EasyChair Preprint

№ 7680

# Strategies for Integrating Health and Urban Planning

Riddhi Sarda and Sarika Bahadure



March 30, 2022

**Title: Strategies for Integrating Health and Urban Planning**

**Abstract:**

Health is at the core of urban planning and the link between health and built environment was realized in the early 19th century, an era of epidemiology. Over a period, due to industrialization and urbanization, cities' development became economic centric and the link between health and built environment diminished. The ongoing COVID19 pandemic, an unprecedented health catastrophe has affected 2500 cities globally and emerged as an urban humanitarian emergency. There is a need to re-establish the link between health and urban planning as going back to normal is unaffordable.

The aim of the study is to form strategies by integrating Health and Urban planning at local level scale. The tools identified for this study are Sustainable Development Goals, HiAP, Public Health Addendum, Urban HEART, UHI and resilient city tools. These tools are examined to understand how they integrate health and urban planning supported by SWOT analysis, followed by comparative analysis of the tools. Subsequently, sector wise weight assessment is conducted, and the final tool, Integrating Health and Planning tool (IHPAT) devised is a combination of three tools: Public Health Addendum, CityRAP Tool and UHI tool which can encourage assessment of any city for identifying areas of intervention to reduce the impact of COVID19 and prepare cities for future health related disasters.

***Keywords:*** Pandemic, Health, Urban Planning, COVID19.

**Authors:**

**Riddhi Sarda**, M.Tech Urban Planning Student, Department of Architecture and Planning, Visvesvaraya National institute of Technology, Nagpur-440010, email: riddhisarda12@gmail.com

**Sarika Bahadure**, Assistant Professor, Department of Architecture and Planning, Visvesvaraya National institute of Technology, Nagpur-440010, email: sarikabahadure@arc.vnit.ac.in

## 1 Introduction

What is the most important goal for planning any city? Superficially, it may appear to provide modern housing quality, Smart infrastructure, and sophisticated workspace. But at the core, the goal of planning any city is to provide a healthy environment to its citizens (Health as the pulse of the new urban agenda, October 2016). At Present we are facing an unprecedented health crisis, COVID 19 pandemic which has altered millions of lives globally. Pandemic is an outbreak of infectious disease at global scale. Originated last year in Wuhan, China, the COVID 19 pandemic has now reached 220 countries affecting 2500 cities worldwide (Cities and COVID-19, 13 May 2020).

The COVID19 pandemic is not the first pandemic faced by the world. There have been pandemics in past which have hit the world and ended millions of lives. Urban planning is a process that focuses on development of land use and the built environment, including the infrastructure systems. The policies, frameworks, and urban management for developing urban area have direct impact on the health of the citizens. This link between health and built environment was established from the past experiences of epidemics and pandemics. Public health and urban planning have common goals, i.e., to improve wellbeing and welfare of citizens and provide a healthy environment for people to live, learn and play. But because of urbanization, the link between health and built environment got diminished and cities became economic centric developments (Roberts, 2020).

Even before COVID 19 pandemic, due to urbanization, 4 billion people across the globe were living in stressful urban environment in cities. These people were facing worsen air pollution, inadequate

infrastructure and basic services and unplanned urban sprawl. It is observed that majority of people affected by COVID 19 live in cities, making this pandemic an Urban Humanitarian Crisis (The Sustainable Development Goal, 2020). The present scenario of pandemic in urban areas has demonstrated that going back to "normal" or "pre pandemic scenario" is not acceptable. Recurring event like COVID 19 pandemic is not affordable. Therefore, there is a need to re-establish the link between health and urban planning as health of its citizens is the most important asset for any city in response to COVID 19. The built environment in cities need to be planned in such a way that any kind of stress or shock can be sustained by the cities (WHO manifesto for a healthy recovery from Covid19, 2020).

### 1.1 Methodology

The methodology adopted for the study can be divided into two parts. The first part is the literature study which comprises of understanding the impacts of COVID 19 at different scale and in different scenarios and identifying tools and frameworks which integrates health and planning. The second part is the approach adopted to develop the assessment tool which integrates health and planning.

At first, the tools and frameworks which integrate health and planning are identified, followed by the SWOT analysis, and studying case examples of the identified tools to understand their implementation at local level scale. Furthermore, comparative analysis is conducted, based on the14 parameters identified from the literature study, tools identified, SWOT analysis and case studies. Finally, sector wise weights assessment is conducted and the tools which gives more emphasis on health and planning form the assessment tool for integrating health and planning. The figure below describes the methodology of the study.

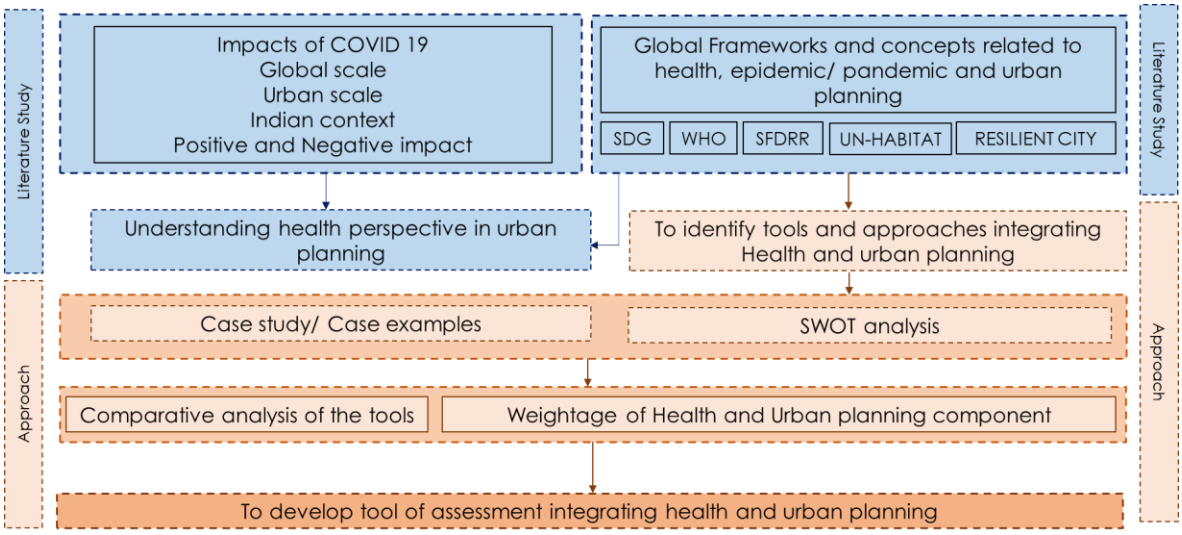



*Figure 1. Methodology of the study*

The first section of the study introduces the study, discusses the need and methodogy of the study. The second section introduces the impact of COVID19 at global scale, at urban scale, followed by COVID 19 scenario in Indian context and positive and negative impacts of COVID 19 given by SDG report. It further mentions approaches to overcome COVID19 impacts. The third section elaborates on identifying tools, followed by SWOT analysis, case studies of the identifies tools, furthermore comparative analysis, and sector wise weight assessment of the tools. The fourth section elaborates on the development of the final assessment tool. The last section discusses the in brief the methodology of the assessment tool development, and approaches for future city planning.

