

REVIEW

How to Make Future Cities Smart in the Realm of Environmentally Friendly Healthy Cities? Looking from the Perspective of Ease of Living Index

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ABSTRACT

Rapid urbanization and environmental issues have led the Government of India to implement urban development initiatives like Heritage City Development and Augmentation Yojana, Atal Mission for Rejuvenation and Urban Transformation, Smart Cities Mission, Deen Dayal Antyodaya Yojana-National Urban Livelihood Mission, and Swachh Bharat Mission-Urban to improve citizens' quality of life. The Ease of Living Index (EOL), developed to assess the outcomes of these initiatives, is a data-driven assessment tool aligned with the Sustainable Development Goals that enables cities to adopt evidence-based planning and execution. It assesses the well-being of citizens in 111 cities, including cities under the Smart Cities Mission, capital cities, and cities with populations over one million. The concept of healthy cities gained popularity in the South-east Asian Region of the World Health Organization, with the Healthy City Network Assessment Tool being introduced in 2021 to help cities assess their health profile in its eleven member countries, including India. In view of NITI Aayog's 2021 recommendation for the development of 500 healthy cities by 2030, there is a need to expand the scope of the existing EOL Index (2020). This research aims to integrate the healthy city evaluation criteria from WHO's South-east Asia Regional Guidelines with the EOL Index 2020 to develop an integrated tool for data-driven assessment of India's proposed healthy cities program. The study based on literature review and comparative analysis identifies 8 determinants, 28 sub-determinants and 112 indicators, enhancing the comprehensiveness of the EOL Index to promote smart, environmentally friendly, healthy, and sustainable urban development.

Keywords: Ease of living index; Environmental problems; Healthy cities; Smart cities; Sustainable development; Urban health; Well-being

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1. Introduction

A steep rise of 30% is expected in the percentage of people living in urban areas globally from the year 1970 to 2050. In India alone, more than 50% of the total population will be living in cities by 2050^[1] (**Figure 1**). This is primarily attributed to the presence of economic opportunities and the promise of an improved quality of life, with access to essential amenities such as housing, water supply, sanitation, power, healthcare infrastructure, security, and recreational facilities.

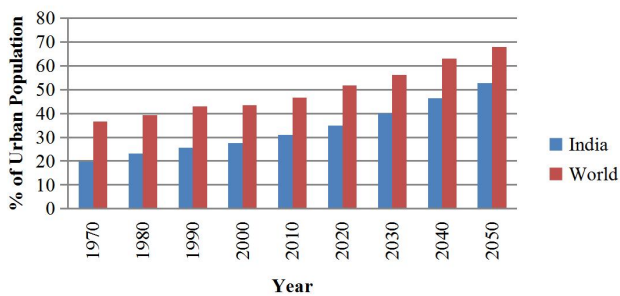


Figure 1. Trend of urbanization in World and India.

The Government of India (GOI) has implemented various initiatives- Heritage City Development and Augmentation Yojana (HRIDAY), Atal Mission for Rejuvenation and Urban Transformation (AMRUT), Smart Cities Mission (SCM), Deen Dayal Antyodaya Yojana-National Urban Livelihood Mission (DAY-NULM), and Swachh Bharat Mission-Urban (SBM-U) aiming to enhance the quality of life for citizens by improving urban environment, infrastructure, services, and living conditions.

The Ease of Living Index (EOL) is a data-driven assessment tool that was developed in 2018 (1) to assess the outcomes of these initiatives (2) to comprehend and compare the city's baseline information drawn from index's indicators to enable evidence-based planning (3) to drive the action towards Sustainable Development Goals^[2]. It assesses the well-being of citizens in 111 cities which comprises the cities under the SCM, capital cities, and cities with a population over one million^[2]. EOL (2020) comprises of framework consisting of four pillars (Quality of Life, Economic Ability, Sustainability, and Citizen's Perception Survey), 14 categories (Education, Health, Housing & Shelter, WASH & SWM,

Mobility, Safety & Security, Recreation, Economic Development, Economic Opportunities, Environment, Green Spaces & Building, Energy Consumption, and City Resilience), and 49 indicators^[2]. Additionally, the Municipal Performance Index (MPI) 2020, a division of EOL, was introduced to evaluate the performance of municipalities in five areas (Governance, Technology, Planning, Services, and Finance), aiming to enhance urban governance and infrastructure. While EOL focuses on output indicators to assess the overall quality of life and outcomes for citizens, MPI emphasizes input indicators to measure the efficiency and effectiveness of municipal governance and operations.

