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Infant Mortality Rate in Uttar Pradesh, and Haryana: A Comparative Analysis

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Abstract:

Mortality is one of the most important components of population change, along with fertility and migration. It reflects the status, living conditions and socio-economic development of a region. Among various mortality indicators, infant mortality occupies a special but it measures the survival chance of infants during the first year of life and it considered a sensitive indicator of social welfare and public health. The purpose of this review is to gain a deeper understanding of child health indicators, specifically the infant mortality rate (IMR), by comparing a high-performing state like Haryana and a low-performing state like Uttar Pradesh, using SRS and CRS data. The study uses publicly available data from CRS and SRS for the year 2023, involving secondary analysis without human involvement or ethical committee approval. The study found that Uttar Pradesh generally has higher Infant Mortality Rate than Haryana.

Keywords — **Infant mortality rate, Sample Registration System (SRS), Civil Registration System (CRS), NHFS-5.**

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INTRODUCTION

The first month of life is the most vulnerable period for child survival. Newborns who are born too soon or too small, or sick, are at the greatest risk of death. IMR (Infant Mortality Rate) is define as the number of deaths of infants under one year of age per thousand live births in a given years. A high IMR indicates poor health facilities, low maternal education, malnutrition and inadequate sanitation, while a declining IMR reflects improvements in healthcare services, immunization and maternal care.

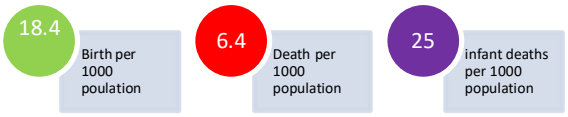
The estimated global rate of preterm birth rate is 10.6%, with variations across countries ranging from 5–18%. Sub-Saharan Africa and South Asia together account for 65% of total preterm births globally in 2020. The top five low- and middle -income countries contributing to preterm birth are India, China, Nigeria, Bangladesh, and Indonesia, with India having preterm birth rate of around 12% leading the list by contributing over 23% of all preterm births across the world. India accounts for the highest number of preterm births globally, with an estimated 3.5 million cases annually.

India has made significant progress in reducing infant mortality over the past few decades; however, wide inter- state variations still exist. States like Haryana and Uttar Pradesh show noticeable differences in infant mortality due to variations in economic development, healthcare infrastructure, literacy levels and government interventions. Haryana, being a relatively developed state, has shown improvement in infant survival, whereas Uttar Pradesh continues

to face challenges due to its large population and its socio-economic disparities. Our study therefore aims to determine the trends and patterns of birth in Haryana and Uttar Pradesh.

Haryana and Uttar Pradesh present an interesting case for comparative analysis of infant mortality. Haryana a relatively more developed state, has shown steady improvement in health indicators due to better healthcare facilities and higher female literacy rates. On the other hand, Uttar Pradesh being one of the most populous state in India, continues to face challenges relative to poverty, inadequate healthcare coverage and socio-economic disparities, which adversely affect infant survival.

The present study attempt to analyse and compare the infant mortality rates of Haryana and Uttar Pradesh using recent secondary data. The findings of this study are expected to provide useful insights for policymakers, planners, and researchers in understanding the determinates of infant mortality and in designing effective population and health policies aimed at reducing infant deaths . In 2023, the Birth Rate for the Country has been estimated at 18.4, whereas the Death Rate has been estimated at 6.4. The estimate of Infant Mortality Rate for the year 2023 is 25 infant deaths per thousand live births.

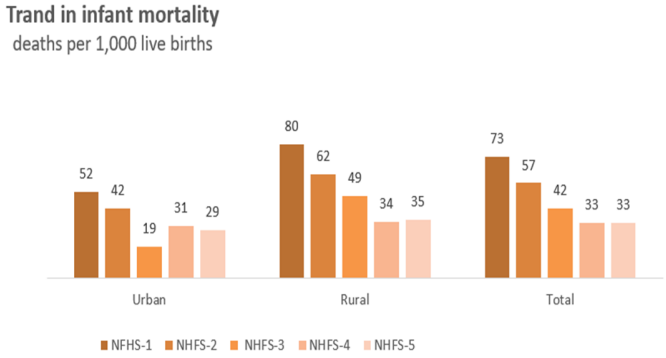


Neonatal mortality and survival of infant

HARYANA

The mortality rate among children under age 5 years, including neonatal, postneonatal, and infant mortality