## 2 Impact of COVID19

### 2.1 Global overview

Originated in Wuhan, China in December 2019, the COVID-19 pandemic, also known as the coronavirus pandemic, was declared a Public Health Emergency of International Concern in January 2020, and a pandemic in March 2020. As of 17 August 2021, there have been 71,051,805 confirmed cases of COVID-19, including 1,608,648 deaths is attributed to COVID-19 (Coronavirus disease (COVID-19) pandemic, n.d.).

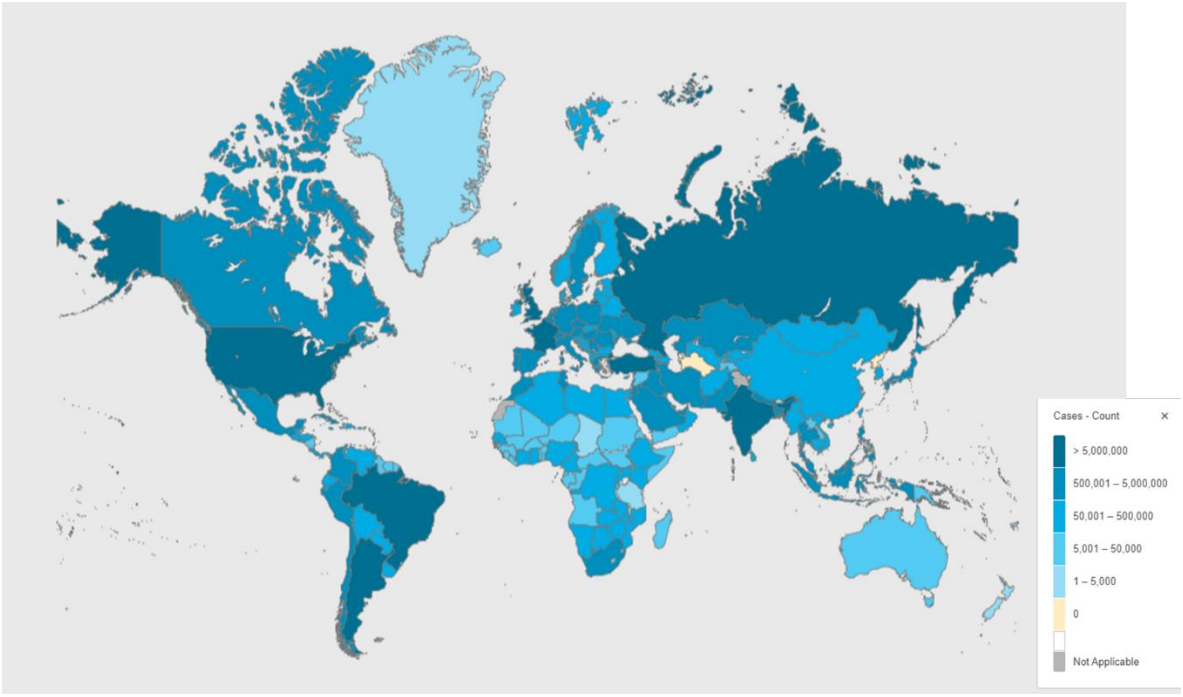



*Figure 2. COVID19 global scenario as on 17 August 2021 (WHO Coronavirus Disease (COVID-19) Dashboard, 2020)*

As per UN-Habitat, most people affected by COVID-19 live in cities, making this pandemic an urban humanitarian crisis. Pandemic has affected all sections of the population, all sectors of the economy, and all areas of the world. Granting that the novel coronavirus distresses every person and community, but it does not do so equally. Instead, it has exposed and worsened prevailing inequalities and prejudices. The fatality rates have been highest among marginalized groups in advanced economies. The most exposed in the developing countries are those employed in the informal economy, older people, children, persons with disabilities, indigenous people, migrants, and refugees – risk being hit even harder (Policy Brief: COVID-19 in an Urban World J , July 2020).

### 2.2 Urban Context

COVID-19 has widened the existing spatial, social, and economic inequalities in cities. There is non-uniform access to urban public space even though its importance in restricting COVID-19 spread. Urban housing crisis has worsened due to pandemic and conversely worsened the pandemic. There is limited access to basic services and urban healthcare and is undermining COVID-19 responses (Policy Brief: COVID-19 in an Urban World J , July 2020).

### 2.3 COVID19 scenario in Indian Context

India is the second worst hit country by COVID 19 with 99,31,011 total cases as of 15 December 2020.

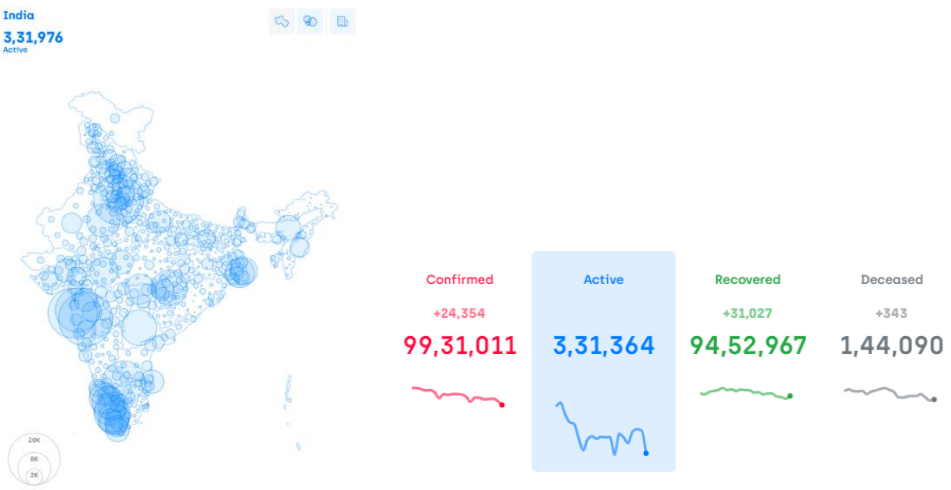
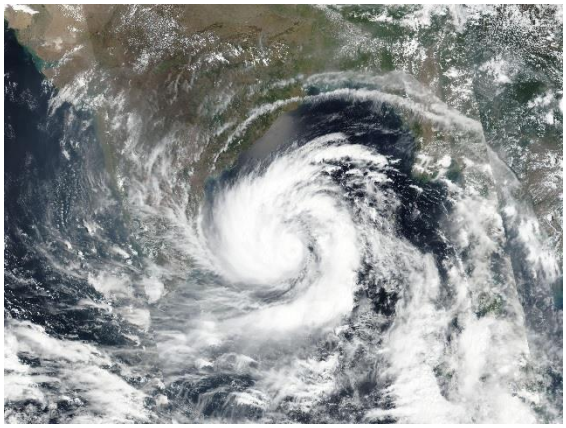



*Figure 3. India is the second worst hit country by COVID19 (2020)*

*a) locust infestation*



*b) Cyclone Amphan- Bay of Bengal/ Cyclone Nisarga- Arabian Sea*

*c) Uttarakhand Forest fires*

*d) Floods in Assam and Bihar*

*Figure 4. Natural disasters faced by India amidst pandemic*

Amidst COVID 19, there were many other natural disasters faced by India: Locust attack in Rajasthan (May-June 2020), Cyclone Amphan in Bay of Bengal, Cyclone Nisarga in Arabian sea (June 2020), forest fires in Uttarakhand (May 2020), and floods in Assam and Bihar (May 2020).