Despite these efforts, achieving smart, environmentally friendly, and healthy cities requires considering current issues affecting urban living conditions and health. **Table 1** outlines a few environmental issues, their health impacts, emphasizing urgent attention and improvement.

Following the implementation of the SCM, the GOI is now focusing on the Healthy City initiative as the next transformative step in urban development. *"A healthy city is the 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 in developing to their maximum potential."*^[8] This concept is popular throughout the world, and the six WHO regions (European Region, Region of the Americas, Western Pacific Region, Eastern Mediterranean Region, South-east Asian Region, and African Region) have each established regional guidelines for its implementation and evaluation. The South-east Asian Region (SEAR) of the World Health Organization has presented Healthy City Network Assessment Tool (HC NAT) to help cities assess their health profile in its eleven member countries including India. This framework consists of six areas of assessment (1) general information; (2) livelihood and living conditions; (3) socioeconomic and work conditions; (4) urban infrastructures and facilities; (5) public health systems and welfare services; and (6) urban governance with 61 indicators^[9].

Table 1. Challenges in achieving smart, environmentally friendly, and healthy cities.

Environmental issues	Statistics	Health impacts
Pollution	Pollution Ranking: 2/240 countries ^[3]	Life expectancy reduced by 5 years
Air Quality	Ranking: 179/180 ^[4]	Respiratory illnesses, higher rates of heart disease, cancer, and diabetes, susceptibility to COVID-19, etc.
Climate Change Mitigation	Ranking: 165/180 ^[4]	Compromise on the ecosystem and health- Heat-related deaths, dehydration, disease spread, and other health issues.
Water infrastructure (Clean water supply, drainage systems, water resource management, etc.)	< 50 per cent of the population in India has access to safely managed drinking water ^[5]	Waterborne diseases with an economic burden of approximately USD 600 million a year: <ul style="list-style-type: none"> • Cholera • Typhoid (Enteric fever) • Diarrhoea • Viral Hepatitis A & E etc
Waste management (Landfills, treatment plants recycling facilities storage facilities solid and hazardous waste transport, etc.)	Sewage generated: 72,368 million litre per day. Total capacity of STP's: 36,668 Mld, Total No. of STP's: 1,631 with a gap of 50% ^[6]	
Electricity	Northern and eastern households still receive less than 20 hours of grid supply ^[7]	<ul style="list-style-type: none"> • Reduced psychological wellbeing • Reduced quality of health care facilities • Dependency on fossil fuel for electricity generation

Table 2. Comparison of the ease of living index and sear network assessment tool.

Tool	Ease of living index ^[2]	SEAR network assessment tool ^[10]
Year of development	2018 revised in 2019, 2020	2023
Countries addressed	India	11 member countries (including India) in SEAR Region
Developed by	MoHUA	RL-UGHW, SEARO/WHO
Framework	4 pillars, 14 categories and 49 indicators	6 categories, 20 sub-categories and 61 indicators
Selection of indicators	Drawn from Global and national indicator sets; service level benchmarks; research literature; and consulted leading city policy, sector and data experts. <ul style="list-style-type: none"> • Generate information to assist evidence-based planning: (To understand the city's baseline and compare its performance across key measures). • Catalyse actions to achieve broader development outcomes including the Sustainable Development Goals. • Assess outcomes achieved from various urban policies and schemes. • Serve as a basis for dialogue between citizens and urban decision makers. 	<ul style="list-style-type: none"> • 1–5th categories are based on review of socio-economic determinants of health. • 6th category is based on UNDP concept of urban governance.
Objectives		<ul style="list-style-type: none"> • To guide cities' systematic collection of data to map the city's health profile. • Create best practices or models for good urban governance for health and well-being. • To address the causes of health outcomes in the WHO South-East Asia urban context.
Broad areas of assessment	Education, Health, Housing & Shelter, WASH & SWM, Mobility, Safety & Security, Recreation, Economic Development, Economic Opportunities, Environment, Green Spaces & Building, Energy Consumption, and City Resilience.	(1) General information; (2) livelihood and living conditions; (3) socioeconomic and work conditions; (4) urban infrastructures and facilities; (5) public health systems and welfare services; and (6) urban governance.

