GEOGRAPHICAL ANALYSIS

RESEARCH ARTICLE

State Level Variations in Neonatal, Infant and Child Mortality Rates: A Study Based on NFHS-5

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OPEN ACCESS

Received: 22.03.2022
Accepted: 10.05.2022
Published: 18.05.2022

Citation: Chandrasekarayya T, Cendrayudu N. (2022). State Level Variations in Neonatal, Infant and Child Mortality Rates: A Study Based on NFHS-5. Geographical Analysis. 11(1): 6-9. https://doi.org/10.53989/bu.ga.v11i1.22.2

Funding: Non

Competing Interests: Nonw

Published By Bangalore University, Bengaluru, Karnataka

ISSN
Print: 2319-5371
Electronic: XXXX-XXXX

Abstract

Mortality after birth, before to one year, and under five years offers a glimpse into present health issues, indicates enduring risk patterns in certain areas, and illustrates patterns in particular causes of death throughout time. One of the biggest threats to public health in developing nations like India is Neonatal, Infant and child mortality. Reduction of the Neonatal, Infant and child mortality rate would benefit human prosperity and well-being as well as public health. Access to social indicators linked to health is uneven everywhere, especially in a nation's various geographic areas. But access to this health and health-related social indicators is poorly managed in India, with disparities between the states. The present study aims at examine the state level variations in Neonatal, Infant and Child Mortality Rates based on NFHS- 5 data, will certainly useful in policy making and implementation of health care services particularly reduction in health risks and mortality of children.

Keywords: Neonatal; Infant and Child Mortality Rates; Child Health Care Services

Introduction

As a developing country, India is confronted with a number of infectious illnesses that can be harmful to health, including pneumonia, HIV, malaria, diarrhea, and other conditions that significantly raise the risk of newborn, infant, and child mortality. Poor access to immunizations and inadequate maternity and newborn care services are the main causes of these fatalities [1]. Furthermore, the accessibility to health and health-related social indicators for inhabitants is threatened by population increase and fast urbanization, particularly with regard to child healthcare facilities [2,3]. Furthermore, child mortality is a serious public health issue that is influenced by climate change and environmental factors like temperature, precipitation, CO2 emissions, rainfall, air pollution, and droughts in addition to socioeconomic and demographic characteristics, housing attributes, and health-related variables [4–6]. Geographically speaking, each of these attributes is location-specific [7,8]. Furthermore, child mortality is a serious public health issue that is influenced by climate change and environmental factors like temperature, precipitation, CO2 emissions, rainfall, air pollution,

and droughts in addition to socioeconomic and demographic characteristics, housing attributes, and health-related variables [4–6]. Geographically speaking, each of these characteristics varies depending on the place [7,8].

The likelihood of Neonatal, Infant and child mortality has been demonstrated to be decreased by elements like raising parental education, household wealth status, access to clean drinking water, restroom facilities, and media exposure [9]. According to [10], there is a direct correlation between child mortality and poverty indicators such as income inequality and gross national income. Asif MF et al. [11] found that access to maternal health care services and appropriate spacing between pregnancies significantly lowers the risk of infant mortality. Researchers and medical professionals are encouraged to look into child mortality from a spatial perspective because of the significant impact that these geographic differences in access to health indicators have on the Neonatal, Infant and child mortality rate. This emerging topic has gained considerable attention among health academicians. Therefore, there is a pressing need to identify from spatial perspective by examine the state level variations in neonatal, infant and child mortality rates to promote health care services apart from raising various socio-economic and other health-related social indicators on child mortality.

Methodology

The study is based on secondary data collected from National Family Health Survey- 5 (2019-21) and descriptive in nature. Data in the present study relates to neonatal, infant and child mortality and covers Indiabesides its 11 major states and 3 union territories.

