



Growth versus Nutrition Debate in India: An Intra-Country Analysis of the Dichotomy*

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Abstract: This paper inquires into the mainstream debate on the growth–nutrition dichotomy, with its particular relevance for India. The contention is that in the case of India the much hyped dichotomy is intriguing because well-being in general and nutritional well-being in particular continues to be placed in the context of growth performance. The paper argues that this focus on growth is misleading, not only because it fails to analyze the apparently enigmatic incidence of child malnutrition in India, but more so because it constrains a realistic understanding of the issue and therefore distorts policy interventions. By situating the issue in the diverse socio-economic contexts of 28 states in India, this paper attempts to offer insight into the debate by accommodating the role of gender and other socio-behavioral factors into a framework for analyzing child malnutrition. To this end, the paper first conducts a cluster analysis to extend the existence of the growth–nutrition dichotomy to the inter-state level in India and then explains the same through a multidimensional conceptual perspective on (mal-)nutritional dynamics. In the process, the paper underscores that the theoretical foundation for a necessarily positive

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growth-nutrition linkage is shaky. While economic growth has the potential to better nutrition security, it is not sufficient in itself and does not necessarily stand in all contexts due to inherent characteristics of child nutrition, wherein the role of gender and government action come to play predominating roles as underlying factors.

Keywords: Nutrition, Gender, Growth, State, Care behavior

There has been a renewed thrust to understand the dynamics underlying the incidence of child malnutrition in developing and less developed countries. India, with its contradictory levels of consistently high economic growth and extremely high incidence of child malnutrition, remains at the center of contemporary debates in this regard (Panagariya 2013). Despite the established importance of non-income factors such as gender in child well-being and child nutrition outcomes, the intriguing case of child malnutrition in India continues to be placed in the context of economic growth performance. This paper argues that such an approach is misguided, not only because it fails to analyze the apparently enigmatic incidence of child malnutrition in India, but more so because it constrains a realistic understanding of the issue and therefore distorts policy interventions. This paper, by situating the issue in diverse socio-economic contexts across the states of India, attempts to offer insight into the much in vogue “growth-nutrition” dichotomy. It observes that once the role of gender and other socio-behavioral factors are accommodated in the analysis, the dichotomy hardly remains a dilemma.

Indeed, it is not a simple task to understand the variation using specific parameters, given the heterogeneity and diversity across regions and sub-regions of India. Nevertheless, such an inquiry is warranted for policy lessons where one state can learn from the other. This paper has attempted such an inquiry through two broad but inter-related objectives

that it pursues, viz. extending the existence of a growth-nutrition dichotomy to states of India and then explaining the same through multidimensional analysis of (mal-)nutritional dynamics within India. In the process, the paper underscores that the theoretical foundation for a necessarily positive growth-nutrition linkage itself is shaky and does not necessarily stand in all contexts due to the multidimensional character of nutrition security wherein the role of gender, care behavior, health seeking behavior, public services and other such factors are found to be predominating.

To begin with, the paper classifies the states in terms of incidence of child malnutrition (as revealed by the composite index constructed using three separate indicators of malnutrition), as well as in terms of indices based on conceptualized underlying determinants. The clusters of states thus produced enable an identification of overlaps or segregation among states based on the predominating influence of particular factors included in the analysis. This commonality in turn has lessons for broader policy direction. Further, following the cluster analyses, the paper undertakes a separate analysis of growth-nutrition dynamics. Although this inter-state analysis masks intra-state variations, it nevertheless highlights key linkages between growth and nutrition, with implications for future research and policy formulation. Also, the paper has tried to accommodate intra-state variation (at least partially) by including variables on inequality in consumption expenditure in rural and urban areas within the 28 states, which helps in figuring out the criticality of distributional aspects of growth. Further, the identification of nutritionally insecure zones in India is helpful as a guide for the direction of public policy. While such mapping has been done for India earlier (MSSRF and WFP 2003), the seven states from the northeast were excluded due to technical constraints. In fact, as shown below, the inclusion of these states in this analysis has rendered marked support to the paper's conceptual premises.

The paper is organized as follows. The next section offers a brief discussion on the conceptual framework that drives the hypotheses and

empirical part of this paper. This is followed by methodological overview, including a look at the data and methods. Subsequent sections present the empirical analysis and discussion, including cluster classification of states by malnutrition status, clusters by underlying determinants and the growth–nutrition dynamics across India’s states, in that order. Finally, the paper concludes with a summing up of key threads emerging out of the analyses.

The Multidimensional Dynamics of Child Malnutrition

While the correlates of infant and/or under-five mortality primarily include income related factors and basic health infrastructure, malnutrition among children has more to do with behavior, attitudes, and practices. The paper proceeds from the premise that income and non-income well-being do not necessarily coincide. And this could be

