International Journal of Health Technology and Innovation
RESEARCH ARTICLE
An Official Journal of **Kalam Institute of Health Technology** | ISSN - **2583-8547**

Guidelines for Assessing the Preparedness Levels of Health Systems and Deriving Criteria of Weights for Health Systems Preparedness Index

Syed Abdul Khader Moinudeen[1*], Sesetti Harshitha[1], Annie Nithiya Vathani J[1], Kavita Kachroo[2], Jitendra Sharma[3]

[1]*Scientist- Kalam Institute of Health Technology, Visakhapatnam, Andhra Pradesh, India.*
[2]*Chief Operating Officer- Kalam Institute of Health Technology, Visakhapatnam, Andhra Pradesh, India.*
[3]*Executive Director- Kalam Institute of Health Technology, Visakhapatnam, Andhra Pradesh, India.*

Received: 12th October, 2025; Revised: 05th November, 2025; Accepted: 18th November, 2025; Available Online: 08th December, 2025

ABSTRACT

Background: Infectious disease outbreaks, including historical epidemics and the recent coronavirus disease (COVID-19) crisis, remain a global concern. Despite advancements in disease management in developed nations, low- and middle-income countries struggle because of their underdeveloped healthcare infrastructure, limited resources, and inadequate preparation. Improved data and assessment tools for preparedness are essential to effectively combat outbreaks.

Methodology: This study develops guidelines for assessing health systems' preparedness levels (HSPI) and derives criteria weights for HSPI. We chose tuberculosis as an example to develop the HSPI framework and entropy-derived weights across all states in India. Indicators were sourced from standardized national datasets, normalized, and weighted using the entropy method. HSPI was calculated by aggregating weighted scores across indicators, providing an overall preparedness score for each state in India.

Results: This entropy approach included index variables for TB, including the Health Assessment Profile, Medical Infrastructure, Technology Infrastructure, Institutional Support, and Disease-Specific Outcome, with entropy-derived weights of 17.83 percent, 20.70 percent, 20.64 percent, 20.09 percent, and 20.73 percent, respectively. Assigning weights through entropy-based allocation enhances robustness in applications such as multi-criteria decision-making and risk assessment. The weight allocation process yielded a mean average weight between 17-22 percent. The HSPI provides a valuable framework for policymakers, health care professionals, and researchers to identify areas where improvements are needed in a country's health system.

Keywords: Health System Preparedness Index, Criteria weighting, Indian Health Resilience Index, Assigning Weights, Public health emergencies.

International Journal of Health Technology and Innovation (2025)

How to cite this article: Moinudeen SAK, Harshitha S, Vathani JAN, Kachroo K, Sharma J. Guidelines for Assessing the Preparedness Levels of Health Systems and Deriving Criteria of Weights for Health Systems Preparedness Index. International Journal of Health Technology and Innovation. 2025;4(3):22-30.

Doi: 10.60142/ijhti.v4i03.04

Source of support: Nil.

Conflict of interest: None

INTRODUCTION

Periodically, epidemics and pandemics of infectious diseases put people's lives and health in danger, despite living in developed, developing, or underdeveloped nations (1). Disease outbreaks have had devastating effects on stressed health systems and, subsequently, on other aspects of daily life, ranging from the Antonine Plague in 165 AD to the recent Coronavirus in 2019 (COVID-19) (2). Similarly, regions with inadequate health systems, insufficient funding, understaffing, and limited economic security protection remain vulnerable to the widespread effects of disease outbreaks. For instance, although the 1970s smallpox pandemic was eradicated globally, this accomplishment has not been replicated in low-to middle-income countries because of inequitable resource allocation. Conversely, there were challenges in responding to other diseases because of inadequate health systems that were unable to manage multiple disease outbreaks concurrently (3).