Results and Discussion

Knowledge about variations in neonatal, infant and child mortality rates in major states and union territories shows the health status of children and access of primary health care in different parts of India. The substantial differences in the neonatal, infant and child mortality indicators are important for the evaluation health care performance and health outcomes.Keeping this in view, variations in neonatal, infant and child mortality ratesacross India discussed briefly hereunder

Neonatal mortality rate (NMR)

The first 28 days of life-the neonatal period-is the most vulnerable time for a child's survival. Children face the highest risk of dying in their first month of life. Neonatal mortality rate (NMR) is the rate of deaths per 1,000 live births at which babies of either less than four weeks of age die. The NMR is commonly accepted as a measure of the general health and well being of a population.

Table 1 depicts that the neonatal mortality rate declined from NFHS-4 to NFHS-5 period in most of the states and union territories. In general, rural areas recorded higher Neonatal mortality rates than urban. As per NFHS-5, the states like Chhattisgarh, Jharkhand, Madhya Pradesh, Odisha, Uttar Pradeshand Uttarakhand have higher Neonatal mortality rate than Indian average.

Infant mortality rate (IMR)

Infant mortality rate is the number of deaths per 1,000 live births of children under one year of age. The rate for a given region is the number of children dying under one year of age, divided by the number of live births during the year, multiplied by 1,000. In addition to giving us key information about maternal and infant health, the infant mortality rate is an important marker of the overall health of a society.IMR represents an important component of under-five mortality. Like under-five mortality, infant mortality rates measure child survival. They also reflect the social, economic, cultural and environmental conditions in which children (and others in society) live, including their health care.

Table 2 shows that infant mortality rate had drastically declined from period of NFHS- to NFHS-5 period in many states and union territories. In NFHS-5 period, rural areas have higher IMR than urban areas and the states like the states like Chhattisgarh, Jharkhand, Madhya Pradesh, Odisha, Uttar Pradesh and Uttarakhand have higher Neonatal mortality rate than National average.

Under-five mortality rate (U5MR)

The under-five mortality rate refers to the probability a newborn would die before reaching exactly 5 years of age, expressed per 1,000 live births. In 2021, 5.0 million children under 5 years of age died. Globally, infectious diseases, including pneumonia, diarrhoea and malaria, remain a leading cause of under-five deaths, along with preterm birth and intrapartum-related complications. It is defined as the number of children who die by the age of 5 years, per 1000 live births. It is an indicator for Sustainable Development Goal (SDG) - 3 that aims to prevent needless suffering from preventable diseases and premature death by focusing on key targets that boost the health of a country's overall population. SDG-3 also aims to achieve universal health coverage, including access to essential medicines and vaccines. Around two in five countries will need to accelerate progress in order to reach SDG targets for immunization. Immunization averts an estimated 2 million to 3 million deaths every year.

Table 3 reveals that under-five mortality rate (U5MR) had declined from NFHS-4 to NFHS-5 period in states and union territories. In period of NFHS-5, rural areas and states like Haryana, Jharkhand, Madhya Pradesh, Uttar Pradesh and

Table 1. Neonatal mortality rate (NMR) per 1,000 live births

S. No	India/ State/ Union Territory	NFHS-5 (2019-21)2222			NFHS-4 (2015-16)
		Urban	Rural	Total	Total
1.	India	18.0	27.5	24.9	29.5
2.	Arunachal Pradesh	12.5	6.9	7.7	11.8
3.	Chhattisgarh	19.3	35.6	32.4	42.1
4.	Haryana	19.0	22.7	21.6	22.1
5.	Jharkhand	17.7	30.4	28.2	33.0
6.	Madhya Pradesh	24.0	30.4	29.0	36.9
7.	Odisha	24.6	27.5	27.0	28.2
8.	Punjab	16.0	24.9	21.8	21.2
9.	Rajasthan	13.3	21.9	20.2	29.8
10.	Tamil Nadu	8.5	16.1	12.7	14.0
11.	Uttar Pradesh	27.7	37.8	35.7	45.1
12.	Uttarakhand	36.2	30.6	32.4	27.9
13.	NCT Delhi	17.0	-	17.5	17.8
14.	Puducherry	3.2	-	2.3	5.8