## 2.4 COVID19 impacts- SDGs

The Sustainable Development Goals report 2020 gives the overview of the 17 goals before and after the start of COVID19 pandemic. It highlights the positive and negative impacts of COVID19 in urban areas (refer fig.4) (The Sustainable Development Goal, 2020).

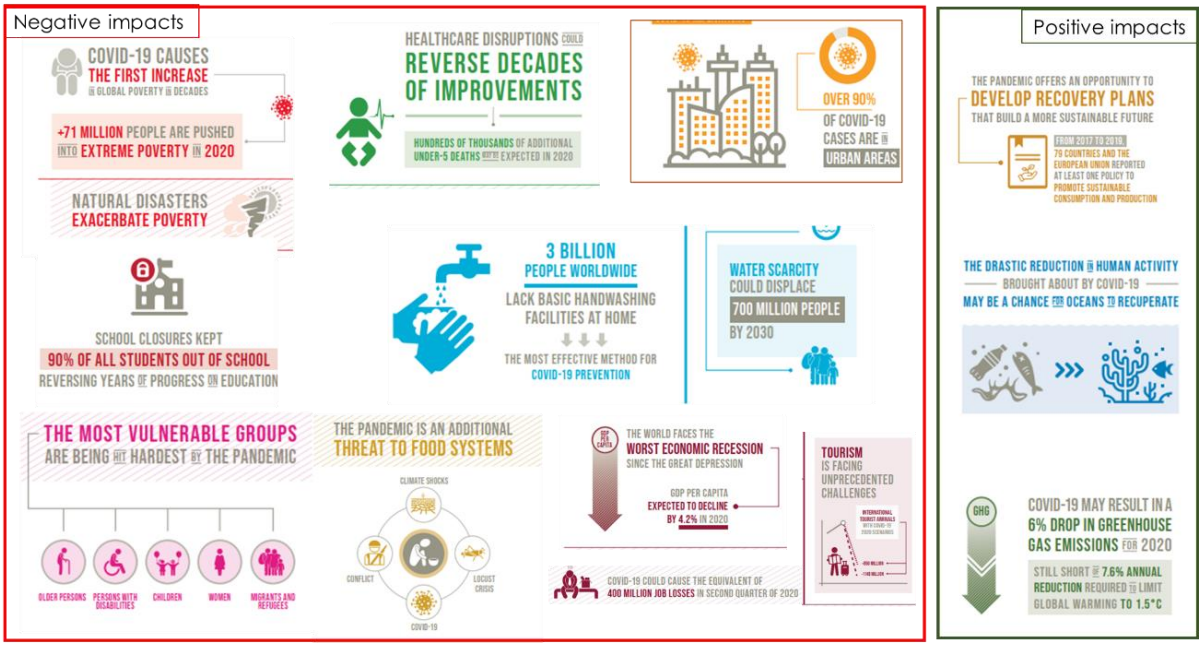



*Figure 5. Positive and Negative impacts of COVID19 (The Sustainable Development Goal, 2020).*

The negative impacts of COVID19 in urban areas are as follows: the pandemic has pushed more than 71 million into extreme poverty in 2020, over 90% of COVID19 cases are in urban areas, reversal years of progress on education is seen as schools were kept closed in lockdown, the most vulnerable sections of the society is being hit the hardest, threat to food security, lack of basic services provisions, worst economic recession since the great depression and tourism is facing unprecedented challenges (The Sustainable Development Goal, 2020).

The positive impacts of COVID19 are as follows: the pandemic also offers an opportunity to develop recovery plans for a more sustainable future, drastic reduction in human activities has provided a chance for ocean to recuperate and 6% drop in GHGs is seen because of COVID19 pandemic (The Sustainable Development Goal, 2020).

## 2.5 Approaches to overcome COVID19 impacts

The impacts of COVID19, observed in urban areas are aggravated vulnerabilities, exposed and worsened prevailing inequalities and prejudices, development deficits, lack of open spaces, infrastructure and basic services and health inequities.

To overcome the impacts of COVID 19 in urban areas (refer fig.6), there is need for integrating health and urban planning and for improving transport systems, housing and green spaces while focusing on addressing the needs of vulnerable and disadvantaged groups to bring immediate health benefits and prepare cities for natural disasters and future health related emergencies.

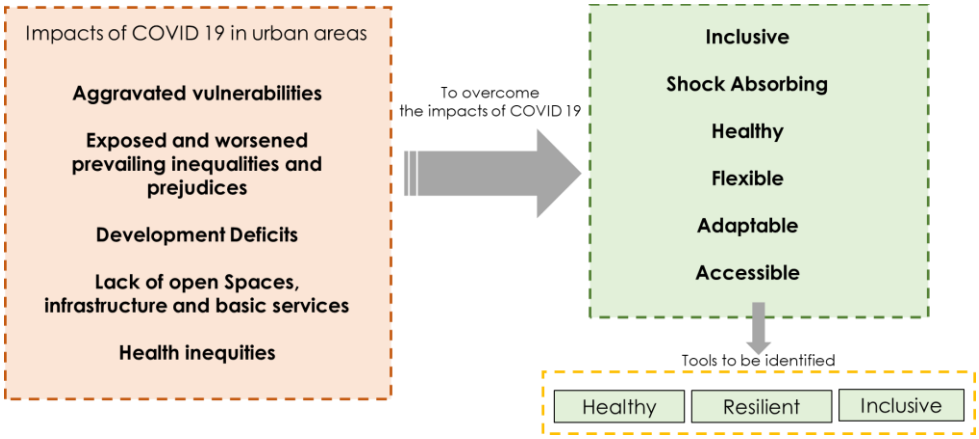
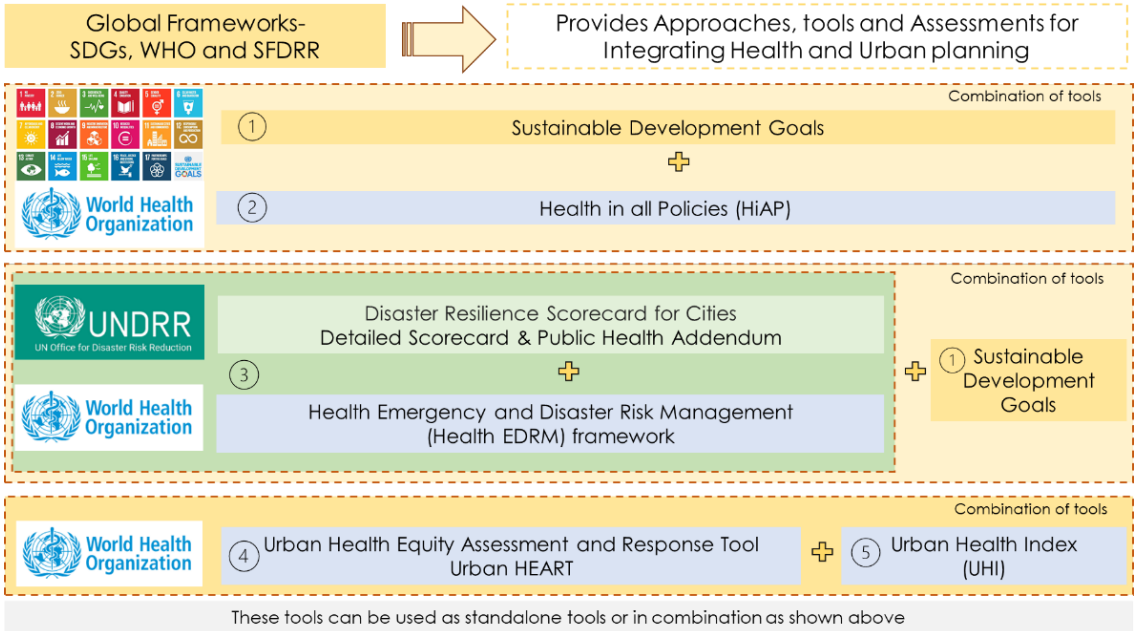


