

# **Child Survival in India:** Unveiling the Transformative Power of Healthcare and Hygiene

**Mr. Satyanarayan Kumbhakar**

Ph.D. Research Scholar In Economics, Vidyasagar University, West Bengal, India.

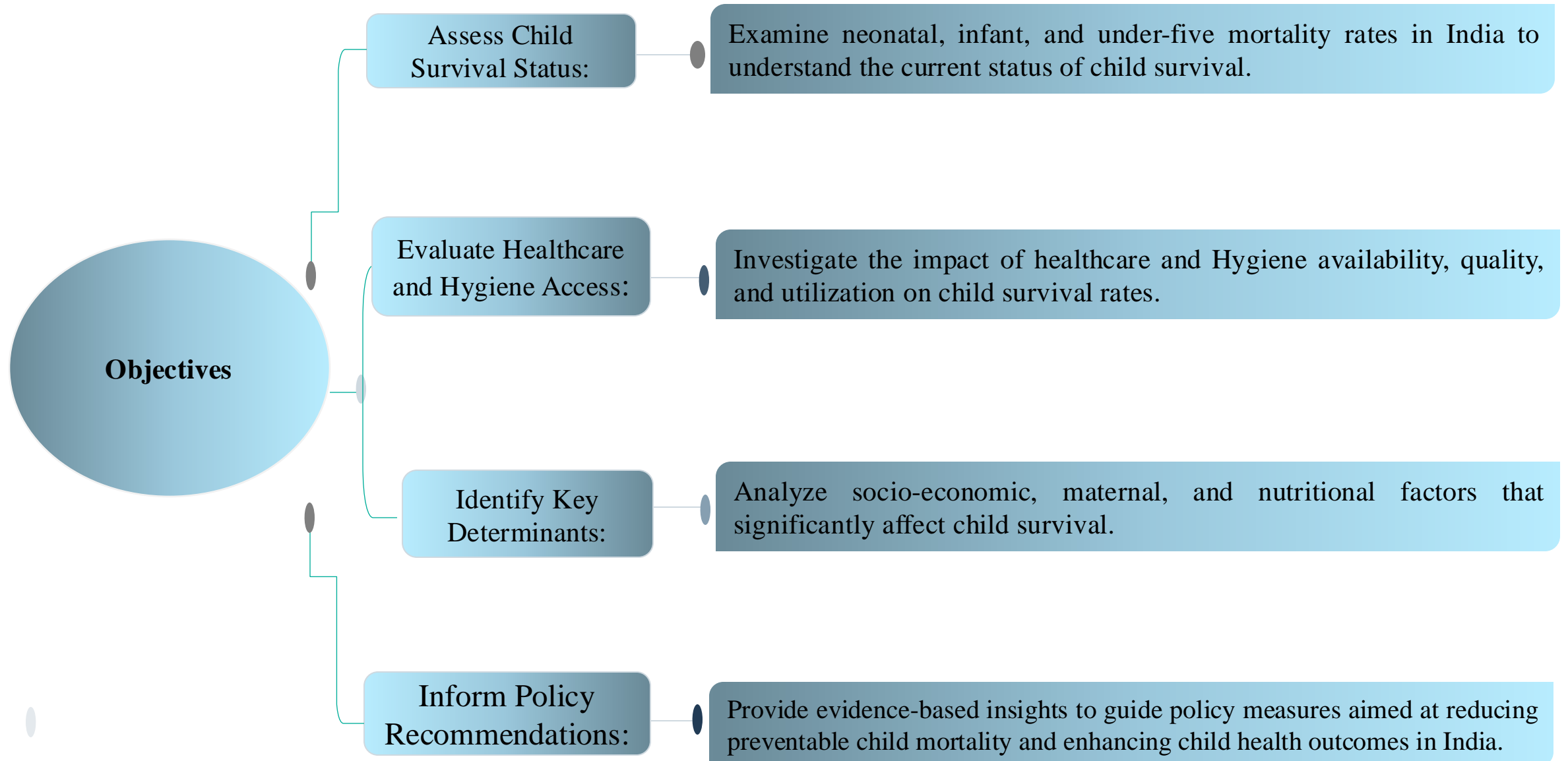
**Dr. Pinaki Das**

Professor of Economics, Vidyasagar University, West Bengal, India.

## 1

*Introduction*

- ❖ As we are well aware of the fact that India takes the pride of subsidizing the largest child population in the world but at the same time, we cannot deny the bitter truth that it too has the highest rate of malnourished children in the world. *India was the highest number of under-5 mortality at 1.3 million in 2015.*
- ❖ Health is the state of physical, mental and social well-being and does not only mean an absence of illness or disease.
- ❖ The right to health is closely linked to other fundamental human rights, most notably access to potable safe drinking water and adequate hygiene.
- ❖ In recent years there has been an increased focus on issues that affect children and improving their health.
- ❖ The present state of child health situation in India does not present a rosy picture in front of our policy makers.



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**Database and Methodology****Database**

- The overall objective of the present study is to estimate and analyze the Under-five mortality. We have tried to develop a comparative analysis across states level in India. For this purpose, we have taken resort to the secondary data. Secondary data have been collected mainly from *National Family and Health Surveys (NFHS) 4<sup>th</sup> (2015-16) and 5<sup>th</sup> (2019-21) round data*.

**Methodology**

- Pooled data regression model is used to analyze the status of under-five mortality rate across states in India for two distinct years. In the present study, the data consist of 28 states for the years of 2015-16 and 2019-21.