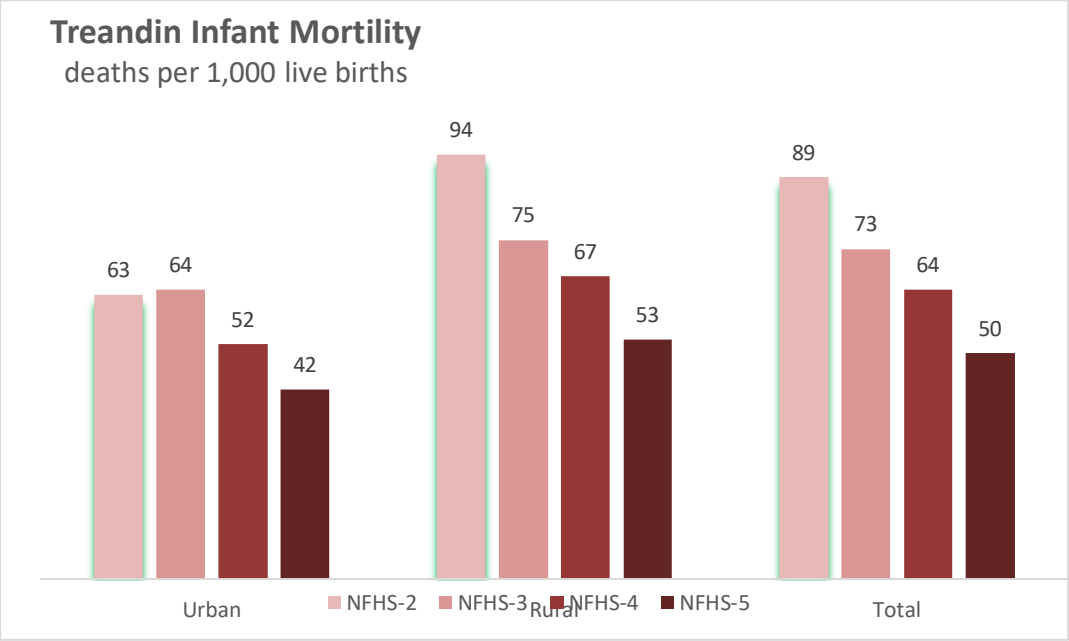
rates , is an important indicator that measures the overall well being of a country. The infant mortality rate in Haryana in NFHS-5 is estimated at 33 deaths before the age of one year per 1000 live births, which is same with the NFHS-4 estimate, but down from the NFHS-3 estimate of 42, the NFHS-2 estimate of 57, and the NFHS-1 estimate of 73. The under-five mortality rate (U5MR) is estimated at 39 deaths before five years of age per 1,000 live births, down by 2 points since NFHS-4 (41 per 1,000). The child mortality rate in Haryana is relatively low compared to many other Indian states due to a combination of strong healthcare infrastructure, effective government programmes, and better socio-economic conditions. Haryana has benefited from improved maternal and child health services under schemes.



Boys generally have higher mortality rate than girls, especially during the neonatal mortality period (within the first month after birth). Girls have a slightly higher mortality rate than boys during the post neonatal period.

Uttar Pradesh

The infant mortality rate in Uttar Pradesh among children under age 5 years including neonatal, postneonatal, and infant mortality rates is an important indicator that measures the overall well-being of a country. The infant mortality rate in Uttar Pradesh in NFHS-5 is estimated at 50 deaths before the age of one year per 1,000 live births, down from the NFHS-4 estimate of 64, the NFHS-3 estimate of 73, the NFHS-2 estimate of 89, and the NFHS-1 estimate of 100. The under-five mortality rate (U5MR) is estimated to be 60 deaths before five years of age per 1,000 live births, which is lower as U5MR in NFHS-4 (78). According to the Sample Registration System(SRS) 2023 report, the infant mortality rate for Uttar Pradesh was 37 per
1,000 live births, the highest among major states alongside Chhattisgarh and Madhya Pradesh.



. As expected, boys generally have higher mortality rates than girls, especially during the neonatal period (in the first month after birth). Girls have a slightly higher mortality rate than boys during the postneonatal period.

In the latest Sample Registration System data, Uttar Pradesh reports an infant mortality rate of about 37 deaths per 1,000 live births, which is significantly higher than that of Haryana, where IMR is around 21-26 deaths per 1,000 live births . this indicates comparatively better infants survival rates than in Uttar Pradesh. It shows that the Haryana's IMR has steadily declined over the last decades, supported by increased institutional deliveries and expended neonatal care services. While UP has made progress over the longer term through vaccination campaigns and improved delivery care.

In Uttar Pradesh, the IMR was higher than in other Indian states. Prematurity, low birth weight, neonatal infections, pneumonia, diarrheal illness, birth asphyxia, and birth trauma are the causes of IMR.

