and child development
- ⌘ Indore Diocese Social Service Society, PAHAL, BGMS led nutritional interventions in targeted slums of the city
- ⌘ GIZ support strengthening end-to-end digitization of the PDS operation.



## Annexure 2: Capacity building of ULBs

### ULB Capacities

Expected Functions	Current Capacities	Gaps/Challenges	Required Capacities
<b>Core ULB functions</b>			
Solid waste management	Perform the function to varying degree of success	Quality of solid waste management in unauthorized settlement reported to be poor, Space for dumping and segregation of waste, minimal effort to engage with communities for solid waste management	Planning and monitoring collection, segregation, and disposal in environmentally safe manner, monitoring coverage of poor settlements, capacities for engaging with communities and implementing behavior change communication interventions
Water and Sanitation	Not all ULBs involved, Many states have parastatal or boards which implement the function, implemented with varying degree of success	Convergence with agencies performing the function is meant to occur at city and ward level, but is minimal, response time to citizen complaints is weak in poorer settlements	Capacities to identify and resolve issues in a coordinated manner, monitoring coverage of poor settlements, capacities for engaging with communities and implementing behavior change communication interventions
Preventive vector control	Implemented effectively by most ULBs, elected representatives being leveraged in some cities to spread awareness both preventive and epidemic control	ULBs in some did not have chemicals, and the machines were out of order	Management of supply chain as well as inventory, coordination with the health department and urban malaria offices, capacities to engage elected representatives and communities

<b>Supportive functions under NUHM</b>			
<p>Support infrastructure identification and allocation, collaborative planning, provision of maps where available, linkages with urban development community structures, rationalization of facilities,</p> <p>Joint monitoring of the program</p>	<p>Several ULBs do not engage with the health department for implementing NUHM, Other cities are supporting infrastructure identification, planning processes, and monitoring adequately</p>	<p>Planning is basic and not comprehensive in some cities, lack public health vision to go beyond PIP guidelines, lack human resources for robust monitoring, existing urban development community structures not leveraged</p>	<p>Basic orientations to NUHM, advocacy at decision-making level, capacities in planning and financial management, public health leadership development, mapping of all community-based structures, planning for linking MAS to social schemes</p>
<b>Leadership Role under NUHM</b>			
<p>Manage and deliver health care, coordinate effectively with sanitation, waste management, and epidemic prevention, effectively manage funding,</p>	<p>In cities leading NUHM, it is effective, convergence is successful, and monitoring is done through structured mechanisms</p>	<p>Cities that are not leading - Lack comprehensive public health vision, Minimal engagement of private sector, no effort to expand the envelope of health budget through resource mobilization</p>	<p>Public health leadership development, resource mobilization, private sector engagement, Capacities to engage elected representatives, link existing urban development community structures, planning for linking MAS to social schemes</p>



### Annexure 3: Descriptors by Indore residents for their vision of a “Healthy City”

- ⌘ Law and Order
- ⌘ Less pollution
- ⌘ Good roads
- ⌘ Everywhere parks with equipment for exercises
- ⌘ Good Emotional health
- ⌘ All are having aadhar cards
- ⌘ Traffic will be disciplined
- ⌘ Digitalization
- ⌘ Better health services
- ⌘ Accessible primary health services
- ⌘ Pollution-free Indore
- ⌘ Nobody is coming to district authorities for financial or other for treatment
- ⌘ Good health care system
- ⌘ Eco-friendly, peaceful, safe and system-oriented city
- ⌘ Pollution-free city with quality of life
- ⌘ No malaria, dengue et
- ⌘ There will not be discrimination between male and female child
- ⌘ Accessible health facility
- ⌘ People will be aware of lifestyle modification
- ⌘ Everybody would love to live in
- ⌘ Freedom from sound and noise pollution
- ⌘ All schools have healthy/stress free environment
- ⌘ Clean, safe drinking water available to everyone
- ⌘ Women will be healthy
- ⌘ People will be happy
- ⌘ No malnourished children or adolescents
- ⌘ Everyone has access to good medical care
- ⌘ Indore will be known as green city
- ⌘ 100%immunization
- ⌘ Public transport is easy
- ⌘ Free and easily accessible water
- ⌘ Low-cost neighbourhood schools
- ⌘ Green parks to relax in
- ⌘ Everyone in Indore is safe secure and gets justice
- ⌘ Fresh air, green gardens
- ⌘ Poverty rates lower
- ⌘ Better community living
- ⌘ Playground in every neighbourhood
- ⌘ Easy to use affordable transport
- ⌘ No cars/very few cars
- ⌘ Underprivileged people will have quality care
- ⌘ Sufficient govt health service providers are available at every level
- ⌘ Green Indore
- ⌘ Primary health education
- ⌘ Subsidized vegetables and fruits
- ⌘ Access to affordable curative care
- ⌘ Tobacco will be restricted

- ⌘ Alcohol will be banned
- ⌘ Sale of tobacco banned
- ⌘ School awareness
- ⌘ Patients spend less in hospitals and their economic situations improves
- ⌘ There is greenery everywhere and there is prosperity everywhere

#### Annexure 4 : Stakeholders to be engaged in Indore

<b>Healthy Food</b>	Pollution Control Board	Irrigation Department	Cost of crop/vegetables - local administration	Cold depot control - local administration
	Food and Civil Supplies - pesticides/fertilizer data and management of hormones use	Adulteration - ghee/milk etc - DandD + Nagar Nigam	Increase use of organic fertilizer - stakeholder?	Quality control - sample collection, checking, and reporting
	Survey reports/ Media	Punishment - law and judiciary	FSSAI	Restaurant Associations
	Association of food producers	Namkeen Industry association	Labeling for packed	Integrated Child Development Services
<b>Healthy Water</b>	PHE and Irrigation Department	Municipal Corporation	Local bodies- RWAs	Water Pollution Control Board
	NGOs - Nagrath Charitable Trust	Health Department	MPEB	
	Education Department	Water Tanker Associations	RO Water plants	Department where water supply is done.
	Rainwater harvesting organizations	Association of cleaning tanks	Eco-Visarjan Group led by Pahal	



<b>Healthy Sanitation</b>	PWD	Urban Affairs	Municipal Corporation	Scientists / Academicians
	Honey Sucker Associations and owners	NGOs - manual scavenging	City planners	Construction department
	Sustainable Sanitation Alliance (SUSANA) - India	Private construction companies	Chapter - India Sanitation Coalition	Slum Board
	Swachh Bharat Abhiyan	Private waste management / septage	Department of Water and Sanitation	Hospital Authorities, Department of Health
	Private technology companies	Landowners	Behavioural economists / scientists	STPs (managed by PCB)
<b>Healthy Environment</b>	Pollution Board	Urban Development	Municipal Corporation	Public Works Department
	NGOs and community leaders	Organic farming market	PHE	District functionaries
	Elected leaders	Industry associations	Livelihood Mission Department	IEC department / NGOs
	Health Department (especially, Communicable department)	Police Department	Judiciary and I legal aid cells	Horticulture Department
	SLA and DLSA	Radio - private channels	Women's rights groups	Motor Vehicles Department
	WCD	RTO	Parks - Municipals	Forest Department
	Transportation Department	Railways	Defense	Airports

<b>Healthy Family and Individual</b>	FSSAI - Labeling of junk food	Education Department	Health Department	Police
	Food and Drug Department	NGOs	Companies/ Workplaces	Collectorate
	Media - advertising agencies	Protein powders - licensing of products	Enforcement - inspection	Youth organizations
	TV companies/ cable agencies	Lions, Rotary, Innerwheel	APL-PMJAY	Preventive & Social Medicine/ Community Medicine Departments
	Self-help groups	Mahila Aarogya Samitis		



# WHAT MAKES A HEALTHY CITY?



## A Desk Research Summary



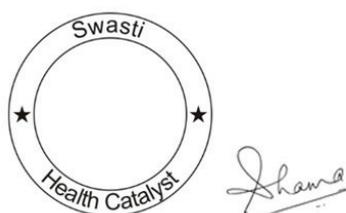
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This document titled '**What Makes a City Healthy: A Desk Research Summary**' has been developed by HSTP in collaboration with Swasti.

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## Designer

**Shrirupa Sengupta and The Pen & Mouse**

# WHAT MAKES A HEALTHY CITY?

## A Desk Research Summary



# Contents

<b>ABBREVIATIONS</b>	<b>1</b>
<b>1. Background</b>	<b>3</b>
<b>2. Desk Research: Objectives and Methodology</b>	<b>5</b>
<b>3. Food: The Foundation of a Healthy City</b>	<b>8</b>
3.1 Significance for Healthy City	8
3.2 Key Findings	8
3.3 Government Interventions	10
3.4 Gap Analysis	10
3.5 Recommendations	11
<b>4. Water: The Basis of Healthy Life</b>	<b>13</b>
4.1 Significance for a Healthy City	13
4.2 Key Findings	13
4.3 Government Interventions	15
4.4 Gap Analysis	16
4.5 Recommendations	16
<b>5. Sanitation: Sustaining Healthy Cities</b>	<b>18</b>
5.1 Significance for Healthy Cities	18
5.2 Key findings	18
5.3 Government Interventions	19
5.4 Gap Analysis	20
5.5 Recommendations	21
<b>6. Environment: The Backbone of a Healthy Life</b>	<b>22</b>
6.1 Significance for Healthy Cities	22
6.2 Key Findings	22
6.3 Government interventions	24
6.4 Gap Analysis	25
6.5 Recommendations	26
<b>7. Individual and Family Health: Underpinning Healthy Cities</b>	<b>28</b>
7.1 Significance for Healthy Cities	28
7.2 Key Findings	28
7.4 Gap Analysis	32
7.5 Recommendations	33
<b>Bibliography</b>	<b>34</b>

# ABBREVIATIONS

<b>AAJ</b>	Antyodaya Anna Yojana
<b>AMRUT</b>	Atal Mission for Rejuvenation and Urban Transformation
<b>ANM</b>	Auxiliary nurse midwife
<b>ASHA</b>	Accredited Social Health Activist
<b>CBGA</b>	Centre for Budget and Governance Accountability
<b>FSSAI</b>	Food Safety and Standards Authority of India
<b>FSSM</b>	Fecal Sludge and Septage Management
<b>GDP</b>	Gross Domestic Product
<b>HIV</b>	Human Immunodeficiency Virus
<b>HSS</b>	Health systems strengthening
<b>HSTP</b>	Health System Transformation Platform
<b>ICDS</b>	Integrated Child Development Services
<b>ICMR</b>	Indian Council of Medical Research
<b>IDSP</b>	Integrated Disease Surveillance Program
<b>IHHL</b>	Individual Household Latrine
<b>IIPS</b>	International Institute for Population Sciences
<b>JNNURM</b>	Jawaharlal Nehru National Urban Renewal Mission
<b>LPCPD</b>	Litres per capita per day
<b>MDM</b>	Mid-day meal
<b>MHM</b>	Menstrual hygiene management
<b>MoHFW</b>	Ministry of Health and Family Welfare
<b>MSDP</b>	Multi-Sectoral Development Programme
<b>NACP</b>	National AIDS Control Programme
<b>NCD</b>	Non-Communicable Disease
<b>NFHS</b>	National Family Health Survey
<b>NFSA</b>	National Food Security Act
<b>NPCDCS</b>	National Program for Prevention and Control of Cancer, Diabetes, Cardiovascular Disease, and Stroke
<b>NPHCE</b>	National Program for Health Care of Elderly
<b>NTCP</b>	National Tobacco Control Program
<b>NUHM</b>	National Urban Health Mission



<b>PMMVY</b>	Pradhan Mantri Matru Vandana Yojana
<b>RMNCH+A</b>	Reproductive, Maternal, Newborn Child plus Adolescent Health
<b>RRTs</b>	Rapid Response Team
<b>RWH</b>	Rain Water Harvesting
<b>SDG</b>	Sustainable Development Goals
<b>SoFTEL</b>	Strengthening Food Testing Laboratories
<b>SSHE</b>	School Sanitation and Hygiene Education
<b>TB</b>	Tuberculosis
<b>TSC</b>	Total Sanitation Campaign
<b>ULBs</b>	Urban Local Bodies
<b>UNICEF</b>	The United Nations Children's Fund
<b>URDPFI</b>	Urban and Regional Development Plan Formulation and Implementation
<b>VAMBAY</b>	Valmiki Ambedkar Awas Yojana
<b>WHO</b>	World Health Organization
<b>WQMIS</b>	Water Quality Information Management System

# 1. Background

Cities have distinct opportunities and challenges to ensure the health of their population. According to Hancock and Duhl (1986), “A healthy city is one that is continually creating and improving those physical and social environments and expanding those community resources which enable people to mutually support each other in performing the functions of life and in developing to their maximum potential.” (World Health Organization, 1998)

Primary care that significantly determines the population health (Rao et al., 2014) has traditionally been focused on rural areas. It has been built on the foundation of the Community Development Programme in India. This led to developing a robust public health system in rural areas resulting in health indices in many cities being lower than rural areas, especially among the disadvantaged populations. The National Urban Health Mission was launched in 2013 to address the gap between urban and rural areas. However, a successful model for service delivery of primary care in urban areas has remained elusive. There is scope for successful cities to develop and validate their own models of urban health care services to become role models for other cities.

India is urbanizing at an unprecedented pace. India’s urban population is projected to reach an additional 300 million by 2050 (World Cities Report, 2016). Urban India contributed 63 percent of India’s GDP in 2014 and is expected to contribute three-fourths of the GDP by 2030 (Gupta, 2019). All of these changes impact the health of urban residents in complex ways: migration, climate change, transitioning disease burden, and unhealthy built environments. Inadequate urban systems to cope with the rapid growth all have a role to play.

As most determinants of health are outside the health sector, the urban areas provide an opportunity to focus on them due to the density of their service areas and the availability of resources. Urban infrastructure and the construct of cities make a significant impact on people’s health. The urban populations are heterogeneous; they have diverse scenarios among different segments, such as inadequate housing, transportation, poor air quality, food insecurity, overcrowding, and lack of access to safe drinking water and sanitation that contribute to the spread of infectious diseases such as tuberculosis (TB) among others. Rates of non-communicable diseases (NCDs), violence, and mental illness are also often higher because of cities’ social built and food environments.

In 2019, the teams at the Health System Transformation Platform (HSTP) and Swasti began collaborating to determine how health outcomes within cities could be improved, with a specific focus on the poor and vulnerable communities. One city that provided an opportunity to conceptualize and implement a “Healthy City” programme differently is Indore. It is India’s cleanest city and one of India’s 20 Smart Cities. By coordinating inputs from the sectors that impact on health Indore has an opportunity to develop a model for a Healthy City which other cities in the state and other states can learn from.

The vision for Indore’s healthy city plan would have to be co-developed with the sectors that have the greatest impact on health. Towards this an initial conversation with Indore’s public health care providers and civil society organisations was conducted. A framework for approaching health outcomes through five key “pillars”



- (i) Healthy water (quantity, quality), (ii) Healthy food (nutrition, quality of processing/ cooking, healthy ingredients) (iii) Healthy sanitation (toilets, solid and liquid waste management), (iv) Healthy environment (air, soil, public spaces, law, environment) and (v) Healthy individual and family (health services, safety) emerged from this discussion.

With the start of the COVID pandemic in 2020, further consultations and discussions were put on hold, though the team continued with secondary research of the work done so far on the Healthy Cities as well as the five pillars that were identified during the initial consultations in Indore.

This document provides a summary of the desk research done on the five pillars. A separate White Paper has been developed which presents our understanding of the work done so far on Healthy Cities as well a way forward for cities in India which want to improve health outcomes for their citizens.

The complete desk research report is available [HERE](#).

## 2. Desk Research: Objectives and Methodology

The Desk Research was undertaken with the following objectives:

- ⌘ Develop a scalable and implementable Healthy City concept and framework relevant to India (Indore is chosen as the city for modelling for this study)
- ⌘ Get an understanding of the healthy cities concept in the Indian context vis-à-vis the global understanding of the concept.

For the desk research, five thematic areas (pillars) were identified which include food, water, sanitation, environment and individual and family health services. Within each of the thematic areas, the following aspects were looked into:

- ⌘ How each pillar impacts urban health and development of a healthy city
- ⌘ Current status and norms for each pillar at the global, India, Madhya Pradesh and Indore level
- ⌘ Government interventions to improve the parameters

The desk research further identifies successful implementation strategies to present actionable insights. The theoretical analysis ensures knowledge gathering to allow evidence-based recommendations for each pillar.

We specifically identified sub-themes under each pillar and publicly available information on these aspects were also compiled.



Sn	Pillar Name	Sub-Pillars
1	 <b>Food</b>	<ul style="list-style-type: none"> <li>⌘ Food nutrition security: Access and storage</li> <li>⌘ Food safety and adulteration</li> <li>⌘ Nutrition and food habits</li> </ul>
2	 <b>Water</b>	<ul style="list-style-type: none"> <li>⌘ Water Security: Access and Supply</li> <li>⌘ Water conservation</li> <li>⌘ Water quality</li> <li>⌘ Wastewater management</li> </ul>
3	 <b>Sanitation</b>	<ul style="list-style-type: none"> <li>⌘ Solid and liquid waste management</li> <li>⌘ Sanitation (Individual household toilets, shared sanitation)</li> <li>⌘ Hygiene (Personal, Menstrual and Food hygiene)</li> </ul>
4	 <b>Sanitation: Sustaining Healthy Cities</b>	<ul style="list-style-type: none"> <li>⌘ Pollution (Land, water, noise)</li> <li>⌘ Urban space (Green spaces, public space, housing conditions)</li> <li>⌘ Safe environment (Woman and child safety)</li> </ul>
5	 <b>Individual and Family Health: Underpinning Healthy Cities</b>	<ul style="list-style-type: none"> <li>⌘ Reproductive health and child health (Maternal and child health, immunization)</li> <li>⌘ Communicable and infectious diseases (TB, malaria, HIV)</li> <li>⌘ Non-communicable diseases (Diabetes, cardiovascular diseases, cancer)</li> <li>⌘ Geriatric disorder</li> <li>⌘ Substance abuse (Tobacco, Alcohol, Drugs)</li> </ul>

We also studied the social determinants of health, i.e., conditions in which people are born, grow, work, live, and age, and the wider set of forces and systems shaping the conditions of daily life (World Health Organization, n.d.). These determinants include economic stability, education, social and community context, health and health care and neighborhood and built environment. Each of these have a major impact on health and well-being of citizens, which is reflected in the detailed study of each of the 5 pillars outlined above.

The secondary sources of information were not entirely predetermined and evolved at various stages. The direction to the approach was altered according to the renewed needs of the proposed solution. The government policies were included only once the pillars were explored and their importance with respect to the pillars emerged. The pillars chosen steered to process design, and therefore, play a crucial role in this document. In the post-implementation phase, the secondary research will aid the design of questionnaires for further evolution of the framework.

During the secondary research the following were studied

- ⌘ Research on various pillars and sub-pillars, preferably published in national and international peer-reviewed journals
- ⌘ White papers and reports published by international agencies such as WHO, United Nations and other well-established institutions
- ⌘ Government policies and schemes on the pillars and sub pillars in India
- ⌘ Examples of established best practices published in journals

Based on the review of publicly available documents, a gap analysis was conducted by the team to identify the gaps in policy or scheme implementation, given the desire to achieve various national and international commitments. Subsequently, recommendations were identified through team discussions.

In the following chapters, one per each of the pillars, a summary of findings is provided and is organized as follows:

- ⌘ The topic's significance in the context of Healthy Cities
- ⌘ Key findings
- ⌘ Government interventions
- ⌘ Gap analysis
- ⌘ Recommendations

While over 50- to 70-page content was compiled for each of the pillars from the desk research process, we believe this summary succinctly gives pointers for action for each of the key determinants of urban health outcomes. We look forward to feedback and inputs from readers.



# 3. Food: The Foundation of a Healthy City

## 3.1 Significance for Healthy City

The role of food, a vital and basic need for human life, in sustaining an individual's health and livelihood can hardly be undermined. The quality and quantity of foods, combined with the systems that produce them, have a profound influence on the nutrition status and thus the mental, physical and social health of populations (World Health Organization, 2017). In urban areas, especially in developing countries and in countries in transition, people experience a shift in dietary patterns such as diets rich in saturated fat, refined foods, and sugar and low in fibre which create increasing health problems.

Food, thus has the ability to form the foundations of a healthy city and catalyze the achievement of key global goals and targets outlined under the Sustainable Development Goals. These include ending hunger and ensuring access to safe, nutritious and sufficient food all year round (SDG 2.1) and ending all forms of malnutrition (SDG2.2). (NITI Aayog, 2017). The impact of food on building healthy cities was studied in the context of three sub pillars:

- ⌘ Food nutrition security: storage and access
- ⌘ Food safety and adulteration
- ⌘ Nutrition and food habits

The National Family Health Survey (NFHS) 3 and 4 reported that India is experiencing the dual burden arising out of a nutrition transition. While pockets of the population are suffering from malnutrition, the spotlight is also on excess weight and obesity, largely in urban areas and older adults (NITI Aayog, 2017).

## 3.2 Key Findings

**Food Nutrition Security: Access and Storage:** According to the Food and Agriculture Organization (FAO), United Nations, food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life. The four pillars of food security, i.e., availability, access, utilization, and stability, are indicated by income, consumption and quality of food (United Nations System Standing Committee on Nutrition, 2013)

Indicators of food security include (World Health Organization, 2010):

- ⌘ Population living on less than US\$ 1 per day
- ⌘ Population with less than minimum dietary energy consumption
- ⌘ Households consuming adequately iodized salt

Proper storage keeps food safe from bacteria that can cause food poisoning. Food storage efficacy is measured by indicators such as balanced diet through the year, prolonged shelf life and cost-effective storage. The National Health Portal of India has outlined food storage guidelines for categories such as dairy products, eggs, raw



meat, poultry, seafood and cooked meats (National Health Portal, Government of India, 2016).

Enabling food and nutrition security is crucial to tackling malnutrition and poverty in India. While the country ranks first in the production of food production globally, based on affordability, availability, quality and safety of food, it is placed at the 76<sup>th</sup> position amongst 113 countries in the Global Food Security Index (The Economist, 2020).

**Food Safety and Adulteration:** Food safety plays an important role in ensuring food security, maintaining good health and well-being. Food Safety and Standards Act (2006) defines food safety as an assurance that food is acceptable for human consumption according to its intended use (FSSAI, n.d.). Food Safety includes handling, preparing, and storing food to best reduce the risk of individuals becoming sick from foodborne illnesses. In this context, FSSAI has released regulations for labeling of packaged foods and guidelines for food business operators.

The 2014 World Ranking: Food Performance, structured around food safety risk governance and food safety performance indicators, found Canada and Ireland to be following high food safety standards. The 2019-20 FSSAI Food Safety Index identified Goa (83.5), Gujarat (78.2), Tamilnadu (74.9), Maharashtra (72.7), Kerala (71.6) and Madhya Pradesh (54.8) as leaders in food safety.

**Nutrition and Food Habits:** According to WHO, adequate nutrition from the earliest stages of fetal development, at birth, through infancy, childhood, adolescence, into adulthood and old age, food and good nutrition are essential for survival, physical growth, mental development, performance and productivity, health and well-being (World Health Organization, 2000).

Malnutrition i.e., deficiencies, excesses, or imbalances in a person's intake of energy and/or nutrients is indicated by undernutrition, micronutrient-related malnutrition or overnutrition. In 2015, the World Health Organization released a global reference list of 100 key health indicators. The nutrition risk factor indicators emphasize breastfeeding, incidence of stunted and wasted children and anemia prevalence (World Health Organization, 2015)

Nutrition-related factors contribute to approximately 45 percent of deaths in children under 5 years of age (mainly due to undernutrition). NFHS 2015-16 revealed that

- ⌘ In India every second child (0-59 months) suffers from some form of nutritional failure (stunting, wasting and/or underweight) (International Institute for Population Sciences (IIPS) and ICF, 2017)
- ⌘ With 40.6 million stunted children, India represents one-third of the global total of stunted children under the age of five.

In Madhya Pradesh about 6.6 percent children in the age group of 6-23 months receive an adequate diet, which is well below the national average of 9.6 percent. Indore, at 12.4 percent is well ahead of the state average. Indore also compares well with the national averages of stunted, wasted, severely wasted and underweight children as well as in prevalence of anemia in children and adults. In Madhya Pradesh, incidence of Vitamin A and Zinc deficiency amongst children in the age group of 1-4 is higher than the national average whereas it fares better for older children. The state is also ahead of the national averages of balanced diets.

While Indore fared well on the breastfeeding parameters set by WHO, almost 10.3 percent of the city's children between 6-23 months of age receive adequate nutrition



and about 1/3<sup>rd</sup> of its children is undernourished (International Institute for Population Sciences (IIPS) and ICF, 2017)

### 3.3 Government Interventions

**Food Nutrition Security: Access and Storage:** The Government of India has launched a slew of schemes to address the challenges of food security, safety and nutrition. Some of these include:

- ⌘ National Food Security Act (NFSA), 2013
  - Public Distribution System (NITI Aayog, 2020)
  - Antyodaya Anna Yojana (AAY) (Department of Food & Public Distribution, GoI, 2019)
- ⌘ Integrated Child Development Services (children in the age range 6 months to 6 years)
- ⌘ National Nutrition Mission (Poshan Abhiyaan) (focuses on stunting, under-nutrition, anemia, low birth weight)
- ⌘ Mid-day meal (MDM) scheme (children at primary and upper primary levels)

Aligned to the goals outlined in SDG 2, some of these are driven at the national level while others are implemented by the States. Madhya Pradesh rolled out a targeted PDS aligned to the Central Government's PDS scheme (NITI Aayog, 2020)

**Food Safety and Adulteration:** The Government of India is creating an ecosystem to ensure food safety and prevent adulteration at various levels. From creating infrastructure for safe handling and storage, to formulating enabling policies and creating consumer awareness, the government has adopted a holistic approach. Some of these include:

- ⌘ Announcement of National Policy on Foodgrain Handling, Storage and Transportation
- ⌘ Setting up Mega Food Parks (Ministry of Food Processing Industries, 2020)
- ⌘ Strengthening Food Testing Laboratories (SoFTeL) Scheme
- ⌘ Launching consumer awareness campaigns such as CHIIFFS

**Nutrition and Food Habits:** The Government of India has rolled out a National Nutrition Strategy aimed at reducing all forms of malnutrition by 2030, with a focus on the most vulnerable and critical age groups as also the achievement of the SDGs. The other initiatives towards this objective include:

- ⌘ Infant and Young Child Care and Nutrition (NITI Aayog, 2017)
- ⌘ Integrated Child Development Service (Department of Women and Child Development, 2015)

The states administer the mid- day meal and poshan abhiyan schemes in schools. The government has initiated several schemes for addressing the challenges of anemia, RMNCH+A, health of the girl child and pregnant women amongst others (National Portal of India, 2018)

### 3.4 Gap Analysis

Though the Government has identified and planned policies and schemes, results are not necessarily as expected. These could happen either because of implementation challenges, environmental challenges or a need to change focus.



**Food Nutrition Security: Access and Storage:** The desk research revealed that the main reason for food and nutrition insecurity in urban areas is unplanned growth of slum dwellers, overcrowding, poor environmental conditions (Upadhyay et al. 2011). Overpopulation often leads to deprivation, lack of employment, and gender inequality escalate into malnutrition, and children and women remain food insecure. In addition, lack of food storage infrastructure leads to loss of food produced (Murthy, T. M. S., & Yogesh, M. S., 2014) According to a Ministry of Consumer Affairs report, between 2013-2018 nearly 60,000 tons of food grains, stored in warehouses, was damaged and became unusable for human consumption.

**Food Safety and Adulteration:** Research has revealed gaps in implementation and enforcement of the Food Safety and Standards Act (FSSAI). Portals such as Jago Grahak Jago remain inaccessible to those from lower socio-economic strata, the most apparent victims of food adulteration and food safety. Apart from that, though street food and mobile food vendors are easily accessible and attractive, it is difficult to regulate them. Inadequate public awareness of precautions and standards with respect to street food pose challenges in food safety (Kaur, 2017). India faces general challenges such as ignorance about food adulteration, especially amongst the low-income groups (Ishwar, S. et al 2018).

**Nutrition and Food Habits:** An unhealthy diet is one of the major reasons for a range of chronic diseases. Research findings have established a strong association between low birth weight and child malnutrition, as they are more susceptible to infections (Rahman, et al. 2016). Mostly the result of high levels of exposure to infection, inappropriate IYCF and caring practices in India, child malnutrition has its origins almost entirely in the first two to three years of life (National Rural Mission Mission, n.d.). In India Anemia, common in children, adolescent girls, and women, is caused mostly due to iron deficiency. Resulting from poor dietary intake of iron, it is often aggravated due to gender discrimination in food allocation. Other causes of anemia include worm infestation, malaria, and infectious diseases that cause intestinal inflammation. Existing research has highlighted that Nutritional Rehabilitation Centres were effective in improving the condition of admitted children, but the effects were not sustained due to high drop-out rates, low follow up rates and lack of adequate parental awareness (Taneja, G. et al. 2012).

## 3.5 Recommendations

### Food Nutrition Safety: Access and Storage

- ⌘ Though several government programmes such as RBSK, RKSK and WIFS are being implemented in Indore, there is an urgent need to strengthen the follow up mechanism.
- ⌘ The intergenerational cycle of anemia can be broken through regular orientation to teachers, anganwadi workers and nutrition education meetings for behavior change communication to the parents is necessary. Behavior change communication programs for parents can also be delivered through Anganwadis and healthcare workers such as ASHAs/ANMs.
- ⌘ While there are antenatal care programmes such as Pradhan Mantri Matru Vandana Yojana (PMMVY), Janani Suraksha Yojana, effective communication strategies are required for enhancing the quality of both antenatal communication and maternal awareness. Specific programs targeted at male members of the family and couples can be driven through the ANM/ASHA network.



- ⌘ Develop management protocols for safe and scientific storage, cleaning and fumigation warehouses to ensure proper aeration of grains followed by regular inspection of grain stock and strictly adhering to the First-in-First-Out (FIFO) policy.

**Food Safety and Adulteration:** Consumer literacy is the need of the hour with special attention to low-income groups who suffer the most (Gupta, N., & Panchal, P., 2009). Collaborative action by various local bodies, government, media, and NGOs can play a pivotal role in achieving food safety in India. Interventions, such as promoting implementation of already defined guidelines are needed to raise awareness of good hygiene practices among food handlers. Empowering people, especially from the lower income groups, with clear information through programs such as Jaago Grahak, will also help them make healthier choices.

**Nutrition and Food Habits:** Healthy dietary habits start with families, therefore if a family enforces healthy food choices both at home and while purchasing raw food and ingredients, the child will make an attempt to adopt healthy food choices.

- ⌘ Specific health education programmes, dietary guidelines and effective public awareness campaigns could be initiated to address the unhealthy lifestyle of university students (Bipasha et al. 2013).
- ⌘ There is also an urgent need to link Nutritional Rehabilitation Centers with community-based models for follow-up and improving health education measures (Taneja, G. et al. 2012)
- ⌘ Encourage counseling and improved communication between healthcare providers through the ASHA/ANM network and a male member to share vital information about family planning and birth spacing (World Health Organization, 1995)
- ⌘ Local health centers need to provide preconception counseling to a couple and help increase awareness in reducing the prevalence of anemia in pregnant women.
- ⌘ Prophylaxis for other micronutrients need to be included in national programmes to ensure that the target audience not only get iron folic acid supplementation and biannual helminthic control, but also folate and vitamin B12 (Ministry of Health and Family Welfare (MoHFW), Government of India, UNICEF and Population Council, 2019)
- ⌘ It is also crucial to carry out surveys and more studies on micronutrient deficiencies to tackle malnutrition.



# 4. Water: The Basis of Healthy Life

## 4.1 Significance for a Healthy City

Safe and accessible water is important for public health, whether for drinking, domestic use, food production or recreational purposes. Improved water supply and sanitation, and better management of water resources, can boost the countries' economic growth and can contribute greatly to poverty reduction (World Health Organization, 2019). A significant correlation has been found between education level, economic status and location and a household's access to improved drinking water, sanitation, and waste disposal services in urban areas.

Water management is thus a key focus area of the Sustainable Development Goals (SDGs) with goals to achieve universal and equitable access to safe and affordable drinking water for all (SDG 6.1) and improving water quality by reducing water pollution, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally (SDG 6.3) (United Nations, 2018). The impact of water on building healthy cities was studied in the context of four sub pillars:

- ⌘ Water security
- ⌘ Water Conservation
- ⌘ Water Quality
- ⌘ Wastewater Management

According to the composite Water Management Index released by NITI Aayog in 2018, 21 major Indian cities were reaching zero groundwater levels by 2020, impacting about a 100 million people. Water resources (both surface and groundwater resources) are adversely affected by an increasing population as well as by man-made activities, including poorly treated drainage, construction, and industrial runoff, resulting in water quality degradation and limiting safe water supply.

## 4.2 Key Findings

**Water Security:** Access and Supply - According to the UN, water security is the capacity of a population to safeguard sustainable access to adequate quantities of acceptable quality water for sustaining livelihoods, human well-being, and socio-economic development, for protection against water-borne pollution and disasters, and preserving ecosystems (United Nations, 2013). The UN also defines access to water as the proportion of population using improved drinking water sources and water supply as the process of supplying water, for a town, community or a household from improved and unimproved sources. Various parameters that determine water supply along with the sources of supply, include connection coverage and metering, litres per capita per day (lpcpd) supplied, non-revenue water, continuity and quality of supply and water treatment.

India's water supply system faces the challenges of inequitable distribution of direct water, inefficient metering and monitoring systems, improper operational zones,



water leakages and drop in groundwater tables due to excessive use of borewells. These also form the source of water borne diseases such as diarrhea, jaundice and meningitis. Madhya Pradesh has seen a 92% increase in spread of waterborne diseases, an indicator of the water quality.

In India, in 2017, 91% of the rural population and 96% of the urban population had access to an improved water supply (World Health Organization & UNICEF, 2015). In Madhya Pradesh 60% of habitations are fully covered with water supply and 25% are partially covered. Hand pumps are the major source of drinking water followed by well, tap water, tube wells or surface water. In Indore, 80% of the water supply comes from the Narmada while 15% comes from borewells. The Narmada-Gambhir Link Project serves as an emergency reserve during summers (WaterAid, 2005).

**Water Conservation:** It is essential to manage water efficiently and conserve the natural resource sustainably, to protect future generations. Factors such as climate change have increased pressures on natural water resources, especially in manufacturing and agricultural irrigation. Efficient water conservation can be achieved by adopting the three R's of reduce, recycle, reuse. Strategies for reducing usage include inculcating better habits in the kitchen and bathroom.

Rainwater harvesting has proven to be extremely important in improving the quality of groundwater, recharging ground water aquifers and raising water levels in wells and borewells, alleviating the challenges of water scarcity. With rising demand for water, several cities around the world that had to procure water from sources over 100 km away, have adopted RWH. Indore, facing an acute drinking water shortage and diminishing aquifers, uses *pile and swale* method of water recharging, in addition to the typical method of collecting water through trenches and wells.

**Water Quality:** Poor water quality can pose several health risks for both human beings and the ecosystem. Water quality refers to the physical, chemical and biological characteristics of the water as well as the sediments and is often determined by the drinking-water services (Government of Western Australia, n.d.). Safe drinking water is dependent on improved sources of water, including piped water supply and safe ground water sources such as covered wells, handpumps and borewells.

WHO has defined the levels of microbial elements such as total coliform organisms, pH level and dissolved oxygen content to determine whether water is fit for drinking. The characteristics that determine whether groundwater is safe for consumption, different from those of drinking water, include salinity, presence of fluoride, arsenic, iron and nitrate.

India recently prescribed water quality parameters for pH value, total dissolved solids, turbidity, chloride, total alkalinity, total hardness, sulphate, iron, total arsenic, fluoride, nitrate, total coliform bacteria and e-coli. Water quality in Madhya Pradesh is of concern due to high levels of fluoride and iron contamination as well as high salinity. In Indore, during a survey in 2015, about 10% of samples tested were found unfit for drinking water purposes. Madhya Pradesh has seen a 92% increase in waterborne diseases such as diarrhea, jaundice and meningitis (WaterAid, 2005).

**Wastewater Management:** The toxic contents of wastewater could pose a hazard to both human health and the environment leading to economic/financial impacts. Water is considered wastewater when its quality is adversely affected by anthropogenic influence or liquid waste discharges from homes, commercial establishments and institutions such as hospitals, industrial units, storm water, other urban run-offs and agricultural activities. Wastewater management can be



undertaken either at centralized levels, such as sewage systems or decentralized levels using on-site or neighborhood level systems.

Wastewater can play a major role in meeting growing water demand in rapidly expanding cities, enhancing energy production, industrial development and supporting sustainable agriculture. The SDGs have set targets for safely treating wastewater (SDG 6.3.1) and percentage of industries complying with wastewater treatment as per CPCB norms (SDG 6.3.2).

Globally, 80% of wastewater flows back into the ecosystem without being treated or reused, leading to around 1.8 billion people using a contaminated source of drinking water. While Malta and Singapore have achieved 100% wastewater recycling, India has the capacity to treat only 33% of its wastewater. Though Madhya Pradesh treats only 14.90% of the waste generated by its class-I cities, Indore has achieved 100% treatment of fecal matter with three Sewage Treatment Plants.

### 4.3 Government Interventions

In 2019, the Government of India set up the Ministry of Jal Shakti to bring the various water management schemes under one umbrella.

**Water Security:** Ensuring water security remains the overarching goal of most governments if India's water related initiatives. The National Water Policy and the National Water Mission together emphasize planning and development of water resources, management for optimal and sustainable utilization and improving water use efficiency, especially in water stressed areas. The objective is to enhance water availability and ensure at least a minimum basic quality to safeguard health and hygiene.

Madhya Pradesh announced the State Water Policy and the Chief Minister's Urban Drinking Water Scheme. The state is working towards ensuring drinking water facilities to both urban and rural areas through development and conjunctive use of surface and groundwater. The Indore Municipal Corporation (IMC) procures water from the Narmada-Gambhir Link Project as an emergency reserve.

**Water Conservation:** The state governments are incentivized to implement the Atal Bhujal Yojana (Atal Jal) to strengthen the institutional framework for participatory groundwater management and bring about behavioral change at the community level for sustainable groundwater resource management. The National Water Policy also focuses on Water Conservation.

The Jal Kranti Abhiyan works to consolidate water conservation and management through a holistic and integrated approach and involvement of key stakeholders. Using traditional water conservation techniques is also encouraged.

**Water Quality:** A framework and guidelines for testing, monitoring and surveillance of drinking water quality as well as a Water Quality Information Management System (WQMIS), an online portal, have been launched recently.

**Wastewater Management:** The High-Powered Expert Committee, set up by the Central Government in 2008, to estimate investments for urban infrastructure management, proposed around 26% investment in water related infrastructure. This includes upgradation of underground sewerage system and 100% collection and treatment of wastewater, ensuring that 100% solid waste is collected, transported, and treated as per Municipal Solid Waste Rules, 2000 and 100% drain network along



both sides of all roads. The AMRUT also focuses on establishing adequate sewage systems and fresh water supply infrastructure for urban transformation. The scheme achieves its objectives through augmentation and rehabilitation of existing water supply and water treatment plants amongst others.

## 4.4 Gap Analysis

**Water Security:** Desk research revealed that water resources (both surface and groundwater) are adversely affected by man-made activities, including poorly treated drainage, construction, and industrial runoff, resulting in water quality degradation and limiting safe water supply. However, government schemes such as AMRUT, do not measure access to water on parameters such as distance to source and time spent on collection.

In Indore rapid urbanization has led to exploitation of water resources and an unequal distribution of water leading to extensive water shortage, especially in summers. The city also has ineffective metering and monitoring systems to measure distribution network, improper operational zones, water leakages and drop in groundwater tables due to excessive use of borewells.

**Water Conservation:** Though Atal Bhujal Yojana does not outline the pathways and procedures for strengthening the institutional framework for participatory groundwater management and trigger behavioural changes. Importance of water conservation through rainwater harvesting or other methods that improve both water quantity and recharge groundwater aquifers, is not emphasized.

The National Water Policy's focus on water conservation, misses the need to arrest declining groundwater levels using improved technologies and the steps needed to proactively rebalance groundwater extraction specific methods to achieve water use efficiency.

**Water Quality:** Currently the policies do not ensure coordination between three tiers of the government. In addition, adequate financial support for municipal bodies is not provided for under various schemes.

**Wastewater Management:** Though AMRUT was launched for rejuvenation and transformation of water and sewage systems across the country, its effectiveness is limited by a general approach towards all cities.

## 4.5 Recommendations

**Water Security:** The National Water Policy needs to ensure that after water for drinking and domestic needs, water for ecology and the environment is given highest priority to ensure survival of crucial ecosystem services. Farmers, especially in water stressed areas, need to be trained to increase area under water-lite crops and incentivized by creating alternate sources of income such as sericulture. Awareness programs and training, especially to domestic users as well as farmers, to improve water use efficiency need to be stepped up.

**Water Conservation:** While surface water resources can be conserved by constructing dams to store rainwater, for sustainability of groundwater resources it is necessary to arrest ground water outflows by constructing subsurface dams, undertake watershed management, treat upstream areas and skim freshwater



outflows in coastal areas and islands. in coastal areas and islands.

Efficient water use practices that can be encouraged to conserve water include application of water by sprinkler and drip irrigation methods, optimal utilization of groundwater conjunctive use and minimizing losses due to evaporation. The government also needs to augment programs for watershed management and catchment development as well as in-situ soil and water conservation works.

**Water Quality:** Given that access to clean drinking water and flush toilets connected to septic tanks have numerous benefits, policies must focus on providing piped water to compounds and dwellings.

**Wastewater Management:** Segregation of liquid and solid waste at source and recycling must be encouraged through schemes that also reduce the financial burden on local governments.



# 5. Sanitation and Healthy Life

## 5.1 Significance for Healthy Cities

Access to clean water and sanitation facilities are major factors impacting the health of urban populations. Poor sanitation not only contributes to spread of disease but also about one-half of all undernutrition is caused by lack of access to safe drinking water, sanitation and hygiene. The lack of access to clean sanitation facilities also impacts women's education and health.

Safe sanitation is extremely essential to maintaining a healthy lifestyle, as well as in improving mental and social well-being of people. Sustainable Development Goal 6.2 has set the target of achieving access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations. The impact of sanitation on building healthy cities was studied in the context of:

- ⌘ Solid and Liquid Waste Management
- ⌘ Sanitation Facilities
- ⌘ Hygiene

Even though 45% of the world's population had access to safely managed sanitation services in 2017, 701 million people could not escape open defecation. In the same year, as many as 3 billion people lacked necessary handwashing facilities at home. In India, the Swachh Bharat Mission has helped reduce the spread of communicable diseases by focusing on sanitation and hygiene.

## 5.2 Key findings

**Solid and Liquid Waste Management:** Any unwanted solid or liquid material thrown out by households, community, institutions or business establishments is called waste and can be categorized as biodegradable and non-biodegradable (Prakash, M. et al. 2012). Safe disposal and management of municipal solid and liquid waste is an integral component of Sustainable Sanitation. It refers to the collection, transportation, processing, recycling, treatment, and disposal of waste material in a scientific manner.

Government of India has defined parameters for disposal of sewage water in terms of pH value, oil & grease, residual chlorine amongst others. Further 28 performance indicators for solid and liquid waste management have been outlined by the Government for assessing service levels of ULBs.

In the Global Waste Index, that studies parameters such as recycling, process for converting rubbish into new material or energy; incineration; landfills and open dumping, South Korea scored a perfect 100. In India, maximum waste is generated by Maharashtra (22,570 metric tonnes) followed by Tamil Nadu (15,437 metric tonnes). Indore has achieved 100% door to door waste collection as well as 100% treatment of fecal matter.

**Sanitation Facilities:** A safe sanitation facility is designed and used to separate human excreta from human contact at every step of the service chain i.e., from toilet to containment through emptying, transport, treatment and final disposal or end-



use (World Health Organization, 2018). The human right to sanitation entitles every individual to sanitation services that are accessible, affordable and of acceptable quality (Ki-moon, B. 2010). In the context of this desk research, the term sanitation facility is used to refer to toilets.

Globally, open defecation is practiced by over 900 million people, i.e., nearly one-third of the world's population and only 62% uses improved sanitation. OD leads to widespread fecal contamination of the environment, spreading diseases such as diarrhea, results in stunting, malnutrition and high child mortality rates (UNICEF, 2019). Therefore, one of the primary goals of sanitation programmes is to make cities open defecation free (ODF). The Swachhta Status Report broadly classified toilets Individual Household Latrine (IHHL), Community Sanitary Complex (CSC) and Institutional Latrines including school and Anganwadi toilet (National Sample Survey Office, GOI, 2016).

The 2006 coverage estimates confirm that more than two-thirds of shared sanitation users are urban dwellers. Though a basic necessity for all, some obstacles that prevent use of suitable sanitation facilities include distance from place of dwelling, safe access and suitability for the differently abled.

India alone accounts for approximately 60% of the global population defecating in the open, with the majority residing in rural areas. However, the country made significant progress over the last few years with 2 states achieving 100% ODF status. In Madhya Pradesh 84.9% of the urban population and 20.7% of rural population had access to improved sanitation facilities. Indore was assessed as India's cleanest city in terms of sanitation coverage.

**Hygiene:** Hygiene refers to a range of behaviors, such as handwashing and personal hygiene, menstrual hygiene management and food hygiene, that help maintain health and prevent the spread of diseases. The indicators of personal hygiene include the percentage of population with access to hand washing facilities with soap and water at home, availability of bathing facilities, quantities of soap for bathing and laundry and accessibility to toilets. Level of menstrual health and hygiene can be assessed by extent of knowledge, availability and affordability of safe hygiene materials and disposal facilities amongst others. MHM appears in several SDGs. For those handling food FSSAI has set strict personal hygiene standards, such as hand, face and hair hygiene, not wearing jewellery and reporting illnesses.

In a study that analyzed 78 countries, WHO found 42 countries with less than half the population having a handwashing facility at home. Nearly three quarters of the population of Least Developed Countries lacked handwashing facilities with soap and water.

At the national level it was found that 60% of the population had access to basic hand washing facilities. In rural India, 23% girls listed menstruation as the chief reason for dropping out of school. According to NFHS-4, urban areas of 11 states or union territories saw more than 90% women using hygienic period protection with 37.6% women in MP using such protection. However, in rural areas of 10 states/union territories an average of 39% hygienic period protection was used with Madhya Pradesh faring the worst at 26.4%.

### 5.3 Government interventions

The central government's sanitation policies and schemes targeting various segments of society such as, school children, adolescent girls, women and the



community as a whole include:

- ⌘ Total Sanitation Campaign (UNICEF & CBGA, 2011)
- ⌘ Swachh Bharat Mission (upgrade of TSC)
- ⌘ National Urban Sanitation Policy
- ⌘ Swachh Survekshan and Nirmal Shahar Puraskar
- ⌘ Community Led Sanitation Programs
- ⌘ Integrated Urban Sanitation Program

These interventions have made an impact on waste management, sanitation facilities and hygiene. The Madhya Pradesh Government apart from joining these national level campaigns also launched thematic schemes such as Brother no. 1 where girls were gifted toilets by brothers and ODF Olympics.

**Solid and Liquid Waste Management:** One of the main focus areas of Swachh Bharat Abhiyan is to build clean cities through solid waste management by building sewerage systems within 30 metres of the toilets. The National Policy on Fecal Sludge and Septage Management (FSSM) was launched by the Government of India to achieve 100% access to safe sanitation and community septage management, city wide sanitation and safe disposal of fecal matter by ensuring functional systems through design and construction (Ministry of Urban Development, GoI, 2017)

**Sanitation Facilities:** The Swachh Bharat Abhiyan focused on building household toilets and periodic desludging of pits to minimize environmental and health related problems. As part the Abhiyan Indore Municipal Corporation (IMC) constructed more than 13,000 IHHLs. The Maryada campaign, in Madhya Pradesh, emphasizes school sanitation and education by ensuring the existence of functional toilets in schools and a separate facility for girls. The Valmiki Ambedkar Awas Yojana (VAMBAY), under the JnNURM, focuses on building toilets and improving sanitation for slum dwellers and urban poor.

**Hygiene:** Both the central and state level government are promoting hygiene practices by implementing schemes in schools. Some of these include the Swachh Bharat Swachh Vidyalaya, School Sanitation and Hygiene Education (SSHE) programme and Multi-Sectoral Development Programme (MSDP) (Ministry of Human Resource Development, GoI, 2015). These schemes focus on ensuring availability of gender separated toilets, hygiene material, and awareness campaigns. Specific efforts are directed at promoting menstrual hygiene through the ASHA network.

## 5.4 Gap Analysis

**Solid and Liquid Waste Management:** Fecal and sludge management are lagging behind given the limited awareness about their importance. Limited access to infrastructure such as tanks, equipment, trained personnel and lack of an institutionalized system have led to reliance on contractors and the informal sector. The adoption of new technologies for waste management is currently lacking thus slowing down the efficiency of the waste management processes.

The Atal Mission for Rejuvenation and Urban Transformation (AMRUT), with a primary focus on water and sewage in larger cities, has taken a generic approach to all cities rather than outlining a specified goal for each city. Currently, no government scheme offers specific guidelines for city wise liquid waste management.

**Sanitation Facilities:** With most schemes focusing on construction of toilets, the focus on usage by triggering behavioral change and shift in social beliefs is largely



missing. Most government schemes are defined with a national perspective, with no geographical considerations, making them less effective. While toilets are at the centre of all sanitation schemes, water supply systems, an essential component of sanitation, is often not taken in to account. Since the credibility of data on progress of schemes is suspect, the progress of projects often slows down (Bharat et al., 2020)

**Hygiene:** Currently, the government schemes do not provide for distribution of hygiene materials such as soaps and detergents. They also do not make it compulsory to follow personal hygiene practices in school and deliver limited hygiene education. In addition, while most government schemes on menstrual hygiene do not target private schools, almost 62.1% students in urban areas attend such institutions at the secondary and higher secondary level (NSSO, 2014). Guidelines for ensuing compulsory hand washing facilities and gender specific toilets in institutions have not been outlined by the government.

## 5.5 Recommendations

**Solid and Liquid Waste Management:** The segregation of liquid and solid waste at source as well as recycling need to be mandated by the government either by charging a fee or encouraging communities to take it up themselves. A strategic approach to optimizing reuse of wastewater, improving institutional responsibilities and recognizing wastewater as a resource, can result in major improvements in both health and environment. In addition, local bodies need to be incentivized to undertake sewage management.

**Sanitation Facilities:** Focus on gender specific needs must be enhanced to improve the sanitation experience and use of sanitation facilities. On-site sanitation needs to be given priority, together with supporting small-scale sanitation providers which will make the system efficient.

**Hygiene:** Given the impact of good hygiene practices on the health of a child, it is proposed that policies and programming aimed at addressing child stunting encompass WASH interventions, thus shifting emphasis from nutrition-specific to nutrition-sensitive programming.

There is a need to build awareness on hygiene practices at a community level, thus leading to collective behavior change. This can be done by systematically promoting hygiene behaviors and providing facilities and resources in schools. Specific efforts are required to increase children's understanding of the importance of hygiene and a clean school environment. Better personal hygiene practices can be propagated by promoting hygiene at the community level and ensuring availability of necessary facilities in proximity to toilets and kitchens.



# 6. Environment: The Backbone of a Healthy Life

## 6.1 Significance for Healthy Cities

The ecological environment combined with the living spaces and the safety together makes an immense and direct impact on people's health. Environmental diseases impact the marginalized population, in particular, women, children, and senior citizens, much more than the rest of the population. For example, continued exposure of pregnant women to ambient air pollution often leads to adverse health outcomes such as preterm delivery or underweight children.

An enabling environment that supports healthy life thus needs to focus on improving air, water, noise pollution, creating better urban spaces, and enhancing at the least the physical safety of citizens. SDG 3.9 seeks to “substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination and SDG 11 focuses on making cities and human settlements safe, inclusive and resilient, by 2030. The impact of the environment on building healthy cities was studied in the context of four sub pillars:

- ⌘ Pollution
- ⌘ Waste Generation
- ⌘ Urban Spaces
- ⌘ Safe Environments

Research has found that the stress of urban sprawling on civic amenities adversely impacts the ecology, which is a multiplied manifold with inadequate waste management, traffic congestion, and poor living conditions. The high prevalence of communicable diseases, such as tuberculosis in urban areas has been found to be a result of overcrowding and poor living conditions.

## 6.2 Key Findings

**Pollution:** Pollution occurs when harmful contaminants or pollutants are present in the environment in concentrations likely to harm living organisms and exceed a defined environmental quality standard. This desk research studies the norms and current status of land/soil, air, water, and noise pollution. Over the last decade, land/soil pollution has increased manifold, especially in certain low and middle-income countries. A major cause is the increased use of pesticides by four to ten times. Globally, over 3 million people are hospitalized for pesticide poisoning annually, resulting in a quarter of a million premature deaths.

Research has also found that 91% of the world's population lives in places with air quality well below the WHO limit, and in 2016 ambient air pollution alone was the cause of 4.2 million deaths. SDGs have thus set specific targets for improving indoor and ambient air pollution under SDG 3.9, 7.1, and 11.6, amongst others. Globally, New Zealand tops the charts in air quality, followed by Darussalam and Sweden. In India, Thane in Maharashtra and Valapad in Kerala, amongst others, record PM 2.5. In Madhya Pradesh, the best levels are PM10, with Datiya being at the top.



More than 5% of the world's population, i.e., 466 million people, have an affected hearing loss, with the majority living in low- and middle-income countries. As per the noise pollution standard limits set by the WHO and indicators of Ambient Air, Zurich, Switzerland, has the least incidence of noise pollution, and Guangzhou, China, has the highest. In India, CPCB has found that almost every city violates noise pollution standards. In Indore, noise pollution, though mostly high, has registered an 8% decline from the 2015 levels.

**Waste Generation:** Hazardous waste from various sources could lead to human toxicity either through oral consumption or inhalation. The industry generates a large amount of waste that needs to be treated. For instance, in Madhya Pradesh alone, industry generates 168594.11082 MT of hazardous waste, of which Indore accounts for 7477.80132 MT.

In addition, most low-income countries generate about 0.2 kg of average hazardous healthcare waste per hospital bed (WHO estimates). In 2019, Madhya Pradesh 17846 .68 kg per day of biomedical waste, with Indore generating the highest amount at 4652 kgs per day. In the context of COVID-19, CPCB, India recently released a set of guidelines to be followed by medical facilities while handling, treatment, and disposal of waste generated during treatment/diagnosis/ quarantine of patients.

Construction and demolition account for almost 50% of the total solid waste generated by cities globally, making its management a crucial activity for a clean and safe environment. The C&D recycling rates in China stood at 5% in 2013 and at 50% in India (2014). EU countries report recycling and recovery rates as high as over 90% and as low as 10%. With increasing instances of accidental deaths of animals, the amount of such waste is rising, making it essential for cities to put in place systems to manage such waste.

**Urban Spaces:** The characteristics of urban green spaces include accessibility, quality, size, presence of specific facilities, tree cover, distance from dwellings. Data shows that urbanization has a direct correlation with a reduction in the availability of urban green cover. As defined by the WHO, UGS has a definitive impact on mental health at varying levels for different population groups such as women, children, older adults, and PwDs. Therefore, SDG 11.7 emphasizes that cities must provide universal access to safe, inclusive, and accessible, green and public spaces to such population groups. Given that UGS is extremely important, particularly in developing countries where both air pollution and instances of depression are very high, the Government of India has issued specific guidelines for strengthening urban green spaces.

In addition to UGS, adequate and safe public spaces are also important for the wellbeing of populations. Public spaces are considered safe when they create a sense of security, are adequately policed, and offer an equitable environment for all sections of society.

Improved housing conditions can save lives, improve quality of life, reduce poverty and diseases, help mitigate climate change and contribute to the achievement of a number of Sustainable Development Goals, including those addressing health (SDG 3) and sustainable cities (SDG 11). Housing is, therefore, a major entry point for intersectoral public health programmes and primary prevention. The 2001 census found that only 19.8% of India's housing comes with concrete roofing and about 21.9% have thatched roofing.

**Safe Environments:** Violence against women is a major public health and human rights concern, with intimate partner violence and sexual violence among the most pervasive forms of violence against women. The UN Women's four-pronged approach



to making cities and public spaces safe for women and girls includes identifying locally relevant solutions and laws and policies. WHO has also issued guidelines to control instances of Intimate Partner Violence, a major aspect of violence against women. These include putting in place women-centered care norms and reaching out to survivors. While IPV has been a global challenge forever, the COVID-19 pandemic led to a sharp increase in cases of domestic violence.

Child safety is the other key aspect of a safe environment. Most violence against children involves falls into one of the six types of interpersonal violence that tend to occur at different stages in a child's development. UNICEF monitors and reports on a range of key indicators of child protection such as birth registration, child labor, child marriage, female genital mutilation, and violence against children. SDG 16.2 focuses on ending abuse, exploitation, trafficking, and all forms of violence and torture of children. Globally, an estimated one billion children aged 2–17 years have experienced physical, sexual, or emotional violence or neglect. In India, both girls and boys face early marriage, domestic abuse, sexual violence, domestic and school violence, trafficking, cyber violence, child labor, and bullying. According to Census 2011, child laborers in India stood at 10.1 million. As per NCRB reports, Madhya Pradesh accounted for the highest number of missing children, with Indore recording maximum numbers in 2017 and 2018 (Tripathi, 2020).

### 6.3 Government Interventions

According to Article 48 of the Directive Principles of State Policy, the state shall endeavor to protect and improve the environment and to safeguard the forests and wildlife of the country. These have a direct impact on pollution, waste generation, and the quality of urban spaces. In pursuance of articles 48 and 51-A, the Government of India has launched a series of policies, laws, and schemes. These include the National Environment Policy, National Green Tribunal Act, Public Liability Insurance Act, Biological Diversity Act, amongst others.

**Pollution:** The Environment Protection Act, 1986 was specifically passed to protect biodiversity and prevent and control environmental pollution. In addition, the following efforts are driven by the Government to improve Air Quality and protect the Ozone layer:

- 1) The Air (Prevention and Control of Pollution) Act, 1981
- 2) National Clean Air Programme
- 3) The Ozone Depleting Substances (Regulation and Control) Rules, 2000

The CPCB also monitors ambient air quality through 328 stations that cover 115 cities/towns in 28 states and 4 Union Territories to determine the level of compliance and assess health hazards. The Madhya Pradesh Pollution Control Board identified 192 industries such as textiles, vegetable oils, soap manufacturing that are now pursuing ECOMARK certification by producing environment-friendly products

Apart from the Noise Pollution (Regulation and Control) Rules, 2000, which are aimed at controlling noise levels, specific rules have also been defined for factories and traffic. The rules define the responsibilities of various stakeholder groups, impose restrictions on creating noise and identify silence zones.

The Government has rolled out a series of centrally sponsored schemes for watershed management, soil conservation, and sustainable agriculture. Soil Health Management is a key intervention to promote the location as well as crop



sustainability by linking soil fertility maps with nutrient management, judicious application of fertilizer, and organic farming practices. The Water (Prevention and Control of Pollution) Act, 1974 was enacted to prevent and control water pollution and maintain or restore its wholesomeness.

**Waste Generation:** The Government of India has put in place laws to ensure proper disposal and management of biomedical wastes, industrial wastes, and construction and demolition wastes. These Acts outline the duties of those responsible for generating the waste, the operators of waste treatment centers, and the government authorities. They also outline the process for treatment and disposal. The process for disposal of dead animals under the charge of an individual as well as those that are unattended is defined under the India code.

The Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008 were rolled out to provide guidelines for managing hazardous wastes other than biomedical wastes, municipal and solid wastes, wastewater, and exhaust gases.

**Urban Spaces:** The Government of India has outlined guidelines for Urban and Regional Development Plan Formulation and Implementation (URDPFI). These ensure the incorporation of recreational space, organized green space, and other common open spaces in cities. The implementation of the National Mental Health Program contributes to improving the mental health of populations residing in urban spaces by ensuring the availability of mental healthcare for all and the application of mental health knowledge. The Accessible India Campaign (Sugamya Bharat Abhiyan) was launched by the Ministry of Social Justice and Empowerment to make urban spaces accessible and inclusive. The campaign aims to create a barrier-free and conducive environment for persons with disabilities.

**Safe Environments:** The Government of India's keen focus on ensuring the creation of safe environments for women and children is demonstrated by the setting up of the Ministry of Women and Child Development. Specific laws have been enacted for women's protection from domestic violence, dowry, sexual harassment at the workplace, amongst others. The National Commission for Women was set up by an Act of Parliament in 1990 to safeguard the rights and legal entitlements of women.

To address the biggest challenge of child labor, the Government of India promulgated the Child Labour Prohibition and Regulation Act, which was further amended in 2016. The Factories Law and the Labour Law also have specific rules to check child labor. Other laws that protect the rights of children in India include the Juvenile Justice Act, Protection of Child Rights Act and Protection of Children from Sexual Offences.

## 6.4 Gap Analysis

**Pollution:** Though multiple laws and acts have been passed to control various types of pollution in India, they generally lack a specific roadmap and pathways to achieve the stated goals. While soil pollution schemes are being implemented in all earnestness, their focus is limited to improving soil quality by controlling contamination from fertilizers and other chemicals. Other forms of land pollution, such as dumping, illegal discharge of untreated industrial effluents, and other such factors have not been considered. Further, information on the implementation of these schemes and policies is not available, making it difficult to monitor progress.



**Waste Generation:** While there are several acts to regulate hazardous waste, these have not been updated to meet the contemporary challenges. For example, there are limited policies to curb waste generated due to population explosion, especially in cities. In addition, there is a lack of substantial data on the implementation and reach of the rules and regulations set, making it difficult to monitor their effectiveness and improve implementation.

Since the laws permit the recycling of only naturally sourced materials from the CDW, most construction agencies avoid using them, leading to an increase in unusable waste and no reuse. Substandard public awareness and participation in limiting waste generation and the recycling laws are the need of the hour.

**Urban Spaces:** Though various measures have been taken to improve urban spaces in cities there is a limited amount of attention given to densely populated areas. These areas occupied by low-income communities, need special attention and require different strategies and solutions as compared to sparsely populated areas in the city. In addition, there is very low importance given to residential gardens and roof gardens despite availability in space.

There is a lack of public participation in urban area development and maintenance. Further, there is a need for regulations to inculcate a sense of responsibility to protect the environment, specifically urban spaces (Imam, A. U. et al. 2016)

**Safe Environments:** A lack of woman centric care coupled with a male dominated society has led to increasing crimes against women making safety a key concern in India. Further, the slow pace of operation of Indian judiciary is another major reason for the increase in unsafe environments for women and children.

## 6.5 Recommendations

**Pollution:** All programmes aimed at abetting soil pollution implemented by the Government must have a comprehensive monitoring system. A possible solution or intervention to reducing water pollution is to have stringent prevention policies rather than policies that involve the treatment of already produced wastewater. Water pollution also needs to be addressed using a non-point source approach, tracing back to the beginning of the chain and identifying methods to reduce use of contaminants, thus reducing pollution levels.

Existing air pollution measures taken by the Government are generic and do not target a specific location or source, which is much needed. This can be done by offering green options for LPG, improved access to cost-effective options, and building common solar panels to reduce the ill effects of burning fuels on the environment. Vehicular pollution control guidelines must consider location, population, type of vehicle, amongst others, and these need to be implemented strictly. Indoor air pollution also needs to be addressed by spreading awareness on solar cookers, improved fuelwood stoves, an increase in the use of biomass fuels, and more.

Technologies for clean fuel and fuel substitution in combustion processes in industries may be encouraged for air pollution control. The industry should be advised to provide a rigorous database for audit and further action in case of non-compliance.

**Waste Generation:** All hazardous waste must be separated at the source and managed in an environmentally sound manner. Stopping uncontrolled mixing of hazardous & non-hazardous waste, disposal of such waste in an unsafe and



uncontrolled manner, and eliminating unsafe recycling practices needs to be the first priority. Management of healthcare waste requires increased attention and diligence to avoid adverse health outcomes associated with the poor practice, including exposure to infectious agents and toxic substances.

**Urban Spaces:** To target the issue of diminishing residential gardens, there needs to be strict enforcement of regulations and guidelines issued to urban areas. The increasing number of flat-roofed buildings in India can be leveraged to develop roof gardens with an added benefit of activities such as rainwater harvesting, which will aid the growth of the green space.

**Safe Environments:** For the improvement of women's safety, there is a need for involvement of more women in every sphere of society (Times of India, 2019). Additionally, emergency services and police stations must have a higher percentage of female staff to build a more conducive environment for women to feel safe.

Technology can provide a certain level of sense of safety like increase in CCTVs, panic buttons and GPS tracking services. However, these technologies cannot ensure a safe environment but can be used as a pathway to achieve a safer environment.



# 7. Individual and Family Health: Defining Healthy Cities

## 7.1 Significance for Healthy Cities

The nature of a family continues to play a crucial role in nurturing and socializing children, influencing adolescent development, nutrition of women and children, health impacting behaviors. These, in turn, affect individual and family health in both positive and negative ways. Health challenges particularly manifest in cities relate to water, environment, violence and injury, noncommunicable diseases (cardiovascular diseases, cancers, diabetes, and chronic respiratory diseases), unhealthy diets and physical inactivity, harmful use of alcohol as well as the risks associated with disease outbreaks.

In this context, the WHO outlined 100 Core Health Indicators in the Global Reference List, 2018, some of which are focused on mortality rates by age, gender and causes, fertility, and morbidity. Specific targets under these are being pursued through SDGs 1, 3, 11, and 16. The impact of individual and family health on building healthy cities was studied in the context of sub pillars:

- ⌘ Reproductive and Child Health
- ⌘ Communicable and Infectious Diseases
- ⌘ Noncommunicable Diseases
- ⌘ Geriatric Disorders
- ⌘ Substance Abuse

India's health system faces a twofold challenge of rising non-communicable diseases occurring due to lifestyles and continuing high incidence of communicable diseases. The nature of this challenge varies across the country, with Madhya Pradesh facing much higher cardiovascular risks compared to other states.

## 7.2 Key Findings

**Reproductive and Child Health:** Reproductive, maternal, and child health need to be dealt with together as they are closely connected to the health of the population at different stages of the life cycle. All elements of reproductive health care, including family planning, essential obstetric care, delivery, play an important role in reducing maternal and neonatal mortality. SDG 3 has thus set specific targets for ensuring healthy lives and promoting wellbeing for all ages.

Chief indicators of RMCH status defined by the WHO include maternal and child mortality, stunting, breastfeeding practices, and family planning, amongst others. The NHFS's key indicators of RMCH focus on antenatal care, registered deliveries, delivery care, and post-natal care. More than 80% of maternal deaths worldwide take place due to five direct causes that occur during pregnancy. Though unpredictable, these can be prevented or treated by skilled health workers in properly equipped



facilities. In India, neonatal mortality is primarily attributed to premature births and low birth weight and to a certain extent, pneumonia, amongst other causes (Drishti, 2020).