Pooled Regression Model has been used in the present study. The model is specified by the regression equation as follows:

$$Y_{it} = \alpha + X_{it}\beta + \varepsilon_{it}$$

**Dimension Index**

Dimensional Index (DI) is calculated for each indicator of the corresponding dimension, and then the arithmetic mean of all DI is taken to obtain two deferent Group Dimensional Index (GDI) as Health Care Index (HCI) and Hygiene Index (HI). The methodology is widely used by the researchers (Das et al. 2021; Kumbhakar et al. 2024) and also in Human Development Reports. The methodology of GDI is given below: Let  $X_{ij}$  is the achievement of  $i$ -th indicator ( $i=1, 2, \dots, 5$ ) in  $j$ -th state ( $j=1, 2, \dots, 28$ ). The Dimensional Index of  $i$ -th indicator and  $j$ -th state ( $D_{ij}$ ) is calculated as follows

$$D_{ij} = \frac{(\text{Actual } X_{ij} - \text{Min } X_{ij})}{(\text{Max } X_{ij} - \text{Min } X_{ij})}, \text{ } D_{ij} \text{ varied from 0 to 1 and the higher value of } D_{ij} \text{ implies higher level of achievement of } i\text{-th state in } j\text{-th indicator. Health}$$

$$\text{Care Index (HCI)} = \frac{\sum_1^3 \text{DI of Health Care}_{ij}}{3} \dots \dots \dots (i), \quad \text{Hygiene Index (HI)} = \frac{\sum_1^2 \text{DI of Hygiene}_{ij}}{2} \dots \dots \dots (ii)$$

HCI and HI varied from 0 to 1 and the values are representing the higher level of achievement of  $i$ -th indicators of  $j$ -th states.

Status of Child Survival in India

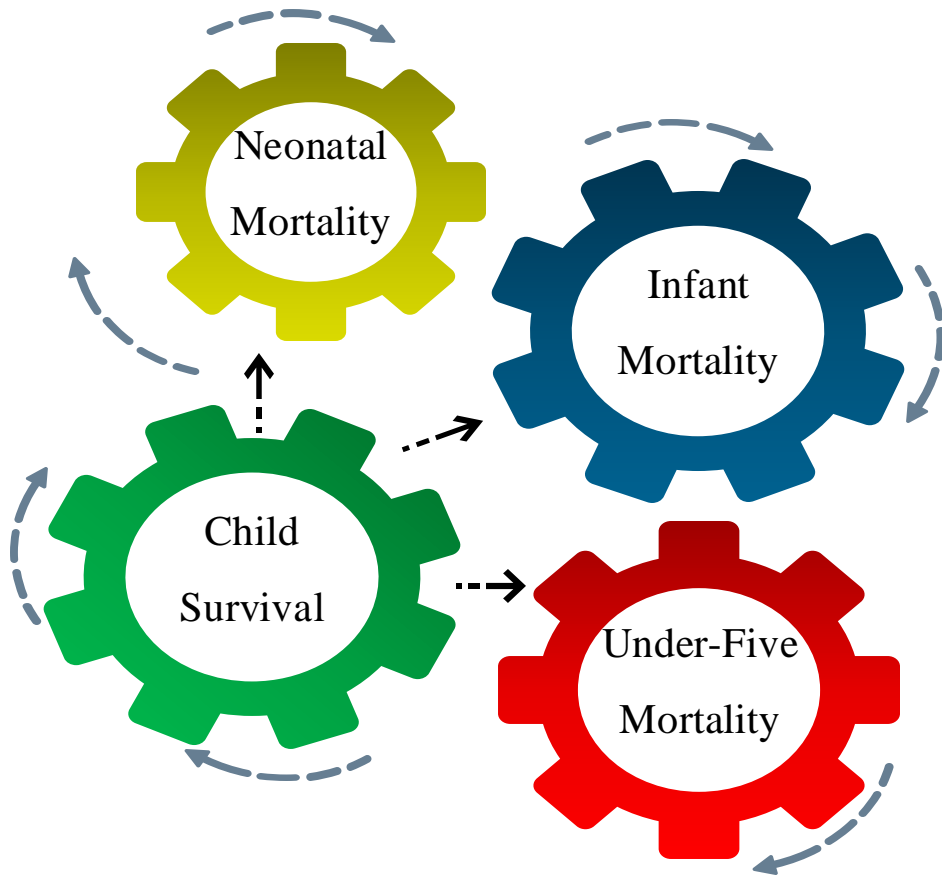
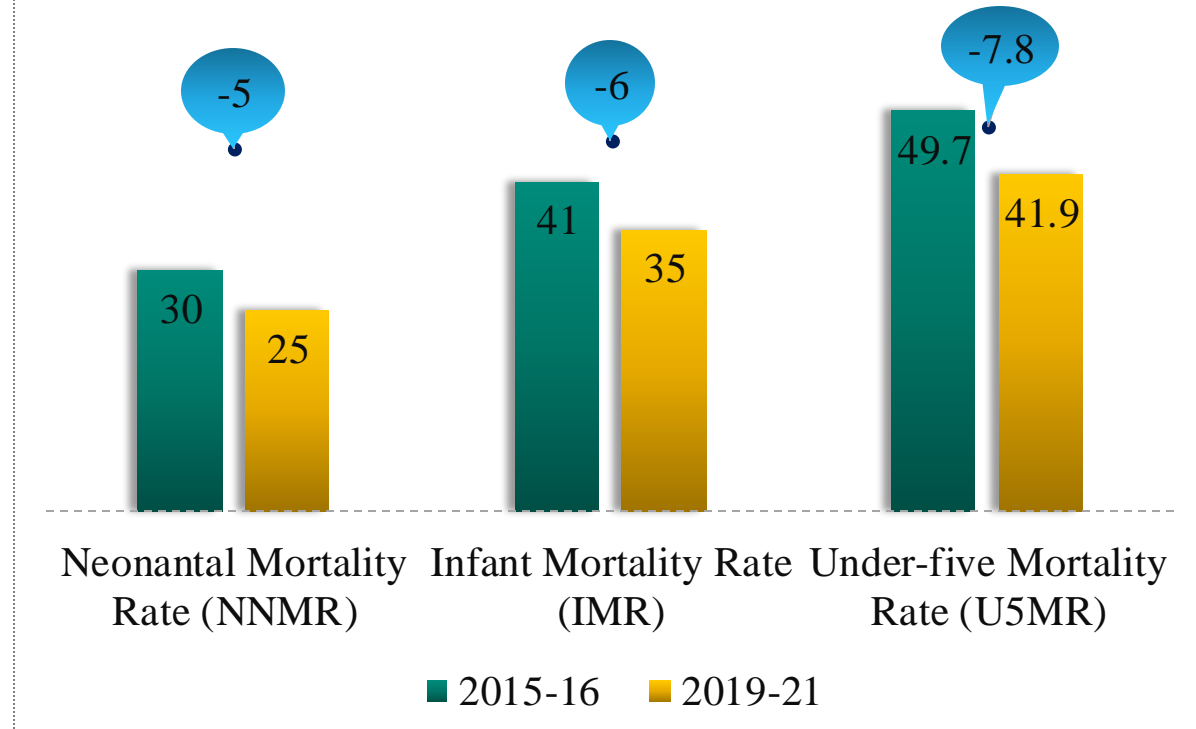


