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Nutritional Deprivation among Indian Pre-school Children: Does Rural-Urban Disparity Matter?

Rudra Narayan Mishra

Gujarat Institute of Development Research

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Phone : **91-2717-242366/242367/242368**
Fax : **91-2717-242365**
E-mail : **postmaster@gidr.ac.in**
Website : **www.gidr.ac.in**

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Abstract

The rural-urban disparities are a reality in developing countries like India. Post reform, there are lot of empirical studies which has focused on this aspect of development experience in India. The vast majority of Indians continues to live in rural areas, despite the phenomenal rise of urban population across states. This work focuses on a particular aspect of such rural-urban difference, namely nutritional status of children. Over the years it is found that under nutrition among children in India; have declining trend, although at different pace in different states. The present work tries to evaluate the achievement of Indian states in three anthropometric indicators in reducing the prevalence of child undernutrition. NFHS data for last three rounds are used for the purpose. The states achievement are judged on the basis of their absolute decline in prevalence of child under nutrition as well as the decline across rural and urban areas using a recently proposed method of groups inequality. Obliviously the states, where decline among all the three categories, urban, rural and aggregate are taking place for past fifteen years are judged successful. But the findings suggest the problem of under-nourishment among young children continues to be grim in India.

JEL Classification : I112, J13, I32

Keywords : Undernutrition; India; Rural-urban disparity; Pre-school children; Anthropometric measures

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Nutritional Deprivation among Indian Pre-school Children: *Does Rural-Urban Disparity Matter?*

Rudra Narayan Mishra

1. Introduction

India is one of the few countries in the world where poor nutritional status among young children[1] is detrimental to their health outcome. According to WHO and recent findings of NFHS-3; one in three children in India suffers from stunting and one in every two children from underweight. [ACC/SCN; 2004] However in recent findings (especially NFHS-3 for 2005-06), it is found that prevalence of undernourishment in different anthropometric indicators has not comedown as expected earlier. [NFHS-3 preliminary reports; 2007] Though for many of the states, the aggregate prevalence of undernourishment has come down for certain indicators; one has to look in to the fact that whether this improvement is taking place across the rural-urban spectrum of the respective states. It is a well-known fact that countries like India have several layers of backwardness. Some times it may be ethnic (like social divisions in terms of caste), economic (poor versus rich), geographic (backwardness is more in certain geographic pockets of the country especially the dry and forest lands) and sectoral (urban versus rural). It is not difficult to find out rural-urban disparity even in a prosperous state or geographic region. The urban areas have always better infrastructure, easy availability of basic necessities of life and economic means than their rural counterparts in any given state, which enables them to have better health, education and economic outcome than their rural counterparts. [Census; 2001, various state reports on Houses, Household Amenities and Assets]. So it is not difficult to say that India can be divided in to urban and rural India respectively and the latter always lag behind the former for any indicator related to human well-being. Given the fact that approximately seventy percent of our population leaves in our villages, the importance of study of rural-urban disparity in a given well-being indicator is well understood. This forms the motivation behind present study. Adding to the fact it is also well known that undernutrition among young children is detrimental to their future physical, psychological and educational achievements. [Alderman et al 1997, Scrimshaw 1998, Glewee *et al* 2001]

[1] Here onwards the term 'young children', 'Pre-school children' and 'children' are used interchangeably. All these terms refers to children of age 0-35 months.

Undernutrition among young children is both an outcome and a correlate of child's poor health. While the nutritional status of child deteriorates due to inadequate food and poor health care, she is more likely to get diseases and infections (in other words the risk of morbidity for a undernourished child is higher than a normal child). The poor health of child prevents him to have required food intake, at the same time reduces the absorption capacity of her body, resulting in loss of nutrients faster than before, thereby setting stage for further decline in her health. It does not allow the child to come out of this vicious cycle of 'undernutrition trap' in coming years as well. [Scrimshaw et al 1997]. Lack of nutritious food, poor hygiene and sanitary practice in the household, poverty, illiteracy among mothers and lack of health care only aggravate the problem further. [Ramalingaswami et al; 1997] Since in rural India these attributes are wide spread, the process of recovery from poor nutritional status in latter life is more difficult for the children of rural households. In other words the rural children have more difficulty in coming out of 'undernutrition trap' when they pass to adolescent and adulthood, in contrast to the urban children.