Immunization is a simple and effective way of protecting children from life-threatening infectious diseases. Children are administered basic vaccinations as per a national schedule and implementation measured in terms of the defined coverage rate defined in the schedule. The NFHS 2015-16 found that In India, 62 percent of children aged 12-23 months received all basic vaccinations. The highest numbers of partially immunized and unimmunized children are found in large states such as Bihar, Madhya Pradesh, Uttar Pradesh, and Rajasthan.

**Communicable and Infectious Diseases:** According to the Centers for Disease Control, USA, infectious diseases are illnesses caused by germs that enter the body, multiply, and can cause an infection. Some of these are communicable and spread from person to person. Some of the vector-borne diseases, caused in humans by parasites, viruses, and bacteria and transmitted by vectors, are preventable. Zoonotic diseases are infectious diseases of animals that spread to humans through ticks, mosquitoes, or fleas, or contact with animals.

In 2018, globally, an estimated 10 million people fell ill with tuberculosis (TB), and 1.5 million people died of the disease. In that year, India led the count of TB burden, followed by China. In addition, as per WHO estimates, India was amongst the 20 countries that accounted for 85% of global malaria deaths in 2018. According to the India HIV Estimation 2017 report, National adult (15–49 years) HIV prevalence in India is estimated at 0.22% (0.16% – 0.30%) in 2017.

The SDG 3.3 has set the targets to end epidemics of AIDS, tuberculosis, malaria, and neglected tropical diseases and combat hepatitis, water-borne diseases, and other communicable diseases. India faces a huge health burden triggered by these diseases.

**Non-Communicable Diseases (NCDs):** Noncommunicable diseases (NCDs), such as heart conditions, cancer, diabetes, tend to be of long duration and are the result of a combination of genetic, physiological, environmental, and behavioral factors. Modifiable behaviors, such as tobacco use, physical inactivity, unhealthy diet, and the harmful use of alcohol, all increase the risk of NCDs.

According to the WHO, noncommunicable diseases (NCDs) kill 41 million people each year, equivalent to 71% of all deaths globally. Each year, 15 million people in low- and middle-income countries die premature deaths because of an NCD. In India, out of 3,57,23,660 patients visiting NCD clinics, 10.22% are diagnosed with hypertension, and another 8.41% people are diagnosed with diabetes. According to WHO, in 2016, India had a 7.8% prevalence of diabetes. Amongst all NCDs, cancer is the second leading cause of death globally, accounting for an estimated 9.6 million deaths in 2018. In India, breast cancer accounts for 14% of all cancers in women and having the highest mortality rate, i.e., 11.1% (The Global Cancer Observatory, WHO, 2021).

The SDG 3.4 has set targets to reduce by one-third premature mortality from noncommunicable diseases through prevention and treatment and promote mental health and wellbeing:

**Geriatric Disorders:** Older age is characterized by the emergence of several complex health states that tend to occur only later in life and that do not fall into discrete disease categories. These are commonly called geriatric syndromes (World Health Organization, 2018). Older age is characterized by the emergence of several complex



health states that tend to occur only later in life and that do not fall into discrete disease categories. These are commonly called geriatric syndrome (World Health Organization, 2020).

**Substance Abuse:** The Healthy City 2020 report defines substance abuse as a set of related conditions associated with consumption of mind- and behavior-altering substances that have negative behavioral and health outcomes. The Tenth Revision of the International Classification of Diseases and Health Problems (ICD-10) defines dependence syndrome as a cluster of physiological, behavioral, and cognitive phenomena in which the use of a substance or a class of substances takes on a much higher priority than other behaviors that once had greater value. Given that the prevalence and pattern of abuse vary from country to country as well as among different demographics, the National Survey on the Extent and Pattern of Substance Use in India used various indicators to ascertain the harmful use and dependence for different substances.

Over 80% of the 1.3 billion tobacco users worldwide live in low- and middle-income countries, where the burden of tobacco-related illness and death is heaviest. The GATS-2 (2016-17) found that in India, there was a 21.4% prevalence of smokeless tobacco users; Madhya Pradesh has a slightly higher prevalence at 28.1%. The WHO reported that worldwide, every year, three million deaths result from harmful use of alcohol. Nationally, about 14.6% of the population (between 10 and 75 years of age) consumes alcohol, with alcohol dependence at around 2.7%. Harmful use of cannabis and dependence is the most common drug-use disorder in epidemiological surveys in Australia, Canada, and the USA.

The Sustainable Development Goal 3 has set targets for reducing substance abuse to ensure healthy lives and promote wellbeing for all of all ages.

## 7.3 Government Interventions

The Government of India has several programmes and schemes to foster the better health of the citizens. The National Health Mission, launched in 2013, is the overarching program. It aims to achieve universal access to equitable, affordable, and quality health care services, accountable and responsive to people's needs, with effective inter-sectoral convergent action to address the wider social determinants of health. It encompasses two sub-missions, National Rural Health Mission (NRHM) and the National Urban Health Mission (NUHM). In addition, the National Health Policy seeks to reach everyone in a comprehensive, integrated way to move towards wellness and aims to achieve universal health coverage by delivering quality health care services to all at affordable cost.

**Reproductive and Child Health:** The Government's Reproductive, Maternal, Newborn Child plus Adolescent Health (RMNCH+A) strategy influences key interventions for reducing maternal and child morbidity and mortality. It is built on the concept of a continuum of care and is holistic in design. The strategy focuses on health systems strengthening (HSS), prioritizing high-impact interventions at various stages of the life cycle, and prioritizing geographical areas based on evidence.

It is implemented through a number of schemes focused on mother and child health. Some of these are aimed at eliminating out-of-pocket expenses for both pregnant women and sick infants, assured, comprehensive, and quality antenatal care, maternity benefits, and improving attendance of children at Anganwadi centers.



To address the higher neonatal and early neonatal mortality, the Government has stressed the creation of facility-based newborn care services at health facilities. Other government programmes also focus on reducing mortality, frequency, and severity of illness and disability and contribute to improved growth and development during the first five years of a child's life.

The Universal Immunization Programme provides life-saving vaccines to all children across the country free of cost to protect them against preventable diseases. Mission Indradhanush was launched to vaccinate all children against preventable diseases by 2020.

**Communicable and Infectious Diseases:** The Integrated Disease Surveillance Program (IDSP) has been implemented to strengthen decentralized laboratory-based IT-enabled disease surveillance systems, monitor disease trends, and detect and respond to outbreaks in the early rising phase through a trained Rapid Response Team (RRTs). In addition, an umbrella program to prevent and control vector-borne diseases has set itself the target of making India a malaria-free country. India is pursuing the goal of completely eliminating TB by 2025; in parallel, efforts are directed at reducing TB-based mortality and providing patients with nutritional support.

Efforts to slow down the spread of HIV infections with a view to reducing morbidity, mortality, and the impact of AIDS are being driven under the National AIDS Control Programme (NACP- I). A leprosy eradication program focuses on early detection, treatment, awareness, and rehabilitation of patients.

**Non-Communicable Diseases:** The Government's comprehensive program to control NCDs, the National Program for Prevention and Control of Cancer, Diabetes, Cardiovascular Disease, and Stroke (NPCDCS) works to increase awareness on risk factors. Infrastructure to manage these diseases and opportunistic screening at PHC levels are also undertaken through this program.

Cardiovascular disease being the leading cause of death in India, the Indian Council of Medical Research (ICMR) joined hands with the Ministry of Health and Family Welfare (MoHFW) WHO and other stakeholders to launch the India Hypertension Control Initiative. This project aims to reduce morbidity and mortality due to CVDs in the country.

**Geriatric Disorders:** The National Program for Health Care of Elderly (NPHCE) was introduced to address various health-related problems of the elderly. It is an articulation of the Government's international and national commitments and offers a community-based primary health care approach. The services are delivered through the Government's healthcare infrastructure, including PHCs and district hospitals.

**Substance Abuse:** The Government assists voluntary organizations for the prevention of alcoholism and drug abuse under the Scheme for Prevention of Alcoholism and Substance (Drugs) Abuse. Financial assistance is provided to innovative/pilot welfare and empowerment projects aimed at the target groups. The other substance to which people are addicted is tobacco. The National Tobacco Control Program (NTCP), while creating awareness about the harmful effects of tobacco, helps people quit the substance. COTPA, 2003 is an act prohibiting promotion and commerce in cigarettes and other tobacco products.



## 7.4 Gap Analysis

**Reproductive and Child Health:** Despite the extensive government efforts at improving reproductive and child health, research has found that nearly two-thirds of all maternal deaths are caused by post-natal severe bleeding and infections, and hypertension during pregnancy. The National Family Health Survey (NFHS-4) indicates that women's education, household wealth status, and sociodemographic factors play a significant role in seeking maternal healthcare. The gap remains in both antenatal and neonatal health-seeking behavior. Availability and accessibility of around-the-clock health delivery service, especially with neonatal care facilities that largely determine infant mortality, remain limited.

A UNICEF study determined that India lacks a reliable framework for monitoring vaccine-preventable diseases. Challenges in achieving full immunization coverage include limited staff capacity and gaps in demand prediction, logistics, and cold chain management, resulting in high waste rates. The multiplicity of service-providing facilities lacking uniformity, slum population characteristics, the poor spread of information, and long immunization schedules in repeated successions make caregivers vaccine-hesitant (Dasgupta et al., 2018).

**Communicable and Infectious Diseases:** The burden of communicable diseases in India is high due to factors such as poor hygiene practices, people's lack of access to safe water, slum crowdedness, and a significant lack of awareness of disease prevention. In addition, specific challenges exist for the control and prevention of diseases such as TB, Malaria, and HIV/AIDS.

Development of an effective surveillance system, accelerated identification of cases and expansion and strengthening of DOTS, expanding the treatment network, and effective coordination among healthcare providers remain some key gaps in effective control of TB. With respect to Malaria, studies have found that though most residents know the importance of using bed nets, the usage is very low. Stigma and discrimination continue to remain big barriers in HIV/AIDS-infected people accessing health, medical, and care services (Saki et al., 2015).

**Non-Communicable Diseases:** An inadequate geographic and demographic coverage of the NCD risk factors and absence of a standardized methodology is the major deficiencies of India's NCD control efforts. A major gap in cancer control is the lack of an organized, systematic, Government-funded screening program for breast cancer as per WHO recommendations.

**Geriatric Disorders:** Lack of awareness, inadequate training opportunities, inequitable distribution of health resources, and the virtual absence of chronic care disease models are the challenges faced by geriatric psychiatry in India. Moreover, the Government's NPHCE program addresses most health challenges of the elderly in an institutional healthcare system while completely neglecting home-based care of elderly persons.

**Substance Abuse:** These risk factors arising out of substance abuse include exposure of children to adverse events such as abuse, neglect, criminality and mental illness of household members, and parental discord. Though the prevalence of alcohol consumption is high in India, there is no government action particularly working on the harmful use of alcohol.



## 7.5 Recommendations

**Reproductive and Maternal Health:** Expanding the coverage of healthcare and raising awareness about pregnancy and childbirth can help mothers understand when to seek medical help and strengthen the functionality of referral networks that can prevent maternal deaths. Early identification of hypertension, anemia by ANMs can lead to an early referral and prompt correction. Improving female literacy rates will certainly help improve child health (Tiwari et al., 2009).

**Communicable Diseases:** Improving awareness amongst illiterates to remove myths and misconceptions and allay the attached social stigma will help decrease TB transmission and improve the efficacy of DOTS. Malaria control campaigns need to be designed according to the knowledge gaps, practices, environments, resources, and preferences of different cities, using interpersonal and media channels most likely to reach the target audiences. Building general knowledge about HIV/AIDS can create positive attitudes for patients' health care. It is, therefore, necessary to implement strategies for eliminating wrong conceptions to reduce stigma and discrimination (Saki et al., 2015).

**Non-Communicable Diseases:** To control the spread of NCDs, India requires an integrated and comprehensive approach that emphasizes health promotion population-based interventions, prevention of exposure to risk factors, specific measures at individual and family level, early diagnosis through screening and better diagnostic facilities, improved capacity for management and universal access to health services. Diabetes mellitus can be prevented by generating awareness amongst peers, public health experts, health services researchers, healthcare providers, and planners to reflect on the higher prevalence and associated risk factors of diabetes mellitus.

In India, the prevalence and mortality due to cervical and breast cancer are high, necessitating government action focused on screening and early cancer detection.

**Geriatric Disorders:** In India, the prevalence and mortality due to cervical and breast cancer are high necessitating government action focused on screening and early cancer detection.

**Substance Abuse:** Efforts need to be made to increase awareness regarding the health risks of chewing areca-nut. These campaigns must be directed at the general public, parents, teachers, and children/adolescents to discourage developing habits. The government also needs to spread awareness about the harmful effects of alcohol by launching media campaigns and community involvement. Increased consumption of new substances such as solvents that are cheap and readily available by youngsters is alarming (Faiza et al., 2019). Multicenter studies in larger sample sizes in slums are required to get a deeper understanding of these issues.



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# WHAT MAKES A HEALTHY CITY?



## A Desk Research Report



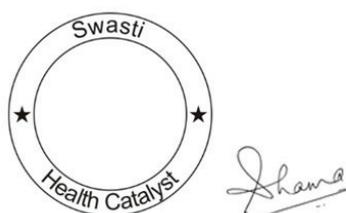
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## Designer

**Shrirupa Sengupta and The Pen & Mouse**

# WHAT MAKES A HEALTHY CITY?

## A Desk Research Report



# Contents

<b>ACRONYMS</b>	<b>1</b>
<b>About this Desk Research Report</b>	<b>7</b>
<b>1. FOOD</b>	<b>9</b>
<b>1.1. Significance for Healthy Cities</b>	<b>10</b>
1.1.1. Food Nutrition Security: Access and Storage	11
1.1.2. Food Safety and Adulteration	13
1.1.3. Nutrition and Food Habits	16
<b>1.2. Government Interventions</b>	<b>26</b>
1.2.4. Food/Nutrition Security: Access and Storage	26
1.2.1.1. National Food Security Act, 2013	26
1.2.4.2. Targeted Public Distribution System	26
1.2.4.3. Antyodaya Anna Yojana	26
1.2.4.4. Targeted Public Distribution System, Madhya Pradesh	27
1.2.5. Safety and Adulteration	27
1.2.1.1. National Policy on Food grain Handling, Storage and Transportation	28
1.2.5.2. Draft National Food Processing Policy, 2019	28
1.2.5.3. Infrastructure Development	28
1.2.5.4. Consumer Awareness Campaigns	29
1.2.6. Nutrition and Food Habits	29
1.2.1.1. Achieving Nutrition Targets	29
<b>1.3. Problem Statement and Gap Analysis</b>	<b>34</b>
1.3.1. Food/Nutrition Security: Access and Storage	34
1.3.2. Safety and Adulteration	34
1.3.3. Nutrition and Food Habits	35
<b>1.4. Recommendations</b>	<b>39</b>
<b>1.5. Bibliography</b>	<b>41</b>
<b>2. WATER</b>	<b>47</b>
<b>2.1. Significance for Healthy Cities</b>	<b>48</b>
2.1.1. Water Security: Access and Supply	49
2.1.2. Water Conservation	53
2.1.3. Water Quality	55
2.1.4. Wastewater Management	57

<b>2.2. Government Interventions</b>	<b>62</b>
2.2.1. Common Interventions	62
2.2.1.1. National Water Policy	62
2.2.1.2. National Water Mission	63
2.2.1.3. Atal Bhujal Yojana (Atal Jal)	63
2.2.1.4. Atal Mission for Rejuvenation and Urban Transformation (AMRUT)	63
2.2.1.5. High-Powered Expert Committee (HPEC)	64
2.2.1.6. State Water Policy – Madhya Pradesh	64
2.2.1.7. Jal Kranti Abhiyan	65
2.2.1.8. Chief Minister Urban Drinking Water Scheme	65
<b>2.3. Problem Statement and Gap Analysis</b>	<b>66</b>
2.3.1. Water Security and Water Conservation	66
2.3.2. Water Quality	67
<b>2.4. Recommendations</b>	<b>68</b>
<b>2.5. Bibliography</b>	<b>70</b>
<b>3. SANITATION</b>	<b>73</b>
<b>3.1. Significance for Healthy Cities</b>	<b>74</b>
3.1.1. Solid and Liquid Waste Management	75
3.1.2. Sanitation Facilities	78
3.1.3. Hygiene	83
<b>3.2. Government Interventions</b>	<b>88</b>
3.2.1. Common Interventions	88
3.2.1.1. Total Sanitation Campaign	88
3.2.1.2. Swachh Bharat Abhiyan	88
3.2.1.3. National Urban Sanitation Policy	89
3.2.1.4. Swachh Survekshan and Nirmal Shahar Puraskar	89
3.2.2. Solid and Liquid Waste Management	90
3.2.2.1. National Policy on Faecal Sludge and Septage Management (FSSM)	90
3.2.2.2. Sanitation Infrastructure schemes	91
3.2.3. Hygiene	91
3.2.3.1. Swachh Bharat Swachh Vidyalaya	91
3.2.3.2. School Sanitation and Hygiene Education	91
3.2.3.3. Multi-Sectoral Development Programme (MSDP)	91
3.2.3.4. Integrated Urban Sanitation Programme (IUSP)	92
<b>3.3. Problem Statement and Gap Analysis</b>	<b>93</b>
3.3.1. Solid and Liquid Waste Management	93



3.3.2. Sanitation	94
3.3.3. Hygiene	95
<b>3.4. Recommendations</b>	<b>97</b>
<b>3.5. Bibliography</b>	<b>98</b>
<b>4. ENVIRONMENT</b>	<b>101</b>
<b>4.1. Significance for Healthy Cities</b>	<b>102</b>
4.1.1. POLLUTION: Pollutants and Effects	102
4.1.1.1. Land and Water Pollution	103
4.1.1.2. Air Pollution	104
4.1.2. Waste Generation and Management	107
4.1.2.1. Hazardous Waste	107
4.1.2.2. Biomedical Waste	108
4.1.2.3. Industrial Waste	110
4.1.2.4. Construction and Demolition Waste (CDW)	110
4.1.2.5. Dead Animal Waste	112
4.1.3. URBAN spaces	112
4.1.3.1. Urban Green Spaces	112
4.1.3.2. Public Spaces	116
4.1.3.3. Housing and Living Spaces	117
4.1.4. Safe Environment	119
4.1.4.1. Women's Safety	119
4.1.4.2. Child Safety	123
<b>4.2. Government Interventions</b>	<b>125</b>
4.2.1. Common Interventions/Regulation	125
4.2.1.1. National Environment Policy 2006	125
4.2.1.2. The National Green Tribunal Act, 2010	125
4.2.1.3. Environmental Legislations in India	126
4.2.1.4. Environment Protection Act	126
4.2.2. Pollution	126
4.2.2.1. Land and Water Pollution	126
4.2.2.2. Air Pollution	127
4.2.2.3. Noise Pollution	128
4.2.3. Waste Generation and Management	129
4.2.3.1. Hazardous Wastes	129
4.2.3.2. Industrial Wastes	129
4.2.3.3. Biomedical Wastes	129
4.2.3.4. Construction and Demolition Waste (CDW)	130

4.2.3.5. Dead Animal Waste	130
4.2.4. Urban Spaces	130
4.2.1.1. Urban and Regional Development Plan Formulation and Implementation	130
4.2.4.2. The National Mental Health Programme (NMHP)	130
4.2.4.3. Accessible India Campaign (Sugamya Bharat Abhiyan)	130
4.2.5. Safe Environment	131
4.2.1.1. Ministry of Women and Child Development	131
4.2.5.2. National Commission for Women	131
4.2.5.3. Laws Preventing Child Labour	131
<b>4.3. Problem Statement and Gap analysis</b>	<b>132</b>
4.3.1. Common Themes	132
4.3.1.1. Land and Water Pollution	132
4.3.1.2. Air Pollution	132
4.3.1.3. Noise Pollution	133
4.3.2. Waste Generation and Management	133
4.3.1.1. Common Themes	133
4.3.2.2. Biomedical Waste	133
4.3.2.3. Construction and Demolition Waste	133
4.3.2.4. Industrial Waste Management	134
4.3.3. Urban Spaces	134
4.3.1.1. Urban Green Spaces	134
4.3.3.2. Safe Environments	134
<b>4.4. Recommendations</b>	<b>135</b>
4.4.1. Pollution	135
4.4.1.1. Soil/Land Pollution	135
4.4.1.2. Air Pollution	135
4.4.1.3. Water Pollution	135
4.4.2. Waste Generation and Management	135
4.4.1.1. Hazardous Waste	135
4.4.2.2. Biomedical Waste	136
4.4.2.3. Industrial Waste	136
4.4.2.4. Construction and Demolition Waste	136
4.4.3. Urban Spaces	137
4.4.1.1. Urban Green Spaces	137
4.4.3.2. Safe Environments	138
<b>4.5. Bibliography</b>	<b>139</b>



<b>5. INDIVIDUAL AND FAMILY HEALTH</b>	<b>143</b>
<b>5.1. Significance for Healthy Cities</b>	<b>144</b>
5.1.1. Reproductive and Child Health	144
5.1.1.1. Maternal and Child Health	145
5.1.1.2. Immunisation	147
5.1.2. Communicable and Infectious Diseases	148
5.1.2.1. Tuberculosis (TB)	149
5.1.2.2. Malaria	150
5.1.2.3. Human Immunodeficiency Virus (HIV) and AIDS	151
5.1.2.4. COVID-19 Pandemic	151
5.1.3. Non-Communicable Diseases (NCD)	152
5.1.3.1. Diabetes	153
5.1.3.2. Cardiovascular Disease	154
5.1.3.3. Cancer	154
5.1.4. Senior Care/Geriatric Care	155
5.1.5. Substance Abuse	156
5.1.5.1. Tobacco	157
5.1.5.2. Alcohol	159
5.1.5.3. Drugs (Cannabis and Opioids)	160
<b>5.2. Government Interventions</b>	<b>161</b>
5.2.1. Common Interventions (Policies and Programmes)	161
5.2.1.1. National Health Mission	161
5.2.1.2. National Urban Health Mission	161
5.2.1.3. National Health Policy 2017 (NHP, 2017)	161
5.2.2. Reproductive, Maternal and Child Health	162
5.2.2.1. Reproductive, Maternal, New-born Child plus Adolescent Health (RMNCH+A)	162
5.2.2.2. Maternal Health	162
5.2.2.3. Child Health	163
5.2.2.4. Immunisation	164
5.2.3. Communicable and Infectious Diseases	165
5.2.3.1. Integrated Disease Surveillance Programme (IDSP):	165
5.2.3.2. National Vector Borne Diseases Control Programme (NVBDCP):	165
5.2.3.3. Tuberculosis	165
5.2.3.4. Malaria	166
5.2.3.5. HIV and AIDS	166
5.2.4. Non-Communicable Diseases	167
5.2.4.1. Common Interventions (Policies and Programmes)	167

5.2.4.2. Cardiovascular Diseases	167
5.2.4.3. Geriatric Health	167
5.2.4.4. Substance Abuse	168
<b>5.3. Problem Statements and Gap Analysis</b>	<b>169</b>
5.3.1. Reproductive and Child Health	169
5.3.1.1. Maternal Health and Child Health	169
5.3.1.2. Immunisation	169
5.3.2. Communicable and Infectious Diseases	170
5.3.1.1. Tuberculosis	170
5.3.2.2. Malaria	170
5.3.2.3. HIV and AIDS	170
5.3.3. Non-Communicable Diseases	170
5.3.1.1. Diabetes	170
5.3.3.2. Cardiovascular Diseases	171
5.3.3.3. Cancer	171
5.3.4. Geriatric Disorders	171
5.3.5. Substance Abuse	172
5.3.1.1. Tobacco	172
5.3.5.2. Alcohol	172
5.3.5.3. Drugs (Cannabis and Opioids)	173
<b>5.4. Recommendations</b>	<b>174</b>
5.4.1. Reproductive and Maternal Health	174
5.4.2. Communicable Diseases	174
5.4.3. Non-Communicable Diseases	175
5.4.4. Senior Care	175
5.4.5. Substance Abuse	175
<b>5.5. Bibliography</b>	<b>176</b>
<b>6. DETERMINANTS OF HEALTH</b>	<b>183</b>
<b>6.1. Determinants of Health</b>	<b>184</b>
6.1.1. Social Determinants of Health	184
6.1.2. Physical Health	184
6.1.3. Health System	184
6.1.4. Healthcare Delivery	185
6.1.5. Healthcare Seeking Behaviour	185
6.1.6. Health Literacy	186
<b>6.2. Bibliography</b>	<b>187</b>



<b>7. ANNEXURE</b>	<b>189</b>
<b>7.1. FOOD</b>	<b>189</b>
7.1.1. Annexure 1: Indicators for Children's Nutritional Status	189
<b>7.2. WATER</b>	<b>191</b>
7.2.1. Annexure 2: Use of Drinking Water Sources in India	191
7.2.2. Annexure 3: Methods for reducing household water consumption	193
7.2.3. Annexure 4: WHO Guideline Values for drinking water quality	194
7.2.4. Annexure 5: Guidelines for maintenance and operation of a wastewater system	196
7.2.5. Annexure 6: Details of Jal Kranti Abhiyan	198
<b>7.3. SANITATION</b>	<b>200</b>
7.3.6. Annexure 7: Parameters for sewage treatment before disposal into the environment	200
7.3.7. Annexure 8: Indicators to assess adequacy of sanitation systems	200
7.3.8. Annexure 9: The general indicators to measure hygiene practices	201
<b>7.4. ENVIRONMENT</b>	<b>202</b>
7.4.1. Annexure 10: The indicators for ambient air pollution are	202
7.4.2. Annexure 11: Guideline values from WHO Air Quality guidelines	203
7.4.3. Annexure 12: Noise pollution standard limits set by the WHO	203
7.4.4. Annexure 13: WHO Recommendations on Environmental Noise for European Region	205
7.4.5. Annexure 14: Types of Bio Medical Waste	206
7.4.6. Annexure 15: Some Sources and Quantum of Industrial Waste Generation	206
7.4.7. Annexure 16: Indicators of Social and Mental Wellbeing	207
7.4.8. Annexure 17: Guidelines for strengthening urban green spaces	208
7.4.9. Annexure 18: Principles of universal design	208
7.4.10. Annexure 19: Housing standards in India	209
7.4.11. Annexure 20: Details of Construction Material Used in India	210
7.4.12. Annexure 21: Types of Violence Faced by Children	211
7.4.13. Annexure 22: Objectives of the National Environment Policy, 2006	212
7.4.14. Annexure 23: Objectives Soil Health Card (SHC)	212
7.4.15. Annexure 24: Features of the Noise Pollution (Regulation and Control) Rules, 2000	213
7.4.16. Annexure 25: Details of Hazardous Waste Rules	214
7.4.17. Annexure 26: Duties under Bio Medical Waste Management Rules	214
7.4.18. Annexure 27: Duties under Construction and Demolition Waste Management Rules, 2016	215
7.4.19. Annexure 28: WHO's Interventions and Tools to Control Ambient Air Pollution	217

<b>7.5. INDIVIDUAL AND FAMILY HEALTH</b>	<b>219</b>
7.5.1. Annexure 29: WHO's "100 Core Health Indicators" in the 2018 Global Reference List	219
7.5.2. Annexure 30: Basic and Comprehensive Care	220
7.5.3. Annexure 31: WHO Indicators of MNCH	220
7.5.4. Annexure 32: Parameters for determining MNCH in NFHS	220
7.5.5. Annexure 33: Indicators and minimum acceptable level listed by WHO for "Monitoring Emergency Obstetric Care"	221
7.5.6. Annexure 34: Immunization coverage rate of vaccination	222
7.5.7. Annexure 35: Malaria Control Strategies	222
7.5.8. Annexure 36 : American Cancer Society Guidelines for the Early Detection of Cancer	223
7.5.9. Annexure 37: Older Americans 2016 Key Indicators of Well-Being	224
7.5.10. Annexure 38: WHO Framework Convention on Tobacco Control (WHO FCTC)	224
7.5.11. Annexure 39: NHM indicators for Maternal Health	225
7.5.12. Annexure 40: NUHM goals	225
7.5.13. Annexure 41: RMNCH+A strategy approaches	226
7.5.14. Annexure 42: Conditionalties and Instalments to avail benefits under PMMVY	226
7.5.15. Annexure 43 Facility Based New-born Care Operational Guide-2011: A Guideline for Planning and Implementation	226



# LIST OF TABLES

Table 1 National Schemes to meet SDGs	10
Table 2 Types of Food Security Measurements	12
Table 3 Public Health Significance of Anaemia Prevalence	19
Table 4 Cut off Levels of Haemoglobin for Anaemia Diagnosis	20
Table 5 Haemoglobin Levels for Diagnosing Anaemia in Adults	20
Table 6 Guidelines for a Balanced Diet	20
Table 7 Percentage of Children Fed Minimum Acceptable Diet (NFHS 4)	21
Table 8 Percentage of Affected Children Under 5 Years of Age (NFHS 4)	21
Table 9 Percentage of Effected Children Under 5 Years of Age (CNNS 2016–18)	22
Table 10 Percentage of Malnourished Children (6–59 months) CNNS 2016–18	22
Table 11 Prevalence of Anaemia Amongst Children and Adults (NFHS 4)	23
Table 12 Percentage of Children and Adolescent with Anaemia	23
Table 13 Cut off levels of Haemoglobin for Diagnosing Anaemia in Adults (15-49 years)	23
Table 14 Percentage of Children and Adolescents with Vitamin A Deficiency	24
Table 15 Percentage of Children and Adolescents with Zinc Deficiency	24
Table 16 Percentage of Children with Vitamin B12 and Folate deficiency	24
Table 17 Percentage of Children Consuming Foods (Once/ Week)	24
Table 18 TPDS Madhya Pradesh	27
Table 19 Government Schemes for Anaemia	31
Table 20 Schemes for meeting SDGs	49
Table 21 Examples of improved water sources and unimproved water sources	50
Table 22 Categories of Access to Water	51
Table 23 Water Landscape of Madhya Pradesh	52
Table 24 Water quality in Madhya Pradesh and Indore	57
Table 25 Parameters for disposal for sewage water	59
Table 26 Urban Wastewater Treatment Capacity	61
Table 27 Sewage Treatment Capacity	61
Table 28 National Schemes and Policies	62
Table 29 Guidelines for Health Protection	76
Table 30 Performance indicators for assessment of service levels in ULBs	77
Table 31 Top 5 countries on the Global Waste Index	77
Table 32 Obstacles preventing access to sanitation facilities	79
Table 33 Progress in population using sanitation facilities between 1990-2012	82

Table 34 Overview of household sanitation facilities in MP (NSSO, 2016)	83
Table 35 Total number of toilets constructed in Madhya Pradesh 2012-2016	83
Table 36 State Level interventions	92
Table 37 Air quality standards at International and National levels	105
Table 38 Air Quality in Indore	105
Table 39 Hazardous waste generated by industry in Madhya Pradesh	108
Table 40 Parameters for Bio-Medical Waste Disposal	109
Table 41 Existing Total Bio-Medical Waste Treatment Capacity	109
Table 42 Government Schemes for Soil and Land Pollution	127
Table 43 Current status of child health in India and Iceland	146
Table 44 Special bulletin on maternal mortality in India 2016-18	147
Table 45 Coverage of all basic vaccinations (NFHS 2015-16)	148
Table 46 Estimates of TB burden (2018)	149
Table 47 Diabetes country profiles (WHO, 2016)	153
Table 48 Tobacco Consumption in Madhya Pradesh	159
Table 49 Risk factors of Alcohol/Drug Abuse	173
Table 50 Indicators for Children's Nutritional Status	187
Table 51 Nutritional Indicators for Adolescent	190
Table 52 Serum Retinol Concentration to Diagnose Vitamin A Deficiency	190
Table 53 Use of Drinking Water Sources in India	191
Table 54 Access to drinking water estimates (in India)	191
Table 55 Proportion of population using improved water supplies	192
Table 56 Guidelines for maintenance and operation of a wastewater system	196
Table 57 Parameters for sewage treatment before disposal into the environment	200
Table 58 Indicators to assess adequacy of sanitation systems at School level	201
Table 59 Noise pollution standard limits set by the WHO	203
Table 60 indicators of Ambient Air Quality standard	204
Table 61 Some Sources and Quantum of Industrial Waste Generation	206
Table 62 Housing standards in India	209
Table 63 Details of Construction Material Used in India	210
Table 64 WHO's Interventions and Tools to Control Ambient Air Pollution	217
Table 65 WHO's "100 Core Health Indicators" in the 2018 Global Reference List	219
Table 66 WHO Guidelines for Monitoring Emergency Obstetric Care	221
Table 67 Older Americans 2016 Key Indicators of Well-Being	224
Table 68 Conditionalities and Instalments to avail benefits under PMMVY	226



# LIST OF FIGURES

Figure 1: Food Security and Nutrition	11
Figure 2: Food Safety Display Boards: Food Storage (10 Golden Rules)	14
Figure 3: Food Safety Display Boards: Food Storage (12 Golden Rules)	15
Figure 4: WHO Growth Standards (Note: Figure not to scale, only for representation)	17
Figure 5: District with high proportion of households with water resources more than 500 meters Source: (Khanna & WaterAid India, 2005)	52
Figure 6: Districts with proportion of household by sources of water	53
Figure 7: Piles and Swales method	55
Figure 8: Drinking water and the burden diarrhoeal diseases	56
Figure 9: Schematic Network Diagram of Decentralised Wastewater Treatment System	59
Figure 10: Flow diagram of a typical wastewater treatment system	60
Figure 11: HPEC Investment Allocation	64
Figure 12: Four step Sanitation Coverage Ladder	80
Figure 13: A global perspective on improved sanitation facilities	81
Figure 14: Percentage of population using shred sanitation in urban and rural areas, by region in 2006	81
Figure 15: MHM in SDGs	86
Figure 16: Major Cities of India with per capita green spaces	115
Figure 17: A causal model of the impacts of urban green spaces on health and well-being	116
Figure 18: UN WOMEN: Domestic Violence	121
Figure 19: The Shadow Pandemic: Violence Against Women and Girls and COVID-19	122
Figure 20: Prevalence of Smokeless Tobacco users in India	158
Figure 21: WHO guidelines for drinking water quality	194
Figure 22: Guideline Values from WHO Air quality guidelines	203
Figure 23: WHO Recommendations on Environmental Noise for European Region	205

# ACRONYMS

<b>AAY</b>	Antyodaya Anna Yojana
<b>AIBP</b>	Accelerated Irrigation Benefit Programme
<b>AIFS</b>	Australian Institute of Food Safety
<b>AMRUT</b>	Atal Mission for Rejuvenation and Urban Transformation
<b>ANC</b>	Antenatal Care
<b>APEDA</b>	Agricultural and Processed Food Products Export Development Authority
<b>ARSH</b>	Adolescent Reproductive and Sexual Health
<b>ART</b>	Antiretroviral Therapy
<b>ARV</b>	Antiretroviral Drugs
<b>ARWSP</b>	Accelerated Rural Water Supply Programme
<b>BMI</b>	Body mass index
<b>BOD</b>	Biological Oxygen Demand
<b>CAC</b>	Codex Alimentarius Commission
<b>CBWTF</b>	Common Biomedical Waste Treatment Facilities
<b>CDC</b>	Centre for Disease Control
<b>CDW</b>	Construction and Demolition Waste
<b>CFC</b>	Chlorofluorocarbons
<b>CGWB</b>	Central Ground Water Board
<b>CHC</b>	Community Health Centre
<b>CII</b>	Confederation of Indian Industry
<b>CMNDS</b>	Communicable, Maternal, Neonatal, and Nutritional Diseases
<b>CMIS</b>	Computerised Management Information System
<b>CNNS</b>	Comprehensive National Nutrition Survey
<b>COD</b>	Chemical Oxygen Demand
<b>CPCB</b>	Central Pollution Control Board
<b>CPS</b>	Child Protective Services
<b>CSC</b>	Community Sanitary Complex
<b>CSE</b>	Centre for Science and Environment
<b>CSI</b>	Coping Strategy Index



<b>CVD</b>	Cardiovascular Diseases
<b>DALY</b>	Disability-Adjusted Life Years
<b>DDC</b>	Drug Distribution Centre
<b>dB</b>	Decibel
<b>DWWM</b>	Decentralised Wastewater Management Systems
<b>EC</b>	Electrical Conductivity
<b>FAECI</b>	Faecal Contamination Index
<b>FAO</b>	Food and Agriculture Organization
<b>FBO</b>	Food Business Operations
<b>FCS</b>	Food Consumption Score
<b>FSI</b>	Food Security Index
<b>FSSAI</b>	Food Safety and Standards Authority of India
<b>FSSM</b>	Faecal Sludge and Septage Management
<b>FTDs</b>	Fever Treatment Depots
<b>GATS</b>	Global Adult Tobacco Survey
<b>GFSI</b>	Global Food Security Index
<b>GoI</b>	Government of India
<b>HBYC</b>	Home-Based Care for Young Child
<b>HDDS</b>	Household Dietary Diversity Scale
<b>HFIAS</b>	Household Food Insecurity and Access Scale
<b>HIV</b>	Human Immunodeficiency Virus
<b>HPEC</b>	High-Powered Expert Committee
<b>HPV</b>	Human Papillomavirus
<b>HSB</b>	Healthcare Seeking Behaviour
<b>HSS</b>	Household Hunger Scale
<b>HWCs</b>	Health and Wellness Centres
<b>ICAR</b>	Indian Council of Agricultural Research
<b>ICD</b>	International Classification of Diseases
<b>ICDS</b>	Integrated Child Development Service
<b>IDSP</b>	Integrated Disease Surveillance Programme
<b>IELRC</b>	International Environmental Law Research Centre

<b>IHHL</b>	Individual Household Latrine
<b>IIHS</b>	Indian Institute for Human Settlements
<b>IMC</b>	Indore Municipal Corporation
<b>IMNCI</b>	Integrated Management of Neonatal and Childhood Illnesses
<b>ISWA</b>	International Solid Waste Association
<b>IUSP</b>	Integrated Urban Sanitation Programme
<b>IYCF</b>	Infant and Young Child Feeding
<b>JNNURM</b>	Jawaharlal Nehru National Urban Renewal Mission
<b>JSSK</b>	Janani Shishu Suraksha Karyakram
<b>JSY</b>	Janani Suraksha Yojana
<b>LCPCD</b>	Litres Per Capita Per Day
<b>MCH</b>	Maternal and Child Health
<b>MDM</b>	Mid-day Meal
<b>MGNREGA</b>	Mahatma Gandhi National Rural Employment Act
<b>MHH</b>	Menstrual Health and Hygiene
<b>MHM</b>	Menstrual Health Management
<b>MLD</b>	Million Litres Per Day
<b>MMR</b>	Maternal Mortality Rate
<b>MoEF&amp;CC</b>	Ministry of Environment Forest and Climate Change
<b>MoHFW</b>	Ministry of Health and Family Welfare
<b>MP</b>	Madhya Pradesh
<b>MPN</b>	Most Probable Number
<b>MSDP</b>	Multi-Sectoral Development Programme
<b>MSSM</b>	Mukhya Mantri Shahri Swachhta Mission
<b>MSWM</b>	Municipal Solid Waste Management
<b>NAPCC</b>	National Action Plan for Climate Change
<b>NBCC</b>	New-born Care Corners
<b>NBSU</b>	New-born Stabilization Units
<b>NCD</b>	Non-Communicable Diseases
<b>NCRB</b>	National Crime Records Bureau
<b>NFHS</b>	National Family Health Survey



<b>NFME</b>	National Framework for Malaria Elimination
<b>NFSA</b>	National Food Security Act
<b>NHM</b>	National Health Mission
<b>NHP</b>	National Health Policy
<b>NIPI</b>	National Iron Plus Initiative
<b>NMHP</b>	National Mental Health Programme
<b>NMOOP</b>	National Mission on Oilseeds and Oil Palm
<b>NMSA</b>	National Mission on Sustainable Agriculture
<b>NRC</b>	Nutrition Rehabilitation Centres
<b>NRHM</b>	National Rural Health Mission
<b>NSP</b>	National Strategic Plan
<b>NSSK</b>	Navjat Shishu Suraksha Karyakram
<b>NSSO</b>	National Sample Survey Office
<b>NTCP</b>	National Tobacco Control Programme
<b>NUHM</b>	National Urban Health Mission
<b>NVBDCP</b>	National Vector Borne Diseases Control Programme
<b>ODF</b>	Open Defecation Free
<b>ODPHP</b>	Office of Disease Prevention and Health Promotion
<b>OECD</b>	Organisation for Economic Co-operation and Development
<b>OEH</b>	Occupational and Environmental Health
<b>PHC</b>	Primary Health Centre
<b>PIM</b>	Participatory Irrigation Management
<b>PKVY</b>	Paramparagat Krishi Vikas Yojana
<b>PM</b>	Particulate Matter
<b>PMMVY</b>	Pradhan Mantri Matru Vandana Yojana
<b>PMSMA</b>	Pradhan Mantri Surakshit Matritva Abhiyan
<b>PMSMA</b>	Pradhan Mantri Surakshit Matritva Abhiyan
<b>PPP</b>	Public Private Partnerships
<b>RBSK</b>	Rashtriya Bal Swasthya Karyakram
<b>RCSI</b>	Reduced Coping Strategy Index
<b>RDA</b>	Recommended Dietary Allowance

<b>RKVY</b>	Rashtriya Krishi Vikas Yojana
<b>RMNCH+A</b>	Reproductive, Maternal, New-born Child Health + Adolescent
<b>RRR</b>	Repair, Renovation and Restoration
<b>RWH</b>	Rainwater Harvesting
<b>SABLA</b>	Rajiv Gandhi Scheme for Empowerment of Adolescent Girls
<b>SAFS</b>	Self-Assessed Food Security
<b>SBR</b>	Sequencing Batch Reactors
<b>SBSV</b>	Swachh Bharat Swachh Vidyalaya
<b>SDH</b>	Social Determinants of Health
<b>SDG</b>	Sustainable Development Goals
<b>SHC</b>	Soil Health Card
<b>SHM</b>	Soil Health Management
<b>SLB</b>	Service Level Benchmarking
<b>SNCU</b>	Special New-born Care Units
<b>SPS</b>	Sanitary and Phytosanitary Measures
<b>SSA</b>	Sarva Shiksha Abhiyan
<b>SSHE</b>	School Sanitation and Hygiene Education
<b>STL</b>	Soil Testing Laboratories
<b>STP</b>	Sewage Treatment Plant
<b>TBT</b>	Technical Barriers to Trade
<b>TPD</b>	Tonnes Per Day
<b>TPDS</b>	Targeted Public Distribution System
<b>TSC</b>	Total Sanitation Campaign
<b>UASB</b>	Upflow Anaerobic Sludge Blanket Reactor
<b>UGS</b>	Urban Green Spaces
<b>UHC</b>	Universal Health Coverage
<b>ULBs</b>	Urban Local Bodies
<b>UNEP</b>	United Nations Environment Programme
<b>UNESCO</b>	United Nations Educational, Scientific and Cultural Organisation
<b>UNFPA</b>	United Nations Population Fund
<b>UNICEF</b>	United Nations Children's Fund



<b>UNODC</b>	United Nations Office on Drugs and Crime
<b>UNSCN</b>	United Nations Standing Committee on Nutrition
<b>URDPFI</b>	Urban and Regional Development Plan Formulation and Implementation
<b>VAMBAY</b>	Valmiki Ambedkar Awaas Yojana
<b>WASH</b>	Water, Sanitation and Hygiene
<b>WHO</b>	World Health Organisation
<b>WIFS</b>	Weekly Iron and Folic Acid Supplementation
<b>WWAP</b>	World Water Assessment Programme

# About this Desk Research Report

In 2019, the teams at the Health System Transformation Platform (HSTP) and Swasti began collaborating to determine how health outcomes within cities could be improved, with a specific focus on the poor and vulnerable communities. One city that provided an opportunity to conceptualize and implement a “Healthy City” programme differently is Indore. It is India’s cleanest city and one of India’s 20 Smart Cities. By coordinating inputs from the sectors that impact on health Indore has an opportunity to develop a model for a Healthy City which other cities in the state and other states can learn from.

The vision for Indore’s healthy city plan would have to be co-developed with the sectors that have the greatest impact on health. The teams from HSTP and Swasti in collaboration with Indore’s public health care providers and civil society organisations developed a framework for approaching health outcomes using five key “pillars” - (i) Healthy water (quantity, quality), (ii) Healthy food (nutrition, quality of processing, healthy ingredients) (iii) Healthy sanitation (toilets, solid and liquid waste management), (iv) Healthy environment (air, soil, public spaces, law, environment) and (v) Healthy individual and family (health services, safety).

This desk research report focuses on five pillars that are considered important for building healthy cities. It was undertaken with the following objectives:

- ⌘ Develop a scalable and implementable Healthy City concept and framework relevant to India (Indore is chosen as the city for modelling for this study)
- ⌘ Get an understanding of the healthy city concept in the Indian context vis-à-vis the global understanding of the concept.

The five pillars include food, water, sanitation, environment and individual and family health. Each of these are detailed in the next five chapters with the following focus:

**Chapter 1** examines the impact of food on building healthy cities in the context of three sub pillars i.e., food nutrition security, food safety and adulteration and nutrition and food habits

**Chapter 2** studies the impact of water on building healthy cities in the context of four sub pillars of water security, conservation, quality and wastewater management

**Chapter 3** outlines the impact of sanitation on building healthy cities by focusing on solid and liquid waste management, sanitation facilities and hygiene

**Chapter 4** surveys the impact of the environment around us on building a healthy city by focusing on pollution, waste generation and management, urban spaces and a safe environment.

**Chapter 5:** looks at the impact of individual and family health impact on building healthy cities in the context of 5 sub pillars. These include RMNCH, communicable and infectious diseases, noncommunicable diseases, senior care and substance abuse.



Within each of the pillars, the following aspects were studied:

- ⌘ How each pillar impacts urban health and development of a healthy city
- ⌘ Current status and norms for each pillar at the global, India, Madhya Pradesh and Indore level
- ⌘ Government interventions to improve the parameters

Where data was not available, it has been so mentioned.

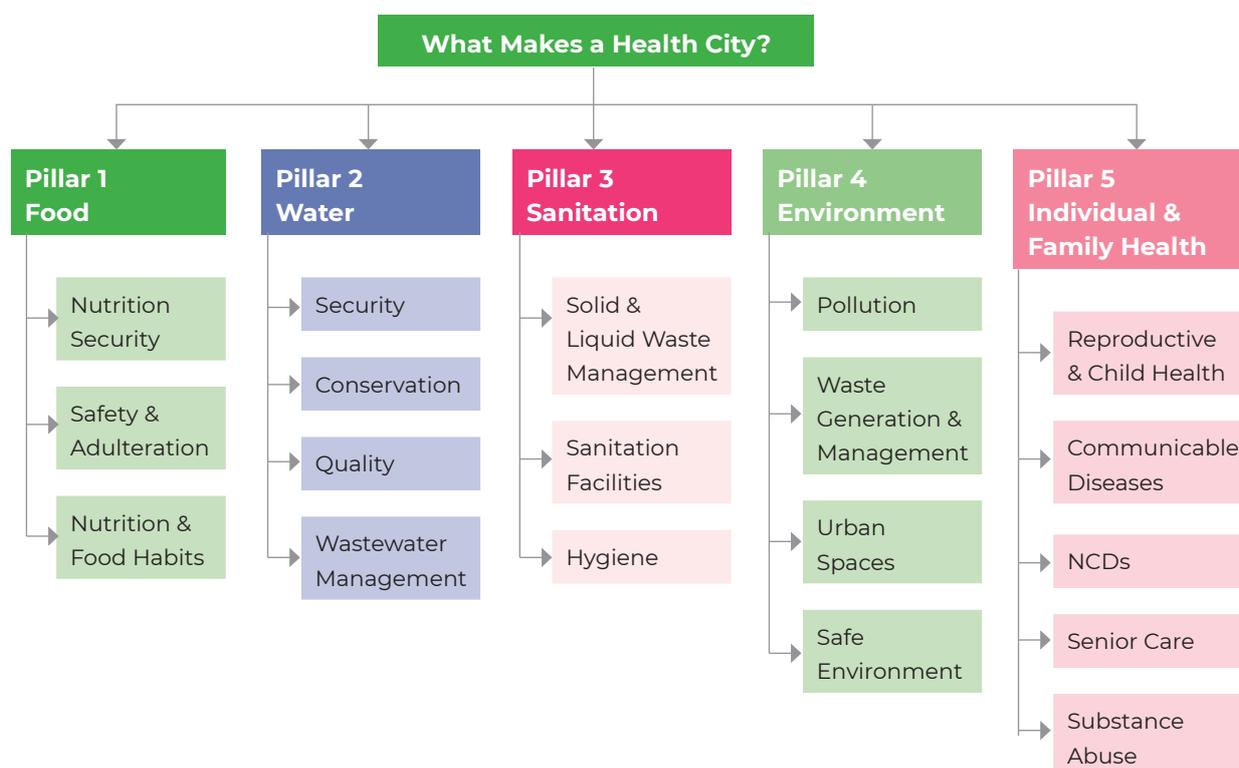
Therefore, this document identifies successful implementation strategies to present actionable insights. The theoretical analysis ensures knowledge gathering to allow evidence-based recommendations for each pillar.

We also studied the social determinants of health, i.e., conditions in which people are born, grow, work, live, and age, and the wider set of forces and systems shaping the conditions of daily life. These determinants include economic stability, education, social and community context, health and health care and neighbourhood and built environment. Each of these have a major impact on health and well-being of citizens, which is reflected in the detailed study of each of the 5 pillars outlined above. These are outlined in Chapter 6 of this section.

In the following chapters, one per each of the pillars, the results of the desk research report are organized as follows:

- ⌘ The pillar's significance to building healthy cities
- ⌘ Key findings
- ⌘ Government interventions
- ⌘ Gap analysis
- ⌘ Recommendations

## Structure of the Desk Research Report



A summary of this document is available [HERE](#)

# 1. FOOD

## The Foundation of a Healthy City



## 1.1. Significance for Healthy Cities

The role of food, a vital and basic need for human life, in sustaining an individual's health and livelihood can hardly be undermined. The quality and quantity of foods, combined with the systems that produce them, have a profound influence on the nutrition status and thus the mental, physical and social health of populations (World Health Organization, 2017). Healthier mothers and children, with stronger immune systems, mean better performance at school as well as at work.

Another important aspect that determines the nutritional status of populations is urbanisation, accelerated by industrialisation, economic development, and market globalisation. In urban areas, especially in developing countries and in countries in transition, people experience a shift in dietary patterns such as diets rich in saturated fat, refined foods, and sugar and low in fibre, which create increasing health problems (World Health Organization, 2003). The National Family Health Survey (NFHS) 3 and 4 data reported that India is experiencing the dual burden arising out of a nutrition transition. While pockets of population are suffering from malnutrition, the spotlight is also on overweight and obesity, largely in wealthier households, urban areas and older adults (NITI Aayog, 2017). Other challenges of urbanisation include lack of access to household food security and livelihoods; high incidence of waterborne diseases due to lack of safe drinking water, sanitation, hygienic environments resulting in undernutrition and sometimes anaemia.

Food thus has the ability to form the foundations of a healthy city and catalyse the achievement of key global goals and targets outlined under the Sustainable Development Goals (SDGs). These include ending hunger and ensuring access to safe, nutritious and sufficient food all year round (SDG 2.1) and ending all forms of malnutrition (SDG2.2). The Government of India is pursuing the achievement of SDGs with a slew of schemes, some of which are outlined below (NITI Aayog, 2020).

**Table 1: National Schemes to meet SDGs**

SDG	Indicators	Schemes
<b>SDG 2.1</b>	2.1.1: Percentage of underweight children under 5 years of age 2.1.2: Proportion of population (marginalised and vulnerable) with access to food grains at subsidised prices	<ul style="list-style-type: none"> <li>⌘ Public Distribution System under the National Food Security Act (NFSA), 2013</li> <li>⌘ Antyodaya Anna Yojana (AAY)</li> </ul>
<b>SDG 2.2</b>	2.2.1: Percentage of stunted children under 5 years of age 2.2.2: Percentage of children under 5 years of age 2.2.3: Percentage of women whose Body Mass Index (BMI) is below normal (BMI<18.5 kg/m <sup>2</sup> ) 2.2.4: Percentage of pregnant anaemic women in the age group of 15-49 years 2.2.5: Percentage of anaemic children 6-59 months old	<ul style="list-style-type: none"> <li>⌘ Integrated Child Development Services (children in the age range 6 months to 6 years)</li> <li>⌘ (i) National Nutrition Mission (Poshan Abhiyaan) (focuses on stunting, under-nutrition, anaemia, low birth weight)</li> <li>⌘ Mid-day meal (MDM) scheme (children at primary and upper primary levels)</li> </ul>

The impact of food on building healthy cities was studied in the context of three sub



pillars: food nutrition security, food safety and adulteration and nutrition and food habits. These three sub pillars are detailed in the following section.

Based on a review of the literature available on the above sub pillars, this section details the key findings and government interventions, provides a gap analysis and makes recommendations to bridge the gaps. The data for these sub pillars has been studied at four levels: international, domestic, state of Madhya Pradesh and city of Indore.

### 1.1.1. Food Nutrition Security: Access and Storage

Enabling food and nutrition security is crucial to tackling malnutrition and poverty in India. According to the Food and Agriculture Organization, United Nations, (FAO) ‘food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life’. A similar definition of food security was also proposed by the United Nations Standing Committee on Nutrition (UNSCN, 2013). While nutritional security remains an integral part of food security, they have different dimensions in terms of their production and sources.

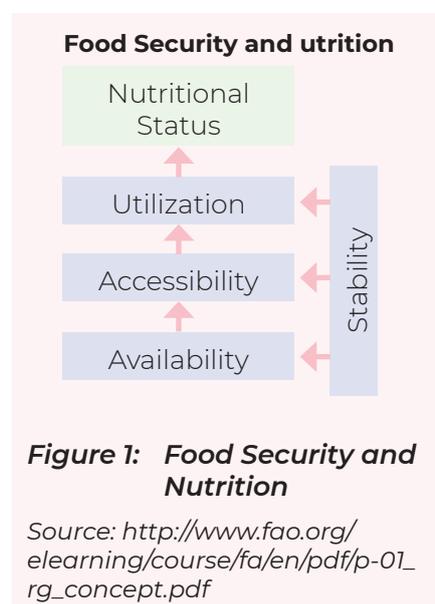
National food security is critically dependent on adequate availability of sufficient food stocks to fully satisfy domestic demand. Food and nutrition security are also determined by storage of both cooked food and raw material in a manner that there is no entry or multiplication of microorganisms or bacteria. Access to food can be enhanced not just by producing more, but also by reducing wastage because of spoilage.

#### Norms

The four pillars of food security include availability, access, utilisation, and stability, which are indicated by income, consumption and quality of food.

#### Indicators of food security (World Health Organization, 2010):

Population living on less than US\$1 per day - indicates the prevalence of people living in extreme poverty, as measured by their daily income. It allows comparisons and data aggregation on country level progress in reducing extreme poverty and monitoring global trends.



- ⌘ Population with less than minimum dietary energy consumption – measures the important aspect of food security of a population. It provides the percentage of population whose food intake falls below the minimum dietary energy requirement, and who are therefore undernourished, or food deprived. According to the FAO, undernourishment is a measure of food deprivation based on three parameters:
  - average amount of food available for per capita of human consumption
  - level of inequality in access to that food
  - minimum number of calories required by an average person



- ⌘ Households consuming adequately iodised salt: indicates the percentage of households consuming iodised salt, defined as salt containing 15–40 parts per million of iodine. Consuming iodised salt has been adopted as a strategy to eliminate the public health challenge of iodine-deficiency disorders.

**Table 2: Types of Food Security Measurements**

Dietary Diversity and Food Frequency	Consumption Behaviour
This type of metric captures different kinds of food or food groups people consume and the frequency of consumption	These measures indirectly capture food security, by measuring food consumption behaviour
<ul style="list-style-type: none"> <li>⌘ Food Consumption Score (FCS)</li> <li>⌘ Household Dietary Diversity Scale (HDDS)</li> <li>⌘ Spending on Food</li> <li>⌘ Undernourishment</li> </ul>	<ul style="list-style-type: none"> <li>⌘ Coping Strategy Index (CSI)</li> <li>⌘ Reduced Coping Strategy Index (RCSI)</li> <li>⌘ Household Food Insecurity and Access Scale (HFIAS)</li> <li>⌘ The Household Hunger Scale (HHS)</li> <li>⌘ Self-Assessed Food Security (SAFS)</li> </ul>

Source: (FAO, 2014)

Proper storage keeps food safe from that have the potential to cause food poisoning. Food storage efficacy is measured by indicators such as balanced diet through the year, prolonged shelf life and cost-effective storage. Some of the food storage guidelines outlined by National Health Portal of India outlined for categories such as dairy products, eggs, raw meat, poultry, seafood and cooked meats include:

- ⌘ Buy only best quality food if you plan to store it
- ⌘ Fresh and cured meats, fish and shellfish, dairy products and prepared foods should only be bought from a refrigerated display
- ⌘ Keep cooked and raw foods separately to avoid cross contamination
- ⌘ Heat refrigerated cooked food before consumption
- ⌘ Avoid repeated heating
- ⌘ Wrap foods with strong smell, such as sea foods and some cheeses
- ⌘ The 'best before' date is the best guide to storage of a particular perishable food

### Current Status

Based on affordability, availability, quality and safety of food, India ranked 76<sup>th</sup> amongst 113 countries in the Global Food Security Index (GFSI, 2018). On the other hand, Singapore with a Food Security Index (FSI) of 85.9, leads in offering food security to its citizens, followed closely by Ireland that has a FSI of 85.5. While Singapore's examples indicate that a smaller population with a high per capita income improves food access, Ireland has achieved it with technology adoption in food production, diversification of agriculture, an established food distribution network, and an improving per capita income (World Atlas, 2019).

Globally, it is estimated that nearly 40 per cent fruits and vegetables, and 30 per cent cereals do not reach the market due to inefficiencies in supply chain management (Singh & Gupta, 2016). India, for example, ranks first in total food production globally and is a leader in production of milk, bananas, guavas, papayas, ginger, okra, pulses and buffalo meat. The country is the second largest producer of green peas, potatoes,



tea, tomato, sesame and inland fish. However, India loses around 30 - 40 per cent of its fruits and vegetables due to non-availability of an efficient cold-storage system, resulting in a low FSI.

The COVID-19 pandemic has made a negative impact on food security related indicators at the global level (Sachs et al., 2020). Some indicators of the impact are given below:

- ⌘ Food insecurity was enhanced by reduction in global food supplies and trade
- ⌘ Hunger increased, with fall in incomes and reduced food availability during lockdown
- ⌘ Food loss and wastage increased with transportation challenges and reduced labour availability
- ⌘ With interruption of school meals there was poorer nutrition

## 1.1.2. Food Safety and Adulteration

Food safety plays an important role in ensuring food security, maintaining good health and well-being. Food Safety and Standards Act (2006) defines food safety as an “assurance that food is acceptable for human consumption according to its intended use”. Food Safety includes handling, preparing, and storing food to best reduce the risk of individuals becoming sick from foodborne illnesses (FSSAI, 2018). Food quality, safety and nutrition are hindered when substandard food or adulterated food is mixed with safe food. Food safety measures have thus been designed to control alteration of natural food compositions and preservation of nutrition.

Compromised quality, increasing adulteration cases and instances of product integrity pose serious challenges to food safety (MoHFW, 2016). Food items can be adulterated by adding substances considered injurious for human consumption or wholly or partly substituting ingredients with inferior substance or abstracting ingredients. This makes awareness and knowledge about common adulterants important for sustaining individual health.

Raw agriculture, dairy, animal husbandry, meat, poultry and fish are processed transforming their original physical properties to give them commercial value, while ensuring they remain fit for human and animal consumption (Drishti, 2019). With food safety being a priority in the journey of food from farm to fork, food processing industry forms a vital bridge between agriculture and manufacturing. Many traditional food processing methods have been designed to minimise food safety risks, including canning, freezing, drying, irradiation, and pasteurisation (Britannica, 2020).

Food processing sector can help preserve the nutritive quality of food and prolong shelf life, while sometimes improving the taste, leading to reduced food wastage. Other advantages of the sector include improving farm incomes by encouraging crop diversification, boosting international trade and employment generation. It also offers the opportunities to curb migration and food inflation.

### Norms

#### *Guidelines on Food Packaging and Labelling*

FSSAI's new Draft Labelling and Display Regulations, 2019 require packaged food companies to declare on the packaging, the nutritional information such as calories (energy), saturated fat, trans-fat, added sugar and sodium as well as the per serve percentage contribution to RDA.



Food Business Operations (FBOs) are advised to install colour coded Food Safety Display Boards to exhibit food safety and hygiene practices being followed by them. Some examples of colour codes and FSDBs are shown in Figure 2 and 3.



(Please Mention Your License no.)

■ Storage

## With Us You Will Get Safe Food

### We Follow These 10 Golden Rules

Hygiene Rule Codes		Hygiene Rule Codes	
1	Keep storage premises clean & pest & rodent free		Wear clean and protective clothes. <span style="float: right; background-color: #f1c40f; padding: 2px 5px;">6</span>
2	Maintain ambient temperature & humidity in storage premise.		Wash hands before & after handling food & after using toilets, coughing, sneezing, etc. <span style="float: right; background-color: #f1c40f; padding: 2px 5px;">7</span>
3	Clean all the storage racks, containers regularly. Do not over load storage area.		Use water proof bandage to cover cuts or burn wounds <span style="float: right; background-color: #f1c40f; padding: 2px 5px;">8</span>
4	Keep refrigerated/chilled foods below 5°C or below & all frozen products below -18°C. Maintain temperature.		Do not handle food when unwell <span style="float: right; background-color: #f1c40f; padding: 2px 5px;">9</span>
5	Store veg and non-veg food in separate area/compartments. Follow FIFO & FEFO.		Keep separate & covered dustbins for food waste. <span style="float: right; background-color: #f1c40f; padding: 2px 5px;">10</span>

If any concern

Give your Feedback to Company Name

<p> Call toll free <b>1800 112 100</b></p> <p> SMS or Whatsapp <b>9868686868</b></p> <p><small>Always quote FSSAI Number for quick action</small></p>	<p><b>(Company Name)</b></p> <p><b>(Contact Details)</b></p>
<p> <b>Download FSSAI APP</b></p> <p><small>or Logon to <a href="https://foodlicensing.fssai.gov.in/cmsweb">https://foodlicensing.fssai.gov.in/cmsweb</a></small></p>	<p><b>Connect with us:</b></p> <ul style="list-style-type: none"> <li> Food Safety and Standards Authority of India</li> <li> fssaiindia</li> </ul>

**Figure 2: Food Safety Display Boards: Food Storage (10 Golden Rules)**

Source: (FSSAI, 2018)



## I Serve Safe Food I Follow These 12 Golden Rules

Hygiene Rule Codes		Hygiene Rule Codes	
<b>1</b>	Keep vending premises/cart clean and pest free 		Wear clean clothes/uniform <b>7</b>
<b>2</b>	Use potable water for food preparation 		Wash hands before & after handling food and after using toilets, coughing, sneezing, etc. <b>8</b>
<b>3</b>	Cook food thoroughly. Keep hot food hot and cold food cold 		Use water proof bandage to cover cuts or burn wounds <b>9</b>
<b>4</b>	Handle and store veg & non veg, raw & cooked food separately 		Do not handle food when unwell <b>10</b>
<b>5</b>	Store cold food at cool temperature 		Use clean and separate dusters to clean surfaces and wipe utensils <b>11</b>
<b>6</b>	Use separate chopping boards, knives, etc. for raw/cooked & veg/non veg food 		Keep separate and covered dustbins for food waste <b>12</b>

If any concern

Give your Feedback to Company Name

Call toll free  
**1800 112 100**  
SMS or Whatsapp  
**9868686868**  
Always quote FSSAI Number for quick action

(Company Name)  
(Contact Details)



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Figure 3: Food Safety Display Boards: Food Storage (12 Golden Rules)

Source: <https://archive.fssai.gov.in/home/safe-food-practices/food-safety-display-boards.html>

### Food Safety Index by FSSAI (2019-20)

The FSI ranks India's states on five food safety parameters i.e., human resources and institutional data, compliance, food testing facility, training and capacity building and consumer empowerment. While ensuring suitable food safety standards it is critical to consider multiple components of storage and preparation. Some guidelines include (AIFS, 2020):



- ⌘ Food is handled and prepared with utmost cleanliness and by thoroughly cleaning and sanitising all surfaces, equipment, and utensils
- ⌘ Maintaining a high level of personal hygiene, especially handwashing
- ⌘ Avoiding contact between raw and cooked food
- ⌘ Storing, chilling, and heating food correctly with regard to temperature, environment, and equipment
- ⌘ Ensuring that food is cooked thoroughly and stored at safe temperatures
- ⌘ Using safe water and raw ingredients
- ⌘ Undertaking pest control checks and implementation, when necessary
- ⌘ Comprehending food allergies, poisoning, and intolerance to obtain food safety i.e., reducing the number of potential food hazards and preventing food poisoning.

### **International Trade**

With an expanding world economy, liberalisation of food trade, growing consumer demand, developments in food science and technology, and improvements in transport and communication, international trade in fresh and processed food will continue to increase. Relevant to the ongoing pandemic as well, food protection measures are essential, especially in developing countries (FAO and WHO, n.d.).

The Codex Alimentarius Commission (CAC), an inter-governmental body that coordinates food standards at the international level, works to protect consumer health and ensure fair food trade practices. The CAC has proved to be most successful in achieving international harmonisation in food quality and safety requirements. In addition, the Sanitary and Phytosanitary Measures (SPS) and the Agreement on Technical Barriers to Trade (TBT) are a good indicator of the food protection measures to be followed at the national level, and the rules under which food is traded internationally.

### **Current Status**

The 2014 World Ranking: Food Performance, structured around food safety risk governance and food safety performance indicators, states that Canada and Ireland follow high food safety standards (Vallee et al., 2014). At the national level, the 2019-2020 Food Safety Index identified Goa (83.5), Gujarat (78.2), Tamil Nadu (74.9), Maharashtra (72.7), Kerala (71.6) and Madhya Pradesh (54.8) as leaders in food safety (FSSAI, 2020).

India's food processing industry has emerged as an important sector contributing 9 per cent and 11 per cent of GDP in manufacturing and agriculture respectively (Make in India, 2020). With approximately 2 per cent of fruits and vegetables, 8 per cent marine, 35 per cent milk, 6 per cent poultry being processed, the levels of processing remain low in percentage terms, though the volumes are large given India's large production base (Ministry of Food Processing Industries, 2017).