Figure 1 Status of Child Survival in India, 2015-16 to 2019-21



Sources: Designed by the authors on the basis of the NFHS-IV (2015-16) and NFHS-V (2019-21).

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Percentage Change in Child Mortality during 2015-15 to 2019-21

Figure 2 U5MR in India, 2015-16 to 2019-21

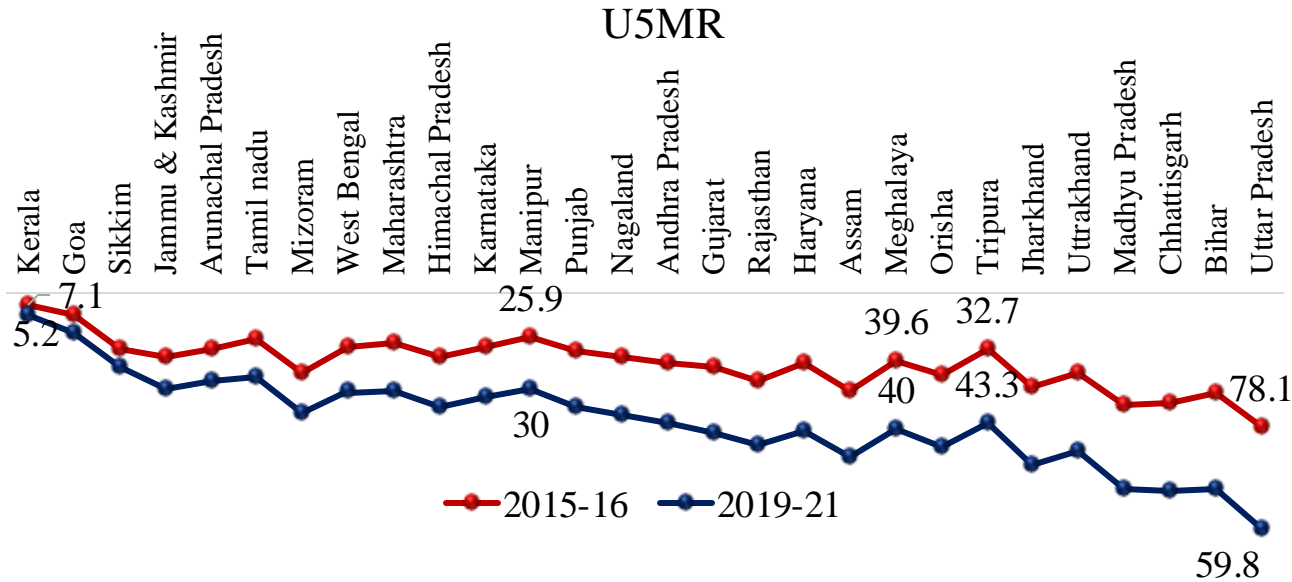


Figure 2 % Change NNMR, IFM and U5MR in India, 2015-16 to 2019-21

States	NNMR % Change	States	IMR % Change	States	U5MR % Change
Sikkim	15.8	Mizoram	18.8	Mizoram	22
Jammu & Kashmir	13.3	Sikkim	18.3	Sikkim	21
Assam	10.3	Jammu & Kashmir	16.1	Jammu & Kashmir	19.1
Chhattisgarh	9.7	Assam	15.7	Uttar Pradesh	18.3
Rajasthan	9.6	Uttar Pradesh	13.1	Assam	17.4
Uttar Pradesh	9.4	Rajasthan	11	Madhyu Pradesh	15.4
Madhyu Pradesh	7.9	Arunachal Pradesh	10	Arunachal Pradesh	14.1
Goa	7.3	Madhyu Pradesh	9.9	Chhattisgarh	13.9
West Bengal	6.5	Chhattisgarh	9.7	Rajasthan	13.1
Nagaland	6.3	Himachal Pradesh	8.7	Jharkhand	8.9
Gujarat	5	Goa	7.3	Himachal Pradesh	8.7
Himachal Pradesh	5	Nagaland	6.1	Orisha	7
Jharkhand	4.8	Jharkhand	5.9	West Bengal	6.4
Arunachal Pradesh	4.1	West Bengal	5.5	Gujarat	5.9
Andhra Pradesh	3.7	Andhra Pradesh	4.6	Andhra Pradesh	5.6
Karnataka	2.7	Orisha	3.3	Nagaland	4.5
Bihar	2.2	Gujarat	3	Tamil nadu	4.5
Tamil nadu	1.3	Tamil nadu	1.6	Haryana	2.4
Orisha	1.2	Karnataka	1.5	Goa	2.3
Kerala	1	Bihar	1.3	Karnataka	2
Haryana	0.5	Punjab	1.2	Kerala	1.9
Mizoram	-0.2	Kerala	1.2	Bihar	1.7
Maharashtra	-0.3	Uttarakhand	0.6	Uttarakhand	0.9
Punjab	-0.6	Maharashtra	0.5	Maharashtra	0.7
Meghalaya	-1.5	Haryana	-0.5	Punjab	0.5
Manipur	-1.6	Meghalaya	-2.4	Meghalaya	-0.4
Uttarakhand	-4.5	Manipur	-3.3	Manipur	-4.1
Tripura	-9.7	Tripura	-10.9	Tripura	-10.6