This study basically wants to highlight the above scenario of rural-urban disparity in prevalence of undernourishment among young children in India for the period 1992-93 to 2005-06. The time period is chosen because; the three available NFHS rounds till date refer to the above time period. They have captured the prevalence of undernourishment among Indian children in internationally accepted nutritional indicators at regular interval of six years. This particular study attempts to judge the states on the basis of their performance in terms of improvement in all the three anthropometric indicators (Height-for-age, Weight-for-age and Weight-for-height), at aggregate as well as sectoral level for the given time period (1992-93 to 2005-06). The reason for selecting only these three anthorpometric indicators to measure child undernutrition will be discussed in following sections.

2. Data and Methodology

As stated earlier the data is taken from past three rounds of NFHS. The first round of NFHS is conducted in year 1992-93. The two successive rounds are conducted in 1998-99 (NFHS-2) and 2005-2006 (NFHS-3). So time interval between each round remains six years and the entire time span for all available NFHS round will cover a period of thirteen years (from 1992-93 to 2005-06).

The figures of undernutrition for three selected anthropometric indicators are taken for aggregate level as well as for rural and urban separately. All 28 states of India are covered in the study. Here rural-urban definition applies to present residential status of 'respondent' (for all these three rounds of NFHS, women of age 15-49 are respondents, otherwise termed as 'reproductive age women'), not the place from where she belongs or her birthplace. Along with the information on health and reproductive status of these women otherwise referred as 'respondents', the survey also collected information on the health related aspects of their children who are of age 0-35 months. One of the information on children also deals with measurement of their current nutritional status. Nutrition indicators for children are collected in terms of stunting (Height-for-age), Underweight (Weight-for-age) and Wasting (Weight-for-height), otherwise known as anthropometric indicators. These anthropometric indicators are ideal in the sense compared to other available indicators (like prevalence of anaemia, calorie intake and protein deficiency) because they help us to capture the health status of the young children in long as well as in the immediate past. Stunting refers to long-term nutritional status of children while the wasting refers to acute short-term undernutrition. However the underweight captures both short term as well as the long-term nutritional status in terms of failure in anthropometric indicator of weight-for-age. It is recommended to measure the nutritional status of children through direct methods (known as anthropometric indicators) because the growth in height and weight of the body are faster for young children than the adults, especially for fast three years of life. [WHO; 1986, 1995] It is also empirically possible to relate these indicators with other correlates of undernutrition. In present study, undernourished children are defined as those who are more than two standard deviations below the 'International reference population' (known as NCHS/WHO standard) for height-for-age, weight-for-age and weight-for-height [See for details, pp. 265-266, NFHS-2, India report; 1998-99]. So the study essentially clubbed together the moderate and severe undernourished children for respective rounds. (i.e. Minus two and three standard deviation from the 'International reference population' for respective indicators of undernutrition). To measure rural-urban disparity in prevalence of undernourishment for the three anthropometric indicators, the study uses simple 'rural-urban difference' and 'rural-urban ratio' methods. However the study also uses a recently developed method of 'group-inequality measurement' by Mishra and Subramanian for following reasons. The available information on children can be clubbed in to two mutually

exclusive groups in terms of their place of residence of the household they belong. [Mishra and Subramanian; 2006]

The proposed methodology is found superior to the commonly used group differential measurement techniques because it clubbed together both 'differential based approach' and 'ratio based approach'. The following three measurement formulas have been used in this paper to measure 'Rural-urban disparity'.