### **1.1.3. Nutrition and Food Habits**

Urbanisation is known to contribute to the triple burden of malnutrition consisting of undernutrition, micronutrient deficiency, and overnutrition. Nutrition is a fundamental pillar of human life, health, and development. The Oxford dictionary defines nutrition as “the process of providing or obtaining food necessary for health and growth”. According to WHO, adequate food and good nutrition from the earliest stages of foetal development, at birth, through infancy, childhood, adolescence,

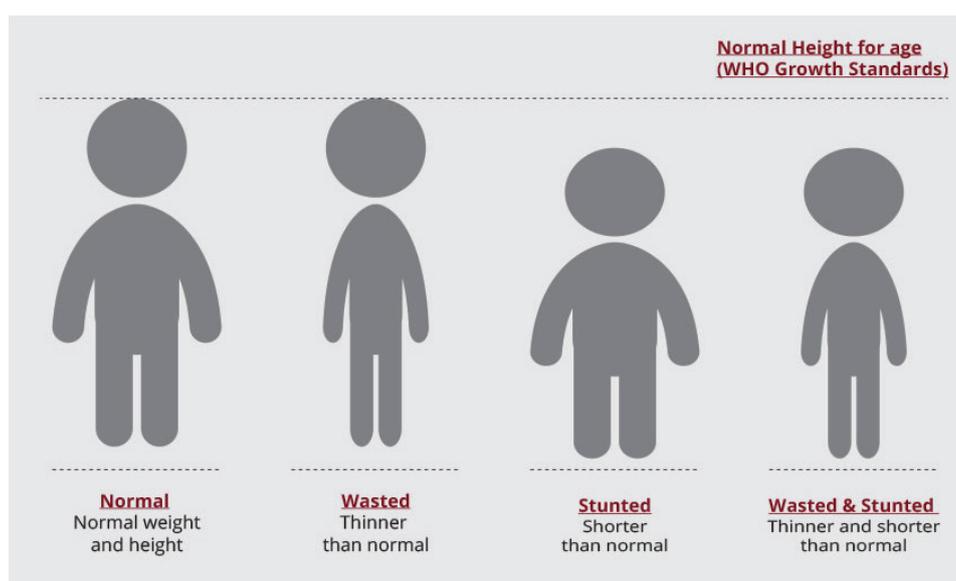


into adulthood and old age, are essential for survival, physical growth, mental development, performance and productivity, health and well-being (World Health Organization, 2000).

The first three years of an individual's life are critical with respect to vulnerability to undernutrition, infections, and mortality. They are also important from the point of view of developing a sound foundation for improved nutrition and development outcomes across an individual's life cycle. WHO recommends that infants be exclusively breastfed, with the exception of oral rehydration solutions, or drops/syrups of vitamins, minerals, or medicines for the first six months to achieve optimal growth, development, and health. Breastfeeding gives babies the best head start to a healthy life, as it contains the nutrients they require and protects them against diarrhoea and common illnesses (World Health Organization, 2019). Around the age of 6 months, an infant's need for energy and nutrients starts to exceed what is provided by breast milk, and complementary foods are necessary to meet those needs (World Health Organization, 2019).

Malnutrition refers to deficiencies, excesses, or imbalances in a person's intake of energy and/or nutrients. WHO has divided indicators of malnutrition into 3 broad groups:

- ⌘ **Undernutrition:** a result of continuously consuming food insufficient to meet dietary energy requirements, poor absorption, and/or poor biological use of nutrients consumed. This usually results in loss of body weight, wasting (low weight-for-height), stunting (low height-for-age) and underweight (low weight-for-age).
- ⌘ **Micronutrient-related malnutrition:** Micronutrient deficiencies are also known as "hidden hunger". These include anaemia, vitamin A deficiency, iodine deficiency, amongst others.
- ⌘ **Overnutrition:** Overnutrition refers to a chronic condition where the intake of food is in excess of dietary energy requirements, resulting in overweight and/or obesity.



**Figure 4: WHO Growth Standards (Note: Figure not to scale, only for representation)**  
(Source: <https://www.validnutrition.org/malnutrition-definition/>)

Acute malnutrition can occur either from moderate or severe starvation. The latter is the most extreme and visible form of undernutrition (World Health Organization and UNICEF, 2009).



Adult nutritional status can be determined by calculating the Body Mass Index, a simple index of weight-to-height. It is used for classifying indicators such as moderate and severe thinness, underweight, overweight, and obesity in adults:

- ⌘ Overweight is a major determinant of non-communicable diseases such as non-insulin-dependent diabetes mellitus, coronary heart disease and stroke. It increases the risks for several types of cancer, gallbladder disease, musculoskeletal disorders, and respiratory symptoms.
- ⌘ Obesity is largely preventable through lifestyle changes. The costs attributable to obesity are high, not only in terms of premature death and healthcare, but also in terms of disability and a diminished quality of life.

Micronutrients (vitamins and minerals) are crucial to healthy growth, disease prevention, and wellbeing. Though required in small amounts, these are not produced in the body and must be derived from the diet.

A micronutrient deficiency can lead to anaemia, a major health challenge facing India. Anaemia, which is marked by low levels of haemoglobin in the blood, can cause a host of health problems. These range from maternal mortality to weakness, diminished physical and mental capacity, increased morbidity from infectious diseases, perinatal mortality, premature delivery, low birth weight, and (in children) impaired cognitive performance, motor development, and scholastic underachievement. Further, the intergenerational cycle of anaemia impacts the health of generations to come. When an adolescent girl has low iron stores, she runs a greater risk of giving birth to a low birth weight and preterm baby. Combined with poor feeding practices and a low storage of iron content, a vicious cycle of iron deficiency anaemia gets created (MoHFW, n.d.).

Encyclopaedia defines food habits as why and how people eat, which foods they eat, and with whom they eat, as well as the ways people obtain, store, use, and discard food. Individual, social, cultural, religious, economic, environmental, and political factors all influence people's eating habits.<sup>1</sup> Making it a habit to have a balanced diet by comprising foods from five groups such as vegetables, fruits, grains, protein, and dairy helps meet all of a person's nutritional needs. On the other hand, food habits that include too much of fast food could cause nutrition-related diseases. Similarly, breastfeeding and infant and young child feeding practices either enhance or hamper nutrition.

## Norms

### Nutrition

In 2015, the World Health Organization released a global reference list of "100 Key Health Indicators". The nutrition risk factor indicators emphasise the need for breastfeeding, incidence of stunted and wasted children and anaemia prevalence (World Health Organization, 2015)

- ⌘ Exclusive breastfeeding from 0–6 months
- ⌘ Early initiation of breastfeeding
- ⌘ Incidence of low birth weight among new-borns
- ⌘ Stunted and wasted children under the age of 5 years
- ⌘ Prevalence of anaemia in children as well as women of reproductive age

The infant and young child feeding (IYCF) practice, recommended by WHO measure the minimum acceptable diet proportion for children aged 6-23 months as follows:

<sup>1</sup><https://www.encyclopedia.com/food/news-wires-white-papers-and-books/eating-habits>



- ⌘ Breastfed children: infants 6-8 months are considered to be consuming a minimum meal frequency if they receive solid, semi-solid, or soft foods at least twice a day and at least three times a day for children 9-23 months.
- ⌘ Non-breastfed children: infants 6 to 23 months are considered to be fed with a minimum meal frequency if they receive solid, semi-solid, or soft foods at least four times a day (MoHFW, 2016)

Apart from the above the caring practice indicators for IYCF, outlined by WHO and NFHS, include breastfeeding immediately on birth and exclusive breastfeeding till 6 months of age.

WHO has in particular described the indicators for children's nutritional status such as underweight, stunting, wasting, overweight and low birth weight. The Government of India is following nutritional status estimates based on the 2006 WHO International Reference Population. The specific nutritional indicators under each are described in Table 50 in **Annexure 1** and Nutrition indicators of adolescents are given in Table 51 in **Annexure 1**.

As adolescents are subdivided into 3 age categories, this indicator is further subdivided into 6 sub-indicators. Each sub-indicator is calculated for each age category 10~12, 13~15 and 16~19 years and by gender. The values for body mass index (BMI) are age-independent for adult populations and are the same for both genders (World Health Organization, 2010):

- ⌘ BMI < 17.0 indicates moderate and severe thinness
- ⌘ BMI < 18.5 indicates underweight
- ⌘ BMI 18.5~24.9 indicates normal weight
- ⌘ BMI ≥ 25.0 indicates overweight
- ⌘ BMI ≥ 30.0 indicates obesity

The Ministry of Health and Family Welfare and the United Nations Children Fund (UNICEF) conducted a comprehensive National Nutrition Survey (CNNS) in 2016-18, which provided a national representation of child and adolescent nutrition levels.

### **Micronutrient Deficiency**

WHO data reveals that a high prevalence of anaemia in a society translates into a major public health challenge. (Table 6 below (MoHFW et al., 2019))

**Table 3: Public Health Significance of Anaemia Prevalence**

<b>Prevalence of Anaemia ( per cent)</b>	<b>Public Health Significance</b>
< 5 per cent	No public health problem
5 ~ 19.9 per cent	Mild public health problem
20 ~39.9 cent	Moderate public health problem
40 per cent	Severe public health problem

Haemoglobin levels provide a good indication of anaemia amongst people:



**Table 4: Cut off Levels of Haemoglobin for Anaemia Diagnosis**

Anaemia Status	Haemoglobin Level (g/dl)			
	Children aged 1–4 years	Children aged 5–11 years	Adolescents aged 12–14 years	Adolescents aged 15–19 years
<b>Any Anaemia</b>	< 11.0 g/dl	< 11.5 g/dl	< 12.0 g/dl	Girls: < 12.0 g/dl Boys: < 13.0 g/dl
<b>Mild</b>	10.0–10.9 g/dl	11.0–11.4 g/dl	11.0–11.9 g/dl	Girls: 11.0–11.9 g/dl Boys: 11.0–12.9 g/dl
<b>Moderate</b>	7.0–9.9 g/dl	8.0–10.9 g/dl	8.0–10.9 g/dl	8.0–10.9 g/dl
<b>Severe</b>	< 7.0 g/dl	< 8.0 g/dl	< 8.0 g/dl	< 8.0 g/dl

**Table 5: Haemoglobin Levels for Diagnosing Anaemia in Adults**

Respondents	Haemoglobin Level in Grams/Decilitre (g/dL)
Non-pregnant women age 15-49	<12.0
Pregnant women age 15-49	<11.0
Men age 15-49	<13.0

According to WHO guidelines, also followed in the CNNS, serum retinol concentration helps diagnose Vitamin A deficiency amongst children and adolescents. Refer to Table 52 in **Annexure 1**.

Vitamin B12 and folate are necessary for formation of healthy red blood cells, repair of body cells and tissues, and for DNA synthesis. WHO guidelines, define Vitamin B12 deficiency as serum vitamin B12 < 203 pg/ml and folate deficiency as serum erythrocyte folate level < 151 ng/ml.

### Balanced Diet

Both international and domestic dietary guidelines provide percentage ranges for each macronutrient to be included in food to make it a balanced diet. These are as follows:

**Table 6: Guidelines for a Balanced Diet**

USDA (The United States Department of Agriculture)	National Institute of Nutrition, Hyderabad
For adults: ☞ 10~35 per cent calories from proteins ☞ 45~65 per cent from carbohydrates ☞ 25~35 per cent calories from fat	Total calorie content: ☞ 10~15 per cent from proteins ☞ 50~60 per cent from carbohydrates, preferably complex carbohydrates ☞ 20~30 per cent from both visible and invisible fat



## Current Status

### Nutrition

Nutrition-related factors contribute to approximately 45 per cent deaths in children under 5 years of age (mainly due to undernutrition). According to the recent National Family Health Survey (NFHS) 2015–16, every second child (0–59 months) in India suffers from some form of nutritional failure (stunting, wasting and/or underweight). The country has the highest number of stunted children in the world, (40.6 million children) representing one-third of the global total of stunted children under the age of five. Low- and middle-income countries are also witnessing a simultaneous rise in childhood overweight and obesity.

Gender discrimination in food allocation in a family aggravates health conditions of individuals. For example, the resultant Vitamin A deficiency contributes to maternal mortality and other poor outcomes of pregnancy and lactation. Child malnutrition often results from high levels of exposure to infection and inappropriate Infant and Young Child Feeding (IYCF) and caring practices. Improving breastfeeding rates globally, could annually save more than 820,000 children under the age of 5, the majority (87 per cent) of whom are under 6 months of age. Diarrheal disease is the second leading cause of death in children under five years of age and is responsible for killing around 525,000 children annually (World Health Organization, 2017).

From the data in Table 9 it can be seen that Indore's percentage of breastfeeding and adequate diet being given to children in the age group of 6 to 23 months is not only better than the State's average, but also better than the national average.

**Table 7: Percentage of Children Fed Minimum Acceptable Diet (NFHS 4)**

Indicators	India	Madhya Pradesh	Indore	Kerala
Breastfeeding children 6-23 months receiving an adequate diet	8.7	6.9	14.4	21.3
Non-breastfeeding children 6-23 months receiving an adequate diet	14.3	4.8	0.7	22.4
Total children age 6-23 months receiving an adequate diet	9.6	6.6	12.3	21.4

**Table 8: Percentage of Affected Children Under 5 Years of Age (NFHS 4)**

Indicators	India	Madhya Pradesh	Indore	Southern Asia (WHO)	Eastern Africa (WHO)
Stunted	38	42	39.2	32.7	35.2
Wasted	21	25.8	17.8	14.6	6.0
Severely Wasted	6	9.2	6.7	4.6	1.8
Underweight	36	42.8	30.8		



**Table 9: Percentage of Effected Children Under 5 Years of Age (CNNS 2016–18)**

Indicators	India	Madhya Pradesh	Kerala
Stunted	34.7	40.4	21.8
Wasted	17.0	19.6	12.6
Underweight	33.4	38.7	18.7

- ⌘ The CNNS survey revealed that 35 per cent of Indian children aged 0–4 years were stunted. Some of the most populous states, including Bihar, Madhya Pradesh Rajasthan and Uttar Pradesh had a high (37~42 per cent) prevalence of stunting. The lowest prevalence of stunting (16~21 per cent) was found in Goa and Jammu and Kashmir (MoHFW et al., 2019)
- ⌘ Overall, 33 per cent Indian children aged 0–4 years were underweight. Many states in north-east India, such as Mizoram, Sikkim, and Manipur had the lowest prevalence (16 per cent) of underweight children. States with the highest prevalence (39 per cent) of underweight children included Bihar, Chhattisgarh, Madhya Pradesh and Jharkhand.

**Table 10: Percentage of Malnourished Children (6–59 months) CNNS 2016–18**

	Percentage below 115 mm	Percentage below 125 mm
India	0.9	4.9
Madhya Pradesh	1.3	5.9

In India overall, 5 per cent children aged 6 to 59 months were acutely malnourished as measured by absolute MUAC (MUAC <125 mm). The states with the highest prevalence (7 per cent) of acute malnutrition were Jammu and Kashmir, Uttar Pradesh, Meghalaya, Assam, and Nagaland. The states with the lowest (1 per cent) prevalence of acute malnutrition were Uttarakhand and Arunachal Pradesh.

## Micronutrient Deficiency

### Anaemia

Anaemia is the most prevalent micronutrient deficiency worldwide, more so in India. According to NFHS 4 (2015-16), almost 58.6 per cent of India’s children, 53.2 per cent of non-pregnant women, and 50.4 per cent of pregnant women suffer from anaemia, of which most experience iron deficiency induced anaemia. The highest occurrence of anaemia is reported in girls between the ages of 12-13 years, which coincides with the average age of menarche.

Highest prevalence of anaemia amongst children aged 6-59 months is recorded in Haryana (72 per cent), followed by Jharkhand (70 per cent) and Madhya Pradesh (69 per cent). Other studies have revealed that at 21 per cent central Kerala (Siva et al.) displayed a fairly low prevalence of anaemia amongst adolescent girls. In Gujarat and Indore almost 46.6 per cent adolescent girls were found to be anaemic (Surana et al., 2017).



**Table 11: Prevalence of Anaemia Amongst Children and Adults (NFHS 4)**

Age group	India	Madhya Pradesh	Indore	Kerala
Children age 6-59 months	58.5	68.9	71.2	35.7
Non-pregnant women age 15-49 years	52	52.4	46.5	34.7
Pregnant women age 15-49 years	50	54.6	53.6	22.6
All women age 15-49 years	53.1	52.5	46.8	34.3
Men age 15-49 years	23	25.5	22.2	11.7

**Table 12: Percentage of Children and Adolescent with Anaemia**

Age group	India Average	Madhya Pradesh	Kerala (Best Performing State)
1-4 years	40.5	53.5	12.5
5-11 years	23.5	22.0	3.1
10-19 years	28.4	21.2	9.1

Source: (CNNS 2016-18)

**Table 13: Cut off levels of Haemoglobin for Diagnosing Anaemia in Adults (15-49 years)**

Respondents	Haemoglobin level in grams/decilitre (g/dL)
Non-pregnant Women	<12.0
Pregnant Women	<11.0
Men	<13.0

Source: (CNNS 2016-18)

Incidence of anaemia in urban areas of Indore

- ⌘ 71.4 per cent children aged 6-59 months
- ⌘ 46.5 per cent women aged 15-49 years
- ⌘ 21 per cent men aged 15-49 years
- ⌘ 54.4 per cent pregnant women aged 15-49 years

Anaemia affects almost 50 to 60 per cent pre-school children and women in India. (Gonmei et al). The micronutrients critical for improved health include Vitamin A, Zinc, Vitamin B12 and folate:

- ⌘ While the national average of Vitamin A intake for children in the age group of 1 to 4 years stood at 17.6 per cent, in Madhya Pradesh it was 27.1 per cent.
- ⌘ CNNS data also revealed that the zinc intake for children in the same age group was 18.9 per cent across India. The positive effect of zinc on children's health is seen from National Family Health Survey (NFHS 4) data that suggests that only 20 per cent children who received zinc suffered from diarrhoea over the next two 2 weeks (MoHFW, 2016).
- ⌘ At 42 per cent and 74.5 per cent respectively, there is a high prevalence of



Vitamin B12 and folate deficiency amongst adolescents aged 10–19 years (Comprehensive National Nutrition Survey, CNNS 2016-18).

## Vitamin A

**Table 14: Percentage of Children and Adolescents with Vitamin A Deficiency**

Age group	India	Madhya Pradesh
1–4 years	17.6	27.1
5–9 years	21.6	13.4
10–19 years	15.6	13.2

Source: (CNNS 2016–18)

## Zinc

**Table 15: Percentage of Children and Adolescents with Zinc Deficiency**

Age group	India	Madhya Pradesh
1–4 years	18.9	22.3
5–9 years	16.8	12.3
10–19 years	31.7	19.9

Source: (CNNS 2016–18)

## Vitamin B12

**Table 16: Percentage of Children with Vitamin B12 and Folate deficiency**

Age group	B12 Deficiency		Folate Deficiency	
	India	Madhya Pradesh	India	Madhya Pradesh
Children aged 1–4 years	13.8	11.6	23.3	57.6
Children aged 5–9 years	17.2	22.4	28.2	62.4
Adolescents aged 10–19 years	30.9	42.0	36.7	74.5

Source: (CNNS 2016–18)

## Balanced Diet

**Table 17: Percentage of Children Consuming Foods (Once/ Week)**

State	Type of Food										
	Milk or Curd	Pulses or Beans	Dark Green, Leafy Vegetables	Roots and Tubers	Fruits	Egg	Fish	Chicken or Meat	Fish or Chicken or Meat	Fried Food	Aerated Drinks
Madhya Pradesh	55.4	89.9	92.7	92.6	36	15.5	12.1	12.5	17.5	47.2	2.6
India	60.5	85.1	88.2	73.9	41.4	34.9	24.3	29.6	36.2	36	10.4

Source: (CNNS 2016–18)

In Madhya Pradesh, while 84 per cent children are breastfed within the first day of



life, only 35 per cent started breastfeeding in the first hours of life as compared to the national average of 42 per cent. In Indore, only 23.4 per cent children under 3 years of age were breastfed within one hour of birth. In Madhya Pradesh:

- ⌘ the percentage of live births, with a reported low birth weight, stood at 21.9 per cent
- ⌘ 31.9 per cent adolescents were thin for their age, which is comparatively high vis-à-vis the national average of 24 per cent
- ⌘ 2.5 per cent adolescents were overweight or obese, which is comparatively low vis-à-vis the national average of 5 per cent

Overweight and obesity are most prevalent in older adults, especially in urban areas and well-educated people. For Madhya Pradesh, the figures stood as follows:

- ⌘ 14 per cent women and 11 per cent men are overweight or obese, as against the national average of 21 per cent for women and 19 per cent for men
- ⌘ 28 per cent of both women and men are too thin, as compared to the national average of 23 per cent for women and 20 per cent for men of 15-49 years of age (MoHFW, 2016).

The NFHS-4 data revealed that in Indore:

- ⌘ 61.2 per cent children under 6 months of age are exclusively breastfed, which is in line with WHO recommendations.
- ⌘ Only 10.3 per cent children between 6-23 months of age receive adequate nutrition and only 23.4 per cent of children under age 3 years were breastfed within one hour of birth.
  - o malnutrition burden in urban areas stood at 39.2 per cent, with nearly one-third of the city's children being undernourished - underweight - 30.6 per cent, stunted - 39.2 per cent and wasted - 17.8 per cent (MoHFW, 2016)
  - o prevalence of overweight or obese women and men in urban areas of Indore was 24.3 per cent and 21.4 per cent respectively.



## 1.2. Government Interventions

### 1.2.4. Food/Nutrition Security: Access and Storage

The Government of India is making efforts to meet the Zero Hunger goal, by targeting specific issues through central level schemes. These include the Public Distribution System (PDS) under the National Food Security Act (NFSA), 2013, and the Antyodaya Anna Yojana (AAY).

#### 1.2.1.1. National Food Security Act, 2013

The NFSA, 2013 is intended to provide for food and nutritional security by ensuring access to adequate and quality food, at affordable prices to enable people to live a life with dignity. The Act classifies the population into three categories: excluded (i.e., no entitlement), priority entitlement under the Targeted Public Distribution System (TPDS), and higher entitlement under Antyodaya Anna Yojana (Planning Department Delhi, 2015).

The Act also focuses on ensuring nutritional support to women and children. There is provision for meals and maternity benefits of not less than INR 6,000 for pregnant women, lactating mothers until six months after childbirth. Antenatal care is stressed by programmes such as Pradhan Mantri Matru Vandana Yojana (PMMVY) and Janani Suraksha Yojana (JSY). Children up to 14 years of age are entitled to nutritious meals under the mid-day meal scheme aimed at students of primary and upper primary level schools. Those between 0 to 6 years receive nutrition support under the Integrated Child Development Service (ICDS) Scheme.

#### 1.2.4.2. Targeted Public Distribution System

The NFSA, 2013 provides statutory backing to the Targeted Public Distribution System, marking a shift in the right to food as a legal right, rather than a general entitlement. The Act provides for up to 75 per cent of the rural population and up to 50 per cent of the urban population to receive subsidised food grains under TPDS, thus covering about two-thirds of the population.

The TPDS aims at ensuring food and nutritional security of economically vulnerable people by allocating food grains such as rice, wheat, and coarse grains at affordable prices (INR 3/ 2/ 1 respectively) per kg. Under the scheme, buffer stock of these food grains is maintained in designated warehouses (NITI Aayog and United Nations, 2020).

#### 1.2.4.3. Antyodaya Anna Yojana

Antyodaya Anna Yojana (AAY), launched by the Ministry of Consumer Affairs, Food, and Public Distribution, was a step towards ensuring that the TPDS works to reduce hunger amongst the poorest of poor. To identify households for AAY, the guidelines stipulated the following criteria:

- a) Landless agricultural labourers, marginal farmers, rural artisans, craftsmen, such as potters, tanners, weavers, blacksmiths, carpenters and slum dwellers. Persons earning a daily wage from the informal sector such as porters, coolies,



rickshaw pullers, hand cart pullers, fruit and flower sellers, snake charmers, rag pickers, cobblers, destitute and other similar categories of people from both rural and urban areas are covered

- b) Households headed by widows or terminally ill persons, disabled persons, older adults (aged above 60 years) with no assured means of subsistence or societal support
- c) All primitive tribal households.

#### 1.2.4.4. Targeted Public Distribution System, Madhya Pradesh

The Government of Madhya Pradesh rolled out the Targeted Public Distribution System on March 1, 2014. To implement the TPDS effectively, strategies are formulated for identifying beneficiaries under the AAY and ensuring transparent and accountable distribution of food grains from fair price shops. FPS are licensed to distribute essential commodities to Ration Card Holders and are operated by cooperative societies. Based on parameters fixed by the GoI and the state's rural/urban development departments, the beneficiary families are identified with the help of Gram Panchayats, Gram Sabhas and urban local bodies.

**Table 18: TPDS Madhya Pradesh**

Subject	Description
Beneficiaries	All AAY families and other priority households as per State Government gazette notification dated 5th June 2014
No of Beneficiaries	As on 08-08-2014 Beneficiary families - 1,14, 78, 863 No. of members - 5,03,56,446 Including: AAY families (up to 6 members) - 14,82,102 Priority Household members (including AAY 6+ members) - 4,52,38,817
Consumer Price	⌘ Wheat and rice - INR 1.00/kg ⌘ Salt - INR 1.00/kg ⌘ Sugar - INR 13.50/kg ⌘ Kerosene – INR 16.00/ltr
Scale of Issue	AAY Families - 35 kg food grain per family per month Other Priority Households - 5 Kgs per member

(Source: Government of Madhya Pradesh, 2018)

#### 1.2.5. Safety and Adulteration

The Government of India is creating an ecosystem to ensure food safety and prevent adulteration at various levels. From creating infrastructure for safe handling and storage, to formulating enabling policies and creating consumer awareness, the government has adopted a holistic approach.



### 1.2.1.1. National Policy on Food grain Handling, Storage and Transportation

The policy was launched by the Ministry of Consumer Affairs, Food and Public Distribution to reduce storage and transit losses at farm and commercial level. The policy aims to achieve the following:

- ⌘ reduce storage and transit losses at farm level, where about 70 per cent of total food grain production is retained and consumed and encourage farmers to adopt scientific storage methods
- ⌘ modernise the system of handling, storage and transportation of food grain procured by the Food Corporation of India (FCI)
- ⌘ harness efforts and resources of public and private sectors, both domestic and foreign, to build and operate infrastructure for bulk handling, storage and transportation of food grain (Department of Food & Public Distribution, 2019).

### 1.2.5.2. Draft National Food Processing Policy, 2019

The Ministry of Food Processing Industries released the Draft “National Food Processing Policy, 2019” for public comments. The policy focuses on the sector’s development to ensure remunerative returns to farmers, address critical gaps hampering growth and by 2035 increase investments by six-fold (Ministry of Food Processing Industries, 2017).

The Food Safety Mitra scheme proposes to support small and medium-scale food businesses to comply with the food safety laws and will handhold them through the licensing and registration processes, hygiene ratings and offer training programmes.

### 1.2.5.3. Infrastructure Development

**Mega Food Parks:** (MFP), a Ministry of Food Processing Industries’ scheme, aims at providing a mechanism to link agricultural production to the market by bringing together farmers, processors and retailers to maximise value addition, minimise wastage, increase farmer income and create employment opportunities, particularly in the rural sector. MFPs typically consist of supply chain infrastructure, including collection centres, primary processing centres, central processing centres, cold chains and around 25-30 fully developed plots for entrepreneurs to set up food processing units. Madhya Pradesh has two mega food parks one each in Dewas and Khargone.

**Food Testing Laboratories (SoFTeL) Scheme:** Formulated by FSSAI, the scheme aims to strengthen and develop a robust food testing laboratory network in the country. It envisages ensuring safe and wholesome food by generating awareness amongst school and college going youth through exposure to food testing in their internal labs. The scheme’s major components include:

- strengthening state level and referral food testing labs
- supporting mobile food labs
- building capacity of food testing lab personnel
- incentivizing states to utilise available facilities



#### 1.2.5.4. Consumer Awareness Campaigns

**Heart Attack Rewind:** World Health Organization has set a target to eliminate industrially- produced trans-fats from global food supply by 2023. In pursuit of this target, FSSAI launched “Heart Attack Rewind”, a mass media campaign to achieve the WHO target, a year ahead of schedule. The campaign focuses on reigning in high amounts of trans fatty acids (TFA), salt and sugar in foods commercially available, warns citizens about health hazards of consuming trans-fat and offers strategies to replace them with healthier alternatives (Eat Right India, 2018)

**Jago Grahak Jago:** Consumer empowerment interventions, such as FSSAI’s *Jago Grahak Jago*, were launched to create awareness about food adulteration and safety. A web-based system, it allows the common man to raise addressable complaints.

**CHIFSS (CII-HUL Initiative on Food Safety Sciences) :** FSSAI joined hands with CHIFSS to drive science based food safety activities in the country, strengthen consumer protection and create an innovative environment for industry. The initiative also promotes collaborations between industry, scientific community, academia, key opinion makers and domain experts with FSSAI to co-produce food safety as a shared responsibility (FSSAI, 2021).

**Detect Adulteration with Rapid Test (DART):** FSSAI has documented more than 50 common quick tests for citizens to be able to detect food adulterants at home and to create awareness about food safety. DART portrays the differences between pure and adulterated food products through pictorial representations (FSSAI, 2021).

#### 1.2.6. Nutrition and Food Habits

##### 1.2.1.1. Achieving Nutrition Targets

**National Nutrition Strategy:** The strategy aims to reduce all forms of malnutrition by 2030, with a focus on the most vulnerable and critical age groups. It also drives the achievement of targets identified under the nutrition and health related Sustainable Development Goals by 2022 (Rao, 2017):

- ⌘ Prevent and reduce undernutrition (underweight prevalence) in children (0- 3 years) by 3 percentage points per annum from NFHS 4 levels
- ⌘ Reduce prevalence of anaemia amongst young children, adolescent girls and women in the reproductive age group (15- 49 years) by one third of NFHS 4 levels.

**Infant and Young Child Care and Nutrition:** These interventions focus on children under 3 years of age, through universal promotion of:

- ⌘ early initiation (within 1 hour of birth) and exclusive breastfeeding for first six months
- ⌘ timely and appropriate complementary feeding after six months, along with continued breastfeeding for two years or beyond
- ⌘ monitoring and promotion of growth of young children by providing WHO-CGS counselling to mothers/families using the Mother Child Protection Card
- ⌘ access to infant and young childcare (including ICDS, crèches, linkages with MGNREGA), with improved supplementary nutritional support/THR through ICDS



- ⌘ ensuring enhanced care, improved feeding during and after illness, nutritional support, referrals and management of severely and acutely undernourished and/or sick children (NITI Aayog, 2017).

**Integrated Child Development Service:** Covering children in the age group of 6 months to 6 years, ICDS is one of the world's largest child development programmes that provides for supplementary nutrition, immunisation, and pre-school education. Though in operation since 1975, the malnutrition burden amongst under-five children remains high in the country.

### State Level Interventions

**Mid Day Meals:** To improve the nutrition requirements of children in Anganwadi centres, the Government of Madhya Pradesh under the mid-day meal programme, provides skimmed milk thrice a week to children between 3-6 years of age. Each child gets 100 ml milk prepared as per the prescribed method using 10 grams milk powder (Integrated Child Development Services, 2015).

**POSHAN Abhiyan:** A sub-scheme under the ICDS scheme, POSHAN (National Nutrition Mission) was initiated in 2018 with a vision to achieve a malnutrition free India by 2022. Aiming to build a people's movement (Jan Andolan) around malnutrition, it intends to improve nutritional outcomes for children, pregnant women, and lactating mothers. The objective of POSHAN Abhiyan is to reduce stunting in districts with the highest malnutrition burden, by improving the utilisation of key Anganwadi Services and improving the quality of Anganwadi Services delivery (National Portal of India, 2018).

**Nutrition Rehabilitation Centres (NRC)** provide appropriate and facility-based case management to children with SAM (severe acute malnutrition).

## Anaemia Management

### *Anaemia and Deworming*

The NHM's RMNCH+A National Nutritional Anaemia Prophylaxis and Control Programme, has outlined the major interventions such as promoting optimal infant and young child feeding practices. It also encourages iron and folic acid supplementation to vulnerable groups such as preschool children and adolescent girls and screening for early detection of anaemia amongst vulnerable groups (such as pregnant women). Focus is on encouraging dietary diversification to include rich dark green leafy vegetables as well as those that promote iron absorption (rich in Vitamin C) and improve iron and folate. In addition, it also focuses on appropriate anaemia management depending upon severity, chronicity, physiological status of the individual and the time available for correction.

IFA supplementation and biannual deworming as per NIPI guidelines followed by screening, detection, and management are key to ensuring good health. Public health measures to improve hygiene and sanitation reduce hookworm infestation and measures for malaria control will help improve health conditions.

Various government programmes, focused on managing iron deficiency, anaemia and deworming in different age groups are detailed below:



**Table 19: Government Schemes for Anaemia**

<b>Initiative</b>	<b>Objective</b>	<b>Target Audience</b>
National Iron Plus Initiative (NIPI)	Address iron deficiency anaemia Prevent and control anaemia in children	Group 1 - 6 to 60 month Group 2 - 5 to 10 years Group 3 - 10 to 19 years (using the life cycle approach)
Anaemia Mukta Bharat Scheme	Intensify Iron-plus Initiative, Strengthen existing mechanisms and foster newer strategies for addressing anaemia Designed to reduce prevalence of anaemia by 3 percentage points per annum by 2022, as planned under the POSHAN Abhiyan	Children, adolescents and women in the reproductive age group (15–49 years)
Weekly Iron and Folic Acid Supplementation (WIFS)	Screen children annually for early detection of deficiencies and necessary interventions	Children and adolescents between 5 - 19 years of age studying in government schools, government aided schools or municipal schools
National Deworming Initiative	The National Deworming Day is an initiative of Ministry of Health and Family Welfare, Government of India to make every child in the country worm free (MoHFW, 2019)	
Rashtriya Bal Swasthya Karyakram (RBSK)	Screen children for deficiencies, diseases, developmental delays including disability, adolescent health at least once a year	School children aged 6 to 18 years

An Anaemia Management Protocol has also been defined by the Government to ensure effective and holistic implementation of these schemes

<b>Target Group A</b>	<b>Children 6–59 months</b>
Who will screen and place of screening	ANM: VHND (Village Health Nutrition Day)/sub-centre/session site RSBK team: AWC/school Medical Officer: health facility



Periodicity	RBSK/ANM: as per scheduled micro plan MO: opportunistic
Target Group B	Children 5–9 years
Who will screen and place of screening	RSBK teams screen in-school and out-of-school children for anaemia. All children with clinical signs and symptoms of anaemia are referred to SC/PHC for Hb estimation and further management
Periodicity	Once a year  Opportunistic screening, e.g., routine Hb assessment of sick children presented to health facility

<b>Target Group C</b>	<b>All school-going adolescents 10–19 years in government/ government-aided schools</b>
Who will screen and place of screening	In school premises by RSBK team
Periodicity	Annually
First level treatment (at all levels of care)	Two IFA tablets (each with 60 mg elemental iron and 500 mcg folic acid), once daily, for 3 months, orally after meals
Follow up	<ul style="list-style-type: none"> <li>Line listing of all anaemic cases is maintained in the school register for iron folic acid supplementation and shared with ANM/LHV/MPHW of the area for follow up</li> <li>Parents are expected to ensure follow-up for adolescents after 45 to 90 days, at the nearest sub-centre/ health facility</li> </ul>

Target Group D	Pregnant women registered for antenatal care
Who will screen and place of screening	Health service provider at any ANC contact, including Pradhan Mantri Surakshit Matritva Abhiyan (PMSMA)
Periodicity	At every ANC contact

## Adolescent Reproductive and Sexual Health Programme (ARSH)

### **Rashtriya Kishor Swasthya Karyakram (National Adolescent Health Programme):**

Launched by the Ministry of Health & Family Welfare, the programme aims at addressing nutrition, reproductive health and substance abuse issues faced by adolescents, in the age group of 10-19 years. It introduces community-based interventions through peer educators and is underpinned by collaborations with other ministries and state governments.

**Rajiv Gandhi Scheme for Empowerment of Adolescent Girls (SABLA):** This programme encompasses a range of schemes aimed at improving health conditions of adolescent girls. These include:



**Kishori Balika Yojana:** Introduced by the Ministry of Women and Child Development, this scheme provides supplementary nutritious take-home ration to school-going, adolescent girls aged 11 to 14 years for 6 days a week. It is implemented by State Governments through Anganwadi centres in districts selected based on a criteria prescribed by the Government of India.

**Udita Scheme:** The Udita Corners set up in Anganwadi centres promote menstrual hygiene and provide a platform to adolescent girls to discuss issues related to nutrition and health (Government of Madhya Pradesh, 2016)

**Dastak Abhiyan:** Women and child development and public health and family welfare departments of the Madhya Pradesh government launched the 'Dastak Abhiyan', an innovative preventive strategy for addressing mortality in under 5 children. The programme aims to shift focus from facility centric care to preventive and promotive aspects of healthcare, targeting major determinants of child mortality in the State.

### **Activities carried out under the programme include:**

1. Active screening of children
  - ⌘ for severe anaemia using the WHO colour scale
  - ⌘ for Severe Acute Malnutrition by Mid-Upper Arm Circumference (MUAC) method
  - ⌘ for critical sickness and pneumonia as per signs outlined in Integrated Management of Neonatal and Childhood Illness (IMNCI) along with counselling of IYCF (Infant and Young Child Feeding) services under MAA programme
2. Demonstrate hand washing steps/ORS preparation at the community doorstep<sup>2</sup>
  - ⌘ emphasise diarrhoea prevention and management with ORS and zinc supplementation
  - ⌘ stress upon Swachh Bharat Mission by ensuring safe drinking water and improved sanitation facilities
  - ⌘ increase general hygiene practices, such as washing hands before feeding, amongst lactating mothers and young child-mothers (Mataria et al, National Nutrition Strategy).[121]

## **RMNCH+A**

A number of programmes have been launched under the Reproductive, Maternal, New-born, Child, and Adolescent Health (RMNCH+A) umbrella. Navjaat Shishu Suraksha Karyakram (NSSK), launched to address care at birth issues, focuses on early initiation of breastfeeding. The Antara programme focuses on spacing methods.

## **NUHM**

Mahila Arogya Samiti is a key intervention under National Urban Health Mission (NUHM) to address local issues related to health, nutrition, water, sanitation, and social determinants of health at the slum level.

<sup>2</sup>[https://www.nhmmp.gov.in/WebContent/CHN/Dastak\\_guidelinenew/Concept\\_Note\\_on\\_Dastak\\_Abhiyaan\\_MP\\_20\\_04\\_17.pdf](https://www.nhmmp.gov.in/WebContent/CHN/Dastak_guidelinenew/Concept_Note_on_Dastak_Abhiyaan_MP_20_04_17.pdf)



## 1.3. Problem Statement and Gap Analysis

Though the Government identifies and plans policies and schemes, based on deliberations with experts and past experience, gaps often tend to exist either in the policies themselves or in their implementation. This section studies the gaps as well as some best practices and interventions formulated to address the gaps, by other cities and states.

### 1.3.1. Food/Nutrition Security: Access and Storage

#### Food Insecurity

*Upadhyay & Palanivel* point out the key issues and challenges in achieving food security in India. They highlight that the main reason for food and nutrition insecurity in urban areas is the unplanned growth of slum dwellers, overcrowding and poor environment conditions. Factors attributed to overpopulation, deprivation, lack of employment and gender inequality escalate into malnutrition, and children and women remain food insecure. The proportion of infants with low birth weight is an indicator of a multifaceted public health problem that includes long-term maternal malnutrition, ill health, hard work, and poor healthcare in pregnancy.

#### Food Storage

Wastage and loss of food is a global challenge, felt more deeply by low-income countries. Food wastage and unplanned growth of slums elevates food and nutrition insecurity, impacting nutritionally vulnerable populations such as infants and young children, pregnant and lactating mothers.

The biggest constraints facing the food-processing industry in India include non-availability of adequate infrastructure facilities, lack of adequate quality control and testing infrastructure, inefficient supply chains, and seasonality of raw material, high inventory carrying cost, high taxation, high packaging cost, affordability and cultural preference of fresh food. (Sridhara & S, 2014). According to a Ministry of Consumer Affairs report, between 2013-2018 nearly 60,000 tons of food grains, stored in warehouses, was damaged and became unusable for human consumption.

It is important to develop management protocols for safe and scientific storage, and clean and fumigate warehouses to ensure proper aeration of grains followed by regular inspection of grain stock (Bhowmick, 2019). The ForumIAS<sup>3</sup> Report notes that the persistent problem of poor food grain storage and resultant food wastage can be solved by strictly adhering to the First-in-First-Out (FIFO) policy.

### 1.3.2. Safety and Adulteration

Research has revealed the gaps in implementation and enforcement of the FSSAI. Portals such as Jago Grahak Jago remain inaccessible to those from lower socio-economic strata, the most apparent victims of food adulteration and food safety.

(Kaur, 2017) found that though street food, along with diverse and mobile food vendors, are an easily accessible and attractive source, it is difficult to regulate these vendors. Inadequate public awareness of precautions and standards with respect to street food pose challenges in food safety. (Eshwar et al, Gupta et al, Kaur et al).

<sup>3</sup> [tps://blog.forumias.com/food-grain-storage-problem-in-india/](https://blog.forumias.com/food-grain-storage-problem-in-india/)



India faces general challenges such as ignorance about incorporating regulations, which are therefore not enforced fully (*Kaur et al.*). Knowledge about majority of adulteration related aspects was found to be missing amongst consumers in an urban slum (Ishwar et al., 2018). Similar findings can be seen in Gupta et al's study that states that low-income groups had minimal awareness about their rights and responsibilities towards food adulteration.

The two studies concluded that consumer literacy is the need of the hour with special attention to low-income groups who suffer the most (Gupta & Panchai, 2009). Collaborative action by various local bodies, government, media, and NGOs can play a pivotal role in achieving food safety in India. Interventions are needed to raise awareness of good hygiene practices among food handlers and empowering people with clear information to make healthier choices (Hawkes, 2013).

### 1.3.3. Nutrition and Food Habits

When poor nutrition starts in-utero, it extends throughout the life cycle since these changes are largely irreversible. Research findings have established a strong association between low birth weight and child malnutrition, as they are more susceptible to infections (*Rahman et al., 2016*). Mostly the result of high levels of exposure to infection, inappropriate IYCF and caring practices in India, child malnutrition has its origins almost entirely in the first two to three years of life (National Rural Health Mission and UNICEF, n.d.).

A child is most vulnerable to undernutrition, infections, and mortality during the first three years of life. This is also when a sound foundation needs to be built for improved nutrition and development outcomes across the life cycle. Given that an infant's need for energy and nutrients exceed what is provided by breast milk, complementary foods are necessary for their overall development after they attain 6 months of age (World Health Organization, 2020).

Some of the early nutrition challenges faced by India include:

- ⌘ mothers, families, and communities are often unaware that an infant is slipping into malnutrition and growth has started to falter
- ⌘ 50 per cent malnutrition is associated with repeated diarrhoea or intestinal worm infections as a result of unsafe water, inadequate sanitation, or insufficient hygiene (The World Health Organization (WHO) estimate)
- ⌘ Diarrhoea leads to nutritional deficiencies, reduced resistance to infections and impaired growth and development. These can be managed with oral rehydration therapy (ORT) and zinc supplementation.

### Anaemia

Anaemia can cause maternal mortality, weakness, diminished physical and mental capacity, increased morbidity from infectious diseases, perinatal mortality, premature delivery, low birth weight, and (in children) impaired cognitive performance, motor development, and scholastic achievement (World Health Organization, 2001). Anaemia is common in children, adolescent girls, and women. Amongst the many causes of anaemia, iron deficiency is the most prevalent in India.

Causes of iron deficiency anaemia and nutritional anaemia include:

- ⌘ poor dietary intake of iron, resulting in deficiency of iron in the body



- ⌘ habitual intake of cereal based diet high in phytate and poor consumption of iron absorption enhancers such as vitamin C result in low availability of iron
- ⌘ dietary deficiency of vitamins such as folic acid, vitamin C, vitamin B12.
- ⌘ gender discrimination in food allocation in families aggravates the situation
- ⌘ other causes of anaemia include worm infestation, malaria, and infectious diseases that cause intestinal inflammation leading to reduced nutrient absorption

The Comprehensive National Nutrition Survey (CNNS 2016-18) indicated the need to include prophylaxis for other micronutrients in national programmes (MoHFW et al., 2019). Majority of the programmes are focused on iron deficiency anaemia and interventions such as iron folic acid supplementation and biannual helminthic control, whereas folate and vitamin B12 interventions have not been given adequate importance. More studies on micronutrient deficiencies are also required to address malnutrition (Gonmei et al, Surana et al)

## Intergenerational cycle of anaemia

An adolescent girl who enters the reproductive age, with low iron stores, and becomes pregnant during adolescence or later is at greater risk of giving birth to a low birth weight and preterm baby. The low iron stores at birth are more likely to be carried forward to adolescence, due to poor infant feeding practices. Thus, this vicious cycle of iron deficiency anaemia continues.

Since breast milk is a natural source of vitamin A, promoting breastfeeding is the best way to protect babies from VAD (World Health Organization, n.d.)

- ⌘ Breastfeeding and complementary foods are crucial to a child's healthy growth and development
- ⌘ Exclusive breast-feeding ensures safe nutrition to the infant, thereby reducing the risk of infection and also ensuring overall development
- ⌘ Initiate community-level monitoring and counselling for sustained improvement in nutrition status (NITI Aayog, 2017)
- ⌘ Disseminate appropriate measures of exclusive breastfeeding and complementary food practices through skilled counsellors during antenatal check-ups and visits to the doctor (World Health Organization, 2019).

## Nutrition Management in Urban Areas

An unhealthy diet is one of the major reasons for a range of chronic diseases. In urban areas, a shift in dietary patterns towards foods with saturated fat, high sugar and low fibre, combined with declining physical activity, is leading to increased risk of non-communicable diseases (World Health Organization, 2003).

India's urban population accounts for 31 per cent of the country's population, with a rapid increase in urban slums over the past decade. Despite this increase, the national coverage of ICDS projects in urban India currently stands at just about 11 per cent (Drishti, 2020). From a total of 7.95 crore Anganwadi beneficiaries, only 6.92 per cent are registered in urban centres, with the remaining 93.08 per cent availing the services in rural areas (The Hindu, 2020).

In Indore, population in urban slums account for about 30 per cent of the total urban population:

- ⌘ Though about 62.1 per cent of students in urban areas attend private (aided



and unaided) secondary and higher secondary schools (NSSO, 2014), these programmes have failed to consider such schools, thus impacting coverage (NSSO, 2014).

- ⌘ A study conducted by *Shukla et al.*, in urban areas of Jabalpur, found a high prevalence of stunting amongst children (41.5 per cent), indicating chronic malnutrition.
- ⌘ Underweight and wasting was higher amongst females, which may be a reflection of privileged treatment of males and provision of superior quality food and healthcare for them, and negligence of the female child.
- ⌘ The study stated that prevalence of underweight, stunting, and wasting was found to be higher amongst children born with low birth weight, having higher birth order, a greater number of siblings, those with incomplete immunisation status and inappropriate feeding practices i.e., lack of exclusive breastfeeding and early or late weaning. (MoHFW, 2016 (Shukla et al., 2017))

## Nutritional Rehabilitation Centres

Existing research has highlighted that Nutritional Rehabilitation Centres were effective in improving the condition of admitted children, but the effects were not sustained due to high drop-out rates, low follow up rates and lack of adequate parental awareness (Taneja et al).

- ⌘ 100 severely malnourished children, admitted to seven different NRCs in Indore and Ujjain divisions of Madhya Pradesh, were observed to evaluate nutritional intervention measures and gather facts (Taneja et al., 2012).
- ⌘ Major factors associated with anaemia include menstruation, improper personal hygiene such as hand washing before food intake and after using the toilet, worm infestation, improper footwear usage, and decreased intake of jaggery. (*Siva et al., 2016*)
- ⌘ *Mehrotra et al.*, study on pregnant women emphasises the significance of education and preconception counselling, of both the husband and wife, in decreasing the prevalence of anaemia
- ⌘ National surveys mainly focused on nutritional status based on anthropometric measurements, dietary intake, and anaemia, but there is no nationwide survey on micronutrient deficiencies (Gonmei & Toteja, 2018). Though several programmes have been launched in India, a large percentage of the population is still affected by micronutrient deficiencies. Anaemia, the most common form of micronutrient deficiency, affects almost 50 to 60 per cent preschool children as well as women. Vitamin A deficiency and iodine deficiency disorders (IDD) have improved over the years.
- ⌘ *Surana et al study* concluded that vitamin B12 deficiency is an important cause of nutritional anaemia in adolescents, especially in males and the vegetarian population
- ⌘ *Sahoo et al and Rastogi et al's* study focused on unhealthy eating practices with low consumption of fruit and vegetables and a preference for fast foods high in sugar, salt, and fat content. Overweight and obesity in childhood are known to have a significant impact on both physical and psychological health. Overweight and obese children are likely to stay obese into adulthood and more likely to develop non-communicable diseases such as diabetes and cardiovascular diseases at a younger age (Sahoo et al., 2015). The gaps and barriers to healthy eating amongst school going adolescents identified highlight that a girl's overall knowledge [18] about nutrition and health was generally poor (Bipasha & Goon, 2013).



- ⌘ A study was conducted to identify fast food preferences and food habits amongst students attending universities in Bangladesh (Bipasha & Goon, 2013). It demonstrated that university students tend to have poor eating habits (preferring consumption of fatty fast foods and sugary soft drinks, skipping meals), even though 98 per cent were well informed about the negative effects associated with excessive fast-food consumption.



## 1.4. Recommendations

### Food Nutrition Safety: Access and Storage

- ⌘ Though several government programmes such as RBSK, RKSK and WIFS are being implemented in Indore, there is an urgent need to strengthen the follow up mechanism.
- ⌘ The intergenerational cycle of anaemia can be broken through regular orientation to teachers, Anganwadi workers and nutrition education meetings for behaviour change communication to the parents is necessary. Behaviour change communication programmes for parents can also be delivered through Anganwadis and healthcare workers such as ASHAs/ANMs.
- ⌘ While there are antenatal care programmes such as Pradhan Mantri Matru Vandana Yojana (PMMVY), Janani Suraksha Yojana, effective communication strategies are required for enhancing the quality of both antenatal communication and maternal awareness. Specific programmes targeted at male members of the family and couples can be driven through the ANM/ASHA network.
- ⌘ Develop management protocols for safe and scientific storage, cleaning and fumigation warehouses to ensure proper aeration of grains followed by regular inspection of grain stock and strictly adhering to the First-in-First-Out (FIFO) policy.

### Food Safety and Adulteration

Consumer literacy is the need of the hour with special attention to low-income groups who suffer the most (Gupta, N., & Panchal, P., 2009).

- ⌘ Collaborative action by various local bodies, government, media, and NGOs can play a pivotal role in achieving food safety in India.
- ⌘ Interventions, such as promoting implementation of already defined guidelines are needed to raise awareness of good hygiene practices among food handlers.
- ⌘ Empowering people, especially from the lower income groups, with clear information through programmes such as Jaago Grahak, will also help them make healthier choices.

### Nutrition and Food Habits

Healthy dietary habits start with families, therefore if a family enforces healthy food choices both at home and while purchasing raw food and ingredients, the child will make an attempt to adopt healthy food choices (Sahoo et al., 2015). Protecting female nutrition is important in providing a head start to the nutritional status of children. *Quisumbing et al.*, also emphasise well-nourished mothers lead to babies with higher birth-weight and well-nourished children in his research, “Women: The Key to Food Security”.

- ⌘ Specific health education programmes, dietary guidelines and effective public awareness campaigns could be initiated to address the unhealthy lifestyle of university students (Bipasha et al.2013).
- ⌘ There is also an urgent need to link Nutritional Rehabilitation Centres with community-based models for follow-up and improving health education measures (Taneja, G. et al. 2012)



- ⌘ Encourage counselling and improved communication between healthcare providers through the ASHA/ANM network and a male member to share vital information about family planning and birth spacing (World Health Organization, 1995)
- ⌘ Local health centres need to provide preconception counselling to a couple and help increase awareness in reducing the prevalence of anaemia in pregnant women
- ⌘ Prophylaxis for other micronutrients need to be included in national programmes to ensure that the target audience not only get iron folic acid supplementation and biannual helminthic control, but also folate and vitamin B12 (MoHFW, Government of India, UNICEF and Population Council, 2019)
- ⌘ It is also crucial to carry out surveys and more studies on micronutrient deficiencies to tackle malnutrition.



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## 2. WATER

### The Basis of a Healthy Life



## 2.1. Significance for Healthy Cities

Safe and accessible water is important for public health, whether for drinking, domestic use, food production or recreational purposes. Improved water supply and sanitation, and better management of water resources, can boost the countries' economic growth and can contribute greatly to poverty reduction. (World Health Organization, 2019) There is nothing more vital to human health than access to clean drinking water.

According to the composite Water Management Index released by NITI Aayog in 2018, 21 major cities were reaching zero groundwater levels by 2020, impacting about a 100 million people. Water resources (both surface and groundwater resources) are adversely affected by an increasing population as well as by man-made activities, including poorly treated drainage, construction, and industrial runoff, resulting in water quality degradation and limiting safe water supply.

A rapid increase in population resulted in intensified demand for water, placing a strain on existing local water resources and limiting the water available per person. Water quality is affected by increased usage, resulting in sudden depletion of water sources, contamination of local water bodies and a rise in pollution. The lack of safe drinking water is the primary cause of diseases, such as diarrhoea and other waterborne illnesses. Lack of hand hygiene, due to water shortage, is also the cause of spread of infectious viruses such as COVID-19 and diarrhoea.

### Key Facts

(World Health Organization, 2017)

- ⌘ 785 million people lack even a basic drinking-water service, including 144 million people who are dependent on surface water
- ⌘ Globally, at least 2 billion people use a drinking water source contaminated with faeces
- ⌘ By 2025, half of the world's population will be living in water-stressed areas
- ⌘ 263 million people spend more than 30 minutes per round trip collecting water
- ⌘ 159 million people drink water directly from surface sources, such as streams or lakes
- ⌘ In the least developed countries, 22 per cent healthcare facilities have no water service, 21 per cent no sanitation service, and 22 per cent no waste management service.

Given the above facts, water management is a key focus area of Sustainable Development Goals (SDGs). *SDG 6.1 aims* to achieve universal and equitable access to safe and affordable drinking water for all and *SDG 6.3* focuses on improving water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally. Government of India is making efforts to meet the SDGs by focusing on specific issues under central schemes shown below (Bhamra et al., 2015.):



**Table 20: Schemes for meeting SDGs**

SDG	Indicator Data Source	Government Agency	Government Scheme
<b>6.1.1:</b> Proportion of population using safely managed drinking water services  <b>6.1.2:</b> Percentage of population using an improved drinking water source	Ministry of Jal Shakti  Ministry of Statistics and Programme Implementation (MoSPI) [National Sample Survey 76th round: Drinking Water, Sanitation, Hygiene and Housing Conditions in India]	Ministry of Drinking Water and Sanitation	National Rural Drinking Water Programme
		Ministry of Housing and Urban Affairs, Government of India	AMRUT
<b>6.3.1:</b> Proportion of wastewater safely treated  <b>6.3.2:</b> Percentage of industries complying with wastewater treatment as per CPCB norms	Ministry of Environment, Forests & Climate Change  [CPCB]	Ministry of Water Resources, River Development and Ganga Rejuvenation	Ganga Action Plan, RRR of Water Bodies and other schemes

Madhya Pradesh suffers from water scarcity, and Indore being the commercial capital and the city with the highest population, faces severe shortage in water. The primary source of water supply for Indore is the river Narmada, supplemented by the Yeshwant Sagar and Bilwali lake. Rapid urbanisation has led to the exploitation of these water sources and an unequal distribution leading to extensive water shortage in Indore. In summers, the increased burden on ground water resources such as borewells, results in many of them running dry, exacerbating the problem.

Under this pillar, sustainable water management is discussed around four aspects of security, conservation, quality and wastewater management. Based on a review of the literature available on the above sub pillars, this section details the key findings, government interventions, provides a gap analysis and makes recommendations to bridge the gaps. The data for these sub pillars has been studied at four levels: international, domestic, state of Madhya Pradesh and city of Indore.

### 2.1.1. Water Security: Access and Supply

Water security is the capacity of a population to safeguard sustainable access to adequate quantities of acceptable quality water for sustaining livelihoods, human well-being, and socio-economic development, for ensuring protection against water-borne pollution and water-related disasters, and for preserving ecosystems in a climate of peace and political stability (UN Water, 2013)

“To achieve water security, it is essential to protect vulnerable water systems, mitigate impacts of water-related hazards such as floods and droughts, safeguard access to



water functions and services and manage water resources in an integrated and equitable manner.” (UNESCO, n.d.)

A community could thus be considered water secure when (UN Water, 2013)

- ⌘ **Drinking water and human well-being:** Populations have access to safe, sufficient and affordable water to meet basic needs for drinking, sanitation and hygiene, to safeguard health and well-being, and to fulfil basic human rights
- ⌘ **Economic activities and development:** Adequate water supplies are available for food and energy production, industry, transport and tourism
- ⌘ **Water related hazards and climate change:** Populations are resilient to water-related hazards including floods, droughts and pollution
- ⌘ **Water ecosystems:** Ecosystems are preserved and can deliver services, on which both nature and people rely, including the provision of freshwater.

Access to water is the proportion of the population using improved drinking water sources such as piped water, public tap, borehole with a pump, protected well, and springs or rainwater (source: UN). Water supply means the process of supplying water, for a town, community or a household from improved and unimproved sources. Various such sources are given in Table 21 (World Health Organization, 2017).

**Table 21: Examples of improved water sources and unimproved water sources**

Improved Drinking-Water Sources	Unimproved Drinking-Water Sources
Piped water into dwelling	Cart with small tank/ drum provided by water vendor
Yard or plot	Surface water (river, dam, lake, pond, stream, canal)
Public tap or standpipe	Tanker truck provision of water
Protected spring	Unprotected spring
Protected dug well	Unprotected dug well
Tube well or borehole	Bottled water*
Rainwater collection	

\*Bottled water is considered to be improved only when the household uses drinking-water from an improved source for cooking and personal hygiene.

Source: <https://apps.who.int/iris/bitstream/handle/10665/254637/9789241549950-eng.pdf?sequence=1>

Currently India’s water supply system faces the following critical challenges:

- ⌘ Inequitable distribution of direct water supply
- ⌘ Metering and no proper monitoring system to measure distribution network
- ⌘ Improper operational zones
- ⌘ Water leakages
- ⌘ Drop in groundwater tables due to excessive use of borewells

### Norms

Key water accessibility indicators include distance to the water source and quantity of water available on a daily basis. Access to water can broadly be divided into four categories:



**Table 22: Categories of Access to Water**

Level of Access	Daily Water Supply	Health Related Risks
Optimal access	Tap in the house, providing approximately 100-200 litres	Very low
Intermediate access	Water source on plot providing up to 50 litres	Low
Basic access	Water source within 1 km providing 20 litres	High
No access	Water source more than 1 km away providing 5 litres	High

Various parameters that determine water supply along with the sources of supply, include connection coverage and metering, litres per capita per day (lpcd) supplied, non-revenue water, continuity and quality of supply and water treatment (Water Aid, 2018).

### Madhya Pradesh

State of Madhya Pradesh has adopted the following norms for water supply:

- ⌘ **Availability:** provision a minimum of 40 lpcd
- ⌘ **Access:** provide at least one hand pump for every 250 persons. Cover settlements with a population of less than 100 people, comprising SC/ST, under the Accelerated Rural Water Supply Programme (ARWSP)
- ⌘ **Distance:** Ensure a water source within a radius of 1.6 km in the plains and within 100 meters in hilly areas

### Current Status

Though access to a source of drinking water improved over the past decade in India, the availability of adequate infrastructure in a house has not necessarily translated into water supply (WHO/UNICEF, 2015). Between 1990 to 2015, both urban and rural India saw a 46 per cent increase in access to drinking water. Access to drinking water and usage of improved water supply stood at 93 per cent nationally and in 2017, 91 per cent of the rural population and 96 per cent of the urban population had access to an improved water supply (Check **Annexure 2**). The proportion of population that uses improved water supply to access water also increased.

At the national level, Chandigarh with 99.4 per cent of population having access to water, stands at the top, followed closely by Daman and Diu, Punjab and Uttarakhand with 99 per cent, 98.9 per cent and 98.7 per cent accessibility respectively.

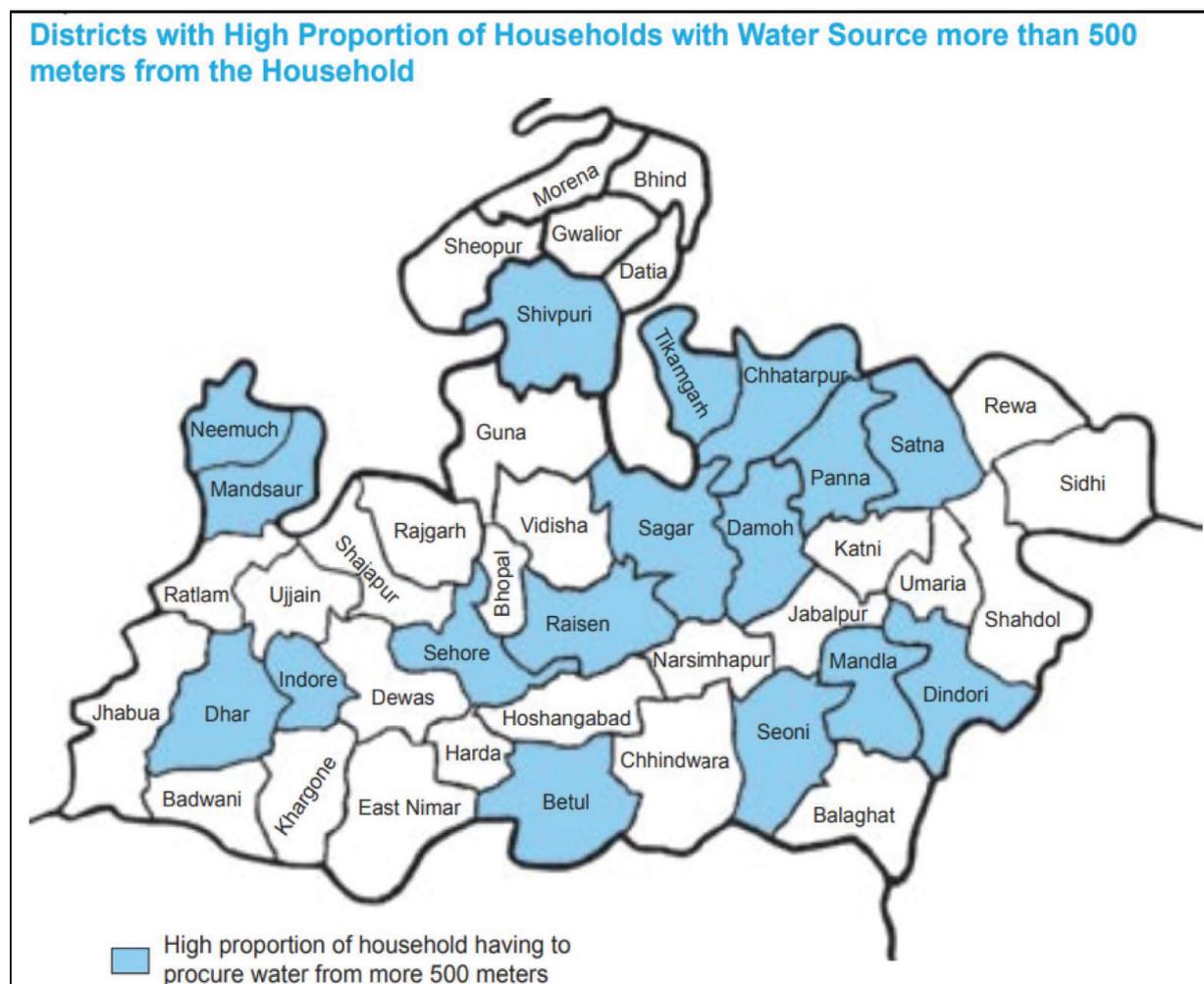
Madhya Pradesh has been able to provide 92.1 per cent water supply, with 60 per cent of habitations being fully covered<sup>4</sup> and 25 per cent partially covered (Khanna & WaterAid India, 2005). Bhopal is the only district that is fully covered with adequate water supply. While coverage is important, distance of a household from water source plays a crucial role in determining access.

<sup>4</sup> The habitations that are fully covered are those that have the provision of 40 lpcd (litres per capita per day) for the population of the habitation.



**Table 23: Water Landscape of Madhya Pradesh**

Distance of Drinking Water Sources from Dwelling	Percentage Households
Within the premises	14 per cent
Within 500 meters	59 per cent
More than 500 meters away	27 per cent
No. of districts accounting for 27 per cent	16, including Indore



**Figure 5: District with high proportion of households with water resources more than 500 meters**

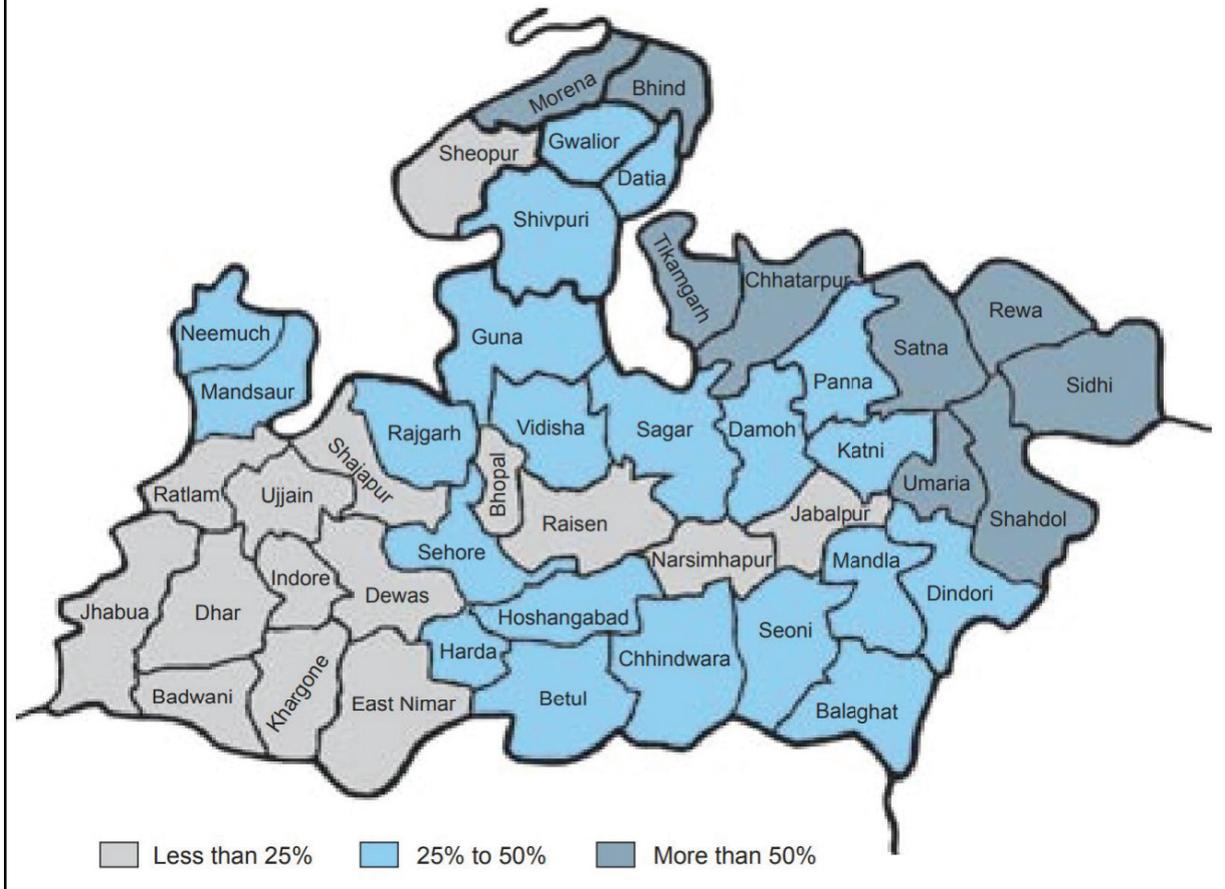
Source: (Khanna & WaterAid India, 2005)

In Madhya Pradesh

- ⌘ Hand pumps are a major source of drinking water for 32 of 45 districts, with 48 per cent of the state’s population dependent on them
- ⌘ 36 per cent population residing in the remaining 13 districts are dependent on wells
- ⌘ Rest of the population depends on tap water, tube wells or surface water.