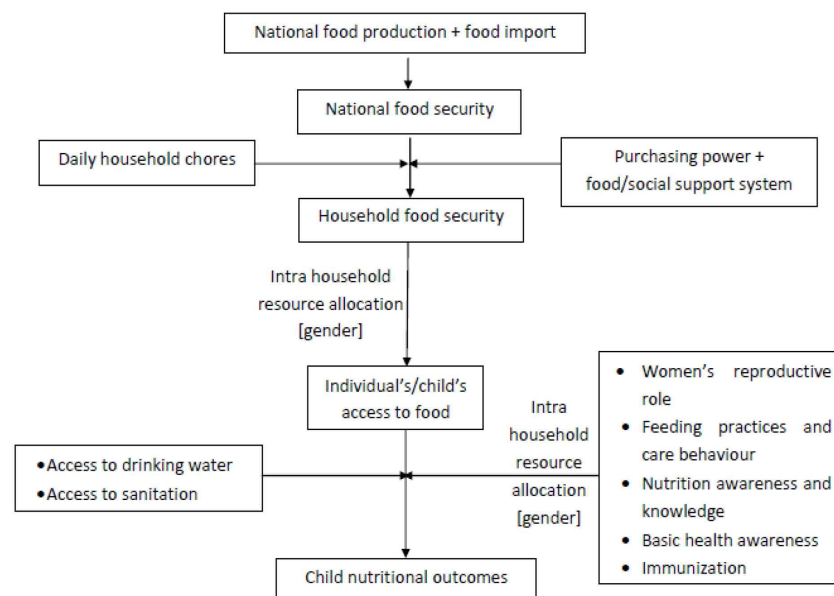


Figure 1. Framework on determinants of (child) malnutrition. Source: Author’s construct.

one of the factors underlying the divergence between levels of economic growth and children's nutrition capabilities. Accordingly, one of the main intents of this paper is also to comprehend whether relatively better off states (in terms of income/economic growth) also group as nutritionally secure ones and what are the likely factors that result in a particular clustering.

As Figure 1 reflects, the incidence of malnutrition among children—beyond starvation—has its roots in cultural practices and social norms along with income, and therefore is difficult to tackle. The determinants of malnutrition range from amount of food to dietary diversity, from shelter, water, hygiene and sanitation to social and cultural values. The functioning of the latter factors remains invisible and therefore, is often overlooked but its ramifications are far reaching. Even though these subtle factors may not result in mortality of infants or children, they certainly carry the possibility of affecting children's nutritional health with long term consequences.

Figure 1 also highlights the role of gender as a crucial link in child nutrition outcomes. Women's reproductive role—including as agents of biological reproduction as well as social providers of primary care, positions gender as a crucial link in household food security and child malnutrition outcomes (Costa et al. 2009; Girma and Genebo 2002; Haddad et al. 1996; Oniang'o and Mukudi 2002; Smith et al. 2003). Gender also comes into the picture due to intra-household discrimination against the female child in allocation of resources especially if these are limited (Choudhary and Parthasarathy 2009; Molini and Nube 2007; Smith et al. 2003). In fact, the relatively high incidence of child malnutrition in India is largely attributed in the literature to rigid gendered norms and the low status of women (Haddad et al. 1999; Smith et al. 2003; Ryan and Spencer 2001). Women's education as a proxy of women's status as well as of women's knowledge and awareness is generally assumed to be of direct importance for child health and nutrition. However, it has also been argued that female education may be useful for nutrition only if it leads to better nutrition knowledge

(Charmarbagwala et al. 2004; Girma and Genebo 2002; Glewwe 1999). It is nutrition education and knowledge level that matters more in this regard and mediates the influence of women's education on child's wellbeing and gender equality/inequality outcomes. Thus, when understanding the issue of malnutrition among children, an assessment of nutrition and care practices is also important. This paper takes a conscious cognizance of this dynamic and attempts an explanatory analysis across states in India.

Methodological Approach: Data, Indicators and Classification Technique

The data for this paper have been obtained from three salient sources: UNICEF's Coverage Evaluation Survey (2009), Planning Commission of India (2014) and the National Family Health Survey (NFHS) (IIPS 2007). For nationwide nutrition data, NFHS-third round data remain the only source. UNICEF's evaluation survey provides data on child health, maternal care and access to sanitation whereas economic growth rate data is obtained from the Planning Commission of India.

This paper relies on anthropometric indicators to measure the extent of malnutrition among children across states in India. Stunting, underweight and wasting are three commonly used anthropometric indicators of child malnutrition, which use respectively the World Health Organization's child growth norms on height for age, weight for age and weight for height ratios. The respective incidences of malnutrition by these three measures in various states of India reflect the relative dominance of particular dimensions of child nutrition deprivation in different states and they do not necessarily coincide with each other. Therefore, this paper constructs a state level malnutrition index using the Principal Component Technique to extract factors from the three indicators, viz. incidence of stunting, incidence of underweight and incidence of wasting among children below five years of age in the 28 states. The index is standardized using the standard formula¹ (see Table 1).

Access to Sanitation, Institutional Care and Nutrition Practices; Gendered Nature of Indicators

To measure access to sanitation, access to maternal–pediatric institutional care and nutrition knowledge/practices, three indices have been constructed using the same Principal Component Technique and standardization. The choice of indicators used in the analysis is driven by theoretical considerations and the framework discussed above. Table 1 gives the list of indicators used to construct various indices in this paper.

Table 1.

Indicators Used in Construction of State Level Indices

Child malnutrition index	Sanitation index	Institutional care index	Nutrition awareness/behavior index
Percentage incidence of stunting among children	Population per 1000 with improved access to drinking water	Percentage of full/all required Antenatal Care (ANC) visits	Percentage treated to first dose of Vitamin A
Percentage incidence of underweight among children	Population per 1000 with improved access to toilet	Percentage of institutional delivery	Percentage treated to early initiation of breastfeeding
Percentage incidence of wasting among children	Population per 1000 with improved access to waste management	Percentage incidence of full immunization among children	Percentage treated to ORT in case of diarrhea

It should be noted that possible forms of gender interface are intrinsic to some components of these indices and hence have not been listed separately. Both of the indicators within the institutional care index and within the nutrition behavior index account for the role of gender issues in child health and nutrition status. Percentage of full antenatal care visits and percentage of institutional delivery are both also indicators of maternal care, having implications for child health and nutrition due to the mother–child biological link discussed in the

¹ Standardized value of index = (given index value – minimum value of index) / (maximum value of index – minimum value of index)

preceding section. Similarly, these indicators along with the three indicators within the nutrition behavior index (percentage treated to first dose of Vitamin A, percentage treated to early initiation of breastfeeding and percentage treated to ORT in case of diarrhea), depend upon a mother's nutrition knowledge and child care practices on account of her social or reproductive role. In fact, whereas treatment to Vitamin A dose is also a function of state machinery, the latter two typically fall within the reproductive domain. For the same reason, an indicator on female literacy has not been utilized separately since female education in the context of nutrition is important inasmuch as it culminates in awareness and care behavior (Charmarbagwala et al. 2004; Girma and Genebo 2002).