d_1 (r,u) = $I_r - I_u$. (It measures 'Rural-urban disparity' in prevalence of undernourishment among pre-school children in terms of 'Rural-urban difference')

d_2 (r,u) = I_r/I_u. (It measures 'Rural-urban disparity' in prevalence of undernourishment among pre-school children in terms of 'Rural-urban ratio')

d_3 (u, r) = $I_u^{\alpha}/I_r^{\alpha+1}$, $\alpha > 0$. (It measures 'Rural-urban disparity' in prevalence of undernourishment among pre-school children in terms of 'combined approach of both ratio based as well as difference based differentials' where one can add weights to a group based on some logical judgement. Here rural prevalence is added twice the weight than urban prevalence of child undernourishment in any of the selected outcome indicators. ' ' is set to 1 here. In the present study this formula is referred as 'revised method').

The methodology adopted above also facilitate in adding weights to the disadvantageous group, thus ensuring that deterioration/improvements in a given attribute for disadvantageous group is valued more than the advantageous group. [For detail mathematical properties of the method and empirical verification see Mishra and Subramanian; 2006]. In our case we hypothesise rural children will be in a disadvantageous position to their urban counterparts regarding nutritional achievement for their given age. So states, which have achieved higher decline in child undernutrition in rural areas (even if their aggregate prevalence level have not declined much), will be given more weights, to states where decline is higher in urban areas than their rural counterparts (as well as at aggregate level).

3. Issues Addressed

The paper tries to find out the pattern of decline in prevalence of child under nutrition in different states of India at aggregate as well as sectoral level.

It also focuses on rural-urban differential in such decline.

It tries to find out the pattern of inter phase decline of undernourishment among children for the given rounds, at aggregate as well as sectoral level. For that purpose time span between NFHS-2 and NFHS-3 (i.e. 1998-99 to 2005-06) is termed as second phase and period between NFHS-1 and NFHS-2 (i.e. 1992-93 to 1998-99) as first phase.

It also finds out the pattern of decline in prevalence of undernourishment at seven major geographic regions in India.

4. Results

The results are presented in a regional perspective to assess the individual states performance against other states, which are in same geographical regions. The reason behind such attempt lies in the fact that the experience of human development across states in an identical geographical region is more identical than states from other regions. Like for examples states from eastern region have poor human development indicators in general compare to their counterparts from southern region. However one can also compare the states across the regions. The results are presented for three indicators of child under nutrition viz. stunting, underweight and wasting separately.

For each indicator, the scheme of the presentation will be, first the rural-urban divide across the states for each round will be discussed. Then the rural to urban risk in terms of rural-urban ratio for the children will be analysed. Then the focus will be on the share of decline over each round and in last thirteen years altogether will be discussed. (i.e. time span from NFHS-1 to NFHS-3).

4.1 Stunting (Height-for-Age)

The rural-urban difference for states in NFHS-3 shows Rajasthan has the highest difference of 13.5-percentage point in child stunting, followed by Haryana (12.5) among states of Northern India. The difference is lowest for Himachal Pradesh (1.7) followed by Punjab (2.2) in this region. The decline in rural-urban divide is very sharp for Himachal Pradesh, Jammu and Kashmir and Punjab where the decline in rural-urban difference over two rounds (between NFHS-2 and NFHS-3), is 10-percentage point or more. [For details see Annexure-1]. The interesting fact to note here is that the Jammu and Kashmir has sustained decline in rural-urban divide over the three rounds. But for Rajasthan it is worst, in the sense that in 1992-93, young children from rural households have advantage over their urban counterparts in prevalence of stunting among them. But in 1997-98 the rural-urban difference becomes 10.1-percentage point and it widens to 15-percentage point in recent round, where children from rural Rajasthan are in disadvantageous position. However over the years, prevalence of stunting among children from both urban as well as rural areas have come down for Rajasthan, but it is much faster in urban than rural areas. For Punjab it is the story of extreme, in the sense, in 1992-93 the rural-urban divide is 2 percentage point which rose to 13 percentage point in 1997-98, but again decline to 2 percentage (approximately) in the recent round of 2005-06. The decline for urban children is at very lower pace for Himachal Pradesh, Punjab and Jammu and Kashmir, from NFHS-2 to NFHS-3. A common trend among northern states found to be their achievements in reducing child stunting accelerated between NFHS-2 and NFHS-3 (at aggregate level) period compared to the time between earlier two rounds. The trend is common for urban as well as rural parts of these states.

