Monitoring Child Mortality in North Eastern India: An Index Based Approach

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Introduction

India's model of Sustainable Development Goals (SDG) emphasizes the involvement of local governments, customized state-level strategies, and robust monitoring mechanisms to achieve the SDG goals across its 28 states and 8 UTs (Aayog, 2022). India adopts a bottom-up approach where individual states and union territories (UTs) play a pivotal role in driving SDG implementation. While the National Indicator Framework (NIF) is developed at the national level, states are encouraged to design their own State Indicator Frameworks (SIFs) based on local conditions to measure progress at the sub national level. Composite Indices are often used to monitor the progress of the 17 SDG goals at international and national levels. Indices provide quantifiable measures of progress toward SDG targets, which is critical for data-driven decision-making (Sachs et. al., 2021). SDG 3: Good Health and Well Being, for example has 13 Targets and 28 Indicators as defined by the United Nations (UN) (WHO, 2021). Each of these targets requires distinct strategies, interventions, and resource allocations. Separate indices in such situations allow for more precise tracking of how well a region or country is performing on a specific target, such as reducing maternal mortality (SDG 3.1) versus combating HIV/AIDS, malaria, and other communicable diseases (SDG 3.3) (Booysen, 2002). Sustainable Development Goal (SDG) 3, part of the 17 SDGs set by the United Nations in 2015, aims to "ensure healthy lives and promote well-being for all at all ages." Within this broader goal, *SDG 3.2: End preventable deaths of newborns and children under five years of age*, specifically targets the two indicators - reducing neonatal mortality and under-five mortality, which are key measures of a country's healthcare quality and social development. The global targets of SDG 3.2 (WHO, 2023) are to reduce the neonatal mortality rate to at least as low as 12 deaths per 1,000 live births and reduce the under-five mortality rate to at least as low as 25 deaths per 1,000 live births by 2030.

The objective of this study is to develop a separate index for each of the two indicators of SDG 3.2: for each of the eight North Eastern States comprising of Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura. A composite index based on these two indicators is then constructed based on the two separate indices. Results from the study are used to compare with the overall SDG 3 India Index based on all 12 indicators for each state followed by a discussion.

Methodology

Data Source

The National Family Health Survey (NFHS) in India provides comprehensive data on various health, social, and economic indicators.[11] The National Family Health Survey (NFHS) in India is conducted by the International Institute for Population Sciences (IIPS), which serves as the nodal agency and is responsible for coordinating and overseeing the survey, including the design, data collection, and analysis. In addition to publishing a National Report, NFHS also publishes state wise data from this survey in the form of State Reports. For the present analysis, data on neonatal mortality and under five mortality was taken from the State Reports of NFHS 5.

Selection of Indicators

To construct Indices for SDG 3.2, both, Indicator 3.2.1: Under five mortality rate and Indicator 3.2.2: Neonatal mortality rate, were considered. Under five mortality is probability of dying before the fifth birthday i.e. the number of children per 1,000 live births who die before their fifth birthday and neonatal mortality is probability of dying in the first month of life i.e. the number of infants dying during the first 28 days of life per 1000 live births.

Index Construction

Baseline values of neonatal and under five mortality rates (NMR and UFMR) for the eight states have been taken from the NFHS 3 Survey 2005-2006, conducted in the five years preceding the survey that is approximately from 2001 to 2005. Current values have been taken from the latest NFHS 5, 2019-21. Both the baseline values and the current values have been taken from the state reports of NFHS (IIPF and ICF, 2021). The targets were set as 25 for under five mortality and 12 for neonatal mortality in accordance with the global targets set by the UN. The data has been normalized by using the min-max normalization process. After normalizing all the indicators, separate indices have been constructed for neonatal and under five mortality. These were finally aggregated using a simple arithmetic mean with equal weights to form a composite index for SDG 3.2 for each of the North Eastern States.

Results and Discussion

The under five mortality indices, neonatal mortality indices for the two indicators of SDG 3.2 and the composite indices for all the eight states considered in the study are given in table 1. Values that exceeded one were rounded off. For example UFMR and NMR for Arunachal Pradesh were both below the target resulting in the indices exceeding one. These were therefore rounded off.

States	Under Five Mortality Index (Indicator 3.2.1)	Neonatal Mortality Index (Indicator 3.2.2)	Composite Index for SDG 3.2

Arunachal Pradesh	1.00	1.00	1.00
Assam	0.77	0.69	0.73
Manipur	0.70	0.22	0.46
Meghalaya	0.67	0.33	0.50
Mizoram	1.00	1.00	1.00
Nagaland	0.80	1.00	0.90
Sikkim	1.00	1.00	1.00
Tripura	0.46	0.48	0.47

Table 1: Mortality Indices for SDG 3.2

The *SDG India Index* by NITI Aayog uses a color-coded system to represent a state's or union territory's progress toward achieving each of the Sustainable Development Goals (SDGs) (Aayog, 2023). The colors are used to categorize regions into different performance levels based on their index scores. The categories based on the scores are given in table 2.

	Score	Category	Colour Code
1.	100	Achiever	Green
2.	65-99	Front Runner	Light Green
3.	50-64	Performer	Yellow
4.	0- 49	Aspirant	Red

Table 2: Categories as per Niti Aayog classification

Table 3 presents the scores of the eight states for the constructed SDG Index 3.2 and categorises them as per the classification in table 2.

	State	**Category as per SDG Index 3.2**
1.	Arunachal Pradesh	100 - Achiever
2.	Assam	73 - Front Runner
3.	Manipur	46 - Aspirant
4.	Meghalaya	50 - Performer
5.	Mizoram	100 - Achiever
6.	Nagaland	100- Achiever
7.	Sikkim	100- Achiever
8.	Tripura	47- Aspirant

Table 3: Categories of the eight North Eastern States

The north eastern states exhibit substantial variation in performance on both under five and neonatal mortality indicators. The composite index based on the two indicators of SGD 3.2 reflects these variations, allowing for a comparison of progress across the states, while the

separate indices for both indicators highlights the specific areas where each state needs to focus its efforts. Indicative comparisons with the broader SDG 3 India Index are made (table 3) to discuss discrepancies, illustrating that separate indices for under-five and neonatal mortality offer greater clarity and more actionable insights than an aggregate health index. The results underscore the need for targeted interventions in states like Assam and Tripura, while highlighting successes in states like Mizoram and Nagaland, which have made significant progress in reducing child mortality.

Conclusion

In conclusion, this paper develops separate indices for neonatal mortality and under-five mortality in the eight North Eastern states of India, based on data from the NFHS surveys, to assess progress toward achieving SDG 3.2. The results show significant variation in child mortality rates across the region, with states like Mizoram, Nagaland, and Arunachal Pradesh making substantial progress, while others, particularly Assam and Tripura, still face challenges in meeting the SDG targets.The findings underscore the need for more targeted interventions and tailored health policies in states with higher mortality rates to further reduce child deaths. The localized approach of this study provides a clearer picture of progress, enabling more effective decision-making and resource allocation in the pursuit of SDG 3.2 in North Eastern India.

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