Further, to gauge the economic growth-malnutrition scenario, the paper calculates per capita average annual growth rates in states of India during the period from 2000–2001 to 2012–2013 since child malnutrition data pertains to 2005–2006, whereas all other data are obtained from fairly recent surveys. Such averaging of growth data over a longer period enables relatively better comparability of the same to other variables from the two different periods.

To explore the macro dynamics and broad delineation of unfavorable factors for child malnutrition in India, this paper chooses to classify the states using the criteria of incidence of malnutrition, extent of access to sanitation, extent of mother-child institutional care and extent of nutrition aware behavior. These in turn are gauged from the four state level indices. For classification of states into groups across these dimensions, the paper adopts the cluster approach. A hierarchical clustering technique based on Ward's algorithm is used here since it has been proved to generate good results and is designed to optimize the minimum variance within clusters by making use of the error sum of squares or within group sum of squares (see Leschke 2005). Further, squared Euclidean distances as the dissimilarity measure are used because they preserve both profile level and shape for quantitative variables. The cluster analysis results in a graphical picture, called a

“dendogram,” depicting agglomeration of various cases into a cluster. The nodes of the dendogram represent clusters. The number of clusters to be retained is decided on the basis of these visual clues projected from the dendogram. In addition, a scatter matrix diagram is presented to bring out the broad relative role of respective factors underlying the incidence of child malnutrition in states of India.

Family of States by Severity of Malnutrition

Table 2 lists the families of states that emerged out of the cluster analysis based on the malnutrition index, with a higher index score representing a higher level of malnutrition. The table also provides the average level for each of the three malnutrition indicators. This disaggregated presentation enables an insight into the affiliation of states to a particular family (Figure 2). State wise data on each variable are given in tables in the appendices.

Table 2.

Cluster of States by Child Malnutrition Index

Cluster no.	Members	Average level of stunting (%)	Average level of wasting (%)	Average level of underweight (%)	Average value of Child Malnutrition index	Category
1	Haryana, Rajasthan, Orissa, Tripura, Uttaranchal, Maharashtra, WB, Karnataka	43.6	19.2	38.9	0.45	Poor
2	AP, TN, Assam, HP, Ar. P	40.4	16.54	33.54	0.31	Average
3	Gujarat, Chhattisgarh, UP	53.80	17.67	44.70	0.61	Very Poor
4	Jammu, Nagaland, Goa, Kerala, Manipur, Mizoram, Sikkim, Punjab	34.3	11.9	23.2	0.05	Good
5	Bihar, Jharkhand, Meghalaya, MP	52.63	31.28	55.30	0.92	Alarming

The table shows that cluster 5, which includes Bihar, Jharkhand, Madhya Pradesh (MP) and Meghalaya as member states, is worst in

terms of child nutrition status. This cluster commands a malnutrition index value of 0.92 and has the highest incidence of child malnutrition among the five clusters in terms of stunting, underweight and wasting. Although cluster 3 (Gujarat, Chhattisgarh and Uttar Pradesh (UP)) has a very high incidence of stunting among children, the average incidence of underweight and wasting among children is lower than the respective averages for cluster 5. Thus, despite having a similar level of stunting among children, cluster three has a lower malnutrition index value and therefore appears separately from cluster 5.

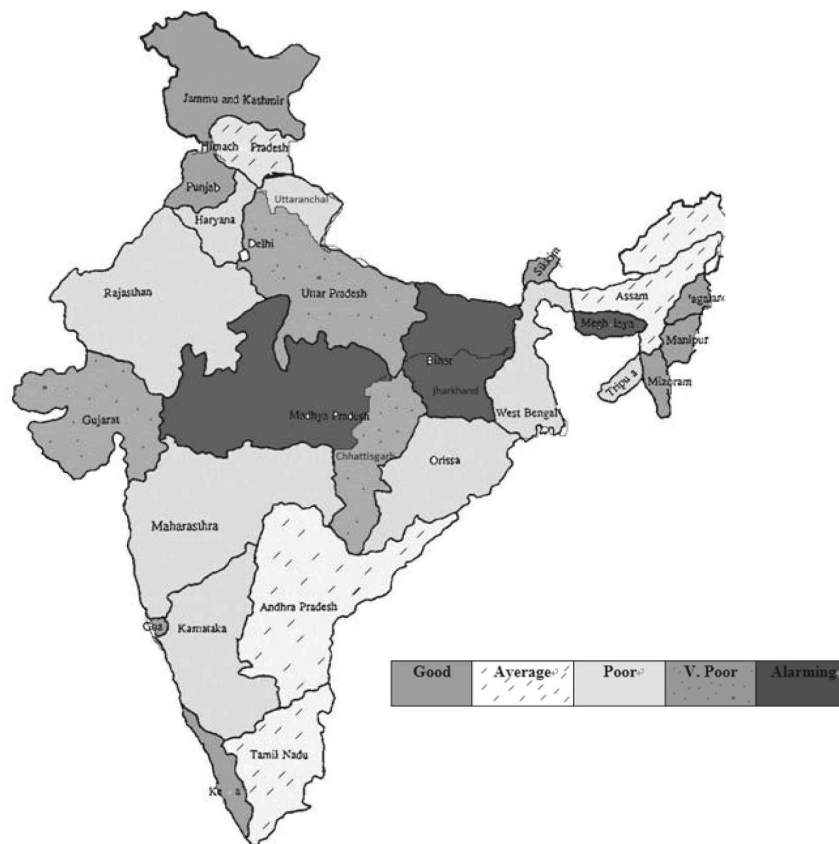


Figure 2. Map displaying the severity of child malnutrition across states in India.