The rural-urban ratio, which implies disadvantage of rural children against urban children, implies that over three rounds the risk is coming down for Himachal Pradesh, Jammu and Kashmir and Punjab. But for Rajasthan and Haryana the risk is increasing for the same period. The revised method which combines both difference and ratio and adds weight to rural prevalence, shows that Rajasthan is the worst performer in the latest round, where as, it is Jammu and Kashmir in second round as well as first round. But in last three rounds the situation for Rajasthan has been gradually worsened as the figure increased (more than doubled) from 0.023 in 1992-93, to 0.028 in 1998-99 and 0.069 in 2005-06, which implies in rural Rajasthan the process of improvement in

prevalence of stunting among children is very slow compared to urban Rajasthan, though for both rural and urban Rajasthan, the absolute figure for prevalence are declining for the same period. [See Annexure-1 for detail].

If one goes in to the rate of decline/increase in stunting prevalence at aggregate level as well as rural-urban separately then it becomes clear that states like Rajasthan has achieved phenomenal reduction (about 20.6 percentage point) for urban areas for all the three rounds taken together, compared to rural areas (only 6.6 percentage). It is worth to mention here that between NFHS-1 and NFHS-2 i.e first phase, the situation actually worsened for Rajasthan, as the prevalence of stunting among children rose from 43.1 to 54.1 percent at aggregate level. Whereas urban prevalence increased by only 0.5 percentage points, it is the rural Rajasthan, which bears the burden (prevalence of stunting is increases by 11.1 percentages as evident from negative sign) during the first phase. Among other states, of Northern India, Haryana and Jammu and Kashmir also experienced deterioration in aggregate prevalence as well as rural prevalence where as for urban areas the improvement is marginal. It is during second phase, that the situation has improved for both urban as well as rural parts. Rajasthan and Haryana have the higher improvement for urban areas compared to rural areas where as in case of Jammu and Kashmir, Punjab and Himachal Pradesh the rural areas have experienced higher decline in stunting prevalence than their urban counterparts [Also see Annexure-2].

In Central India, Information is not available for rural-urban separately for Madhya Pradesh and Uttarakhand during NFHS-1 round (the latter is not created then). It is found that in Uttarakhand the rural-urban difference has grown from 3.7 percentages to 17.9 percentages (approximately 4 times more) between NFHS-2 and NFHS-3 rounds. It is highest for the region. For Uttar Pradesh also it is found that the rural-urban difference has grown over the three rounds of NFHS (from 4.3 percentage point to 12.7 percentage point in the latest round). For Madhya Pradesh, however it is found that the rural-urban difference is almost declined by half during 1997-98 to 2005-06. Rural-urban ratio indicates the risk for rural children for stunting is higher for all states in the region for both NFHS-2 and NFHS-3 rounds. The weighted difference also indicates Uttarakhand, which has the lowest rural-urban disparity in 1997-98 (0.025) now have the highest rural-urban disparity in 2005-06 (0.107) in the region, the fact shown in rural-urban difference earlier. [For details see

Annexure-1]. The rate shows that between NFHS-2 and NFHS-3 i.e. second phase, the decline in prevalence of stunting is highest for urban children from Uttarakhand (25.3 percentage point), where as the urban Madhya Pradesh has the lowest reduction (only 5.2 percentage point). However rural Madhya Pradesh has the highest decline of prevalence of stunting among all states of the region for the same period (second phase), followed by Uttarakhand and Uttar Pradesh. It is interesting to observe that during second phase, percentage decline in prevalence of stunting in rural Uttarakhand is less than half of the urban Uttarakhand [See Annexure-2].