Table 2 continued

Tool	Ease of living index ^[2]	SEAR network assessment tool ^[10]	
SDG's addressed	SDG 3	Good health and well-being	
	SDG 4	Quality education	
	SDG 6	Clean water and sanitation	
	SDG 7	Affordable and clean energy	
	SDG 8	Decent work and economic Growth	
	SDG 11	Sustainable cities and communities	
	SDG 16	Peace, justice, and strong institutions	
	SDG 17	Partnerships for the goals	
		SDG 1	No poverty
		SDG 2	Zero hunger
	SDG 3	Good health and well-being	
	SDG 4	Quality education	
	SDG 5	Gender equality	
	SDG 6	Clean water and sanitation	
	SDG 7	Affordable and clean energy	
	SDG 8	Decent work and economic growth	
	SDG 10	Reduced inequalities	
	SDG 11	Sustainable cities and communities	
	SDG 16	Peace, justice, and strong institutions	
		Member countries of the South-East Asia Region have agreed to the vision of SDGs in attaining the goal of healthy cities. SDG mapping for the indicators of HC NAT has been done by the author.	

NITI Aayog's recommendation for India in 2021 to develop 500 Healthy Cities by 2030 requires expanding the EOL Index's scope ^[11]. **Table 2** compares the framework, objectives, and alignment with SDGs of the EOL Index and SEAR HC NAT, emphasizing their potential integration for comprehensive urban health and well-being assessment. Notably, the EOL Index focuses on urban development goals but doesn't cover all Sustainable Development Goals (SDGs), such as SDG 1 (No Poverty), SDG 2 (Zero Hunger), and SDG 10 (Reduced Inequalities). Combining both frameworks is necessary for a more inclusive approach, addressing a broader range of socio-economic and health determinants critical for sustainable urban living.

2. Literature review

A range of studies have explored the development of indicators for assessing the ease of living in cities, with a focus on the relationship between liveability and health. Liveability and Health Index (LHI-HK) has been established in Hong Kong, which includes indicators related to education, economy, housing, walkability/transport, environment, and health facilities ^[12]. A global index has been designed to aid city leaders and practitioners in comprehending the impact of urban environments on health and wellbeing, and to encourage policy and decision-making to improve health outcomes through urban environment policies and programs ^[13]. A study revealed that de-

spite Vienna being ranked as the most liveable city, it still faces a significant premature mortality burden due to non-compliance with health recommendations for physical activity, air pollution, noise, green space, and heat ^[14]. These studies collectively underscore the importance of considering a wide range of factors, including education, economy, environment, and health facilities, in assessing the ease of living in cities.

The use of integrated indicators in city planning and governance provides a holistic assessment of urban policies by measuring smart city interventions and health outcomes ^[15], enabling comprehensive planning and identifying areas for improvement. Since a smart city involves various stakeholders seeking different outcomes, integrated indicators can help balance these needs, ensuring that the technological aspects of a smart city benefit all sectors, including health, environment, and social equity ^[16]. Besides measuring city-wide outcomes, good indicators can identify spatial inequities and help to ensure equitable access to urban services and infrastructure, an important aspect in the highly diverse urban settings of Indian cities ^[15]. Therefore, the integration of healthy and smart city indicators is fundamental in the Indian context, where the rapid urbanization challenges the environment, planning and governance systems. Using such indicators allows for more effective, equitable, and sustainable city management.

In this context, this research aims to integrate the indicators of healthy city evaluation criteria from WHO’s SEAR Guidelines with the existing framework of the EOL index (2020). The goal is to develop an integrated tool for data-driven assessment of India’s proposed healthy cities program by creating a comprehensive list of indicators encompassing both frameworks.

3. Materials and methods

A range of methodologies and approaches have been proposed for integrating indicators from different evaluation frameworks for the assessment of smart cities and health and well-being. A three-level goal system has been proposed utilizing systematic review, content analysis, multi-criteria analysis, and expert consultation to generate indicators for evaluation of urban plans and infrastructure design [17]. Another research reviews global approaches to assessing smart cities’ sustainability performance,

identifying indicators and their convergence/divergence, aiming to integrate different indicator sets into a coherent smart and sustainable system of indicators [18]. Skvarciany (2021) suggests a balanced approach, combining indicators for sustainable and smart cities [19]. A scientific indicator system was developed to evaluate the Healthy Cities Project in Chongqing, China, using the review of government documents, focus group discussions, and in-depth interviews, resulting in 5 first-level, 21 second-level and 73 third-level indicators [20].

Drawing from the literature, the methodology adopted for this ongoing research is divided into two stages (Figure 2). This paper addresses the first stage, which involves a systematic review to identify a comprehensive list of indicators from the frameworks of WHO’s SEAR HC NAT and the EOL Index (2020). Subsequently, in the second step, these identified indicators will undergo refinement and finalization following further analysis using MCDM and expert consultation.