## Districts with Proportion of Household by Source of Water



**Figure 6: Districts with proportion of household by sources of water**

Source: <https://washmatters.wateraid.org/publications/water-and-sanitation-in-madhyapradesh-a-profile-of-the-state-institutions-and-policy>

In Indore sources of water supply include the Gambhir line, ground borewells (public and private) and elevated storage reservoirs (Indore Municipal Corporation, 2019). While bulk of the supply, almost 80 per cent, comes from the Narmada, borewells supply 15 per cent of the total water. During the summers IMC procures water from the Narmada-Gambhir Link Project, which serves as an emergency reserve.

The spread of waterborne diseases is an indicator of the water quality of a state. Madhya Pradesh has seen a 92 per cent increase in diarrhoea, jaundice and meningitis, with at least 15 per cent of villages identified as problem affected.

### 2.1.2. Water Conservation

It is essential to manage water efficiently and conserve the natural resource sustainably, to protect future generations. Factors such as climate change have increased pressures on natural water resources, especially in manufacturing and agricultural irrigation (EuroSciCon, 2020). Efficient water conservation can be achieved by adopting the three R's:

- ⌘ Water usage must be **reduced**, by fixing leaks, limiting shower time and avoiding use of water for non-essential activities
- ⌘ Water **recycling** is a vital part of conserving with wastewater management playing an important role



- ⌘ **Reuse** recycled water to limit its usage in activities such as irrigation and reuse greywater in toilets

## Strategies for achieving 3R (Park, 2005)

### *Reducing Usage*

Creating widespread awareness amongst people about economical use of water is the key to reducing consumption and wastage of the invaluable water reserves. While efficient water management can substantially reduce the total water requirement of communities, domestic consumption can be reduced by individuals cultivating better habits in the kitchen and bathrooms. (Details in **Annexure 3**)

### *Water Harvesting*

Simple innovative ideas such as water harvesting are extremely important to preserve and build-up underground water reserves in urban and semi-urban areas, where considerable water is drawn out by tube wells for domestic consumption. Vast quantities of rainwater, that are normally discharged into drains, can instead be diverted from rooftops and courtyards into soaking pits or trenches. This water can be further cleaned, filtered and added to existing tube wells or wells. Agencies such as Central Ground Water Board (CGWB) and UNICEF have suggested economic designs for rainwater harvesting (RWH).

RWH helps improve the quality of groundwater, recharge groundwater aquifers and raise water levels in wells and borewells alleviating the challenges of water scarcity. While mitigating the effects of drought and ensuring drought proofing, it reduces soil erosion by reducing surface runoffs. With water getting diverted to the RWH pits, choking of storm water drains and flooding of roads can also be reduced. An indirect benefit is the reduction in energy consumption used for lifting groundwater (one-meter rise in water level saves 0.40-kilowatt hour of electricity).

### **Norms**

Some key action points outlined by the Ministry of Water Resources in the general guidelines for water conservation focus on conservation of surface and ground water resources, RWH and efficient water use practices (Ministry of Water Resources, GoI, 2017)

RWH, a water collection and storage technique at the surface or in subsurface aquifers, helps reduce surface runoffs and flooding of storm water drains. RWH structures can be created in paved and unpaved areas, rooftops and near water bodies.

Water conservation can be accomplished broadly by building water resource development structures such as small reservoirs, percolation embankments and diversion drains. A unique practice, followed particularly in MP's Bundelkhand zone, is the construction of submergence bunds. Catchment area treatment is yet another important practice for water conservation.

### **Current Status**

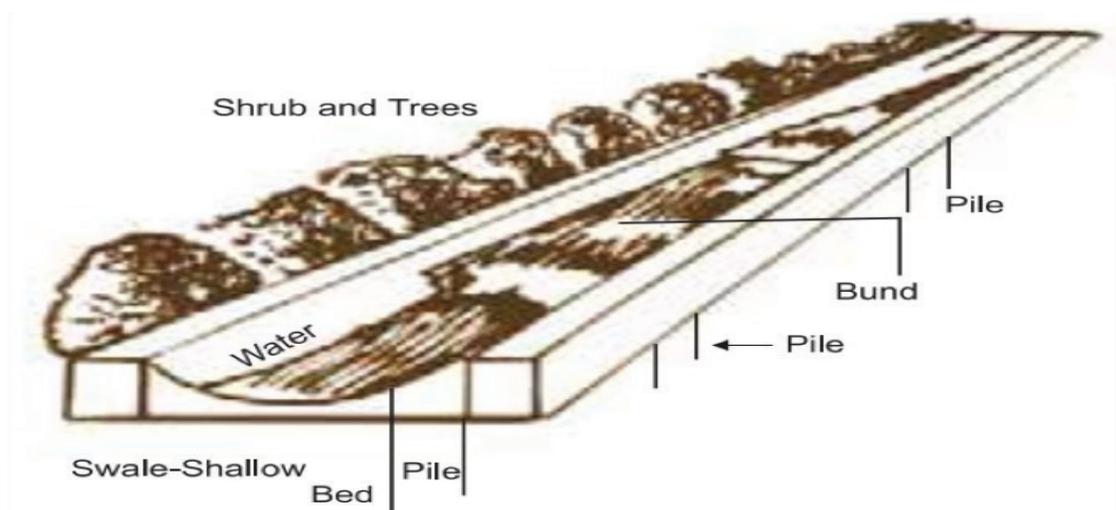
With rising demand for water, several cities around the world procure water from sources over 100 km away. This not being a sustainable model immensely increases the importance of RWH, a technique practiced all over the world not necessarily only in drought prone or water scarce regions.

RWH, a self-sustained system, can work well for cities such as Bengaluru and New



Delhi, that experience an imbalance in water supply and demand despite adequate rainfall. They also offer high potential for roof RWH structures. (UN-Habitat, n.d.)

Indore, being the commercial capital of Madhya Pradesh, faces an acute shortage of drinking water and is also experiencing diminishing aquifers. Water conservation through RWH can offer a two-fold solution to Indore by helping replenish aquifers and increasing the availability of drinking water in scarce areas. The main water recharge technique followed in Indore is the *Piles and Swales* method, in addition to the typical method of collecting water through trenches and wells.



**Figure 7: Piles and Swales method**  
(Source: (UN\_Habitat, n.d.))

### 2.1.3. Water Quality

Access to clean drinking water is vital to human health as poor water quality can pose a health risk for people as well as to the ecosystems. Water quality refers to the physical, chemical and biological characteristics of both the water as well as the sediments (Government of Western Australia, 2017). Water quality is also dependent on drinking-water services, which include accessibility, availability, and quality of the main source used by households for drinking, cooking, personal hygiene, and other domestic uses (WHO/UN-Water, 2019). Safe drinking water is dependent on improved sources of water including piped water supply and safe ground water sources such as covered wells, handpumps and borewells.

A key aspect of water quality and safety for consumption is the presence of microbial, chemical, and radioactive elements. World Health Organisation (WHO) has outlined the guidelines and health-based targets to determine the quality of water:

- ⌘ The key microbial aspect is the presence of **total coliform organisms**. A type of bacteria of faecal origin, it may or may not indicate faecal contamination as it could be caused by soil or surface water runoff. Coliform presence is measured broadly in terms of total coliforms, faecal coliforms and *Escherichia coli*. *E. coli* is a major species in the faecal coliform group and the best indicator of such pollution and the possible presence of pathogens.
- ⌘ The **pH level of water** determines how acidic or basic the water solution is and whether it is safe for consumption.
- ⌘ The **dissolved oxygen content in water**, i.e., the amount of gaseous oxygen dissolved in water, determines the nutrient content and influences the taste.



It is one of the most important indicators of water quality as it also stimulates the water temperature.

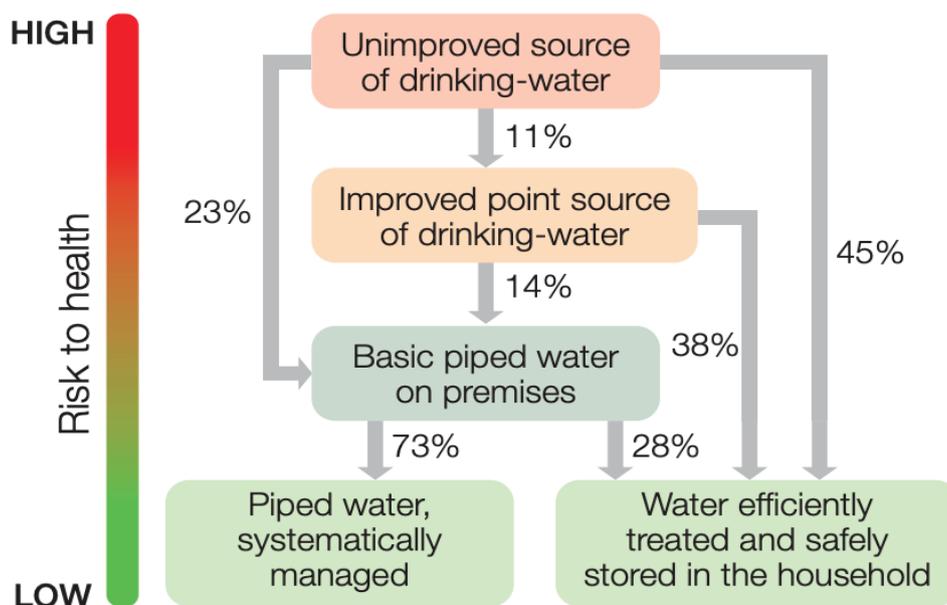
Groundwater, contained beneath the surface in rocks and soil, accumulates in aquifers (Chilton et al., 2006). It being the primary source of drinking water and perhaps the only economically viable option to many communities around the world, protecting groundwater is important.

### Norms

There are multitude ways by which water quality can be measured and current standards determined. The specific criteria to ascertain if water is fit for drinking is as follows:

- ⌘ Total Coliforms in drinking water - not exceeding 50 (MPN/100ml)<sup>5</sup>
- ⌘ pH level of water - between 6.5 and 8.5
- ⌘ Dissolved oxygen - above 6mg/l

Drinking water also plays a crucial role in reducing the burden of diarrhoeal diseases as shown in figure 8.



**Figure 8: Drinking water and the burden diarrhoeal diseases**

Source: (World Health Organization, 2016)

While groundwater requires almost no treatment as compared with surface water, it cannot always be assumed to be clean. The characteristics that determine whether groundwater is safe for consumption, different from those of drinking water, are as follows:

- ⌘ **Salinity:** The concentration of soluble salts in soil or water deemed safe for human consumption stands at 830 EC or half a gram of salt in a litre of water (World Health Organization, 2008). Water temperature, which has a significant impact on salinity, must be at 25oC. Salinity is often measured using the Electrical Conductivity (EC) method.<sup>6</sup>

<sup>5</sup> MPN/100ml: Most Probable Number (MPN) is a method used to estimate the concentration of viable microorganisms in a sample, in this case, it is per 100 ml. It is most commonly applied for quality testing of water.

<sup>6</sup> EC is a measure of how much electrical current can flow through a sample of water. The standard EC



- ⌘ **Fluoride and Arsenic:** Considered the most serious inorganic matters, these groundwater constituents occur naturally. Prolonged exposure to fluoride can lead to fluorosis and arsenic is considered a Group 1 human carcinogen (World Health Organization, 2001). It is thereby important to ensure that:
  - Fluoride concentration in water does not exceed 1.5 mg/l
  - Arsenic is not allowed to exceed the maximum allowable limit of 0.01 mg/l (WHO standards)
- ⌘ **Iron:** Presence of iron in groundwater, common in India, must be maintained below 1.0 mg/l.
  - **Nitrate:** A common chemical contaminant found in groundwater the primary source of nitrate is anthropogenic activities. The permissible limit of nitrates in water is 45 mg/l, beyond which it can cause acute health effects.

All the above-mentioned criteria must be considered to maintain a healthy water system in a city. Refer **Annexure 4** for WHO guidelines on drinking water quality.

### Current Status

At a global level, water quality in most European cities meets the WHO standards. In India, the best water quality was recorded in Mumbai with 100 per cent of the samples clearing the tests, followed by Hyderabad, where 1 of 10 samples failed the test.

Water quality in Madhya Pradesh is however of concern (Khanna & WaterAid India, 2005):

- ⌘ Fluoride contamination - 2,767 water sources in 1,545 villages (22 districts)
- ⌘ Iron contamination - 1,052 sources in 583 villages
- ⌘ High salinity - 13 districts

In Indore, water quality sampling is undertaken by the Water Quality Testing Department, IMC at production as well as distribution level. Between Jan to Sep 2015, out of 12,314 samples tested about 10 per cent tested unfit for drinking water purposes (Indore Municipal Corporation, 2019).

**Table 24: Water quality in Madhya Pradesh and Indore**

Criteria	Temperature	pH level	Nitrate (mg/l)	Fluoride (mg/l)
Madhya Pradesh	30°C	7.62	2.77	0 - 1
Indore	31.53°C	7.1	21.93	0.59

Madhya Pradesh has seen a 92 per cent increase in waterborne diseases such as diarrhoea, jaundice and meningitis. The Department of Health has identified that 15 per cent villages are affected by such problems.

## 2.1.4. Wastewater Management

With increasing population, accelerated urbanisation and economic development, the quantity of wastewater generated, and its overall pollution load are increasing globally. The toxic contents of wastewater could pose a hazard to both human health and the environment leading to economic/financial impacts.

unit used is micro siemens per centimetre ( $\mu\text{S}/\text{cm}$ ) at 25°C. (<http://agriculture.vic.gov.au/agriculture/farm-management/soil-and-water/salinity/measuring-the-salinity-of-water>)



Water is considered wastewater when its quality is adversely affected by anthropogenic influence or liquid waste discharges from:

- ⌘ domestic effluents consisting of black water (excreta, urine and faecal sludge) and greywater (kitchen and bathing wastewater)
- ⌘ water from commercial establishments and institutions, including hospitals
- ⌘ industrial effluent, storm water and other urban run-offs
- ⌘ agricultural, horticultural and aquaculture effluent, either dissolved or as suspended matter (UN-Water, 2015)

The major components of wastewater include

- ⌘ Plant nutrients (nitrogen, phosphorus, potassium)
- ⌘ Pathogenic micro-organisms (viruses, bacteria, protozoa and helminths)
- ⌘ Heavy metals (e.g., cadmium, chromium, copper, mercury, nickel, lead and zinc)
- ⌘ Organic pollutants (e.g., polychlorinated biphenyls, polyaromatic hydrocarbons, pesticides) and biodegradable organics (BOD, COD)
- ⌘ Micro-pollutants (e.g., medicines, cosmetics, cleaning agents)

Wastewater management can be undertaken either at centralised levels such as sewage systems or decentralised level using on-site or neighbourhood level systems. Centralized systems are usually planned, designed and operated by government agencies which collect and treat large volumes of wastewater for entire communities. On the other hand, decentralised wastewater management (DWWM) systems treat wastewater of individual houses, apartment blocks or small communities, isolated communities, industries, or institutional facilities, as well as from portions of existing communities at or near the point of waste generation (Ministry of Urban Development, GoI, 2012).

Far from being something to discard or ignore, wastewater can play a major role in meeting the growing water demand in rapidly expanding cities, enhancing energy production, industrial development and supporting sustainable agriculture (UN-Water, 2015). The multiple uses of recycled wastewater include:

- ⌘ a drought-resistant source of water supply in drought prone areas
- ⌘ useful in agriculture, as it works as a soil conditioner and improves the source of nutrients in agriculture
- ⌘ during anaerobic digestion, the wastewater recycling process generates methane and carbon, which can be used as biogas, an eco-friendly option for fuels.

The SDGs directly related to wastewater management include:

- ⌘ SDG 6.3.1: Proportion of wastewater safely treated
- ⌘ SDG 6.3.2: Percentage of industries complying with wastewater treatment as per CPCB norms

## Norms

A series of parameters have been defined by WHO and the Government of India for wastewater management and treatment. Before sewage water is disposed into the environment, it must be treated to ensure that contaminants do not exceed the values given below (Telangana State Pollution Control Board, n.d.)<sup>7</sup>

<sup>7</sup> <http://tspcb.cgg.gov.in/Environment/standards-effl.pdf>



**Table 25: Parameters for disposal for sewage water**

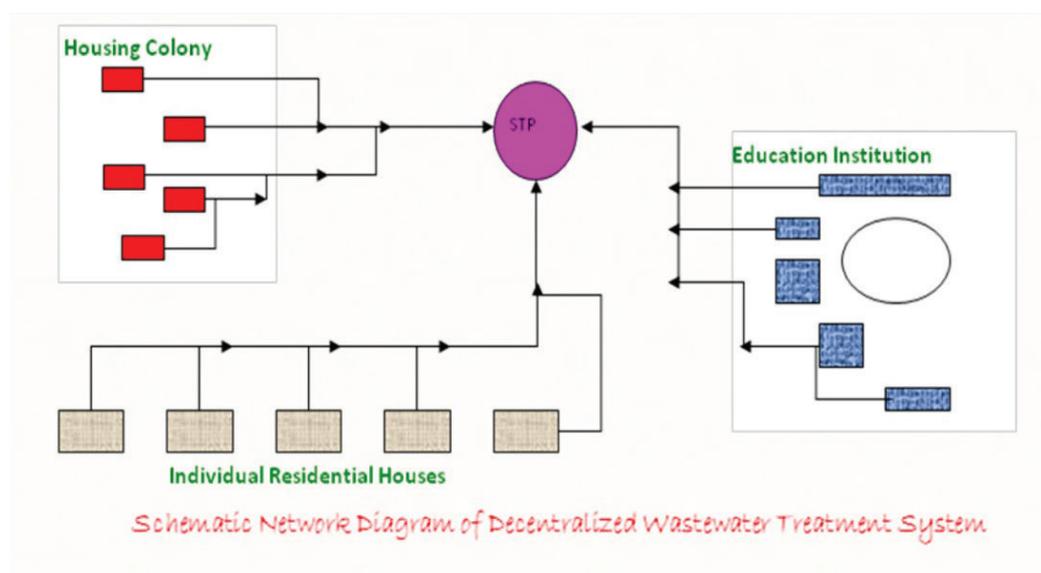
Parameter	Standard (max)
pH value	5.5 – 9 pH units
Oil and grease	10 - 20 mg/l
Total residual chlorine	1.0 mg/l
Ammoniacal nitrogen	50 mg/l
Total kjeldahl nitrogen	100 mg/l
Free ammonia (as NH <sub>3</sub> )	5.0 mg/l
Biochemical oxygen demand (3 days at 27°C)	30 – 100 mg/l
Chemical oxygen demand	250 mg/l
Suspended solids	30 – 150 mg/l

The following performance indicators have been outlined to ensure Service Level Benchmarking (SLB) of Urban Local Bodies in India:

- ⌘ Coverage of toilets
- ⌘ Coverage of wastewater network services
- ⌘ Collection efficiency of wastewater network
- ⌘ Adequacy of wastewater treatment capacity
- ⌘ Quality of wastewater treatment
- ⌘ Extent of reuse and recycling of wastewater
- ⌘ Extent of cost recovery in wastewater management
- ⌘ Efficiency in redressal of customer complaints
- ⌘ Efficiency in collection of sewerage-related charges

### Domestic Water Treatment

Domestic wastewater is treated using both on-site or a non-sewer system and a centralised, sewer system. There is also provision of following a mixed on- and off-site management facility. A typical decentralised wastewater management system can be seen in Figure 9.

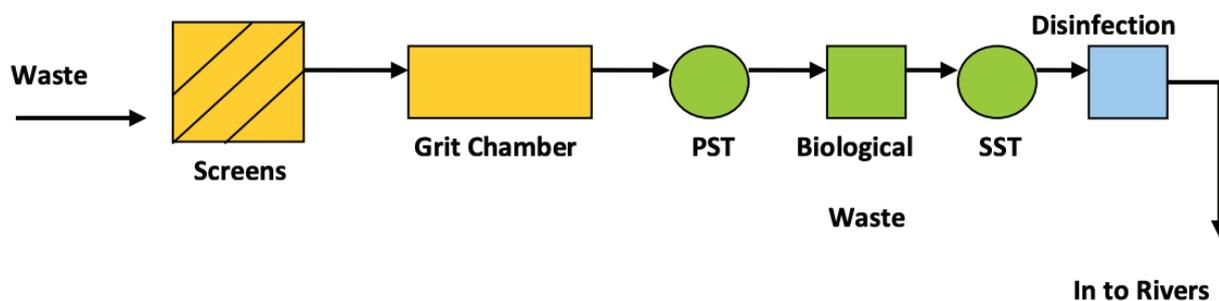


**Figure 9: Schematic Network Diagram of Decentralised Wastewater Treatment System**  
 Source: (Ministry of Urban Development, GoI, 2012)



Wastewater treatment takes place at three levels:

- ⌘ Primary treatment system consisting of screens, grit chambers and a primary sedimentation tank
- ⌘ Secondary treatment system mainly consists of biological treatment
- ⌘ **Tertiary treatment** is given to polish the treated wastewater to meet the reuse / recycle requirement.



**Figure 10: Flow diagram of a typical wastewater treatment system**

Source: (Ministry of Urban Development, GoI, 2012)

Refer to **Annexure 5** for guidelines related to maintenance and operation of a wastewater system.

**Industrial Wastewater Treatment:** Management of industrial wastewater and its discharge/disposal can be classified as follows:

- ⌘ Uncontrolled discharges to environment
- ⌘ Illegal, mostly clandestine, discharges to sewerage systems
- ⌘ Controlled (licensed) discharges to the environment (watercourses) or to sewerage systems, possibly after pre-treatment
- ⌘ Wastewater collected in tankers for treatment/disposal elsewhere.

### **Agricultural Wastewater**

The key challenges associated with agricultural wastewater include:

- ⌘ Sediment runoff - can cause siltation and increase flood risks
- ⌘ Nutrient runoff - nitrogen and phosphorus, applied to farmland as fertiliser, animal manure and municipal wastewater, are key pollutants found in agricultural runoff
- ⌘ Microbial runoff - from livestock or use of excreta as fertiliser. Domestic animals, such as poultry, cattle, sheep and pigs, generate 85 per cent of the world's animal faecal waste (Dufour A, Bartram J, Bos R, Gannon V (2012) *Animal waste, water quality and human health*. IWA Publishing, London.)
- ⌘ Chemical runoff - from pesticides, herbicides, other agrichemicals and residues of veterinary drugs may cause water pollution.

For various types of decentralised wastewater management systems (DWWMs) and their possible locations refer to **Annexure 5**.

### **Current Status**

Globally, 80 per cent of wastewater flows back into the ecosystem without being treated or reused, leading to around 1.8 billion people using a source of drinking water contaminated with faeces, putting them at risk of contracting cholera, dysentery, typhoid and polio. Of the many countries striving to address this challenge, Malta and Singapore have achieved 100 per cent of their wastewater, followed closely by



The Netherlands, who recycle 99.9 per cent of wastewater.

With both the population and industrial landscape in India growing at a phenomenal speed, wastewater volume is also rising at an alarming rate. According to a 2015, Central Pollution Control Board, India had the capacity to treat approximately 37 per cent of its wastewater (i.e., 22,963 million litres per day MLD), against a daily sewage generation of approximately 61,754 MLD (The Third Pole, 2017). Of the staggering 1.7 million tonnes of faecal waste generated daily in India, about 78 per cent remains untreated and is disposed of in rivers, groundwater or lakes. This is a major cause of a high burden of water-borne diseases.

Over the years, India’s wastewater treatment capacity has remained at a national average of around 33 per cent.

**Table 26: Urban Wastewater Treatment Capacity**

Category	States	Urban Wastewater Treatment Capacity (Drishti, 2019)
Large Wastewater Generators	Punjab, Maharashtra, Gujarat, and UP	65-100 per cent
Populous States	Madhya Pradesh, Bihar and Andhra Pradesh	Less than 50 per cent

Madhya Pradesh has the capacity to treat only 14.90 per cent of the waste generated by its class-I cities (1,248.72 MLD sewage generated 186.1 MLD treated).

**Table 27: Sewage Treatment Capacity**

City	Sewage Generated	Sewage Treated	Percentage
Indore	204 MLD	78 MLD	38 per cent
Bhopal	334.75 MLD	22 MLD	6 per cent
Jabalpur	143.34 MLD	Nil	Nil

Indore has achieved 100 per cent treatment of faecal matter with three Sewage Treatment Plants:

- ⌘ World’s first and largest Sequencing Batch Reactors (SBR) based STP with a 245 MLD capacity
- ⌘ 78 MLD and 12 MLD Upflow Anaerobic Sludge Blanket reactor (UASB) based STPs at Kabitkhedi. These plants also have power generation capacity of around 18.5 KW to 22 KW
- ⌘ An additional 122MLD STP is also located in the city



## 2.2. Government Interventions

Water scarcity being one of the biggest challenges facing India, there is a need for both, the state and central governments to regulate usage and ensure its availability to all sections of society.

### 2.2.1. Common Interventions

The Government of India is making concerted efforts to achieve its commitments to the SDGs (Bhamra et al., 2015). These are mainly aimed at ensuring:

- ⌘ access to safe drinking water
- ⌘ improved water supply
- ⌘ better groundwater management
- ⌘ creation of rainwater harvesting infrastructure
- ⌘ improved drainage and sewerage systems
- ⌘ solid waste management.

Some key national level schemes and policies for water and wastewater management are as follows (NITI Aayog, 2020):

**Table 28: National Schemes and Policies**

SDG Indicator	Indicator Data Source	Government Agency	Government Scheme
6.1.1: Proportion of population using safely managed drinking water services	Ministry of Jal Shakti  Ministry of Statistics and Programme Implementation (MoSPI) [National Sample Survey 76th round: Drinking Water, Sanitation, Hygiene and Housing Conditions in India]	Ministry of Drinking Water and Sanitation	National Rural Drinking Water Programme
6.1.2: Percentage of population using an improved drinking water source		Ministry of Housing and Urban Affairs, Government of India	AMRUT
6.3.1: Proportion of wastewater safely treated	Central Pollution Control Board (MoEF&CC)	Ministry of Water Resources, River Development and Ganga Rejuvenation	Ganga Action Plan, Repair, Renovation & Restoration (RRR) of Water Bodies and other schemes
6.3.2: Percentage of industries complying with wastewater treatment as per CPCB norms			

In 2019, the Government of India set up the Ministry of Jal Shakti to bring the various water management schemes under one umbrella.

#### 2.2.1.1. National Water Policy

The most widely known water related policy in India is the National Water Policy,



formulated by the Ministry of Jal Shakti. It lays emphasis on planning and development of water resources and management for optimal and sustainable utilisation of groundwater and surface water reserves.

This policy focuses on providing assistance to water stressed areas by improving ground water, access to water supply and flood management (Ministry of Water Resources, GoI, 2012). It stresses on enhancing water availability and ensuring that at least a minimum basic quality is available to safeguard health and hygiene by managing water as a common community resource. Likewise, strategic water pricing to promote efficient usage as well as reward conservation are included in the policy.

### **2.2.1.2. National Water Mission**

The National Water Mission, an overarching intervention, has the following goals:

- ⌘ Develop comprehensive water databases in public domain and assess the impact of climate change on water resource
- ⌘ Promote citizen and state action for water conservation, augmentation and preservation
- ⌘ Focus attention on vulnerable areas, including over-exploited areas
- ⌘ Improve water use efficiency by 20 per cent
- ⌘ Promote basin level integrated water resources management

Towards this end, the Department of Water Resources, Ministry of Jal Shakti has begun management of surface water resources as well as management and regulation of groundwater resources. In addition to upgrading storage structures for fresh water and drainage systems for wastewater, measures have been taken to conserve wetlands and development of new technologies for water desalination.

### **2.2.1.3. Atal Bhujal Yojana (Atal Jal)**

Atal Bhujal Yojana (Atal Jal) prioritises strengthening of the institutional framework for participatory groundwater management and bringing about behavioural change at the community level for sustainable groundwater resource management. State governments were incentivised to implement the Yojana with initiatives such as, data dissemination, preparation of water security plans, implementation of management interventions through convergence of ongoing schemes and adopting demand side management practices (Vikaspedia, n.d.).

### **2.2.1.4. Atal Mission for Rejuvenation and Urban Transformation (AMRUT)**

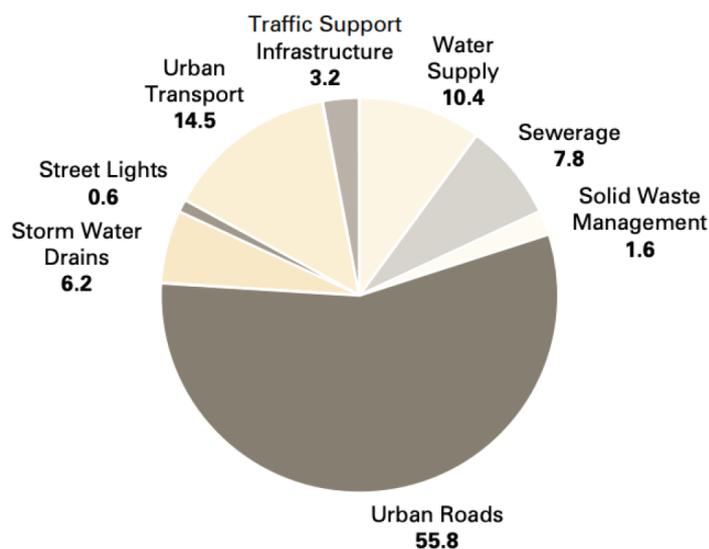
The Atal Mission for Rejuvenation and Urban Transformation (AMRUT) was launched in 2015 as a continuation of the Jawaharlal Nehru National Urban Renewal Mission (JNNURM). Focused on establishing adequate sewage systems and fresh water supply infrastructure for urban transformation in larger cities, it drives the achievement of SDGs. By prioritizing improvement in water supply for the first few years, it leads to improved service coverage in many cities. AMRUT is also the first national scheme to provide funds for septage management and extension of networked systems (Wankhade & Indian Institute for Human Settlements (IIHS), 2016)



The scheme achieves its objectives through augmentation and rehabilitation of existing water supply and water treatment plants, rejuvenation of water bodies for drinking water supply and recharging groundwater. Special water supply arrangements are undertaken for difficult areas, hill and coastal cities, including those with water quality problems such as presence of arsenic and fluoride.

### 2.2.1.5. High-Powered Expert Committee (HPEC)

In 2008, the Ministry of Urban Development set up a High-Powered Expert Committee (HPEC) to estimate investment requirements for provision of urban infrastructure services over the next two decades.



**Figure 11: HPEC Investment Allocation**

The HPEC proposal, an improvement of the JNNURM, estimated around 26 per cent investment in water related infrastructure. By ensuring high quality public services in cities and towns it aims at facilitating the realisation of India’s full economic potential through these services. The water related parameters to be achieved for all cities under this proposal, include:

- ⌘ 100 per cent piped water supply for individual households, including informal settlements
- ⌘ 24x7 water supply
- ⌘ Underground sewerage system and 100 per cent collection and treatment of wastewater
- ⌘ 100 per cent solid waste collected, transported, and treated as per Municipal Solid Waste Rules, 2000
- ⌘ 100 per cent drain network along both sides of all roads

## State Level Interventions

### 2.2.1.6. State Water Policy – Madhya Pradesh

Madhya Pradesh has implemented two water interventions over the past two decades, including the State Water Policy in 2003. These interventions focused on developing an information system to indicate water availability for different purposes by credible and broader projections, provision for drinking water and



hydroelectricity, groundwater development, and drinking water and quality control (International Environmental Law Research Centre, IELRC, 2003). The State Water Policy focuses on providing drinking water facilities to both urban and rural areas through development and conjunctive use of surface and groundwater.

### 2.2.1.7. Jal Kranti Abhiyan

Launched in 2015, the Jal Kranti Abhiyan works to consolidate water conservation and management through a holistic and integrated approach by making it a mass movement. Some of its key objectives include:

- ⌘ Strengthening grassroots involvement of stakeholders, including Panchayati Raj Institutions and local bodies in the water security and development schemes (e.g. Participatory Irrigation Management (PIM))
- ⌘ Encouraging adoption/utilisation of traditional knowledge in water resources conservation and its management
- ⌘ To utilise sector level expertise from different levels in government, NGOs, citizens amongst others
- ⌘ Enhancing livelihood security through water security in rural areas.

Refer **Annexure 6** for details of the scheme.

### 2.2.1.8. Chief Minister Urban Drinking Water Scheme

Chief Minister Urban Drinking Water Scheme, launched by Madhya Pradesh in 2013, pursues the Central Government's vision of "a tap in every house, water in every tap."<sup>8</sup> Towards this end, MP's Water Resource Department, provided 30 per cent water subsidy to urban bodies of areas with over 50,000 population and 20 per cent to urban bodies with less than 50,000 population.

In Indore, water management activities are undertaken by IMC, along with Madhya Pradesh Public Health Engineering Department.

<sup>8</sup> [http://www.mpurban.gov.in/Uploaded%20Document/cm%20peyjal/CM\\_Peyjal\\_Yojna17\\_July2012.pdf](http://www.mpurban.gov.in/Uploaded%20Document/cm%20peyjal/CM_Peyjal_Yojna17_July2012.pdf)



## 2.3. Problem Statement and Gap Analysis

### 2.3.1. Water Security and Water Conservation

Access to clean water and sanitation facilities is crucial to improve urban health, as those lacking basic amenities are often at higher risk of water-borne and vector-borne diseases. Water resources (both surface and groundwater) are adversely affected by man-made activities, including poorly treated drainage, construction, and industrial runoff, resulting in water quality degradation and limiting safe water supply.

#### Indore's Water Challenges

- ⌘ Indore's rapid urbanisation has led to exploitation of water resources and an unequal distribution of water leading to extensive water shortage
- ⌘ Indore is one of the districts with a majority population having water sources more than 500 meters away from their homes
- ⌘ Indore faces water shortage in summers and groundwater is the most economical alternative
- ⌘ To meet the city's demands in the summer, the Indore Municipal Corporation (IMC) procures water from the Narmada-Gambhir Link Project as an emergency reserve. In summers, the increased burden on ground water resources such as borewells, results in many of them running dry
- ⌘ The critical issues in the current water supply system include inequitable distribution of direct water supply, ineffective metering and monitoring systems to measure distribution network, improper operational zones, water leakages and drop in groundwater tables due to excessive use of borewells,

### Addressing Water Security and Conservation

Groundwater, the only economically viable source of water supply, is also the primary source of drinking water for many regions of the world. One of the effective methods of conserving replenishing groundwater is rainwater harvesting (RWH).

Improved water access is directly proportional to the economic status of a household. A study conducted in Nepal (*Behera B, Rahut D B, Sethi N*) found a significant correlation between education level, economic status and location and a household's access to improved drinking water, sanitation, and waste disposal services in urban areas. The indicators used in this study can be useful for further research and building a multinomial logistic model.

### Policy Gaps

#### 1. AMRUT

Though AMRUT was launched for rejuvenation and transformation of water and sewage systems across the country, the following gaps have limited its effectiveness:

- ⌘ A general approach towards all cities rather than a specified goal for each city based on size and needs
- ⌘ Although the scheme encompasses the necessary indicators, evidence towards continuous water supply during summer and other scarcity situations have not been outlined
- ⌘ Though water supply is a key component, without adequate channels to



access water, the maximum capacity cannot be leveraged. The scheme does not measure access to water on parameters such as distance to source and time spent on collection

- ⌘ Importance of water conservation through rainwater harvesting or other methods that improve both water quantity and recharge groundwater aquifers, is not emphasised.

## 2. Atal Bhujal Yojana (Atal Jal)

Atal Jal was designed to strengthen the institutional framework for participatory groundwater management and trigger behavioural changes for sustainable groundwater management. However, this scheme does not outline the pathways and procedures for achieving these objectives.

## 3. The National Water Policy (2012)

While the NWP emphasises promotion of water conservation and its efficient usage:

- ⌘ It does not highlight the need to arrest declining groundwater levels with improved technologies of water use, efficiency in usage and community involvement in managing aquifers
- ⌘ concrete steps to proactively rebalance groundwater extraction levels in line with recharge are not proffered (The Economic Times, 2013)
- ⌘ specific methods to achieve water use efficiency are not defined.

### 2.3.2. Water Quality

Improving access to safe drinking-water can result in tangible improvements to health, as it directly reduces the risk of water borne diseases and has the potential to improve child mortality (World Health Organization, 2016). Water quality is affected by the sudden depletion of water sources triggered by increased usage, contamination of local water bodies and increased pollution.

Wastewater, if managed well, can play a major role in addressing the growing water demand in rapidly expanding cities, enhancing energy production and industrial development, and supporting sustainable agriculture (UN-Water, 2015). This requires both an appropriate waste management system as well as its continued maintenance and sustainability.

## Addressing the challenge

Following recommendations for access to clean drinking water are noteworthy:

- ⌘ Given that access to clean drinking water and flush toilets connected to septic tanks have numerous benefits, policies should be aimed at providing piped water to compounds and dwellings
- ⌘ Segregation of liquid and solid wastes at source and recycling must be encouraged through schemes that also reduce the financial burden on local governments
- ⌘ Addressing policy measures and coordination between the three tiers of the government must be maintained and adequate financial support be given to municipal bodies.

The following questions, arising out of a research of interventions in 24 countries,



also need consideration while addressing water quality challenges. (Fewtrell, L., Kaufmann, R. B., Kay, D., Enanoria, W., Haller, L., & Colford, J. M.)

- ⌘ role of community versus household connections in water supply interventions
- ⌘ role of sanitation interventions in reducing diarrhoeal illness
- ⌘ longevity of health-related effects of individual interventions.

## 2.4. Recommendations

### Water Security

The National Water Policy needs to ensure that after water for drinking and domestic needs, water for ecology and the environment is given highest priority to ensure survival of crucial ecosystem services. Farmers, especially in water stressed areas, need to be trained to increase area under water-lite crops and incentivised by creating alternate sources of income such as sericulture. Awareness programmes and training, especially to domestic users as well as farmers, to improve water use efficiency need to be stepped up.

### Water Conservation

While surface water resources can be conserved by constructing dams to store rainwater, for sustainability of groundwater resources it is necessary to arrest ground water outflows by constructing subsurface dams, undertake watershed management, treat upstream areas and skim freshwater outflows in coastal areas and islands.

Efficient water use practices that can be encouraged to conserve water include application of water by sprinkler and drip irrigation methods, optimal utilisation of groundwater conjunctive use and minimizing losses due to evaporation. The government also needs to augment programmes for watershed management and catchment development as well as in-situ soil and water conservation works.

### Water Quality

Given that access to clean drinking water and flush toilets connected to septic tanks have numerous benefits, policies must focus on providing piped water to compounds and dwellings.

### Wastewater Management

Segregation of liquid and solid waste at source and recycling must be encouraged through schemes that also reduce the financial burden on local governments

## Some Water Management Best Practices

### International

- ⌘ Some countries with RWH best practices include Brazil, Singapore, China, Germany and Australia. After Brazil implemented a RWH system to supply water to over one million homes, buildings were mandated to be equipped with these facilities.
- ⌘ China, with a similar population crisis as India, launched a RWH and reuse project which required every family to have at least two rainwater collection cisterns for every one acre of agricultural land. This project benefited over 1.3 million people (CleanaWater, 2015)



## India

Some best practices and successful interventions implemented in India's cities (NITI Aayog and TERI University, 2017)

- 1. Nagpur Orange City Water Project:** PPPs help ULBs in governance by separating monitoring and regulation from service delivery, proper implementation and technical and managerial expertise. Maximum liability, full accountability and wholesome planning ensure greater availability of water, minimal losses and consumer satisfaction.
- 2. Bulk Metering System, Bangalore:** Bulk flow metering helps water operators in assessing the overall water balance, along with identification of illegal connections. In large urban water supply systems, comprehensive monitoring and real-time data procurement ensure control, decision support and sustainable use of water resources. This ensures affordable and equitable water supply to citizens, while minimizing wastages consistently and reliably.
- 3. Community Managed Drinking Water Supply Programme, Gujarat:** This sustainable system of providing clean water to households was set up in collaboration with communities. Making maximum use of existing infrastructure, it ensures adequate, regular, safe, sustainable and convenient water supply at household level. Engagement of communities in the implementation process reduces the need for government support, making the programme self-reliant and ensuring social sustainability.
- 4. Adaptive Water Management in Mandli, Rajasthan:** Mandli faced a drinking water scarcity and salinity crisis leading to health hazards. The community and the Jal Sabha together generate funds from every household in the village. These funds were used for building a robust and sustainable community system to improve water availability. This project exhibits how an external agency, with cooperation of the local community, can facilitate revival of a sustainable water management system.
- 5. Birkha Bawri, Jodhpur:** To overcome the acute water shortage a housing complex built a RWH within their premises. This system reduced dependence on municipal water supply and groundwater extraction by 50 per cent. Further, the economic benefits included an annual saving of INR 2.36 crore, increase in property value, reduced water logging, and development of green landscapes. The intervention is a good example of sustainable urban development and water management practices in a low rainfall region, demonstrating the value of water by conserving rainwater.
- 6. Mazhapolima Initiative, Thrissur District, Kerala:** High dependence on groundwater led to drying up of wells urging the Thrissur District Administration along with various NGOs to launch an artificial groundwater recharge programme. Under this initiative, employees of 100 NGOs received training to install roof water harvesting systems. Localised and affordable efforts helped in implementation of a simple technique that can even be deployed by a layman.
- 7. Bhungroo, Groundwater Injection Well, Gujarat:** This system injects and stores excess rainwater underground. Major beneficiaries of this pilot programme were the underprivileged female farmers, who were completely dependent upon rain fed agriculture. This project has also contributed to improving food security.



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# 3. SANITATION

## Sustaining Healthy Cities



### 3.1. Significance for Healthy Cities

Access to clean water and sanitation facilities are major factors impacting the health of urban populations. Sanitation refers to access and use of facilities and services for safe disposal of human urine and faeces. Poor sanitation not only contributes to spread of diseases but is also a major factor contributing to undernutrition in children.

Safe sanitation is extremely essential to maintain a healthy lifestyle, as well as in improving mental and social well-being. One-half of all under-nutrition is caused by lack of access to safe drinking water, sanitation and hygiene. In addition to malnutrition, in developing countries diarrheal diseases are a leading cause of death amongst children aged five or below. In an urban setting, people who live in poorly constructed houses are often unable to maintain household hygiene given the limited access to water, garbage disposal and toilets. The high incidence of diseases such as diarrhoea, malaria and other waterborne diseases arising from limited sanitation facilities in underdeveloped and developing countries is a major public health concern.

The lack of access to clean sanitation facilities is a major cause of risks and anxiety, particularly for women. Driven by cultural norms and social pressures, lack of access to sanitation is a significant barrier to women living a holistic life with a negative impact on their health and education.

In the context of the ongoing COVID-19 pandemic, limited access to water amongst lower income groups is likely to have a moderately negative impact as it reduces their ability to follow the strict hygiene guidelines. Some COVID-19 related government responses include (Sachs et al., 2020):

- ⌘ Improving food security and hygiene to subsequently reduce the spread of zoonotic diseases
- ⌘ Provide universal access to water and sanitation with focus on personal hygiene practices such as handwashing to curb transmission of diseases
- ⌘ Increase investments to provide improved access to water and sanitation

Sustainable Development Goal 6, primarily focused on sanitation, revolves around access to water and sanitation for all by 2030. More specifically, SDG 6.2 sets the target of achieving access to adequate and equitable sanitation and hygiene for all

#### Key facts

(The World Bank, 2018)

- ⌘ The world generates 0.74 kilogram of waste per capita per day, yet national waste generation rates fluctuate widely from 0.11 to 4.54 kilograms per capita per day. Waste generation volumes are generally correlated with income levels and urbanisation rates.
- ⌘ An estimated 2.01 billion tonnes of municipal solid waste were generated in 2016, and this number is expected to grow to 3.40 billion tonnes by 2050, under a business-as-usual scenario.
- ⌘ Globally, about 37 per cent waste is disposed of in some type of landfill, 33 per cent is dumped in the open, 19 per cent undergoes material recovery through recycling and composting, and 11 per cent is treated through modern incineration.
- ⌘ Lower-income countries generally rely on open dumping with 93 per cent waste being dumped compared to only 2 per cent being dumped in high-income countries.



and ending open defecation, paying special attention to the needs of women and girls and those in vulnerable situations.

Some other SDG targets and indicators related to Water, Sanitation and Hygiene (WASH) include (UN-Water, 2016):

- ⌘ Increase the proportion of population living in households with access to basic services
- ⌘ End epidemics such as AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases
- ⌘ Reduce mortality rate attributed to unsafe water, unsafe sanitation and lack of hygiene (exposure to unsafe WASH services)
- ⌘ Ensure access for all to adequate, safe and affordable housing and basic services and upgrade slums
- ⌘ Significantly reduce the number of deaths and the number of people affected and substantially decrease direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations.

Even though 45 per cent of the world's population had access to safely managed sanitation services in 2017, 701 million people could not escape open defecation. In the same year, as many as 3 billion people lacked necessary handwashing facilities at home. The emphasis on water and sanitation, primarily through the Swachh Bharat Mission, has had a considerable impact on the spread of communicable diseases. Water and sanitation are the most cost-effective health interventions available.

The impact of sanitation on building healthy cities was studied in the context of three sub pillars of solid and liquid waste management, sanitation facilities and hygiene. These three sub pillars are detailed in the following sections.

Based on a review of the literature available on the above sub pillars, this section details the key findings, government interventions, provides a gap analysis and makes recommendations to bridge the gaps. The data for these sub pillars has been studied at four levels: international, domestic, state of Madhya Pradesh and city of Indore.

### **3.1.1. Solid and Liquid Waste Management**

Solid Waste Management is a universal issue affecting every person. Safe disposal and management of municipal solid and liquid waste is an integral component of 'Sustainable Sanitation'. It is defined as the collection, transportation, processing, recycling, treatment, and disposal of waste material in a scientific manner. Here, any unwanted solid or liquid material thrown out by households, community, institutions or business establishments is called waste.

Waste can be categorised into solid, liquid or gaseous waste. It also includes wastewater, which is domestic effluent consisting of blackwater (excreta, urine and faecal sludge) and greywater (kitchen and bathing wastewater).

Solid waste is classified into (Prakash et al., 2012)

- ⌘ Biodegradable waste - which can be decomposed by biological processes, for example, vegetable peel, food and farm waste amongst others. Organic waste is biodegradable and can be recycled; and



- ⌘ Nonbiodegradable waste – which cannot be broken down by biological processes, for example, paper, glass, metal amongst others. Nonbiodegradable wastes can be further classified into two types:
  - Recyclable waste, has economic value that can be recovered, for example, metal, paper, glass, plastic bottle, and so on
  - Non-recyclable waste does not have economic value of recovery, for example, tetra packs, thermocol, and so on.

## Norms

Any form of contaminated water is termed as wastewater. It is a combination of

- ⌘ domestic effluents consisting of black water (excreta, urine and faecal sludge) and greywater (kitchen and bathing wastewater)
- ⌘ water from commercial establishments and institutions, including hospitals
- ⌘ industrial effluent, storm water and other urban run-off
- ⌘ agricultural, horticultural and aquaculture effluent, either dissolved or as suspended matter (Prakash et al., 2012)

Parameters for disposal of sewage (water that contains human faecal waste and urine) have been outlined in terms of pH value, oil and grease, residual chlorine amongst others. Details are given in **Annexure 7**.<sup>9</sup>

The key indicators for measuring solid and liquid waste include:

- ⌘ Generated: kilograms of waste produced per person
- ⌘ Recycled: kilograms of waste converted into new materials
- ⌘ Incineration: kilograms of waste disposed via controlled combustion
- ⌘ Landfill: kilograms of waste disposed via burial. All types of landfill sites are included (unspecified, sanitary, controlled)
- ⌘ Open dump: kilograms of waste dumped illegally
- ⌘ Unaccounted: kilograms of untraceable waste.

WHO has released a set of guidelines, as an integrated preventive management framework, for maximizing public health benefits of wastewater, excreta and greywater use in agriculture and aquaculture. The guidelines are built around both a health component and an implementation component since health protection is dependent on both elements (World Health Organization, 2006). These are given in Table 29.

**Table 29: Guidelines for Health Protection**

Health Component	Implementation Component
⌘ establishes a risk level associated with each identified health hazard	⌘ establishes monitoring and system assessment procedures
⌘ defines a level of health protection that is expressed as a health-based target for each risk	⌘ defines institutional and oversight responsibilities
⌘ identifies health protection measures that, if used collectively, can achieve the specified health-based target.	⌘ requires system documentation
	⌘ requires confirmation by independent surveillance.

In India, the Service Level Benchmarking (SLB) includes 28 performance indicators for assessment of service levels in ULBs. These indicators are given in Table 30.

<sup>9</sup> <http://tspcb.cgg.gov.in/Environment/standards-effl.pdf>



**Table 30: Performance indicators for assessment of service levels in ULBs**

<b>Solid Waste Management</b>	<b>Wastewater Management</b>
⌘ Household level coverage of SWM services	⌘ Coverage of toilets
⌘ Efficiency of collection of municipal solid waste	⌘ Coverage of wastewater network services
⌘ Extent of segregation of municipal solid waste	⌘ Collection efficiency of wastewater network
⌘ Extent of municipal solid waste recovered	⌘ Adequacy of wastewater treatment capacity
⌘ Extent of scientific disposal of municipal solid waste	⌘ Quality of wastewater treatment
⌘ Extent of cost recovery in SWM services	⌘ Extent of reuse and recycling of wastewater
⌘ Efficiency in redressal of customer complaints	⌘ Extent of cost recovery in wastewater management
⌘ Efficiency in collection of SWM-related user charges	⌘ Efficiency in redressal of customer complaints
	⌘ Efficiency in collection of sewerage-related charges

### Current Status

The Global Waste Index offers a comprehensive breakdown of the most environment friendly waste management methods, being followed by the OECD countries. The index studies various parameters such as recycling, the process of converting rubbish into new material; incineration, the process of turning waste into energy through controlled combustion; landfills and open dumping. Countries with highest scores, indicating an effective and efficient waste management process are<sup>10</sup>:

**Table 31: Top 5 countries on the Global Waste Index**

South Korea	100
Sweden	93.09
Japan	92.48
Switzerland	89.14
Netherlands	87.43

In India, maximum waste is generated by Maharashtra (22,570 metric tonnes) followed by Tamil Nadu (15,437 metric tonnes), Uttar Pradesh (15,288 metric tonnes) and Delhi (10,500 metric tonnes). The country as a whole produces an average of 143,558 metric tonnes per day, of which only 24.8 per cent is processed.

### Madhya Pradesh and Indore

Indore has set up a 100% door-to-door waste collection system. The city is divided into 19 zones and 85 wards, with each ward having an average of 6,000 households and 600 commercial establishments (part of 88 notified commercial areas). All aspects of waste management, such as waste generation, segregation, collection

<sup>10</sup> Each country was scored according to the kilograms of waste it processes every year using each of these techniques – as well as per capita waste generated, and kilograms of waste unaccounted for. The final scores were standardised from 0 to 100, with 0 being the lowest score, indicating the country worst at managing waste; and 100 the highest, indicating the country best at managing waste. Full list can be found here <https://sensoneo.com/sensoneo-global-waste-index-2019/>.



and transportation are undertaken by Indore Municipal Corporation. In addition, the city has:

- ⌘ Eliminated 2000 open dump spots
- ⌘ Removed garbage bins from all 1,170 locations
- ⌘ Installed biometric attendance and monitoring leading to increased attendance of Safai Mitr (cleaning crew).

Indore has also achieved 100 per cent treatment of its faecal matter with:

- ⌘ world's first and largest 245 MLD single stage Sequencing Batch Reactors (SBR) STP
- ⌘ 78 MLD and 12 MLD Upflow Anaerobic Sludge Blanket Reactor (UASB) STP at Kabitkhedi. Along with the sewage treatment, these plants also have power generation capacity of around 18.5 KW to 22 KW
- ⌘ A 122MLD STP

As of August 2020, Indore was generating an average of 4,000 kg per day of COVID-19 waste, according to the regional pollution control board (Times of India, 2020).

### 3.1.2. Sanitation Facilities

A safe sanitation system is designed and used to separate human excreta from human contact at every step of the service chain i.e., from toilet to containment through emptying, transport, treatment and final disposal or end-use (World Health Organization, 2018). Sanitation includes disposal of solid waste (including medical wastes), wastewater, human excreta as well as wastewater reuse and surface water drainage (World Health Organization, n.d.). Given the crucial role of access to safely managed sanitation in protecting public health and reducing global burden of infectious diseases, the International Year of Sanitation propagated the following messages:

- ⌘ Sanitation is vital for human health
- ⌘ Sanitation generates economic benefits
- ⌘ Sanitation contributes to dignity and social development
- ⌘ Sanitation helps environment
- ⌘ Sanitation is achievable

Further, shared sanitation and school sanitation are of utmost importance for reducing the disease burden and creating a healthy and safe environment for children. Schools with poor water, sanitation and hygiene conditions, and intense levels of person-to-person contact are high-risk environments and exacerbate children's particular susceptibility to environmental health hazards.

One of the primary goals of sanitation programmes is to make cities open defecation free (ODF). This requires making available toilets and improved or unimproved sanitation facilities. The Swachhta Status Report has broadly classified toilets into the following (NSSO, 2016)

- ⌘ Individual Household Latrine (IHHL)
- ⌘ Community Sanitary Complex (CSC)
- ⌘ Institutional Latrines including school and Anganwadi toilets

Sanitation facilities of an otherwise acceptable type shared between two or more households, include public toilets. Sharing sanitation facilities is three times more



likely in urban areas than in rural areas of the developing world. The 2006 coverage estimates confirm that more than two-thirds of shared sanitation users are urban dwellers. Shared sanitation facilities, whether fully public or accessible only to some households, are not considered 'improved' facilities, according to the Millennium Development Goal indicators.

Though a basic necessity for all, there are some obstacles, as given in table 32, that prevent the access to suitable sanitation facilities (WaterAid, n.d.).

**Table 32: Obstacles preventing access to sanitation facilities**

<b>Environment</b>	<b>Examples</b>
Physical Environment (Natural)	⌘ Distance to toilets or defecation areas, rough paths and darkness
Physical Environment (Infrastructure)	⌘ Narrow entrances and lack of space inside ⌘ Steps to latrines, slippery floors ⌘ Difficulty in squatting, with nothing to hold on to, necessitate placing hands on the latrine floor
Institutional	⌘ Discriminatory legislation, policies or strategies that ignore the differently abled: ⌘ Lack of consultation and mechanisms for consultations with such people ⌘ Lack of information, staff training and understanding of accessible design options
Economic	⌘ Cost of construction, user fees
Social/ Cultural	⌘ Social status, harassment, negative traditional beliefs, pity, stigma, shame, overprotection, isolation, misinformation

### **Norms**

The WHO has represented sanitation coverage as a 4-step ladder as depicted in the image below (World Health Organization, 2014):





The **human right to sanitation** entitles every individual to sanitation services that are accessible, affordable and acceptable:

- ⌘ Availability: A sufficient number of sanitation facilities must be available for all individuals.
- ⌘ Accessibility: Sanitation services must be accessible to everyone either within or in the immediate vicinity of households, health and educational institutions, public institutions, public places and workplace. Physical security must not be threatened when accessing these facilities.
- ⌘ Quality: Sanitation facilities must be hygienically and technically safe to use. To ensure good hygiene, access to water for cleansing and handwashing at critical times is essential.
- ⌘ Affordability: The price of sanitation and services must be affordable for all without compromising the ability to pay for other essential necessities guaranteed by human rights such as water, food, housing and healthcare.
- ⌘ Acceptability: Services, in particular sanitation facilities, have to be culturally acceptable. This will often require gender-specific facilities, constructed to ensure privacy and dignity.

Figure 12: Four step Sanitation Coverage Ladder

Multiple parameters have been defined to indicate whether a chosen toilet system is adequate at a village and household level as well as at the school level. These are detailed in **Annexure 8**.

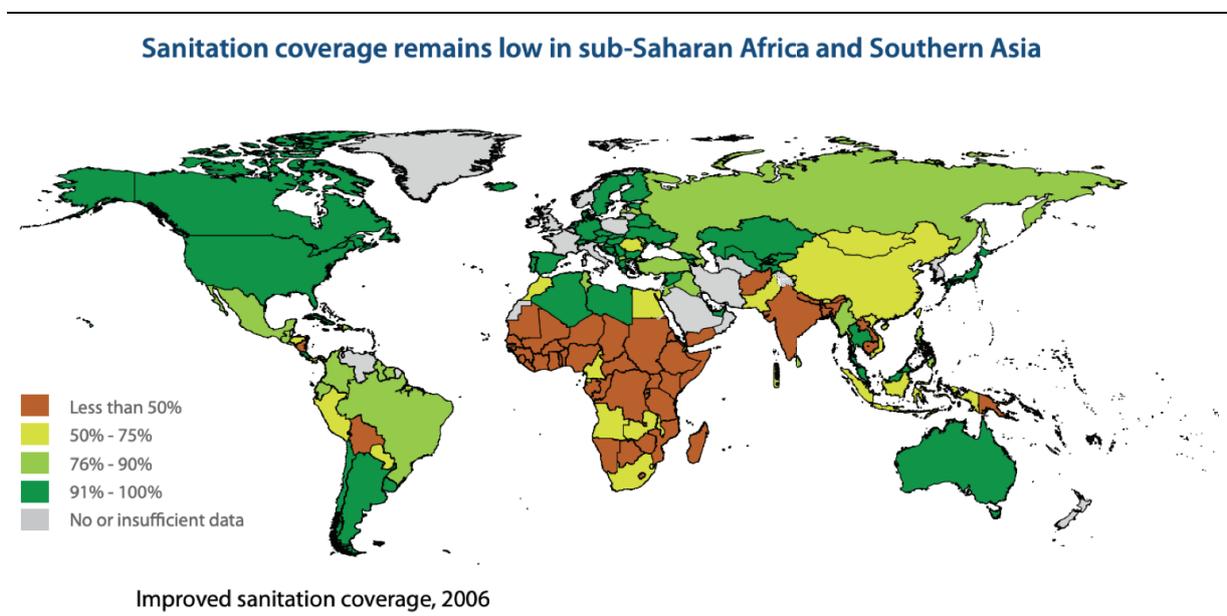
### Current Status

#### International

- ⌘ Globally, open defecation is practiced by over 900 million people, i.e., nearly one-third of the world's population
- ⌘ Only 62 per cent of the world's population uses improved sanitation, up from 54 per cent in 1990

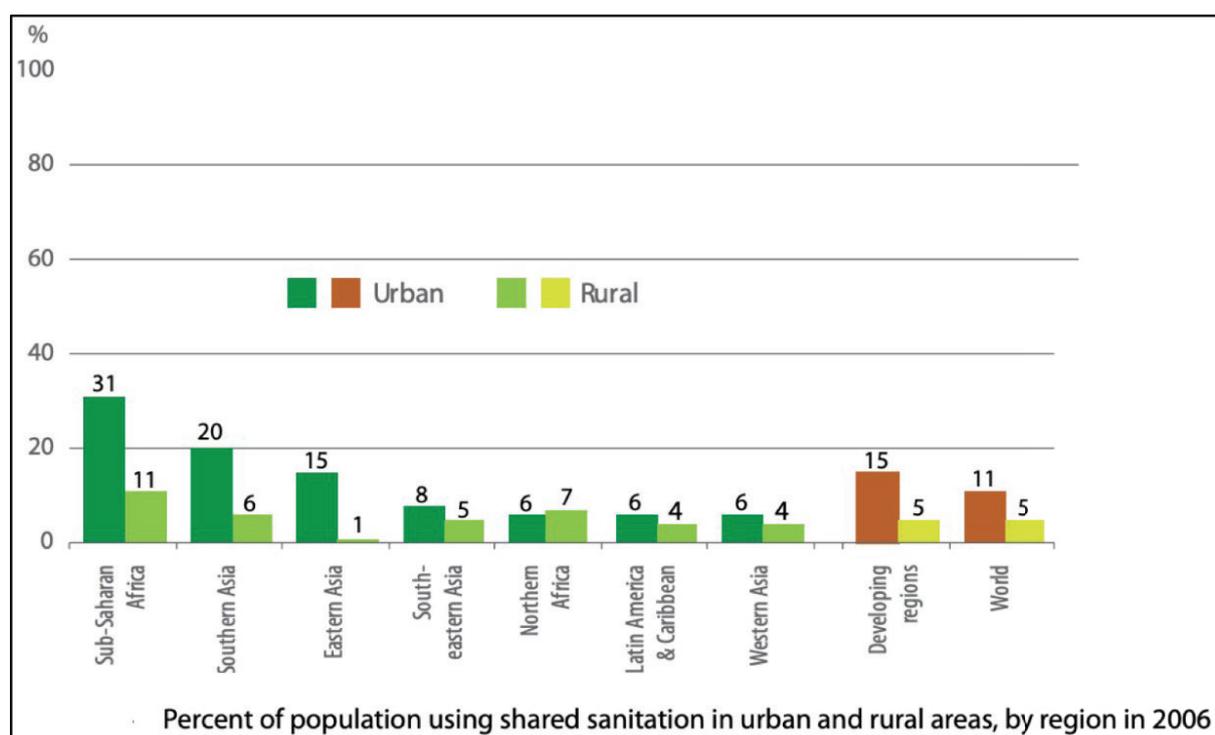


- ⌘ More than 2.5 billion people do not use an improved sanitation facility of which almost 1.8 billion live in Asia
- ⌘ Improved sanitation coverage is lowest in sub-Saharan Africa, followed by South Asia. Significant efforts since 1990 moved regional coverage from 21 to 33 per cent in 2006 – more than doubling the number of people who use improved sanitation facilities
- ⌘ Diarrheal disease remains the second leading cause of death in children under five years of age, with diarrhoea killing around 525,000 children annually.



**Figure 13: A global perspective on improved sanitation facilities**

Limited sanitation options are available in many congested cities and towns, an issue that is likely to become increasingly serious if urban and peri-urban populations continue to grow at current rates.



**Figure 14: Percentage of population using shared sanitation in urban and rural areas, by region in 2006**



## National

- ⌘ India alone accounts for approximately 60 per cent of the global population defecating in the open, with the majority residing in rural areas
- ⌘ OD leads to widespread faecal contamination of the environment, spreading diseases such as diarrhoea and resulting in stunting and malnutrition
- ⌘ Over the past few years, India has made substantial progress in sanitation.

### Open Defecation Status

- ⌘ Sikkim and Himachal Pradesh are 100 per cent open defecation free (ODF)
- ⌘ While Kerala has achieved around 95 per cent sanitation coverage, states such as Uttarakhand, Punjab, Haryana, West Bengal and Gujarat have relatively high coverage (NITI Aayog, n.d.).
- ⌘ States such as Odisha and Bihar, with less than 33 per cent coverage, are making gradual progress.
- ⌘ Fatehgarh Sahib, Punjab is the most recent district, amongst the 17 districts declared ODF
- ⌘ Number of villages which are open defecation free is over 72,000.

### Piped Sewer System

While majority of the States have less than 1 per cent toilets connected to a piped sewer system, the leaders are (Bharat et al., 2020)

- ⌘ Chandigarh, is the only UT with 100 per cent toilets connected to piped sewer system
- ⌘ Daman and Diu - 20 per cent
- ⌘ Delhi - 15 per cent
- ⌘ Jammu and Kashmir - 14.7 per cent
- ⌘ Gujarat - 13.5 per cent

**Table 33: Progress in population using sanitation facilities between 1990-2012**

Year	Population (x1000)	Percentage Urban Population	Use of Sanitation facilities ( Percentage of population)												Proportion of 2012 population that gained access since 2000
			URBAN				RURAL				TOTAL				
			Improved	Shared	Other Unimproved	Open Defecation	Improved	Shared	Other Unimproved	Open Defecation	Improved	Shared	Other Unimproved	Open Defecation	
1990	868891	26	50	17	5	28	7	1	2	90	18	5	3	74	14
2000	1042262	28	54	18	6	22	14	3	4	79	25	7	5	63	
2012	1236687	32	60	20	8	12	25	5	5	65	36	9	7	48	

## Madhya Pradesh

In MP, almost 84.9 per cent of the urban population and 20.7 per cent of the rural population had access to an improved source of sanitation. This was below the national average of 89.6 per cent and 38.8 per cent.



**Table 34: Overview of household sanitation facilities in MP (NSSO, 2016)**

State	Year	Percentage of Households			
		Without Latrine Facilities		Having Access to Improved Sources of Latrine	
		Rural	Urban	Rural	Urban
Madhya Pradesh	2011	86.4	22.5	10.9	71.5
	2012	79	14	20.7	84.9
India	2011	67.3	12.6	25.1	77.3
	2012	59.4	8.8	38.8	89.6

**Table 35: Total number of toilets constructed in Madhya Pradesh 2012-2016**

Toilets Constructed Between 2012 and 2016				
	2012-13	2013-14	2014-15	2015-16
IHHL	558,189	515,583	521,739	914,473
School Toilet	1033	59	70	6
Anganwadi Toilet	804	364	2	1

By 2017, with concerted efforts at building toilets, 8 cities in the state counted amongst the top **25 clean cities** of the country as per *Swachh Survekshan 2017*. **Indore** was declared as India’s cleanest city in terms of overall **sanitation** coverage.

In MP, 91.90 per cent schools have separate toilet facilities for girls (national average 91.96 per cent). Delhi, Daman and Diu, Puducherry, Lakshadweep, and Chandigarh have the highest coverage. MP falls just around the national average of 76.24 per cent in terms of availability of drinking water in schools.

### 3.1.3. Hygiene

Hygiene refers to a range of behaviours, such as handwashing and personal hygiene, menstrual hygiene management and food hygiene, that help maintain health and prevent the spread of diseases.

**Personal Hygiene:** Personal hygiene is defined as a condition promoting sanitary practices to the self to prevent or minimise the incidence and spread of communicable diseases. The various components of personal and domestic hygiene, considered stepping stones to achieving numerous health benefits, include handwashing after defecating, after cleaning a child who has defecated and before eating or handling food. This is one of the most effective ways of preventing the spread of diarrheal diseases. Handwashing is effective when adequate water, soap or ash are readily available.