Coming to Eastern India, it is found that rural-urban difference is coming down for all the states across rural as well as urban areas. Since Jharkhand and Chattisgarh states of this region are not created during NFHS-1 survey and information is not available for West Bengal for the same period, the discussion for states mostly comprised of last two rounds (NFHS-2 and NFHS-3). Rural-urban difference is above 10-percentage point in all states except Orissa. Among them, Jharkhand and Chattisgarh show very high rural-urban difference (16.1 and 15.1 respectively) for the current round (NFHS-3). Only Orissa among all the eastern states has lowest rural-urban difference in all the three rounds. On account of aggregate prevalence of stunting West Bengal fares best in all the three rounds, for the whole region, but this achievement is overshadowed by higher rural-urban disparity, suggesting the burden of stunting is higher for rural children. The risk for rural children visa-vie their urban counter parts is highest for Jharkhand and West Bengal in NFHS-3, where as for NFHS-2 these two interchange their position. The revised or weighted measure of rural-urban difference confirms the findings from simple difference and risk ratios. The West Bengal followed by Jharkhand are the states where rural bias in child stunting are highest for the region. It is also important to note that the revised rural-urban disparity measure is higher for all states of this region in NFHS-3 compared to NFHS-2, which implies the rural children are leaving behind their urban counterparts to come out from the risk of stunting [See Annexure-2].

Coming to North-east India, the information on rural-urban prevalence of stunting is only available for NFHS-3 and NFHS-1. In NFHS-2 except Assam, no other North-eastern states have information on child stunting for rural-urban separately. So the comparison is restricted to NFHS-3 and NFHS-1 for all states except Assam, in this part of the country. Though aggregate prevalence

is coming down over the thirteen years except Nagaland where it has increased from 28.7 in 1992-93 to 30.3 in 2005-06. The rural-urban disparity is still higher for Nagaland and Mizoram for latest round (above 10 percentage point), where as it is lowest for Tripura (1.2 percentage point), followed by Sikkim (3.2 percentage point) and Arunachal Pradesh (3.5 percentage point). In fact for Nagaland rural-urban disparity has increased from 1.7 percentages in 1992-93 to 10.9 percentages in 2005-06. Comparing to NFHS-1, Assam (from 13.9 to 6.6 percentages), Manipur (from 25.8 to 8.1 percentages) and Mizoram (24.9 to 13.7 percentages) has reduced the rural-urban disparity in child stunting drastically along with reduction in aggregate prevalence. [For details see Annexure-1]. The risk of stunting in terms of ratio of prevalence of stunting among urban children to rural children, Mizoram is the worst performer followed by Manipur in NFHS-3 and Meghalaya in NFHS-2. According to revised measure Arunachal Pradesh still have the lowest disparity for prevalence of stunting among young children in both NFHS-1 (0.014) and NFHS-3 rounds (0.035). Mizoram and Manipur show the highest disparity in both the rounds [See Annexure-1]. At aggregate level it is found except Nagaland and Manipur (where prevalence of stunting among young children reported in NFHS-3 is higher than that of NFHS-2), all other states in the region have improved, highest being Assam, for all three rounds taken together (17.4 percentage decline). Most of this decline has taken place in between last two rounds [For details see Annexure-1]. Due to lack of information the rural-urban discussion could not be in detail. But for Assam, which has information for all the three rounds at aggregate, urban as well as rural level, the decline for rural children far exceeds to that of urban children (15.4 percentage to 8.2 percentage, comparing last two rounds) in all rounds. The pace is accelerated in second phase [See Annexure-2].