Cluster number 4 including Jammu, Nagaland, Goa, Kerala, Manipur, Mizoram, Sikkim and Punjab as its members has a very low malnutrition index value and the lowest levels of all three malnutrition indicators. Clusters 1 and 2 also represent a very high incidence of child malnutrition across all three specified indicators. The cluster output clearly reveals that Kerala, Punjab, Goa and Jammu, and all states from north eastern region of India except Meghalaya and Tripura, fare significantly better than others in terms of child malnutrition parameters (see Figure 2).

Malnutrition Dynamics and Access to Care: Identifying the Linkages

This section attempts to identify the commonalities in some of the broad determining factors underlying child malnutrition in these state clusters. The process is driven by the conceptual framework presented earlier in this paper, which of course may not be able to capture the whole dynamics of nutrition deprivation. In fact, part of the objective behind such an exercise is also to identify linkages among factors that culminate into deprivation in particular states.

Table 3 displays state clusters by relative access to maternal and child health institutional care. It shows that Goa and Kerala provide the highest access to institutional care, and Nagaland the lowest. Cluster 2's (Andhra Pradesh, Karnataka and Tamil Nadu) performance is fair, while cluster 3 (Arunachal Pradesh, Bihar, Jharkhand, Orissa and Uttar Pradesh) provides very poor access to institutional care.

The sanitation index clusters are shown in Table 4. Haryana and Nagaland (cluster 6), provided the best access to improved sanitation. Cluster 1 comprised of Sikkim, Uttar Pradesh (UP), Punjab, Andhra Pradesh (AP) and Maharashtra rank higher than the remaining other states. Bihar and Jharkhand are at the bottom level. In terms of disaggregated indicators, access to improved toilet facilities can be seen as the most important component of the sanitation index for individual

Table 3.

Cluster of States Based on Access to Institutional Care

Cluster no.	Members	Full Antenatal Care	Institutional delivery	Full immunization	Institutional care index	Category
1	Gujarat, Sikkim, Haryana, Jammu Maharashtra, Himachal Pradesh, Tripura, Orissa, Punjab, Mizoram	34.26	72.87	70.23	0.58	Average
2	AP, TN, Karnataka	43.5	93.03	74.43	0.74	Very good
3	Ar. P, Jharkhand, UP, Bihar, Chhattisgarh	12.8	53.06	46.34	0.24	Very poor
4	Meghalaya, WB, Manipur, Assam, Uttaranchal, MP, Rajasthan	19.7	68.92	57.84	0.41	Poor
5	Goa, Kerala	65.65	99.85	84.7	0.94	Very good
6	Nagaland	3.5	30.4	27.8	0	Very poor

health. While cluster 5 (Bihar and Jharkhand) is the worst on access to improved toilets, cluster 4 (Madhya Pradesh, Chhattisgarh, Tripura, Rajasthan and Orissa) is not much better. Clusters 1 and 2, comprising most of the north-eastern states of India along with UP, Punjab, AP, Maharashtra, Karnataka and Goa, have fairly high access to improved toilets.

Table 4.

Cluster of States Based on Sanitation Index

Cluster No.	Members	Access to improved toilet per 1000 population	Access to improved drainage per 1000 population	Access to improved waste disposal per 1000 population	Average sanitation index	Category
1	Sikkim, UP, Punjab, AP, Maharashtra	820.3	695.5	599.4	0.704	Very good
2	Meghalaya, Mizoram, Gujarat, Manipur, Karnataka, Goa	818.08	456.6	602.91	0.576	Average
3	HP, TN, Ar. P, Assam, Kerala, Uttaranchal, Jammu, WB	680.5	531.57	506.28	0.404	Poor
4	MP, Chhattisgarh, Tripura, Rajasthan, Orissa	589.4	396.6	416.3	0.233	Very poor
5	Bihar, Jharkhand	483	395.75	251.5	0.028	Very poor
6	Haryana, Nagaland	924.75	685.75	834.25	0.956	Very good

The most important source of child health and nutritional well being is appropriate nutrition awareness and behavior, the importance of which is over and above even access to food. The results for this index are shown in table 5. Clusters 3 and 4 perform well and are much better than the other three families of states. Cluster 5 comprising Bihar, Jharkhand, UP and Uttarakhand is at a very low level, with a nutrition awareness index value of only 0.0611. Cluster 1 stands somewhere near the average with a nutrition awareness index value of 0.53.

Table 5.