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## Status of Under-Five Mortality across states in India

	2015-16	2019-21
Low U5MR (0-30 %)	Kerala (7.1); Goa (12.9) Manipur (25.9); Tamil Nadu (26.8); Maharashtra (28.7)	Kerala (5.2); Goa (10.6); Sikkim (11.2); Jammu & Kashmir (18.5); Arunachal Pradesh (18.8); Tamil Nadu (22.3); Mizoram (24); West Bengal (25.4); Maharashtra (28); Himachal Pradesh (28.9); Karnataka (29.5); Manipur (30)
Moderate U5MR (30.1 to 50 %)	Karnataka (31.5); West Bengal (31.8); Sikkim (32.2); Tripura (32.7); Arunachal Pradesh (32.9); Punjab (33.2); Nagaland (37.5); Himachal Pradesh (37.6); Jammu & Kashmir (37.6); Meghalaya (39.6); Andhra Pradesh (40.8); Haryana (41.1); Gujarat (43.5); Mizoram (46); Uttarakhand (46.5); Orisha (48.1)	Punjab (32.7); Nagaland (33); Andhra Pradesh (35.2); Gujarat (37.6); Rajasthan (37.6) Haryana (38.7); Assam (39.1) Meghalaya (40); Orisha (41.1) Tripura (43.3); Jharkhand (45.4) Uttarakhand (45.6); Madhya Pradesh (49.2)
High 5MR (50.1% & above)	Rajasthan (50.7); Jharkhand (54.3); Assam (56.5); Bihar (58.1); Chhattisgarh (64.3); Madhya Pradesh (64.6); Uttar Pradesh (78.1)	Chhattisgarh (50.4); Bihar (56.4) Uttar Pradesh (59.8)

- ❑ In 2015-16, U5MR of child varied from 7.1 per cent (Kerala) to 78.1 percent (Uttar Pradesh).
- ❑ U5MR was highest in Uttar Pradesh among other states followed by Madhya Pradesh (64.6 %), Chhattisgarh (64.3), Bihar (58.1 %) and Jharkhand (54.5 %), 2015-16 whereas it was (U5MR) lowest in Kerala, Goa and Sikkim.
- ❑ In 2019-21, it varied from 5.2 % in Kerala to 59.8 % in Uttar Pradesh. Uttar Pradesh remained in the highest position in this regard followed by Bihar (56.4 %) and Chhattisgarh (50.4 %) whereas it was lowest in Kerala, Goa, Sikkim and Arunachal Pradesh.

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Status of Health Care and Hygiene in India

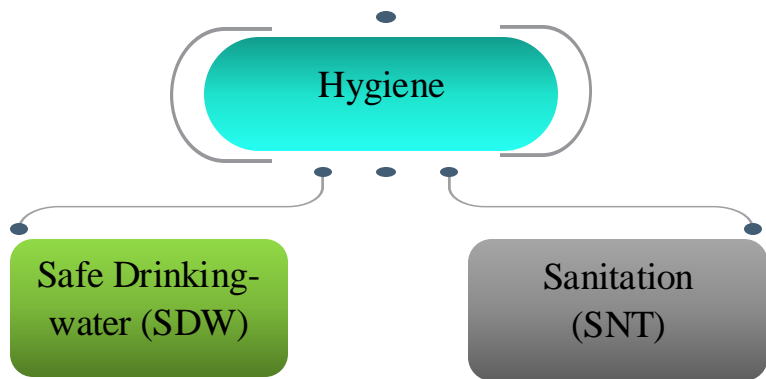
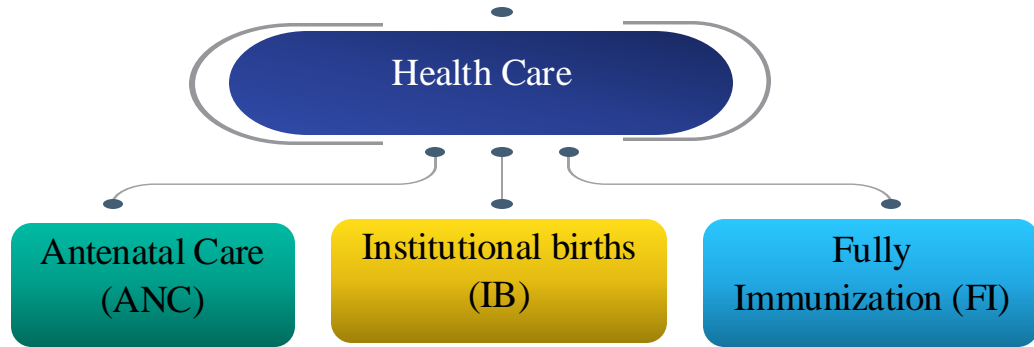
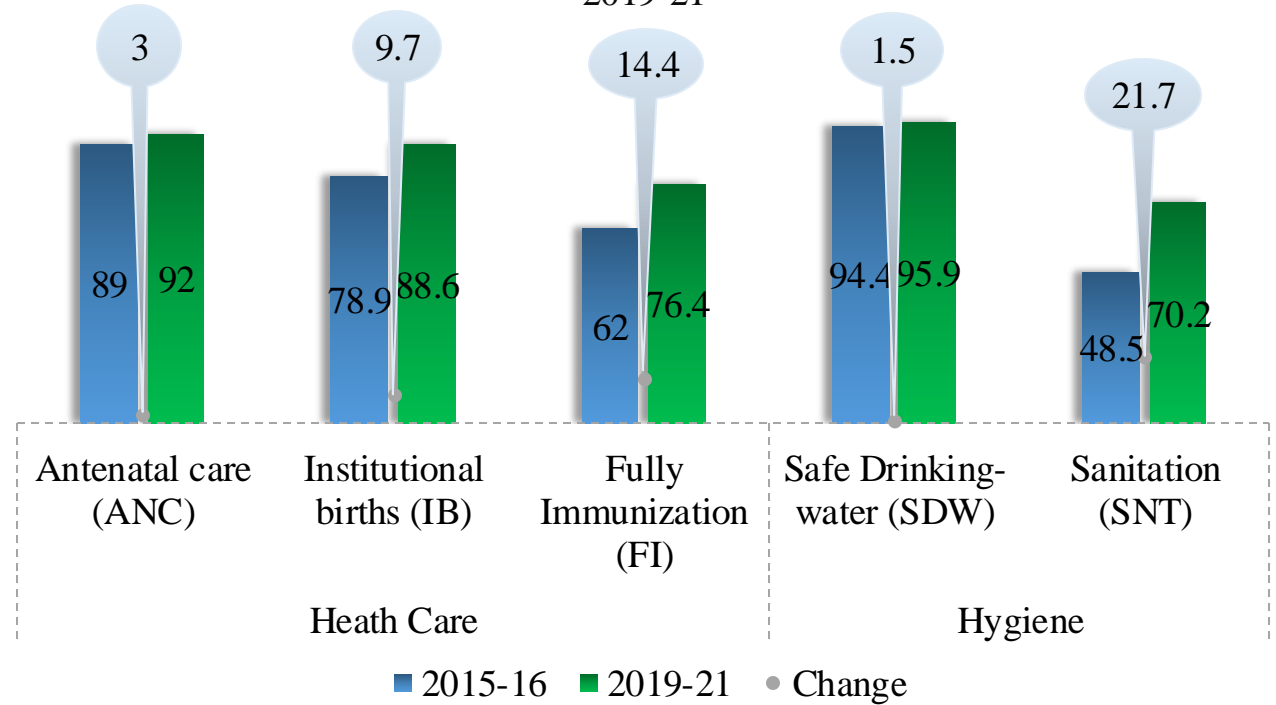