Community hygiene is a vital part of personal hygiene, as some health measures can only be addressed at the community level. These include water source protection, proper disposal of solid waste and excreta, wastewater drainage, controlling animal rearing and market hygiene.



**Menstrual Health and Hygiene (MHH):** MHH encompass both Menstrual Health Management (MHM) and the broader systemic factors that link menstruation with health, well-being, gender equality, education, equity, empowerment, and rights (UNICEF, 2019). It increases the ability of adolescent girls to stay in schools, further enhancing the dignity of women. Adopting a holistic approach towards menstrual health and hygiene, UNICEF's four main interventions to address MH and create an enabling environment include providing social support, developing knowledge and skills, offering facilities and services, and providing menstrual materials.

Menstrual hygiene practices in schools play a crucial role in reducing female drop-out rates. At the very basic level, they require at least one sex-separated toilet with menstrual hygiene facilities. In addition, compulsory orientation of teachers and staff, sensitisation of male teachers and students will help increase the comfort level of girl students and shape social behaviours. Establishing support groups to provide peer-to-peer guidance could also prove to be extremely constructive.

**Food Hygiene:** Food hygiene refers to the conditions and measures necessary to ensure safety and sustainability of food across all stages of the food chain. Food can become contaminated at any point from harvesting/slaughtering, processing, storage, distribution to transportation and preparation. Lack of adequate hygiene can lead to foodborne diseases and at times death of the consumer. Therefore, food control is a mandatory regulatory activity to ensure consumer protection. These regulations also ensure that all foods remain safe, wholesome and fit for human consumption during production, handling, storage, processing, and distribution; conform to safety and quality requirements; and are honestly and accurately labelled as prescribed by the law.

## Norms

### *Personal Hygiene*

The key indicator for hygiene is the proportion of the population with access to facility to wash hands with soap and water at home. A few proxy indicators, that measure a condition related to the behaviour of interest, have also been defined. For example, whether or not a household has soap at the place of hand wash, suggests availability of appropriate materials and convenience to use while handwashing. However, it does not reveal how often, or when hands are washed. By definition, proxy measures yield an approximation of the true behaviour but are often used as they are more efficient to collect and more objective than self-report methods. The more accurate measures are also more expensive and require skilled personnel, hence, they are not a viable option for many developing and low-income countries. The option of direct indicators, that measure the actual behaviour of interest through structured observation or self-report, can also be adopted.

The general indicators to measure hygiene practices include the availability of bathing facilities, quantities of soap for bathing and laundry and accessibility to toilets and handwashing facilities. The details are listed in **Annexure 9**.

Additionally, it is also important that education is provided to encourage hygiene, positive hygiene behaviours are systematically promoted and facilities and resources enable control of disease transmission. Specific efforts are required to increase children's understanding of the importance of hygiene and a clean school environment.

Better personal hygiene practices can be propagated by promoting hygiene at the community level and ensuring availability of necessary facilities in proximity to toilets



and kitchens.

- ⌘ Bathing and Body Hygiene: Bathing routinely and maintaining cleanliness is of utmost importance to stay hygienic and avoid spreading hygiene related diseases. It is essential to bathe with soap and clean water to reduce skin infections such as scabies, pimples and ringworm. Apart from ensuring sufficient water for bathing from a regular water supply or a water source nearby, the common toilets and shower spaces must be sterilised regularly. Sex separated facilities are critical both for maintaining cleanliness and safety reasons.
- ⌘ Oral Hygiene: A crucial element to ensuring improved health, it is a must to brush teeth with a fluoride-containing toothpaste twice a day and rinse the mouth after each meal.
- ⌘ Laundering: Constructing laundry slabs or sinks near water points is important. Locating laundry spots in natural water bodies, streams and irrigation canals is best avoided, since these can contribute to transmission of skin diseases as well as contaminate the source of water.

### **Menstrual Hygiene**

For adolescent girls adequate menstrual hygiene materials and supplies must be made available at all times. Menstrual hygiene materials, such as pads, cloths, tampons or cups and menstrual supplies, used to absorb menstrual flow and other supportive material such as body and laundry soap, underwear and pain relief items, are necessary for managing MHH. Coupled with sanitary menstrual facilities, such as toilets and water infrastructure, which are associated with safe and dignified menstruation, must be provided to a menstruator.

The key indicators for menstrual health and hygiene are:

- ⌘ accurate and timely knowledge and access to information on menstruation
- ⌘ availability and affordability of safe hygiene materials and menstrual absorbents
- ⌘ access to health services
- ⌘ adequate water, sanitation, hygiene and washing amenities
- ⌘ safe and hygienic disposal facilities to discard used menstrual absorbents
- ⌘ toilets designed with provision of cultural and context-appropriate facilities for anal cleansing, handwashing and menstrual hygiene management
- ⌘ necessary advocacy and policy.

MHM appears in several sustainable development goals as shown in figure 14.





**Figure 15: MHM in SDGs**

Source: (UNICEF, 2019)

## Food Hygiene

Strict personal hygiene standards, set by FSSAI for handling food, include:<sup>11</sup>

- ⌘ Hands: Since hands are the most common way to transmit bacteria, a handwashing and drying technique has been outlined by FSSAI.
- ⌘ Face and head: To ensure clean food the handlers must avoid coughing or sneezing into the food; touching face and head; cover their hair with a net or a cap; wash hair frequently; and never comb hair in a food area.
- ⌘ Wearing jewellery must be completely avoided
- ⌘ Sanitize wounds, keep them covered and away from food and report any illness
- ⌘ Wear protective clothing at all times while handling food, to avoid contamination
- ⌘ No smoking or chewing tobacco while handling food as one touches the lips for consuming these products and the possibility of saliva being placed on working surfaces also exists.

## Current Status

### International

In a study that analysed 78 countries, WHO found 42 countries with less than half the population having a handwashing facility at home. The countries with the least proportion of population with handwashing facilities were Liberia, Lesotho,

<sup>11</sup> [http://www.old.fssai.gov.in/Portals/0/Training\\_Manual/Level%203%20Manufacturing%20-supervisors.pdf](http://www.old.fssai.gov.in/Portals/0/Training_Manual/Level%203%20Manufacturing%20-supervisors.pdf)



Cameroon and the Democratic Republic of Congo. Whereas the countries with high proportion of population with adequate hygiene facilities were Turkmenistan, Kazakhstan, Oman and Maldives. A further 22 per cent (1.6 billion people) had access to handwashing facilities that lacked water or soap, and 18 per cent (1.4 billion people) had no hand washing facility at all. Nearly three quarters of the population of Least Developed Countries lacked handwashing facilities with soap and water.

### **National**

At the national level the following hygiene statistics have been observed:

- ⌘ 60 per cent population had access to basic hand washing facilities
- ⌘ In rural India, 23 per cent girls have listed menstruation as the chief reason for dropping out of school
- ⌘ Only in 7 of India's 36 states/union territories, 90 per cent or more women in the 15-24 age group use hygienic protection during menstruation (latest national health data)
- ⌘ According to NFHS-4, in the urban areas of 11 states or union territories, more than 90 per cent women used hygienic period protection:
  - Bihar (55.6 per cent), Dadra Nagar Haveli (66.4 per cent), Madhya Pradesh (65.4 per cent), Tripura (56.5 per cent) and Uttar Pradesh (68.6 per cent) are exceptions to the rule, where more than 70 per cent urban women maintain period hygiene
  - In ten states/union territories, villages have reported an average of 39 per cent hygienic period protection. Madhya Pradesh fares the worst at 26.4 per cent (Business Standard, 2017)

### **Madhya Pradesh**

The National Family Health Survey (NFHS) 2017 reveals that hardly 37.6 per cent women in Madhya Pradesh use safe and hygienic means like sanitary pads during periods (Times of India, 2019).



## 3.2. Government Interventions

The central government has launched numerous sanitation policies and schemes targeting various segments of society such as, school children, adolescent girls, women and the community as a whole. Several of the Government interventions are driven at the school level given the necessity for safe, secure and healthy environment for children to learn better and face life's future challenges.

### 3.2.1. Common Interventions

#### 3.2.1.1. Total Sanitation Campaign

The Central Rural Sanitation Programme, launched in 1986, was one of the very first sanitation policies of the Government of India. The Programme aimed at accelerating sanitation coverage in rural areas. Restructured in 1999 as Total Sanitation Campaign (TSC), by the Ministry of Rural Development, it exhibited a paradigm shift in approach. The overarching objective was complete eradication of open defecation. The following objectives were outlined for the rural areas:

- ⌘ Improve general quality of life
- ⌘ Accelerate sanitation coverage by ensuring access to toilets to all by 2012
- ⌘ Motivate communities and Panchayati Raj Institutions through awareness creation and health education
- ⌘ Provide sanitation facilities in schools and Anganwadis by March 2012 to promote hygiene and sanitary habits among students
- ⌘ Encourage cost effective and appropriate technologies for ecologically safe and sustainable sanitation
- ⌘ Develop community managed environmental sanitation systems focusing on solid and liquid waste management

In 2014, the TSC was redefined as the Swachh Bharat Abhiyan.

#### 3.2.1.2. Swachh Bharat Abhiyan

The Government of India rolled out the Swachh Bharat Abhiyan to be implemented by the Ministry of Urban Development. The programme includes elimination of open defecation, conversion of unsanitary toilets to pour flush toilets, eradication of manual scavenging, municipal solid waste management and behavioural change towards healthy sanitation practices. The Mission has a multitude of focus areas, one of the key aspects being improving the cleanliness of cities and making them ODF, through solid and liquid waste management activities.

The primary attention areas are household toilets (including conversion of insanitary toilets into pour-flush toilets), community toilets, public toilets and urinals, solid waste management, public awareness, capacity building and administrative and office expenses (A&OE).

#### **The MoUD carried out a slew of activities to ensure**

- (i) all manual scavengers in urban areas are identified, unsanitary toilets linked to their employment are upgraded to sanitary toilets, and the manual scavengers are adequately rehabilitated



(ii) household toilets are constructed, with sewerage system available within 30 metres and periodic desludging of pits to minimise environmental and health related problems.

### **Madhya Pradesh**

As part of the Swachh Bharath Abhiyan, Indore Municipal Corporation (IMC) constructed more than 13,000 IHHLs using “Swachhta Rath”. The city of Indore followed several unique steps and practices to achieve efficiency.<sup>12</sup> Post selection the beneficiary households were approved either for individual or community level toilets. Based on the identification construction of IHHL, community toilets/ renovation of existing structures (including disabled friendly toilet facilities) was undertaken. Modular toilets, with a concrete cement base, were developed for slum settlements on private and disputed lands. A google locator for “Swachh Public Toilet” was introduced.

To ensure that the infrastructure is managed well, registers are kept at these toilets, CCTV surveillance systems installed, and existing urinals undergo regular maintenance. Special “Swachhta Grahi Monitoring Committee” have been formed to oversee modular toilets. Mobile toilets are also checked regularly.

Citizens are disincentivized to resort to open defecation (OD) by regular surveillance of the hot spots and by launching several information, education and communication (IEC) initiatives, including hoardings, jingles and movies.

### **3.2.1.3. National Urban Sanitation Policy**

The national urban sanitation policy was launched by the Ministry of Urban Development with the vision of making all Indian cities and towns totally sanitized, healthy and liveable. The objective was also to ensure and sustain good public health and environmental outcomes for all citizens, with a special focus on hygienic and affordable sanitation facilities for the urban poor and women.

Based on priority issues to be addressed to achieve these objectives, the policy goals were focused on awareness generation and behaviour change leading to ODF cities. Efforts were to be made at developing integrated city-wide sanitation installations and ensuring their operation and maintenance. A system for sanitary and safe disposal was also envisaged.

### **3.2.1.4. Swachh Survekshan and Nirmal Shahar Puraskar**

Two schemes have been launched to encourage cities to implement sanitation programmes.

The Swachh Survekshan programme was launched with the objective of inculcating a sense of competitiveness amongst municipal corporations and ULBs to achieve sanitation and cleanliness targets. It also aimed at increasing citizen participation and improving the city’s capacity to sustain ODF, and sanitation goals set through partnerships, collaborations and healthy competition. Cities were divided into different categories, based on population and size and were ranked accordingly. Indore achieved a five-star rating, topping the list for three consecutive years, and becoming a ODF city.

<sup>12</sup> [http://www.sac.ap.gov.in/Sac/UserInterface/Downloads/SBM\\_ODF\\_Final-ilovepdf-compressed.pdf](http://www.sac.ap.gov.in/Sac/UserInterface/Downloads/SBM_ODF_Final-ilovepdf-compressed.pdf)



The Nirmal Shahar Puraskar rewards cities through a biennial rating of achievement of required sanitation goals. The key objective is to attain total sanitation, with regular monitoring of progress and also spreading awareness about sanitation (Ministry of Urban Development, Gol et al., 2011).

### Community Led Sanitation Programmes

Community led sanitation programmes play a crucial role in school sanitation. For instance, the Maryada campaign, in Madhya Pradesh, emphasises school sanitation and education by ensuring the existence of functional toilets in schools and a separate facility for girls. Along with this, appropriate hygiene education regarding personal hygiene, open defecation, handwashing and safe handling of drinking water is provided.

The Sarpanch and Panchayat secretary also play a key role in implementing WASH in schools by ensuring that functional and separate toilets are made available for boys and girls in schools. In addition, they ensure regular water supply and maintenance of toilets in schools through school management committees and public health and engineering. They often appoint a 'caretaker' for every school to undertake activities such as cleanliness of toilets and maintain close coordination between Sarpanch and school staff for unannounced spot checks. Girls are given necessary menstrual hygiene management education, provided hygienic toilets and required sanitary materials.

### Thematic Campaigns

Some sanitation campaigns launched in Madhya Pradesh include:<sup>13</sup>

- ⌘ "Brother no. 1": under which girls are gifted toilets by brothers
- ⌘ Pure ("Paavan") Village: rural campaign with the basic thought that "Sanitation leads to godliness"
- ⌘ ODF Olympics: ODF communities conducted sports activities as motivation
- ⌘ Good Morning Sehore: Daily follow ups conducted to check ODF progress

## 3.2.2. Solid and Liquid Waste Management

### 3.2.1.1. National Policy on Faecal Sludge and Septage Management (FSSM)

The urban FSSM Policy was launched to set the context, priorities, and direction for, and to facilitate, nationwide implementation of FSSM services in all ULBs. The overarching goal include achieving (Ministry of Urban Development, Gol, 2017)

- ⌘ 100 per cent access to safe sanitation by both household and community septage management
- ⌘ city wide sanitation
- ⌘ sanitary and safe disposal of faecal matter by ensuring functional systems through design and construction
- ⌘ awareness generation and behaviour change



### 3.2.2.2. Sanitation Infrastructure schemes

The Valmiki Ambedkar Awas Yojana (VAMBAY), focuses on building toilets and improving sanitation for slum dwellers and urban poor. It falls under the Jawaharlal Nehru National Urban Renewal Mission (JnNURM) which has a provision for building sanitation infrastructure.

### 3.2.3. Hygiene

#### 3.2.1.1. Swachh Bharat Swachh Vidyalaya

The Ministry of Human Resource Development has rolled out the Swachh Vidyalaya (SBSV) under the Swachh Bharat Abhiyan, with elements of Sarva Shiksha Abhiyan (SSA) also aligned to the SBA. The SBSV, launched specifically to implement WASH in schools, focuses on (Ministry of Human Development, 2014):

- ⌘ building gender separated toilets in schools, while maintaining toilet to student ratio at 1:40
- ⌘ ensuring availability of menstrual hygiene facilities such as sanitary napkins, handwashing provision and adequate waste disposal equipment
- ⌘ handwashing before meals, and necessary amenities accessible for group handwashing activity
- ⌘ safe and adequate drinking water facilities.

In Madhya Pradesh, one successful programme, implemented under the SBSV scheme, was the provision of cabinets to students. Children, trained as change agents, played a vital role in ensuring maintenance of WASH in schools.

#### 3.2.3.2. School Sanitation and Hygiene Education

The School Sanitation and Hygiene Education (SSHE) programme implemented by the Ministry of Drinking Water and Sanitation, have parallel focus areas and goals as Sarva Shiksha Abhiyan (SSA). The SSHE, apart from providing necessary facilities, aims at educating children on safe sanitation, personal hygiene and healthy hygiene practices. The combination of adequate facilities, correct behavioural practices and education is meant to have a positive impact on the health and hygiene conditions of the community as a whole and aid in promoting practices that prevent water and sanitation-related diseases. In addition, SSHE formed an essential component of the Total Sanitation Campaign (now SBA), which includes the provision of toilet infrastructure and handwashing facilities in schools and delivery of hygiene education to promote behavioural change amongst children (ENVIS Centre on Hygiene, Sanitation, Sewage Treatment Systems and Technology, 2020).

#### 3.2.3.3. Multi-Sectoral Development Programme (MSDP)

The MSDP, implemented by the Ministry of Minority Affairs, provides financial support to minority communities for construction of houses and toilets in each household as well as in schools. A key component is ensuring the availability of pumps and drinking water towards safety and health of students and staff in schools.



## Menstrual Hygiene Schemes

Given the importance of menstrual health and hygiene in achieving sanitation targets, the Ministry of Health and Family Welfare introduced The Menstrual Hygiene Scheme. It aims to increase awareness on menstrual hygiene practices amongst adolescent girls, enhance affordability of menstrual materials and create an environment friendly disposal system. To help meet the stated goals, a pack of six sanitary napkins called “Freedays” was distributed to rural adolescent girls for INR 6 through ASHA workers. In addition, MoHFW also introduced the Adolescent Reproductive and Sexual Health (ARSH) and Adolescence Education Programme (AEP) towards these objectives.

**Table 36: State Level interventions**

State	Scheme	Details
Kerala	She Pad Scheme	To enable free distribution of sanitary napkins to girls in government schools
Maharashtra	1. Asmita Yojana 2. Red Dot Campaign	1. To provide affordable (subsidised) sanitary pads to school girls and women 2. In Pune, sanitary napkins, diapers are collected individually and processed in a scientific manner
Odisha	Khushi Scheme	Provide free sanitary pads to girl students

### 3.2.3.4. Integrated Urban Sanitation Programme (IUSP)

In Madhya Pradesh, the Integrated Urban Sanitation Programme (IUSP), later changed to Mukhya Mantri Shahri Swachhta Mission (MSSM), was developed by the Urban Administration and Development Department, Ministry of Urban Development. The IUSP, aimed at providing citywide sanitation facilities, focuses on all aspects of sanitation and is implemented with support from local communities and other stakeholders. The programme was introduced to eradicate open defecation, ensure safe disposal of human excreta, develop sanitation facilities in urban areas, and improve quality of life of sanitation workers. The following measures were undertaken to drive the programme:

- ⌘ Construction of individual household as well as public/ community toilets
- ⌘ Development of Municipal Solid Waste Management (MSWM) and sewerage management system
- ⌘ Implementation of cost-effective sewerage projects
- ⌘ Innovation in sanitation (e.g., bio-toilets)



## 3.3. Problem Statement and Gap Analysis

### 3.3.1. Solid and Liquid Waste Management

- ⌘ Municipal Solid Waste (MSW) recycling is a crucial component of sanitation and is extremely beneficial for the environment. A study conducted in an urban area in New Delhi, emphasises formalizing waste collection to improve the lives of waste collectors. In Delhi, MSW recycling is currently undertaken by the informal sector, comprising recycling at the lowest end and a succession of dealers. The process creates a market of recyclables through value addition in the recycling process. It is possible to formally organise the recyclable activity, so that those involved in recycling lead a secured and better life. The benefit is two-fold, helping the waste pickers as well as improving sustainability in the community.
- ⌘ The segregation of liquid and solid waste at source and recycling needs to be mandated by the government. For example, imposing charges on waste generated will ensure that communities undertake these activities themselves and will reduce the financial burden on local governments. Further, coordination amongst the three tiers of Government must be maintained and adequate financial support be provided to municipal bodies
- ⌘ Wastewater management and wastewater recycling, if leveraged and implemented efficiently, can be instrumental in reducing the burden on the water supply system. While doing so WHO's guidelines aimed at minimizing the ill effects of wastewater reuse and protecting public health must be considered. It is also important to bear in mind long-term health implications of increase in heavy metal content such as zinc and copper in soil (Rattan et al., 2005) and a considerable impact on human health through chemical exposed areas of sewage treatment plants (STP) (Singh et al., 2004)
- ⌘ Sewage and wastewater treatment have a direct impact on human health, given that the microbial pathogens, viruses and bacteria in wastewater may get washed into drinking water supplies or receiving water bodies. These often trigger outbreaks of waterborne diseases, that could cause chronic diseases (Min, 2006). Adopting a strategic approach, optimizing wastewater reuse, improving institutional responsibilities and recognizing wastewater as a resource, can result in major improvements in both health and environment (UN-Water, 2015)
- ⌘ Faecal and sludge management are lagging behind given the following constraints:
  - Limited awareness of faecal and sludge management and the importance of waste management in the face of limited awareness drives and related programmes
  - Limited access to infrastructure such as tanks, equipment, trained personnel and more
  - Lack of an institutionalised system and private bodies leading to a reliance on contractors and the informal sector
  - Lack of new technology choices to increase efficiency in waste management processes
  - Lack of an integrated city-wide approach
  - The Atal Mission for Rejuvenation and Urban Transformation (AMRUT) primarily focuses on water and sewage in larger cities, as opposed to its predecessor, the JNNURM. This approach has been criticised for its generic



approach to all cities rather than outlining a specified goal for each city, based on size and needs. Currently, no government scheme offers specific guidelines for city wise liquid waste management.

### International Best Practices

Some waste management best practices around the world include (P & Institute of Biological Sciences, n.d.)

- ⌘ Japan: Home appliances recycling law which promotes recycling and reuse, which resulted in a 20 per cent increase in recycling.
- ⌘ European Union: Multiple restrictions and laws related to waste disposal (e-waste and hazardous waste)
- ⌘ United Kingdom: Deposit-refund scheme for bottles and cans, which has proved to be an effective method of reducing waste and improving recycling
- ⌘ Philippines: Material recovery facilities (MRFs), specialising in recycling through networking and partnerships
- ⌘ Bangladesh: Increase in composting capacity to handle larger amounts of waste
- ⌘ Privatisation of waste management processes adopted by countries such as Nepal, Ghana and Egypt.

### 3.3.2. Sanitation

- ⌘ Diarrheal diseases are a leading cause of malnutrition amongst children. These diseases can be significantly reduced through ensuring access to safe drinking water and clean sanitation and hygiene facilities leading to improved child health. Other key measures to prevent diarrhoea include hand washing with soap, exclusive breastfeeding for first six months of life and good personal and food hygiene. It is also important to educate people about how infections spread and administer the rotavirus vaccination.
- ⌘ While in several countries, increased prevalence of diarrhoea has been found to be associated with shared sanitation facilities, studies have also shown that such shared facilities do not pose a high risk of trachoma.
- ⌘ Research has also suggested that stunting amongst children is caused by diarrhoea and unsafe drinking water. A study conducted across nine states of India<sup>14</sup> revealed that improved sanitation conditions and hygiene practices have resulted in reduced prevalence of stunting in rural India.

A few gaps in the government's sanitation programmes are as follows: (Bharat et al., 2020)

- ⌘ With most schemes aimed at construction of toilets, the focus on usage by triggering behavioural change is largely missing. Cultural and social beliefs are one of the main reasons for open defecation, which needs to be changed through sustained advocacy.
- ⌘ Most of the schemes are defined with a national perspective with no geographical considerations, making them less effective
- ⌘ While toilets are at the centre of all sanitation schemes, mention of water supply systems, an essential component of sanitation, is generally missing
- ⌘ There is poor maintenance of existing as well as newly constructed toilets in the absence of available guidelines and mandates

<sup>14</sup> Nine states include Madhya Pradesh, Bihar, Himachal Pradesh, Jharkhand, Kerala, Odisha, Rajasthan, Uttar Pradesh and Tamil Nadu.



- ⌘ Credibility of data on progress of schemes is suspect as revealed by various reports claiming mismatch with ground reality. This mismatch often comes in the way of progress since projects can only be implemented after assessing the current situation.

Some state level activities launched to meet sanitation goals are:

- ⌘ **Jharkhand:** Training programmes conducted by the state to train officials on health, water and sanitation, specially dedicated to the achievement of SDGs.
- ⌘ **Telangana:** Various schemes have been implemented to ensure that minority communities are included in the state's progress. These include schemes on water, sanitation and health as well.
- ⌘ **Kerala:** Nava Keralam Karma Padhathi is a flagship programme for water and sanitation among six key sectors. It focuses on meeting the state's targets through local self-governments.
- ⌘ **Uttarakhand:** The State has amended the Gram Panchayat Development Plan (GPDP) guidelines to integrate these with the SDG goals. A group of master trainers train and educate members on focus areas, including sanitation practices at a gram panchayat level.
- ⌘ **Madhya Pradesh:** Bhaguwar, a community led project being implemented in Narsinghpur district, has achieved total sanitation setting an example for sanitation, health, education and waste management. The village was declared open defecation free in 2007, with every house having a toilet along with availability of 2,500 community toilets. Further, successful water conservation efforts led to efficient wastewater management and major rainwater harvesting initiatives. The Rashtriya Madhyamik Shiksha Abhiyan and Sarva Shiksha Abhiyan also focus on toilets in schools and gender specific toilets.

### 3.3.3. Hygiene

Madhya Pradesh is amongst the states experiencing the worst stunting rates in children. A study conducted in a semi-urban area of Gwalior, to understand the key drivers of stunting, found a direct correlation between sanitation and nutrition. When children are no longer exclusively breastfed, it has been found to directly impact stunting and child health. The study further reveals that an improved sanitation environment is more relevant to girls, suggesting that investment in sanitation coverage is specifically worthwhile for improving the girl child's life.

Currently, the government schemes do not focus on promoting hygiene practices in schools and supplies such as soaps and detergents are not distributed under the sanitation schemes. The schemes do not make it compulsory to follow personal hygiene practices in school or to deliver hygiene education,

Some drawbacks of Government of India's hygiene schemes are:

- ⌘ While 62.1 per cent students in urban areas attend private (aided and unaided) institutions at the secondary and higher secondary level, menstrual hygiene programmes do not target private school systems (NSSO, 2014)
- ⌘ According to the Public Health Association, only 53 per cent population washes hands with soap after defecation, 38 per cent washes hands with soap before eating and only 30 per cent wash hands with soap before preparing food. Only 11 per cent Indian rural families dispose of child stools safely. Therefore,



- higher importance needs to be accorded to hygiene practices (Nayyar, 2014)
- ⌘ Guidelines need to be defined for compulsory hand washing facilities and gender specific toilets in institutions. This is especially important with COVID-19 heightening the importance for hygiene and handwashing to reduce the spread of the virus.
  - ⌘ There is need for collective behaviour change to build awareness of hygiene practices at a community level, conducted by individuals.

## Evidence and Studies

- ⌘ Pakistan: A randomised control trial conducted in urban slums of Karachi demonstrates that children younger than 5 years, in households that received plain soap and handwashing promotion, had a 50 per cent lower incidence of pneumonia. The intervention promoted regular hand washing to assess the effect on child health and more specifically, respiratory infections and diarrhoea, the two leading global causes of childhood death.
- ⌘ A handwashing intervention with students in a school, under a hygiene education programme, also included staff training in proper handwashing. This resulted in significant increase in water treatment and the students' ability to apply proper handwashing techniques, appearing to translate to primary caregivers in households. The intervention, though simple and requires minimum resources, yields promising results.
- ⌘ A study has revealed that using a comparable school-based education study designed for menstrual education, can lead to a significant improvement in knowledge, beliefs and practices in menstrual hygiene. Not only did menstrual knowledge amongst girls increase from 51 to 82.4 per cent there was also substantial improvement in school attendance.
- ⌘ A study has revealed substantial reduction in morbidity and mortality rates with an adequate investment in water supply and suitable excreta disposal facilities. Investments that improve both water quality and sanitation accessibility are especially effective in reducing diarrhoea and other related diseases.
- ⌘ Sanitation interventions have been found to be more effective at reducing diarrhoea at lower levels of faecal contamination. Interventions are less likely to show reduction in the incidence of diarrhoea if faecal contamination in the community remains above a certain level. A set of WASH indicators can be used to develop a Faecal Contamination Index (FAECI) to assess previously published sanitation intervention studies, using a meta-regression analysis to find an association between relative risk estimates as an outcome and the *FAECI* as an explanatory variable.



## 3.4. Recommendations

### Solid and Liquid Waste Management:

- ⌘ The segregation of liquid and solid waste at source as well as recycling need to be mandated by the government either by charging a fee or encouraging communities to take it up themselves.
- ⌘ A strategic approach to optimizing reuse of wastewater, improving institutional responsibilities and recognizing wastewater as a resource, can result in major improvements in both health and environment.
- ⌘ In addition, local bodies need to be incentivised to undertake sewage management.

### Sanitation Facilities:

- ⌘ Focus on gender specific needs must be enhanced to improve the sanitation experience and use of sanitation facilities.
- ⌘ On-site sanitation needs to be given priority, together with supporting small-scale sanitation providers which will make the system efficient.
- ⌘ Importance of repair services needs to be emphasised and monitoring of existing toilets and sanitation facilities undertaken on a regular basis.

### Hygiene:

- ⌘ Given the impact of good hygiene practices on the health of a child, it is proposed that policies and programming aimed at addressing child stunting encompass WASH interventions, thus shifting emphasis from nutrition-specific to nutrition-sensitive programming.
- ⌘ There is a need to build awareness on hygiene practices at a community level, thus leading to collective behaviour change. This can be done by systematically promoting hygiene behaviours and providing facilities and resources in schools. Specific efforts are required to increase children's understanding of the importance of hygiene and a clean school environment. Better personal hygiene practices can be propagated by promoting hygiene at the community level and ensuring availability of necessary facilities in proximity to toilets and kitchens.
- ⌘ Ensure the training of officials is not a one-time affair but a continuous process which is conducted regularly.
- ⌘ A study analysis revealed that household sanitation and the caregivers' personal hygiene practices are strong predictors of child stunting in India. This reinforces the growing evidence of the effects of WASH practices on a child's linear growth. Correspondingly, it is proposed that policies and programming aimed at addressing child stunting should encompass WASH interventions, thus shifting emphasis from nutrition-specific to nutrition-sensitive programming.



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# 4. ENVIRONMENT

The Backbone of a Healthy Life



## 4.1. Significance for Healthy Cities

The ecological environment combined with the living spaces and the safety, together make an immense and direct impact on people's health.

The stress of urban sprawling on civic amenities such as drinking water supply, electricity, transport, housing and healthcare services adversely impacts air, water and land i.e., the ecology. This impact is multiplied manifold with inadequate waste management, traffic congestion and poor living conditions, further deteriorating individual health. The high prevalence of communicable diseases, such as tuberculosis, in urban areas are a result of overcrowding and poor living conditions. Environmental diseases impact the marginalised population, in particular, women, children, and senior citizens much more than the rest of the population. For example, continued exposure of pregnant women to ambient air pollution often leads to adverse health outcomes such as preterm delivery or underweight children.

Urban design affects public health in several ways, including physical activity, traffic accident risk, pollution exposure, access to health resources, mental health and affordability, which in turn affect a household's ability to afford other critical goods, such as healthy food and medical care (Iravani & Rao, 2020).

In addition, urban green spaces provide opportunities for active lifestyles, promote and encourage health and well-being by promoting stress reduction and relaxation, physical activity, increased social engagement, and community cohesiveness. (WHO (2017b))

Urban populations, more specifically the urban poor, face several safety challenges. These range from secure housing to impact of natural disasters, to unsafe working environments and neighbourhoods. These in turn limit their ability to access food, education, healthcare systems and also impact the quality of daily life.

An enabling environment that supports healthy life thus needs to focus on improving air, water, noise pollution, creating better urban spaces and enhancing at the least the physical safety of citizens.

The impact of the environment on building healthy cities was studied in the context of four sub pillars of pollution, waste generation and management, urban spaces and safe environments.

Based on a review of the literature available on the above sub pillars, this section details the key findings and government interventions, provides a gap analysis and makes recommendations to bridge the gaps. The data for these sub pillars has been studied at four levels: international, domestic, state of Madhya Pradesh and city of Indore.

### 4.1.1. POLLUTION: Pollutants and Effects

Pollution occurs when harmful contaminants or pollutants are present in the environment in concentrations likely to harm living organisms and exceed a defined environmental quality standard (OECD, 2001). Some major pollutants to the environment include chlorofluorocarbons (CFC), lead, methane, carbon monoxide, particulate matter, nitrogen oxides and sulphur dioxide. Long term exposure to such chemicals affects human health for example, air polluted by carbons can lead to chronic respiratory diseases, lung cancer and other diseases.



### 4.1.1.1. Land and Water Pollution

Land pollution occurs from deposition of solid or liquid waste material on land or underground in a manner that contaminates the soil and groundwater, threatens public health, and causes unsightly conditions and nuisances (Nathanson, 2017). Land pollution can contaminate the soil and water and is a health hazard to local communities. Pollutants are typically the cause of major water quality degradation around the world. Some key man-made pollutants include microbial pathogens, nutrients, oxygen-consuming materials, heavy metals and persistent organic matter, as well as suspended sediments, nutrients, pesticides and oxygen-consuming substances, much of them arising from non-point sources. Heat, which raises the temperature of the receiving water, can also be a pollutant (UNESCO, 2017).

Soil pollution occurs when an out of place chemical or substance is present in higher-than-normal concentration adversely impacting a non-targeted organism. Although majority of pollutants have anthropogenic origins, some contaminants do occur naturally as components of minerals and can be toxic at high concentrations (Eugenio et al., 2018).

#### Norms

The land/soil are often polluted with heavy metals, metalloids, nitrogen, phosphorus, pesticides, persistent organic pollutants and polycyclic aromatic hydrocarbons. The key pollutants and their sources include the following:

- ⌘ **Natural and geogenic sources:** Several soil parent materials and rocks are natural sources of heavy metals and other elements, such as radionuclides and the radioactive gas radon. These can pose a risk to the environment and human health at elevated concentrations. Further, natural events such as volcanic eruptions or forest fires release many toxic elements into the environment, thus causing pollution.
- ⌘ **Industrial activities:** Several factories release toxins into the air, soil and water. While the gaseous pollutants enter the soil through rain or atmospheric deposition, water pollutants are often released into the soil if not disposed correctly.
- ⌘ **Mining:** Heavy metals and other toxic elements released into the environment by mining and smelting facilities persist for long after these activities have ended.
- ⌘ **Urban and transport infrastructure:** Widespread infrastructure development, such as housing, roads and railways, has contributed considerably to environmental degradation. Their more evident negative effects on soil are soil sealing and land consumption. Gasoline and other combustion materials also pose a threat to soil health.
- ⌘ **Waste and sewage generation and disposal:** Increasing waste and sludge production, combined with a lack of municipal services for waste management, create a dangerous situation. Adding sewage sludge to soils may prove beneficial, as it adds organic matter and nutrients to soils. However, untreated sludge can lead to pollutants such as heavy metals' accumulating in the soil and eventually entering the food chain.

Municipal waste disposal in landfills and incineration are the two most common ways to manage waste. In both cases, pollutants, such as heavy metals, polyaromatic hydrocarbons, pharmaceutical compounds, personal care products and their derivative products, accumulate in the soil. Of late, globally recycled lead batteries have been identified as a major source of soil contamination.



## Current Status

- ⌘ Over the last decade, certain low- and middle-income countries increased the use of pesticides; for example, Bangladesh increased this usage by four times, Rwanda and Ethiopia by over six times, and Sudan by ten times (Eugenio et al., 2018).
- ⌘ Manure often contains high amounts of heavy metals, pathogen organisms and antibiotics. Global manure production increased 66 per cent between 1961 and 2016, from 73 to 124 MT, the volume of manure applied to soil grew from 18 to 28 MT, and the amount of manure left on pasture increased from 48 to 86 MT.
- ⌘ Globally, over 3 million people are hospitalised for pesticide poisoning annually, resulting in a quarter of a million premature deaths.

A recent national database on land degradation in India shows that 120.7 million hectare (Mha) or 36.7 per cent of the total arable and non-arable land surface of the country suffers from various forms of degradation. Water erosion being the chief contributor impacts about 83 Mha or 68.4 per cent of land impacting soil health and runoff water quality. It results in loss of organic carbon, nutrient imbalance, soil compaction, decline in soil biodiversity, and contamination with heavy metals and pesticides (Indian Council of Agricultural Research, 2010)

### 4.1.1.2. Air Pollution

Research has found that 91 per cent of the world's population lives in places where air quality is well below the WHO guidelines limit. WHO data has also shown that 9 out of 10 people breathe air containing high levels of pollutants. Air pollution exacerbates asthma and increases respiratory infections, especially in children and increases the incidence of cardiovascular diseases, chronic respiratory diseases and cancer (World Health Organization, 2019). Around 7 million people die annually from exposure to polluted air. In 2012, one out of every nine deaths were the result of air pollution-related conditions. Ambient air pollution alone was the cause of 4.2 million deaths in 2016, while household air pollution from cooking with polluting fuels and technologies caused an estimated 3.8 million deaths in the same period (World Health Organization, 2018).

Air pollution, a major cause of health problems, occurs when the environment gets contaminated by chemicals, physical or biological agents that modify its natural characteristics. Air pollution takes place when gases, finely divided solids, or finely dispersed liquid aerosols exceed the natural capacity of the environment to dissipate and dilute or absorb them. These cause undesirable health, economic, or aesthetic effects.

Air pollution is broadly divided into ambient and household air pollution. Ambient air pollution is the potentially harmful pollutants emitted by industries, households, cars, and trucks and is basically outdoor pollution. Whereas, household air pollution is mainly pollution caused indoors, within and around buildings and structures.

The following targets have been set for indoor and ambient air pollution:

- ⌘ SDG target 3.9: substantial reduction in deaths and illnesses from air pollution
- ⌘ SDG target 7.1: ensure access to clean energy in homes
- ⌘ SDG target 11.2: provide access to safe, affordable, accessible and sustainable transport systems for all
- ⌘ SDG target 11.6: reduce the environmental impact of cities by improving air quality



## Norms

Air quality<sup>15</sup> is measured by the Air Quality Index (AQI) with commonly used measurements being PM 2.5 or PM 10, i.e., microorganisms per cubic meter. A microscopic particle, it is almost 30 times smaller than the diameter of human hair. When levels are high, PM2.5 particles form a haze in the sky, making their way into people's respiratory tracts and harming the lungs (The World Bank, 2015). The indicators for ambient air pollution and parameters for chemical limits in household air pollution are detailed in **Annexure 10** (World Health Organization, 2010).

## Current Status

Globally, New Zealand tops the charts in air quality, followed by Darussalam and Sweden. In India, Thane in Maharashtra and Valapad in Kerala, amongst others, record PM 2.5. In Madhya Pradesh the best levels were PM10, with Datiya being at the top.

Air quality standards at the international, national and Madhya Pradesh level (World Health Organization, 2018) are shown in Table 37.

**Table 37: Air quality standards at International and National levels**

Rank	Best in the world (PM 2.5) <sup>16</sup>	Best in India (PM 2.5) <sup>17</sup>	Best in Madhya Pradesh (PM10) <sup>18</sup>
1	New Zealand	Thane, Maharashtra	Datiya
2	Brunei Darussalam	Valapad, Kerala	Sidhi
3	Sweden	Thogummi, Andhra Pradesh	Bhind
4	Australia	Kuzhuppilly, Kerala	Dewas
5	Canada	Panchkula, Haryana	Morena
6	Finland	Ernakulam, Kerala	

WHO guidelines on air quality are detailed in **Annexure 11**.

## Madhya Pradesh and Indore

Overall air quality index in Indore is 50, which is fairly good.<sup>19</sup>

**Table 38: Air Quality in Indore**

Air Quality	PM2.5	PM10
Indore	12 µg/m <sup>3</sup>	46 µg/m <sup>3</sup>

## Noise Pollution

Noise pollution occurs with unwanted or excessive sound making a deleterious effect on human health and environmental quality. Noise can cause a number of

<sup>15</sup> For WHO air quality guidelines, check the appendix.

<sup>16</sup> (World Economic Forum, 2017) <https://www.weforum.org/agenda/2017/02/the-best-and-worst-countries-for-air-pollution-and-electricity-use>

<sup>17</sup> [https://air-quality.com/country/india/3ffd900b?lang=en&standard=aqi\\_us](https://air-quality.com/country/india/3ffd900b?lang=en&standard=aqi_us)

<sup>18</sup> <http://www.mppcb.mp.gov.in/proc/Oct-18.pdf>

<sup>19</sup> <https://www.iqair.com/india/madhya-pradesh/indore>



short- and long-term health problems, such as sleep disturbance, cardiovascular effects and hearing impairment or deafness.

A person who is not able to hear as well as someone with normal hearing – hearing thresholds of 25 dB or better in both ears – is said to have hearing loss. The causes of hearing loss and deafness can be congenital or acquired, such as because of noise pollution.

### **Norms**

The frequency of a sound, the overall sound pressure levels and their variation define noise pollution. Because human beings can detect a large range of sound pressures, these levels are measured on a logarithmic scale with units of decibels. Most environmental sounds are made up of a complex mix of many different frequencies, with the audible frequency range being 20–20 000 Hz for younger listeners with unimpaired hearing.

The sum of the total energy over a time period gives a level equivalent to the average sound energy over that period. Thus, LAeq,T is the energy average equivalent level of the A weighted sound over a period T and is used to measure continuing sounds, such as road traffic noise or types of more-or-less continuous industrial noises. However, for distinct events to noise, such as aircraft or railway noise, measures of noise level (LAmax), or the weighted sound exposure level (SEL), are used in addition to LAeq,T (World Health Organization et al., 1995)

At the global level, noise pollution is measured through the Worldwide Hearing Index Noise Pollution Rank. Noise pollution standard limits set by the WHO and indicators of Ambient Air Quality standards in respect of day and night time noise is detailed in **Annexure 12**.

### **Current Status**

Zurich, Switzerland has the least incidence of noise pollution and Guangzhou, China has the highest. Some other cities with high hearing index, low noise pollution include Vienna, Austria, Oslo, Norway, Munich, Germany and Stockholm, Sweden. More details of WHO's Environmental noise guidelines for the European Region can be found in **Annexure 13**.

This noise pollution can be costly and dangerous too. More than 5 per cent of the world's population – or 466 million people have an affected hearing loss (432 million adults and 34 million children) (World Health Organization, 2021). Majority of people with hearing loss live in low- and middle-income countries.

Because of threats from noise pollution, the Central Pollution Control Board (CPCB) tracks noise-levels through monitoring stations located across India's major cities. Average noise levels during the day, recorded across 10 such stations, was found to be 67.8 decibels (dB). Almost every city in India violates noise pollution standards, that are mandated at 55 dB (daytime) and 45 dB (at night) for residential areas (National Herald, 2020).

At an average of 78 dB, with a minimum of 35.8 dB and maximum 115.5 dB, in commercial areas, noise pollution in Indore is mostly high, though it has recorded an 8 per cent decline from the 2015 levels. However, residential and silent areas in Indore have not registered a significant decline in noise pollution. Bhopal recorded a slight increase, with an average of 7 dB rise in noise pollution in commercial, residential and silent zones. On the other hand, Guna recorded an increase of 34.9 per cent (96.1 dB in commercial areas) and Dewas saw a 37.5 per cent increase in residential areas in noise pollution (Hindustan Times, 2016).



## 4.1.2. Waste Generation and Management

### 4.1.1.1. Hazardous Waste

Hazardous waste, a chemical material that can no longer be used for the intended purpose, is mostly harmful or potentially harmful to plants, animal and human health and/or the environment. Such waste, either by itself or in combination with other material, poses a danger because of its characteristics such as physical, chemical, biological, reactive, toxic, flammable, explosive or corrosive.<sup>20</sup> Healthcare and medical waste such as material contaminated with bodily fluids, protective clothing, body parts, chemicals and pharmaceuticals, medical devices and radioactive material are hazardous wastes.

#### Norms

Hazardous waste originates from various sources such as industries, petroleum refineries, transportation, blast furnace sludges, biological waste generating laboratories, thermal and nuclear power plants amongst others. With regard to human toxicity, waste is considered to be hazardous if it has an oral LD<sub>50</sub> toxicity equal to or greater than 50 mg/kg or an inhalation LC 50 toxicity of 2 mg/kg (Shah, n.d.)

Hazardous waste is also identified by its qualitative properties such as:

- ⌘ Ignitability: Does the waste cause or enhance fire?
- ⌘ Corrosivity: Does the waste destroy tissues or metal?
- ⌘ Toxicity: Does the substance pollute water supplies and threaten health?
- ⌘ Reactivity: Does the substance react violently or cause explosion?

All hazardous waste must be separated at source and managed in an environmentally sound manner. Stopping uncontrolled mixing of hazardous and non-hazardous waste, disposal of such waste in an unsafe and uncontrolled manner and eliminating unsafe recycling practices need to be the first priority.

#### Current Status

It has been observed that hazardous waste generation is increasing in developed countries. For example, in the EU there was an increase of 3.3 per cent in hazardous waste generation between 2010 (97.5 million tonnes) and 2012 (100.7 million tonnes) (UNEP and ISWA, 2015)

As per WHO estimates, the average hazardous healthcare waste generated per hospital bed is around 0.2 kg in most low-income countries and 0.5 kg in high-income countries.

Hazardous waste generated by industry in Madhya Pradesh is recorded in Table 39.<sup>21</sup>

<sup>20</sup> <http://www.iwma.in/HWM%20Rules.pdf>

<sup>21</sup> [http://www.mppcb.nic.in/pdf/hazardous\\_mangt\\_in\\_mp.pdf](http://www.mppcb.nic.in/pdf/hazardous_mangt_in_mp.pdf)



**Table 39: Hazardous waste generated by industry in Madhya Pradesh**

Location	Secured Landfill Facility (MT)	Reuse/Sale (MT)	Incineration (MT)	Total (MT)
Bhopal	2,261.363	17,834.2869	1,230.39	21,326.0399
Dhar	2,197.2365	60,471.0328	361.965	63,030.2343
Guna	698.84	1,799.6908	0	2,498.5308
Gwalior	1,023.565	1,402.716	26.7385	2,453.0195
Indore	2,133.516	5,292.56732	51.727	7,477.80132
Jabalpur	2,033.446	22,636.3226	0.72	24,670.488
Sagar	0	154.4307	0	154.4307
Satna	2,708.59	692.4231	40	3,441.0131
Rewa	1,888.758	10,897.7695	16.312	12,802.8395
Ujjain	19,688.0345	9,336.0142	1,715.665	30,739.7137
Total	34,633.349	130,517.25392	3,443.5175	168,594.11082

#### 4.1.2.2. Biomedical Waste

Almost 85 per cent of total waste generated by healthcare activities is general and non-hazardous waste; the balance 15 per cent, that may be infectious, toxic or radioactive, is considered hazardous. With an estimated 16 billion injections being administered worldwide annually, needles and syringes if disposed unsafely can be a huge threat.

Biomedical waste is any waste generated during diagnosis, treatment or immunisation of human beings or animals. Hospitals, healthcare facilities, laboratories, research centres, mortuaries, autopsy centres, animal research and testing laboratories, blood banks and collection services all generate biomedical waste.

#### Norms

Biomedical and healthcare waste can be of eight different types such as infectious, pathological, sharps, chemicals, pharmaceuticals, cytotoxic, radioactive and non-hazardous or general wastes. Refer **Annexure 14** for details. Adverse health outcomes of healthcare waste and by-products include:

- ⌘ Sharps-inflicted injuries
- ⌘ Toxic exposure to pharmaceutical products, in particular, antibiotics and cytotoxic drugs released into the surrounding environment, and to substances such as mercury or dioxins, during the handling or incineration of healthcare wastes
- ⌘ Air pollution from release of particulate matter during medical waste incineration
- ⌘ Burns such as thermal injuries during open burning and operation of medical waste incinerators or chemical burns during disinfection, sterilisation or waste treatment activities or radiation burns.

The CPCB, controlled by the Ministry of Environment, Forest & Climate Change,



recently released a set of guidelines to be followed by medical facilities while handling, treatment and disposal of waste generated during treatment/diagnosis/quarantine of COVID-19 patients. The responsibilities have been divided amongst following stakeholders (CPCB, 2020):

- ⌘ COVID-19 Isolation Wards
- ⌘ Sample Collection Centres and Laboratories for COVID-19 suspected patients
- ⌘ Responsibilities of persons operating Quarantine Camps/Homes or Homecare facilities
- ⌘ Common Biomedical Waste Treatment Facilities (CBWTF)
- ⌘ Urban Local Bodies
- ⌘ HCFs / Isolation Wards to manage (biomedical) wastewater

According to the Bio-medical Waste Management Rules, 2016, biomedical waste treatment and disposal facility is any facility where treatment, disposal of biomedical wastes or processes incidental to such treatment and disposal is carried out and includes CBWTF. The features of a Common Bio-medical Waste Treatment and Disposal Facility (CBWTF) have been defined by the Central Pollution Control Board of India (CPCB, 2016). The operator of a CBWTF refers to a person who owns or controls a CBWTF for collection, reception, storage, transport, treatment, disposal or any other form of handling of bio-medical waste (CPCB, 2016). Effluent generated by a hospital needs to ensure that around 40 parameters are within the permissible limits. (Table 40) (Babu et al., 2009)

**Table 40: Parameters for Bio-Medical Waste Disposal**

Parameters	Permissible Limits
pH	6.3-9.0
Suspended solids	100 mg/L
Oil and grease	10 mg/L
Biochemical oxygen demand (BOD)	30 mg/L
Chemical oxygen demand (COD)	250 mg/L

### Current Status

In 2019, Madhya Pradesh produced 17,846.68 kg per day of bio medical waste and had an installed capacity to treat 17,794.60 kg per day of the waste. At 4,652 kgs per days, Indore generated the highest amount of bio medical wastes, followed by Bhopal at 1,900 kg per day (Madhya Pradesh Pollution Control Board, 2020). Of the 14 dedicated biomedical waste disposal facilities in Madhya Pradesh, the one located in Indore covers waste disposal for around 12 districts.

**Table 41: Existing Total Bio-Medical Waste Treatment Capacity**

Existing Total Bio Medical Waste Treatment Capacity (Both captive and CBWTF) in Kg/Day	
Equipment	Total
Incinerator	12438.74
Auto Clave	4824.34



<b>Existing Total Bio Medical Waste Treatment Capacity (Both captive and CBWTF) in Kg/Day</b>	
Shredder	
Deep Burial	405.60
ETP	A
Any others	
Medical Waste	25.92
<b>Total</b>	<b>17694.60</b>

### 4.1.2.3. Industrial Waste

Waste generated during industrial activities, such as manufacturing and processing in chemical plants, paint industry, cement factories, metallurgical plants, thermal power plants amongst others, are classified as industrial waste.

In developing countries such as India, industrial activity is associated with growth and is therefore encouraged by the Government. Efforts need to be made to control pollution by converting these unwanted wastes into utilizable raw material for various beneficial uses. Disposal of industrial waste remains a challenge in India due to the lack of necessary infrastructure.

#### Norms

Coal based thermal power plants, the biggest source of industrial pollution, generate almost 70 million tonnes of fly ash annually. Steel mills and blast furnaces for example produce 35 million tonnes of waste during conversion of pig iron to steel and manufacture of iron. The other major generators of industrial solid wastes include non-ferrous industries such as aluminium, zinc and copper, sugar industry generating press mud, pulp and paper industry producing lime and fertiliser and allied industries producing gypsum. Details of sources and waste generated are available in **Annexure 15**.

#### Current Status

Information is not available on current status of industrial waste at international, national, Madhya Pradesh or Indore city level

### 4.1.2.4. Construction and Demolition Waste (CDW)

CDW consist of debris generated during construction, renovation and demolition of buildings, roads, and bridges. CDW material often contains bulky, heavy materials such as concrete, wood (from buildings), asphalt (from roads and roofing shingles), gypsum (the main component of drywall), metals, bricks, glass, plastics, salvaged building components (doors, windows, and plumbing fixtures), trees, stumps, earth, and rock from clearing sites. Proper handling of construction and demolition waste management is necessary to ensure a clean and safe environment.

#### Norms

The Construction and Demolition Waste Management Rules outline the specific duties of waste generators, service providers and contractors, Central and State



Governments, ULBs, CPCB and the State Pollution Control Boards. Standards for construction products and demolition waste and the infrastructure required by processing / recycling facilities have also been defined.

## Recycling

In countries such as China and India where urban infrastructure development and redevelopment are expanding rapidly, CDW recycling is a business opportunity for the private sector. With CDW recycling rates estimated at 5 per cent in China (2013) and 50 per cent in India (2014), there is still a lot left to be desired (UNEP and ISWA, 2015)

The CDW recycling rates vary widely between countries. The 2011 Bios report provides a 'best estimation' of the 2008-09 EU average as being in the range of 30 to 60 per cent, with EU countries reporting recycling and recovery rates as high as over 90 per cent and as low as 10 per cent.

A number of countries have set city level targets for CDW recycling. For example, EU had set a target of a minimum of 70 per cent of non-hazardous CDW to be reused, recycled or to undergo other material recovery by 2020.

India set up its first CDW recycling plant in New Delhi in 2009 in cooperation with the private sector. The plant aims to divert waste from a landfill and develop a market for CDW. Originally the plant was designed with a capacity of 500 tonnes per day, which was expanded to 2000 tonnes per day in 2014. Incoming material is inspected and weighed; plastics, metal, wood and certain other materials are separated both manually and mechanically. The remaining waste is sorted into whole bricks for internal use and sale. Large pieces of concrete and mixed waste are dry processed to crush and grade the concrete and wet processed for mineral processing and washing. Products such as sand, stone and ready-mix concrete recovered by the plant are used for manufacturing value-added products such as paving blocks, tiles, kerbstones and bricks. By early 2015, the plant had sold well over a million tonnes of recycled products.

While recycling is a solution to manage CDW, high recycling targets could prove counterproductive. In the high-income countries, one common source of waste is over-ordering of bricks and other material for building sites, to avoid supply related delays. Recycling targets provide a perverse incentive to crush and recycle leftover raw materials, rather than to return and reuse them at another building site. This is an example of a simple waste prevention measure which pays for itself very quickly. Another slightly complex example is controlled dismantling rather than wholesale dismantling of buildings, to salvage more components for reuse.

### Current Status

Construction and demolition waste generated by regions around the world:

- ⌘ European Union, 821 million tonnes
- ⌘ Japan, 77 million tonnes
- ⌘ China, 33 million tonnes
- ⌘ India, 17 million tonnes

CDW accounts for at least 30 per cent of the total solid waste produced around the world. CDW is the largest waste worldwide at around 30 to 40 per cent: 36 per cent in the European Union and close to 67 per cent in the United States and 34 per cent of the urban waste generated by OECD countries (Ginga et al., 2020).



Globally, cities generate about 1.3 billion tonnes of solid waste per year. This volume is expected to increase to 2.2 billion tonnes by 2025, says a 2012 World Bank Report. Building material accounts for about half of all material used and about half the solid waste generated worldwide (Centre for Science and Environment, n.d.).

The MoEF&CC states that a systematic database of CDW is not created. As per Centre for Science and Environment (CSE) estimates, since 2005, India has constructed 5.75 billion sq mtr of new floor space, with almost one billion sq mtr being added in 2013. If a new construction generates 40-60 kg of CDW per sq mtr, then taking an average of 50 kg per sq mtr, India must have generated 50 million tonnes (MT) of CDW in 2013 alone.

This estimate only accounts for new construction. Demolition and renovation/repair-related waste of the older stock generates additional waste. The waste produced per sq mtrs of demolition is 10 times that generated during construction, which as per Technology Information Forecasting and Assessment Council (TIFAC), stands at 300-500 kg of waste per sq mtr.

According to the Madhya Pradesh Pollution Control Board's annual report of CDW Management Act, the entire 655 TPD (tonnes per day) CDW generated in the state was collected and sent for processing. However, only 336 TPD were processed and utilised for further activities. The only operational waste processing plant in MP, located in Indore, has a capacity of 100 TPD.

#### 4.1.2.5. Dead Animal Waste

Animals that die accidentally or naturally are categorised as dead animal waste. Such waste needs to be disposed of in a safe and sterile manner to avoid the spread of zoonotic diseases to humans or other animals. Various methods of animal waste disposal include burial, incineration, rendering, composting/bin composting, pile or windrow composting, daily pickup, landfilling, constructed disposal pit and mini composters.

#### Norms

### Recycling

The Indore Municipal Corporation (IMC) has set up a carcass utilisation plant, in PPP mode, to manage an increasing number of dead animals in a day. Here, the carcasses are treated and converted into useful products thus adding to the city's cleanliness.

#### Current Status

Information on current status of industrial waste is not available for international, national, Madhya Pradesh or Indore city level.

### 4.1.3. URBAN spaces

#### 4.1.1.1. Urban Green Spaces

Green spaces such as parks and sports fields as well as woods and natural meadows, wetlands or other ecosystems, represent a fundamental component of an urban ecosystem. Urban green spaces are areas partly or completely covered with



vegetation, such as parks, community, allotment or residential gardens, urban forests or street trees. Green spaces and other nature-based solutions offer innovative approaches to increase the quality of urban settings, enhance local resilience and promote sustainable lifestyles, improving both the health and well-being of urban residents. Parks, playgrounds or vegetation in public and private places are a central component of these approaches.

Urban green spaces (UGS) are extremely important, particularly in developing countries such as India and China, where air pollution levels are extremely high. They enhance urban living by purifying air, enabling urban agriculture, regulating the microclimate and controlling the impact of climate change. They also reduce soil erosion, noise pollution, and energy use by regulating surface temperatures of urban landscapes. These phenomena come together to improve health and wellbeing of urban populations.

Urban green spaces have a definitive impact on mental health which is defined by WHO as a state of well-being that enables an individual to realise his or her abilities, to cope with the normal stresses of life, work productively and fruitfully, and contribute to their community (World Health Organization, 2016).

Depression is characterised by sadness, loss of interest or pleasure, feelings of guilt or low self-worth, disturbed sleep or appetite, tiredness, and poor concentration. Details available in **Annexure 16**.

Urban green spaces are an important component of public open spaces and common services provided by a city and can serve as a health-promoting setting for all members of the urban community. It is therefore necessary to ensure that public green spaces are easily accessible for all population groups and distributed equitably within the city (World Health Organization, 2017). The Ministry of Urban Development's Urban Green Guidelines, applicable to cities aim to highlight the impact of urbanisation and urban greenery (Ministry of Urban Development, GoI, 2014). The guidelines suggest practices and methods for protecting and enhancing urban greenery in a sustainable manner and enhancing urban green areas. These also enable city administrators to identify stages in planning and development to integrate urban greenery with the built environment.

Research has revealed that urban green spaces have different health benefits for specific population groups: (World Health Organization, 2016)

- ⌘ Women
  - Improved mental health
  - Healthier diurnal cortisol patterns, low stress levels
  - Reduction in blood pressure and depression amongst pregnant women and beneficial effects on in-utero development
- ⌘ Children and adolescents
  - stimulate development of gross and fine motor skills as well as cognitive, emotional, social and physical development
- ⌘ Other adults
  - stronger effect on senior citizens and housewives than on general population, perhaps due to their greater dependence on local living environment
  - In terms of sleep deficiency, stronger protective effects for people aged 65 and older, compared to younger adults
  - promotion of social ties and a sense of community thus promoting health and well-being, especially amongst older people, where social isolation



- has been significantly associated with increased mortality
- ⌘ Deprived sub-populations and minority groups
  - Health benefits linked with access to green space may be strongest among the lowest socioeconomic groups, including minority ethnic groups

Populations exposed to the greenest environments had the lowest level of health inequality related to income deprivation.

## Norms

The characteristics and indicators of urban green spaces that result in specific health benefits or hazards include the following:

- ⌘ Accessibility and quality: A qualitative analysis revealed that attributes of green spaces, such as safety, aesthetics, amenities, maintenance and proximity to home, are important for supporting physical activity outdoors. Aspects such as concerns over safety, violence, graffiti, vandalism, litter, noise, pollution, and dog fouling had negative associations with park use and physical activity.
- ⌘ Size of green space: The size of green space is likely to influence levels and types of activity people undertake within it. WHO recommends that a city should provide 9 sq mtrs of undeveloped (unpaved) open space for every habitat.
- ⌘ Presence of specific facilities: Research has found that level of physical activity in urban green spaces is related to the availability of features such as walking/cycling tracks, wooded areas, water bodies, lights, pleasant views, and parking lots.
- ⌘ Tree cover and canopy density: The presence of nearby trees and grass visible from apartment buildings result in lower levels of aggression and mental fatigue in residents, in comparison to those living in buildings overlooking barren vistas
- ⌘ Distance: Designing green area networks in a manner that residents are at a 15-minute walking distance of an open area and every urban resident life within 300 metres from a green space.

Detailed guidelines for strengthening urban green spaces issued by the Ministry of Housing and Urban Development are given in **Annexure 17**.

## Current Status

Since 1970, India has undergone rapid urbanisation, with the urban population increasing by 11.7 per cent over four decades. The number of cities in the country with population exceeding one million increased from 23 in 1991 to 53 in 2011. Data shows that urbanisation has a direct correlation with reduction in availability of urban green cover. By 2018, India's capital city, New Delhi had a population density of 12,591 and a 20 per cent green cover translating to a per capita coverage of 10.41 sq mtrs. In comparison Chandigarh, with a population density of 9,252 and a 35 per cent green cover, had a per capita coverage of 38 sq mtrs.



City	Population in Millions	Population Density (km <sup>-2</sup> )	Geographical Area (km <sup>2</sup> )	Green Cover % (in km <sup>2</sup> ; 2017)	Per Capita Green Space (m <sup>2</sup> ; 2018)
Delhi	28.50	12,591	1484.00	20.00 (296.80)	<b>10.41</b>
Mumbai	23.50	20,482	603.00	36.48 (220.00)	<b>9.36</b>
Kolkata	15.20	24,400	1380.00	7.30 (100.74)	6.61
Bangalore	13.90	4381	2196.00	2.09 (46.03)	3.31
Hyderabad	11.57	18,480	650.00	1.66 (10.79)	0.93
Chennai	9.88	14,350	1189.00	15.00 (178.35)	<b>18.05</b>
Ahmedabad	8.41	9900	464.00	17.00 (78.88)	<b>9.38</b>
Surat	6.55	1376	326.50	11.84 (38.66)	5.90
Gandhinagar	6.33	660	649.00	54.00(188.46)	<b>29.77</b>
Jaipur	3.71	598	467.00	5.43 (24.75)	6.67
Nagpur	2.94	11,000	285.90	18.00 (51.42)	<b>17.49</b>
Mysore	1.70	6911	128.40	20.19 (25.92)	<b>15.25</b>
Chandigarh	1.05	9252	114.00	35.00(39.90)	<b>38.00</b>

**Figure 16: Major Cities of India with per capita green spaces**

Source: (Ramaiah & Avtar, 2019)

India is also amongst the most depressed countries in the world, followed by China and USA with all three countries having a high incidence of anxiety, schizophrenia, and bipolar disorders (WHO Report, October 2018). National Mental Health Survey (NMHS 2015-16) reported that, 1 in 20 people in India are depressed, and 1 in 40 have experienced depression in the past, with an estimated 150 million people requiring mental healthcare interventions. *Similar data for state of Madhya Pradesh and Indore city is not available.*

In addition, SDG 11.7 has emphasised that by 2030, cities must provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities. In India in 1990, there were 7.2 million blind people, rising to 8.8 million in 2015, making the country the host of nearly a quarter of the total 36 million blind people.<sup>22</sup>

<sup>22</sup> <http://www.nihfw.org/Doc/Daily%20Health%20News%2020170804.pdf>



## A causal model of the impacts of urban green spaces on health and well-being

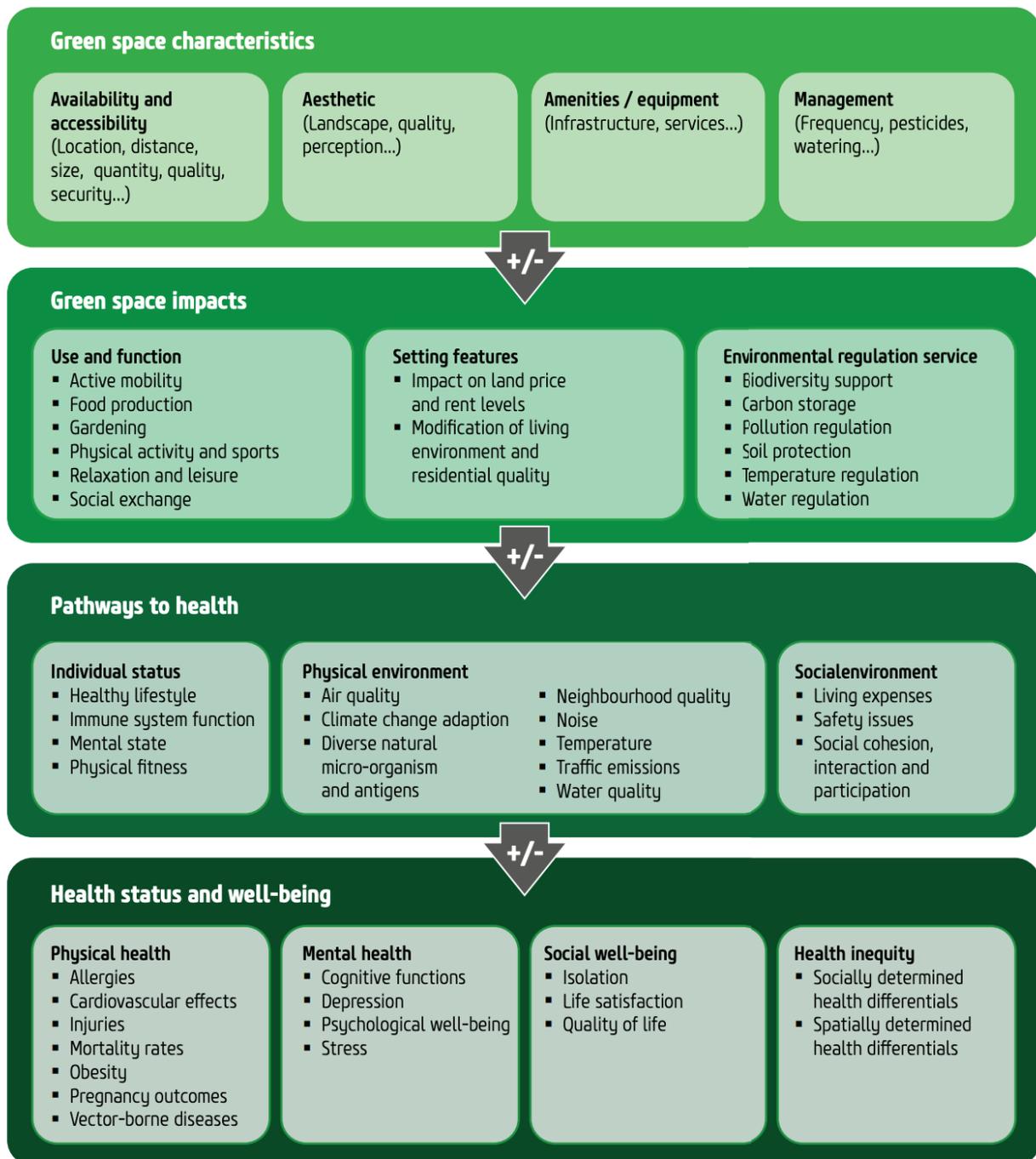


Figure 17: A causal model of the impacts of urban green spaces on health and well-being

Source: (World Health Organization, 2017)

### 4.1.3.2. Public Spaces

A public space is an area or place that is open and accessible to all people, regardless of gender, race, ethnicity, age or socio-economic level. Public space relates to all those parts of the built and natural environment to which the public has free access. It encompasses all the streets, squares and other right of way, whether predominantly in residential, commercial or community/civic uses; open spaces and parks, and the “public/private” spaces where public access is unrestricted (at least during daylight hours). It includes the interfaces with key internal and private spaces to which the public normally has free access (UNESCO, 2017).



