Estimation of Infant and Child mortality across districts of India over the past 30 years: A cross-sectional birth history data application

Extended Abstract:

Motivation of the study:

Sustainable Development Goal 3 focuses on ensuring healthy lives and promoting th e well-being for all, with specific targets to end preventable deaths of neonatal, infant, child and U5 mortality by 2030 and to achieve universal health coverage (UHC), through access to quality, safe, effective, affordable and essential health care services. Even before the SDGs are finalized, the UN Secretary General has called for a Data Revolution for Sustainable Development and appointed a high-level advisory group to define what it should be. (UN 2014) The aim is clear: to rapidly improve the coverage, quality, availability and timeliness of the data used to measure and monitor progress toward the SDGs. Even if the current national-level all the indicator were halved by 2030, the SDG3 target might still not be achieved in many districts. At the same time, unlike the Millennium Development Goals (MDGs), the SDGs are not only target-oriented, but also include all subsections of the country. The battle cry for the SDGs, "No one left behind" means that for India, the overarching goal is to reduce inequalities across gender, region, class, and caste. For a large and diverse country like India, it is thus imperative to examine the improvement in child survival at the lowest possible geographical unit and by gender. UN sex-specific birth and mortality totals; the researchers indirectly calculated that only 37% of 597 districts were on track to achieve Millennium Development Goal (MDG) number 4 of 38 deaths per 1000 live births among the under-fives by 2015, and only around another 37% after 2020. spatial clustering and risk factors of infant mortality rate (IMR) across nine high focused states of India has been examined. (Gupta et al.,2016). Concentration curve approaches to the states of India shows poorer states are more homogeneous. (De and Dhar 2013). Most of the study, in the Indian contest has mainly focus on Admin 1 level, i.e., State level estimation of infant and child mortalities. Though Bora et al.,2018, has showed the district-level estimate of NMR and U5MR related to the SDG3 target on preventable deaths among new-borns and children. But this study only considers the reference period 10 years prior to the study only. So, this paper takes an initiation for estimating the patterns of infant and child mortalities at state as well as district level for the last 30 years. Paper has also tried to estimate the variance of mortality rates (mainly U5MR) at state level for latest period.

Data Sources & Methods

We primarily used the most recent (fourth round) of the Demographic and Health Survey (DHS) for India, popularly known as the National Family Health Survey-4 (NFHS-4) conducted in 2015-2016. (NFHS 2015-16) under the stewardship of the Ministry of Health and Family Welfare (MoHFW), Government of India. NFHS-4 was based on 1,315,617 children born of 699,686 women in 601,509

households with a response rate of 98%. In our study we have taken total 30 years preceding the survey, we have excluded before that due to data constraint. We have adopted Bayesian hazard model where first year is split into the first month when a child is particularly vulnerable and the remainder of the first year. The remaining 4 age groups cover the subsequent years until age 5 years. Since a month is the shortest time unit considered, each child's data is expanded to provide up to 60 records, one for each month from birth, with a binary indicator of survival or death. Random walk models are Markovian, meaning that dependencies between terms are assumed to be local. The total variance of the observed data can also be decomposed. Each of the quantity will be the variance due to random effect. Here, Indicators corresponding to survey designs are survey strata, cluster, household, survey weight, date of interview, date of child birth as well as death and age at death.

Results and Discussion

Over the increasing period the rate started decreasing in all over the districts. But some of the district from Jammu & Kashmir, Andhra Pradesh, Mizoram showing higher NMR. From the recent period it has been observed that, UP got most no of districts which having high NMRs. In PNMR distribution, districts from the central region of India showing higher in number. Between 1900-2005, some districts from Rajasthan and Gujrat having higher PNMR. The condition of IMR is scattered in Northern India. Districts from Uttarakhand, Chhattisgarh, Uttar Pradesh having most no of districts of having high IMR throughout all the year. There is also existence of districts of having IMR of 185 in the late 80's. Child death during the 1^{st} and 5^{th} year of age had a maximum rate greater that 206 in some districts in Tamilnadu, Chhattisgarh, Madhya Pradesh and UP in 1985-90. Between 1995-2000 the no of district has suddenly decreased like of nowhere but after 5 years no. of such districts again got evolved in spite of less deaths. Coming to the mortality of under-five child, district with having greater than 305 deaths out of 1000 children has also been found in some districts of orisha and Madhya Pradesh. The density of U5MR is higher in central districts of the country throughout all the period. Many north-eastern state's districts are still in high no of U5MR in the last observation (2015-16). From the value of the spatial autocorrelation index, it can be said that over the year the spatial autocorrelation between the districts has been increased with a positive association. From the marginal posterior summaries of two type of random effects, one is time wise, other is for both the time-space. IID graph is relatively flat, though some jiggling part in the middle, whereas RW shows the original scenario of U5MR national estimate. The present study primarily highlights the distribution of Infant and child mortalities across the states as well as for districts, which is rare. The main reason is largely due to the challenge of estimating rates based on small sample sizes. The few analyses of this nature that do exist have generally attempted to overcome the challenge posed by small numbers by utilizing small area estimation techniques and where possible, incorporating multiple data sources of available. But through this proposed method, we will be capable incorporating spatially misaligned data, increasing the amount of