3. Comparing Haryana and Uttar Pradesh Infant Mortality Rate

According to the latest Annual Health Report (2024-25) released by the Union Ministry Of Health And Family Welfare despite improvement in past year, Uttar Pradesh is among the states with highest child mortality rate in india.

Haryana has seen substantial reductions in IMR.

TABLE -1: NUMBER OF INFANT DEATHS REGISTERED - STATES/ UNION TERRITORIES/ DISTRICTS, 2023

HARYANA

Sl. No.	States/ UTs / Districts	Rural			Urban			Total		
		Male	Female	Person	Male	Female	Person	Male	Female	Person
1	2	3	4	5	6	7	8	9	10	11
	Haryana	651	782	1434	5691	4491	10188	6342	5273	11622
1	Ambala	63	37	100	39	50	89	102	87	189
2	Bhiwani	48	104	152	55	34	89	103	138	241
3	Charkhi Dadri	17	18	35	4	1	5	21	19	40
4	Faridabad	6	5	11	175	112	287	181	117	298
5	Fatehabad	33	35	68	12	18	30	45	53	98
6	Gurugram	27	24	51	117	107	224	144	131	275
7	Hisar	109	108	217	282	162	444	391	270	661
8	Jhajjar	12	17	29	33	24	57	45	41	86
9	Jind	34	51	85	47	33	80	81	84	165
10	Kaithal	18	34	52	26	29	55	44	63	107
11	Karnal	23	35	58	143	123	266	166	158	324
12	Kurukshetra	14	16	30	56	34	90	70	50	120
13	Mahendragarh	12	26	38	10	10	21	22	36	59
14	Nuh (Mewat)	74	54	129	316	234	550	390	288	679
15	Palwal	15	15	30	18	19	37	33	34	67
16	Panchkula	4	5	9	95	72	167	99	77	176
17	Panipat	14	34	48	220	120	340	234	154	388
18	Rewari	12	16	28	32	27	59	44	43	87
19	Rohtak	7	4	11	3801	3135	6941	3808	3139	6952
20	Sirsa	26	30	56	94	51	145	120	81	201
21	Sonipat	72	91	163	48	27	75	120	118	238
22	Yamunanagar	11	23	34	68	69	137	79	92	171

TABLE -2: NUMBER OF INFANT DEATHS REGISTERED - STATES/ UNION TERRITORIES/ DISTRICTS, 2023

UTTAR PRADESH

Sl. No.	States/ UTs / Districts	Rural			Urban			Total		
		Male	Female	Person	Male	Female	Person	Male	Female	Person
1	2	3	4	5	6	7	8	9	10	11
	Uttar Pradesh	1453	919	2372	3505	2190	5695	4958	3109	8067
1	Saharanpur	2	1	3	10	10	20	12	11	23
2	Muzaffarnagar	0	1	1	6	7	13	6	8	14
3	Shamli	1	1	2	0	1	1	1	2	3
4	Bijnor	53	32	85	1	2	3	54	34	88
5	Moradabad	14	5	19	129	40	169	143	45	188
6	Rampur	4	3	7	6	12	18	10	15	25
7	Amroha	12	14	26	1	0	1	13	14	27
8	Sambhal	0	2	2	0	0	0	0	2	2
9	Meerut	5	4	9	58	21	79	63	25	88
10	Baghpat	9	1	10	4	5	9	13	6	19
11	Ghaziabad	2	1	3	104	64	168	106	65	171
12	Gautambudhnagar	159	108	267	269	171	440	428	279	707
13	Bulandshahar	6	14	20	3	7	10	9	21	30
14	Hapur	2	2	4	0	3	3	2	5	7
15	Aligarh	9	7	16	250	175	425	259	182	441
16	Kashi Ram Nagar	1	2	3	0	1	1	1	3	4
17	Etah	1	3	4	0	0	0	1	3	4
18	Hathras	1	2	3	0	1	1	1	3	4
19	Mathura	84	36	120	56	56	112	140	92	232
20	Agra	12	10	22	138	50	188	150	60	210
21	Firozabad	99	53	152	5	4	9	104	57	161
22	Mainpuri	3	2	5	6	4	10	9	6	15
23	Badaun	1	4	5	3	5	8	4	9	13
24	Bareilly	1	4	5	3	3	6	4	7	11
25	Pilibhit	16	8	24	11	14	25	27	22	49
26	Shajhanpur	3	0	3	0	0	0	3	0	3
27	Lakhmipur-Kheri	10	4	14	0	0	0	10	4	14
28	Sitapur	16	11	27	0	0	0	16	11	27
29	Hardoi	5	5	10	13	20	33	18	25	43
30	Unnao	3	3	6	1	0	1	4	3	7
31	Lucknow	5	2	7	727	480	1207	732	482	1214
32	Raibareilly	14	10	24	61	44	105	75	54	129
33	Farrukhabad	4	1	5	49	39	88	53	40	93
34	Kannauj	5	2	7	0	0	0	5	2	7
35	Etawah	565	325	890	0	0	0	565	325	890
36	Auraiya	1	0	1	0	1	1	1	1	2
37	Kanpur (Dehat)	4	3	7	1	2	3	5	5	10
38	Kanpur (Nagar)	5	6	11	94	71	165	99	77	176
39	Jalaun	6	1	7	5	4	9	11	5	16
40	Jhansi	6	0	6	1	8	9	7	8	15
41	Lalitpur	4	5	9	18	21	39	22	26	48
42	Hamirpur	1	1	2	3	4	7	4	5	9
43	Mahoba	0	1	1	1	1	2	1	2	3
44	Banda	1	3	4	0	0	0	1	3	4
45	Chitrakoot	2	2	4	1	9	10	3	11	14
46	Fatehpur	1	2	3	1	1	2	2	3	5
47	Pratapgarh	34	15	49	5	5	10	39	20	59
48	Kaushambi	0	0	0	3	2	5	3	2	5
49	Prayagraj (Allahabad)	9	7	16	226	135	361	235	142	377
50	Barabanki	38	15	53	171	95	266	209	110	319