## Norms

Various approaches have been adopted to implement the parameters that indicate an adequate and safe public space for well-being. These include:

- ⌘ **Safety and security:** urban environments pose several threats, such as crime, terrorism and natural disasters. Creating a sense of security and safety is an essential prerequisite of successful urban design.
- ⌘ **Policing public places:** Policing, goes beyond providing public police, to include social control at primary, secondary and tertiary levels. Primary or formal controls are directly enforced by those responsible for crime prevention, peacekeeping, and investigations. Secondary (informal) social controls are exerted by those for whom social control activities are an important secondary aspect of their roles and tertiary controls are also indirectly exerted by intermediate groups within local communities.
- ⌘ **Equitable environment:** In the context of urban design, the term people refer to all potential users of a built-up environment – old/young, rich/poor, male/female, able-bodied and those with disabilities, the ethnic majority and ethnic minorities.

Following design attributes have been outlined as being important for making streets usable:

- ⌘ Familiarity – recognisable, with long-established forms and features and designs familiar to older people
- ⌘ Legibility – help older people understand where they are and identify which way, they need to go
- ⌘ Distinctiveness – reflect local character in their built form and use and thereby give a clear image of the place
- ⌘ Accessibility – enable older people to reach, enter, use and walk around places they need or wish to visit, regardless of any physical, sensory or mental impairment
- ⌘ Comfort – enable people to visit places of their choice, without physical or mental discomfort and to enjoy being out of the house
- ⌘ Safety – enable people to use, enjoy, and move around the outside environment, without fear of tripping or falling, being run over or being attacked.

Principles of Universal Design of a space are detailed in **Annexure 18**.

## Current Status

Current status of urban spaces at the international, national and state level is not available.

### 4.1.3.3. Housing and Living Spaces

Healthy housing is a shelter that supports a state of complete physical, mental and social well-being. Healthy housing provides a feeling of home, including a sense of belonging, security and privacy. The quality of housing has major implications on health and specific to urban areas and cities where population density is higher with an increased demand for housing. Improved housing conditions can save lives, enhance quality of life, reduce poverty and diseases, help mitigate climate change and contribute to achievement of a number of Sustainable Development Goals, including those addressing health (SDG 3) and sustainable cities (SDG 11).



Housing is therefore a major entry point for intersectoral public health programmes and primary prevention. With an increase in urban population, going forward appropriate housing solutions will become an absolute necessity (World Health Organization, 2018).

## Norms

A few key indicators of living conditions include:

- ⌘ **Overcrowding:** Household crowding is defined as more than 3 people living in a habitable room (UN-Habitat), or (Eurostat) one room for the household. The minimum criterion for non-crowding is one room per couple in the household. Criteria for assigning rooms to children and adolescents have also been defined.
- ⌘ **Indoor temperature and insulation:** Cold air inflames lungs and inhibits circulation, increasing the risk of respiratory conditions, such as asthma, chronic obstructive pulmonary disease (COPD), and infections. Thus, for temperate or colder climates 18°C is proposed as a safe and well-balanced indoor housing temperature during cold seasons. In addition, home insulation must be provided with safe materials.

High indoor temperatures can cause mortality, heatstroke, hyperthermia, dehydration and hospital admission. Given these adverse effects of heat on health, well balanced indoor temperatures are proposed to be maintained below 24 °C. In populations exposed to high ambient temperatures, strategies to protect them from excess indoor heat should be developed and implemented.

- ⌘ **Injury Hazards:** Injuries in the home include falls, burns, poisoning, ingestion of foreign objects, smoke inhalation, drowning, cuts and collisions with objects, and crushing and fractured bones as a result of structural collapse. To reduce hazards that lead to unintentional injuries, housing could be equipped with safety devices, such as smoke and carbon monoxide alarms, stair gates and window guards, fireplace guards for stoves and unprotected hot surfaces.
- ⌘ **Housing Accessibility:** Housing should be built to be easily accessible by populations with functional impairments and older citizens. According to the United Nations Convention on the Rights of Persons with Disabilities, Member States have an obligation to identify and eliminate all barriers to accessibility, including in housing.

The WHO has provided guidelines for other key housing risk factors such as water, air quality, tobacco smoke, noise, asbestos, lead and radon. The standards defined by the Government of India are detailed in **Annexure 19**.

## Current Status

The materials used in construction of houses determine whether a home can follow the international norms. Thatched roofs, mud walls and mud floorings do not create the environment for maintaining well balanced temperatures or installing safeguards against unintended injuries. The 2001 census found that only 19.8 per cent of India's housing comes with concrete roofing and about 21.9 per cent have thatched roofing. While 43.7 per cent of the housings have burn brick walls, 32.3 per cent of them come with mud or unburnt brick walls. Almost 57 per cent of India's houses are built with mud flooring. Details of the construction material used in India are given in **Annexure 20**.



Data for the current status at the international, Madhya Pradesh state and Indore city levels is not available.

## 4.1.4. Safe Environment

### 4.1.1.1. Women's Safety

All around the world, women and girls face sexual harassment and other forms of violence in public spaces. In many cities, a large majority of women and girls have experienced some form of violation, ranging from unwanted sexual remarks or groping to rape and gender-related killings (UN Women, 2017).

Violence against women is a major public health and human rights concern, with intimate partner violence and sexual violence among the most pervasive forms of violence against women. Violence against women is defined by United Nations as any act of gender-based violence that results in, or is likely to result in, physical, sexual or mental harm or suffering to women, including threats of such acts, coercion or arbitrary deprivation of liberty, whether occurring in public or in private life.

Sexual violence is a sexual act, attempt to obtain a sexual act, unwanted sexual comments or advances, or acts to traffic, or otherwise directed against a person's sexuality, using coercion, by any person, regardless of their relationship to the victim, in any setting, including, but not limited to, home and work. Sexual assault, a sub-category of sexual violence, usually includes the use of physical or other force to obtain or attempt sexual penetration (World Health Organization, 2013).

It is suggested that formal or informal places be made available where women and girls feel physically and emotionally safe while socializing or building their social networks. These spaces could be women centres, women community centres, or listening and counselling centres and are not the same as shelters or reception centres or one-stop centres (UNFPA, n.d.). These safe spaces could provide women the opportunity to acquire contextually relevant skills, offer access to safe and non-stigmatizing multi-sectorial GBV response services and provide information on issues relating to women's rights, health, and services.

#### Norms

The UN Women has suggested a four-pronged approach to making cities and public spaces safe for women and girls is (UN Women, 2017)

- ⌘ Identifying locally relevant and owned solutions
- ⌘ Developing and implementing comprehensive laws and policies
- ⌘ Investing in safety and economic viability of public spaces
- ⌘ Transforming social and gender norms

Several examples for each of these aspects have been studied and documented by UN Women (UN Women, 2019)

WHO's guidelines on responding to intimate partner violence and sexual violence are as follows (World Health Organization, 2013):

- ⌘ The care norms should be women centred, capable of providing immediate support and practical care based on the situation. They should be designed such that the woman can be assisted in increasing safety for herself and her



children, where needed.

- ⌘ Survivors of intimate partner violence must be identified and take care of
- ⌘ Clinical care for survivors of sexual assault must ensure interventions in within first 5 days of assault. These include first line support, emergency contraception, post-exposure prophylaxis for HIV and other sexually transmitted infections. These need to be followed by psychological/ mental health interventions after 5 days.
- ⌘ The health systems must ensure training of healthcare providers to deal with victims of intimate partner violence and sexual assault, make provision for a healthcare policy and encourage reporting of intimate partner violence.

### **Current Status**

As per global statistics:

- ⌘ 13 to 61 per cent women between 15–49 years of age report having been physically abused by an intimate partner at least once in their lifetime
- ⌘ 6 to 59 per cent women report forced sexual intercourse, or an attempt at it, by an intimate partner at least once in their lifetime
- ⌘ between 1 to 28 per cent women report they were physically abused by an intimate partner during pregnancy.

While IPV has been a global challenge for long, with a majority of the population sheltered at home during the COVID-19, the world saw a sudden rise in domestic violence cases.



**As stay-at-home orders expand to contain the spread of the virus, women with violent partners increasingly find themselves isolated from the people and resources that can help them.**

**87,000** women

were intentionally killed in 2017. The majority of these killings were committed by an intimate partner or family member of the victim.

Violence against women and girls is pervasive but at the same time widely under-reported. Less

than **40%** of women who experience violence report these crimes or seek help of any sort.

The global cost of violence against women had previously been estimated at approximately.

**US\$1.5** trillion

That figure can only be rising as violence increases now, and continues in the aftermath of the pandemic.

**The surge in COVID-19 cases is straining even the most advanced and best-resourced health systems to the breaking point, including those at the front line in violence response.**



Domestic violence shelters are reaching capacity, or unable to take new victims due to lockdown and social distancing measures. In other cases, they are being re-purposed to serve as health centers.

**National responses to COVID-19 must include:**



**Services to address violence against women and girls**, including increased resources to support shelters, hotlines and online counselling. These essential services should be expanded and adapted to the crisis context to ensure survivors' access to support.



**A strong message from law enforcement that impunity will not be tolerated.** Police and Justice actors must ensure that incidents of VAWG are given high priority and care must be taken to address the manifestations of violence emerging in the context of COVID 19.



**Psychosocial support** for women and girls affected by the outbreak, gender-based violence survivors, frontline health workers and other frontline social support staff must be prioritized.



Figure 18: UN WOMEN: Domestic Violence

The UN Women data reveals the following status of violence against women in India (UN Women, 2016)



- ⌘ Lifetime Physical and/or Sexual Intimate Partner Violence: 28.8 per cent
- ⌘ Physical and/or Sexual Intimate Partner Violence in the last 12 months: 22 per cent
- ⌘ Child Marriage: 27.3 per cent

## The Shadow Pandemic: Violence Against Women and Girls and COVID-19

Globally,

**243** million



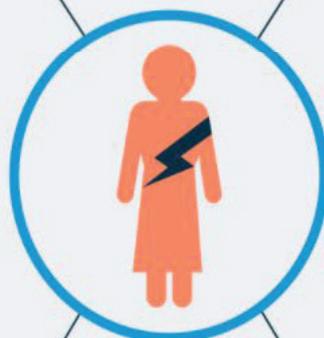
women and girls aged 15-49 have been subjected to sexual and/or physical violence perpetrated by an intimate partner in the previous 12 months.

**The number is likely to INCREASE as security, health, and money worries heighten tensions and strains are accentuated by cramped and confined living conditions.**

**Emerging data shows that since the outbreak of COVID-19, violence against women and girls (VAWG), and particularly domestic violence, has INTENSIFIED.**

In **France**, reports of domestic violence have increased by **30%** since the lockdown on March 17.

In **Argentina** emergency calls for domestic violence cases have increased by **25%** since the lockdown on March 20.



In **Cyprus** and **Singapore** helplines have registered an increase in calls of **30%** and **33%**, respectively.

Increased cases of domestic violence and demand for emergency shelter have also been reported in **Canada, Germany, Spain, the United Kingdom** and **the United States**.

**Figure 19: The Shadow Pandemic: Violence Against Women and Girls and COVID-19**

A Confederation of Indian Industry (CII) study on Crimes in India's cities has revealed that a total of 4,05,861 cases of crime against women were registered during 2019. Almost 30.9 per cent of these cases were registered under cruelty by husband or his



relatives, followed by assault on women with intent to outrage her modesty at 21.8 per cent.

In Madhya Pradesh, cases registered under Protection of Women from Domestic Violence Act stood at 0.8 per lakh in 2019. This is far higher than the national average of 0.1 per lakh. In Indore, dowry deaths stood at 0.9 per lakh, as against an average of 0.6 per lakh in 19 metropolitan cities studied (National Crime Records Bureau, Ministry of Home Affairs, 2019).

#### 4.1.4.2. Child Safety

Violence against children, prevalent globally, appears to be a bigger challenge for millions of Indian children across socio-economic classes. SDG 16.2 thus focuses on ending abuse, exploitation, trafficking and all forms of violence and torture of children.

In India, both girls and boys face early marriage, domestic abuse, sexual violence, domestic and school violence, trafficking, cyber violence, child labour, and bullying (UNICEF, n.d.). Abuse and neglect are defined as “injury, sexual abuse, sexual exploitation, negligent treatment or maltreatment of a child”. Violence against children includes all forms of violence against people under 18 years of age, whether perpetrated by parents or other caregivers, peers, romantic partners, or strangers (World Health Organization, 2020).

Most violence against children falls in one of the six types of interpersonal violence that tend to occur at different stages in a child’s development. These are detailed in **Annexure 21**. When directed against girls or boys, because of their biological sex or gender identity, any of these types of violence can also constitute gender-based violence.

Industries such as brick kilns, carpet weaving, garment making, domestic service, food and refreshment services (such as tea stalls), agriculture, fisheries and mining are often known to adopt child labour practices. When children perform part- or full-time economic activity, it affects them both mentally and physically.

According to UNICEF the term ‘child protection’ refers to prevention and response to violence, exploitation and abuse of children in all contexts. This includes reaching children who are especially vulnerable to these threats, such as those living without family care, on streets or in situations of conflict or natural disasters. A child welfare system comprises a group of public and private services focused on ensuring that all children live in safe, permanent and stable environments that support their well-being. Child Protective Services (CPS) are provided by government social services agencies designated to receive reports, conduct investigations and assessments, and provide treatment and intervention services to children and families where children have been maltreated.

#### Norms

UNICEF monitors and reports on a range of key indicators of child protection which include:

- ⌘ Birth registration: the official recording of a child’s birth
- ⌘ Child labour: the type of work a child performs, whether paid or unpaid, and hours spent, along with hazards faced at work
- ⌘ Child marriage: marriage or cohabitation before the age of 18



- ⌘ Female genital mutilation: the partial or total removal of external female genitalia for non-medical reasons
- ⌘ Violence against children: including emotional and physical abuse, neglect or negligent treatment, sexual exploitation and abuse, and use of violent discipline.

Evidence from around the world shows that violence against children can be prevented. Some strategies that could help include:

- ⌘ Implementation and enforcement of laws such as banning violent discipline and restricting access to alcohol and firearms
- ⌘ Altering norms that condone sexual abuse of girls or aggressive behaviour among boys
- ⌘ Providing safe environments by identifying neighbourhood hot spots for violence and addressing local causes through problem-oriented policing and other interventions
- ⌘ Providing parent training to young, first time parents and caregivers
- ⌘ Strengthening income and economic status through microfinance and gender equity training
- ⌘ Providing response services to children facing violence, ensuring access to effective emergency care and providing appropriate psychosocial support and
- ⌘ Providing opportunities for education and obtaining life skills.

### **Current Status**

Globally, it is estimated that up to 1 billion children aged 2–17 years, have experienced physical, sexual, or emotional violence or neglect in the past year. A total of 152 million children, 64 million girls and 88 million boys, are projected to be in child labour, accounting for almost one in ten of all children around the world (UNICEF, n.d.).

The UNODC Global Report on human trafficking, 2018, reported that the 35 per cent victims trafficked were forced labour and three-quarters of them were trafficked for sexual exploitation (Drishti, 2019).

Although India has ratified the United Nations Convention on the Rights of Children, according to data from Census 2011, child labourers in India stood at 10.1 million, of which 5.6 million were boys and 4.5 million girls. (Observer Research Foundation & Athray, 2020)

National Crime Records Bureau (NCRB) reports stated that Madhya Pradesh accounted for the highest number of missing children, with Indore recording the maximum number of missing children during 2017 and 2018 (Economic Times, 2020).



## 4.2. Government Interventions

According to Article 48 of the Directive Principles of State Policy, the state shall endeavour to protect and improve the environment and to safeguard the forests and wildlife of the country; Article 51-A states that every citizen of India must protect and improve the natural environment including forests, lakes, rivers and wildlife and to have compassion for living creatures.

### 4.2.1. Common Interventions/Regulation

#### 4.2.1.1. National Environment Policy 2006

The National Environment Policy seeks to extend coverage, and fill in gaps that still exist, in light of present knowledge and accumulated experience. It does not displace but builds on the earlier policies.<sup>23</sup> National policies for environmental management are outlined in the National Forest Policy, 1988, National Conservation Strategy and Policy Statement on Environment and Development, 1992 Policy Statement on Abatement of Pollution, 1992 National Agriculture Policy, 2000 National Population Policy, 2000 National Water Policy, 2002. These are promulgated in response to India's national commitment to a clean environment, mandated in the Constitution in Articles 48A and 51A (g), strengthened by judicial interpretation of Article 21.

The National Environment Policy aims to conserve critical environment resources, ensure livelihood security and intra generational equity. The details of the Policy's objectives are available in **Annexure 22**.

The strategies for achieving these objectives include:

- ⌘ Regulatory Reforms, both process related and substantive reforms, focused on environment and forest clearances, coastal areas, environmentally sensitive zones and use of economic principles in environmental decision-making
- ⌘ Enhancing and conserving environmental resources such as stopping land degradation, saving desert ecosystems, forest and wildlife, biodiversity, traditional knowledge, and natural heritage
- ⌘ Enhancing freshwater resources, river water, groundwater, wetlands, mountain ecosystems and coastal resources
- ⌘ Abetting all kinds of pollution and reversing the impact of climate change
- ⌘ Environmental standards, management systems, ecolabeling, certification, and indicators
- ⌘ Encouraging adoption of clean technologies and innovation, creating environmental awareness, education, and information
- ⌘ Partnerships and stakeholder involvement, capacity building and research and development.

#### 4.2.1.2. The National Green Tribunal Act, 2010

The National Green Tribunal Act, 2010 provides for the establishment of a National Green Tribunal for effective and expeditious disposal of cases relating to environmental protection and conservation of forests and other natural resources including enforcement of any legal right relating to environment and giving relief and compensation for damages to persons and property and for matters connected therewith or incidental thereto.

<sup>23</sup> [https://www.indiawaterportal.org/sites/indiawaterportal.org/files/National%20Environment%20Policy\\_%20MoEF\\_2006.pdf](https://www.indiawaterportal.org/sites/indiawaterportal.org/files/National%20Environment%20Policy_%20MoEF_2006.pdf)



### 4.2.1.3. Environmental Legislations in India

The framing of legislations has played a significant role in environment protection in post-independent India. Some noteworthy Acts include:

- ⌘ Wildlife (Protection) Act, 1972
- ⌘ Forest (Conservation) Act, 1980
- ⌘ Public Liability Insurance Act, 1991
- ⌘ Environmental Impact Assessment Notification, 1994
- ⌘ National Environment Tribunals Act, 1995
- ⌘ National Environment Appellate Authority Act, 1997
- ⌘ Biological Diversity Act, 2002
- ⌘ Environmental Impact Assessment Notification, 2006 (supersession of 1994 Notification)

### 4.2.1.4. Environment Protection Act

Amongst the many Acts that govern environment in India, the Environment Protection Act, 1986 was passed to protect biodiversity and prevent and control abatement of environmental pollution. It provides for protection and improvement of the environment. The Environment Protection Act establishes the framework for studying, planning and implementing long-term requirements of environmental safety and laying down a system of speedy and adequate response to situations threatening the environment. Following policies have also been implemented for environment protection:

- ⌘ National Conservation Strategy and Policy Statement on Environment and Development 1992 focuses on nature and dimensions of environmental problems, actions taken in response to problems and priorities and strategies for action. It also views development policies from environmental perspectives, support policies and systems required.
- ⌘ Policy Statement for Abatement of Pollution 1992 emphasises increased use of regulations and development and application of financial incentives.
- ⌘ National Environment Policy, 2006<sup>24</sup> aims at conservation of critical environmental resources, efficiency in use of environmental resource, environment conservation and governance.

## 4.2.2. Pollution

### 4.2.1.1. Land and Water Pollution

The Government of India has undertaken a series of initiatives to curb soil and land pollution (Soil and Water Conservation Department, 2019). These are detailed in Table 42.

<sup>24</sup> [https://www.indiawaterportal.org/sites/indiawaterportal.org/files/National%20Environment%20Policy\\_%20MoEF\\_2006.pdf](https://www.indiawaterportal.org/sites/indiawaterportal.org/files/National%20Environment%20Policy_%20MoEF_2006.pdf)



**Table 42: Government Schemes for Soil and Land Pollution**

Centrally Sponsored Schemes	<ul style="list-style-type: none"> <li>⌘ Department of Land Resources, Ministry of Rural Development</li> <li>⌘ Integrated Wasteland Development Programme (IWDP)</li> <li>⌘ Integrated Watershed Management Programme (IWMP)</li> <li>⌘ Others:</li> <li>⌘ Watershed Development Project in Shifting Cultivation Areas (WDPSCA)</li> <li>⌘ Accelerated Irrigation Benefits Programme (AIBP)</li> </ul>
Other Schemes	<ul style="list-style-type: none"> <li>⌘ Soil Conservation for enhancing productivity of degraded land in the catchment of River Kopili in Jaintia Hills District under Macro-Management Mode of Agriculture Department, Meghalaya.</li> <li>⌘ Rastriya Krishi Vigyan Yojana (RKVY)</li> </ul>

National Mission on Sustainable Agriculture (NMSA) and National Action Plan for Climate Change (NAPCC) were initiated by the Government of India to promote sustainable use of natural resources, including soil.

Soil Health Management (SHM), part of NMSA, promotes soil testing, nutrient management and balanced use of fertilisers. One of the most important interventions, SHM promotes location as well as crop specific sustainable soil health management, creation and linking of soil fertility maps with macro and micro nutrient management, judicious application of fertilisers and organic farming practices. This component is being implemented by State Governments, National Centre of Organic Farming (NCOF), Central Fertiliser Quality Control & Training Institute (CFQC&TI) and sanctioned by INM division (Ministry of Agriculture & Farmers Welfare, 2017). Objectives of SHC are detailed in **Annexure 23**.

### **Paramparagat Krishi Vikas Yojana (PKVY)**

PKVY an elaborated component of SHM, promotes certified commercial organic farming, i.e., farming of agricultural produce free from chemicals and pesticide residues, by adopting eco-friendly low-cost technologies. PKVY focuses on adoption of organic villages using the cluster approach and PGS certification. The aim is to increase farmer income while creating a potential market for traders and improving consumer health. The Scheme also motivates farmers to mobilise natural resource for input production. (Ministry of Agriculture & Farmers Welfare, 2017)

### **The Water (Prevention and Control of Pollution) Act, 1974**

The act was promulgated to provide for prevention and control of water pollution and maintain or restore wholesomeness of water. It provides for establishment of Boards for the prevention and control of water pollution and achieving the aforesaid objectives.

## **4.2.2.2. Air Pollution**

### **The Air (Prevention and Control of Pollution) Act, 1981**

This Act provides for prevention, control and abatement of air pollution. It also provides for the establishment of Boards empowered to take action to achieve these objectives and for other connected matters.<sup>25</sup> This act has been implemented to control and regulate emission of harmful air to curb the air pollution issue.

<sup>25</sup> <http://legislative.gov.in/sites/default/files/A1981-14.pdf>



## National Clean Air Programme

The Ministry of Environment, Forest and Climate Change launched the National Clean Air Programme in 2018, to evolve an effective and proficient ambient air quality monitoring network across the country, ensure a comprehensive and reliable database and build efficient data dissemination. It also aims to create a public outreach mechanism for taking timely measures and encouraging public participation in both planning and implementation of programmes and policies to mitigate air pollution. The 102 cities targeted for improvement of ambient air quality included Indore, Bhopal, Sagar, Dewas, Ujjain and Gwalior from Madhya Pradesh.

The Madhya Pradesh Pollution Control board identified 192 sectors that fall under the purview of the state's Environmental Policy and are pursuing the ECOMARK certification in the larger interest of the environment. This helped in promotion of producing environment friendly products from identified sectors such as textile, vegetable oil and soap and detergents.

## The Ozone Depleting Substances (Regulation and Control) Rules, 2000

These Rules regulate the production, consumption, sale, purchase, import and export of ozone depleting substances and require a registration with specified authorities (Ministry of Environment and Forest, 2000). Non-compliance with the implementation modalities of these rules attract penalties.

## Air Quality Monitoring

The CPCB monitors ambient air quality at 328 stations covering 115 cities/towns in 28 states and 4 Union Territories. This programme monitors sulphur dioxide (SO<sub>2</sub>), oxides of nitrogen as NO<sub>2</sub>, suspended PM and respirable particulate matter (RSPM/PM<sub>10</sub>) with a view to:

- ⌘ determining the status and trends in ambient air quality
- ⌘ ascertaining compliance to air quality standards
- ⌘ assessing health hazards
- ⌘ undertaking periodic evaluation of air pollution in urban and industrial areas
- ⌘ building knowledge for developing preventive and corrective measures
- ⌘ understanding the natural cleansing process through pollution dilution, dispersion, wind movement, dry deposition, precipitation and chemical transformation of the pollution generated.

Additional parameters, such as respirable lead and toxic trace metals, hydrogen sulphide (H<sub>2</sub>S), ammonia (NH<sub>3</sub>) and polycyclic aromatic hydrocarbons are also monitored at selected locations (Planning Commission, GoI, 2007).

### 4.2.2.3. Noise Pollution

Of the many laws regulating noise pollution, The Noise Pollution (Regulation and Control) Rules, 2000, fall under the ambit of The Environment (Protection) Act, 1986 (ENVIS CPCB, 2020). The other rules include:

- ⌘ Amendments to Factories Act, 1948 and Rules, (1987)
- ⌘ Enactment of a New Environment (Protection) Act 1986 and a series of rules including a 1992 Amendment to Environment Protection Rules
- ⌘ Revised Motor Vehicle Act, 1988
- ⌘ Central Motor Vehicle Rules, 1989 with latest amendments.



These rules regulate noise pollution in different areas/zones and outline responsibility for their enforcement. Details are available in **Annexure 25**.

## 4.2.3. Waste Generation and Management

### 4.2.3.1. Hazardous Wastes

The Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008 Rules, guide the handling of hazardous wastes except for wastewater and exhaust gases, wastes arising from operation of ships beyond five kilometres of relevant baseline, radio-active wastes, bio-medical wastes and certain types of solid wastes. Details are available in **Annexure 24**. The Central Government and CPCB issue guidelines for standards of performance for recycling processes from time to time. Hazardous wastes can be utilised as a supplementary resource or for energy recovery only after obtaining approval from the CPCB.

### 4.2.3.2. Industrial Wastes

Several acts that regulate hazardous wastes from factories include Hazardous Waste Management Regulations, Factories Act, 1948, Public Liability Insurance Act, 1991, National Environment Tribunal Act, 1995 and rules and notifications under the Environment Act. A guide for manufacture, storage and import of hazardous chemicals and management of hazardous wastes has been issued by the Government to provide direction to industry.

The E - Waste (Management and Handling) Rules, 2011 were announced with the objective of reducing the use of hazardous substances in electrical and electronic equipment. In addition, the Batteries (Management & Handling) Rules, 2001 provide guidelines on how to effectively manage and handle waste from lead acid batteries.

The state governments are expected to allot industrial space or sheds for and facilitate the setting up of units for recycling, pre-processing and other utilisation of hazardous or other wastes. The state governments are expected to register those working at these sites and help them develop the requisite skills.

### 4.2.3.3. Biomedical Wastes

Biomedical Waste (Management and Handling) Rules, 1998 were formulated to ensure proper disposal, segregation and transport of infectious wastes without adversely impacting human health or the environment. Now called the Biomedical Waste Management Rules, 2016, these are applicable to all persons who generate, collect, receive, store, transport, treat, dispose, or handle biomedical waste in any form. Duties of the occupier, operator of common biomedical waste management facilities and government authorities have been defined under these rules. (See **Annexure 26** for details).

These rules also define the process for treatment and disposal of various types of wastes. For example, it is mandated that anatomical waste as well as soiled wastes undergo incineration or plasma pyrolysis.



The rules require that care is taken not to mix untreated biomedical waste with other wastes. These must be segregated into containers or bags at the point of generation in accordance with Schedule I<sup>26</sup> prior to storage, transportation, treatment and disposal.

#### **4.2.3.4. Construction and Demolition Waste (CDW)**

Construction and Demolition Waste Management Rules, 2016 apply to anyone who generates wastes such as building materials, debris, rubble resulting from construction, re-modelling, repair and demolition of any civil structure belonging to an individual or organisation or authority. The objective is to address indiscriminate disposal of CDW and channelise it for reuse and recycling in a gainful manner (Vikaspedia, 2018). Duties of key stakeholders such as waste generators, service providers, contractors, state and central government regulatory bodies, amongst others, are available in **Annexure 27**

#### **4.2.3.5. Dead Animal Waste**

When an animal, under the charge of a person, dies such person is responsible for its safe disposal within twenty-four hours as defined under the law. Otherwise such death is to be informed to the Commissioner who then organises for the disposal on payment of a fee.

### **4.2.4. Urban Spaces**

#### **4.2.1.1. Urban and Regional Development Plan Formulation and Implementation**

Government of India has outlined guidelines for Urban and Regional Development Plan Formulation and Implementation (URDPFI). These ensure incorporation of recreational space, organised green space, and other common open spaces in cities.

#### **4.2.4.2. The National Mental Health Programme (NMHP)**

NMHP was launched in 1982 in view of the heavy burden of mental illness, and the absolute inadequacy of mental healthcare infrastructure in the country to deal with it. This programme aims to ensure availability and accessibility of minimum mental healthcare for all, particularly the most vulnerable and underprivileged population groups. The programme also works to encourage the application of mental health knowledge in general healthcare and social development as well as promote community participation in mental health service development.

#### **4.2.4.3. Accessible India Campaign (Sugamya Bharat Abhiyan)**

AIC is a nationwide flagship campaign of the Ministry of Social Justice and Empowerment, to make a barrier-free and conducive environment for Divyangans (Persons with Disabilities - PwDs). The target was to make 50 per cent of government buildings in NCR as well as in 10 state capitals accessible to persons with disabilities

<sup>26</sup> "Biomedical wastes categories and their segregation, collection, treatment, processing and disposal option" it specifies the type of bag or container to be used for different types of wastes. More information can be found on [https://dhr.gov.in/sites/default/files/Bio-medical\\_Waste\\_Management\\_Rules\\_2016.pdf](https://dhr.gov.in/sites/default/files/Bio-medical_Waste_Management_Rules_2016.pdf)



with no hindrance in entering and using the facilities by 2018. Similar targets were set for railway stations and public transport carriers. The campaign also provided for a post implementation audit.<sup>27</sup>

## 4.2.5. Safe Environment

### 4.2.5.1. Ministry of Women and Child Development

The Government of India's keen focus on ensuring the creation of safe environments for women and children is demonstrated by the setting up of the Ministry of Women and Child Development. The Ministry that came into existence on 30th January 2006, was constituted with the prime intention of addressing gaps in State action for women and children to create gender equitable and child-centred legislation, policies and programmes. The Ministry formulates plans, policies and programmes, enacts/amends legislations, guides and coordinates the efforts of both government and non-government organisations working in the field of Women and Child Development.

Specific laws have been enacted for women's protection from domestic violence, dowry, sexual harassment at the workplace, amongst others.

### 4.2.5.2. National Commission for Women

The National Commission for Women was set up by an Act of Parliament in 1990 to safeguard the rights and legal entitlements of women. Its main objectives include reviewing the constitutional and legal safeguards for women, recommending remedial legislative measures, facilitating grievance redressal and advising the Government on policy matters affecting women. In keeping with its mandate, the Commission initiated various steps to improve the status of women in the country and continues to work for their economic empowerment.<sup>28</sup>

### 4.2.5.3. Laws Preventing Child Labour

To address the biggest challenge of child labour, the Government of India promulgated the Child Labour Prohibition and Regulation Act, which was further amended in 2016. The Factories Law and the Labour Law also have specific rules to check child labour. Other laws that protect the rights of children in India include the Juvenile Justice Act, Protection of Child Rights Act and Protection of Children from Sexual Offences.

<sup>27</sup> <https://www.india.gov.in/hi/spotlight/%E0%A4%B8%E0%A5%81%E0%A4%97%E0%A4%AE%E0%A5%8D%E0%A4%AF-%E0%A4%AD%E0%A4%BE%E0%A4%B0%E0%A4%A4-%E0%A4%85%E0%A4%AD%E0%A4%BF%E0%A4%AF%E0%A4%BE%E0%A4%A8#tab=tab-1>

<sup>28</sup> <http://ncw.nic.in/>



## 4.3. Problem Statement and Gap analysis

### 4.3.1. Common Themes

Multiple laws and acts, to control pollution, clearly state the goals to be achieved. However, they lack a specific roadmap or pathways on how to achieve the goals.

#### 4.3.1.1. Land and Water Pollution

Soil pollution and its effect on health are demonstrated in a study by *Anabela Cachada, Teresa Rocha-Santos, Armando C. Duarte*. It also outlines main causes and types of soil pollution such as waste disposal, mining, agrochemicals, industry, and atmospheric deposition. Soil can be linked directly to human health by ingestion, inhalation, skin contact and dermal absorption, whereas the indirect ways would be the presence of soil in the atmosphere, hydrosphere and biosphere (*Abrahams, P. W.*).

Fertilisers and pesticides play a major role in agricultural yield although the environmental effects such as soil contamination, intoxication of farmers, and unintentional poisoning killing humans due to exposure to toxic agrochemicals are on the rise (Carvalho, 2017). Although programmes to curb soil pollution have been implemented, the schemes and policies which focus on land pollution are limited. Majority of the schemes focus on soil quality in terms of contamination from fertilisers and other chemicals. Other forms of land pollution such as dumping, illegal discharge of untreated industrial effluents and other such factors have not been considered.

The government programmes need a comprehensive monitoring system which is currently non-existent. Further, there is no availability of information on progress of these schemes and policies to ascertain the impact or reach.

#### 4.3.1.2. Air Pollution

The association between air pollution and mortality and health impacts has been assessed by multiple researches. Many of these studies have analysed the effect of increased air pollutants on various health aspects such as respiratory diseases and cardiovascular diseases and the further impact on issues such as infant mortality. Various meta-analysis studies have found a direct correlation between concentration and length of exposure to PM and overall health impacts. One study has identified cardiovascular health effects that link PM exposure with cardiopulmonary morbidity and mortality and a series analysis of daily air pollution, shows a considerable global evidence of air pollutants being positively and significantly associated with mortality.

Air quality is usually measured in terms of PM (particulate matter). Some research, based on difference-in-difference design to test for the impacts of key air and water pollution regulations in India, found that regulations were in part responsible for observed improvements in air quality over the last two decades. However, these successes have not made a significant impact on infant mortality rates.

The current air pollution measures taken by the government are generic and do not target a specific location or source and they also lack a roadmap on how to achieve the clearly stated goals. A comprehensive monitoring system for the government



schemes is largely missing with no information on progress of these schemes and policies

WHO guidelines on Interventions and tools to control ambient air pollution are available in **Annexure 28**.

### 4.3.1.3. Noise Pollution

Noise pollution is a nuisance particularly higher in urban settings with disturbance from loudspeakers and automobiles being felt a little less by people in the age group of 20-40 years. WHO places traffic related noise as the second most harmful environmental factor (in Europe), right after air pollution. The best method to curb noise pollution is public education and awareness on the subject.

## 4.3.2. Waste Generation and Management

### 4.3.1.1. Common Themes

While there are several laws and acts aimed at regulating hazardous waste generation and management, there is no substantial data available on implementation and reach of the rules and regulations. A systematic database on waste generation as a resource or in a region is not available.

Moreover, these rules have not been updated in step with times and fail to focus on issues that prevail currently. For example, there are limited or no recent policies to curb waste generation triggered by population explosion, especially in cities.

There is limited public awareness about waste generation and participation in the need for recycling of waste generated by both individuals as well as institutions. The Government's initiatives to spread information about recycling laws and availability of recycling facilities remain far and few between.

### 4.3.2.2. Biomedical Waste

Biomedical waste poses a health hazard if not disposed of safely. In this context, training on biomedical waste management, though important, is currently limited. A lack of proper and complete knowledge about biomedical waste management impacts practices of appropriate waste disposal (*Mathur et al., 2011*).

### 4.3.2.3. Construction and Demolition Waste

Recycling of construction and demolition waste can prove to be beneficial. For example, recycled concrete aggregate can be produced from recycled pre-cast elements and demolished concrete buildings. These can offer a promising solution to the CDW management challenge. Construction and demolition activities generate enormous waste making it essential to recycle them. Although, the law permits recycling of only naturally sourced materials, most construction agencies avoid using these given the costs involved, thus generating unusable waste.



#### 4.3.2.4. Industrial Waste Management

There is limited or no information available on industrial waste management.

### 4.3.3. Urban Spaces

#### 4.3.1.1. Urban Green Spaces

Though various measures have been taken to improve urban spaces in cities there is a limited amount of attention given to densely populated areas. These areas occupied by low-income communities, need special attention and require different strategies and solutions as compared to sparsely populated areas in the city. In addition, there is very low importance given to residential gardens and roof gardens despite availability in space.

There is a lack of public participation in urban area development and maintenance. Further, there is a need for regulations to inculcate a sense of responsibility to protect the environment, specifically urban spaces (Imam & Banerjee, 2016)

#### 4.3.3.2. Safe Environments

##### Women's Safety

A lack of woman centric care coupled with a male dominated society has led to increasing crimes against women making safety a key concern in India. Further, the slow pace of operation of Indian judiciary is another major reason for the increase in unsafe environments for women.

##### Child Safety

Despite several laws for protecting children in India, a large number of them continue to be engaged in the worst form of child labour due to limited law enforcement, poverty and the lack of basic income. Child labour is expected to increase in the aftermath of the COVID-19 pandemic, especially in the light of changes made to the labour laws to alleviate some of the adverse effects on the industry and economy (Observer Research Foundation & Athray, 2020).



## 4.4. Recommendations

### 4.4.1. Pollution

#### 4.4.1.1. Soil/Land Pollution

The most common methods to dispose of hazardous waste materials are through incineration, immobilisation, landfill, offshore, deep well disposal and underground storage. A few recommendations are, (i) envisaging approach to waste minimisation to avoid problems of treatment and disposal, (ii) introducing waste minimisation concept through simple waste reduction systems, without involving a major change in the process or raw materials, (iii) introducing waste minimisation concepts in administrative, technological and legal systems, to ensure better strategies.

#### 4.4.1.2. Air Pollution

Existing air pollution measures taken by the Government are mostly generic and do not target a specific location or source, which is much needed. This can be done by offering green options for LPG, improved access to cost effective options and building of common solar panels to reduce the ill effects of burning fuels on the environment.

Vehicular pollution control guidelines must consider location, population, type of vehicles amongst others and also be implemented strictly. Indoor air pollution also needs to be addressed by spreading awareness on solar cookers, improved fuel wood stoves, increase in use of biomass fuels amongst others.

#### 4.4.1.3. Water Pollution

A possible solution or intervention to reducing water pollution is to have stringent prevention policies rather than policies that involve treatment of already produced wastewater. The key objective being, focus on preventive measures leading to reduction in burden of facilities for treatment of wastewater.

The issue of water pollution needs to be tackled using a non-point source approach. This would involve tracing backwards to the start of the chain and identifying methods to reduce use of contaminants to thereby cause a fall in final pollution levels.

### 4.4.2. Waste Generation and Management

#### 4.4.1.1. Hazardous Waste

The most common methods to dispose of hazardous waste materials are through incineration, immobilisation, landfill, off-shore, deep well disposal and underground storage. India needs to envisage an approach to waste minimisation to avoid problems of treatment and disposal. Waste minimisation concept could be introduced through simple waste reduction systems without making a major change in the process or raw materials. The concept could be introduced in administrative, technological and legal systems for ensuring better strategies.



All hazardous waste must be separated at source and managed in an environmentally sound manner. Stopping uncontrolled mixing of hazardous and non-hazardous waste, disposal of such waste in an unsafe and uncontrolled manner and eliminating unsafe recycling practices needs to be the first priority. Management of healthcare waste requires increased attention and diligence to avoid adverse health outcomes associated with poor practice, including exposure to infectious agents and toxic substances.

#### 4.4.2.2. Biomedical Waste

Management of healthcare waste requires increased attention and diligence to avoid adverse health outcomes associated with poor practice, including exposure to infectious agents and toxic substances. Key elements that could be considered for improving health-care waste management include:

- ⌘ promoting practices that reduce the volume of wastes generated and ensure proper waste segregation
- ⌘ developing strategies and systems along with strong oversight and regulation to incrementally improve waste segregation, destruction and disposal practices with the ultimate aim of meeting national and international standards
- ⌘ where feasible, favouring the safe and environmentally sound treatment of hazardous healthcare wastes (e.g., by autoclaving, microwaving, steam treatment integrated with internal mixing, and chemical treatment) over medical waste incineration
- ⌘ building a comprehensive system, addressing responsibilities, resource allocation, handling and disposal. This is a long-term process, sustained by gradual improvements
- ⌘ raising awareness of the risks related to health-care waste, and of safe practices
- ⌘ selecting safe and environment friendly management options, to protect people from hazards when collecting, handling, storing, transporting, treating or disposing of waste.

Government commitment and support is needed for universal, long-term improvement, although immediate action can be taken locally (World Health Organization, 2018). Additional information on how to manage biomedical wastes is available from WHO (World Health Organization, 2017).

#### 4.4.2.3. Industrial Waste

For successfully recycling and reusing industrial wastes, apart from a regulatory framework, added provision on technical, management and economic incentives are required. Strengthening regulations and measures can be an important driving force for economic incentives to promote waste recycling and reuse. One such method of categorisation of reuse and recycling of industrial waste in Nanjangud, Karnataka uses material flow analysis. In addition, industry should be advised to provide a rigorous database for further audits in case non-compliance is observed.

#### 4.4.2.4. Construction and Demolition Waste

Some best practices in CDW management, that could be considered for implementation or scale up by India include (Centre for Science and Environment, n.d):



- ⌘ **Hong Kong:** Stringent controls on CDW and monetary fee imposed on waste generated helped lower the waste generated as well as create revenue.
- ⌘ **Singapore:** Recycles 98 per cent of its waste (land constrained country implementing strict laws)
- ⌘ **South Korea:** Extensive recycling policy, providing step-by-step guidelines for demolition along with specified rules for different building type. Further, both education and incentive given to increase in recycling of materials.
- ⌘ **European Union:** Recycling of waste in non-structural framework, due to firm implementation of rules and regulations.
- ⌘ **United Kingdom:** Northern Ireland Environment Agency's Quality Protocol for Production of Aggregates from Inert Waste published in 2004 has helped promote use of recycled and secondary aggregates.
- ⌘ Other countries that have excelled in reducing and reuse of CDW include Scotland, Netherlands and Japan.
- ⌘ Examples of reuse of CDW by architects in India:
  - School building in Rajkot, designed by Ahmedabad based architect Surya Kakani, has been built from debris of Bhuj earthquake.
  - The Institute of Rural Research and Development (IRRAD) building in Gurgaon has innovatively recycled and utilised its own construction waste in the building.

### 4.4.3. Urban Spaces

#### 4.4.1.1. Urban Green Spaces

The issue of diminishing residential gardens needs to be addressed through strict enforcement of regulations and guidelines issued to town and urban planning agencies. The increasing number of flat-roofed buildings in India can be leveraged to develop roof gardens with an added benefit of activities such as rainwater harvesting, which will aid growth of green spaces.

#### Public Spaces

Learnings from best disability-friendly cities around the world could be adopted by India. The following examples are based on accessible public transportation, ease of access to hotels and public attractions (Sunrise Medical, 2017).

- ⌘ **United States:** Washington DC has a highly visible community of PwDs. The public transport systems, as well as other public places such as museums, are easily accessible. The city's metro system is completely wheelchair accessible with lifts at each station
- ⌘ **Rome, Italy:** All modes of transport in the city are wheelchair friendly. Wheelchair ramps have been made on pavements, with plenty of space for wheelchairs in restaurants as well
- ⌘ **Berlin, Germany:** Berlin's public transport system is almost 100 per cent accessible with sidewalks and a guidance system for disabled people at road crossings. It received the EU City Access Award from the European Commission for the comprehensive disability policy and investments in accessibility for people with disabilities.



### 4.4.3.2. Safe Environments

#### Women's Safety

To improve women's safety, more women need to be encouraged to get involved and included in every sphere of society. Additionally, emergency services and police stations must have a higher percentage of female staff to build a more conducive environment for women to feel safe. Well-lit streets and buildings and 24X7 police pickets will enhance the safety for women in a city. Use of technologies such as installation of CCTVs, panic buttons and GPS tracking services, can provide a certain sense of safety to women. While these technologies cannot ensure a safe environment, they can be used as a pathway to achieve a safer environment.

#### Child Safety

There is a need for a coordinated response from all stakeholders and to replicate child-friendly programmes through child participation to protect children and reduce crimes against children. Redesigning long term urban development plans through a child's lens will go a long way in building cities that are safe for children (Save the Children, 2015).

In addition, local administrations could map safe and unsafe places and identify risks of violence and abuse through a participatory assessment process that actively and meaningfully involves the community, especially its children and youth. There is also a need to improve the child protection systems to ensure implementation of municipal-level regulations and legal persecution of those perpetrating crimes against children.



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# 5. INDIVIDUAL AND FAMILY HEALTH

## Underpinning Healthy Cities



## 5.1. Significance for Healthy Cities

Family nature continues to play a crucial role in nurturing and socializing children, influencing adolescent development, nutrition of women and children and health impacting behaviours. All these in turn affect individual and family health in both positive and negative ways.

The world is urbanising fast, with substantial shifts in living standards, lifestyles, social behaviour, and health. Presently over 50 per cent of the world's population lives in urban areas, which is expected to increase to 70 per cent by 2050. Urbanisation in less-developed countries is currently increasing at rates faster than those of more-developed countries.

Health challenges particularly manifest in cities relate to water, environment, violence, and injury, non-communicable diseases, unhealthy diets, physical inactivity, harmful use of alcohol as well as risks associated with disease outbreaks. This situation is further worsened by the fact that many urban poor live in slums with little access to basic services. Urban slums and smaller informal settlements face greater health hazards due to overcrowding, poor sanitation, lack of access to safe drinking water, and environment pollution.

The burden of disability associated with a disease or disorder is often measured in terms of disability-adjusted life years (DALYs). They represent total number of years lost to illness, disability, or premature death within a given population.

India's health system, therefore, faces a twofold challenge. Even though the absolute burden from CMNNDs (communicable, maternal, neonatal, and nutritional diseases) is diminishing, in percentage terms it still remains high at 32.7 per cent DALYs. At the same time, the contribution to health loss from non-communicable conditions such as heart diseases, strokes, and diabetes is growing and currently stands at 55.4 per cent DALYs. However, the precise nature of this challenge varies across the country.

WHO has outlined "100 Core Health Indicators" in the 2018 Global Reference List, for determining health status. These are focused on mortality by age and sex, mortality by cause, fertility and morbidity. Targets to improve these health indicators have been set under SDG 1, 3, 11 and 16. Some of these are detailed in **Annexure 29** (World Health Organization, n.d.).

The impact of individual and family on building healthy cities was thus studied in the context of sub pillars of reproductive and child health, communicable and infectious diseases, non-communicable diseases, senior care and substance abuse.

Based on a review of the literature available on the above sub pillars, this section details the key findings and government interventions, provides a gap analysis and makes recommendations to bridge the gaps. The data for these sub pillars has been studied at four levels: international, domestic, state of Madhya Pradesh and city of Indore.

### 5.1.1. Reproductive and Child Health

Reproductive health affects the lives of women and men from conception to birth, through adolescence to old age, and includes attainment and maintenance of good health as well as prevention and treatment of ill-health. Improving maternal and child health remains one of the top health priorities of the Government of India. It is necessary to note that reproductive, maternal and child health cannot ever be dealt



with in isolation, as they are closely connected to the health of population at different stages of the life cycle. All elements of reproductive healthcare, including family planning, essential obstetric care and delivery play an important role in reducing maternal and neonatal mortality. An adolescent girl's health impacts pregnancy, while a pregnant woman's health impacts new-born and child wellbeing.

### 5.1.1.1. Maternal and Child Health

Mothers and children constitute a large percentage of the population and are also a “vulnerable” or special-risk group. Concern for a child's wellbeing is important not only for the mother, but also for a nation as the country's future depends on healthy children.

Maternal and child health (MCH), an integral part of healthcare, refers to health of mothers, infants, children, and adolescents. It also includes promotive, preventive, curative and rehabilitative healthcare for mothers and children at home, schools or in special settings such as day care centres or those with disabilities. MCH also focuses on family planning and adolescent health.

Women's health during pregnancy, childbirth and the postnatal period are critical. Antenatal care (ANC), i.e., the care provided by skilled healthcare professionals to pregnant women and adolescent girls, ensures best health conditions for both mother and baby during pregnancy. It includes risk identification, prevention and management of pregnancy-related or concurrent diseases and health education and health promotion (World Health Organization, 2016).

While child health forms the foundation of adult health and wellbeing, they are highly vulnerable to infections and illnesses, making their health of utmost importance (World Health Organization, 2018). Maternal health status, habits, and environment during and even before pregnancy profoundly impact health and wellbeing of a child.

Basic emergency obstetrics are critical to reducing maternal (including adolescent mothers) and neonatal deaths. Essential obstetric care (EOC) i.e., professional medical and surgical care for pregnant women, with a special focus on delivery and immediate postpartum period, must be available and accessible to all women to reduce maternal mortality. More details of basic and comprehensive care are available in **Annexure 30**.

Sustainable Development Goal 3 has set the targets for ensuring healthy lives and promoting wellbeing for all at all ages. The targets for maternal and child health to be achieved by 2030 include:

- ⌘ reducing global maternal mortality ratio to less than 70 per 100,000 live births
- ⌘ ensuring universal access to sexual and reproductive healthcare services, including for family planning, information and education, and integration of reproductive health into national strategies and programmes
- ⌘ ending preventable deaths of new-borns and children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1,000 live births and under 5 mortality to at least as low as 25 per 1,000 live births.

### Norms

WHO's indicators of maternal, new-born and child health (MNCH) focus on mortality rates, stunting, family planning ratio, ANC, neo natal and post-natal care. Details of



these indicators are available in **Annexure 31** (World Health Organization, 2020).

The National Family Health Survey (NFHS) uses a series of parameters for determining maternal and child health. These include frequency and quality of antenatal and neonatal care for mothers, issuance of Mother and Child Protection Card and delivery care. The specific parameters are detailed in **Annexure 32**. (MoHFW, 2016)

In the handbook of “Monitoring Emergency Obstetric Care” WHO has listed 8 indicators along with the minimum acceptable level for each (World Health Organization et al., 2009). For example, availability of emergency obstetric care is determined based on the number of such centres available for every 50,000 population and their geographic distribution. Other indicators include direct obstetric case fatality rate, intrapartum and neonatal death rates and indirect causes of death. Details of these and other indicators is available in **Annexure 33**.

### Current Status

Every day in 2017, approximately 810 women died from preventable causes related to pregnancy and childbirth. More than 80 per cent of maternal deaths worldwide occur due to five direct causes: severe bleeding, infections, high blood pressure during pregnancy (pre-eclampsia and eclampsia), unsafe abortion and obstructed labour. Most of these complications are unpredictable but can be effectively prevented or treated by skilled health workers in properly equipped facilities (UNFPA, 2012).

Almost 94 per cent maternal deaths occur in low and lower middle-income countries In Sub-Saharan Africa, where maternal mortality ratios are the highest, only 46 per cent women are attended by a trained midwife, nurse or doctor during childbirth.

In India, neonatal mortality is primarily attributed to premature births and low birth weight (35.9 per cent), pneumonia (16.9 per cent), birth asphyxia and birth trauma (9.9 per cent), other non-communicable diseases (7.9 per cent), diarrhoea (6.7 per cent), congenital anomalies (4.6 per cent) and infections (4.2 per cent) (Drishti, 2020)

**Table 43: Current status of child health in India and Iceland**

Indicators	Definitions	India	Madhya Pradesh	Kerala	Iceland
Neonatal Mortality Rate	Number of annual neonatal deaths (0-28 days) per 1,000 live births in the same year	23	47	6	1
Infant Mortality Rate	Ratio of annual deaths of under 1 year of age to the total number of live births in the same year	32	48	7	2
Under 5 Mortality Rate <sup>29</sup>	Annual number of deaths of children under 5 years of age, expressed as a rate per 1,000 live births	37	40	9	2

When compared to Iceland, amongst the leaders in MNCH, India has very high neonatal mortality, infant mortality and under mortality rates. Madhya Pradesh fares worse than the national averages.

<sup>29</sup> <https://www.niti.gov.in/niti/content/under-5-mortality-rate-u-5mr-1000-live-births>



India's Maternal Mortality Ratio declined to 113 in 2016-18 from 122 in 2015-17 and 130 in 2014-2016 as per the National Sample Registration System (SRS) data declining by 17 points, from 130/ 1,00,000 live births in 2014-16. This translates to 2,500 additional mothers saved annually in 2018 as compared to 2016. Total estimated annual maternal deaths declined from 33,800 in 2016 to 26,437 in 2018.

**Table 44: Special bulletin on maternal mortality in India 2016-18**

Indicator	Definition	India	Madhya Pradesh	Kerala
Maternal Mortality Ratio	Proportion of maternal deaths per 1,00,000 live births	113	173	43

According to data from the Sample Registration System (SRS) of 2017, Madhya Pradesh has the highest incidence of infant deaths at 47 per 1,000 live births. Similar data is not available for Indore city.

### 5.1.1.2. Immunisation

Immunisation, a simple and effective way to protect children from life-threatening infectious diseases, is the process whereby a person is made immune or resistant to an infectious disease, typically by administering a vaccine. Vaccines are substances that stimulate the body's own immune system to protect a person against subsequent infection or disease (World Health Organization, 2020).

#### Norms

Government of India has defined a national schedule for all basic vaccinations for children (MoHFW, 2017). These include

- ⌘ one dose of BCG vaccine, which protects against tuberculosis
- ⌘ three doses of DPT vaccine, which protect against diphtheria, pertussis (whooping cough) and tetanus
- ⌘ three doses of polio vaccine
- ⌘ one dose of measles vaccine

The immunisation coverage rate of each vaccine is monitored based on indicators defined in the national schedule (MoHFW, 2016). These are available in **Annexure 34**.

#### Current Status

In India, 62 per cent children aged 12-23 months received all basic vaccinations any time before the NFHS Survey 2015-16. DPT-3 coverage stood at 78.4 per cent, for first dose of measles it was 81.1 per cent, while 54 per cent had received all basic vaccinations by the time, they turned 12 months old. The highest number of partially immunised and unimmunised children are found in large states such as Bihar, Madhya Pradesh, Uttar Pradesh and Rajasthan. At 53.6 per cent DPT coverage, Madhya Pradesh fell behind the national average, while Indore was almost aligned to the national average. *International data on immunisation is not available.*



**Table 45: Coverage of all basic vaccinations (NFHS 2015-16)**

Indicator	India	Madhya Pradesh	Goa	Indore
Children age 12-23 months fully immunised (BCG, measles, and 3 doses each of polio and DPT) (per cent)	62.0	53.6	88.4	60.5
Children age 12-23 months who received most of the vaccinations in a public health facility (per cent)	-	95.7	77.2	68.7
Children age 12-23 months who received most of the vaccinations in a private health facility.	-	3.7	22.8	31.3

### 5.1.2. Communicable and Infectious Diseases

The Centres for Disease Control and Prevention, a US agency, defines infectious diseases as illnesses caused by germs (such as bacteria, viruses, and fungi) that enter the body, multiply, and can cause an infection. Some of these are transmitted through insect bites while others are caused by ingesting contaminated food or water (World Health Organization, 2020). Socioeconomic, environmental and behavioural factors, as well as international travel and migration, foster and increase the spread of communicable diseases. Some infectious diseases, such as COVID-19, are communicable as they spread from person to person (CDC, 2019).

Vectors are living organisms that transmit infectious pathogens between humans, or from animals to humans. Vector-borne diseases are human illnesses caused by parasites, viruses and bacteria that are transmitted by vectors (World Health Organization, 2020). Many vector-borne diseases are preventable, through protective measures, and community mobilisation.

Zoonotic diseases are infectious diseases of animals that spread to humans through ticks, mosquitoes, or fleas or contact with animals. These include lyme disease, malaria and dengue amongst others.

SDG 3.3 has set a target to end by 2030, epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases.

For communicable diseases, WHO outlined the following indicators amongst the “100 Core Health Indicators” in the 2018 Global Reference List (World Health Organization, 2018):

- ⌘ TB mortality rate
- ⌘ AIDS-related mortality rate
- ⌘ Malaria mortality rate
- ⌘ HIV incidence rate [SDG 3.3.1]
- ⌘ HIV prevalence rate
- ⌘ Hepatitis B surface antigen prevalence
- ⌘ Hepatitis B incidence [SDG 3.3.4]
- ⌘ TB incidence rate [SDG 3.3.2]
- ⌘ TB notification rate



### 5.1.1.1. Tuberculosis (TB)

Tuberculosis (TB) is caused by bacteria that most often affect the lungs and it spreads from person to person through air. When people with lung TB cough, sneeze or spit, they propel TB germs into the air. Common symptoms of active lung TB are coughing with sputum and blood at times, chest pains, weakness, weight loss, fever and night sweats. Government has launched a national strategic plan to completely eliminate TB by 2025 (MoHFW, 2017).

#### Norms

International Standards for TB Care, Diagnosis, Treatment and Public Health Responsibilities have been defined by the WHO (Tuberculosis Coalition for Technical Assistance, 2006). These standards describe a widely accepted level of care that all practitioners, public and private, should seek to achieve in managing patients who have, or are suspected of having, tuberculosis.

India has a comprehensive set of guidelines describing how to accomplish goals set under the eliminate TB campaign. Issued by the Central TB Division, Government of India, these are regularly reviewed and updated. In addition, standards for TB care, diagnosis and management have been defined based on international guidelines available. These are meant for use as a benchmark by all providers managing TB patients in India (World Health Organization, 2014).

#### Current Status

A total of 1.5 million people died from TB in 2018 (including 2,51,000 people with HIV). Worldwide, TB is one of the top 10 causes of death and the leading cause from a single infectious agent (above HIV/AIDS). In the same year, the 30 high TB burden countries accounted for 87 per cent of new TB cases. Eight countries account for two thirds of the total, with India leading the count, followed by China, Indonesia, the Philippines, Pakistan, Nigeria, Bangladesh and South Africa.

In 2018, the largest number of new TB cases occurred in the South-East Asian region, with 44 per cent new cases, followed by the African region, with 24 per cent new cases and the Western Pacific with 18 per cent. Worldwide, an estimated 10 million people fell ill with the disease of which 5.7 million were men, 3.2 million women and 1.1 million children (World Health Organization, 2020).

WHO's Global Tuberculosis (TB) Report, 2019 provides a comprehensive and up-to-date assessment of the TB epidemic and progress at global, regional, and country levels. The statistics for India are given in Table 46.

**Table 46: Estimates of TB burden (2018)**

Estimates of TB burden (2018)	Number	Rate per 1,00,000 population
Incidence of TB cases (includes HIV + TB)	2.690 million	199
Incidence (HIV+TB only)	92,000	6.6
Incidence (MDR/RR-TB)	130,000	9.6
Mortality (deaths) (excludes HIV+TB)	440,000	32
Mortality (deaths) (HIV+TB only)	9,7000	0.72



In Madhya Pradesh 1,39,111 TB Patients were Notified Public Sector and 48,296 TB Patients were Notified Private Sector in 2019. In the same year, Indore notified 11,454 TB patients, of which 7176 were notified from Public Sector (MOHFW, 2019).

### 5.1.2.2. Malaria

Malaria is a major public health issues in India's urban slums. Stagnant water perpetrates vector-borne diseases such as malaria and dengue. Malaria is caused by Plasmodium parasites, that are spread to people by infected female anopheles' mosquitoes, called malaria vectors. Of the 5 parasite species that cause malaria in humans, 2 pose the greatest threat (World Health Organization, 2021).

#### Norms

The Global Technical Strategy for malaria 2016-2030 targets

- ⌘ reduction in global malaria case incidence and mortality rates of at least 90 per cent by 2030, compared to a 2015 baseline
- ⌘ elimination of malaria in at least 35 countries that were endemic in 2015
- ⌘ prevention of re-establishment of malaria in all countries that are malaria-free. (World Health Organization, 2019).

It is founded upon three core pillars and two supporting elements.

#### Pillars:

- ⌘ ensuring universal access to malaria prevention, diagnosis and treatment
- ⌘ accelerating efforts towards elimination and attainment of malaria-free status and
- ⌘ transforming malaria surveillance into a core intervention.

Supporting elements:

- ⌘ harnessing innovation and expanding research; and
- ⌘ strengthening the enabling environment.

India's Malaria Control Strategies focus on early case detection and prompt treatment, vector control, encouraging community participation, environmental management and source reduction methods and continuous monitoring. The basic norms for each of these, defined in the strategy, are available in **Annexure 35** (MoHFW, 2021).

#### Current Status

According to the World Malaria Report, 2019, there were 228 million cases of malaria in 2018 compared to 231 million cases in 2017. Children under 5 years of age, the most vulnerable group affected by malaria, accounted for 67 per cent (272,000) of all malaria deaths worldwide. Nearly 85 per cent global malaria deaths in 2018 were concentrated in 20 countries in the WHO African Region and India.

Majority of malaria cases in India are reported from eastern and central part of the country and from states with forest and hilly terrains and tribal populations. These states include Odisha, Chhattisgarh, Jharkhand, Madhya Pradesh, Maharashtra, and some north-eastern states such as Tripura, Meghalaya and Mizoram (MoHFW, 2017). Data for the city of Indore is not available.



### 5.1.2.3. Human Immunodeficiency Virus (HIV) and AIDS

Human immunodeficiency virus (HIV) weakens the target's immune system impacting their defence against several types of infections as well as cancers. The most advanced stage of HIV infection, acquired immunodeficiency syndrome (AIDS), is defined by the development of certain cancers, infections or other severe long term clinical manifestations (World Health Organization, 2020).

HIV can be transmitted via exchange of a variety of body fluids such as blood, breast milk, semen and vaginal secretions. HIV can also be transmitted from a mother to her child during pregnancy and delivery. There is no cure for HIV infection although effective antiretroviral drugs (ARVs) can control the virus and help prevent onward transmission to other people.

#### Norms

HIV can be diagnosed through rapid diagnostic tests that provide same-day results. WHO-recommended principles for all HIV testing services known as the “5 Cs” are as follows:

- ⌘ Informed consent
- ⌘ Confidentiality
- ⌘ Counselling
- ⌘ Correct test results
- ⌘ Connection (linkage to care, treatment and other services)

#### Current Status

In 2019, of the 68 per cent adults and 53 per cent children living with HIV globally were receiving lifelong antiretroviral therapy (ART). The WHO reported that due to gaps in access to HIV testing, treatment and care, 6,90,000 people died of HIV-related causes in 2019 and 1.7 million people were newly infected.

According to the India HIV Estimation 2019 Report, nationally there were 69.22 thousand (37.03 thousand – 121.50 thousand) estimated new HIV infections in 2019. This translates into 190 new infections every day. Maharashtra was estimated to have the highest number of new HIV infections in 2019 (8.54 thousand), followed by Bihar (8.04 thousand) (NACO, 2021). Madhya Pradesh saw new annual HIV infections ranging between 2,000 and 3,000 in 2019 (NACO and ICMR-National Institute of Medical Statistics, 2020). Data for the city of Indore is not available

### 5.1.2.4. COVID-19 Pandemic

The COVID-19 pandemic, infectious disease caused by the most recently discovered coronavirus, is the current defining global health crisis.

Most people infected with the COVID-19 virus experience mild to moderate respiratory illness. Older people, and those with underlying medical conditions such as cardiovascular disease, diabetes, chronic respiratory disease, and cancer are more likely to develop serious illness.

#### Norms

WHO has advised people to stay safe from the Coronavirus infection by following simple precautions, such as physical distancing, wearing a mask, keeping rooms well ventilated, avoiding crowds and close contact, regularly cleaning hands, and



coughing into a bent elbow or into a tissue. Apart from these selfcare norms, those experiencing symptoms are advised to observe 15 days quarantine. Several healthcare advisories have been issued by CDC, WHO and local authorities.

In India Ministry of Health and Family Welfare has released a series of health advisories for various population groups. Specific advisories have been issued for vulnerable groups such as the Elderly Population to stay safe during COVID19 and detailed out measures to reduce transmission among elderly population. Detailed information about the measures is available on the Ministry's website (MoHFW, 2020).

### **Current Status**

As per WHO statistics, globally, by April 3 2021, there were 12,99,02,402 confirmed cases of COVID-19, including 28,31,815 deaths (World Health Organization, 2020). As on the same date India had registered 1,24,85,509 total cases and 1,64,655 deaths.<sup>30</sup>

Till April 3, 2021, West Bengal had registered the highest number of COVID-19 cases at 11,629,289 and 164,623 deaths, followed by Maharashtra at 24,95,315 cases and 55,656 deaths.<sup>31</sup> With 279,275 COVID-19 cases and 4029 deaths, Madhya Pradesh had a relatively lesser incidence of the pandemic. *Data for Indore City is not available.*

### **5.1.3. Non-Communicable Diseases (NCD)**

India has seen significant changes leading to substantial health impacts over the last few decades. The disease landscape has changed considerably, with prevalence of chronic NCDs increasing and accelerating steadily. NCDs, also known as chronic diseases, tend to be of long duration and are the result of a combination of genetic, physiological, environmental factors as well as behaviour patterns. The main types of NCDs include cardiovascular diseases (such as heart attacks and strokes), cancers, chronic respiratory diseases (such as chronic obstructive pulmonary disease and asthma) and diabetes.

Modifiable behaviours, such as tobacco use, physical inactivity, unhealthy diets and the harmful use of alcohol, all increase the risk of NCDs. Metabolic risk factors contribute to four key metabolic changes i.e., high blood pressure, overweight, hyperglycaemia, and hyperlipidaemia, that increase the risk of NCDs (World Health Organization, 2018).

SDG 3.4 has set a target to reduce by one third, by 2030, premature mortality from non-communicable diseases through prevention and treatment and promote mental health and wellbeing.

### **Current Status**

According to WHO, NCDs kill 41 million people annually, equivalent to 71 per cent of all deaths globally. Of these cardiovascular diseases account for most NCD deaths, or 17.9 million people annually, followed by cancers (9.0 million), respiratory diseases (3.9million), and diabetes (1.6 million). Each year, 15 million premature deaths (between 30 and 69 years) are caused by NCDs; of these over 85 per cent occur in low- and middle-income countries.