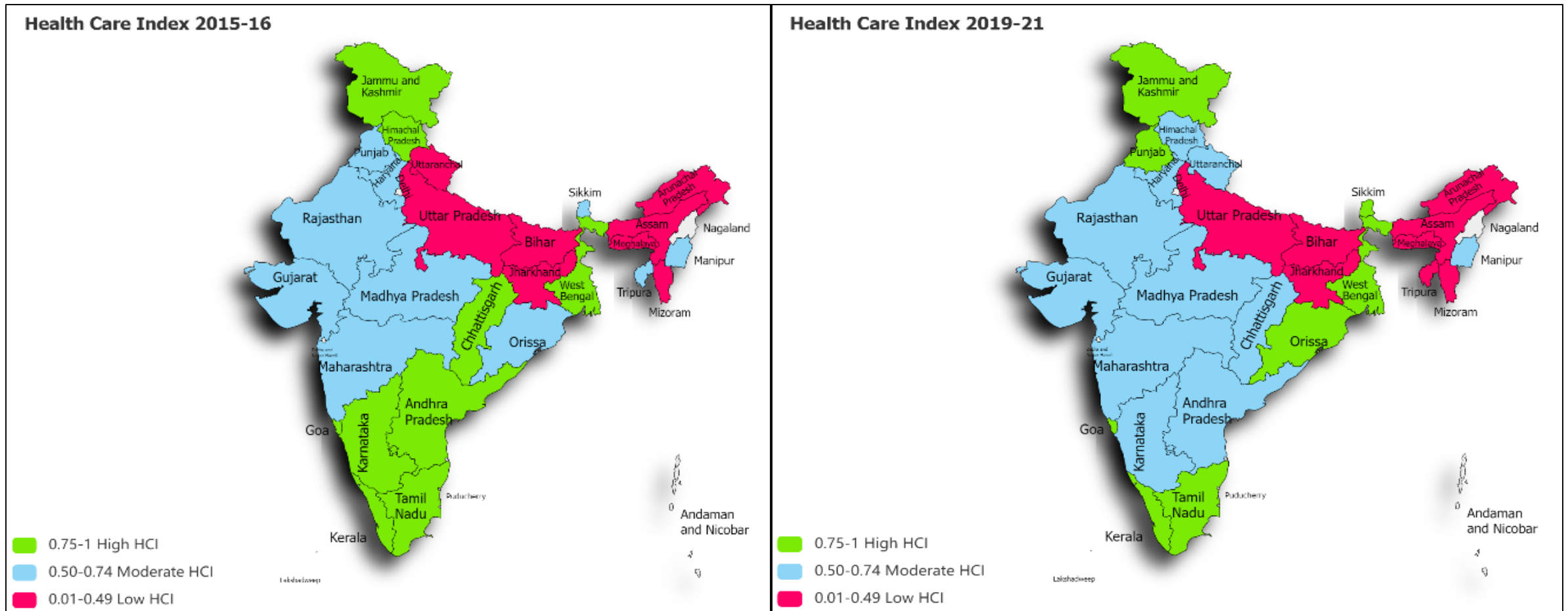
Figure 2 Status of Health Care and Hygiene in India, 2015-16 to 2019-21