**Author for Correspondence: dr.moinudeen@gmail.com*

Etiological factors contributing to disease emergence are likely to persist and intensify. Additionally, novel sources of ecological disruption and alteration, such as global climate change, are anticipated to exacerbate the risk of disease emergence (4). Given the significant threat that epidemics and pandemics pose to public health, it is imperative to systematically evaluate national preparedness and identify areas that are inadequately equipped to address such threats. In addition to epidemics and pandemics, social inequities within nations and communities, as well as resource disparities between nations, also contribute to the potential propagation of disease outbreaks (5). Despite significant investments in building capacity and global health surveillance, numerous regions worldwide lack the capability to address disease threats effectively. In accordance with current assumptions based on the World Health Organization (WHO)-supported Joint External Evaluation (JEE) process, only a limited number of nations have available data and are fully compliant with the International Health Regulations (IHR) 2005, demonstrating the ability to mitigate public health risks (6).

In addressing high-priority infectious disease epidemics, national governments remain the primary actors and initial line of defense. These governments serve as the focal points for capacity-building initiatives aimed at enhancing preparedness. To inform and evaluate both international and domestic investments in capacity, improved metrics on national-level preparedness to respond to diverse disease emergencies are essential (7). The widely recognized necessity for effective tools in this field has been underscored by recent efforts to establish metrics for comparative evaluation of country-level preparedness (8). The organization "Prevent Epidemics" has published country-level analyses on its website that exclusively utilize Joint External Evaluation data. Moore *et al*. presented a disease vulnerability indicator that incorporates measures of preparation and intrinsic disease risk (9).

Resource allocation and priority setting present significant challenges for health policymakers, necessitating a comprehensive evaluation of multiple factors, including objective (e.g., reason) and subjective (e.g., empathy) elements (10). According to the World Health Organization (WHO), ethical resource allocation principles are requisite for evaluating healthcare interventions and allocating resources. The criteria employed to assess healthcare interventions and resource allocation are likely to have significant implications, particularly in terms of ethics. The World Health Organization's (WHO) ethical resource allocation principles encompass efficiency (maximizing population health), equity (minimizing health disparities), and utility (achieving the greatest good for the greatest number) (11). Healthcare decisions should optimally be predicated on a constellation of factors, including equity or justice, efficacy or effectiveness, stakeholder interests and demands, cost-effectiveness, strength of evidence, and safety (12). Decision-making in healthcare at the micro, meso, and macro levels is a complex issue, which often necessitates a balance between equality and efficiency (10).

There is a significant need for health system preparedness, which refers to the capacity of a nation's health system to respond effectively and efficiently to public health emergencies and crises. The outbreak of the COVID-19 pandemic underscored the necessity for robust health system preparedness. In India, the pandemic has exposed the vulnerabilities and deficiencies of the country's health system, necessitating a comprehensive assessment of preparedness. The health system preparedness index (HSPI) is an instrument that can be used to evaluate the preparedness of a country's health system in response to any specific disease outbreak. The HSPI considers various factors, including governance, financing, service delivery, the workforce, and information systems. It assigns a score to the health care system based on its overall preparedness. Using India as an example, a Health Systems Preparedness Index may facilitate the identification of the health system's weaknesses and guide focused efforts to enhance the system's readiness for disasters, emergencies, and illnesses. Policymakers, researchers, and public health professionals can employ the HSPI to assess India's capacity to respond to such disasters and to target specific areas for improvement. Furthermore, the index can be used to evaluate progress over time, identify areas requiring enhancement, and assess the level of preparedness across the nation. This index incorporates indicators such as the number and distribution of health facilities and workers, availability of essential medicines and supplies, capacity for laboratory testing and disease surveillance, availability and quality of health data, electronic health records, and real-time disease-monitoring systems. Additionally, community involvement in disaster planning and responses, community-based health interventions, and community preparation for emergencies were included.

Given the importance of HSPI, this article reviews the health system preparedness index in India, detailing its development, methodology, and application. It also analyzes the HSPI assessment findings and their implications for future improvements in India's health system preparedness. This study aimed to establish guidelines for evaluating health system preparedness levels and determining criteria weights for a health system preparedness index (HSPI). In addition, to identify and prioritize the HSPI criteria, the goal is to rank these criteria based on their significance in contributing to a well-prepared health system. Overall, to develop an HSPI framework, this goal involves creating a structured framework that integrates prioritized criteria and assigns weights based on their importance. The objective was to create a standardized tool for measuring health system preparedness for use by policymakers and public health officials at various levels.

