

Can the Gap between Infant and Child
Mortality be explained by Malnutrition Prevalence in India?

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1. Introduction:

- a). High prevalence of underweight, stunting, wasting and anemia among children in India. (Global Nutrition Report by Development Initiatives 2018)
- b). Child malnourishment may act as a challenge towards fulfilling country's SDG target (GOI 2019b).
- c). Whether malnutrition a significant contributor for under-five mortality?
United Nations Inter-agency Group for Child Mortality Estimation (2019)
India State-Level Disease Burden Initiative (2019)
- d). In India, Child mortality (1 to 4 years) is lesser than Infant mortality (0 to 1 years).
- e). But disaggregated data analyses suggest: Malnutrition Prevalence (1 to 4 years) greater than Malnutrition Prevalence (0 to 1 years).
- f). Inquiry on trend inconsistency: Examine nature of relationships between malnutrition & death burden at relevant age groups.
- g). Also examine the divergences of child malnutrition & death burden (0-1 year and 1-4 years) across states of India.

2. Objectives:

- a). To examine the variations between infant and child mortalities across states
- b). To examine the variations between malnutrition prevalence in corresponding age groups for the states
- c). Subsequently, we explore their empirical links by using cross-sectional regressions

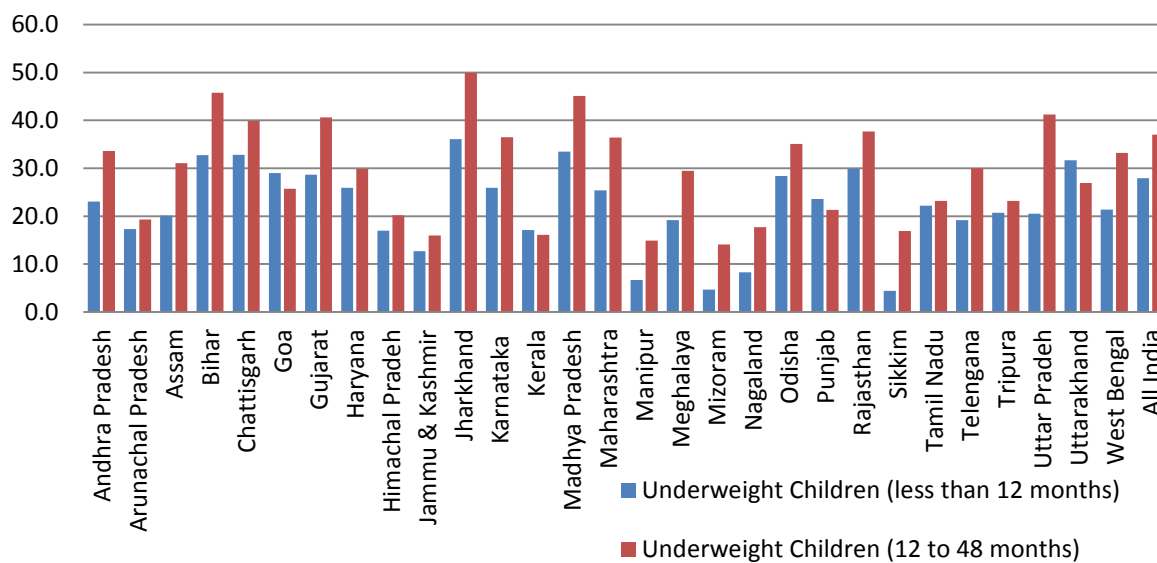
3. Issues in India:

- a). See Deaton and Drèze 2009, Nandakumar et al 2010, Saxena 2011, Ravi and Singh. 2016, Pingali and Abraham 2018, Swaminathan et al 2019 for the literature on Child under-nutrition in India
- b). Child malnutrition in the country remains high along with some slow improvements during the past decade.
- c). The anthropometric measures of child malnutrition, viz., underweight, stunting and wasting for children during the period from NFHS-3 (2005-06) to NFHS-4 (2015-16) indicate reduction in stunting and underweight prevalence but rise in child wasting among children below 5 years.