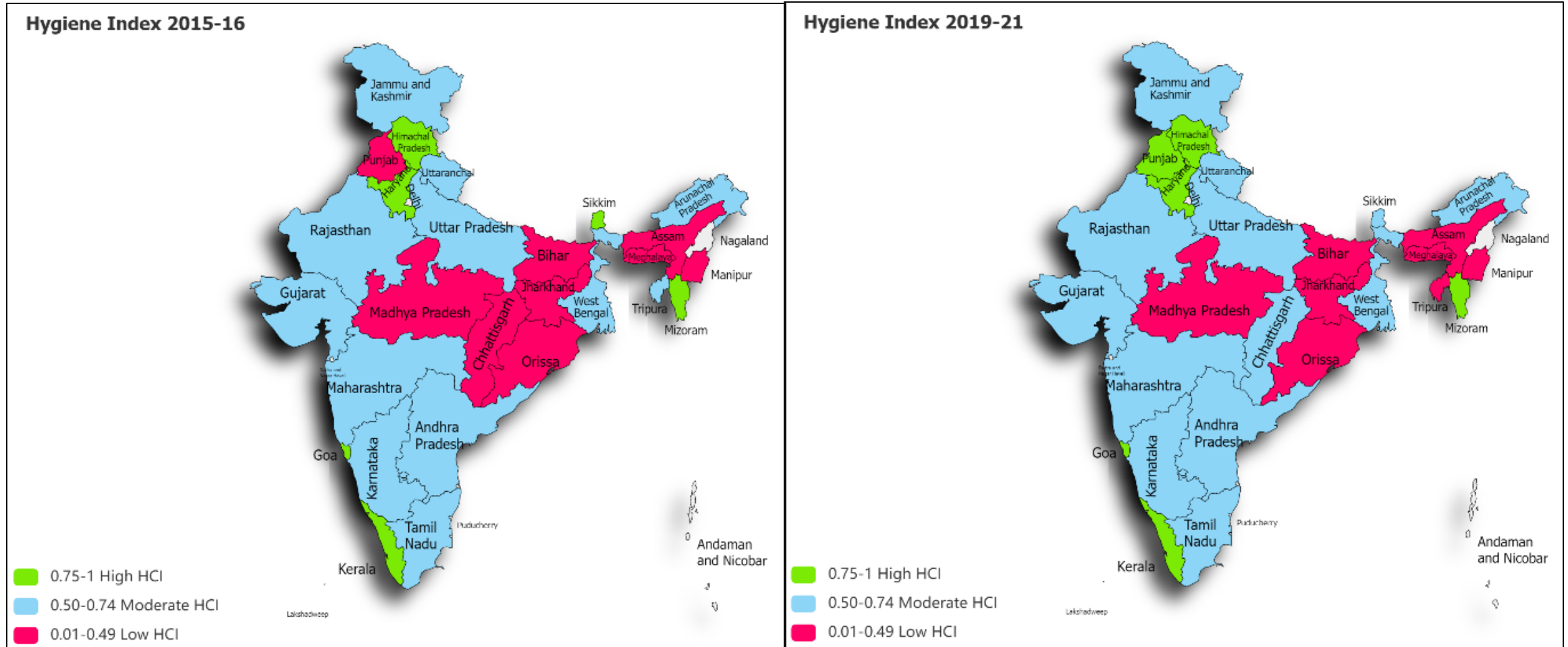
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*States wise level of Health Care Index during 2015-16 and 2019-21*



Sources: Designed by the authors on the basis of the NFHS-IV (2015-16) and NFHS-V (2019-21).

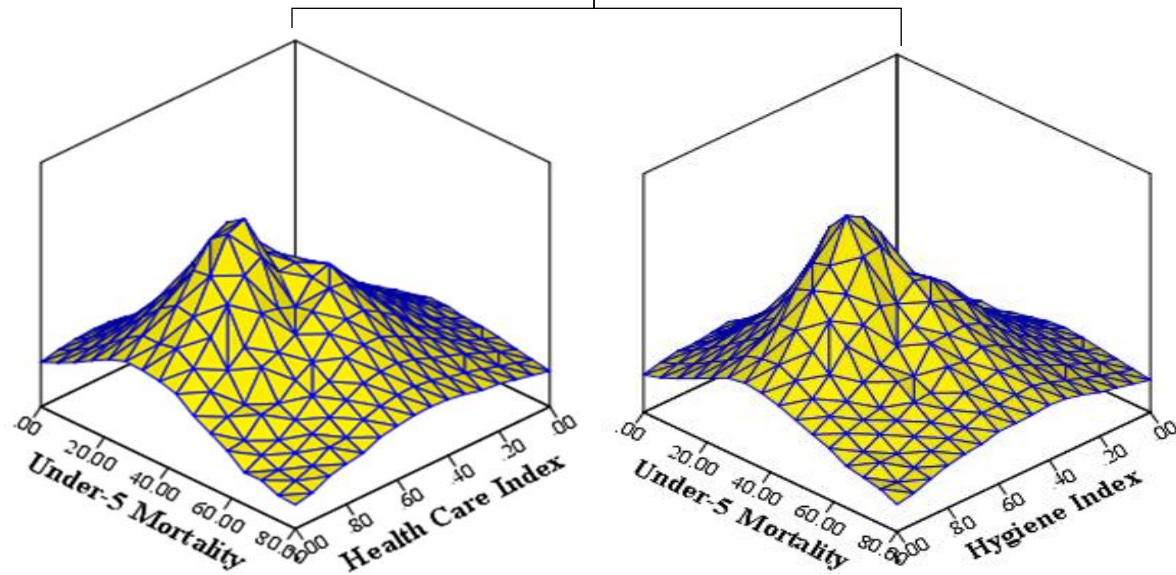
9 States wise level of Hygiene Index during 2015-16 and 2019-21