In case of Western India, Goa is the best state in western region. In fact only second to Kerala at national level, in prevalence of stunting at aggregate, urban and rural level. Though Goa has experienced a rise in prevalence of child stunting by 3.2 percentage point in latest round (21.1) compared to the second round (18.1), it is well below the prevalence level in first round (29.8). But what is disturbing fact is that the rural-urban difference has been worsened (the difference is increased from 0.4 percentage point in 1998-99 to 6.6 percentage in 2005-06, marginally higher than 6.1 in 1992-93). Interestingly for Gujarat the prevalence of stunting is near stagnant in last thirteen years (42.4 in 2005-06, 43.6 in 1998-99 and 43.6 in 1992-93). The rural-urban difference also remains

stagnant for past ten years (around 8 percentage point). In case of Maharashtra the pace of decline in aggregate prevalence of stunting has been slowed down drastically between second and first phase (only 2 percentage point during second phase compared to 6.1 percentage point in first phase). But correspondingly rural-urban difference has also come down by half from 10.9 percentage point in 1998-99 to 5.5 in 2005-06. If one focus on rural-urban ratio in child stunting, Goa is the worst performer in western region in recent round (NFHS-3), but the same state was best in second round i.e. NFHS-2. But the picture is clear when one uses the revised method to measure rural-urban disparity. Goa is the poor performer in all three rounds followed by Maharashtra (0.074 in NFHS-3, 0.057 in NFHS-2 and 0.043 in NFHS-1). So even at lowest aggregate prevalence, Goa is not able to reduce the rural-urban difference in child stunting for past thirteen years. From Annexure-2 it is clear that for rural Goa the situation has deteriorated considerably between two rounds. However for urban Goa decline is marginal. For Maharashtra the pace of decline has come down for urban as well as rural areas in the second phase compared to decline in first phase [For details see Annexure-2].

For southern states, the results shows that Karnataka' situation has been worsened in second phase as the prevalence of stunting has been increased to 38.0 percent from 36.6 percent. Correspondingly rural-urban difference has also been increased from 8.4 to 14.9 for the same period. Interestingly in first round the prevalence of stunting is 10 percentages point higher in urban areas (50.6) compared to rural areas of the state (40.3). For Andhra Pradesh the rural-urban difference has come down only by 2-percentage point in between second and third round (11.9 to 9.9 percentage points). Perhaps the most egalitarian states as far as child stunting is concerned comes out to be Kerala, where aggregate prevalence is lowest in the country as a whole and also the rural-urban difference is marginal (-0.2), suggesting a lower prevalence for rural Kerala compared to urban Kerala, as per NFHS-3; 2005-06. Tamilnadu is the next best state after Kerala in the region, where aggregate prevalence is around 25 percent and the rural-urban difference favours rural Tamilnadu, for the same survey [See annexure-1]. However the revised method, which takes in to account both rural-urban difference as well as the rural-urban ratio, shows that Tamilnadu has the lowest disparity in prevalence of stunting (0.036 in 2005-06 and 0.042 in 1998-99) among children in the region followed by Kerala (0.047 in 2005-06) and Karnataka (0.041 in 1998-99). For Karnataka the risk for rural children has increase in the second phase, as shown by rural-urban ratio

and revised rural-urban measure (weight given to reduction in rural areas). For all the four states in the region the pace of decline has been slowed down between in last two phase compared to the decline in first phase. In case of rural Karnataka and urban Kerala the decline is negative implying an increase in level of stunting from 1998-99 to 2005-06.For country as a whole the revised method confirms increase in rural-urban disparity (increase from 0.038 to o.o42), though the pace of decline in the second phase is marginally higher for rural India (7.8 percentage) than urban India (4.5 percentage).

At all India level the prevalence of stunting shows gradual decline from NFHS-1 to NFHS-3 (from 52.0 percent in 1992-93 to 38.4 percent in 2005-06). The absolute rural-urban difference also comes down to 9.6 percentage point in the latest round against 12.9 in the second round (1998-99). The pace of decline has marginally comedown in the last phase, for aggregate as well as urban and rural level [see Annexure-2, last row for All India].