Cluster of States Based on Child Nutrition Awareness Index

Cluster no.	Members	Vitamin A 1 st dose	Early initiation of breastfeeding	ORT for diarrhea	Nutrition awareness index	Category
1	Maharashtra Gujarat Chhattisgarh Karnataka Mizoram HP, TN Jammu Nagaland Assam	66.84	43.42	64.52	0.53	Average
2	MP, Punjab, AP Tripura, Rajasthan, WB	67.31	23.13	54.88	0.341	Poor
3	Goa, Manipur, Meghalaya	64.6	69.7	84.36	0.995	Very good
4	Haryana, Sikkim, Arunachal P, Orissa, Kerala	64.5	58.4	74.22	0.807	Very good
5	Bihar, Jharkhand, UP, Uttarakhand	55.5	18.15	31.65	0.0611	Very poor

Table 6 depicts a comparative picture on cluster segregation by malnutrition outcomes as well as by underlying determinants. It is apparent that states that cluster together at fair to good levels of nutrition security perform average or better than average on indices of each determinant (institutional care, sanitation, nutrition awareness). Nagaland, Manipur and Jammu are slight outliers in this regard. These three states rank satisfactory on two out of three underlying parameters, while on one they lag considerably behind and in fact cluster with states that suffer from significant or alarming level of child malnutrition. At the same time, not all states in relatively nutritionally insecure clusters fair the worst on all underlying determinants. For example, Haryana and

Karnataka belong to the third cluster for the nutrition security indicator, but rank better on indicators of sanitation and nutrition awareness. Ostensibly, the pathways are too dynamic to be captured completely through a state level aggregated analysis. Nevertheless, the analysis is able to make a fair delineation of states not only by given status but also by likely dynamics underlying that status. While there may certainly be important sub-regional factors that need to be accounted for, the state level cluster analysis has helped in identifying and stressing upon key issues and challenges in achieving the goal of nutrition security at the state level.

One of the key results summarized in Table 6 is that better nutrition security status as an outcome variable is likely to be associated with better determinant levels of nutrition aware practices, institutional care and access to sanitation. This conforms to the conceptual framework. However, the reverse may not be obvious as is revealed by the case of Haryana, Gujarat and Karnataka. These three states scored average to good in terms of determinants yet poor to extremely poor in terms of nutrition outcomes. Factors such as intra-state and intra-group inequalities might be responsible for this divergence. What is important here is the state's ability to translate its economic growth into the population's access to underlying determinants as well as to ensure lesser inequality across regions and groups in terms of consumption expenditure. The next section inquires into movements in levels of malnutrition as related to levels of economic growth and inequality in per capita consumption expenditure across states in India.

Table 6.

Cluster Arrangement in Decreasing Order of Performance under Each Category

Nutrition security	Overall status on outcomes	Institutional care	Sanitation	Nutrition awareness	Overall Status on determinants
Jammu, Nagaland, Goa, Kerala, Manipur, Mizoram, Sikkim, Punjab,	Fair to good	Goa, Kerala	Haryana, Nagaland	Goa, Manipur, Meghalaya	Average to good
AP, TN, Assam, HP, Ar. P,		AP, TN, Karnataka	Sikkim, UP, Punjab, AP, Maharashtra	Haryana, Sikkim, Arunachal P, Orissa, Kerala	
Haryana, Rajasthan, Orissa, Tripura, Uttaranchal, Maharashtra, WB, Karnataka	Poor to extremely poor	Gujarat, Sikkim, Haryana, Jammu, Maharashtra, Himachal Pradesh, Tripura, Orissa, Punjab, Mizoram	Meghalaya, Mizoram, Gujarat, Manipur, Karnataka, Goa	Maharashtra, Gujarat, Chhattisgarh, Karnataka, Mizoram, HP, TN, Jammu, Nagaland, Assam	Poor to very poor
Gujarat, Chhattisgarh, UP h, UP		Meghalaya, WB, Manipur, Assam, Uttaranchal, MP, Rajasthan	HP, TN, Ar. P, Assam, Kerala, Uttaranchal, Jammu, WB	MP, Punjab, AP, Tripura, Rajasthan, WB	
Bihar, Jharkhand, Meghalaya, MP		Ar. P, Jharkhand, UP, Bihar, Chhattisgarh,	MP, Chhattisgarh, Tripura, Rajasthan, Orissa	Bihar, Jharkhand, UP, Uttarakhand	
		Nagaland	Bihar, Jharkhand		

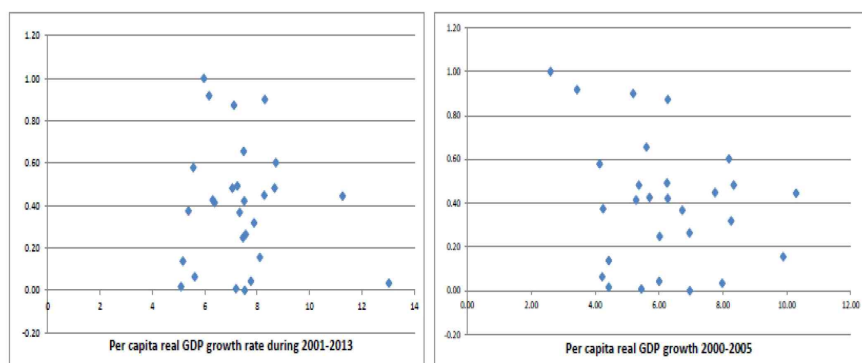


Figure 3. Plots of malnutrition index against annual average real per capita GDP growth rates during 2001–2013 and during 2000–2005 across states of India

Growth Dynamics of Child Malnutrition across States

As discussed earlier, the latest source of child malnutrition data is the NFHS third round survey (2005–2006) whereas data on all other indicators and variables are obtained from fairly recent surveys. Therefore, to ensure comparability of growth data with malnutrition data (2005–2006) as well as with data on other relevant indicators (2012–2013) so as to gauge the economic growth–malnutrition scenario, this paper makes use of average annual real per capita growth rates in Indian states during 2000–2001 to 2012–2013. At the same time, malnutrition data is also posed against annual average real per capita growth rates for the period 2001–2005 i.e. the period of five to six (5–6) years preceding the year of NFHS estimation of malnutrition among children.