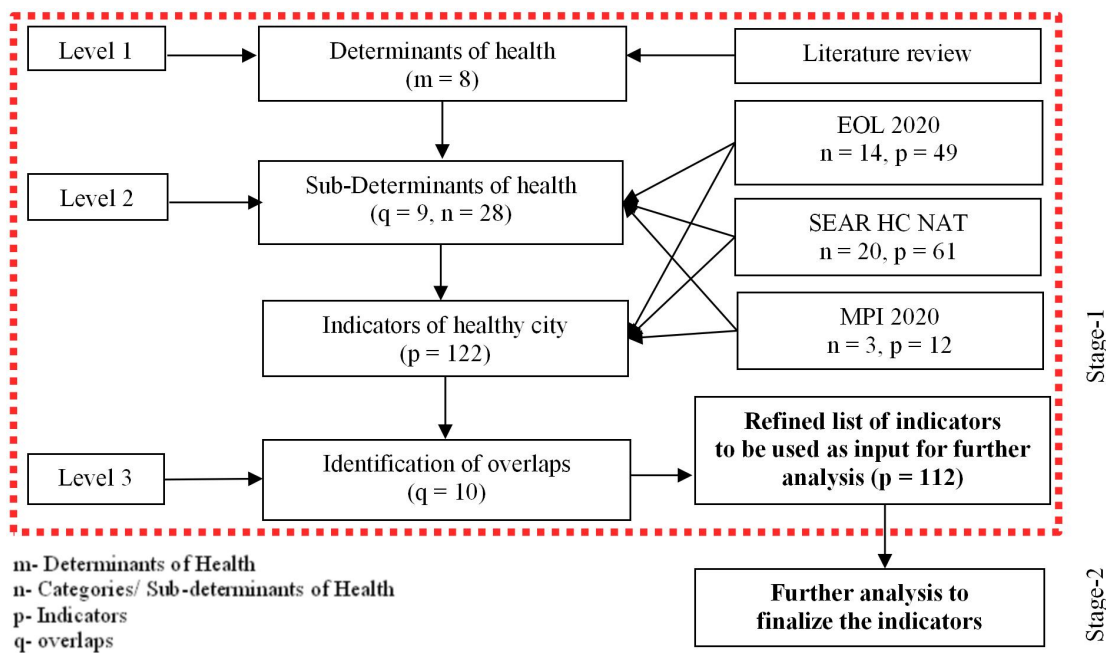


Figure 2. Methodology.

3.1 Identification of determinants

The WHO defines social determinants of health as conditions or circumstances in which people are born, grow, live, work, and age [21]. These conditions

are shaped by society’s political, social, and economic factors. The healthy city approach emphasizes the importance of addressing the determinants of health to address the health challenges existing within the cities making it necessary to develop a framework

based on determinants ^[21]. The determinants of health (m = 8) were identified following a systematic literature review encompassing the global conferences on health promotion and existing models on determinants of health.

3.2 Identification of sub-determinants

The identified determinants were divided into 28 sub-determinants (n = 28) extracted from the existing categories of EOL Index 2020 and SEAR HC NAT with three sub-determinants for the technological determinant sourced from the technology vertical of MPI 2020. Notably, technological determinant was not addressed in either EOL Index 2020 and SEAR HC NAT; therefore, it was incorporated from MPI 2020 ^[22] to fill this gap. This ensured alignment between the categories of both the frameworks and consistency in further division of indicators. A total of 9 overlaps (q = 9) were identified for which the SEAR HC NAT terminology was chosen for its

alignment with international standards and comparability in assessing healthy cities.

3.3 Identification of indicators

An indicator is a measurable variable that provides insight into a given situation ^[23]. A total of 122 indicators (p = 122) were sourced from the WHO’s SEAR HC NAT (61 indicators), EOL Index (2020) (49 indicators) and MPI 2020 (12 indicators).

3.4 Identification of overlaps and preparation of a refined list of indicators

To ensure the uniqueness of each indicator, their definition, description, attributes and objectives were scrutinized. Ten overlapping indicators (q = 10) between the frameworks were identified and a refined list of 112 indicators was prepared which will be used as input for further analysis to finalize the indicators for the Indian context in stage 2 of the research.