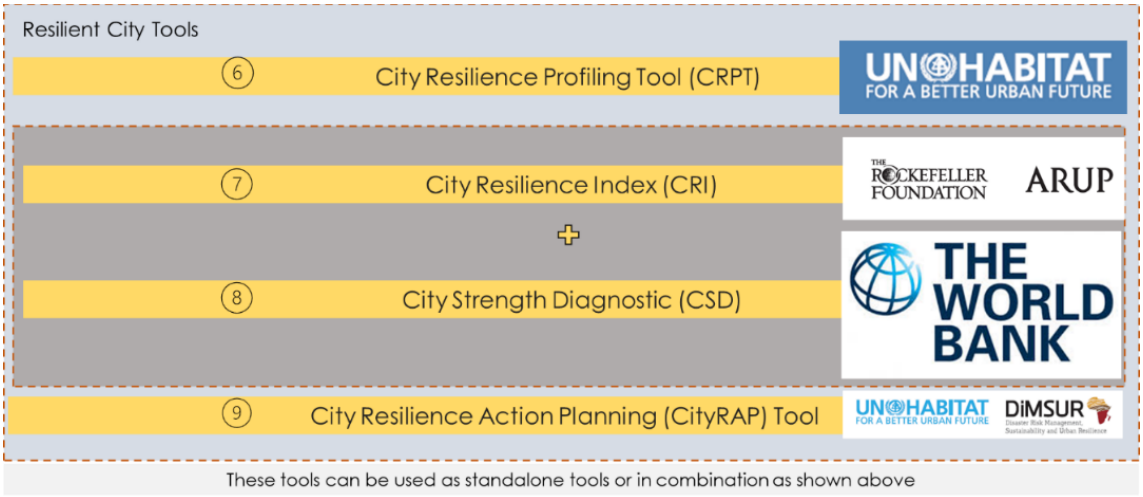

*Figure 6. Approach to overcome the impacts of COVID19 in urban areas.*

## 3 Tools and Framework

The tools identified which integrate health and urban planning are the global frameworks and resilient city tools. The global frameworks identified includes Sustainable Development Goals, tools by World Health Organizations and Sendai Framework for Disaster Risk Reduction (refer fig. 7(a)). The resilient city tools identified includes City Resilience profiling tool, City Resilience Index, City Strength Diagnostic and City RAP tool (refer fig. 7(b)). In total nine tools are identified for the study.




a) Identified tool from global frameworks.




b) Identified Tools from resilient city tools.

*Figure 7. Identified tools that integrate health and planning.*

The identified tools are analyzed to understand how the tools integrate health and planning. The table below gives the overview of the tools and illustrates the features, area of intervention and assessment method of the tools.

*Table 1. About the tools.*

| Identified tools | | Year | Feature | Intervention | Assessment method | |
|---|---|---|---|---|---|---|
| 1 | Sustainable Development Goals (SDGs) | 2015 | Health and well-being for all at all ages and **the determinants of health** are at the heart of the 17 SDGs. | Physical Development | Quantitative assessment | A **composite score** for SDG Index (2019) was computed in the **range of 0–100** for based on its aggregate performance across 16 SDGs. **Aspirant:** 0–49 **Performer:** 50–64 Front **Runner:** 65–99 **Achiever:** 100 |
| 2 | Health in all Policies (HiAP) | 2011 | A collaborative approach to improve the health of all people by **incorporating health considerations into decision-making across sectors and policy areas.** | Policy Assessment Physical Development | Quantitative and Qualitative assessment | Health impact assessment: This approach uses an array of **data sources and analytic methods and considers input from stakeholders** to determine the **potential effects of a proposed policy, plan, program, or project** on the health of people. |
| 3 | Disaster Resilience Scorecard for Cities & Public Health Addendum | 2017 | To strengthen and integrate coverage of the many aspects of **public health issues and** | Disaster risk Reduction | Quantitative assessment | **Scoring** is done from **1-5** and the essential which has **least score** can be the **area of focus**. |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | **consequences of disasters**. | | | |
| 4 | Urban Health Equity Assessment and Response Tool (Urban HEART) | 2010 | A guide for policy- and decision-makers at national and local levels to **identify and analyze inequities in health and frame effective strategies.** | Policy Assessment Physical Development | Quantitative assessment | The assessment is done using indicators of key health outcomes, and major social determinants grouped into four policy domains. Urban HEART recommends data representation to identify key equity problems: 1) Urban Health Equity Matrix 2) Urban Health Equity Monitor |
| 5 | Urban Health Index | 2014 | **To measure and map the disparities** in health determinants and outcomes in urban areas. | Physical Development (Mapping Tool) | Quantitative assessment | The two steps for calculating the UHI: **(1) Standardization of indicators (using min-max method), and (2) Amalgamation of the standardized indicators (Geometric mean**). |
| 6 | City Resilience Profiling Tool (CRPT) | 2018 | A diagnostic methodology **to determine shocks and stresses faced** by the city and **prioritize action**. | Resilient City assessment | Qualitative assessment | designed as a self-assessment, aims to help city officials and other stakeholders identify a host of possible risks facing urban areas and prioritize policies and action plans accordingly |
| 7 | City Resilience Index (CRI) | 2014 | A tool for measuring city Resilience. | | Quantitative and Qualitative assessment | 1. QUALITATIVE: Scored on a linear scale between 1 and 5, based upon consideration of a 'best case' and 'worst case' scenario relevant to a particular area of city performance. 2. QUANTITATIVE: Scored on relevant city data in a specific unit as a globally applicable metrics of resilience. A score is then normalized from 1 to 5 scale. |

| | | | | | | |
|---|---|---|---|---|---|---|
| 8 | City Strength Diagnostic (CSD) | 2014 | To enhance **the city's resilience** as well as increase the resilience-building potential of planned or aspirational projects. It promotes a holistic and integrated approach that **encourages cross-sectoral** collaborations to tackle existing issues more efficiently **and to unlock opportunities within the city.** | | Qualitative assessment | **Lens 1** – Shock and Stress Assessment – using traditional risk assessment method<br>**Lens 2** – Dependencies and Interdependencies – with other sectors<br>**Lens 3** – Holistic Resilience – qualitative rating based on the specialist's experience or City Resilience Framework (CRF), i**.e., tool no. 7**<br>**Lens 4** – Alignment with Local Goals |
| 9 | City Resilience Action Planning (CityRAP) Tool | 2015 | To build urban resilience **with participatory approach** with city planners. | Resilient City assessment Capacity building Tool | Quantitative and Qualitative assessment | All collected information is compiled in the Results Matrix and a list of priority issues per neighborhood.<br>Collected Data is analyzed through **focus group discussions**. |

### 3.1 SWOT Analysis

SWOT analysis is done to understand the strength, weakness, opportunities, and threats of the nine tools identified with respect to health and urban planning integration at local level scale. The SWOT analysis of the tools is developed upon how the tools address to the health outcomes, determinants of health, implication in physical development and implementation at local level scale.