Figure 3 depicts two plots of the malnutrition index against annual real per capita growth rates during 2001–2013 as well as during 2000–2005. There is a clear absence of symmetric movements between the per capita growth rate and malnutrition index during either period. Although the plot of the malnutrition index against per capita growth rates for 2000–2005 gives the impression of downward movement in the former with an increase in the latter, a careful examination of the plot reveals that most of the states fit in the growth band of 3–10% per annum, and across states within this band, there is significant variation in the value of the malnutrition index (i.e. incidence of child malnutrition). Moreover, there is no pattern in this variability in the malnutrition index value against per capita growth rates across states within this band. Thus, the perspective adopted in this paper that income well-being does not necessarily reflect non-income well-being in general and child nutrition well-being in particular appears to be relevant, at least in the broader sense. In fact, it has been noted earlier that it is the nature of growth which matters for health or human development only if it provides social and public services (Anand and Ravallion 1993). Economic status has been found to be significantly associated with child nutrition, but with limited effect (Ajieroh 2009). While poverty reduction has been somewhat stronger in

the presence of strong growth, economic gains do not automatically translate into nutrition benefits (see Webb and Lapping 2002).

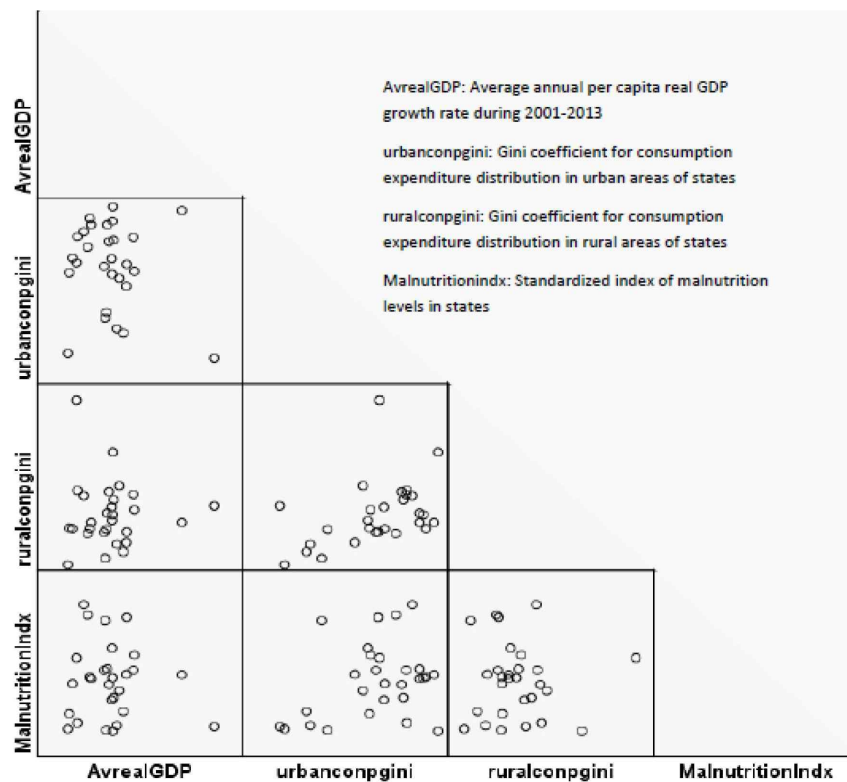


Figure 4. Scatter matrix plot between rural and urban per capita consumption expenditure Gini coefficient (2010–2011), average real per capital GDP growth rate (2001–2013) and child malnutrition index.

Figure 4 plots the child malnutrition index against the Gini coefficient of distribution of per capita consumption expenditure in rural and urban areas of states along with average annual real per capita growth rate. As seen already in Figure 3, the malnutrition index trend across states of India does not seem to move parallel to trends in per capita real GDP growth rates. However, the state wise trend in

malnutrition index values does seem to be negatively associated with that in the Gini coefficient of urban per capita consumption expenditure. Thus, while inequality in rural consumption expenditure does not seem to indicate a variation in malnutrition trends across states, inequality in distribution of urban per capita consumption expenditure does seem to be inversely associated with levels of child malnutrition. This is explicable given that urban areas are much more dependent than rural areas on market based access to consumption of food and non-food determinants of nutrition security. Amid such circumstances, it is state transfers to disadvantaged sections of society that becomes critical to reach an adequate level of nutrition outcome, irrespective of trends in economic growth rates.

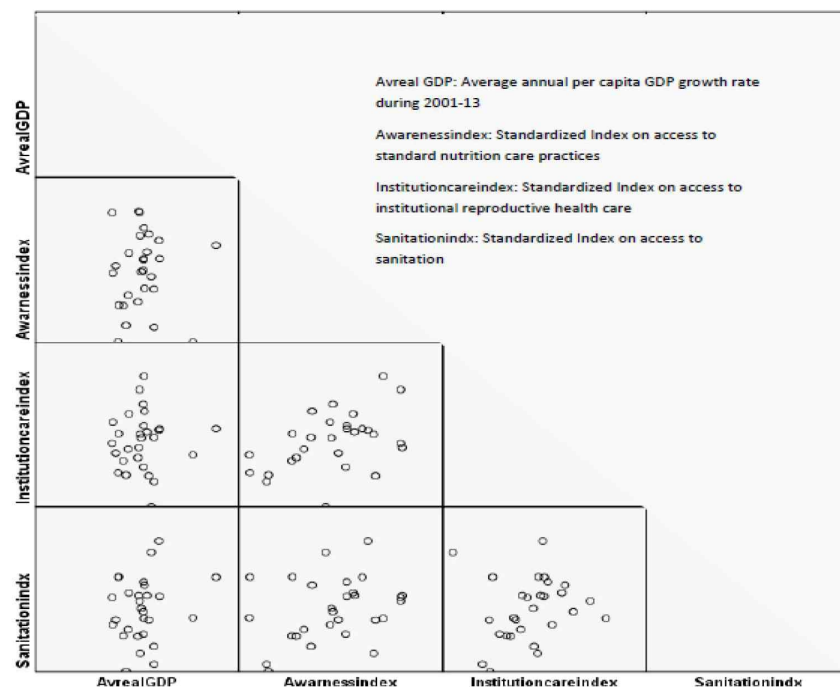


Figure 5. Scatter matrix of institutional care index, sanitation index and awareness index against average annual real per capita GDP growth rate during 2001–2013.