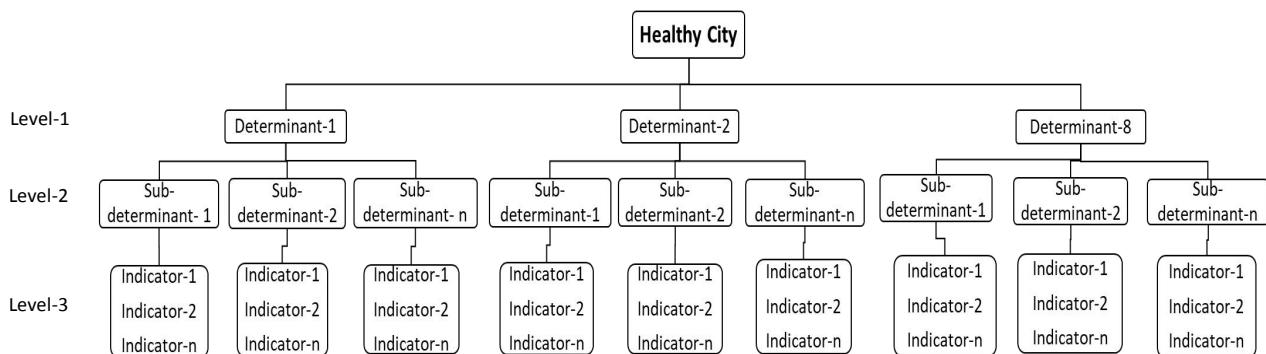


Figure 3. Conceptual framework showing the hierarchical structure of determinants, sub-determinants and indicators

The identified list of determinants, sub-determinants and indicators are organized in a hierarchical structure as per the conceptual framework/model depicted in Figure 3.

4. Results and discussion

4.1 Level-1—the determinants of health

Table 3 shows the determinants of health that have been identified as important to the development

and classification of indicators of a healthy city.

Table 3. Identified list of determinants of health.

S. No.	Determinants of Health	Source
I.	Social	[24–31]
II.	Political	[24–31]
III.	Economic	[24–31]
IV.	Natural environmental	[24–31]
V.	Built environment	[24–31]
VI.	Legal	[25,26,32]
VII.	Commercial	[25,26,32]
VIII.	Technological	[25,26,32]

Social determinants

The circumstances in which people are born, grow, live, work, and age are referred to as the social determinant of health [33]. These affect people's access to opportunities, resources, and supportive settings and therefore are important in determining health outcomes.

Economic determinants

These play a significant role in shaping health outcomes by affecting individuals' ability to afford food, housing and other basic services like healthcare and education, adopt healthy behaviors, and reside in safe and stable environments [21].

Political determinants

Population health is significantly influenced by policies, governance structures, and political ideologies. These policies, including environmental regulations, social welfare programs, economic policies, and public health initiatives influence resource distribution, access to services, and health-promoting interventions [28].

Natural environment

It refers to physical surroundings individuals live and interact in, including air, water, land, and biodiversity [21] which significantly impact health, leading to respiratory diseases, waterborne illnesses, and mental health issues.

Built environment

The built environment refers to the physical infrastructure and surroundings where people live, work, and engage in daily activities, influencing health outcomes through factors like housing quality, transportation systems, access to parks, and neighborhood safety [21].

Legal

Legal determinants of health encompass the impact of laws, regulations, and legal systems on public health outcomes and health equity. Legal frameworks govern healthcare access, food safety, housing standards, workplace safety, and environmental protection, promoting health equity and ensuring the well-being of all individuals within society through

strong enforcement mechanisms [34].

Commercial

Commercial determinants of health refer to the private sector's commercial interests and marketing practices for the sale of unhealthy products such as tobacco and alcohol which, can lead to diseases, pandemics, injuries, and climate change [35]. Addressing them requires collaboration between communities, civil society, governments, and the private sector.

Technological

Technological determinants of health pertain to the influence of advancements in technology and innovation on population health. However, disparities in access to technology and digital literacy can exacerbate health inequities among different population groups [25].

Out of these, social, political, economic, and environmental determinants are widely accepted and are consistently referenced in all ten Global Conferences on Health Promotion [24–27] and WHO recognized models of determinants of health [28–31]. In contrast, technological, legal, and commercial determinants have garnered recognition more recently [25,26]. All identified determinants hold global relevance, and determining intervention levels, priorities, and strategies should align with specific location and context-based objectives which requires breaking down these broad and complex determinants into sub-determinants also to ensure that no relevant aspect is overlooked.