*Table 2. SWOT analysis of the tools.*

| **Identified tools** | | **SWOT Analysis** | | | |
|---|---|---|---|---|---|
| | | **S**trength | **W**eakness | **O**pportunities | **T**hreat |
| 1 | Sustainable Development Goals (SDGs) | Intersectoral approach | Goals are for National and Global level. | Addresses to all the Determinants of Health | Pandemic has made these goals unachievable. |
| 2 | Health in all Policies (HiAP) | Considers the positive and negative health and equity consequences during the decision-making process | Less Implication on Physical Development.<br><br>Does not directly address to determinants of health. | Root cause mapping exercise contribute to identify community health problems and can help to identify methods for correcting or eliminating these underlying factors and promoting improved outcomes. | - |

| | | | | | |
|---|---|---|---|---|---|
| 3 | Disaster Resilience Scorecard for Cities & Public Health Addendum | It integrates Public Health with the other sectors.<br>It also addresses to pandemic and has multi hazard approach. | Public health addendum addresses all the sectors briefly. Therefore, it is necessary to use the tool in conjunction with detailed Scorecard. | Public health addendum addresses to the public health system and public health issues.<br>Public health addendum, disaster Resilience scorecards for cities and Health EDRM should be used in conjunction for effective assessment. | Data can be misleading as individual scores may unavoidably be subjective. |
| 4 | Urban Health Equity Assessment and Response Tool (Urban HEART) | It is guide for policy- and decision-makers at national and local levels to identify and analyze inequities in health and recommend effective strategies. | Less Implication on Physical Development and has direct implications on policy development. | It has intersectoral approach and involves communities.<br>It focuses on determinants of health, health equalities and health outcomes. | Assessment method is not clearly described. |
| 5 | Urban Health Index | It is a mapping tool for health disparities in urban areas.<br>It does not involve stakeholders or community and can use data from Urban HEART of any other assessment tool. | It does not provide with any interventions or response plans. | Since there is no prescriptive method or indicators or framework for this tool, the application is flexible and open to modification. | Constrained by the availability or, rather, lack of suitable data on the desired indicators for the geopolitical level of interest. |
| 6 | City Resilience Profiling Tool (CRPT) | Approach is City specific.<br>Initial training on the CRPT is provided to the local authorities or stakeholders through regular conference calls.<br>Quality assessment is undertaken to ensure the data is accurate and traceable. | CRPT guide does not mention how to analyze collected data.<br>Data sets are very generalized parameters which talk about general information about the city. | Involves Multi stakeholders in data collection process | After data collection is complete, it is UN-Habitat that provides city with prioritized and practical recommendations to address weaknesses and vulnerabilities in the urban system. |

| | | | | | |
|---|---|---|---|---|---|
| 7 | City Resilience Index (CRI) | Provides both qualitative and quantitative assessment. This is user-friendly, web-based tool to help collect and analyze data, generating a city's resilience profile. | Each dimension has limited and general indicators. | Involves Multi stakeholders to address the indicators and deals with multi-disciplinary issues. | This tool does not address to environment institutional capacity, disaster risk reduction strategies or response plans. |
| 8 | City Strength Diagnostic (CSD) | Existing plans and reports are reviewed and studied, and potential impacts of existing stresses and shocks is studied. | Maximum indicators are infrastructure related. | Involves Private sectors, NGOs, Universities along with all levels of government and stakeholders | - |
| 9 | City Resilience Action Planning (CityRAP) Tool | A key principle of the tool is bottom-up planning: participatory risk mapping exercises involves multi stakeholders as well as urban dwellers. The RAP identifies specific issues and priorities **accor ding to the context and local realities.** | It does not emphasize much on Health inequalities and health outcomes. | The tool is designed so that local governments can adapt and implement it with minimal intervention from outside technical experts, using practical methods to leverage local knowledge. This is a capacity building tool for urban resilience. | - |

### 3.2 Case Studies

Furthermore, to understand the implications of integrating health and planning at local level, case studies are studied for the identified tools and inferences are engendered (refer table 3). The case studies identified are at local level scale and underscores the combination of the tools.

*Table 3. Case studies of the tools*

| Case study | Tools addressed | Objective | Inferences |
|---|---|---|---|
| the Greater Christchurch UDS: in | Health in all Policies | Understand the implications of Health impact assessment in | The HIA has led to population health outcomes becoming a key |

| | | | |
|---|---|---|---|
| Canterbury, New Zealand | SDGs | planning and the combination of the tools | focus of the UDS and contributes to SDG 11 |
| Tokyo, Japan | Urban Health Index<br><br>Urban HEART Indicators | Implications of Preparing Urban Health Index using Urban HEART indicators | The index plot provides visualization of the extent of geographic disparities for a particular urban area. |
| Cairns and Hinterland Hospital and Health Service Queensland, Australia | Public Health Addendum<br><br>Health EDRM | Implications of Health review in physical planning | Health Review led to planning Health facilities and services in Queensland, Australia. |
| Morondava, Madagascar | City RAP tool | Implications of addressing determinants of health in physical planning and in alignment with local context | Implementation of participatory methods that use and value local knowledge defines a strategic framework identifying transversal and cross-sectoral priority actions. |
| Preliminary Resilience Assessment Surat | City Resilience Index<br><br>City Strength Diagnostic | Implication of the resilience assessment on Health and planning | City Resilience Framework serves as a parameter to understand the complexity of cities. It addresses to determinants of health that contribute to the city's resilience. It helps cities assess their extent of resilience, identify critical weakness, and to improve city resilience. |

### 3.3 Comparative analysis of the tools

The SWOT analysis and case studies is followed by comparative analysis of the tools which is quantitative approach to highlight the tools which are to be nominated for the development of assessment tool. The initial study of the identified tools, SWOT analysis, case studies and approach to overcome the impacts of COVID19 in urban areas forms the basis on which 14 parameters are identified for comparative analysis (refer fig. 8).