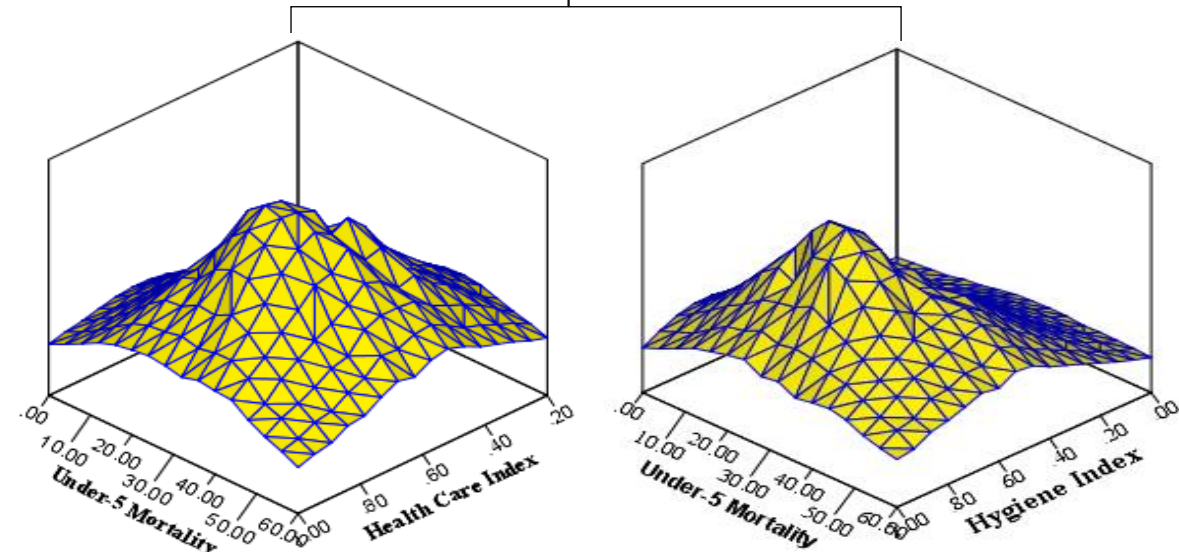
Sources: Designed by the authors on the basis of the NFHS-IV (2015-16) and NFHS-V (2019-21).

## Density distribution of the Under Five-mortality in relation to Health Care and Hygiene Index in India

2015-16



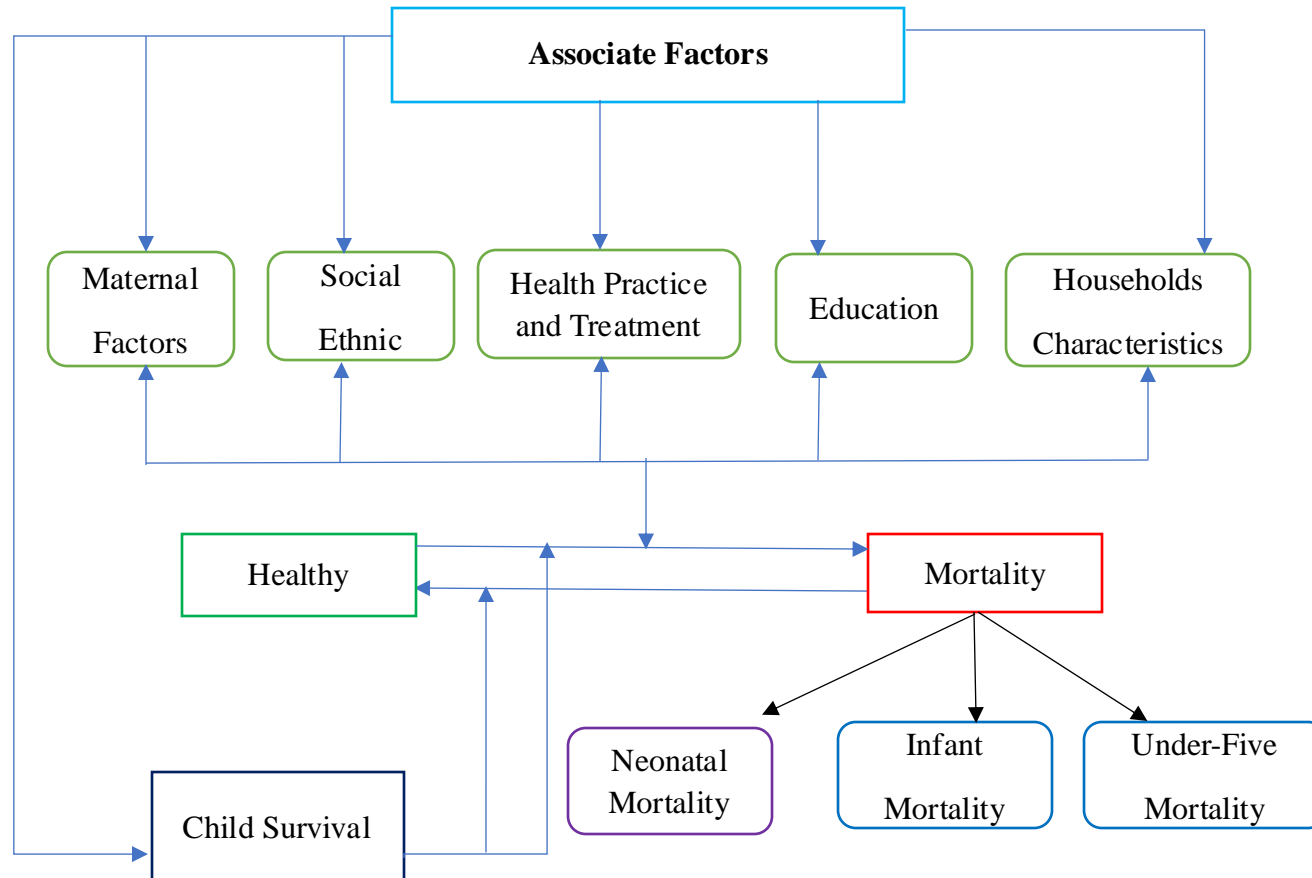
2019-21



Sources: Designed by the authors on the basis of the NFHS-IV (2015-16) and NFHS-V (2019-21).