Figure 5 plots indices on access to health institutions, nutrition support/awareness and sanitation across 28 states of India against each state's average annual real per capita GDP growth rates during the preceding decade. The figure clearly depicts the absence of any correspondence in trends of per capita economic growth rates and trends of institutional care, sanitation and nutrition awareness. This further implies that states that have not been growing at relatively higher rates during the last 10 years are not necessarily lagging behind in providing access to basic entitlements. At the same time, states that have been growing at impressive rates during the last 10 years do not necessarily transfer the gains from growth to their population equally or in terms of entitlements to basic necessities. Despite high growth, malnutrition cannot be tackled unless direct public action is taken in this regard. In the case of Kerala, it is strong public intervention for food security which also needs to be noted when mentioning better malnutrition outcomes (see Suryanarayan 2001). Consequently, we observe a lack of correspondence between economic growth and child nutrition outcomes but a certain association between vertical inequality in consumption expenditure and nutrition outcomes.

In any case, the foregoing analyses reinforces the need for intra-regional, intra-group and intra-household level studies to identify factors that mediate the translation of growth into actual nutritional outcomes—either through market based or state based transmission mechanisms.

Conclusions

This paper has inquired into the striking variation in child (mal-)nutrition outcomes across states of India. Indeed, it is not a simple task to understand the variation using specific parameters, given the heterogeneity and diversity across regions and sub-regions of India. Nevertheless, such an inquiry is warranted for policy lessons where one state can learn from another. The paper has made use of the cluster

technique to group states by their respective status in terms of child nutrition as well as by their performances on underlying determinants as envisaged in the conceptual framework. These two cluster outputs were compared to identify overlaps and deviations in state cluster membership. This was followed by the use of scatter plots to identify correspondence (or lack thereof) among selected variables with implications for nutrition status. Despite being an inter-state state level aggregated analysis, this paper has significant research and policy implications as it brought out key linkages connecting growth and nutrition. Further, the analysis has enabled the identification of nutritionally insecure zones in India, which may guide the direction of public policy.

The key threads emerging out from the preceding analysis are as follows:

- i. While a majority of the states in India suffer from very high levels of child malnutrition, there is an undeniably significant variation in the same. The north eastern states of India except Tripura and Meghalaya along with the southern states of Kerala, Tamil Nadu and Andhra Pradesh, the western state of Goa and the northern state of Punjab, perform considerably better than the states that lag behind. In fact, Goa, Kerala, Sikkim, Manipur, Mizoram, Jammu, Punjab and Nagaland fair well in terms of the malnutrition index. Thus, out of the 28 states of India, 18 suffer from alarming rates of child malnutrition.

- ii. Barring a few exceptions, the cluster output of states using determinants of malnutrition revealed that most of the relatively nutrition secure states are also those with better levels of nutrition behavior, awareness, and access to institutional care and sanitation. Since some components of institutional care and nutrition awareness indices give weight to factors related to reproductive care and women's reproductive role, they are usually likely to achieve better values in areas where the social status of women is better. This is one reason why Kerala, Goa and most of the north eastern states perform better on nutrition status despite having relatively low levels of growth or health infrastructure. At the

same time Punjab fairs better on nutrition status due to its role in food grain production and its ability to translate decent growth rates into better institutional care systems, and sanitation access, health and nutrition.

iii. The findings from the analysis underscore some critical points as far as the role of state and affirmative action is concerned. The analysis reinforces the need for committed activism on the part of the state if the Millennium Development Goal on cutting child malnutrition is to be reached. Irrespective of economic growth rates, it is inequality in the distribution of gains from growth across states and the ability of various state governments to transfer fundamental entitlements to the population that seems to decide the position of states on the nutrition indicator.

This is not to argue that economic growth rates are unimportant. Instead the argument is that growth may not be sufficient on its own to reach nutrition related goals. In fact, there may well be a growth cut off below which states may not be able to adopt an active approach due to resource constraints. At the same, after that cut off, states may need to be proactive in equitably transferring the gains from growth. This remains a matter of further inquiry. It is clear, however, that the greater a state's commitment to ensuring its people are entitled to certain preconditions of health and nutrition (e.g. nutrition care, sanitation etc.) irrespective of fluctuations in per capita income, the greater the likelihood of nutrition security.