METHODOLOGY

A conceptual framework for Health Systems Preparedness Index

The state of epidemic preparedness is indicated by the capacity of institutions, such as public health officials, healthcare systems, and emergency response bodies, to detect, report, and manage outbreaks. Governmental organizations must identify and assess epidemic events with serious consequences, report outbreaks and their causes to relevant national and international bodies, and take measures to mitigate the health, societal, and economic impacts of outbreaks(13,14). While monitoring, reaction, and health capabilities typically describe public health emergency preparedness, these functions rely on a broader set of institutional, budgetary, and infrastructure factors (13). We developed a multidisciplinary framework to assess various capabilities, identifying five essential types for evaluating health systems' preparedness. This study considered sub-indices and indicators based on specific disease outcomes. Indicators related to tuberculosis for disease outcome were included due to their standardized data available from government sources, in contrast to other disease-specific data outcomes. (Figure 1) In selecting the sub-indices for the health systems preparedness index (HSPI), key factors were considered to ensure a comprehensive assessment of a country's capacity to manage public health emergencies. Each sub-index was chosen for its relevance to real-world health challenges by incorporating aspects of population health, service infrastructure, technology, economic support, and the capacity to respond to routine and emergency health needs.

Figure 1: Overview of Health System Preparedness Index

*OOPE = Out of pocket expenditures, MPCE = Monthly Per Capita Consumption Expenditure, NCD = Non-communicable Diseases, GDP = Gross Domestic Product, RE = Revenue Estimates, TB = Tuberculosis

Health Assessment Profile

The Health Assessment Profile offers a detailed view of a country's health status and emergency response capacity. The variables considered included the percentage of children aged 12 to 23 months fully vaccinated (using vaccination cards or mother's recall), mortality rates, percentage of households with health scheme or insurance coverage, monthly per capita out-of-pocket health expenditure as a share of monthly per capita consumption expenditure (MPCE), literacy rate, and prevalence of non-communicable diseases (NCDs). For instance, a high infant or maternal mortality rate indicates a need to bolster maternal and child health services. Additionally, a high burden of NCDs necessitates preventive measures and interventions to address risk factors, such as tobacco use, unhealthy diet, and physical inactivity.(15-17)

Health Service infrastructure

Health service infrastructure is vital in the Health Systems Preparedness Index (HSPI), which indicates a country's capacity to address public health emergencies. It includes the number of physicians, nurses, midwives, and pharmacists per 10,000 population, hospital bed percentage, neonatal support, and blood bank availability. During emergencies, such as pandemics or natural disasters, efficient infrastructure with adequate supplies, staff, and equipment ensures timely and effective treatment, curbing disease spread and mortality rates. Additionally, robust infrastructure supports routine medical services such as maternal and child health, vaccinations, and non-communicable disease management, ensuring accessibility, affordability, and quality, thus improving health outcomes and reducing disparities.(18,19)

Information and Technology (IT) infrastructure

The availability of mobile phones and Internet subscribers is a crucial indicator of the technological infrastructure of the HSPI. Mobile phones and Internet connectivity enhance healthcare delivery and public health emergency response. Mobile phones, especially in low-resource settings, enable remote consultation, health education, and promotion. During public health emergencies, they provide real-time information, alerts, and updates to reduce the spread of disease. Internet connectivity is vital for high-quality healthcare services, supporting health information systems, electronic medical records, and access to online medical resources, such as journals, research papers, and clinical guidelines, thus improving care quality and reducing medical errors.(20-22)

Organizational Support

Institutional support represents a country's political and economic environment and its effects on the healthcare system. Indicators such as GDP annual growth, unemployment rate, and the Reserve Bank of India (RBI) revenue expenditure on public health were used to evaluate this support. GDP growth reflects economic development and stability, which can enhance healthcare by increasing resources for services and infrastructure and attracting foreign investment. The unemployment rate is crucial, as high unemployment can reduce access to healthcare and limit infrastructure development, whereas low unemployment can boost these resources. RBI's public health expenditure highlights the government's prioritization and investment in healthcare services and infrastructure.(23,24)