4.2 Level-2—Sub-determinants

Social determinant included sub-determinants demographic characteristics, sociocultural characteristics, education, health, social security and insurance coverage and social security and insurance inclusiveness. Out of these categories, the factors related to health and education were found to be common in both the frameworks and hence merged. Similarly, common categories related to natural and built environments, political, economic and legal determinants were integrated to ensure a comprehensive assessment framework resulting in 28 sub-determinants (Table 4).

Table 4. Identification of sub-determinants.

Determinants	Categories defined under EOL index 2020 (n = 14)	Categories defined under SEAR HC network assessment tool (n = 20)	Integrated categories to be called as sub-determinants (q = 9, n = 28)	Remarks
I. Social	-	Demographic characteristics	1. Demographic characteristics	Present in SEAR HC NAT only
	-	Sociocultural characteristics	2. Sociocultural characteristics	Present in SEAR HC NAT only
	Education	Education	3. Education	Overlap
	Health	Public health facilities	4. Public health facilities	Overlap
	-	Social security and insurance coverage	5. Social security and insurance coverage	Present in SEAR HC NAT only
	-	Social security and insurance inclusiveness	6. Social security and insurance inclusiveness	Present in SEAR HC NAT only
II. Natural environment	Environment	Urban Environment	7. Urban environment	Overlap
	Green building	-	8. Green building	Present in EOL index only
	Energy consumption	-	9. Energy consumption	Present in EOL index only
	Housing and shelter	Housing adequacy	10. Housing adequacy	Overlap
III. Built environment	WASH and SWM	Public utilities	11. WASH AND SWM	Overlap
	Mobility	Active transportation modals	12. Active transportation modals	Overlap
	Recreation	Recreational facilities	13. Recreation facilities	Overlap
	-	Universal design	14. Universal design	Present in SEAR HC NAT only
	-	Geographical characteristics	15. Geographical characteristics	Present in SEAR HC NAT only
IV. Political	-	Urban governance	16. Urban governance	Present in SEAR HC NAT only
	City resilience	-	17. City resilience	Present in EOL index only

Table 4 continued

Determinants	Categories defined under EOL index 2020 (n = 14)	Categories defined under SEAR HC network assessment tool (n = 20)	Integrated categories to be called as sub-determinants (q = 9, n = 28)	Remarks
	Level of economic development	-	18. Level of economic Development	Present in EOL index only
	Economic opportunities	-	19. Economic opportunities	Present in EOL index only
V. Economic	Gini coefficient	Income equality	20. Income equality	Overlap
	-	Unemployment	21. Unemployment	Present in SEAR HC NAT only
	-	Employment inclusiveness	22. Employment inclusiveness	Present in SEAR HC NAT only
VI. Legal	Safety and security	Urban safety	23. Urban safety	Overlap
	-	Work environment	24. Work environment	Present in SEAR HC NAT only
VII. Commercial	-	Accessibility to healthy Food	25. Accessibility to healthy food	Present in SEAR HC NAT only
			26. Digital governance	Based on MPI 2020
VIII. Technological	-	-	27. Digital access	Based on MPI 2020
			28. Digital literacy	Based on MPI 2020

4.3 Level-3- Indicators of a healthy city

Table 5 presents a comprehensive list of 112 indicators categorized under sub-determinants and determinants, forming a structured framework.

This integration allows for a holistic evaluation of city health, supporting data-driven policymaking and international comparability. However, working with indicators in the Indian context presents significant challenges, including inconsistent data availability and quality, difficulties in standardizing indicators due to the country’s diverse socio-economic landscape, and resource constraints that hinder effective

data collection and analysis. Technological barriers, such as inadequate digital infrastructure and skilled personnel, complicate the integration of advanced indicators. Additionally, political and administrative hurdles, coupled with low public awareness and participation, impede the implementation of comprehensive assessment frameworks. Rapid urbanization further necessitates dynamic and adaptable indicators, making it crucial to invest in robust data management, foster intergovernmental cooperation, and raise public awareness to ensure the development of smart, environmentally friendly, and healthy cities.

Table 5. Integrated indicators from EOL 2020 and sear HC network assessment tool.