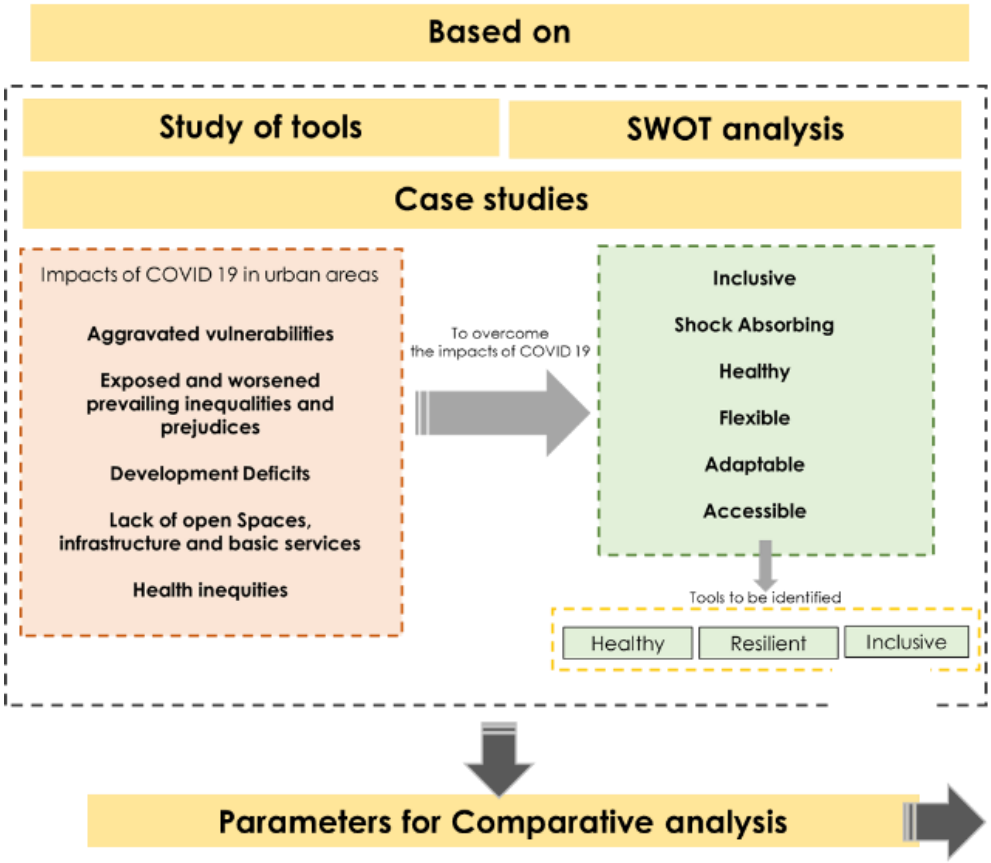



*Figure 8. Parameters identified for comparative analysis.*

The 14 parameters identified are:

1. Implementation at **Local level scale**
2. **City Specific** approach
3. Implications on **Physical development**
4. Implications on **Policy development**
5. **Multi Stakeholders Engagement**
6. **Community Participation**
7. **Capacity building**
8. **Intersectoral Approach**
9. **Identifying Vulnerabilities**
10. **Multi Hazard Approach**
11. **Response Plans**
12. Addressing to **Social Determinants of Health**
13. Addressing to **Health Inequalities**

14. Addressing to **Health outcomes**

The parameters are score from 1-5 for all the tools and the final score is obtained by the average score of the 14 parameters for each tool. Also, the two-way correlation is also done to understand the interdependency of the parameters (refer fig. 9).

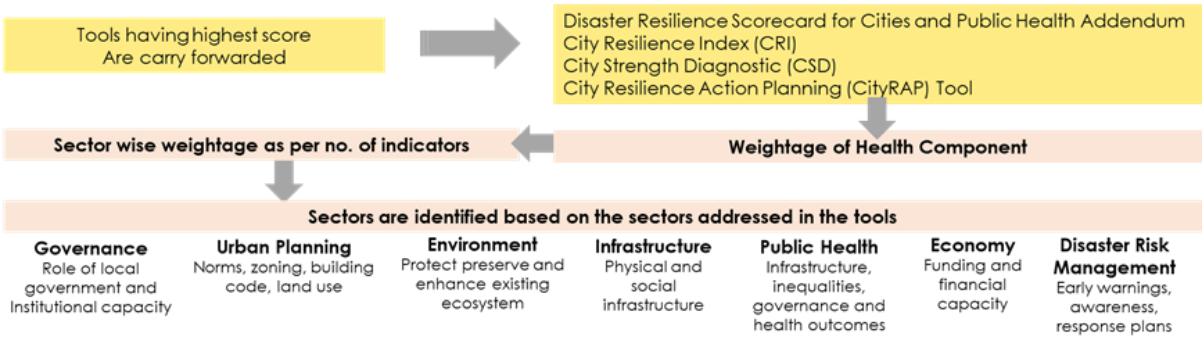
| | Tool identified | Local level scale | City Specific | Physical Development | Policy assessment | Intersectoral approach | identifying vulnerability | Multi hazard Approach | Multi stakeholder | Community participation | Capacity Building | Response plans | Social Determinants | Health inequalities | Health Outcomes | Final Score |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Sustainable Development Goals (SDGs) | 1 | 1 | 5 | 3 | 5 | 3 | 3 | 3 | 1 | 3 | 4 | 5 | 2 | 1 | 2.9 |
| 2 | Health in all Policies (HiAP) | 5 | 3 | 3 | 5 | 3 | 3 | 3 | 3 | 2 | 1 | 4 | 2 | 5 | 5 | 3.4 |
| 3 | Disaster Resilience Scorecard for Cities & Public Health Addendum | 5 | 3 | 3 | 4 | 4 | 5 | 5 | 4 | 3 | 3 | 4 | 3 | 4 | 3 | 3.8 |
| 4 | Urban Health Equity Assessment and Response Tool (Urban HEART) | 5 | 3 | 3 | 4 | 3 | 2 | 2 | 4 | 4 | 2 | 3 | 5 | 5 | 5 | 3.6 |
| 5 | Urban Health Index | 5 | 4 | 4 | 1 | 3 | 4 | 4 | 1 | 1 | 1 | 1 | 5 | 5 | 5 | 3.1 |
| 6 | City Resilience Profiling Tool (CRPT) | 5 | 4 | 4 | 1 | 4 | 3 | 3 | 3 | 2 | 1 | 2 | 3 | 2 | 1 | 2.7 |
| 7 | City Resilience Index (CRI) | 5 | 3 | 5 | 3 | 4 | 3 | 3 | 4 | 3 | 3 | 4 | 4 | 4 | 3 | 3.6 |
| 8 | City Strength Diag0stic (CSD) | 5 | 3 | 5 | 3 | 4 | 3 | 4 | 4 | 3 | 3 | 4 | 4 | 4 | 3 | 3.7 |
| 9 | City Resilience Action Planning (CityRAP) Tool | 5 | 4 | 5 | 1 | 4 | 4 | 4 | 3 | 5 | 5 | 5 | 4 | 3 | 2 | 3.9 |

*Figure 9. Comparative analysis of the parameters.*

Based on comparative analysis of the tools, it is inferred that the tools having high score are Disaster Resilience Scorecard for Cities, Health EDRM, City Strength Diagostic (CSD) tool, City Resilience Index (CRI) and City Resilience Action Planning (CityRAP) Tool. These tools are carry forwarded for sector wise weightage assessment. The Disaster Resilience Scorecard for Cities and Health EDRM are tools that link health and disaster risk reduction. The City Strength Diagostic (CSD) tool uses City Resilience Index (CRI) for assessment and have more implications on Physical development. The City Resilience Action Planning (CityRAP) Tool is in alignment with local context and is capacity building tool with involves community participation in the planning process. The Urban Health Index tool can be used for Mapping the health disparities and is flexible for application.