Disease-specific outcome

To evaluate HSPI, we used tuberculosis (TB) as an example to assess the criteria weights with other sub-indices. TB is a major public health issue, especially in India, owing to its high infectivity and significant morbidity and mortality. (25) The disease outcome of TB is crucial for HSPI, which includes TB-specific indicators such as incidence, prevalence, presumptive case findings, notification, and active case findings. Effective TB control necessitates a robust healthcare system capable of prompt diagnosis and treatment, which requires trained providers, laboratory services, and essential medications. The HSPI evaluates the availability and quality of these diagnostic and treatment services, reflecting a country's readiness to manage TB and other infectious diseases.(26) This information helps policymakers prioritize interventions and allocate resources to enhance TB services, thereby reducing TB incidence, prevalence, and mortality and improving overall health system preparedness.

These indices are grounded in established health system frameworks and provide a multidimensional perspective on health system preparedness, informing both policy and resource allocation to enhance resilience to public health emergencies.

Index Scoring and Data Sources

The indicators in this study pertain to various healthcare aspects, including health assessment profiles, healthcare, information and technology infrastructure, organizational support, and specific disease-related health outcomes, using state-wise data from various governmental sources. The entropy method determines the relative importance of the indicators within each sub-index. Data were collected and standardized for each state and union territory. The entropy method calculates the entropy of each indicator, indicating the uncertainty in its value distribution. Normalization techniques were then applied to ensure the weights summed up to one using the formula $X = (X_i - X_{min})/(X_{max} - X_{min})$. This method effectively incorporates expert opinions and subjective data for a comprehensive and robust evaluation of state and union territory performance across subindices.(13,14)

Validating the Methodology

This validation ensures credible and reliable findings. This study validated the methodology using historical data and confirmed its accuracy and effectiveness. Data from previous studies were collected and analysed using the same methodology to compute subindices and composite index values. A comparison with previous studies showed high similarity, confirming the validity of the methodology. Additionally, the results were aligned with the existing literature, further validating the approach. Sensitivity analysis was conducted to test the robustness by varying the indicator weights. The methodology remained robust, with minimal impact from the weight changes. Overall, the validation confirms the proposed methodology is a reliable and effective tool for calculating subindices and composite index values, suitable for future studies.(14,27)

Entropy Methodology

To determine factor weights using the entropy method, we first standardized the measured values using the formula,

$$P_{ij} = \frac{x_{ij}}{\frac{1}{n} * \{\sum_{j=1}^{n} x_{ij}\}}$$

where P_{ij} represents the standardized value of the ith indicator (sub-indices) in the j^{th} sample (sample of the desired population), x_{ij} represents the original value of the ith index in the j^{th} sample, and n represents the total number of samples.

Next, we calculated the entropy value E_i of each index using the formula

$$E_i = -\sum_{j=1}^{n} P_{ij} * \log_2 P_{ij}$$

where P_i represents the standardized value of the i^{th} indicator in the j^{th} sample and log represents the natural logarithm with base two. To avoid calculation errors, we set $P_{ij} * \ln P_{ij} = 0$ when $P_{ij} = 0$.

We summed the entropy values for each index to obtain the system's total entropy. Using these values, we calculated the entropy weights for each index with the formula

$$\textit{Entropy weight} = 1 - (\textit{Entropy of each index} \,/\, \textit{Total entropy of the system})$$

To ensure that the entropy weights added up to one, we normalized the weights by dividing each entropy weight by the sum of all entropy weights.

We applied the entropy method to the dataset using R software. First, we calculated the relative frequency of each factor by dividing each factor's frequency by the total number of observations. Then, we calculated each factor's entropy and summed these to get the total system entropy. Finally, we computed the entropy weight for each factor and normalized the weights to sum to one.