Determinants	Sub-determinants	Integrated indicators from EOL 2020 and SEAR HC network assessment tool
(I) Social	(1) Demographic characteristics	1) Number of registered residents (persons)**
		2) Estimate number of actual residents persons (including non-registered residents and other types of urban dwellers)**
		3) Population density (Sq.m/person)**
		4) Fecundity (birth) rate (persons/year)**
		5) Mortality (death) rate (persons/year)**
		6) Child and infant mortality rate (per 100 000 child births)**
		7) Sex ratio %**
		8) Average life expectancy (years old)**
		9) Literacy rate (percentage of population aged 15 years and above)**
		10) Population by income levels (description with statistics)**
	(2) Sociocultural characteristics	11) Existing ethnicity (list with percentages of total population)**
		12) Existing religious beliefs (list with percentages of total population)**
		13) Gender roles (description)**
	(3) Education	14) Household expenditure on education*
		15) Literacy rate*
		16) Pupil-Teacher ratio at primary level*
		17) Pupil-Teacher ratio at the upper primary level*
		18) Dropout rate at secondary level*
		19) Percentage of schools with access to digital education*
		20) Percentage of professionally trained teachers*
		21) National achievement survey score*
		22) Education inequality: Gini coefficient of education**
		(4) Health
	24) Availability of healthcare professionals*	
	25) Accredited public health facilities*	
	26) Availability of hospital beds*	
	27) Prevalence of diseases*	
	28) Distance to the nearest health facility**	
	29) Travel time to the nearest primary health facility (minutes)**	
	30) Health information accessibility**	
	31) Disability-adjusted life year: Age-standardized DALYs attributable to the environment (per 100 000 pop.)**	
(5) Social security and insurance coverage	32) Social security and insurance coverage**	
(6) Social security and insurance inclusiveness	33) Social security and insurance inclusiveness**	
(II) Natural Environment	(7) Environment	34) Water quality index (WQI)***
		35) Total tree cover*
		36) Households using clean fuel for cooking*
		37) Rainwater harvesting structures*

Table 5 continued

Determinants	Sub-determinants	Integrated indicators from EOL 2020 and SEAR HC network assessment tool
(II) Natural Environment	(7) Environment	38) Air quality index (AQI)**
		39) Noise pollution (decibel)**
	(8) Green building	40) Does the city incentivise green buildings?*
		41) Green buildings*
	(9) Energy consumption	42) Energy requirements vs Energy consumption*
		43) Energy consumed from renewable sources*
		44) Number of sustained electrical interruptions*
	(10) Housing adequacy	45) Proportion of population with access to electricity (%)***
		46) Beneficiaries under PMAY*
		47) Urban slum population (%)***
48) Price-to-Income ratio (housing price/GDP per capita)**		
49) Tenants' protection laws and legislation**		
50) Amount of homeless per 10 000 population**		
(III) Built Environment	(11) WASH and SWM	51) Deviation of total water supplied from service-level benchmark*
		52) Households with piped water supply*
		53) Swachh survekshan score*
		54) Amount of wastewater treated*
		55) Households connected to sewerage network*
		56) Coverage of stormwater drainage network*
	(12) Mobility	57) Proportion of population using at least basic drinking water services (%)**
		58) Proportion of population using safely managed drinking water services (%)**
		59) Proportion of population using at least basic sanitation services (%)**
		60) Household coverage of solid waste management services and in slum settlements**
(13) Recreation	61) Walking distance to the nearest public transport stop (meters)***	
	62) Travel time to the nearest public transport stop (minutes)***	
	63) Traffic accident rate: Death and injury rates from traffic accidents as well as management plans and preventative measures.***	
	64) Presence and design of streets, walking and cycling paths as well as interconnecting streets***	
(14) Universal design	65) Share of total area of cities that is open space for public use*	
	66) Number of recreational facilities***	
(15) Geographical characteristics	67) Walking distance to a recreational facility (meters)***	
	68) Proportion of population with access to at least one recreational facility (%)***	
(IV) Political	(16) Urban governance	69) Time spent doing active activities (e.g. walking, cycling, dancing, sport, gardening, chores, etc.)***
		70) Universal design: The quality of universal design for accessibility**
	(16) Urban governance	71) Size of administrative area**
		72) Size of urban area**
		73) Levels of participation**
		74) Service performance**
(16) Urban governance	75) Open data and information**	
	76) Adaptiveness**	
(16) Urban governance	77) Trust and strong civic networks**	
	78) Mode(s) of governance (description)**	