### 3.4 Sector wise weight assessment

The comparative analysis is followed by Sector wise weight assessment which is done to understand weights assigned to the health and planning sectors as per the number of indicators the tools have for these sectors. It is conducted for Disaster Resilience Scorecard for Cities and Public Health Addendum, City Resilience Index (CRI), City Strength Diagnostic (CSD) and City Resilience Action Planning (CityRAP) Tool as these tools have scored highest in the comparative analysis. Sectors addressed by these tools are identified for weight assessment (refer fig. 10).




| Tools | | Sectors wise weightage (%) | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Governance | Urban planning | Environment | Infrastructure | Public health | Economy | Disaster risk management |
| City Resilience Index (CRI) | | 25% | 8% | 0% | 27% | 8% | 19% | 13% |
| City Strength Diagnostic (CSD) | | 9% | 9% | 6% | 50% | 5% | 13% | 8% |
| City Resilience Action Planning (CityRAP) Tool | | 20% | 23% | 3% | 17% | 5% | 15% | 17% |
| Disaster Resilience Scorecard for Cities (Scorecard) | Preliminary assessment | 28% | 9% | 6% | 17% | 2% | 19% | 19% |
| | Detailed assessment | 32% | 9% | 5% | 25% | 3% | 9% | 18% |
| | Public Health Addendum | 46% | 4% | 4% | 13% | 100% | 4% | 29% |

*Figure 10. Sector wise weightage assessment.*

Based on the sector wise weight assessment, the finalized tools are CityRAP tool as it has highest weightage in urban planning sector and public health addendum as it has 100% weightage for public health.

## 4 Development of final framework

The final developed tool i.e., Integrating Health and Planning assessment tool (IHAP) is combination of three tools. First is the Disaster resilience Scorecard for Cities: Public Health Addendum which addresses to Disaster resilience and public health components, second is Urban Health Index which is a mapping tool, and third tool is CityRAP tool which addresses to urban resilience and urban planning components (refer fig. 11).

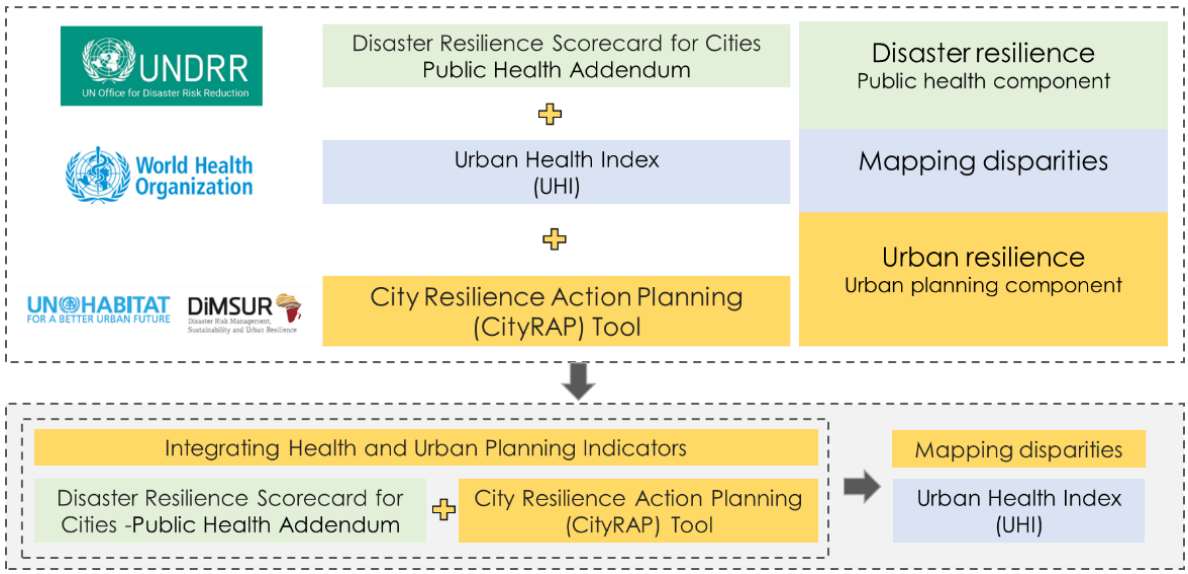
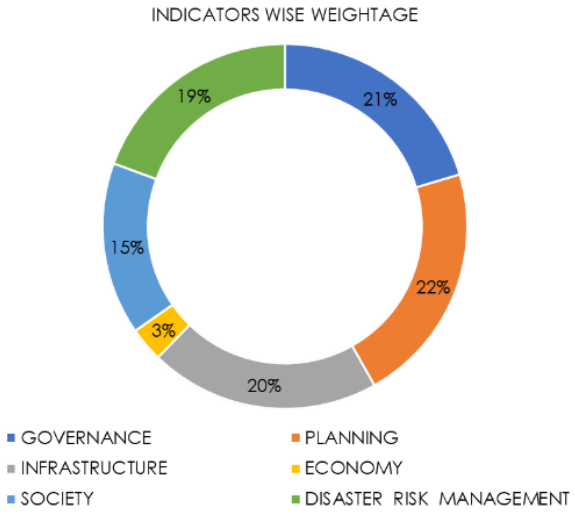



*Figure 11. Finalized Combination of tools.*

In total, there are 98 indicators from public health addendum and CityRAP tool which are classified under 6 sectors: Governance, Planning, Infrastructure, Economy, Society and Disaster risk management. There are 21% of the indicators addresses to governance sector, 22% of the indicators addresses to planning, 20% of the indicators addresses to Infrastructure, 3% of the indicators addresses to economy, 15% of the indicators addresses to society, and 19% of the indicators addresses to disaster risk management. The 6 sectors are further classified under 26 themes (refer fig. 12).




*a) Pie chart showing Number of indicators wise weightage for the sectors.*

| 26 Themes | |
|---|---|
| **SECTOR** | **THEME** |
| GOVERNANCE | ORGANISATIONAL CAPACITY |
| | GOVERNANCE STRUCTURE |
| | PARTICIPATION & CIVIL SOCIETY |
| | PUBLIC HEALTH & GOVERNANCE |
| | MUNICIPAL FINANCE |
| PLANNING | PLANNING INFORMATION SYSTEMS |
| | URBAN PLANNING AND LAND MANAGEMENT |
| | BUILDING CODES |
| | PUBLIC SPACES |
| | INFORMAL SETTLEMENTS |
| | ENVIRONMENTAL MANAGEMENT |
| INFRASTRUCTURE | HEALTH AND EDUCATION FACILITIES |
| | WATER, DRAINAGE AND SANITATION |
| | WASTE MANAGEMENT |
| | ENERGY |
| | TRANSPORT AND COMMUNICATION |
| ECONOMY | URBAN ECONOMY |
| SOCIETY | URBAN SAFETY |
| | FOOD SECURITY |
| | PUBLIC HEALTH |
| DISASTER RISK MANAGEMENT | RISK AWARENESS AND KNOWLEDGE |
| | PREPAREDNESS AND RESPONSE |
| | RECOVERY AND RECONSTRUCTION |
| | PREVENTION |
| | ADAPTATION |
| | MITIGATION |

*b) 26 themes categorized under 6 sectors*

*Figure 12. About the indicators of the developed assessment tool*

## 5 Conclusion

The link between health and built environment was recognized in 19th century which diminished as a consequence of industrialization and urbanization. In the pre pandemic scenario, the urbanization resulted in the stressful living condition for the billions of people in urban areas and consequently, the pandemic has a catastrophic effect in the urban areas. Thus, the COVID 19 pandemic is referred as urban humanitarian catastrophe. There is a need to re-establish the link between health and urban planning to prepare the cities from further health related emergencies. The aim of the study is to develop an assessment to integrate health and planning at local level scale. The study is divided into two parts where the first part is the literature study which includes of understanding the impacts of COVID 19 and identifying tools and frameworks which integrates health and planning, and the second part is the approach adopted to develop the (IHAP) assessment tool which integrates health and planning.