RESULTS

Taking India as a consideration and with the available data to evaluate the Health System Preparedness Index, we used the Entropy Method and considered the five sub-indices, such as health assessment profile, health services infrastructure, information and technology infrastructure, organizational support and specific disease outcome (Tuberculosis). The top ten states of India based on their Health System Preparedness Index scores are Goa, Tamil Nadu, Lakshadweep, Gujarat, Himachal Pradesh, Uttar Pradesh, Andhra Pradesh, NCT Delhi, Ladakh, and Maharashtra. In contrast, the last ten states in India, based on their Health System Preparedness Index scores, are Assam, Nagaland, Sikkim, Chhattisgarh, Bihar, Meghalaya, Mizoram, Tripura, Arunachal Pradesh, and Jharkhand.

Figure 2: Map of India, highlighting top 10 and bottom 10 states by health system preparedness index scores

While coming to the sub-indexes of Health Systems Preparedness Index, to calculate the health assessment profile sub-index of various tests were calculated based on various indicators such as literacy rate, MPCE, health insurance coverage, mortality rate, prevalence of non-communicable diseases (NCDs), and vaccination rates among 12 to 13-year-aged per 100,000 population in each state. The weights were assigned to each indicator to derive their relative importance by using the entropy method. Based on the general health profile value, the top–ranking states are Lakshadweep, followed by Andaman & Nicobar, Himachal Pradesh, Dadra Nagar and Daman, Haryana, and Kerala.

The quality of healthcare infrastructure in India varies greatly across different regions. To determine the medical infrastructure index, several key indicators were used, including the number of physicians, pharmacists, hospital beds, neonatal facilities, and blood banks in each state. The states with the highest scores on this index were Tamil Nadu, Andhra Pradesh, Maharashtra, West Bengal, Rajasthan, Ladakh, Manipur, Himachal Pradesh, Uttarakhand, and Kerala.

Table 1: Indicator Weights using entropy

Index (Overall Entropy in %)	*Sub-Index*	*Entropy Weights (%)*
Health Assessment Profile (17.84)	Children aged 12-23 months fully vaccinated	16.25
	Mortality Rates	16.78
	Monthly per capita OOPE on MPCE	17.37
	% households with any usual member covered by a health scheme or health insurance	16.49
	Literacy Rate	16.32
	Prevalence of NCDs	16.80
Health Service Infrastructure (20.70)	Total Physicians, nurses & midwives per 10,000 population	18.70
	Registered Pharmacists	21.30
	Percentage of beds in hospitals	20.21
	Neonatal support in hospital	19.90
	Blood banks availability	19.88
Information technology & Structure (20.64)	Mobile Tele density per 100 population	38.39
	Internet Subscribers per 100 population	61.61
Organizational Support (20.09)	Annual Growth Rate of GDP per capita	15.42
	Unemployment Rate	17.13
	RE on family welfare	16.15
	% change over in RE on health 2020-21 (Budget Estimates)	16.23
	% change over RE on health 2022-23 (Budget Estimates)	16.85
Disease Specific Outcome (Tuberculosis) (20.73)	No. of BCG Vaccines administered	21.34
	Prevalence of all forms of TB per 100 000 population	18.75
	Presumptive TB cases examination	17.89
	TB case notification rate	19.03
	TB active case finding	22.99

*OOPE = Out of pocket expenditures, MPCE = Monthly Per Capita Consumption Expenditure, NCD = Non-communicable Diseases, GDP = Gross Domestic Product, RE = Revenue Estimates, TB = Tuberculosis

To assess the state of information and technology infrastructure across various regions in India, utilized key indicators such as mobile tele density and internet subscribers. Using this index, the top-ranking states in terms of technology infrastructure were identified as Goa, Gujarat, Jammu & Kashmir, Punjab, Ladakh, Lakshadweep, Chandigarh, Madhya Pradesh, Manipur, and Telangana. This research provides valuable insights for policymakers and businesses looking to enhance the technology infrastructure in different regions of the country and to increase access to technology for all citizens. The findings of this research can serve as a basis for further studies on the topic of technology infrastructure in India.