4. Malnutrition Prevalence across States:

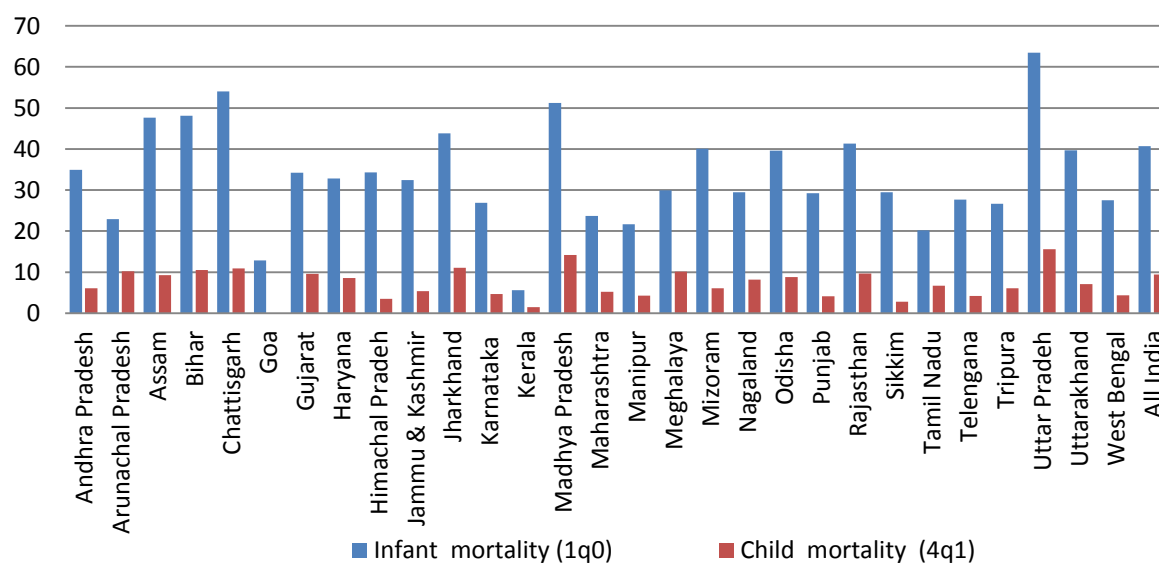
- a). Figure 1 reveals that malnutrition rates for many states are higher among children of age 12 to 48 months than the same among children of less than 12 months of age.
- b). Figure 2 shows infant mortality rates at much higher levels than the child mortality rates for the majority of the states.

Figure 1: Percentage of Underweight Children at Different Age Groups in States of India.



Source: IIPS (2017): NFHS-4.

Figure 2: Infant and Child Mortality in Different States of India, 2015-16.



Source: IIPS (2017): NFHS-4.

5. Methodology:

We estimate the following model using cross-sectional observations from 31 states and union territories of India

$$Mortality\ Rate = \alpha + \beta_1 Malnutrition + Control\ Variables \quad (1)$$

The control variables are picked up from mothers with no schooling, all age appropriate vaccinations, median duration of predominant breastfeeding, minimum dietary diversity, and per capita net state domestic product as a measure of per capita income in the state.

6. Data Base:

a). The basic source: National Family and Health Survey, Fourth Round, (2015-16), International Institute for Population Science, Mumbai on behalf of the Ministry of Health and Family Welfare, (GoI).

7. Results:

- a). The relationships between mortality rate and underweight prevalence for 0 to 11 months and 12 to 48 months age-group are graphically represented for the 29 states in Figure 3 & 4.
- b). A positive correlation is observed in both cases, but the relationship remains stronger for the 12 to 48 months age-group.
- c). Figure 5 & 6 indicate stronger correlation between mortality rate and stunting prevalence for the 12 to 48 months age-group.
- d). Similarly, Figure 7 & 8 indicate stronger correlation between mortality rate and wasting prevalence for the 12 to 48 months age-group.
- e). Table 1 and Table 2 provide regression results of (1) for 0 to 11 months and 12 to 48 months age group.
- f). Results suggest that besides the underweight prevalence, variables like women illiteracy, vaccinations, breastfeeding, dietary diversity or per capita income could have contributed to the infant mortality.

Table 1: Regression Results: Dependent Variable: Infant Mortality Rate, 2015-16 (Sample: 29 States plus All-India).