Table 5 continued

Determinants	Sub-determinants	Integrated indicators from EOL 2020 and SEAR HC network assessment tool
(IV) Political	(17) City resilience	79) Does the city have a disaster management plan in place?*
		80) Are early warning systems (EWS) in place for hazards?*
		81) Number of deaths and directly affected persons attributed to disasters*
(V) Economic	(18) Level of economic development	82) Traded clusters*
		83) Cluster strength*
		84) Economic characteristics (gross city income/production)**
	(19) Economic opportunities	85) Credit availability and accessibility*
		86) Number of incubation centres/skill development centres*
	(20) Income equality	87) Gini coefficient**
(VI) Legal	(21) Unemployment	88) Unemployment Rate**
		89) Women: Employment rate (without obligation)**
		90) Persons with disabilities: Employment rate (without obligation)**
		91) Minorities (and refugees): Legal allowance to work**
		92) Prevalence of violent crime***
(VII) Commercial	(23) Urban safety	93) Extent of crime recorded against women***
		94) Extent of crime recorded against children***
		95) Extent of crime recorded against elderly***
(VIII) Technology	(24) Work environment	96) Working hours**
		97) Work environment**
		98) Travel time to food stores with healthy foods (minutes)**
		99) Proportion of healthy food choices (%)**
(IX) Digital	(25) Accessibility to healthy foods	100) Proportion of population who can afford healthy foods (%)**
		101) E-Governance initiatives**
		102) Command and control system**
		103) Number of e-tenders**
		104) Value of e-tenders**
		105) Open Data Policy**
		106) Presence of chief digital officer**
		107) City-data alliance**
		108) Presence on open data portal.**
		(27) Digital access
110) Internet usage**		
(28) Digital literacy	111) Digital literacy programmes**	
	112) Number of people who participated in these programmes.**	

Note: * Indicators from EOL 2020; ** Indicators from SEAR HC NAT; *** Overlapping indicators.

5. Implications of the study

The integrated list of indicators offers a comprehensive understanding of living conditions and serves as a valuable tool for policymakers, urban planners, and researchers, with key implications across various domains.

The indicators aid in informed decision-making and resource allocation, identifying areas for improvement. They also serve as a benchmark for the monitoring and evaluating the impact of policies and programs over time, promoting continuous improvement in living conditions.

Urban planners can use integrated indicators to

design cities that promote sustainability, inclusivity, and resilience. These indicators focus on environmental quality, infrastructure, and social amenities, ensuring livable urban spaces. The comprehensive nature of these indicators encourages community involvement in planning processes, considering residents' needs and preferences.

The list offers a robust academic research framework for comparing living conditions across regions and identifying best practices, facilitating interdisciplinary studies by integrating insights from sociology, economics, environmental science, and public health.

Real estate developers can assess the livability of areas to align their projects with market demands better and contribute to improving local living conditions.

The index based on indicators promotes transparency and accountability by making data from indicators publicly available, fostering trust and encouraging civic participation. It also aids in raising awareness about quality-of-life issues, enabling non-governmental organizations and advocacy groups to mobilize efforts to address these challenges.

6. Conclusions

Urbanization is accelerating globally, making it crucial to create healthy cities that prioritize residents' well-being. With over 50% of India's population projected to live in cities by 2050, evaluation frameworks like the EOL index play a significant role in planning and monitoring of urban development initiatives and enhancement of urban living conditions.

This research developed a comprehensive tool for evaluating India's proposed healthy cities program by integrating WHO's Guidelines for SEAR HC NAT with the EOL Index 2020 framework and the MPI 2020 framework. The proposed framework includes 8 determinants, 28 sub-determinants, and 112 indicators, providing a robust foundation for data-driven decision-making to improve urban living conditions.

Future work will focus on detailing the numera-

tors, denominators, and units to make the indicators measurable and comparable across different urban contexts. The development of indicators for India's Healthy Cities Programme is ongoing, adapting to new knowledge and data availability. The indicators will be interpreted within the Indian context and supplemented with additional country-specific information using Multi-Criteria Decision Making (MCDM) analysis in the next stage of research.

In conclusion, making future cities smart, environmentally friendly, and healthy requires a comprehensive approach that integrates various frameworks and assessment tools. This integrated approach will not only enhance the quality of life for urban residents but also drive progress towards achieving the Sustainable Development Goals, ensuring that future cities are not only smart but also equitable and resilient.

Author Contributions

Sakshi Gupta conceptualized the study, conducted the literature review, and developed the methodology. She also collected and analyzed the data, wrote the initial draft of the manuscript, and coordinated revisions based on feedback from co-authors and reviewers. This work represents a significant component of her PhD research efforts.

Neeraja Lugani Sethi supervised the research study and made significant contributions to the study design and methodology. She guided the data analysis and interpretation, reviewed the manuscript drafts, and provided critical feedback to refine and improve the final version.

Conflict of Interest

The authors declare no conflict of interest.

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Data Availability Statement

The data supporting the findings of this study are available from the corresponding author upon re-

quest. Additionally, relevant data sources cited in the bibliography are accessible for further reference.

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