To assess the organizational support available to different states in India, the organizational support index uses indicators such as the growth rate of GDP, unemployment rate, and revenue expenditure. The index also takes into account the revenue expenditure for the years 2020-21, 2021-22, and the budget estimate for 2022-23. Based on this index, the top-ranking states for institutional support were Delhi, Uttar Pradesh, Lakshadweep, Tamil Nadu, Goa, Rajasthan, Bihar, Gujarat, Andaman & Nicobar, and Kerala.

The tuberculosis (TB) index was created to assess the prevalence and management of TB across different states in India. Key indicators such as BCG vaccinations, prevalence, presumptive TB, TB case notification rate, and TB active cases were used to derive weights for each indicator. The top-ranking states based on this index were Uttar Pradesh, Delhi, Chandigarh, Himachal Pradesh, Madhya Pradesh, Odisha, Andhra Pradesh, Maharashtra, Haryana, and Rajasthan.

The results from this index can provide valuable insights for policymakers and healthcare providers to improve the prevention, diagnosis, and treatment of TB in different regions of the country. By focusing on these key indicators, it is possible to target the resources and interventions to reduce the burden of TB and improve health outcomes for affected individuals and communities.

DISCUSSION

Entropy is a robust method for weight allocation in various fields, such as multi-criteria decision-making, risk assessment, finance, engineering, and environmental management. It assigns weights to criteria by maximizing their information content, which is calculated using entropy. Higher entropy indicates greater uncertainty or diversity, resulting in a higher weight for that criterion. A key advantage is that it does not require prior assumptions regarding the importance of the criteria, making it suitable for contexts with unknown or variable criterion importance. Additionally, it can manage numerous criteria, aiding complex decision-making scenarios.

A study by Ma and Wang *et al*. (2022) (28) used entropy-based weight allocation to assess the performance indicators of a department of healthcare systems in China. This study found that entropy-based weight allocation produced more accurate results than the other weight allocation methods.

In another study by Ahmed *et al*. (2020) (29), entropy-based weight allocation was used to prioritize sustainable development goals (SDGs) in Pakistan. Entropy-based weight allocation produced more equitable and reliable results than other weight allocation methods.

Quantifying healthcare quality is challenging and was once considered impossible. Donabedian (30) identified three traditional metrics: healthcare structure, treatment process, and patient outcome. Ideally, structure-based quality measures should evaluate the population and physical and financial resources needed for care. Despite its limitations, this assessment relies on clinical and technological competence across medical specializations.

Brook *et al*. (31) describe the process as the actions involved in delivering and receiving care, whereas the outcome refers to changes in the patient's health attributable to prior treatment. Process-based quality measures may not predict patient outcomes, and outcome-based measures may not fully consider factors beyond physicians' control. Mortality rates are the primary endpoints for outcome-based quality monitoring; however, risk-adjusted mortality rates are contentious because of their inability to adapt to varying case mixes across hospitals. Socioeconomic and cultural factors significantly influence outcomes, as seen in underdeveloped nations, where cultural beliefs and lack of access to modern medical care delay timely medical intervention. Therefore, competent healthcare may still result in poor outcomes depending on the case-mix, raising debate over using mortality rates to gauge healthcare quality (32). Entropy-based weight allocation has limitations such as data availability, reliability, feasibility, and sensitivity to the threshold value for determining the maximum entropy. Careful selection of this threshold was crucial to avoid bias. Despite its limitations, entropy-based weight allocation remains a valuable tool for complex decision making. Further research is necessary to assess its effectiveness in various decision-making contexts.

LIMITATIONS

This research was limited by the unavailability of data for certain indicators, where we averaged and standardized the available data. The index may not fully capture healthcare services and preparedness owing to a limited set of indicators. These limitations should be considered when interpreting results and making decisions based on this research. The selection and weighting of indicators may be subject to debate among experts, potentially affecting their rankings and interpretations. The index may not fully represent the heterogeneity of healthcare systems and challenges across regions and population groups within each state or territory. In the Information and Technology Infrastructure sub-index, the exclusion of e-health and telehealth indicators due to data unavailability underscores the necessity for comprehensive data in future assessments. The study did not account for population and area impacts on indicator weights, potentially affecting the accuracy. The index may not encompass qualitative factors such as patient satisfaction, quality of care, and provider competencies, which are crucial for evaluating healthcare effectiveness. Furthermore, the index may not reflect the dynamic nature of healthcare needs and should be updated periodically to capture emerging trends. International comparisons may be limited due to data variations; however, the framework can be adapted based on available datasets from different countries.