	Dependent Variable: Infant Mortality Rate					
<i>Explanatory Variables</i> ↓	OLS (1a)	Cochrane- Orcutt (1b)	OLS (2a)	Cochrane- Orcutt (2b)	OLS (3a)	Cochrane- Orcutt (3b)
Constant	5.43 (2.46)	5.79 (2.97)	4.12 (1.90)	5.69 (2.92)	1.44 (1.20)	2.06 (1.75)
% of Children (less than 12 months) who are underweight as per weight for age	-0.19 (0.64)	-0.25 (0.79)	-0.25 (0.79)	-0.25 (1.04)	0.01 (0.01)	-0.10 (0.39)
% of Women (age: 15-49) with No Schooling	0.43 (1.96)	0.62 (2.64)	0.60 (2.88)	0.73 (3.75)	0.60 (2.79)	0.76 (3.58)
% of Children (age 12-23 months) who received all Basic Vaccinations	-0.01 (0.10)	-0.06 (0.50)	-0.10 (1.01)	-0.11 (1.26)	-0.12 (1.14)	-0.15 (1.66)
Median Duration of Predominant Breastfeeding	-2.02 (0.69)	-3.49 (1.29)	-1.09 (0.36)	-3.85 (1.25)	1.42 (0.57)	0.32 (0.11)
% of Children (age 6-23 months) with Minimum Dietary Diversity	-0.42 (1.75)	-0.46 (1.94)	-0.36 (1.46)	-0.45 (1.95)		
Per capita Net State Domestic Product in States at Current Prices (Triennium ending 2015-16)	-0.01 (1.79)	-0.01 (0.83)				
R-Squared	0.56	0.67	0.51	0.66	0.46	0.58
R-Bar-Squared	0.45	0.49	0.40	0.51	0.37	0.46
DW Statistic	2.22	1.92	2.23	1.97	2.18	1.94
F-Statistic	5.01	3.87	4.92	4.33	5.37	4.87

Note: * and ** indicate statistical significance at 5% and 20% level of significance, respectively.

Table 2: Regression Results: Dependent Variable: Child Mortality Rate, 2015-16 (Sample: 29 States plus All-India).

	Dependent Variable: Child Mortality Rate					
<i>Explanatory Variables</i> ↓	OLS (1a)	Cochrane- Orcutt (1b)	OLS (2a)	Cochrane- Orcutt (2b)	OLS (3a)	Cochrane- Orcutt (3b)
Constant	0.85 (1.54)	1.12 (2.87)	0.49 (0.80)	1.17 (2.89)	0.30 (1.13)	0.82 (3.52)
% of Children (less than 12 months) who are underweight as per weight for age	0.11 (1.54)	0.03 (0.58)	0.10 (1.42)	-0.01 (0.20)	0.11 (1.50)	-0.01 (0.13)
% of Women (age: 15-49) with No Schooling	0.08 (1.40)	0.08 (1.92)	0.12 (2.11)	0.13 (3.19)	0.12 (2.10)	0.12 (2.98)
% of Children (age 12-23 months) who received all Basic Vaccinations	-0.05 (-2.03)	-0.05 (-2.56)	-0.03 (3.24)	-0.09 (5.48)	-0.08 (3.28)	-0.08 (5.33)
Median Duration of Predominant Breastfeeding	-0.53 (0.75)	-0.49 (-0.89)	-0.29 (0.40)	-0.60 (1.03)		
% of Children (age 6-23 months) with Minimum Dietary Diversity	-0.01 (-0.28)	-0.06 (-1.44)	0.01 (0.05)	-0.07 (1.73)	0.01 (0.38)	-0.05 (1.35)
Per capita Net State Domestic Product in States at Current Prices (Triennium ending 2015-16)	-0.01 (-1.84)	-0.01 (-2.05)				
R-Squared	0.70	0.83	0.65	0.79	0.65	0.77
R-Bar-Squared	0.62	0.75	0.58	0.71	0.60	0.71
DW Statistic	2.18	1.78	2.18	1.71	2.15	1.68
F-Statistic	8.88	11.23	9.06	10.46	11.67	11.97

Note: * and ** indicate statistical significance at 5% and 20% level of significance, respectively.

8. Summary:

a). Our results suggest that role of other factors, such as, women illiteracy, vaccinations, breastfeeding, dietary diversity or per capita income for the infant mortality prevalence across states in India.