51	Ayodhya (Faizabad)	6	2	8	2	3	5	8	5	13
52	Ambedkarnagar	1	0	1	0	2	2	1	2	3
53	Sultanpur	0	2	2	12	3	15	12	5	17
54	Amethi	1	3	4	0	0	0	1	3	4
55	Bahraich	1	2	3	8	3	11	9	5	14
56	Shrawasti	0	3	3	10	5	15	10	8	18
57	Balrampur	8	3	11	111	88	199	119	91	210
58	Gonda	4	2	6	19	28	47	23	30	53
59	Sidharth Nagar	9	6	15	1	0	1	10	6	16
60	Basti	3	1	4	3	2	5	6	3	9
61	Sant Kabir Nagar	4	2	6	3	2	5	7	4	11
62	Maharajganj	17	18	35	0	0	0	17	18	35
63	Gorakhpur	6	1	7	0	3	3	6	4	10
64	Kushinagar	62	53	115	2	3	5	64	56	120
65	Deoria	1	1	2	1	0	1	2	1	3
66	Azamgarh	52	63	115	0	2	2	52	65	117
67	Mau	1	0	1	366	165	531	367	165	532
68	Ballia	1	0	1	0	1	1	1	1	2
69	Jaunpur	1	1	2	3	0	3	4	1	5
70	Ghazipur	3	1	4	5	2	7	8	3	11
71	Chandauli	2	2	4	2	1	3	4	3	7
72	Varanasi	6	1	7	445	221	666	451	222	673
73	Sant Ravidas Nagar	10	4	14	62	50	112	72	54	126
74	Mirzapur	2	0	2	0	3	3	2	3	5
75	Sonbhadra	13	4	17	6	5	11	19	9	28

The present comparison is based on district-wise data on number of infant deaths registered in 2023 for the states of Haryana and Uttar Pradesh, classified by rural–urban residence and sex.

A striking contrast emerges between Haryana and Uttar Pradesh in terms of the absolute number of infant deaths. Uttar Pradesh reports a significantly higher number of infant deaths compared to

Haryana. This difference is primarily attributable to Uttar Pradesh's large population size, higher birth rate, and substantial rural population. Haryana, being relatively more urbanized and economically advanced, shows lower infant mortality figures, indicating better maternal and child healthcare outcomes.

Rural–Urban Differentials

In both states, rural areas record more infant deaths than urban areas, highlighting persistent rural health disadvantages. However, the rural–urban gap is much wider in Uttar Pradesh. Several districts in Uttar Pradesh, such as Prayagraj, Varanasi, Gorakhpur, Mau, and Ghaziabad, exhibit very high urban and rural infant death counts, suggesting pressure on healthcare services even in urban settings. In contrast, Haryana shows a more balanced rural–urban distribution, with urban districts like Faridabad, Gurugram, Panipat, and Rohtak reporting higher numbers mainly due to population concentration rather than poor healthcare access. . Rural districts in Haryana generally show comparatively lower infant deaths, reflecting relatively better outreach of institutional delivery and maternal care services.