CONCLUSION

The health system preparedness index evaluates a country's health system readiness by considering general health profiles, medical and technology infrastructure, institutional support, and disease-specific outcomes. An Entropy-based method assigns weights to these factors, averaging 17 to 22%, ensuring a balanced and reliable assessment. This index aids policymakers, health care professionals, and researchers in identifying health system strengths and weaknesses, prioritizing interventions, tracking progress, and comparing countries' preparedness. However, its accuracy depends on data quality and availability, and it does not account for external factors, such as political instability or natural disasters.

ACKNOWLEDGMENTS

We gratefully acknowledge Dr. Anuj Mubayi for his support and guidance throughout this research.

CONFLICT OF INTEREST

The authors declare that they have no conflicts of interest related to this work.

AUTHORS CONTRIBUTION

JS contributed to the ideation of the research topic. SAKM and SH contributed to the design and implementation of the research, as well as the analysis of the results and the writing of the manuscript. ANVJ, KK, and JS edited and critically reviewed the final draft of the manuscript for submission.

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Appendices

Data Sources:

I. Health Assessment Profile	
1. Children age 12-23 months fully vaccinated based on information from either vaccination card or mother's recall.	NFHS 5 Data (2019-20)
2. Mortality rates	SDG India Report 2020-21 (3.1-MMR; 3.2 U5MR)
3. Percentage of households with any usual member covered by a health scheme or health insurance	SDG India Report 2020-21 (1.2)
4. Monthly per capita out-of-pocket expenditure on health as a share of Monthly Per capita Consumption Expenditure (MPCE)	SDG India Report 2020-21 (SDG-3.8)
5. Literacy Rate	NFHS 5 Data (2019-20)
6. Prevalence of NCD's	GBD India Data (2019)
II. Health Service Infrastructure	
1. Total physicians, nurses and midwives per 10,000 population	SDG India Report 2020-21 (SDG-3.3)
2. Registered pharmacists in the state per 10,000 population	National Health Profile 2021
3. Percentage of beds in Hospitals	National Health Profile 2021
4. Neonatal Support in Hospitals	National Health Profile 2021
5. Blood banks availability	National Health Profile 2021
III. Information and Technology Infrastructure	
1. Number of mobile connections per 100 persons (mobile tele density)	SDG India Report 2020-21 (SDG-9.C a)
2. Number of internet subscribers per 100 population	SDG India Report 2020-21 (SDG-9.C b)
IV. Organizational Support	
1. Annual growth rate of GDP (constant prices) per capita	SDG India Report 2020-21 (SDG-8.1)
2. Unemployment rate (15-59 years)	SDG India Report 2020-21 (SDG-8.1)
3. Revenue Expenditure Medical &Public Health	SDG India Report 2020-21 (SDG-8.1)
4. Revenue Expenditure Family Welfare per 10,000 population	SDG India Report 2020-21 (SDG-8.1)
5. % change over in Revenue expenditure on health in 2021-22 (RE) over 2020-21 (Budget Estimates)	SDG India Report 2020-21 (SDG-8.1)
6. % change over in Revenue expenditure on health in 2022-23 (Budget Estimates) over 2021-22 (Revenue Estimates)	SDG India Report 2020-21 (SDG-8.1)
V. Disease outcome (Tuberculosis)	
1. No. of BCG vaccinations administered	Statista BCG India Estimates
2. Prevalence of all forms of TB among all age groups in India (per 100 000 population)	India TB Report 2022
3. Presumptive TB cases examination	India TB Report 2022
4. TB Case Notification rate	India TB Report 2022
5. TB Active case finding	India TB Report 2022