4.2 Underweight (Weight-for-Age)

This indicator measures nutritional status of children in terms of weight-for-age (it is sensitive to change in nutritional status in recent past as well). The results are disturbing for some states of Northern India. Though for all states in this region, except Haryana, the aggregate prevalence has come down for last three rounds, the rate of decline is lower in second phase compared to first phase. In the recent round (i.e. NFHS-3), Punjab has the lowest prevalence of underweight (27 percent) among all other counterparts from the region. It has also distinction of highest absolute decline of 19-percentage point between first and third round (between 1992-93 and 2005-06) for the region followed by Jammu and Kashmir (15.1 percentage point). Rajasthan's situation also deteriorated like that of Haryana in second phase, though there is improvement in first phase. Rural-urban disparity measured in terms of difference is highest for Himachal Pradesh (18.1 percentages) followed by Jammu and Kashmir (15.8 percentages) in the latest round (NFHS-3). Jammu and Kashmir also show higher risk for rural children measured in terms of rural-urban ratio for all the three rounds. The revised method shows the rural-urban disparity is higher for the Jammu and Kashmir for the NFHS-3 (0.074) and Punjab (0.092) for NFHS-2. But for The revised method, the disparity is increasing between NFHS-1 and NFHS-3 as the figures are getting higher for states like Himachal Pradesh, Punjab, Jammu and Kashmir and Rajasthan. [For details see

Annexure-3]. Annexure-4 shows that in urban Haryana the prevalence of underweight has increased by 10.8 percent in second phase followed by urban Himachal Pradesh (5.2 percent). For rural Haryana also the prevalence of underweight has been increased by 6.2 percent for the same period. For both rural and urban areas of the states of northern India the figure for decline in underweight was higher in first phase than that of second phase. [For details see Annexure-4].

Coming to Central India, The situation has been worsened for Madhya Pradesh at aggregate level. Three out of five children below age of three are found to be underweight here. The situation in Madhya Pradesh has worsened as prevalence of underweight among pre-school children has increased from 57.4 in 1992-93 to 60.3 in 2005-06, though in 1998-99 it has marginally improved to 53.5. Uttarakhand has maintained it pace of reduction through out and the lowest prevalence of underweight at state level in the region. In case of Uttar Pradesh also the prevalence of underweight at aggregate level has comedown from 51.8 in 1998-99 to 47.3 in 2005-06. Rural-urban difference is highest for Uttar Pradesh where prevalence of underweight is 11.5 percent more for the rural children than their urban counter parts for the year 2005-06. Uttarakhand closely follows Uttar Pradesh, where the difference is 11.4 percent for the same round (2005-06). Rural-urban absolute difference in prevalence of underweight has increased near three times for Uttarakhand where as it remains stagnant for Uttar Pradesh and comedown for Madhya Pradesh between 1998-99 and 2005-06 (i.e in second phase). The revised method however shows the highest rural-urban disparity for Uttarakhand for the recent round of 2005-06 (0.047), which has increased from 0.029 in 1998-99 [For details see Annexure: 3]. For Madhya Pradesh we found the prevalence of underweight has increased in second phase compared to that of first phase, both for urban as well as rural children, but the increase is more for the urban children (8.5 percentage increase for urban children. against 4.2 percentage point increase for rural children). For Uttar Pradesh however the pace of decline is identical for both urban as well as rural children across the rounds (approximately 5 percentage point) [for details see Annexure-4].

For Eastern India the information on underweight are not available for children of Jharkhand and Chattisgarh in NFHS-1. (These two states are created after 1992-93). However for West Bengal, Bihar and Chattisgarh the information shows that concentration of underweight among young children is very high.

For Bihar, Chattisgarh and Jharkhand, nearly one in two children are found to be underweight at aggregate level in the latest round (NFHS-3). For Bihar and Jharkhand the prevalence of underweight has increase from 54.3 percent each in 1998-99 to 58.4 percent and 59.2 percent respectively in 2005-06. Orissa, Chattisgarh and West Bengal show marginal improvement for the same period at aggregate level. Rural-urban disparities in terms of difference are more than 10 percentage point for all states except Bihar. Jharkhand in 2005-06 and West Bengal in 1998-99 show nearly 20-percentage difference for prevalence of underweight among urban and rural children. The revised method shows that rural-urban disparity in prevalence of underweight among young children is highest for West Bengal for all the three rounds, 0.030 in 1992-93, 0.053 in 1998-99 and 0.052 in 2005-06 [for details see Annexure-3]. The pace of absolute decline in prevalence of underweight is found to be for Orissa at aggregate level (10.4 percentage point) during 1998-99 to 2005-06 i.e. in second phase. It is true for urban Chattisgarh for the same time period, where prevalence of underweight has come down by 21-percentage point followed by urban Orissa (12 percentage point). For the same period, decline in prevalence of underweight among rural children is highest for Orissa, by 9.8-percentage point [for details see Annexure-4].