District-Level Patterns

District-level analysis reveals that in Uttar Pradesh, infant mortality is highly uneven across districts. Eastern Uttar Pradesh districts such as Gorakhpur, Kushinagar, Azamgarh, Mau, and Varanasi report particularly high infant deaths, indicating regional disparities in healthcare

infrastructure, maternal nutrition, and socio-economic conditions. In Haryana, although districts like Hisar, Nuh (Mewat), Faridabad, and Rohtak report relatively higher infant deaths, the overall numbers remain substantially lower than those observed in Uttar Pradesh districts. Notably, Nuh (Mewat) stands out within Haryana due to socio-economic backwardness, lower female literacy, and limited healthcare utilization, suggesting that intra-state disparities also persist

Gender Differential

Both states show a higher number of male infant deaths compared to female infant deaths, which is consistent with biological vulnerability of male infants. However, the difference is not extremely wide, suggesting improved reporting and reduced gender bias in infant death registration. Haryana exhibits a more balanced male–female distribution, while Uttar Pradesh shows larger absolute numbers for both sexes.

Public Health Implications

The comparison clearly indicates that Haryana performs better than Uttar Pradesh in terms of infant mortality outcomes. The relatively lower infant deaths in Haryana may be linked to:

- *Better healthcare infrastructure*
- *Higher institutional delivery rates*
- *Improved maternal education*
- *Stronger implementation of health schemes*

Uttar Pradesh, on the other hand, continues to face challenges such as:

- *High population pressure*
- *Regional inequality*
- *Inadequate healthcare access in rural areas*
- *Socio-economic deprivatio*

The comparative analysis highlights significant inter-state and intra-state disparities in infant mortality. While Haryana demonstrates relatively favorable outcomes, Uttar Pradesh continues to record a high burden of infant deaths, particularly in rural and eastern districts. Strengthening primary healthcare, improving maternal nutrition, enhancing female education, and reducing regional inequalities are essential to further reduce infant mortality, especially in Uttar Pradesh. The findings emphasize the need for district-specific and region-focused health interventions to achieve equitable child survival outcomes across India.

Conclusion

The Infant Mortality Rate (IMR), which is widely accepted as a crude indicator of the overall health scenario of a country or a region, is defined as the infant deaths (less than one year) per thousand live births in a given time period and for a given region. The present level of IMR (25 infant deaths per thousand live births, for the year 2023) is less than one-fifth as compared to 1971 (129 infant deaths per thousand live births). In the last ten years, IMR has witnessed a decline of about 37.5%. The Figure-4 given below indicates that IMR at all India level has declined from 40 to 25 in the last decade. The corresponding decline in rural areas is 44 to 28, and for urban areas it is from 27 to 18, thereby exhibiting about 36% and 33% decadal decline respectively. Despite the decline in IMR over the last decades, one in every 40 infants die within first year of their life at the National level (irrespective of rural-urban).

Causes of Child Mortality:

Septicemia is a major cause of death in newborns, It is a serious bloodstream infection that can lead to sepsis, a life-threatening condition, and organ damage.
The state has a high rate of home deliveries, which is a major risk. The lack of trained midwives, poor hygiene, and the absence of medical professionals in home deliveries increase the risk of infection.

*Uttar Pradesh lacks access to health care in remote and under-**served areas.** Lack of health care, such as lack of prenatal and postnatal care, increases infant mortality.*

Although the government has introduced several initiatives like the Janani Shishu Suraksha Karyakram (JSSK) and Home-Based Newborn Care (HBNC) to safeguard maternal and child health, the benefits of these schemes are not uniformly reaching all families.

As a result, the infant mortality rate remains high, particularly in remote and underserved regions.

***Malnutrition** and **climate change** affect the health of children. This leads to an increase in infant mortality rate.*

*Many families **lack awareness about infections** during delivery and baby care. Child mortality in Indian states can be reduced through a comprehensive approach that strengthens maternal and child healthcare services and addresses social determinants of health. Ensuring regular antenatal care, skilled attendance at birth, and quality newborn care can significantly lower deaths during the neonatal period. Full immunization coverage against vaccine-preventable diseases, along with timely treatment of common childhood illnesses such as pneumonia and diarrhea using antibiotics, ORS, and zinc, is essential. Improving child nutrition through exclusive breastfeeding, adequate complementary feeding, and micronutrient supplementation helps build immunity and prevent infections. Access to safe drinking water, proper sanitation, and hygiene practices reduces disease burden, while educated and empowered mothers are more likely to adopt healthy childcare practices. Strengthening health systems, supporting frontline health workers, using data for targeted interventions, and addressing poverty and inequality through social welfare programmes together play a crucial role in sustainably reducing child mortality across Indian states.*

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