Based on the literature study and approaches, nine tools are identified for this study. For developing the IHPAT, SWOT analysis, case studies, comparative analysis, and sector wise weightage assessment was done. The IHPAT addresses to health and planning indicators which will help in identifying sectors/ areas of intervention for any city. Addressing to the identified sector of intervention will prepare the cities from the future disasters and health related emergencies (refer fig. 13). This tool can be used by city administrators and planners for the assessment of any city to identify priority areas of intervention to reduce the impact of COVID 19 and prepare cities for future health related disasters.

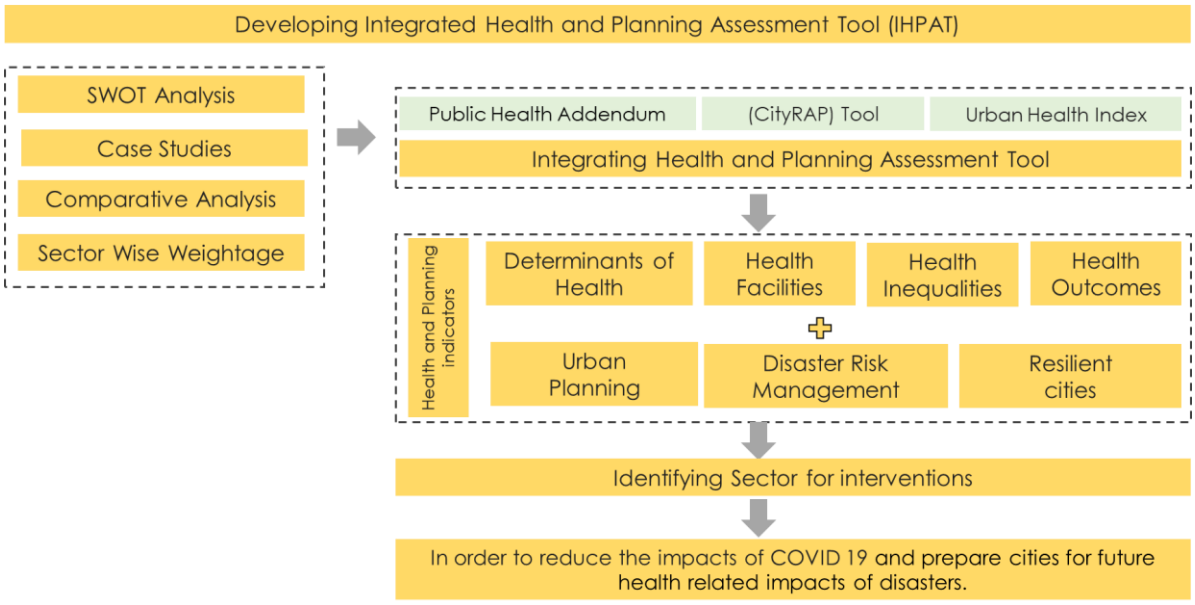



*Figure 13. Methodology of the development of IHAT*

**References**

(2014). *World Focus*(Disaster Management in India).

(2020, 12 15). Retrieved 12 15, 2020, from https://www.covid19india.org/

(2019). *Action plan of Puducherry.* Puducherry U.T.: Department of Revenue and Disaster management .

(13 May 2020). *Cities and COVID-19.* UN-Habitat.

*Coronavirus disease (COVID-19) pandemic*. (n.d.). (WHO) Retrieved 10 15, 2020, from https://www.who.int/emergencies/diseases/novel-coronavirus-2019?gclid=CjwKCAiAt9z-BRBCEiwA_bWv-B5ZlrEVaaf8fyagA9842a0XmQRtKbPj8g1_OtIzHt0zPjeqL45BZBoCHnQQAvD_BwE

*Curly tales*. (n.d.). Retrieved 01 15, 2021, from https://curlytales.com/9-natural-disasters-that-have-already-happened-in-just-5-months-of-2020/

(December, 2016). *Disaster Risk Reduction: A handbook for Urban Managers.* New Delhi: Ministry of Housing & Urban Poverty Alleviation, GoI; Building Materials & Technology Promotion Council, New Delhi; United Nations Development Programme, New Delhi.

*Down To Earth*. (n.d.). Retrieved 01 15, 2021, from https://www.downtoearth.org.in/

Dr. Barkatullah Khan, D. A. (2014). INCESSANT DISASTERS, VULNERABILITY AND COMMUNITY RESPONSE IN INDIA. *World focus*(Disaster Management in India).

Golechha, M. (2020). COVID-19 Containment in Asia's Largest Urban Slum Dharavi-Mumbai, India: Lessons for Policymakers Globally. *J Urban Health*. doi:https://doi.org/10.1007/s11524-020-00474-2

(October 2016). *Health as the pulse of the new urban agenda.* Quito: United Nations conference on housing and sustainable urban development.

(2019). *National Disaster Management Plan.* New Delhi: NATIONAL DISASTER MANAGEMENT AUTHORITY, MINISTRY OF HOME AFFAIRS, GoI.

(November, 2019). *National Disaster Management plan.* New Delhi: National Disaster Management Authority, Ministry of Home Affairs, GoI.

(n.d.). *National Disaster Management Toolkit for urban planning.* New Delhi: DDF Consultants Pvt. Ltd.

(2017). *Opportunities and options for integrating climate change adaptation with the Sustainable Development Goals and the Sendai Framework for Disaster Risk Reduction 2015–2030.* Bonn, Germany: United Nations Climate Change Secretariat.

(July 2020). *Policy Brief: COVID-19 in an Urban World J* . UN Habitat.

Roberts, M. H. (2020). Connections and Divergence between Public Health. *MDPI*(Urban Science).

Shaw, J. U. (January 2016). *Sustainable Development and Disaster Risk Reduction.* Japan: Springer.

(2020). *The Sustainable Development Goal.* United Nations.

*United Nations Office for Disaster Risk Reduction*. (n.d.). Retrieved 10 15, 2020, from https://www.undrr.org/terminology/disaster

*WHO Coronavirus Disease (COVID-19) Dashboard*. (2020, 12 15). Retrieved 12 15, 2020, from https://covid19.who.int/

(2020). *WHO manifesto for a healthy recovery from Covid19.* World Health Organisation.