Source: Government of India; 2019-21: Ministry of Health And Family Welfare, Compendium of Fact Sheets, India and 14 States/UTs (Phase-11), National Family Health Survey (NFHS-5)

Table 2. Infant mortality rate (IMR) per 1000 live births

S. No	India/ State/ Union Territory	NFHS-5 (2019-21)2222			NFHS-4 (2015-16)
		Urban	Rural	Total	Total
1.	India	26.6	38.4	35.2	40.7
2.	Arunachal Pradesh	16.7	12.3	12.9	22.9
3.	Chhattisgarh	26.2	48.7	44.3	54.0
4.	Haryana	28.6	35.3	33.3	32.8
5.	Jharkhand	22.2	41.1	37.9	43.8
6.	Madhya Pradesh	33.9	43.5	41.3	51.2
7.	Odisha	31.2	37.2	36.3	39.6
8.	Punjab	20.1	32.4	28.0	29.2
9.	Rajasthan	22.2	32.2	30.3	41.3
10.	Tamil Nadu	14.9	21.7	18.6	20.2
11.	Uttar Pradesh	42.0	52.6	50.4	63.5
12.	Uttarakhand	38.3	39.5	39.1	39.7
13.	NCT Delhi	24.2	-	24.5	31.2
14.	Puducherry	4.1	-	2.9	15.7

Source: Government of India; 2019-21: Ministry of Health And Family Welfare, Compendium of Fact Sheets, India and 14 States/UTs (Phase-11), National Family Health Survey (NFHS-5)

Uttarakhand recorded higher Under-five mortality rate.

Conclusion and recommendations

The present paper investigates the spatial variations in neonatal, infant, and child mortality rates at the state level. These rates had drastically decreased between the NFHS-4 and NFHS-5 periods. Similarly, during the NFHS-5 period, the rates of neonatal, infant, and child mortality were higher in rural areas and most states other than union territories. It might result from differences in the physical layout, developmental trajectory, accessibility, and use of health care services across states and union territories. The results of this study are highly valuable to public health professionals and policy planners because they offer crucial information for setting priorities for resolving disparities in neonatal, infant, and child mortality rates among the states and union territories that are the subject of the research. Putting policies into place that will help them financially, ultimately hoping to lower the rates of neonatal, infant, and

Table 3. Under-five mortality rate (U5MR) per 1000 live births

S. No	India/ State/ Union Territory	NFHS-5 (2019-21)222			NFHS-4 (2015-16)
		Urban	Rural	Total	Total
1.	India	31.5	45.7	41.9	49.7
2.	Arunachal Pradesh	22.2	18.3	18.8	32.9
3.	Chhattisgarh	36.0	39.8	38.7	41.1
4.	Haryana	27.3	49.2	45.4	54.3
5.	Jharkhand	27.3	49.2	45.4	54.3
6.	Madhya Pradesh	8.2	52.5	49.2	64.6
7.	Odisha	32.0	42.7	41.1	48.1
8.	Punjab	24.1	37.5	32.7	33.2
9.	Rajasthan	32.3	38.8	37.6	50.7
10.	Tamil Nadu	17.3	26.4	22.3	26.8
11.	Uttar Pradesh	49.7	62.5	59.8	78.1
12.	Uttarakhand	46.2	45.3	45.6	46.5
13.	NCT Delhi	30.5	-	30.6	42.2
14.	Puducherry	4.1	-	3.9	16.2

Source: Government of India; 2019-21: Ministry of Health And Family Welfare, Compendium of Fact Sheets, India and 14 States/UTs (Phase-11), National Family Health Survey (NFHS-5)

child mortality. Furthermore, the results of the study have confirmed that improving postnatal care for the newborn and putting better drinking water systems in place in rural areas have significantly lowered the rates of neonatal, infant, and child mortality in India. Improving the accessibility of neonatal, infant, and child (and maternal) healthcare is urgently needed.

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