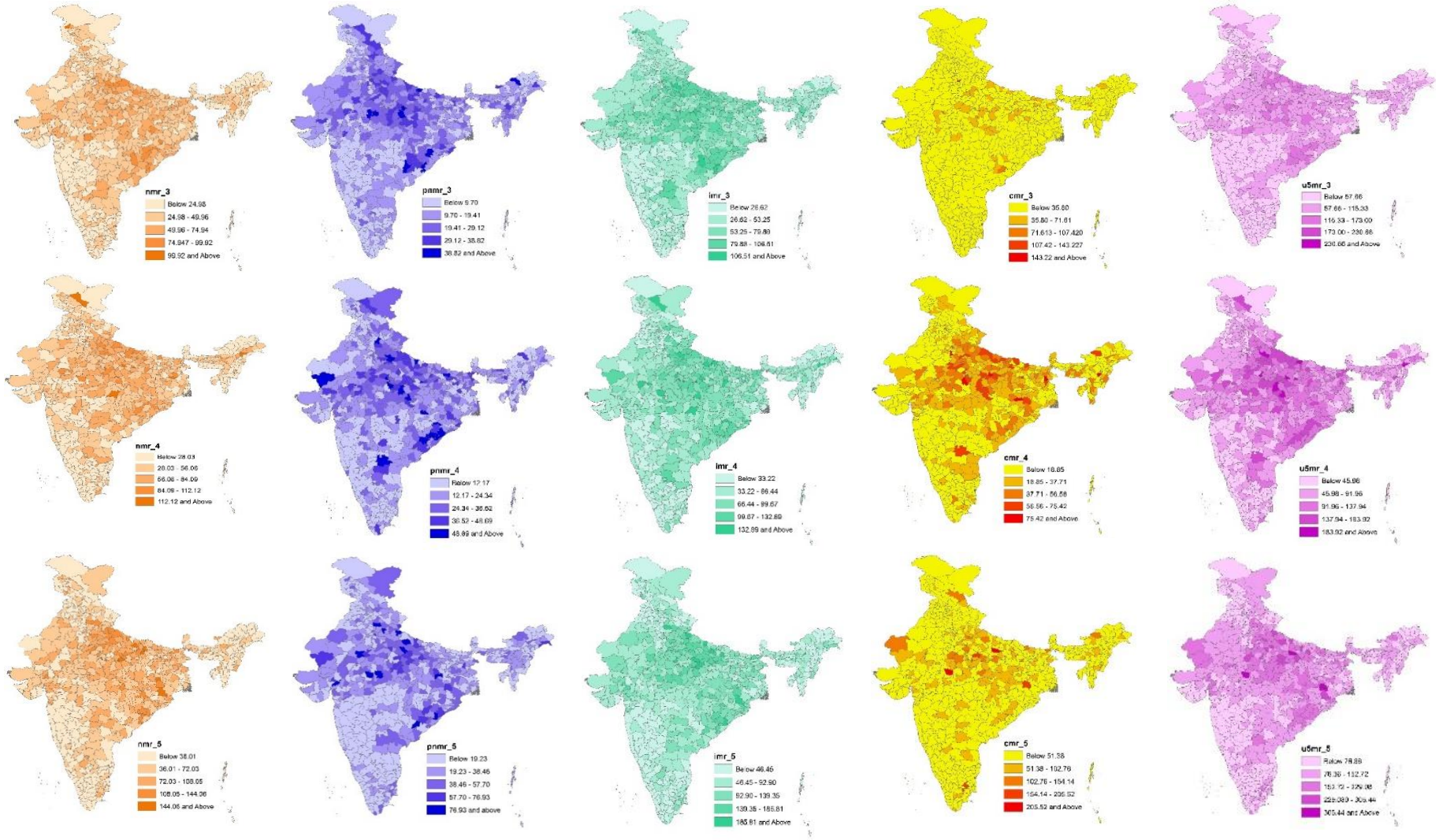

Fig1:District wise Infant and child mortality distribution for selected timepoint

data available for analysis from the latest nationally representative health survey of history of child birth. These estimates exposed a high degree of spatial heterogeneity in states as well as districts. As country consider how to reduce these child mortality indicators, these types of geographically precise estimates can be used to identify areas where attention and resources are most needed, or to highlight areas that have done well and might be mined for effective strategies. It can also be considered when tracking progress towards SDGs.

Reference:

- De, P., & Dhar, A. (2013). Inequality in child mortality across different states of India: A comparative study. Journal of Child Health Care, 17(4), 397–409. https://doi.org/10.1177/1367493512468359

- Gupta, A. K., Ladusingh, L., & Borkotoky, K. (2016). Spatial clustering and risk factors of infant mortality: District-level assessment of highfocus states in India. *Genus*, *72*(1). https://doi.org/10.1186/s41118-016-0008-9

- UN (2014b). Data revolution for sustainable development. Available at http://www.un.org/apps/