- ❑ The probability density distribution relationship of HCI and HI on the U5MR in India during 2015-16 to 2019-21.
- ❑ In both figures of **Density Distribution** indicated that the swelling is upward, indicating less decline in U5MR due to lower HCI and HI values in 2015-16. In 2019-21, the diagrams are becoming flattered due to improvements in HCI and HI values, with a swelling down of the volume of the curvature indicating a greater reduction of U5MR with the effects of HCI and HI.

## 11 Conceptual Framework of Health Outcomes and Associate factors



Sources: Designed by the authors. (Satyanarayan Kumbhakar & Dr. Pinaki Das)

- ❖ Maternal health, education, social/ethnic background, and household conditions shape child health outcomes.
- ❖ A mother's health and education directly impact child well-being.
- ❖ Background and household income affect healthcare and nutrition access.
- ❖ Parental choices influence health through treatment, education, and practices.
- ❖ Socioeconomic factors impact health directly and indirectly, highlighting prevention and treatment's role in better outcomes.

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## Econometrics Results

- ❑ Health practices, especially healthcare access (HCI) and insurance (HINS), significantly reduce mortality rates.
- ❑ Socio-ethnic disparities show varied impacts, with Hindu and OBC groups at higher mortality risk.
- ❑ Larger household size and lower maternal education are linked to higher mortality.
- ❑ Maternal factors, like age and birth spacing, crucially influence child survival.

	NNMR		IMR		U5MR	
	<i>Coeff.</i>	<i>t</i>	<i>Coeff.</i>	<i>t</i>	<i>Coeff.</i>	<i>t</i>
<b>Health Practice and Treatment</b>						
HCI	-13.7***	-163.5	-21.0***	-188.2	-26.5***	-201.8
HI	-7.4***	-85.3	-15.9***	-137.8	-19.8***	-145.5
ICDS	-0.9***	-29.3	-1.1***	-27.7	-1.2***	22.9
HINS	-2.3***	-61.3	-2.9***	-59.8	-3.0***	-51.8
<b>Social Ethnic</b>						
Hindu	5.4***	90.9	5.6***	70.6	7.0***	75.7
Muslim	2.8***	46.4	2.7***	33.7	3.2***	34.0
Chistian	0.7***	13.4	2.1***	30.0	2.5***	30.9
ST	-2.0***	-41.2	-1.5***	-23.1	-1.9***	-24.9
SC	-5.6***	-128.8	-4.6***	-80.2	-5.1***	-75.3
OBC	2.6***	64.8	3.9***	71.8	5.2***	81.8
<b>Households Characteristics</b>						
FEMALE	-0.1**	-2.6	-0.1***	-2.6	-0.1***	-3.0
LWC	2.9***	70.1	3.6***	65.7	4.5***	70.2
MWC	-0.3***	-6.9	-0.4***	-7.4	-0.2***	-2.9
HHSSIZE	0.5***	78.5	0.7***	78.2	0.9***	79.9
AOFHHEAD	0.01***	-23.7	0.01***	-26.3	-0.1***	-31.9
<b>Education</b>						
HYOFE	-0.2***	-27.3	-0.3***	-25.9	-0.4***	-27.8
LWL	-0.7***	-55.7	-0.8***	-51.7	-1.0***	-50.5
<b>Maternal Factors</b>						
NOOFUFCHILD	-0.2***	-12.4	-0.3***	-13.2	-0.3***	-12.1
UAM	2.5***	8.4	3.3***	8.3	4.2***	9.0
AOFRSTBIRTH	-0.1***	-25.4	-0.1***	-24.1	-0.2***	-26.8
TIME	-2.2***	-55.3	-4.6***	-85.3	-6.9***	-109.5
_cons	29.1***	225.2	39.5***	230.5	49.0***	243.4
Obs.	4,54,374		4,54,374		4,54,374	
Parms	22		22		22	
RMSE	9.6		12.8		15.0	
R-sq.	0.2788		0.2675		0.3007	
F	8364.3		7901.8		9303.6	
P>F	0.000		0.000		0.000	

## 13

*Conclusions*

- Improved healthcare and hygiene are key in reducing U5MR. Higher HCI and HI scores in states like Kerala and Tamil Nadu demonstrate significantly lower U5MR, underscoring the role of accessible healthcare and hygienic practices.
- Significant U5MR disparities across states (e.g., higher rates in Uttar Pradesh and Bihar) highlight the need for region-specific strategies to address health service and socio-economic gaps.
- Women's literacy, empowerment, and decision-making in health strongly influence child survival, creating a positive feedback loop for child health outcomes.
- Maternal education, household income, and social background impact child health outcomes directly, influencing healthcare access, birth practices, and overall well-being.

- ❖ ***Targeted Health Interventions:*** Prioritize maternal healthcare access in high-U5MR states, offering subsidized antenatal care, institutional birth incentives, and full immunization to reduce disparities.
- ❖ ***Enhanced Hygiene Infrastructure:*** Strengthen safe drinking water and sanitation infrastructure, especially in rural and underserved areas, to ensure equitable access to hygiene facilities.
- ❖ ***Promote Women's Literacy and Empowerment:*** Focus on increasing women's literacy and health education, emphasizing birth spacing and maternal care for improved child health.
- ❖ ***Integrated Health & Social Programs:*** Combine healthcare access with social support for low-income families, creating a holistic approach to improve child survival.
- ❖ ***Data-Driven Regional Policies:*** Conduct regular state-level data collection to tailor interventions and efficiently allocate resources for child health.
- ❖ ***Socio-Ethnic Inclusivity:*** Develop culturally sensitive programs for marginalized groups, such as scheduled tribes and castes, to reduce health disparities.
- ❖ ***Strengthen Maternal Health Policies:*** Emphasize birth spacing and delay in marriage age in maternal health policies to further reduce U5MR.

**Thank You**