In India, out of 3,57,23,660 patients visiting NCD clinics (MoHFW, 2018)

⌘ 8.41 per cent are diagnosed with diabetes

<sup>30</sup> <https://www.worldometers.info/coronavirus/country/india/>

<sup>31</sup> <https://www.mohfw.gov.in/>



- ⌘ 10.22 per cent are diagnosed with hypertension
- ⌘ 0.37 per cent are diagnosed with cardiovascular diseases
- ⌘ 0.13 per cent are diagnosed with stroke and
- ⌘ 0.11 per cent are diagnosed with common cancers

The prevalence of above normal blood pressure was observed to highest in Uttarakhand (28 per cent) followed by Jharkhand (25.7 per cent); and lowest in Chhattisgarh (18.3 per cent) (Ministry of Home Affairs, 2011). According to the Annual Health Survey (AHS, 2014), this figure for Madhya Pradesh stands at 21 per cent. *Giridhar et al's* study found the prevalence of obesity in an urban area of Ludhiana at 29.6 per cent. According to NFHS 4 (2015-16) 24.3 per cent of the women in the urban area of Indore were found to be overweight or obese.

### 5.1.1.1. Diabetes

Diabetes is a chronic disease that occurs either when the pancreas does not produce enough insulin or when the body cannot effectively use the insulin produced. Type 1 diabetes, once known as juvenile diabetes or insulin-dependent diabetes, is a chronic condition in which the pancreas produces little or no insulin by itself. Type 2 diabetes (formerly called non-insulin-dependent, or adult-onset) results from the body's ineffective use of insulin. This type of diabetes is largely the result of excess body weight and physical inactivity (World Health Organization, 2020).

#### Norms

Diagnosis is produced by the presence of classic symptoms of hyperglycaemia and an abnormal blood test. "A plasma glucose concentration  $\geq 7$  mmol/L (or 126 mg/dL) or  $\geq 11.1$  mmol/L (or 200 mg/dL) 2 hours after a 75g glucose drink".<sup>32</sup>

#### Current Status

In 2016, diabetes was the direct cause of 1.6 million deaths globally and between 2000 and 2016, there was a 5 per cent increase in premature mortality from diabetes. Diabetes has been rising more rapidly in low- and middle-income countries than in high-income countries. In lower-middle-income countries, premature mortality rate due to diabetes increased. WHO – Diabetes country profiles, 2016 reported 7.8 per cent prevalence of diabetes in India.

**Table 47: Diabetes country profiles (WHO, 2016)**

Diabetes and Related Risks	Males (%)	Females (%)	Total (%)
Overweight	19.0	23.9	21.4
Obesity	3.1	6.5	4.7
Physical Inactivity	9.2	15.1	12.1

According to the NFHS – 4 Survey, the prevalence of diabetes is two per cent among both men and women in the age group of 15-49 years (MoHFW, 2017). NFHS-4 included measurement of random blood glucose amongst women of 15-49 years and men of 15-54 years. Three per cent women and four per cent of men in Madhya Pradesh have high blood glucose levels, whereas in Indore 5.4 per cent women and 7.8 per cent men have high blood glucose level (MoHFW, 2016).

<sup>32</sup> [https://www.who.int/diabetes/action\\_online/basics/en/index1.html](https://www.who.int/diabetes/action_online/basics/en/index1.html)



### 5.1.3.2. Cardiovascular Disease

CVDs are a group of heart and blood vessel disorders and include coronary heart diseases, cerebrovascular diseases, rheumatic heart diseases and other such conditions (World Health Organization, 2017).

Heart attacks and strokes are usually acute events and are mainly caused by a blockage that prevents blood from flowing to the heart or brain. High blood pressure, high blood cholesterol and obesity are major risk factors contributing to heart diseases. High blood pressure is diagnosed with a simple equipment that indicates how strongly blood presses against the arterial walls as the heart pumps it around the body. High blood pressure strains the arteries and heart, increasing the probability of cardiovascular and kidney diseases (World Health Organization, 2013)

#### Norms

According to WHO's guidelines for management and prevention of CVDs, timely and sustained lifestyle interventions and, when needed, drug treatment reduce the risk of CVD events, such as heart attacks and strokes. Many people are unaware of their risk status; opportunistic and other forms of screening by healthcare providers are therefore a potentially useful means of detecting risk factors, such as raised blood pressure, abnormal blood lipids and blood glucose.

The predicted risk of an individual can be a useful guide for making clinical decisions on the intensity of preventive interventions. A risk stratification approach is particularly suitable to settings with limited resources, where saving the greatest number of lives at lowest cost becomes imperative. Targeting patients with a high risk is the first priority in a risk stratification approach.

In patients with a systolic blood pressure above 150 mmHg, or a diastolic pressure above 90 mmHg, or a blood cholesterol level over 5.0 mmol/l, drug treatment reduces the relative risk of cardiovascular events by between one-quarter and one-third (20–27). If blood pressure is reduced by 10–15 mmHg (systolic) and 5–8 mmHg (diastolic) and blood cholesterol by about 20 per cent through combined treatment with antihypertensives and statins, cardiovascular disease morbidity and mortality can be reduced by up to 50 per cent (28) (World Health Organization, 2007).

#### Current Status

Out of the 17 million premature deaths (under the age of 70) due to noncommunicable diseases in 2015, 82 per cent take place in low- and middle-income countries, and 37 per cent are caused by CVDs. WHO – Diabetes country profiles, 2016 reported 26 per cent mortality due to cardiovascular diseases in India (World Health Organization, 2016). The prevalence of any heart disease is considerably higher amongst women (1849 per 100,000) as compared to men (1058 per 100,000).<sup>33</sup>

Data for the City of Indore is not available.

### 5.1.3.3. Cancer

Cancer is a large group of diseases that can start in almost any organ or tissue of the body when abnormal cells begin to grow uncontrollably, go beyond their usual boundaries to invade adjoining parts of the body and/or spread to other organs (World Health Organization, 2020).

<sup>33</sup><http://rchiips.org/NFHS/NFHS-4Reports/MadhyaPradesh.pdf>



Neoplasm and malignant tumours are common names for cancer. While lung, prostate, colorectal, stomach and liver cancer are the most common types of cancer in men, breast, colorectal, lung, cervical and thyroid cancer are the most common amongst women.

## Norms

The American Cancer Society Guidelines for the Early Detection of Cancer defines specific guidelines for breast, cervical and lung cancers amongst others (American Cancer Society, n.d.) These include types of tests and screenings that vulnerable groups could undergo as precautionary measures. The details are available in **Annexure 36**.

## Current Status

Globally, cancer is the second leading cause of death, accounting for an estimated 9.6 million deaths, or one in six deaths, in 2018. Vaccination against the human papillomavirus (HPV) and screening for pre-cancer or cancer are key tools to prevent the 530,000 new cervical cancer cases diagnosed every year.

According to GLOBOCAN 2018 data, India saw 11,57,294 new cancer cases, 7,84,821 deaths and 22,58,208 people living with cancer (within 5 years of diagnosis) (Cancer India, 2020).

Cancers of oral cavity and lungs account for over 25 per cent of cancer deaths in males and cancer of breast and oral cavity account for 25 per cent cancers in females. Cervical cancer is the third largest cause of cancer mortality in India accounting for nearly 10 per cent of all cancer related deaths in the country.

Breast cancer is the most common cancer in women in India, accounting for 14 per cent of all cancers in women and having highest mortality rate at 11.1 per cent. In urban areas, 1 in 22 women is likely to develop breast cancer during her lifetime as compared to rural areas where 1 in 60 women develops breast cancer in her lifetime. Overall, 1 in 28 women is likely to develop breast cancer during her lifetime (International Agency for Research on Cancer and WHO, 2020). In Madhya Pradesh, 24 per cent women had undergone an examination of the cervix, 10 per cent had undergone a breast examination.

Data for city of Indore is not available.

### 5.1.4. Senior Care/Geriatric Care

Population ageing or rapid increase in the number of older people is a global phenomenon. According to the Population Census 2011, India was home to nearly 104 million elderly persons (aged 60 years or above), of which 53 million were females, and 51 million males.

Older age is characterised by the emergence of several complex health states that tend to occur only later in life and that do not fall into discrete disease categories. These are commonly called geriatric syndromes. The elderly is more likely to suffer from chronic illnesses or NCDs, particularly cardiovascular, metabolic, and degenerative disorders amongst others. Geriatric care is a branch of medicine that deals with problems and diseases of old age and medical care and treatment of aging people. The quality of senior care and the infrastructure ensure the well-being of senior citizens.



Older Americans 2016 Key Indicators of Wellbeing, a report on aging-related statistics, has studied the key indicators in the context of health status, health risks and behaviours, access to and financing of healthcare services and the environment. The details are available in **Annexure 37**.

## Norms

Often the wellbeing of seniors depends on their living arrangements. Though India's elders did not face this challenge till a few decades ago, the reducing size of families, migration and increased life expectancy have disrupted the conventional living arrangements, where the elderly resided with their children/younger family members.

The wellbeing of older persons is mandated in the Constitution of India under Article 41 which states that the Government, within the limits of its economic capacity and development, will make effective provision for securing the right to public assistance in cases of old age. The Right to Equality is guaranteed by the Constitution as a fundamental right. Social security is the concurrent responsibility of the central and state governments.

Traditionally the senior care industry in India has been offering services such as rehabilitative therapies, nursing care and palliative care to support the personal care provided by family caregivers or home healthcare agencies. These services however address only the challenges arising out of physical ageing and a drop in health.

## Current Status

Between 1990 and 2010, the living arrangements of older persons have undergone a significant shift towards independent living. The UN Study on World Population Ageing 2017, has indicated that the percentage of seniors living independently increased from 18 to 27 per cent in Asia and in Europe they increased from 66 to 76 per cent. In India:

- ⌘ Approximately 17.20 per cent elderly live alone
- ⌘ Almost every second elderly i.e., 48.88 per cent, live only with their spouse (Agewell Foundation)
- ⌘ Only 26.5 per cent elderly respondents live either with their children and/or other family members (Agewell Foundation)

In this backdrop, the subject of an ageing population will be of social as well as economic significance to the country. Therefore, India needs to transform its approach towards this segment of the population – from being considered a burden on resources to a precious resource for the nation's economic growth.

## 5.1.5. Substance Abuse

Substance abuse, a major global health problem including in India, sees a varying prevalence and pattern from country to country as well as among different demographics. Tobacco and alcohol use amongst young people is emerging as a matter of concern.

As defined in the Healthy City 2020 report, substance abuse refers to a set of related conditions associated with the consumption of mind- and behaviour-altering substances that have negative behavioural and health outcomes (ODPHP, 2020). Additionally, psychoactive substances are defined by the National Institutes of



Health (U.S. Department of Health) as a drug or other substance that affects how the brain works and causes changes in mood, awareness, thoughts, feelings, or behaviour. These include alcohol, caffeine, nicotine, marijuana, and certain pain killers. Harmful use of these substances is defined as a pattern that causes physical or mental damage to health.

The Tenth Revision of the International Classification of Diseases and Health Problems (ICD-10) defines the dependence syndrome as being a cluster of physiological, behavioural, and cognitive phenomena in which the use of a substance or a class of substances takes on a much higher priority for a given individual than other behaviours that once held greater value.

Under the SDG 3, that encourages countries to ensure healthy lives and promote wellbeing for all at all ages targets the following:

- ⌘ SDG 3.5: Strengthen prevention and treatment of substance abuse, including narcotic drug abuse and harmful use of alcohol:
  - 3.5.1: Coverage of treatment interventions (pharmacological, psychosocial and rehabilitation and aftercare services) for substance use disorders
  - 3.5.2: Harmful use of alcohol, defined according to the national context as alcohol per capita consumption (aged 15 years and older) within a calendar year in litres of pure alcohol
- ⌘ SDG 3.a: Strengthen implementation of the World Health Organization Framework Convention on Tobacco Control in all countries, as appropriate

Globally, the prevalence of alcohol use disorders is significantly higher than the prevalence of drug use disorders. Generally, alcohol and drug use disorders are more common among males than among females (National Health Portal, 2017).

The Ministry of Social Justice and Empowerment commissioned a National Survey on the Extent and Pattern of Substance Use in India. Indicators used were current use (use within the past 12 months), harmful use and dependence, for alcohol, cannabis, opioids, cocaine, amphetamine type stimulants (ATS), sedatives and inhalants and hallucinogens. The survey found that in India, alcohol was the most common psychoactive substance used, followed by cannabis and opioids (Ministry of Social Justice and Employment, 2019).

National Mental Health Survey, Madhya Pradesh, 2015-16 indicated that the state had 36.6 per cent burden of any psychoactive substance use. The prevalence of psychoactive substance use is three-fold higher in the state as compared to national prevalence<sup>34</sup>.

### 5.1.1.1. Tobacco

Tobacco use is associated with a wide range of diseases, including several types of cancers and heart and lung diseases, diabetes, eye disease, and rheumatoid arthritis. Cigarette smoking is the most common form of tobacco use worldwide. Other tobacco products include waterpipe, smokeless products, cigars, cigarillos, roll-your-own tobacco, pipe, bidis and kreteks.

Smokeless tobacco, often consumed by chewing, moist snuffing or inhaling dry snuff, contains nicotine and many harmful, cancer-causing chemicals.

<sup>34</sup> <https://www.aiimsbhopal.edu.in/news/nmhs.pdf>



## Norms

The WHO Framework Convention on Tobacco Control (WHO FCTC) was the first treaty negotiated in 2003 under the auspices of the World Health Organization. The WHO FCTC is an evidence-based treaty that reaffirms the right of all people to the highest standard of health (World Health Organization, 2003). India ratified the Convention in 2004. The Convention has identified strategies to reduce demand and supply reduction, which are being implemented by India (MoHFW, 2021). Key points of the Convention are available in **Annexure 38**.

## Current Status

Over 80 per cent of the 1.3 billion tobacco users worldwide live in low- and middle-income countries, where the burden of tobacco-related illness and death is heaviest (World Health Organization, 2020). The most prevalent form of tobacco used in India is smokeless tobacco and commonly used products are khaini, gutkha, betel quid with tobacco and zarda. Smoking forms of tobacco used are bidi, cigarette and hookah.

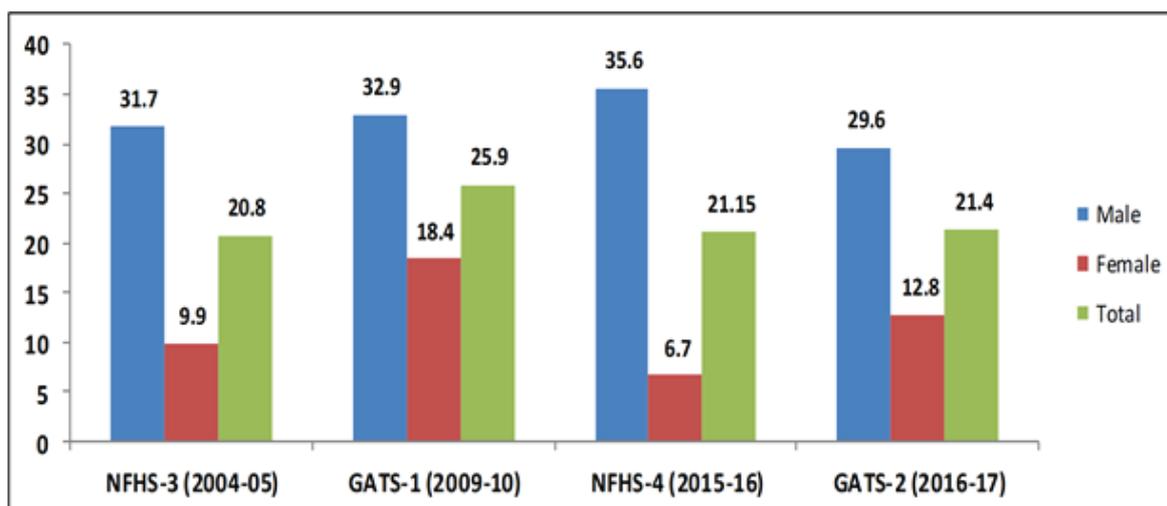
The Global Adult Tobacco Survey (GATS), a global standard, systematically monitors adult tobacco use (smoking and smokeless) and tracks key tobacco control indicators. Data as per the Global Adult Tobacco Survey, INDIA 2016-17 edition reveals the following

### 1. Tobacco use:

- ⌘ 42.4 per cent men, 14.2 per cent women, and 28.6 per cent (266.8 million) of all adults currently use tobacco (smoked and/or smokeless tobacco)
- ⌘ 19.0 per cent men, two per cent women, and 10.7 per cent (99.5 million) of all adults currently smoke tobacco
- ⌘ 29.6 per cent men, 12.8 per cent women, and 21.4 per cent (199.4 million) adults currently use smokeless tobacco.

### 2. Second-hand smoke:

- ⌘ 38.7 per cent adults are exposed to second-hand smoke at home
- ⌘ 30.2 per cent adults who work indoors are exposed to second-hand smoke at their workplaces
- ⌘ 7.4 per cent adults are exposed to second-hand smoke at restaurants.



**Figure 20: Prevalence of Smokeless Tobacco users in India**

Source: <http://cancerindia.org.in/smokeless-tobacco-india/>

In Madhya Pradesh, smokeless tobacco consumption is higher than the national averages.

**Table 48: Tobacco Consumption in Madhya Pradesh**

<b>Global Adult Tobacco Survey India Report – 2016-17</b>	<b>Male</b>	<b>Female</b>	<b>Total</b>
Madhya Pradesh	38.7	16.8	28.1

A study of prevalence and pattern substances in a slum area of Indore showed that tobacco was the most common substance used by about 53.9 per cent population, followed by gutka (non-tobacco pan masala). The use of tobacco is higher than the national average of 42.4 per cent among males (World Health Organization, 2018). The slum population had a higher prevalence of tobacco use than the general population.

A study conducted in Indore, found 27 per cent prevalence of areca-nut chewing, amongst 3,896 school-going children aged 3~17 years. The research also draws attention to an important issue that a majority of users (70.4 per cent) were unaware of the harmful effects of areca-nut chewing and only a few were aware that it could cause cancer.

### 5.1.5.2. Alcohol

Harmful use of alcohol encompasses several aspects of drinking such as the volume of alcohol drunk over time; the pattern of drinking that includes occasional or regular drinking to intoxication; if the drinking context increases public health risks; and quality or contamination of alcoholic beverages (World Health Organization, 2009).

#### Norms

The ASSIST, Alcohol, Smoking and Substance Involvement Screening Test, is a brief screening questionnaire to identify people’s use of psychoactive substances. It is especially designed for use by healthcare workers in a range of healthcare settings (World Health Organization et al., 2003). It was developed by the World Health Organization (WHO) and an international team of substance use researchers as a simple method of screening for hazardous, harmful and dependent use of alcohol, tobacco and other psychoactive substances.

The ASSIST provides information about:

- ⌘ substances people have ever used in their lifetime
- ⌘ substances they have used in the past three months
- ⌘ problems related to substance use
- ⌘ risk of current or future harm
- ⌘ dependence
- ⌘ injecting drugs

#### Current Status

WHO reported that worldwide, every year 3 million deaths, i.e. 5.3 per cent of all deaths, result from harmful use of alcohol (World Health Organization, 2018). Nationally, about 14.6 per cent of the population (between 10 and 75 years of age) uses alcohol. About 30 per cent of the alcohol users, predominantly consume country liquor or ‘desi sharab’ and an equal number consume spirits or Indian Made Foreign Liquor.



The prevalence of alcohol dependence is estimated to be around 2.7 per cent with an additional 2.5 per cent consuming alcohol in a harmful manner.

In Madhya Pradesh, 42 per cent women and 51 per cent men in the age group of 15-49 were found to consume alcohol less than once a week.

Data for the city of Indore is not available.

### 5.1.5.3. Drugs (Cannabis and Opioids)

Cannabis is a generic term used to denote several psychoactive preparations of the plant cannabis sativa (World Health Organization, 2020).

#### Norms

WHO and UNODC have joined hands to outline the International Standards on Drug Use Prevention. The 2<sup>nd</sup> edition summarises currently available scientific evidence, describing interventions and policies that have been found to result in positive prevention outcomes and their characteristics. It defines standards and strategies to prevent drug abuse for the well-being of children, adolescents, youth, families and communities (UNODC, 2020)

#### Current Status

Harmful use of cannabis and dependence were found to be the most common drug-use disorders by epidemiological surveys conducted in Australia, Canada and the USA. The National Survey of Youth Risk Behaviour indicates that 12.8 per cent of South African students in grades 8-10 (13-15-year-olds) used cannabis, and 9.2 per cent had done so in the past month of the survey.

Nationally, the most common opioid used is heroin (1.14 per cent) followed by pharmaceutical opioids (0.96 per cent) and opium (0.52 per cent). Cannabis products consumption was about two per cent (approximately 2.2 crore persons) for bhang and about 1.2 per cent (approximately 1.3 crore persons) for illegal cannabis products, ganja and charas.

States with a high population of children needing help for inhalant use included Uttar Pradesh, Madhya Pradesh, Maharashtra, Delhi, and Haryana. About 2.8 per cent of the population reported using cannabis and 2.1 per cent of the country's population reported using opioids. (Ministry of Social Justice and Employment, 2019)

Specific data for Madhya Pradesh and Indore is not available.



## 5.2. Government Interventions

### 5.2.1. Common Interventions (Policies and Programmes)

#### 5.2.1.1. National Health Mission

Launched by the Government of India in 2013. The National Health Mission (NHM) encompasses two sub-missions: National Rural Health Mission (NRHM) and the National Urban Health Mission (NUHM). Flexible and dynamic, NHM is intended to guide States towards ensuring the achievement of universal access to healthcare by strengthening health systems, institutions, and capabilities.

##### NHM Vision

“Attainment of universal access to equitable, affordable and quality healthcare services, accountable and responsive to people’s needs, with effective inter-sectoral convergent action to address wider social determinants of health”. NHM seeks to ensure achievement of several indicators including those on maternal and child health as well as mortality from CDs and NCDs. The details of these indicators are available in **Annexure 39**.

#### 5.2.1.2. National Urban Health Mission

The NUHM, a sub-mission of the NHM, envisages meeting the healthcare needs of the urban population, by making essential primary healthcare services available to urban poor and reducing their out-of-pocket expenses for treatment (MoHFW, 2020). NUHM covers all state capitals, district headquarters, and cities/towns with a population of more than 50,000. Cities and towns with populations below 50,000 are covered under NRHM. The primary focus is on slum dwellers and other marginalised groups such as rickshaw pullers, street vendors, railway and bus station coolies, homeless people, street children, construction site workers.

While strengthening the existing healthcare service delivery system the mission also endeavours to bring convergence with various schemes relating to wider determinants of health such as drinking water, sanitation, school education implemented by Ministries of Urban Development, Housing & Urban Poverty Alleviation, Human Resource Development and Women & Child Development is also pursued under this mission. Some activities pursued under NHUM are available in **Annexure 40**.

#### 5.2.1.3. National Health Policy 2017 (NHP, 2017)

The policy seeks to reach everyone in a comprehensive integrated manner to move towards wellness. It aims to achieve universal health coverage and deliver affordable quality healthcare services to all.

The policy’s goal is the attainment of highest possible level of health and wellbeing for all at all ages, through a preventive and promotive healthcare orientation in all developmental policies, and universal access to good quality healthcare services without anyone having to face financial hardship as a consequence.

⌘ Ensuring adequate investment - The policy proposes a potentially achievable



target of raising public health expenditure to 2.5 per cent of GDP in a time bound manner.

- ⌘ Preventive and promotive health - The policy identifies coordinated action on seven priority areas for improving the environment for health:
  - The Swachh Bharat Abhiyan
  - Balanced, healthy diets and regular exercises
  - Addressing tobacco, alcohol and substance abuse
  - Yatri Suraksha – preventing deaths due to rail and road traffic accidents
  - Nirbhaya Nari – action against gender violence
  - Reduced stress and improved safety in the workplace
  - Reducing indoor and outdoor air pollution
- ⌘ Organisation of public healthcare delivery - The policy proposes seven key policy shifts in organizing healthcare services (Vikaspedia, 2020).

## 5.2.2. Reproductive, Maternal and Child Health

### 5.2.1.1. Reproductive, Maternal, New-born Child plus Adolescent Health (RMNCH+A)

The Ministry of Health & Family Welfare launched Reproductive, Maternal, New-born Child plus Adolescent Health (RMNCH+A) to influence key interventions for reducing maternal and child morbidity and mortality. The RMNCH+A strategy is built upon the continuum of care concept and is holistic in design, encompassing all interventions aimed at the reproductive, maternal, new-born, child, and adolescent health under a broad umbrella, and focuses on the strategic lifecycle approach.

With an additional focus on adolescence as a distinct “life stage”, it outlines the strategy to increase knowledge and access to reproductive health services and information for adolescents and to address nutritional anaemia (MoHFW, 2020). Other components of the RMNCH+A strategy approaches are given in **Annexure 41**.

### 5.2.2.2. Maternal Health

#### Janani Suraksha Yojana (JSY)

A safe motherhood intervention under the National Health Mission, JSY is a centrally sponsored scheme launched in 2005. It integrates cash assistance with delivery and post-delivery care. An Accredited Social Health Activist (ASHA) scheme, it is an effective link between the government and pregnant women. The scheme is under implementation in all states and Union Territories (UTs), with a special focus on the Low Performing States (LPS). Madhya Pradesh is included in LPS.

#### Janani Shishu Suraksha Karyakram (JSSK)

JSSK was launched in June 2011 to eliminate out-of-pocket expenses for both pregnant women and sick infants, while accessing services at government health facilities. The initiative entitles all pregnant women delivering in public health institutions to absolutely free and no expense delivery, including caesarean section. These provisions, applicable to both the pregnant woman and a sick new-born till the age of 1, also include provision of free drugs, consumables, diagnostics, diet, blood, transport from home to health institutions and referral institutions and back and exemption various user charges (Vikaspedia, 2019).



## **Pradhan Mantri Surakshit Matritva Abhiyan (PMSMA)**

PMSMA was launched to provide assured, comprehensive, and quality antenatal care universally to all pregnant women (in the 2<sup>nd</sup> and 3<sup>rd</sup> trimester) on the 9<sup>th</sup> of every month (MoHFW, 2017). In pursuit of a critical component of the Abhiyan red stickers are pasted on the Mother and Child Protection cards of identified high-risk pregnancies to ensure follow-up.

A National Portal for PMSMA and a mobile application were developed to facilitate and encourage voluntary engagement of OB/GYN specialists/ radiologist/ physicians from private sector.

## **Pradhan Mantri Matru Vandana Yojana (PMMVY)**

PMMVY is a maternity benefit programme launched by the Ministry of Women and Child Development implemented across the country, following the provision of the National Food Security Act, 2013. Under PMMVY, a cash incentive of INR 5,000 is provided directly in the account of Pregnant Women and Lactating Mothers (PW&LM) for the first living child of the family, subject to their fulfilling specific conditions relating to Maternal and Child Health (Ministry of Woman and Child Development, 2017). Some of these have been detailed in **Annexure 42**.

## **Mangal Diwas Yojana**

The Ministry of Women and Child Development, Government of Madhya Pradesh initiated Mangal Diwas Yojana. This scheme aims to improve the attendance of children at Anganwadi centres, ensure safe delivery, reduce maternal mortality and infant mortality rates, reduce malnutrition in children and proper care of adolescent girls by providing them appropriate facilities. Under the scheme, every Tuesday of the month is celebrated as Godbharayi, Annaprashan, Janm Divas, and Kishor Balika programme, with a view to creating an environment of affinity (Mishra, 2017).

## **5.2.2.3. Child Health**

### **Facility Based New-born Care**

Facility based new-born care services at health facilities have been stressed to address the higher neonatal and early neonatal mortality. MoHFW published “Facility Based New-born Care Operational Guide- 2011: A Guideline for Planning and Implementation” as a reference tool for states to take necessary steps in implementation of facilities for care of sick new-born children. These include Special New-born Care Units (SNCUs), New-born Stabilization Units (NBSUs) and New-born Baby Corners (NBCCs) at different levels. Basic details of these units are outlined in **Annexure 43**.

### **Integrated Management of Neonatal & Childhood Illnesses (IMNCI)**

This programme aims to reduce mortality, frequency and severity of illness and disability and contribute to growth and development during the first five years of a child's life. It includes pre-service and in-service training of providers, improving health systems (e.g. facility up-gradation, availability of logistics, referral systems), community and family level care.

### **Facility Based Integrated Management of Neonatal and Childhood Illness (F-IMNCI)**

This programme integrates the facility-based care package with the IMNCI package



to empower health workers with skills to manage new-born and childhood illnesses at the community level as well as at the facility. It provides appropriate skills for in-patient management of major causes of neonatal and childhood mortality such as asphyxia, sepsis, low birth weight, pneumonia, diarrhoea, malaria, meningitis, severe malnutrition in children. This 11-day training is provided to medical officers, staff nurses and ANMs at CHC/FRUs and 24x7 PHCs where deliveries take place.

### **Home Based New-born Care**

HBNC, aimed at improving new-born survival, strives to decrease neonatal mortality and morbidity by:

- ⌘ providing essential new-born care to all new-borns and preventing complications
- ⌘ early detection and special care of preterm and low birth weight new-borns
- ⌘ early identification of illness in new-borns and provision of appropriate care and referral
- ⌘ supporting the family in adopting healthy practices and building the mother's confidence and skills to safeguard her health and that of the new-born

Under the programme, ASHA workers are incentivised to visit all new-borns as per a specified schedule for up to 42 days after birth. They are expected to record the weight of the new-born in MCP card, ensure the necessary vaccinations and the safety of both the mother and the new-born.

### **Home-Based Care for Young Child (HBYC) Programme**

An extension of the HBNC programme, HBYC aims to promote evidence-based interventions in four key domains of nutrition, health, childhood development and WASH (Water, Sanitation and Hygiene). Under this programme ASHA workers carry out five additional five home visits, with support from Anganwadi workers. Through these visits they promote breastfeeding along with adequate complementary feeding, prevention of childhood pneumonia and diarrhoea, ensure age-appropriate immunisation and early childhood development.

### **Navjat Shishu Suraksha Karyakram (NSSK)**

NKKS aims to train health personnel to address issues arising at birth to prevent hypothermia, infection, early initiation of breastfeeding, and basic new-born resuscitation.

### **Rashtriya Bal Swasthya Karyakram (RBSK)**

RBSK is an initiative targeting early identification and intervention for children from birth to 18 years to cover the 4 'D's viz. defects at birth, deficiencies, diseases and development delays including disability.

## **5.2.2.4. Immunisation**

### **Universal Immunisation Programme**

MoHFW, Government of India provides for several life-saving vaccines to be administered free of cost to infants, children and pregnant women under the Universal Immunisation Programme. India's Universal Immunisation Programme (UIP) provides free vaccines against 12 life-threatening diseases, to 26 million children annually



## Mission Indradhanush

Launched by MoHFW to accelerate the process of immunisation by covering five per cent and more children every year, the Mission was adopted to achieve full coverage by 2020. It aims to cover all unvaccinated, or partially vaccinated children against preventable diseases. (Vikaspedia, 2018)

### 5.2.3. Communicable and Infectious Diseases

#### Common Interventions (Policies and Programmes)

##### 5.2.1.1. Integrated Disease Surveillance Programme (IDSP):

Implemented for surveillance of outbreak of communicable diseases, IDSP works to strengthen/maintain decentralised laboratory-based IT enabled disease surveillance systems to monitor trends in epidemic prone diseases and respond to early outbreaks through trained Rapid Response Team (RRTs). Surveillance units have been established in all states/districts (SSU/DSU), with a Central Surveillance Unit (CSU) established and integrated in the National Centre for Disease Control (NCDC), Delhi. Weekly disease surveillance data on epidemic disease are collected from reporting units such as sub centres, PHC, CHC, DH and other hospitals including government and private sector hospitals and medical colleges.

##### 5.2.3.2. National Vector Borne Diseases Control Programme (NVBDCP):

NVBDCP is an umbrella programme for prevention and control of vector borne diseases viz. Malaria, Japanese Encephalitis (JE), Dengue, Chikungunya, Kalaazar and Lymphatic Filariasis. Specific programmes for control of Vector Borne Diseases, initiated by the Government of India include<sup>35</sup>:

- ⌘ National Anti - Malaria Programme
- ⌘ Kala - Azar Control Programme
- ⌘ National Filariasis Control Programme
- ⌘ Japanese Encephalitis Control Programme
- ⌘ Dengue and Dengue Haemorrhagic Fever

##### 5.2.3.3. Tuberculosis

#### Revised National TB Control Programme (RNTCP)

The goal is to decrease mortality and morbidity due to TB and reduce transmission of infection until TB ceases to be a major public health problem in India. A 'National Strategic Plan for Tuberculosis 2017-2025' (NSP) was released under the RNTCP for control and elimination of TB by 2025. This plan focuses on four strategic pillars of "Detect – Treat – Prevent – Build" (DTPB).

#### NIKSHAY

NKSHAY is a case-based web-based TB surveillance system, developed under the RNTCP, to facilitate TB notification by both government and private healthcare facilities.

<sup>35</sup>[https://www.nhp.gov.in/national-vector-borne-disease-control-programme\\_pg](https://www.nhp.gov.in/national-vector-borne-disease-control-programme_pg)



## Nikshay Poshan Yojana

MoHFW announced an incentive of INR 500 for nutritional support to each notified TB patient for duration for which the patient is on anti-TB treatment (MoHFW, n.d.).

### 5.2.3.4. Malaria

#### National Framework for Malaria Elimination

The NFME 2016-2030 outlines India's strategy for elimination of the disease by 2030 in line with the WHO Global Technical Strategy for Malaria 2016–2030 (GTS) and the Asia Pacific Leaders Malaria Alliance Malaria Elimination Roadmap. The framework was developed with a vision to eliminate malaria from the country, contribute to improved health and quality of life and poverty alleviation. The Framework also aims to maintain malaria-free status in areas where its transmission is interrupted and prevent re-introduction.

#### National Strategic Plan (NSP) for Malaria Elimination (2017-2022)

This strategic plan, based on the National Framework for Malaria Elimination (NFME), was developed with the specific objectives of (MoHFW, 2018):

- ⌘ achieving universal coverage of case detection and treatment services in endemic districts to ensure 100 per cent parasitological diagnosis of all suspected malaria cases and complete treatment of all confirmed cases.
- ⌘ strengthening the surveillance system to detect, notify, investigate, classify and respond to all cases and focus in all districts to move towards malaria elimination.
- ⌘ achieving near universal coverage of population at risk of malaria, with an appropriate vector control intervention.
- ⌘ achieving near universal coverage by appropriate BCC activities to improve knowledge, awareness and responsive behaviour regarding effective preventive and curative interventions for malaria elimination.
- ⌘ providing effective program management and coordination at all levels to deliver a combination of targeted interventions for malaria elimination.

### 5.2.3.5. HIV and AIDS

#### National AIDS Control Programme (1992)

India launched the National AIDS Control Programme (NACP- I) to slow down the spread of HIV infections so as to reduce morbidity, mortality and its impact in the country. NACP IV, launched in 2012, was aimed at accelerating the reversal process and further strengthening the epidemic response through a cautious and well-defined integration process over the next five years. Key strategies of the programme included: -

- ⌘ Intensifying and consolidating prevention services, with a focus on high-risk groups (HRGs) and vulnerable populations
- ⌘ Increasing access and promoting comprehensive care, support and treatment
- ⌘ Expanding IEC services for general population and high-risk groups with a focus on behaviour change and demand generation
- ⌘ Building capacities at national, state, district and facility levels
- ⌘ Strengthening the Strategic Information Management System.



## National Leprosy Eradication Programme

The National Leprosy Eradication Programme, a centrally sponsored Scheme of the MoHFW, is supported by the World Health Organization, The International Federation of Anti-leprosy Associations (ILEP) and a few Non- Government Organisations. It strives to work towards early detection through active surveillance by the trained health workers and regular treatment through Multi-Drug Therapy (MDT) at fixed centres. Efforts are also made to remove the stigma attached to leprosy by providing health education and creating public awareness. Appropriate medical rehabilitation and leprosy ulcer care services are offered under the programme.

### 5.2.4. Non-Communicable Diseases

#### 5.2.1.1. Common Interventions (Policies and Programmes)

##### National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular disease, and Stroke” (NPCDCS)

The programme endeavours to increase awareness about risk factors, set up infrastructure and carry out opportunistic screening. The following activities are carried out under the programme:

- ⌘ Health promotion through behaviour change, with involvement of the community, civil society, community-based organisations, media amongst others
- ⌘ Outreach camps are organised for opportunistic screening at all levels in the healthcare delivery system from sub-centre and above for early detection of diabetes, hypertension, and common cancers
- ⌘ Management of chronic NCDs through early diagnosis, treatment and follow up by setting up NCD clinics
- ⌘ Support for diagnosis and cost-effective treatment at primary, secondary, and tertiary levels healthcare.

#### 5.2.4.2. Cardiovascular Diseases

##### India Hypertension Control Initiative

IHCI is a joint project of Indian Council of Medical Research (ICMR), MoHFW, State Governments, WHO and 'Resolve to Save Lives'- initiative of Vital Strategies. It primarily aims to reduce morbidity and mortality due to cardiovascular diseases (CVDs), the leading cause of death in India. Efforts are directed at improving the control of high blood pressure, a leading risk factor for CVDs among adults in the country.

#### 5.2.4.3. Geriatric Health

##### National Programme for the Healthcare of Elderly (NPHCE)

Introduced to address health related problems faced by the elderly, NPHCE is an articulation of the Government's international and national commitments. Its core strategies include:

- ⌘ Community based primary healthcare approach including domiciliary visits



- by trained healthcare workers
- ⌘ Dedicated services at PHC/CHC level, including provision of machinery, equipment, training, additional human resources (CHC), IEC programmes
- ⌘ Dedicated facilities at District Hospitals with 10 bedded wards, additional human resources, machinery and equipment, consumables and drugs, training, and IEC programmes
- ⌘ Strengthening eight Regional Medical Institutes to provide dedicated tertiary level medical facilities for the elderly, introducing PG courses in Geriatric Medicine, and in-service training of health personnel at all levels
- ⌘ Information, Education and Communication (IEC) using mass media, folk media, and other communication channels to reach out to the target community

#### 5.2.4.4. Substance Abuse

##### Scheme for Prevention of Alcoholism and Substance (Drugs) Abuse

The Scheme has two parts: -

- ⌘ Part I: Financial assistance up to 90 per cent of the approved expenditure is offered to voluntary organizations and other eligible agencies for setting up/running Integrated Rehabilitation Centre for Addicts (IRCAs), Regional Resource and Training Centres (RRTCs), for holding awareness-cum-de-addiction camps (ACDC) and Workplace Prevention Programs amongst others.
- ⌘ Part II: Support is provided to innovative/pilot initiatives in welfare and empowerment of the target groups, especially those that cannot be supported under the Ministry's regular schemes. Financial assistance up to 90 per cent of the approved expenditure is provided to the voluntary and other eligible organisations. (Ministry of Social Justice and Empowerment, 2020)

##### The National Tobacco Control Programme (NTCP)

NTCP aims to create awareness about the harmful effects of tobacco consumption, help people quit tobacco use and reduce production and supply of tobacco products. It also ensures effective implementation of the provisions under "The Cigarettes and Other Tobacco Products (Prohibition of Advertisement and Regulation of Trade and Commerce, Production, Supply, and Distribution) Act, 2003" (COTPA) (MoHFW, n.d.). District Tobacco Control Cells have been set up for effective implementation and monitoring of tobacco control initiatives. The key activities include:

- ⌘ Training of stakeholder such as health and social workers, NGOs, school teachers and enforcement officers
- ⌘ Setting-up and strengthening of cessation facilities including the provision of pharmacological treatment facilities at the district level



## 5.3. Problem Statements and Gap Analysis

### 5.3.1. Reproductive and Child Health

#### 5.3.1.1. Maternal Health and Child Health

According to UNICEF, India major complications, that account for nearly two-thirds of all maternal deaths, are because of severe bleeding (mostly bleeding after childbirth), infections (usually after childbirth), high blood pressure during pregnancy (pre-eclampsia and eclampsia), complications from delivery and unsafe abortions.

Some studies have determined that hypertensive disorder in pregnancy is a direct major cause of death (Sundari, 2016). A study carried out in three districts of Madhya Pradesh, namely Shahdol, Tikamgarh, and Indore districts, asserted that Poor antenatal care and lack of human resources caused major reasons for maternal death in all facilities (Toppo et al., 2019).

The WHO has defined the three delays model to include delay in deciding to seek care, delay in reaching care in time, delay in receiving adequate healthcare. A study to understand the causes of delays in emergency obstetric care that could lead to maternal deaths determined that delay in deciding to seek care was a major contributor to maternal deaths in the study population (Agrawal et al., 2020).

A study of socio-demographic factors influencing the utilisation of maternal healthcare services in India using data from NHFS 2015–2016 indicated that education of women and household wealth status were the most significant predictors of maternal healthcare utilisation (Paul & Chouhan, 2020). Socio-demographic factors including rural-urban residence, caste, religion, women's age, age at marriage, exposure to mass media and region play a significant role in maternal healthcare utilisation.

Child Health: A study to determine the relationship between infant mortality and its major distal determinants in rural India concluded that availability and accessibility of around-the-clock health delivery service, especially with neonatal care facilities, is an important social indicator determining infant mortality. (Mukherjee et al., 2019)

#### 5.3.1.2. Immunisation

Studies have found that missing Routine Immunisation (RI) can be life-threatening for infants. Recent challenges in achieving full immunisation coverage include limited staff capacity, particularly in poorly performing states and on the ground level. Gaps in key areas such as demand prediction, logistics and cold chain management have often resulted in high waste (UNICEF, 2020).

A study was undertaken to determine the factors contributing to hesitancy in childhood vaccinations in slums of Siliguri (Dasgupt et al., 2018). It suggested that multiplicity of facilities lacking uniformity, slum population characteristics, poor spread of information, and long immunisation schedule in repeated successions make the caregivers vaccine hesitant. A UNICEF report has also stated that India lacks a reliable framework for monitoring vaccine-preventable diseases.



## 5.3.2. Communicable and Infectious Diseases

The burden of disease in India is high for noticeable factors such as poor hygiene practices, lack of access to safe water, crowded slum, and a significant lack of awareness of disease prevention.

### 5.3.1.1. Tuberculosis

“Tuberculosis: A Global Health Problem” (Zaman, 2010) listed several challenges in TB management in India. These include lack of: an effective surveillance system, accelerated identification of cases, expansion of DOTS to hard-to-reach areas, strengthening DOTS in urban settings, ensuring adequate staff and laboratory facilities, involving private practitioners, treatment facilities for MDR cases, identification of TB among children and extra-pulmonary cases, and effective coordination amongst healthcare providers.

### 5.3.2.2. Malaria

Stagnant water is one of the main causes of thriving vector-borne diseases such as malaria and dengue. Malaria is a major public health issue in India, especially in urban slums. A research to assess malaria-related knowledge and prevention practices revealed that despite knowing the effectiveness of bed nets in preventing malaria, residents rarely use these, with use of insecticide-treated bed nets being zero (Dhawan et al., 2014).

### 5.3.2.3. HIV and AIDS

A study on the perception of patients with HIV/AIDS noted that stigma and discrimination are big barriers for such people accessing health, medical and care services (Saki et al., 2015).

## 5.3.3. Non-Communicable Diseases

Risky behaviour such as tobacco and alcohol consumption, lack of physical activity, unhealthy diets, obesity, stress and environmental factors lead to a high NCD burden. These are potentially modifiable and can be managed to minimise the prevalence of NCDs and improve outcomes.

Prevalence of obesity was found to be highest amongst middle-aged housewives belonging to middle and high socio-economic status, due to menopausal changes, decreasing physical activity and high-fat diet (Girdha et al., 2016). A systematic review of NCD risk factors in India draws attention to deficiencies such as inadequate coverage of NCD Risk Factors, inadequate geographic and demographic coverage and absence of a standardised methodology impacting NCD control in the country (Nethan et al., 2017).

### 5.3.1.1. Diabetes

A healthy diet, regular physical activity, maintaining normal body weight and avoiding tobacco consumption are ways to prevent or delay the onset of type 2 diabetes. A



study of the prevalence and risk factors of type 2 diabetes mellitus amongst the adult population of Puducherry showed hypertension and family history as factors increasing the risk of the disease (Bharati et al., 2011). The pattern was substantially higher in adults over 50 years of age and those with elevated blood cholesterol and blood pressure than normal family history of diabetes mellitus.

### **5.3.3.2. Cardiovascular Diseases**

Cessation of tobacco consumption, reduction of salt in diet, consuming fruits and vegetables, regular physical activity and avoiding harmful use of alcohol have been shown to limit the risk of cardiovascular diseases.

### **5.3.3.3. Cancer**

The cancer burden continues to grow globally, exerting tremendous physical, emotional and financial strain on individuals, families, communities and health systems. According to WHO, many health systems in low- and middle-income countries are least prepared to manage this burden, and large numbers of cancer patients globally do not have access to timely quality diagnosis and treatment (World Health Organization, n.d.).

A study of the Influence of Dietary Habits, Physical Activity and Affluence Factors on Breast Cancer demonstrated a positive correlation with a higher standard of living, higher educational status, and higher intake of animal protein, fat frequent intake of fried food and sweets (Datta & Biswas, 2009).

A woman's chances of survival become better if cancer is detected and treated in early stages, making it important for them to undergo such screening. The World Health Organization (WHO) recommends mammography every 1–2 years for women aged 50–69 years. However, there is no organised, systematic, government funded screening programme for breast cancer in India.

Cervical cancer is the most common cancer amongst women in Rwanda, with 68.8 per cent women diagnosed with this cancer in 2010 dying. However, Rwanda became the world's first low-income country to provide universal access to the HPV (Human papillomavirus) vaccine by combating obstacles such as rumours about infertility and social stigma amongst people. The HPV vaccination programme attained 93.23 per cent coverage after the first three-dose course of vaccination (Binagwaho et al., 2012).

## **5.3.4. Geriatric Disorders**

According to the Population Census 2011, India is home to nearly 104 million elderly persons (aged 60 years or above). The National Sample Survey Office (NSSO), 2006 reported that a majority of rural (66 per cent) and urban (63 per cent) dwellers were dependent on their children for financial and social support as well as personal care. Due to economic dependence on family members, most elderly have limited availability and accessibility to healthcare. An article about Geriatric Health in India: Concerns and Solutions stated that elderly people suffer from both communicable as well as non-communicable diseases. Another study determined that rapid urbanisation and societal modernisation had led to a breakdown of family values and support, economic insecurity, social isolation, and elderly abuse resulting



in a host of psychological illnesses.

Challenges of geriatric psychiatry in India include lack of awareness, inadequate training, inequitable distribution of health resources and a virtual absence of chronic care disease models.

The Government's NPHCE programme addresses most health problems in an institutional healthcare system, but completely neglects home based care of an elderly person in families.

### 5.3.5. Substance Abuse

Children exposed to adverse childhood events such as abuse (physical, emotional or sexual), neglect (physical or emotional), growing up with household substance abuse, criminality of household members, mental illness amongst household members, parental discord and illicit drug use are more prone to take to substance abuse. Substance abuse significantly contributed to inflated social, physical, mental, and public health problems such as family disruptions, financial problems, loss of productivity, failure in school, domestic violence, child abuse, and criminal activities.

#### 5.3.1.1. Tobacco

Tobacco use is a major risk factor for many chronic diseases, including cancer, lung disease, cardiovascular disease and stroke. It accounts for nearly 1.35 million deaths every year. The GLOBOCAN 2018 report found that of the total deaths caused by oral cancer, about 80-90 per cent were directly attributable to tobacco use (Cancer India, 2020).

Tobacco use contributes to poverty by diverting household spending from basic needs such as food and shelter to tobacco. The economic costs of tobacco use are substantial and include significant healthcare costs for treating the diseases caused by tobacco use as well as the lost human capital that results from tobacco-attributable morbidity and mortality (World Health Organization, 2020). In 2011, India incurred about INR 104,500 crore (US\$ 22.4 billion) economic costs due to diseases caused by tobacco use by persons aged 35-39. Tobacco use shows a steady and substantial decrease, with increasing levels of education among both men and women (MoHFW, 2017).

#### 5.3.5.2. Alcohol

Alcohol is the most common psychoactive substance used by Indians with 14.6 per cent of the population (aged 10 ~75) using it. Alcohol consumption is a causal factor in more than 200 disease and conditions such as mental and behavioural disorders, including alcohol dependency, severe NCDs such as liver cirrhosis, some cancers and cardiovascular diseases (World Health Organization, 2018). New causal associations have been found between harmful drinking and infectious disease occurrences, such as tuberculosis and HIV/AIDS.

The prevalence of alcohol consumption is high in India and Madhya Pradesh. There is no Government action, particularly to raise awareness about the harmful effects of alcohol consumption.



### 5.3.5.3. Drugs (Cannabis and Opioids)

States with a high population of children that need help in reducing use of inhalants include Uttar Pradesh, Madhya Pradesh, Maharashtra, Delhi, and Haryana (Ministry of Social Justice and Employment, 2019).

The five domains and the risk factors and protective effects that impact substance abuse are listed in Table 49 (National Institute on Drug Abuse, 2011).

**Table 49: Risk factors of Alcohol/Drug Abuse**

<b>Risk Factors</b>	<b>Domain</b>	<b>Protective Factors</b>
Early Aggressive Behaviour	Individual	Self-Control
Lack of Parental Supervision	Family	Parental Monitoring
Lack of Parental Supervision	Family	Parental Monitoring
Substance Abuse	Peer	Academic Competence
Drug Availability	School	Anti-drug Use Policies
Poverty	Community	Strong Neighbourhood Attachment



## 5.4. Recommendations

### 5.4.1. Reproductive and Maternal Health

#### Maternal Health

Expanding healthcare coverage, raising awareness, providing education, spreading information about pregnancy and childbirth will help the patient to understand when to seek medical help. Further strengthening the functionality of referral networks can prevent maternal deaths. It is also proposed that the government should pay attention to better educational opportunities, economic conditions, and ensure access to healthcare and information for improvement of maternal healthcare utilisation.

Quality antenatal care should be provided by ANM with support of ASHA to detect problems related to anaemia and blood pressure at field level. ANMs should also routinely carry out postnatal care for both baby and mother to ensure timely detection of complications during this period.

Early identification and management of pregnancy induced hypertension and anaemia and the importance of contraception, early referral, judicious use of IV fluids, blood products, and drugs can prevent more than 90 per cent maternal deaths.

#### Child Health

The need to improve the female literacy rates as a priority for child health can hardly be undermined (Tiwari et al., 2008)

### 5.4.2. Communicable Diseases

#### Tuberculosis

A study was undertaken on “Perception of tuberculosis among general patients of tertiary care hospitals of Bengal”. (Das et al., 2012). It suggested that TB transmission can be reduced by enhancing awareness amongst illiterates about the myths and misconceptions and allaying the social stigma attached to it. Other awareness interventions could focus on preventing drug resistance and improving the efficacy of DOTS.

#### Malaria

It is suggested that malaria control campaigns be designed based on the knowledge gaps, practices, environments, resources, and preferences in different areas of a city, using interpersonal and media channels most likely to reach the target audiences.

#### HIV AIDS

Improving general knowledge about HIV/AIDS can create positive attitudes for patients' healthcare. To reduce stigma and discrimination, it is also necessary to plan and practice strategies for eliminating misconceptions amongst public, families and medical teams (Saki et al., 2015).



### 5.4.3. Non-Communicable Diseases

A research on “Burden of NCDs, policies and programmes for prevention and control of NCDs in India” recommended an integrated and comprehensive approach (Srivatsava & Bachani, 2011). Such an approach would need to emphasise health promotion, population-based interventions, prevention of exposure to risk factors, specific measures at individual and family level, early diagnosis through screening and better diagnostic facilities, improved capacity for management and universal access to health services.

#### Diabetes

To prevent diabetes mellitus, it is necessary to create awareness amongst peers, public health experts, health services researchers, healthcare providers and planners to reflect on the higher prevalence and associated risk factors of diabetes mellitus.

#### Cancer

In India the prevalence and mortality due to cervical and breast cancer is very high. The government thus needs to take urgent action for screening and early cancer detection.

### 5.4.4. Senior Care

The need of the hour to address geriatric mental health issues is to increase awareness, build capacity, strengthen training and research activities, develop community-based rehabilitation programmes and develop a holistic primary healthcare system.

### 5.4.5. Substance Abuse

The article “Preventing Drug Use among Children and Adolescents”, states that being aware of risk factors can assist families, health professionals, schools and other community workers in identifying at-risk youth and aid in reducing or eliminating risk factors through prevention and treatment programmes (Chakravarthy et al., 2013). The Government thus needs to launch a series of awareness programmes in this direction.

#### Tobacco

A study on evaluating the prevalence of areca-nut chewing recommended that efforts must be undertaken to increase awareness regarding the health risks of areca-nut among the general public, parents, teachers, and children/adolescents to discourage developing habits (Khandelwal et al., 2013).

#### Alcohol

Government needs to take action to spread awareness about the harmful use of alcohol through media and community involvement.

#### Drugs

New substances such as solvents (nail polish remover and thinner to paints) being cheap and readily available are being increasingly consumed by youngsters (Ghulam et al., 2016). It is recommended that multi-centre studies be undertaken with larger sample sizes drawn from the slums to get better insights on how to control drug consumption, especially such newer substances



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# 6. DETERMINANTS OF HEALTH



## 6.1. Determinants of Health

The range of personal, social, economic, and environmental factors that influence health are known as determinants of health. These determinants fall under several broad categories, such as social factors, individual behaviour, health systems, healthcare delivery, health seeking behaviour and health literacy (ODPHP, 2020). These determinants are briefly studied in this section.

### 6.1.1. Social Determinants of Health

SDH are the conditions under which people are born, grow, work, live, and age, and a wider set of forces and systems shaping the conditions of daily life. Key areas of SDH include economic stability, education, social and community context, health and healthcare and neighbourhood and built environment. A range of factors that impact health include inequality; poverty; social exclusion; socioeconomic position; income; public policies; health services; employment; education; housing; transport; the built environment; health behaviours or lifestyles-diet, smoking, and alcohol (substance abuse); and psychosocial factors-social and community support networks and stress.

Addressing social determinants of health is important for improving health and reducing longstanding disparities in health and healthcare. According to WHO, 50 per cent of the inequalities in major NCDs are accounted for by social inequalities. It also states that 50 per cent reduction in under-5 child mortality, between 1990 and 2010, was attributable to non-health sector investments.

### 6.1.2. Physical Health

Physical well-being implies engaging in a healthy lifestyle to decrease the risk of disease. Regular exercise, balanced nutrition, and adequate rest all contribute to good health. European Patients' Academy defined physical health as the body condition, from absence of disease to fitness levels (European Patients' Academy, 2020). Good physical health can work in tandem with mental health to improve a person's overall quality of life.

Walking, cycling, sports and recreation, are physical activities that can be undertaken at any skill level. Regular and adequate physical activity improves overall health and reduces the risk of lifestyle diseases, such as hypertension, diabetes and strokes. Exercise, a subcategory of physical activity, is planned, structured, repetitive, and aims to improve or maintain one or more components of physical fitness.

All forms of physical activity offer health benefits if undertaken regularly for sufficient duration and with required intensity, also defined by WHO for different age groups (World Health Organization, 2018). However, globally, 1 in 4 adults is not active enough and more than 80 per cent of the adolescent population is physically insufficiently active.

### 6.1.3. Health System

WHO defines a health system as one which consists of organisations, people, and actions with the primary intent to promote, restore or maintain health. This includes

efforts to influence the determinants of health as well as more direct health-improving activities. The vital components of a strong health system include service delivery, trained health workforce, health information systems, medical products, vaccines, and technologies (World Health Organization, 2007). Health financing systems, leadership and governance, quality and safety of care, utilisation and access are other key building blocks of an effective health system.

Public health infrastructure provides communities, states, and nations the capacity to prevent disease, promote health, and prepare for and respond to both acute (emergency) and chronic (ongoing) health challenges (ODPHP, 2020). India has a 3-tiered Public Health System, with the District Health System being the most fundamental for implementing health policies, delivering healthcare and managing health services. Sub centres, PHCs and CHCs form an important part of the health infrastructure in India. In 2015, Madhya Pradesh had 9,912 sub centres, 1,171 PHCs and 334 CHCs (MoHFW, 2015). Despite these efforts, India's health system shows widespread inequality in access to healthcare services and challenges in creating awareness, human resources, affordability, and accountability.

Health System Strengthening is thus a major component of the National Health Mission. It includes adoption of Indian Public Health Standards, quality standards for clinical protocols, skill gaps and standard treatment protocols and Quality Improvement Programmes amongst others (MoHFW, 2021).

#### **6.1.4. Healthcare Delivery**

According to WHO safe, accessible, high quality, efficient, people-centred, and integrated health service delivery systems, that offer personal and non-personal health interventions are critical for achieving universal health coverage. India has a mixed and fragmented healthcare network, comprising public and private healthcare providers. Most private healthcare providers are clustered in urban India, with urban poor often getting deprived of basic healthcare services. Data on health infrastructure and health manpower in Health Statistics 2018-19 show a manpower shortfall at both the U-PHC as well as the U-CHCs.

Emphasis on improving quality of healthcare at the system level involves an emphasis on governance issues, including improving public-sector management, building institutional capacity, and promoting a culture of data-driven policies.

The Government of India's Ayushman Bharat Scheme aims to achieve UHC in alignment with the SDGs, with the underlying commitment to "leave no one behind". It adopts a continuum of care approach, comprising of two interrelated components, i.e., Health and Wellbeing Centres (HWBs) and Pradhan Mantri Jan Arogya Yojana (PM-JAY).

#### **6.1.5. Healthcare Seeking Behaviour**

Healthcare seeking behaviour (HSB) is an action or inaction taken by individuals to find an appropriate remedy when they perceive themselves to have a health issue or to be ill. The early recognition of symptoms, presentation to health facilities, and compliance with effective treatment reduce the spread of diseases such as COVID-19 and TB. Factors that affect health-seeking behaviours include accessibility and availability of health systems, patient's awareness of symptoms and severity of a



disease and socio-economic factors (Musing Uzi et al., 2018).

In India's urban areas poverty is amongst the major reasons for not seeking any treatment, reflecting an urgent need for health provision for the deprived populations. HSB of mothers with respect to their children is driven by factors such as joint family structures, mass media exposure, literacy status, socioeconomic status of mothers, and gender differences among children.

### **6.1.6. Health Literacy**

According to European Health Literacy Consortium, Health Literacy is linked to literacy and entails people's knowledge, motivation and competence to access, understand, appraise and apply health information to take decisions concerning healthcare, disease prevention and health promotion to maintain or improve quality of life during the life course. Higher levels of health literacy within populations yield social benefits by mobilizing communities to address social, economic, and environmental determinants of health.

The health literacy scores amongst patients attending a tertiary care hospital were found to be very poor, making it important to start health literacy education in childhood. In addition, improving women's health literacy levels can make a positive impact on the family and community health.





# 7. ANNEXURE

## 7.1. FOOD

### 7.1.1. Annexure 1: Indicators for Children’s Nutritional Status

Table 50: Indicators for Children’s Nutritional Status

Indicator	Prevalence cut-off values for public health significance	Consequences and implications
Underweight (weight-for-age)	<p>&lt; 10 per cent: Low prevalence</p> <p>10~19 per cent: Medium prevalence</p> <p>20~29 per cent: High prevalence</p> <p>≥ 30 per cent: Very high prevalence</p>	<ul style="list-style-type: none"> <li>•Mildly underweight children have a high risk of mortality whereas, severely underweight children are at higher risk.</li> </ul>
Stunting (height-for-age)	<p>&lt; 20 per cent: Low prevalence</p> <p>20~29 per cent Medium prevalence</p> <p>30~39 per cent: High prevalence</p> <p>≥ 40 per cent: Very high prevalence</p>	<ul style="list-style-type: none"> <li>•Cumulative effects of undernutrition and infections since and even before birth.</li> <li>•Results in delayed mental development, poor school performance and reduced intellectual capacity</li> </ul>
Wasting (weight-for-height)  (Acute malnutrition is also known as “wasting”)	<p>&lt; 5 per cent: Acceptable</p> <p>5~9 per cent: Poor</p> <p>10~14 per cent: Serious</p> <p>≥ 15 per cent: Critical</p>	<ul style="list-style-type: none"> <li>•A symptom of acute undernutrition, usually as a consequence of insufficient food intake or a high incidence of infectious diseases, especially diarrhoea.</li> <li>•Impairs the functioning of the immune system and can lead to increased severity and duration of and susceptibility to infectious diseases</li> </ul>
Low birth weight (weight at birth less than 2500 g) (5.5 lb)	<p>(i) Low birth weight (LBW): Baby weighs less than 2500 grams, or 5 lbs 5 oz.</p> <p>(ii) Very low birth weight (VLBW): Baby weighs less than 1500 grams, or about 3 lb 9 oz.</p> <p>(iii) Extremely low birth weight (ELBW): Baby weighs less than 1000 grams, or about 2 lb 3 oz.</p>	<ul style="list-style-type: none"> <li>•An indicator of a multifaceted public health problem that includes long-term maternal malnutrition, ill health, hard work and poor healthcare in pregnancy.</li> <li>•It contributes to a range of poor health outcomes: it is closely associated with foetal and neonatal mortality and morbidity, inhibited growth and cognitive development and chronic diseases later in life.</li> </ul>



Overweight and Obese	<ul style="list-style-type: none"> <li>•Weight for height &gt; +2 SD of the WHO Child Growth Standards median</li> <li>•Obesity is weight-for-height greater than 3 standard deviations above the WHO Child Growth Standards median.</li> </ul>	•Child overweight can lead to early onset of type-2 diabetes, stigmatisation and depression, and is a strong predictor of adult obesity, with serious health and economic consequences.
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([https://www.who.int/nutrition/nlis\\_interpretation\\_guide.pdf](https://www.who.int/nutrition/nlis_interpretation_guide.pdf))

**Table 51: Nutritional Indicators for Adolescent**

<b>Nutrition indicators</b>	<b>Prevalence cut-off values for public health significance</b>
Prevalence rate of obesity among adolescents (10–19 years), and by age category and sex (per cent)	Obese (BMI $\geq$ 30.0 kg/m <sup>2</sup> )
Prevalence rate of overweight among adolescents (10–19 years), and by age category and sex (per cent)	Overweight (BMI = 25–29.9 kg/m <sup>2</sup> )
Prevalence rate of underweight among adolescents (10–19 years), and by age category and sex (per cent)	Underweight (BMI < 18.5 kg/m <sup>2</sup> )
Prevalence rate of anaemia among adolescents (10–19 years), and by age category and sex (per cent)	Haemoglobin level below 11 g/dl for males and 12 g/dl for females (at sea level)

Source: [https://applications.emro.who.int/dsaf/EMROPUB\\_2014\\_EN\\_1694.pdf](https://applications.emro.who.int/dsaf/EMROPUB_2014_EN_1694.pdf)

**Table 52: Serum Retinol Concentration to Diagnose Vitamin A Deficiency**

<b>Indicator</b>	<b>Indicator prevalence cut-off values for public health significance</b>
1–9 years serum retinol concentration	<20 $\mu$ g/dL
10–19 years serum retinol concentration	<20 $\mu$ g/dL
Night blindness (XN) pregnant women	$\geq$ 5: Moderate

## 7.2. WATER

### 7.2.1. Annexure 2: Use of Drinking Water Sources in India

Table 53: Use of Drinking Water Sources in India

Year	Use of drinking water sources (percentage of population)															Percentage of 2015 population that gained access in 1990 (per cent)
	URBAN					RURAL					TOTAL					
	Improved			Unimproved	Surface Water	Improved			Unimproved	Surface Water	Improved			Unimproved	Surface Water	
	Total Improved	Piped On Premises	Other Improved			Total Improved	Piped On Premises	Other Improved			Total Improved	Piped On Premises	Other Improved			
1990	89	47	42	10	1	64	6	58	32	4	71	16	55	26	3	46
2015	97	54	43	3	0	91	16	77	6	1	94	28	66	5	1	

Source: (WHO/UNICEF, 2015)

Table 54: Access to drinking water estimates (in India)

Year	Population	per cent Urban	National Drinking Water Estimates														
			NATIONAL					RURAL					URBAN				
			At least basic	Limited (More than 30 mins)	Unimproved	Surface Water	Annual Rate of Change in Basic	At least basic	Limited (More than 30 mins)	Unimproved	Surface Water	Annual Rate of Change in Basic	At least basic	Limited (More than 30 mins)	Unimproved	Surface Water	Annual Rate of Change in Basic
2000	1053	28	79	5	14	1	1	74	6	18	2	1	95	3	5	<1	0
2017	1339	34	93	<1	6	<1		91	<1	7	<1		96	<1	3	<1	

Source: (WHO/UNICEF, 2015)



**Table 55: Proportion of population using improved water supplies**

Year	Proportion of population using improved water supplies																	
	NATIONAL						RURAL						URBAN					
	Safely Managed	Accessible on premises	Available when needed	Free from contamination	Piped	Non-Piped	Safely Managed	Accessible on premises	Available when needed	Free from contamination	Piped	Non-Piped	Safely Managed	Accessible on premises	Available when needed	Free from contamination	Piped	Non-Piped
2000	-	33	70	-	44	40	20	20	63	48	33	47	-	68	88	-	74	21
2017	-	63	82	-	44	50	56	56	79	67	32	60	-	77	87	-	68	28

Source: (WHO/UNICEF, 2015)

## 7.2.2. Annexure 3: Methods for reducing household water consumption

Methods for reducing household water consumption:<sup>36</sup>

### ⌘ In Toilets:

- Install Low Models: Ensure new toilets do not use more than 22 litres per flush. Replace old toilets with ultra-low volume (ULV) flush model to reduce water consumption per flush.
- Dual flush model: Which uses a converter to change a normal toilet to a dual model leading to significant water saving.
- Install composting toilets: A composting toilet is a type of dry toilet that treats human waste by a biological process called composting.

### ⌘ Laundry:

- Only run washing machine when fully loaded
- Use a high efficiency machine, which uses less water and energy.