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Appendix A

State Wise Data on Child Malnutrition, Per Capita Growth Rate and Consumption Inequality

States	Malnutrition indicators			Annual average per capita real GDP growth rate		Gini coefficient of consumption expenditure distribution	
	Stunting	Wasting	Underweight	2001-2012	2000-05	Rural	Urban
Andhra Pradesh	42.7	12.2	32.5	7.56	6.522	0.269	0.353
Arunachal Pradesh	43.3	15.3	32.5	7.88	9.172	0.293	0.299
Assam	46.5	13.7	36.4	5.37	4.392	0.22	0.328
Bihar	55.6	27.1	55.9	8.29	6.03	0.215	0.319
Chhattisgarh	52.9	19.5	47.1	7.48	6.002	0.234	0.305
Goa	25.6	14.1	25	7.19	5.104	0.219	0.251
Gujarat	51.7	18.7	44.6	8.71	7.062	0.252	0.309
Haryana	45.7	19.1	39.6	8.66	8.198	0.278	0.357
Himachal Pradesh	38.6	19.3	36.5	7.33	6.446	0.283	0.351
Jammu	35	14.8	25.6	5.16	4.204	0.221	0.307
Jharkhand	49.8	32.3	56.5	6.16	4.544	0.212	0.343
Karnataka	43.7	17.6	37.6	6.37	4.416	0.231	0.375
Kerala	24.5	15.9	22.9	7.52	6.444	0.35	0.4
Madhya Pradesh	50	35	60	5.96	2.156	0.276	0.365
Maharashtra	46.3	16.5	37	7.50	5.094	0.244	0.38
Manipur	35.6	9	22.1	5.09	4.108	0.159	0.193
Meghalaya	55.1	30.7	48.8	7.11	6.004	0.17	0.243
Mizoram	39.8	9	19.9	7.76	5.844	0.194	0.228
Nagaland	38.8	13.3	25.2	8.10	9.834	0.181	0.222
Orissa	45	19.5	40.7	7.24	6.348	0.247	0.375
Punjab	36.7	9.2	24.9	5.61	3.944	0.285	0.358
Rajasthan	43.7	20.4	39.9	7.05	5.156	0.214	0.316
Sikkim	38.3	9.7	19.7	13.03	7.678	0.259	0.186
Tamil Nadu	30.9	22.2	29.8	7.46	4.7	0.257	0.327
Tripura	35.7	24.6	39.6	8.27	8.076	0.197	0.288
Uttar Pradesh	56.8	14.8	42.4	5.56	3.75	0.438	0.321
Uttarakhand	44.4	18.8	38	11.26	9.618	0.231	0.395
West Bengal	44.6	16.9	38.7	6.30	5.606	0.22	0.384
India	42.76	18.40	36.55	7.52	7.02	0.24	0.31

Source: IIPS (2007); Planning Commission of India (2014)

Appendix B

State wise data on conceptualized underlying determinants

States	Institutional care			Nutrition awareness & practice			Sanitation		
	Full Ante Natal Care	Institutional delivery	Complete immunization	Vitamin A 1 st dose	Early initiation of breast-feeding	ORT in diarrhea	With improved toilet facility	With improved drainage	With improved garbage disposal
Andhra Pradesh	46.2	94.3	68	84.4	27.2	54.9	67.75	66.25	70.25
Arunachal Pradesh	16.3	69.9	24.8	40	55.6	84.6	72.2	39.85	49.95
Assam	21.3	64.4	59.1	69.3	46.1	60	86.25	28.0	45.3
Bihar	4.5	48.3	49	49	16.5	40.4	52.1	42.5	23.15
Chhattisgarh	19.9	44.9	57.3	62.1	44.4	68.3	47.45	39.75	59.5
Goa	53.4	99.8	87.9	87.8	66.3	81.8	90.9	60.65	36.65
Gujarat	45.7	78.1	56.6	66.9	50	63	67.15	56.7	66.5
Haryana	42.9	63.3	71.7	55.9	51	79.8	86.2	88.3	81.1
Himachal Pradesh	39.2	50.3	75.8	87.8	38.8	57.4	84.7	47.4	44.4
Jammu	43.5	80.9	66.6	59	20.4	79.8	61.75	57.85	42.45
Jharkhand	10.9	40.1	59.7	63.3	15.6	39.4	44.5	36.65	27.15
Karnataka	40.2	86.4	78	85.5	38.2	74	58.05	66.45	71.55
Kerala	77.9	99.9	81.5	66.8	66	74.2	97.85	52.85	18.3
Madhya Pradesh	11.1	81	42.9	45.1	31.2	45.9	52.8	50.75	44.9
Maharashtra	27	81.9	78.6	82.6	51.3	58.1	68.5	66.1	72.85
Manipur	28.4	80	51.9	47.9	75.1	82.9	85.4	19.4	74.35
Meghalaya	28.1	63.7	60.8	58.1	67.7	88.4	92.7	44.15	52.0
Mizoram	21.7	83	73.7	74.4	56.5	60.8	96.65	26.65	60.7
Nagaland	3.5	30.4	27.8	28.2	49.4	57.5	98.75	48.85	85.75
Orissa	37.5	75.5	59.5	69.7	63.7	69	48.9	38.65	39.65
Punjab	29.4	60.3	83.6	73.1	16.4	53.3	85.45	84.15	49.15
Rajasthan	14.6	70.4	53.8	59.9	27.7	48.9	52.2	50.9	45.0
Sikkim	27.7	68.9	85.3	90.1	55.7	63.5	99.55	65.5	48.75
Tamil Nadu	44.1	98.4	77.3	52.6	39.1	66.3	59.8	54.3	59.85
Tripura	21.5	82.6	66	68	7.1	76.4	93.35	18.25	19.1
Uttar Pradesh	12.4	62.1	40.9	48.9	15.6	29.2	88.9	65.75	58.7
Uttarakhand	17	53.5	71.5	60.8	24.9	17.6	54.55	69.7	47.85
West Bengal	17.4	69.5	64.9	73.4	29.2	49.9	75.6	36.75	39.65
India	28.04	69.90	63.20	63.93	41.46	61.86	74.55	50.25	50.52

Source: UNICEF (2009)