### ⌘ Bathing:

- Install water saving appliances
- Reduce the time and water used during every shower

### ⌘ Faucet and Sink:

- Do not leave tap running while performing activities like brushing, washing vessels, cleaning vegetables etc

### ⌘ Leaks:

- Check pipes for leaks
- Check toilets for leaks
- Use water meters to check internal water leaks and fix immediately

### ⌘ Other:

- Insulation of water pipes
- Recycle water
- Consume less water intensive foods
- Reduce consumption footprint

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<sup>36</sup> <https://learn.eartheasy.com/guides/45-ways-to- conserve-water-in-the-home-and-yard/>



### 7.2.3. Annexure 4: WHO Guideline Values for drinking water quality

Source: <https://apps.who.int/iris/bitstream/handle/10665/276001/9789241550376-eng.pdf?ua=1>

#### WHO guideline values for drinking-water quality: bacteria

Pathogen	Guideline value
<b><i>Legionella</i> spp.</b>	<p>There is no guideline value for <i>Legionella</i>.</p> <p>Water temperature is an important element of control strategies against <i>Legionella</i>. Wherever possible, water temperatures should be kept outside the range of 25–50 °C and preferably outside the range of 20–50 °C to prevent the growth of the organism. In hot water systems, temperatures leaving heaters should be above 60 °C, and temperatures above 50 °C should be maintained throughout associated pipework. However, maintaining temperatures of hot water above 50 °C may represent a scalding risk in young children, the elderly and other vulnerable groups. Where temperatures in hot or cold water distribution systems cannot be maintained outside the range of 25–50 °C, greater attention to disinfection and strategies aimed at limiting development of biofilms are required.</p>
<b><i>Escherichia coli</i></b>	<p><i>Escherichia coli</i> (<i>E. coli</i>) or thermotolerant coliform bacteria must not be detectable in any 100 ml sample.</p> <p>The presence of <i>E. coli</i> indicates faecal contamination of drinking-water due to cross-contamination. Such cross-contamination may occur in buildings due to cross-connection with non-drinking-water systems or during water transport or storage in non-piped water supply conditions where households need to fetch water at a source outside their home.</p>

Figure 21: WHO guidelines for drinking water quality

## WHO guideline values for drinking-water quality: chemical contaminants II

Compound	Guideline value
<b>Arsenic</b>	<p>0.01 mg/l (10 µg/l)</p> <p>The guideline value is designated as provisional on the basis of treatment performance and analytical achievability.</p> <p>Arsenic is usually present in natural waters at concentrations of less than 1–2 µg/l. However, in waters, particularly groundwaters, where there are sulfide mineral deposits and sedimentary deposits deriving from volcanic rocks, the concentrations can be significantly elevated. Signs of chronic arsenicism, including dermal lesions, such as hyperpigmentation and hypopigmentation, peripheral neuropathy, skin cancer, bladder and lung cancers and peripheral vascular disease, have been observed in populations ingesting arsenic-contaminated drinking-water. For local non-piped water supplies, the first option for control is often substitution by, or dilution with, microbially safe low-arsenic sources. It may also be appropriate to use alternative sources for drinking and cooking but to use the contaminated sources for purposes such as washing and laundry.</p>
<b>Fluoride</b>	<p>1.5 mg/l (1500 µg/l)</p> <p>Traces of fluorides are present in many waters, with higher concentrations often associated with groundwaters. Skeletal fluorosis (with adverse changes in bone structure) may be observed when drinking-water contains 3–6 mg/l fluoride, particularly with high water consumption. Crippling skeletal fluorosis usually develops only where drinking-water contains over 10 mg/l. The risk of dental fluorosis will depend on the total intake of fluoride from all sources and not just the concentration in drinking-water. A management guidance document on fluoride is available. In some countries, fluoride may also be added to drinking-water in order to provide protection against dental caries, such that final concentrations are usually between 0.5 and 1 mg/l.</p>
<b>Nitrate</b>	<p>50 mg/l (50 000 µg/l)</p> <p>Methaemoglobinaemia has most frequently been associated with private wells. The most appropriate means of controlling nitrate concentrations, particularly in groundwater, is the prevention of contamination. This may take the form of appropriate management of agricultural practices, the careful siting of pit latrines and septic tanks, sewer leakage control, as well as management of fertilizer and manure application and storage of animal manures. It may also take the form of denitrification of wastewater effluents.</p>



## WHO guideline values for drinking-water quality: chemical contaminants I

Compound	Guideline value
<b>Antimony</b>	0.02 mg/l (20 µg/l) As the most common source of antimony in drinking-water appears to be dissolution from metal plumbing and fittings, control of antimony from such sources would be by product control.
<b>Benzo[a]pyrene</b>	0.0007 mg/l (0.7 µg/l) The presence of significant concentrations of benzo[a]pyrene in drinking-water in the absence of very high concentrations of fluoranthene indicates the presence of coal tar particles, which may arise from seriously deteriorating coal tar pipe linings. It is recommended that the use of coal tar based and similar materials for pipe linings and coatings on storage tanks be discontinued.
<b>Copper</b>	2 mg/l (2000 µg/l) In most instances where copper tubing is used as a plumbing material, concentrations of copper will be below the guideline value. However, there are some conditions, such as highly acidic or aggressive waters, that will give rise to much higher copper concentrations, and the use of copper tubing may not be appropriate in such circumstances.
<b>Lead</b>	0.01 mg/l (10 µg/l) This is a provisional guideline value as the key effects of lead seem not to have a threshold. Lead is exceptional compared with other chemical hazards, in that most lead in drinking-water arises from plumbing in buildings, and the remedy consists principally of removing plumbing and fittings containing lead. All other practical measures to reduce total exposure to lead, including corrosion control, should be implemented.
<b>Nickel</b>	0.07 mg/l (70 µg/l) Where nickel leaches from alloys in contact with drinking-water or from chromium- or nickel-plated taps, control is by appropriate control of materials in contact with the drinking-water and flushing taps before using the water.
<b>Vinyl chloride</b>	0.0003 mg/l (0.3 µg/l) As vinyl chloride is a known human carcinogen, exposure to this compound should be avoided as far as practicable, and levels should be kept as low as technically feasible. Vinyl chloride is primarily of concern as a potential contaminant from some grades of polyvinyl chloride pipe and is best controlled by specification of material quality.

### 7.2.4. Annexure 5: Guidelines for maintenance and operation of a wastewater system

Table 56: Guidelines for maintenance and operation of a wastewater system

Screens	<ul style="list-style-type: none"> <li>⌘ Screens should be cleaned at regular intervals</li> <li>⌘ The rakes should be made of stainless steel to prevent rusting and associated injuries</li> <li>⌘ Before manual inspection of the screen chamber, stop the flow and then inspect</li> <li>⌘ Always use hand gloves and boots during the cleaning.</li> </ul>
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Grit Chambers	<ul style="list-style-type: none"> <li>⌘ Check the corrosion of the various parts of the grit chamber regularly.</li> <li>⌘ Spray mild insecticide weekly on the walking platform and joints of guide rail/ tubing</li> <li>⌘ Check oil in the gearbox connected to the scraper as per manufacturer's time schedule</li> <li>⌘ Before repairing any electrical/mechanical parts, switch off the power supply.</li> <li>⌘ Ensure all labourers wear oxygen support equipment and cylinders while on the detritus tank</li> <li>⌘ Once a day, close and open the inlet and outlet control gates of the detritus tanks</li> <li>⌘ Once in six months, isolate a detritus tank, drain it fully and inspect the scraper blades and other parts</li> </ul>
Primary Sedi-mentation	<ul style="list-style-type: none"> <li>⌘ Make sure that all the weirs are at the same elevation</li> <li>⌘ Clean the sides and bottom of effluent launder once a day with a long handle wire brush</li> <li>⌘ Bleed the sludge whenever the sludge height exceeds the top of hopper</li> <li>⌘ If floating sludge is noticed, bleed more of settled sludge and check if all scrapers are alright</li> <li>⌘ If black and foul odour sludge is noticed, try to send all the flows to other tanks</li> <li>⌘ If scum is noticed in the settled sewage, increase the depth of the scum baffle plates</li> <li>⌘ If there is oil slick in the water surface, check oil guards of gearboxes or chain sprockets</li> <li>⌘ If sludge is escaping over the weir, evacuate bottom sludge almost completely</li> <li>⌘ If the problem continues, drain the tank and investigate the problem</li> </ul>
Aerators	<ul style="list-style-type: none"> <li>⌘ Check the machinery for corrosions, cracks, crevices, loose bolts, alignment etc</li> <li>⌘ If eccentricity is detected, stop the aerator and call the service engineer of the company</li> <li>⌘ Check for oil / grease leaks from the assembly of motor and gearbox</li> <li>⌘ Check the temperature of the motor casing and compare with the rating by the manufacturer</li> <li>⌘ Make sure the connecting cable is securely fastened and has not become loose</li> <li>⌘ Observe the vertical shaft of the aerator for any wobbling or oscillation</li> <li>⌘ If anything, unusual is observed, stop the aerator and inform plant superintendent</li> </ul>
Biological Treatment systems	<ul style="list-style-type: none"> <li>⌘ Ensure the required biomass in the system by measuring the biomass concentration in the system and adjusting the recycling rate</li> <li>⌘ Avoid clogging of pipelines, nozzles and other appliances. Follow the maintenance schedule provided by the manufacturer</li> <li>⌘ Avoid flushing out of biomass from the system by appropriate controlling of the flow</li> </ul>



Pumps	<ul style="list-style-type: none"> <li>⌘ Check for unusual pump noise while running</li> <li>⌘ Make sure that while the pump is running, it is actually pumping out the sludge</li> <li>⌘ Carry out the oiling of gearbox and gland packing etc as per manufacturer's terms</li> <li>⌘ Check for ammeter reading against manufacturer guidelines while running</li> <li>⌘ If the pump is drawing more current, report to plant superintendent;</li> <li>⌘ Ensure that the working pump is rotated in every shift and the pumps are identified</li> </ul>
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Types of decentralised wastewater management systems and their possible locations (DWWMs) :<sup>37</sup>

- ⌘ **Micro scale conventional centralised system:** This may be adopted in locations where there is no underground drainage (UGD) system and either an on-site system is non-existent or improperly designed/functioning and the ability of the user population to financially sustain the O and M costs.
- ⌘ **The settled sewerage system, shallow sewer system, small bore sewers or a twin drain system** can be adopted in already developed localities where UGD system is not there, but properly functioning on-site treatment systems like septic tanks are widely existent. The small bore sewer can be designed as a pressurised system or a vacuum system, but this will require a 24x7 unflinching electrical power supply and as such may be suitable only for high style resorts at faraway places.
  - Small bore sewers and shallow sewers can be adopted where per capita water supply is very low (< 50 lpcd).
- ⌘ **Incremental sewerage systems** can be adopted for a newly developing locality.
  - The incremental sewerage system comprises an integral twin drain on both sides of the road, the drain nearer to the property carrying the septic tank effluent and the grey water and the drain on the roadside for storm water and the sewer drains are interconnected to flow out to treatment.

## 7.2.5. Annexure 6: Details of Jal Kranti Abhiyan

The five components of the Jal Kranti Abhiyan include:<sup>38</sup>

- ⌘ **Jal Gram Yojana:** Two villages, in every district preferably being a part of dark block or facing acute water scarcity, shall be selected as "Jal Grams" An Integrated water security plan, water conservation, water management and allied activities shall be undertaken for the villages to ensure optimum and sustainable quantities of water.
- ⌘ **Model Command Area:** The field Officers of Central Water Commission in consultation with State Governments will identify those command areas which are under implementation through schemes of the Ministry of Water Resources like Accelerated Irrigation Benefit Programme (AIBP), Repair,

<sup>37</sup> <http://cpheeo.gov.in/upload/uploadfiles/files/Guidelines%20for%20Decentralized%20Wastewater%20Management.pdf>

<sup>38</sup> [http://jalshakti-dowr.gov.in/sites/default/files/JalKrantiAbhiyan\\_StepByStepGuide.pdf](http://jalshakti-dowr.gov.in/sites/default/files/JalKrantiAbhiyan_StepByStepGuide.pdf)

Renovation & Restoration (RRR) of Water Bodies and Command Area Development & Water Management (CAD & WM).

- ⌘ **Pollution Abatement**
- ⌘ **Mass Awareness Programme**
- ⌘ **Other Activities**



## 7.3.SANITATION

### 7.3.6. Annexure 7: Parameters for sewage treatment before disposal into the environment

Table 57: Parameters for sewage treatment before disposal into the environment

Parameter	Standard (max)
pH value	5.5 – 9 pH units
Oil and grease	10 - 20 mg/l
Total residual chlorine	1.0 mg/l
Ammoniacal nitrogen	50 mg/l
Total kjeldahl nitrogen	100 mg/l
Free ammonia (as NH <sub>3</sub> )	5.0 mg/l
Biochemical oxygen demand (3 days at 27°C)	30 – 100 mg/l
Chemical oxygen demand	250 mg/l
Suspended solids	30 – 150 mg/l

### 7.3.7. Annexure 8: Indicators to assess adequacy of sanitation systems

⌘ At the village and household level

- Availability and usage: Community/public toilets and adequate water is available for flush/pour-flush toilets. Different types of latrine can be used such as simple pit latrine, ventilated improved pit, pour flush latrine and composting latrine.
- Functional: The toilet is not broken, blocked, or no cracks and leaks in the toilet structure.
- Type of drainage arrangement
- Method of disposal of drainage/wastewater
- Prevalence of open defecation in that village
- Private: There are closable doors that can be locked from the inside and no large gaps or holes in the structure
- At least one sex separated latrine must be present
- Accessible for users with limited mobility: Toilets should be accessible without stairs or steps, have handrails for support attached either to the floor or sidewalls, a door which is at least 80 cm wide, for people on wheelchairs.

⌘ At the school level

**Table 58: Indicators to assess adequacy of sanitation systems at School level**

Water facilities and access to water	A reliable water point is available A reliable drinking-water point is accessible at all times Sufficient showers are available
Latrine/ Toilet	Sufficient toilets are available (one per 25 girls and one for female staff; one toilet plus one urinal (or 50 cm of urinal wall) per 50 boys, and one for male staff.) Toilets are easily accessible to all, including differently-abled children and staff. Male and female toilets are completely separated. Toilets provide privacy and security Toilets are hygienic to use and easy to clean. Toilets have convenient handwashing facilities close by. A cleaning and maintenance routine is in operation, and ensures that clean and functioning toilets are available at all times.
Water Quantity	a. Basic quantities of water required and sufficient water is available at all times for drinking, personal hygiene, food preparation and cleaning. Day schools (5 litres per person per day for all schoolchildren and staff) Boarding schools (20 litres per person per day for all residential schoolchildren and staff) Non-residential schoolchildren and staff (5 litres per person per day) b. Additional quantities of water required- The following should be added to the basic quantities as necessary. Figures given are for day schools. They should be doubled for boarding schools. Flushing toilets (10–20 litres per person per day for conventional flushing toilets) Pour-flush toilets (1.5–3.0 litres per person per day) Anal washing (1–2 litres per person per day)

### 7.3.8. Annexure 9: The general indicators to measure hygiene practices

- ⌘ Where communal bathing facilities are necessary, there are sufficient bathing cubicles available, with separate cubicles for males and females, and they are used appropriately and equitably.
- ⌘ There is at least 250g of soap available for personal hygiene per person per month.
- ⌘ Each person has access to 200g of laundry soap per month
- ⌘ Hand hygiene facilities at toilets must be located no more than 5 metres from the toilets.
- ⌘ Infants and children up to two years of age have 12 washable nappies or diapers, where these are typically used
- ⌘ Handwashing facility: Sink with tap, water tank with tap, bucket with tap or another similar device. (May include alcohol-based hand rub dispensers, whether they are fixed or portable).
- ⌘ Women and girls have sanitary materials for menstruation
- ⌘ Adequate excreta disposal system
- ⌘ Use and maintenance of toilets
- ⌘ Hygienic water collection and storage
- ⌘ Proximity of water supply to latrine for handwashing



## 7.4. ENVIRONMENT

### 7.4.1. Annexure 10: The indicators for ambient air pollution are

Carbon monoxide (CO)	35 ppm (1-hour period); 9 ppm (8-hour period)
Nitrogen oxides (NO and NO <sub>2</sub> )	40 µg/m <sup>3</sup> annual mean 200 µg/m <sup>3</sup> 1-hour mean
Sulphur dioxide (SO <sub>2</sub> )	20 µg/m <sup>3</sup> 24-hour mean 500 µg/m <sup>3</sup> 10-minute mean
Ozone (O <sub>3</sub> )	100 µg/m <sup>3</sup> 8-hour mean
Particulate matter	1. Fine particulate matter (PM <sub>2.5</sub> ) 10 µg/m <sup>3</sup> annual mean 25 µg/m <sup>3</sup> 24-hour mean 2. Coarse particulate matter (PM <sub>10</sub> ) 20 µg/m <sup>3</sup> annual mean 50 µg/m <sup>3</sup> 24-hour mean

While the list of parameters for chemical limits in household air pollution are:  
(World Health Organization, 2010)

Benzene	The concentrations of airborne benzene associated with an excess lifetime risk of 1/10 000, 1/100000 and 1/1 000 000 are 17, 1.7 and 0.17 µg/m <sup>3</sup> , respectively.
Carbon monoxide	100 mg/m <sup>3</sup> = 90 ppm for 15 minutes 60 mg/m <sup>3</sup> = 50 ppm for 30 minutes 30 mg/m <sup>3</sup> = 25 ppm for 1 hour 10 mg/m <sup>3</sup> = 10 ppm for 8 hours
Formaldehyde	0.1 mg/m <sup>3</sup> – 30-minute average
Naphthalene	0.01 mg/m <sup>3</sup> – annual average
Nitrogen dioxide	200 µg/m <sup>3</sup> – 1-hour average 40 µg/m <sup>3</sup> – annual average
Tetrachloroethylene	0.25 mg/ m <sup>3</sup> – annual average
Polycyclic aromatic hydrocarbons	The corresponding concentrations for lifetime exposure to B[a] P producing excess lifetime cancer risks of 1/10000, 1/100 000 and 1/1 000 000 are approximately 1.2, 0.12 and 0.012 ng/m <sup>3</sup> , respectively
Radon	The radon concentrations associated with an excess lifetime risk of 1/100 and 1/1000 are 67 and 6.7 Bq/m <sup>3</sup> for current smokers and 1670 and 167 Bq/m <sup>3</sup> for lifelong non-smokers, respectively.
Trichloroethylene	The concentrations of airborne trichloroethylene associated with an excess lifetime cancer risk of 1:10000, 1:100 000 and 1:1 000 000 are 230, 23 and 2.3 µg/m <sup>3</sup> , respectively

## 7.4.2. Annexure 11: Guideline values from WHO Air Quality guidelines

Guideline values from WHO Air quality guidelines – global update 2005

Compound	Guideline value valid indoors and outdoors	Interim target levels <sup>13</sup>		
		IT-1	IT-2	IT-3
PM2.5	10 µg/m <sup>3</sup> annual mean	35 µg/m <sup>3</sup>	25 µg/m <sup>3</sup>	15 µg/m <sup>3</sup>
	25 µg/m <sup>3</sup> 24-hour mean	75 µg/m <sup>3</sup>	50 µg/m <sup>3</sup>	37.5 µg/m <sup>3</sup>
PM10	20 µg/m <sup>3</sup> annual mean	70 µg/m <sup>3</sup>	50 µg/m <sup>3</sup>	30 µg/m <sup>3</sup>
	50 µg/m <sup>3</sup> 24-hour mean	150 µg/m <sup>3</sup>	100 µg/m <sup>3</sup>	75 µg/m <sup>3</sup>
Ozone	100 µg/m <sup>3</sup> daily maximum 8-hour mean	160 µg/m <sup>3</sup>	—	—
Sulfur dioxide	20 µg/m <sup>3</sup> 24-hour mean	125 µg/m <sup>3</sup>	50 µg/m <sup>3</sup>	—
	500 µg/m <sup>3</sup> 10-minute mean	—	—	—

Figure 22: Guideline Values from WHO Air quality guidelines

## 7.4.3. Annexure 12: Noise pollution standard limits set by the WHO

Table 59: Noise pollution standard limits set by the WHO

Specific Environment	Time Base (hr)	Standard Limits as per WHO guidelines	
		LAeq[dB] <sup>39</sup>	LAm <sub>ax,fast</sub> [dB] <sup>40</sup>
Outdoor living area	16	50-55	-
Dwelling, indoors, Inside bedrooms	16 8	35 30	- 45
Outside bedrooms	8	45	60
School classrooms and pre-schools, indoors	During class	35	-
Pre-school bedrooms, indoors	Sleeping time	30	45
School, playground outdoor	During play	55	-
Hospital, ward rooms, indoors	8 16	30 30	40 -
Hospitals, treatment rooms, indoors	-	As low as possible	-
Industrial, commercial, shopping and traffic areas, indoors and outdoors	24	70	110

<sup>39</sup> LAeq [dB]: Denotes the time weighted average of the level of sound in decibels on scale A which is relatable to human hearing.

<sup>40</sup> LAm<sub>ax,fast</sub> [dB]: The maximum value that the A-weighted sound pressure level reaches during a measurement period.



Ceremonies, festivals and entertainment events	4	100	110
Public addresses, indoors and outdoors	1	85	110
Music through headphones/earphones	1	85 (headphones)	110

The indicators of Ambient Air Quality standards in respect of Noise (Day time, Night time) are: (World Health Organization, 2018)

**Table 60: Indicators of Ambient Air Quality standard**

Environment	Day (dB)	Night (dB)
Road traffic noise	53	45
Railway noise	54	44
Aircraft noise	45	40
Wind turbine noise	45	45
Industrial area	75	70
Commercial Area	65	55
Residential area	55	45
Silence zone	50	40
Community	55	45

## 7.4.4. Annexure 13: WHO Recommendations on Environmental Noise for European Region

Source: (World Health Organization, 2018)

**Recommendations of the WHO Environmental noise guidelines for the European Region, continued**

Source of noise	Recommendation	Strength of recommendation
<b>Aircraft noise</b>	For average noise exposure, the GDG strongly recommends reducing noise levels produced by aircraft to below 45 dB $L_{den}$ as aircraft noise above this level is associated with adverse health effects.	Strong
	For night noise exposure, the GDG strongly recommends reducing noise levels produced by aircraft during night time to below 40 dB $L_{night}$ as night-time aircraft noise above this level is associated with adverse effects on sleep.	Strong
	To reduce health effects, the GDG strongly recommends that policy-makers implement suitable measures to reduce noise exposure from aircraft in the population exposed to levels above the guideline values for average and night noise exposure. For specific interventions, the GDG recommends implementing suitable changes in infrastructure.	Strong
<b>Wind turbine noise</b>	For average noise exposure, the GDG conditionally recommends reducing noise levels produced by wind turbines to below 45 dB $L_{den}$ as wind turbine noise above this level is associated with adverse health effects.	Conditional
	No recommendation is made for average night noise exposure $L_{night}$ of wind turbines. The quality of evidence of night-time exposure to wind turbine noise is too low to allow a recommendation.	N/A
	To reduce health effects, the GDG conditionally recommends that policy-makers implement suitable measures to reduce noise exposure from wind turbines in the population exposed to levels above the guideline values for average noise exposure. No evidence is available, however, to facilitate the recommendation of one particular type of intervention over another.	Conditional
<b>Leisure noise</b>	For average noise exposure, the GDG conditionally recommends reducing the yearly average from all leisure noise sources combined to 70 dB $L_{Aeq,24h}$ as leisure noise above this level is associated with adverse health effects. The equal energy principle can be used to derive exposure limits for other time averages, which might be more practical in regulatory processes.	Conditional
	For single-event and impulse noise exposures, the GDG conditionally recommends following existing guidelines and legal regulations to limit the risk of increases in hearing impairment from leisure noise in both children and adults.	Conditional
	Following a precautionary approach, to reduce possible health effects, the GDG strongly recommends that policy-makers take action to prevent exposure above the guideline values for average noise and single-event and impulse noise exposures. This is particularly relevant as a large number of people may be exposed to and at risk of hearing impairment through the use of personal listening devices. There is insufficient evidence, however, to recommend one type of intervention over another.	Strong

Figure 23: WHO Recommendations on Environmental Noise for European Region



### 7.4.5. Annexure 14: Types of Bio Medical Waste

- ⌘ **Infectious waste:** Waste contaminated with blood and other body fluids (e.g. from discarded diagnostic samples), cultures and stocks of infectious agents from laboratory work (e.g. waste from autopsies and infected animals from laboratories), or waste from patients with infections (e.g. swabs, bandages and disposable medical devices);
- ⌘ **Pathological waste:** Human tissues, organs or fluids, body parts and contaminated animal carcasses;
- ⌘ **Sharps waste:** Syringes, needles, disposable scalpels and blades, etc.;
- ⌘ **Chemical waste:** For example, solvents and reagents used for laboratory preparations, disinfectants, sterilant and heavy metals contained in medical devices (e.g. mercury in broken thermometers) and batteries;
- ⌘ **Pharmaceutical waste:** expired, unused and contaminated drugs and vaccines;
- ⌘ **Cytotoxic waste:** waste containing substances with genotoxic properties (i.e. highly hazardous substances that are, mutagenic, teratogenic or carcinogenic), such as cytotoxic drugs used in cancer treatment and their metabolites;
- ⌘ **Radioactive waste:** such as products contaminated by radionuclides including radioactive diagnostic material or radiotherapeutics materials; and
- ⌘ **Non-hazardous or general waste:** waste that does not pose any particular biological, chemical, radioactive or physical hazard.

### 7.4.6. Annexure 15: Some Sources and Quantum of Industrial Waste Generation

Table 61: Some Sources and Quantum of Industrial Waste Generation

Name	Quantity (million tonnes per annum)	Source/Origin
Steel and Blast furnace	35	Conversion of pig iron to steel and manufacture of Iron
Brine Mud	0.02	Caustic soda industry
Copper slag	0.0164	By product from smelting of copper
Fly ash	70	Coal based thermal power plants
Kiln Dust	1.6	Cement plants
Lime Sludge	3	Sugar, paper, fertiliser tanneries, soda ash, calcium carbide industries
Mica scraper waste	0.005	Mica mining areas
Phospho-gypsum	4.5	Phosphoric acid plant, Ammonium phosphate

Name	Quantity (million tonnes per annum)	Source/Origin
Red mud/ Bauxite	3	Mining and extraction of alumina from Bauxite
Coal washery dust	3	Coal mines
Iron tailing	11.25	Iron ore
Limestone waste	50	Limestone quarry

### 7.4.7. Annexure 16: Indicators of Social and Mental Wellbeing

Valid positive indicators of social and mental wellbeing are scarce, making it necessary to use indicators of social and mental pathology, examples of the possible indicators are the rate of suicide, homicide, other act of the violence and other crime, road traffic accidents, juvenile delinquency, alcohol, and drug abuse, smoking, consumption of the tranquilizers, obesity, etc.<sup>41</sup>

The 2018 Global Reference List “100 Core Health Indicators” included indicator for mental health in the service coverage domain (World Health Organization, 2018):- Coverage of services for severe mental health disorders Definition of the Indicators:- percentage of persons with a severe mental disorder (psychosis, bipolar affective disorder, moderate-severe depression) who are using services.

Mental health indicators among adolescents are (World Health Organization, 2014):

- ⌘ Prevalence rate of depression among adolescents (10–19 years), and by age category and sex (per cent)
- ⌘ Prevalence rate of suicide attempts among adolescents (10–19 years), and by age category and sex (per cent)
- ⌘ Prevalence rate of substance use among adolescents (10–19 years), and by age category and sex (per cent)

NMHS Survey (2015-16) states that 1 in 20 people in India are depressed, and 1 in 40 have experienced depression in the past.

National Health Profile, 2018 reported that Maximum number of Suicide Cases (44,593) is reported between the age group 30-45 Years

World Health Statistics 2016 reported that the suicide rate in India in 2015 at 15.7/100,000 is higher than the regional average of 12.9 and the global average of 10.6.

According to the National Mental Health Survey of India, 2015-16 the availability of psychiatrists (per lakh population) is 0.05 in Madhya Pradesh and 1.2 in Kerala<sup>42</sup>.

<sup>41</sup>[http://www.communityhealth.in/~commun26/wiki/images/a/a1/Development\\_of\\_indicators\\_for\\_monitoring\\_progress\\_towards\\_Health\\_for\\_All\\_by\\_the\\_Year\\_2000.pdf](http://www.communityhealth.in/~commun26/wiki/images/a/a1/Development_of_indicators_for_monitoring_progress_towards_Health_for_All_by_the_Year_2000.pdf)

<sup>42</sup> <http://indianmhs.nimhans.ac.in/Docs/Summary.pdf>



## 7.4.8. Annexure 17: Guidelines for strengthening urban green spaces

### ⌘ Roads

- Correct species of tree must be selected considering the climate, soil conditions, life of the tree etc
- Deep rooted trees which will not disrupt roads
- Must be easy to transplant and must grow quickly
- Planting of trees along roads can be done in the following manner:
  - Avenue planting
  - Group planting
  - Mixed planting
  - Informal planting
- Spacing of trees:
  - Minimum spacing of 10-12 meters must be maintained between trees.
  - At urban intersections, trees to be at minimum of 3meters from intersection
- Type of trees: Specified guidelines on the type of trees suitable and unsuitable for roadside avenues must be followed.

⌘ **Water logging areas:** The landscape chosen also depends on the type of water logging in that area. Areas with high water logging have high roads, with mild slopes which are covered with shrubs.

⌘ **Sandy areas:** Plants with low water requirements and wind resistant must be grown

⌘ **Wooded areas:** As far as possible roads should be aligned along the outskirts of the forest and it should form a part of the road landscape; cutting of trees should be avoided

⌘ **Industrial Areas:** Where the roads are passing through the industrial area, screen planting should be done on both sides of the road so that views are addressed and they act as a buffer for noise and air pollution.

⌘ **Parking areas:** The most desirable plant material in the parking area is trees and shrubs. Trees provide shade in summer and improve the environment of a car park.

The Ministry of Housing and Urban Development has issued clear guidelines on maintenance of trees and green spaces (Ministry of Urban Development, GoI, 2014).

## 7.4.9. Annexure 18: Principles of universal design

The US-based Centre for Universal Design defined the principles of universal design as follows:

- ⌘ *Equitable* – the design should be usable by people with diverse abilities and should appeal to all users
- ⌘ *Flexible* – the design should cater for a wide range of individual preferences and abilities.
- ⌘ *Simple and intuitive* – use of the design should be easy to understand, regardless of experience, knowledge, language skills or current concentration level.
- ⌘ *Perceptible* – the design communicates necessary information effectively to

the user, regardless of ambient condition or the user's sensory abilities.

- ⌘ *Tolerance for error* – the design minimises hazards and the adverse consequences of accidental or unintended actions.
- ⌘ *Low physical effort* – the design can be used efficiently and comfortably with a minimum of fatigue.
- ⌘ *Size and space for approach use* – appropriate size and space is provided for approach, reach, manipulation and use, regardless of the user's body size, posture or mobility.

## 7.4.10. Annexure 19: Housing standards in India

Housing standards in India, recommended by the Environment and Health Committee 1947:

**Table 62: Housing standards in India**

Criteria	Standard
Site	<ul style="list-style-type: none"> <li>⌘ The subsoil water should be below 10 feet (3 meters)</li> <li>⌘ It should be away from nuisances such as smoke, smell, excessive noise and traffic</li> <li>⌘ It should be away from nuisances such as smoke, smell, excessive noise and traffic</li> </ul>
Set back	<ul style="list-style-type: none"> <li>⌘ For proper lighting and ventilation, there should be an open space all-round the house that is called "set back".</li> <li>⌘ In rural areas, it is recommended that the built-up area should not exceed one-third of the total area; in urban areas where land is costly, the built-up area may be up to two thirds.</li> <li>⌘ The setback should be such that there is no obstruction to lighting and ventilation</li> </ul>
Floor	<ul style="list-style-type: none"> <li>⌘ Impermeable</li> <li>⌘ Free from cracks n smooth</li> <li>⌘ Damp proof</li> <li>⌘ Ht. of plinth 2-3 ft</li> </ul>
Walls	<ul style="list-style-type: none"> <li>⌘ Reasonably strong</li> <li>⌘ Should have a low heat capacity i.e., should not absorb heat and conduct the same</li> <li>⌘ Weather resistant</li> <li>⌘ Unsuitable for harbourage of rats and vermin</li> </ul>
Roof	<ul style="list-style-type: none"> <li>⌘ The height of the roof should not be less than 10 feet (3 m) in the absence of air-conditioning.</li> <li>⌘ The roof should have a low heat transmittance coefficient.</li> </ul>



Criteria	Standard
Rooms	<ul style="list-style-type: none"> <li>⌘ The number of living rooms should not be less than two, at least one of which can be closed for security. The other may be open on one side if that side is a private courtyard. The number and area of rooms should be increased according to the size of the family.</li> <li>(i) Floor area: <ul style="list-style-type: none"> <li>⌘ The floor area of a living room-120 sq. ft. (12 m<sup>2</sup>) for more than one person</li> <li>100 sq. ft. (10 sq. m.) for a single person</li> <li>⌘ The floor area in living rooms per person should not be less than 50 sq.ft</li> </ul> </li> <li>(ii) Cubic space: <ul style="list-style-type: none"> <li>⌘ Unless mechanical replacement of air, the height of rooms should be such as to give an air space of at least 500 c.ft. per capita, preferably 1,000 c.ft.</li> </ul> </li> </ul>
Windows	<ul style="list-style-type: none"> <li>⌘ Unless mechanical ventilation and artificial lighting, every living room should be provided with at least 2 windows, and one of them should open directly on to an open space</li> <li>⌘ The windows should be placed at a height of not more than 3 feet (1 m) above the ground in living rooms</li> <li>⌘ Window area should be 1/5th of the floor area</li> <li>⌘ Doors and windows combined should have 2/5th the floor area.</li> </ul>
Lighting	<ul style="list-style-type: none"> <li>⌘ The daylight factor should exceed 1 per cent over half the floor area.</li> </ul>
Kitchen	<ul style="list-style-type: none"> <li>⌘ Every dwelling house must have a separate kitchen. The kitchen must be protected against dust and smoke; adequately lighted; provided with arrangements for storing food, fuel and with water supply</li> </ul>
Other	<ul style="list-style-type: none"> <li>⌘ Privy: A sanitary privy is a MUST in every house belonging exclusively to it and readily accessible, equipped with water carriage systems.</li> <li>⌘ Garbage And Refuse: These should be removed at least daily and disposed</li> <li>⌘ Bathing And Washing: The house should have facilities for bathing and washing and providing</li> <li>⌘ Water supply must be available at all times.</li> </ul>

Source: <http://ecoursesonline.iasri.res.in/mod/page/view.php?id=20362>

## 7.4.11. Annexure 20: Details of Construction Material Used in India

Details of Construction Material Used in India

**Table 63: Details of Construction Material Used in India**

No. of households (In million)	Percentage
Total number of households	100.0
Roof	
Concrete	19.8
Tiles	32.6

No. of households (In million)	Percentage
Grass, thatch, bamboo, wood, mud, etc.	21.9
Others	25.7
Wall	
Burn brick	43.7
Mud, unburnt brick	32.2
Grass, thatch, bamboo, wood, etc.	10.2
Others	13.9
Floor	
Mosaic, Floor tiles	7.3
Cement	26.5
Mud	57.1
Others	9.1

Source: Housing Tables, Census of India 2001. [https://censusindia.gov.in/census\\_and\\_you/housing.aspx](https://censusindia.gov.in/census_and_you/housing.aspx)

## 7.4.12. Annexure 21: Types of Violence Faced by Children

Different types of violence faced by children

- ⌘ **Maltreatment** (including violent punishment) involves physical, sexual and psychological/emotional violence; and neglect of infants, children and adolescents by parents, caregivers and other authority figures, most often in the home but also in settings such as schools and orphanages.
- ⌘ **Bullying** (including cyber-bullying) is unwanted, aggressive behaviour by another child or group of children who are neither siblings nor in a romantic relationship with the victim. It involves repeated physical, psychological or social harm, and often takes place in schools and other settings where children gather.
- ⌘ **Youth violence**, concentrated among children and young adults aged 10–29 years, occurs most often in community settings between acquaintances and strangers, includes bullying and physical assault with or without weapons (such as guns and knives), and may involve gang violence.
- ⌘ **Intimate partner violence** (or domestic violence) involves physical, sexual and emotional violence by an intimate partner or ex-partner. Although males can also be victims, intimate partner violence disproportionately affects females. It commonly occurs against girls within child marriages and early/forced marriages. Among romantically involved, but unmarried adolescents, it is sometimes called dating violence.
- ⌘ **Sexual violence** includes non-consensual completed or attempted sexual contact and acts of a sexual nature, not involving contact (such as voyeurism or sexual harassment); acts of sexual trafficking committed against someone who is unable to consent or refuse; and online exploitation.
- ⌘ **Emotional or psychological violence** includes restricting a child's movements, denigration, ridicule, threats and intimidation, discrimination, rejection and other non-physical forms of hostile treatment.



### **7.4.13. Annexure 22: Objectives of the National Environment Policy, 2006**

Following objectives were kept in mind while framing the National Environment Policy, 2006:<sup>43</sup>

- ⌘ Conservation of Critical Environmental Resources: To protect and conserve critical ecological systems and resources, and invaluable natural and man-made heritage, which are essential for life-support, livelihoods, economic growth, and a broad conception of human well-being.
- ⌘ Livelihood Security for the Poor: To ensure equitable access to environmental resources and quality for all sections of society, and in particular, to ensure that poor communities, which are most dependent on environmental resources for their livelihoods, are assured secure access to these resources.
- ⌘ Inter-generational Equity: To ensure judicious use of environmental resources to meet the needs and aspirations of the present and future generations.
- ⌘ Integration of Environmental Concerns in Economic and Social Development: To integrate environmental concerns into policies, plans, programmes and projects for economic and social development.
- ⌘ Efficiency in Environmental Resource Use: To ensure efficient use of environmental resources in the sense of reduction in their use per unit of economic output, to minimise adverse environmental impacts.
- ⌘ Environmental Governance: To apply the principles of good governance (transparency, rationality, accountability, reduction in time and costs, participation, and regulatory independence) to the management and regulation of use of environmental resources.
- ⌘ Enhancement of Resources for Environmental Conservation: To ensure higher resource flows, comprising finance, technology, management skills, traditional knowledge and social capital for environmental conservation through mutually beneficial multi stakeholder partnerships between local communities, public agencies, the academic and research community, investors, and multilateral and bilateral development partners.

### **7.4.14. Annexure 23: Objectives Soil Health Card (SHC)**

- ⌘ To issue soil health cards every 3 years, to all farmers of the country, so as to provide a basis to address nutrient deficiencies in fertilisation practices.
- ⌘ To strengthen functioning of Soil Testing Laboratories (STLs) through capacity building, involvement of agriculture students and effective linkage with Indian Council of Agricultural Research (ICAR) / State Agricultural Universities (SAUs).
- ⌘ To diagnose soil fertility related constraints with standardised procedures for sampling uniformly across states and analysis and design taluka / block level fertiliser recommendations in targeted districts.
- ⌘ To develop and promote soil test based nutrient management in the districts

<sup>43</sup> [http://delhigreens.com/wp-content/uploads/2017/04/Ch\\_Env-Policy-India-Dr.Govind-Singh.pdf](http://delhigreens.com/wp-content/uploads/2017/04/Ch_Env-Policy-India-Dr.Govind-Singh.pdf)

for enhancing nutrient use efficiency.

- ⌘ To build capacities of district and state level staff and of progressive farmers for promotion of nutrient management practices
- ⌘ Promotion of organic farming (helping to reduce soil contamination) through schemes such as:
  - Rashtriya Krishi Vikas Yojana (RKVY), Mission for Integrated Development of Horticulture (MIDH), National Mission on Oilseeds and Oil Palm (NMOOP), National Programme on Organic Production (NPOP) of Agricultural and Processed Food Products Export Development Authority (APEDA).
  - Paramparagat Krishi Vikas Yojna (PKVY) was launched by the Govt. of India in 2015 as a component of Soil Health Management (SHM) as an initiative to promote organic farming in the country
- ⌘ National guidelines have been issued to prevent burning of crop residues, thereby ensuring their proper recycling for improving soil health.

#### **7.4.15. Annexure 24: Features of the Noise Pollution (Regulation and Control) Rules, 2000**

Features of the Noise Pollution (Regulation and Control) Rules, 2000 are:<sup>44</sup>

- ⌘ Ambient air quality standards in respect of noise for different areas/zones
  - The State Government shall categorise the areas into industrial, commercial, residential or silence areas/zones for the purpose of implementation of noise standards for different areas.
  - The State Government shall take measures for abatement of noise including noise emanating from vehicular movements, blowing of horns etc
  - An area comprising not less than 100 metres around hospitals, educational institutions and courts may be declared as a silence area / zone for the purpose of these rules.
- ⌘ Responsibility as to enforcement of noise pollution control measures
  - The noise levels in any area / zone shall not exceed the ambient air quality standards in respect of noise as specified
- ⌘ Restrictions on the use of loud speakers / public address system and sound producing instruments:
  - A loud speaker or a public address system shall not be used except after obtaining written permission from the authority.
  - A loud speaker or a public address system shall not be used at night time except in closed premises for communication within or during a public emergency.
- ⌘ Restrictions on the use of horns, sound emitting construction equipment and bursting of firecrackers:
  - No horn shall be used in silence zones or during night time in residential areas except during a public emergency.
  - Sound emitting fire crackers shall not be burst in the silence zone or during night time.

<sup>44</sup> [http://cpcbenvvis.nic.in/noisepollution/noise\\_rules\\_2000.pdf](http://cpcbenvvis.nic.in/noisepollution/noise_rules_2000.pdf)



- ⌘ Consequences of any violation in the silence zone / area: Whoever, in any place covered under the silence zone / area commits any of the following offences, he shall be liable for penalty under the provisions of the Act.

#### **7.4.16. Annexure 25: Details of Hazardous Waste Rules**

The Hazardous Wastes Rules, guide the handling of hazardous wastes except for the following:

- ⌘ waste-water and exhaust gases as covered under the provisions of the Water (Prevention and Control of Pollution) Act, 1974 (6 of 1974) and the Air (Prevention and Control of Pollution) Act, 1981 (14 of 1981) and the rules made thereunder;
- ⌘ wastes arising out of the operation from ships beyond five kilometres of the relevant baseline as covered under the provisions of the Merchant Shipping Act, 1958 (44 of 1958) and the rules made thereunder;
- ⌘ radio-active wastes as covered under the provisions of the Atomic Energy Act, 1962 (33 of 1962) and the rules made thereunder;
- ⌘ bio-medical wastes covered under the Bio-Medical Wastes (Management and Handling) Rules, 1998 made under the Act; and
- ⌘ wastes covered under the Municipal Solid Wastes (Management and Handling) Rules, 2000 made under the Act;”

#### **7.4.17. Annexure 26: Duties under Bio Medical Waste Management Rules**

Some of the components are:

- ⌘ Duties of the occupier: An “occupier” means a person having administrative control over the institution and the premises generating bio-medical waste, which includes a hospital, nursing home, clinic, dispensary etc
  - Ensure safe handling of bio-medical waste
  - Make a provision within the premises for a safe, ventilated and secured location for storage of segregated biomedical waste in colored bags or containers
  - Ensure not to give treated bio-medical waste with municipal solid waste, and more
- ⌘ Duties of the operator of a common bio-medical waste treatment and disposal facility:
  - “Take all necessary steps to ensure that the bio-medical waste collected from the occupier is transported, handled, stored, treated and disposed of, without any adverse effect to the human health and the environment”
  - ensure timely collection of bio-medical waste from the occupier as prescribed under these rules
  - inform the prescribed authority immediately regarding the occupiers which are not handing over the segregated bio-medical waste in accordance with these rules

- ⌘ Duties of authorities: Some of the key authorities responsible for handling the waste are,
  - Ministry of Environment, Forest and Climate Change, Government of India
  - Central or State Ministry of Health and Family Welfare, Central Ministry for Animal Husbandry and Veterinary or State Department of Animal Husbandry and Veterinary
  - Ministry of Defence (for activities within Armed Forces healthcare facilities)
  - Central Pollution Control Board
  - State Government of Health or Union Territory Government or Administration
  - State Pollution Control Boards or Pollution Control Committees
  - Municipalities or Corporations, Urban Local Bodies and Gram Panchayats

#### **7.4.18. Annexure 27: Duties under Construction and Demolition Waste Management Rules, 2016**

- ⌘ Duties of waste Generators
  - Every waste generator shall segregate construction and demolition waste and deposit at collection centre or handover it to the authorised processing facilities
  - Shall ensure that there is no littering or deposition so as to prevent obstruction to the traffic or the public or drains.
  - Large generators (who generate more than 20 tons or more in one day or 300 tons per project in a month) shall submit waste management plan and get appropriate approvals from the local authority before starting construction or demolition or remodelling work,
  - Large generators shall have an environmental management plan to address the likely environmental issues from construction, demolition, storage, transportation process and disposal / reuse of C and D Waste.
  - Large generators shall segregate the waste into four streams such as concrete, soil, steel, wood and plastics, bricks and mortar,
  - Large generators shall pay relevant charges for collection, transportation, processing and disposal as notified by the concerned authorities;
- ⌘ Duties of Service providers and Contractors
  - The service providers shall prepare a comprehensive waste management plan for waste generated within their jurisdiction, within six months from the date of notification of these rules,
  - Shall remove all construction and demolition waste in consultation with the concerned local authority on their own or through any agency.
- ⌘ Duties of State Government and Local Authorities (LA)
  - The Secretary, UDD in the State Government shall prepare their policy with respect to management of construction and demolition of waste within one year from date of final notification of these rules
  - The concerned department in the State Government dealing with land shall provide suitable sites for setting up of the storage, processing and recycling facilities for construction and demolition waste within one-and-a-half years from date of final notification of these rules



- The Town and Country planning Department shall incorporate the site in the approved land use plan so that there is no disturbance to the processing facility on a long-term basis
  - Shall procure and utilise 10-20 per cent materials made from construction and demolition waste in municipal and Government contracts
  - Local Authority shall place appropriate containers for collection of waste, removal at regular intervals, transportation to appropriate sites for processing and disposal
  - LA shall seek detailed plan or undertaking from large generator of construction and demolition waste and sanction the waste management plan
  - Seek assistance from concerned authorities for safe disposal of construction and demolition waste contaminated with industrial hazardous or toxic material or nuclear waste, if any
  - LA shall give appropriate incentives to generator for salvaging, processing and or recycling preferably in-situ
  - LA shall establish a database and update once in a year
  - Million plus cities (based on 2011 census of India), shall commission the processing and disposal facility within one-and-a-half years from date of final notification of these rules
  - 0.5 to 1 million cities, shall commission the processing and disposal facility within two years from date of final notification of these rules
  - for other cities (< 0.5 million populations), shall commission the processing and disposal facility within three years from date of final notification of these rules.
- ⌘ Duties of Central Pollution Control Board, State Pollution Control Board or Pollution Control Committee
- The Central Pollution Control Board shall prepare operational guidelines related to environmental management of construction and demolition waste.
  - SPCB shall grant authorisation to construction and demolition waste processing facility
  - Monitor the implementation of these rules by the concerned local bodies
  - Submit an annual report to the Central Pollution Control Board and the State Government.
- ⌘ Standards for products of construction and demolition waste
- The Bureau of Indian Standards need to prepare code of practices and standards for products of construction and demolition waste
  - Indian Roads Congress needs to prepare standards and practices pertaining to products of construction and demolition waste in roads construction.
- ⌘ Duties of Central Ministries
- The Ministry of Urban Development, and the Ministry of Rural Development, Ministry of Panchayat Raj, shall facilitate local bodies in compliance of these rules;
  - The Ministry of Environment, Forest and Climate Change shall review implementation of these rules as and when required.

⌘ Facility for processing / recycling facility

- The operator of the facility shall obtain authorisation from the State Pollution Control Board or Pollution Control Committee.
- The processing / recycling site shall be away from habitation clusters, forest areas, water bodies, monuments, National Parks, Wetlands and places of important cultural, historical or religious interest.
- The processing/recycling facility exceeding five tonnes per day capacity, shall maintain a buffer zone of no development around the facility.

## 7.4.19. Annexure 28: WHO's Interventions and Tools to Control Ambient Air Pollution

**Table 64: WHO's Interventions and Tools to Control Ambient Air Pollution**

Cities	<ul style="list-style-type: none"> <li>⌘ making cities more compact, and thus energy efficient</li> <li>⌘ creating spaces for safe walking and cycling</li> <li>⌘ investing in bus rapid transit or light rail</li> <li>⌘ creating green spaces that help remove particulate matter and reduce the heat island effect</li> <li>⌘ improving urban waste management, including capture of methane gas emitted from waste sites as an alternative to incineration</li> </ul>
Transport	<ul style="list-style-type: none"> <li>⌘ prioritizing rapid urban transit, walking and cycling networks in cities as well as rail interurban freight and passenger travel</li> <li>⌘ shifting to cleaner heavy duty diesel vehicles and low-emissions vehicles and fuels, including fuels with reduced sulphur content</li> <li>⌘ implementing stricter vehicle emissions and efficiency standards</li> </ul>
Housing	<ul style="list-style-type: none"> <li>⌘ replacing traditional household solid fuel with lower-emission cookstoves and/or cleaner fuels</li> <li>⌘ shifting away kerosene</li> <li>⌘ improving the energy efficiency of homes and commercial buildings through insulation and passive design principles such as natural ventilation and lighting</li> </ul>
Waste management	<ul style="list-style-type: none"> <li>⌘ promoting waste reduction, waste separation, recycling and reuse of waste reprocessing</li> <li>⌘ improving methods of biological waste management such as anaerobic waste digestion to produce biogas are feasible, low cost alternatives to the open incineration of solid waste. Where incineration is unavoidable, then combustion technologies with strict emission controls are critical.</li> </ul>
Industry	<ul style="list-style-type: none"> <li>⌘ improving brick kilns and coke ovens, which emit large amounts of black carbon</li> <li>⌘ adopting clean technologies that reduce industrial smokestack emissions</li> <li>⌘ increased recovery and use of gas released during fossil fuel production</li> </ul>



Agriculture	<ul style="list-style-type: none"> <li>⌘ reducing the burning of agricultural fields</li> <li>⌘ promoting healthy diets low in red and processed meat and rich in plants-based foods</li> <li>⌘ alternating wet/dry rice irrigation</li> <li>⌘ improving the management of agricultural waste and livestock manure, including the capture of methane gas emitted from waste sites as an alternative to incineration</li> </ul>
Power generation	<ul style="list-style-type: none"> <li>⌘ transitioning away from fossil fuel combustion (oil, coal) for large-scale energy production, as well as diesel generators for small-scale production</li> <li>⌘ increasing the use of low-emissions fuels and renewable combustion-free power sources (like solar, wind or hydropower)</li> <li>⌘ increasing reliance on the cogeneration heat and power and distributed energy generation (e.g. mini-grids and rooftop solar power generation)</li> </ul>

## 7.5. INDIVIDUAL AND FAMILY HEALTH

### 7.5.1. Annexure 29: WHO's "100 Core Health Indicators" in the 2018 Global Reference List

Table 65: WHO's "100 Core Health Indicators" in the 2018 Global Reference List

Mortality by age and sex	Mortality by cause	Fertility	Morbidity
<ul style="list-style-type: none"> <li>⌘ Life expectancy at birth</li> <li>⌘ Adult mortality rate between 15 and 60 years of age</li> <li>⌘ Under-five mortality rate</li> <li>⌘ Infant mortality rate</li> <li>⌘ Neonatal mortality rate</li> <li>⌘ Stillbirth rate</li> </ul>	<ul style="list-style-type: none"> <li>⌘ TB, AIDS, Malaria and NCDs</li> <li>⌘ Household and ambient air pollution</li> <li>⌘ Unsafe water, unsafe sanitation and lack of hygiene</li> <li>⌘ unintentional poisoning</li> <li>⌘ Suicide</li> <li>⌘ road traffic injuries</li> <li>⌘ Number of deaths, missing persons and persons affected by disaster per 100 000 people</li> <li>⌘ homicide</li> </ul>	<ul style="list-style-type: none"> <li>⌘ Adolescent birth rate</li> <li>⌘ Total fertility rate</li> </ul>	<ul style="list-style-type: none"> <li>⌘ New cases of vaccine-preventable diseases</li> <li>⌘ New cases of IHR-notifiable diseases and other notifiable diseases</li> <li>⌘ HIV incidence and prevalence rates</li> <li>⌘ Hepatitis B surface antigen prevalence and incidence</li> <li>⌘ Sexually transmitted infections (STIs) incidence rate</li> <li>⌘ Congenital syphilis rate</li> <li>⌘ TB incidence and notification rate</li> <li>⌘ Malaria parasite prevalence among children aged 6–59 months</li> <li>⌘ Malaria incidence rate</li> <li>⌘ Cancer incidence, by type of cancer</li> </ul>

Source: (World Health Organization, 2015)



## 7.5.2. Annexure 30: Basic and Comprehensive Care

Basic emergency obstetric and new-born care is critical to reducing maternal and neonatal death. This care, which can be provided with skilled staff in health centres, large or small, includes the capabilities for:

- ⌘ Administering antibiotics, uterotonic drugs (oxytocin) and anticonvulsants (magnesium sulphate);
- ⌘ Manual removal of the placenta;
- ⌘ Removal of retained products following miscarriage or abortion;
- ⌘ Assisted vaginal delivery, preferably with vacuum extractor;
- ⌘ Basic neonatal resuscitation care.

Comprehensive emergency obstetric and new-born care, typically delivered in hospitals, includes all the basic functions above, plus capabilities for:

- ⌘ Performing caesarean sections;
- ⌘ Safe blood transfusion;
- ⌘ Provision of care to sick and low-birth weight new-borns, including resuscitation.

## 7.5.3. Annexure 31: WHO Indicators of MNCH

- ⌘ Maternal mortality ratio
- ⌘ Under-five child mortality, with the proportion of new-born deaths
- ⌘ Children under five who are stunted
- ⌘ The proportion of demand for family planning satisfied (met need for contraception)
- ⌘ Antenatal care coverage (at least four times during pregnancy)
- ⌘ Antiretroviral (ARV) prophylaxis among HIV positive pregnant women to prevent HIV transmission and antiretroviral therapy for [pregnant] women who are treatment-eligible
- ⌘ Skilled attendant at birth
- ⌘ Postnatal care for mothers and babies within two days of birth
- ⌘ Exclusive breastfeeding for six months (0–5 months)
- ⌘ Three doses of combined diphtheria-tetanus-pertussis (DTP3) immunisation coverage (12–23 months)

## 7.5.4. Annexure 32: Parameters for determining MNCH in NFHS

Parameters used by National Family Health Survey for determining maternal and child health maternity care:

- ⌘ Mothers who had antenatal check-up in the first trimester
- ⌘ Mothers who had at least 4 antenatal care visits
- ⌘ Mothers whose last birth was protected against neonatal tetanus
- ⌘ Mothers who consumed iron folic acid for 100 days or more when they were pregnant
- ⌘ Mothers who had full antenatal care
- ⌘ Registered pregnancies for which the mother received Mother and Child Protection (MCP) card

- ⌘ Mothers who received postnatal care from a doctor/nurse/LHV/ANM/midwife/ other health personnel within 2 days of delivery
- ⌘ Mothers who received financial assistance under Janani Suraksha Yojana (JSY) for births delivered in an institution
- ⌘ Average out of pocket expenditure per delivery in public health facility
- ⌘ Children born at home who were taken to a health facility for check-up within 24 hours of birth
- ⌘ Children who received a health check after birth from a doctor/nurse/LHV/ ANM/ midwife/other health personnel within 2 days of birth

Delivery care:

- ⌘ Institutional births
- ⌘ Institutional births in a public facility
- ⌘ Home delivery conducted by skilled health personnel (out of total deliveries)
- ⌘ Births assisted by a doctor/nurse/LHV/ANM/other health personnel (per cent)
- ⌘ Births delivered by caesarean section
- ⌘ Births in a private health facility delivered by caesarean section (per cent)
- ⌘ Births in a public health facility delivered by caesarean section.

### 7.5.5. Annexure 33: Indicators and minimum acceptable level listed by WHO for “Monitoring Emergency Obstetric Care”

**Table 66:** WHO Guidelines for Monitoring Emergency Obstetric Care

Indicator	Acceptable level
Availability of emergency obstetric care: basic and comprehensive care facilities	There are at least five emergency obstetric care facilities (including at least one comprehensive facility) for every 500,000 population
Geographical distribution of emergency obstetric care facilities	All subnational areas have at least five emergency obstetric care facilities (including at least one comprehensive facility) for every 500 000 population
Proportion of all births in emergency obstetric care facilities	(Minimum acceptable level to be set locally)
Met need for emergency obstetric care: proportion of women with major direct obstetric complications who are treated in such facilities	100 per cent women estimated to have major direct obstetric complications are treated in emergency obstetric care facilities
Caesarean sections as a proportion of all births	The estimated proportion of births by caesarean section in the population is not less than 5 per cent or more than 15 per cent
Direct obstetric case fatality rate	The case fatality rate among women with direct obstetric complications in emergency obstetric care facilities is less than 1 per cent



Indicator	Acceptable level
Intrapartum and very early neonatal death rate	Standards to be determined
Proportion of maternal deaths due to indirect causes in emergency obstetric care facilities	No standard can be set

## 7.5.6. Annexure 34: Immunization coverage rate of vaccination

Immunisation coverage rate of each vaccine as defined in National Schedule

- ⌘ Children age 12-23 months fully immunised (BCG, measles, and 3 doses each of polio and DPT) (per cent)
- ⌘ Children age 12-23 months who have received BCG
- ⌘ Children age 12-23 months who have received 3 doses of polio vaccine
- ⌘ Children age 12-23 months who have received 3 doses of DPT vaccine
- ⌘ Children age 12-23 months who have received measles vaccine
- ⌘ Children age 12-23 months who have received 3 doses of Hepatitis B vaccine
- ⌘ Children age 9-59 months who received a vitamin A dose in last 6 months
- ⌘ Children age 12-23 months who received most of the vaccinations in a public health facility (per cent)
- ⌘ Children age 12-23 months who received most of the vaccinations in a private health facility.

## 7.5.7. Annexure 35: Malaria Control Strategies

### 1. Early case Detection and Prompt Treatment (EDPT)

- ⌘ EDPT is the main strategy of malaria control - radical treatment is necessary for all the cases of malaria to prevent transmission of malaria.
- ⌘ Chloroquine is the main anti-malaria drug for uncomplicated malaria.
- ⌘ Drug Distribution Centres (DDCs) and Fever Treatment Depots (FTDs) have been established in the rural areas for providing easy access to anti-malarial drugs to the community.
- ⌘ Alternative drugs for chloroquine resistant malaria are recommended as per the drug policy of malaria.

### 2. Vector Control

#### (i) Chemical Control

- ⌘ Use of Indoor Residual Spray (IRS) with insecticides recommended under the programme
- ⌘ Use of chemical larvicides like Abate in potable water
- ⌘ Aerosol space spray during day-time
- ⌘ Malathion fogging during outbreaks

#### (ii) Biological Control

- ⌘ Use of larvivores fish in ornamental tanks, fountains etc.
- ⌘ Use of biocides.

(iii) Personal Prophylactic Measures that individuals/communities can take up

- ⌘ Use of mosquito repellent creams, liquids, coils, mats etc.
- ⌘ Screening of the houses with wire mesh
- ⌘ Use of bed-nets treated with insecticide
- ⌘ Wearing clothes that cover maximum surface area of the body

4. Community Participation

- ⌘ Sensitizing and involving the community for detection of Anopheles breeding places and their elimination
- ⌘ NGO schemes involving them in programme strategies
- ⌘ Collaboration with CII/ASSOCHAM/FICCI

5. Environmental Management and Source Reduction Methods

- ⌘ Source reduction i.e., filling of the breeding places
- ⌘ Proper covering of stored water
- ⌘ Channelisation of breeding source

6. Monitoring and Evaluation of the programme

- ⌘ Monthly Computerised Management Information Systems (CMIS)
- ⌘ Field visits by State-by-State National Programme Officers
- ⌘ Field visits by Malaria Research Centres and other ICMR Institutes
- ⌘ Feedback to states on field observations for correction actions.

## 7.5.8. Annexure 36 : American Cancer Society Guidelines for the Early Detection of Cancer

### Breast cancer

- ⌘ Women ages 40 to 44 should have the choice to start annual breast cancer screening with mammograms (x-rays of the breast)
- ⌘ Women aged 45 to 54 should get mammograms every year
- ⌘ Women 55 and older should switch to mammograms every 2 years, or can continue yearly screening
- ⌘ Screening should continue as long as a woman is in good health and is expected to live 10 more years or longer
- ⌘ All women should be familiar with the known benefits, limitations, and potential harms linked to breast cancer screening.

### Cervical cancer

- ⌘ Cervical cancer screening should start at age 25. People under age 25 should not be tested because cervical cancer is rare in this age group.
- ⌘ People between the ages of 25 and 65 should get a primary HPV (human papillomavirus) test done every 5 years. If a primary HPV test is not available, a co-test (an HPV test with a Pap test) every 5 years or a Pap test every 3 years are still good options.
- ⌘ People over age 65 who have had regular cervical cancer testing in the past 10 years with normal results should not be tested for cervical cancer.

### Lung cancer

The American Cancer Society recommends yearly lung cancer screening with a low-



dose CT scan (LDCT) for certain people at higher risk for lung cancer who meet the following conditions:

- ⌘ Are aged 55 to 74 years and in fairly good health
- ⌘ Currently smoke or have quit smoking in the past 15 years
- ⌘ Have at least a 30 pack-year smoking history. (A pack-year is 1 pack of cigarettes per day per year. One pack per day for 30 years or 2 packs per day for 15 years would both be 30 pack-years.)

## 7.5.9. Annexure 37: Older Americans 2016 Key Indicators of Well-Being

*Table 67: Older Americans 2016 Key Indicators of Well-Being*

Domain	Key Indicators
HEALTH STATUS	<ul style="list-style-type: none"> <li>⌘ Life Expectancy</li> <li>⌘ Mortality</li> <li>⌘ Chronic Health Conditions,</li> <li>⌘ Oral Health,</li> <li>⌘ Respondent-Assessed Health Status</li> <li>⌘ Dementia,</li> <li>⌘ Depressive Symptoms</li> <li>⌘ Functional Limitations.</li> </ul>
HEALTH RISKS AND BEHAVIOURS	<ul style="list-style-type: none"> <li>⌘ Vaccinations</li> <li>⌘ Cancer Screenings</li> <li>⌘ Diet Quality</li> <li>⌘ Physical Activity</li> <li>⌘ Obesity</li> <li>⌘ Cigarette Smoking</li> </ul>
HEALTHCARE	<ul style="list-style-type: none"> <li>⌘ Use of Healthcare Services</li> <li>⌘ Healthcare Expenditures</li> <li>⌘ Prescription Drugs</li> <li>⌘ Sources of Health Insurance</li> <li>⌘ Out-of-Pocket Healthcare Expenditures</li> <li>⌘ Sources of Payment for Healthcare Services</li> <li>⌘ Veterans' Healthcare</li> <li>⌘ Residential Services</li> <li>⌘ Personal Assistance and Equipment</li> <li>⌘ Long-Term Care Providers</li> </ul>
ENVIRONMENT	<ul style="list-style-type: none"> <li>⌘ Use of Time</li> <li>⌘ Air Quality</li> <li>⌘ Transportation</li> </ul>

## 7.5.10. Annexure 38: WHO Framework Convention on Tobacco Control (WHO FCTC)

The key demand reduction strategies are contained in Articles 6 to 14 which include:

- ⌘ Article: 6 – Price and tax measures to reduce the demand for tobacco.
- ⌘ Article: 7 – Non-price measures to reduce the demand for tobacco
- ⌘ Article: 8 - Protection from exposure to second-hand tobacco smoke.
- ⌘ Article: 9 and 10 - Tobacco content and product regulation
- ⌘ Article: 11 - Packaging and labelling of tobacco products.
- ⌘ Article: 12 - Education, communication, training and public awareness.
- ⌘ Article: 13 - Tobacco advertising, promotion and sponsorship
- ⌘ Article: 14 – Demand reduction measures concerning tobacco dependence and cessation

The key supply reduction strategies are contained in Articles 15 to 17 which include:

- ⌘ Article: 15 – Illicit trade in tobacco products.
- ⌘ Article: 16 - Sales to and by minors
- ⌘ Article: 17 - Provision of support for economically viable alternative activities

## 7.5.11. Annexure 39: NHM indicators for Maternal Health

The National Health Mission seeks to ensure the achievement of the following indicators: -

- ⌘ Reduce Maternal Mortality Rate (MMR) to 1/1000 live births
- ⌘ Reduce Infant Mortality Rate (IMR) to 25/1000 live births
- ⌘ Reduce Total Fertility Rate (TFR) to 2.1
- ⌘ Prevention and reduction of anaemia in women aged 15–49 years
- ⌘ Prevent and reduce mortality and morbidity from communicable, non-communicable diseases, injuries and emerging diseases
- ⌘ Reduce household out-of-pocket expenditure on total healthcare expenditure
- ⌘ Reduce annual incidence and mortality from Tuberculosis by half
- ⌘ Reduce prevalence of leprosy to <1/10000 population and incidence to zero in all districts
- ⌘ Annual malaria Incidence to be <1/1000
- ⌘ Less than 1 per cent microfilaria prevalence in all districts
- ⌘ Kala-azar Elimination by 2015, <1 case per 10000 population in all blocks

## 7.5.12. Annexure 40: NUHM goals

NUHM seek to achieve its goals through:

- ⌘ Need-based city-specific urban healthcare system to meet the diverse healthcare needs of the urban poor and other vulnerable sections.
- ⌘ Institutional mechanism and management systems to meet the health-related challenges of a rapidly growing urban population.
- ⌘ Partnership with the community and local bodies for more proactive involvement in planning, implementation, and monitoring of health activities.
- ⌘ Availability of resources for providing essential primary healthcare to urban poor.



- ⌘ Partnerships with NGOs, for-profit, and not for profit health service providers and other stakeholders.

### 7.5.13. Annexure 41: RMNCH+A strategy approaches

- ⌘ Health systems strengthening (HSS) focusing on infrastructure, human resources, supply chain management, and referral transport measures.
- ⌘ Prioritisation of high-impact interventions for various lifecycle stages.
- ⌘ Increasing effectiveness of investments by prioritizing geographical areas based on evidence.
- ⌘ Integrated monitoring and accountability through good governance, use of available data sets, community involvement, and steps to address grievances.
- ⌘ Broad-based collaboration and partnerships with ministries, departments, development partners, civil society, and other stakeholders.

### 7.5.14. Annexure 42: Conditionalities and Instalments to avail benefits under PMMVY

*Table 68: Conditionalities and Instalments to avail benefits under PMMVY*

Instalment	Conditions	Amount
First Instalment	Early Registration of pregnancy	INR 1,000/-
Second Instalment	Received at least one ANC (can be claimed after 6 months of pregnancy)	INR 2,000/-
Third Instalment	<ol style="list-style-type: none"> <li>1. Child Birth is registered</li> <li>2. Child has received the first cycle of BCG, OPV, DPT, and Hepatitis-B or its equivalent/ substitute `</li> </ol>	INR 2,000/

### 7.5.15. Annexure 43: Facility Based New-born Care Operational Guide- 2011: A Guideline for Planning and Implementation

Special New-born Care Units (SNCU) is a 12-20 bedded unit and requires 4 trained doctors and 10-12 nurses for round the clock services. States should set up at least one SNCU in each district

New-born Stabilisation units (NBSUs) are established at community health centres /FRUs. These are 4 bedded units with trained doctors and nurses for stabilization of sick new-borns. New-born Care Corners (NBCCs) at each facility where deliveries are taking place should be established. These are 1 bedded facility attached to the labour room and Operation Theatre (OT) for providing essential new-born care.

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