For North-eastern states, Meghalaya (46.3) has the highest prevalence of underweight for the recent round followed by Assam. Since information is not available for rural-urban separately, for all states except Assam in this region, the comparison of prevalence of underweight for rural and urban children is mainly based on aggregate prevalence level, for the period between NFHS-3 and NFHS-1. Rural parts of these states experience higher prevalence of underweight for both NFHS-3 and NFHS-1 rounds. The rural-urban disparity in prevalence of underweight is highest for Arunachal Pradesh (18.3 percentage point) followed by Mizoram (15 percentage point), Meghalaya (12.1 percentage point) and Nagaland (10.5 percentage point) for the region as a whole as per the recent round [for details see Annexure 3]. The revised methodology for rural-urban disparity also confirms the findings from simple difference, except change in ranks of the states. (Mizoram (0.151) becomes the worst performer followed by Arunachal (0.074) and Nagaland (0.070).

Annexure-4 shows that in second phase (between NFHS-3 and NFHS-2) the situation has worsened for Arunachal Pradesh at aggregate level (increase in prevalence of underweight by 12.6 percentage point). In other states like

Assam (4.4 percentage point), Meghalaya (8.4 percentage point), Nagaland (5.6 percentage point) and Sikkim (2 percentage point), the prevalence of underweight has increased in the second phase (indicated by '-' sign). At urban as well as rural level Manipur has the highest reduction in prevalence of underweight by 17.2 and 22 percentage points respectively, between first and third NFHS rounds. Where as for Tripura both the urban and rural children prevalence of underweight has gone up by 28.3 percentage point and 19.5 percentage point respectively over last three rounds. For other states in the region urban Meghalaya (-10 percentage point), urban Nagaland (-1.2 percentage point), rural Arunachal (-1.8 percentage point) and rural Nagaland (-1.3 percentage point) also show increasing prevalence of underweight [for details see Annexure 4].

Western Indian states except Maharashtra experience marginal increase in prevalence of underweight for their young children between 1998-99 and 2005-06, but the aggregate level of prevalence for the current round is that of 1992-93. The absolute rural-urban disparity is higher for Goa in NFHS-3 (17 percentage point), for Gujarat in NFHS-2 (11.2 percentage point) and for Maharashtra in NFHS-1 (17 percentage point). However the revised method shows that rural-urban disparity is always highest for Goa in this region, 0.083 in 2005-06, 0.043 in 1998-99 and 0.033 in 1992-93 [for details see Annexure 3]. Annexure-4 shows that in all the three rounds Maharashtra has the highest decline in prevalence of underweight (12.9 percentage point) at state level as well as at rural level (14 percentage point). For urban children it is Goa (11.6 percentage point for the entire three rounds) closely followed by Maharashtra (10.7 percentage point for the same period), which has experienced improvement in terms of declining prevalence of underweight. However For both urban and rural Gujarat as well as rural Goa, prevalence level for underweight has increased moderately [for details see Annexure-4].

In south India Kerala continues to be best performer in the region as far as underweight among young children is concerned) in all the three rounds (28.8 percent in 2005-06, 26.9 in 1998-99 and 28.5 in 1992-93). However there is marginal increase in level of underweight for Kerala children in 2005-06 findings (NFHS-3) over 1998-99 findings (NFHS-2). For all other states the decline is also marginal. The absolute differences in prevalence of underweight between urban and rural children are highest for Karnataka and Andhra Pradesh (11.3 percentage point) in the recent round. In earlier two rounds it was Karnataka for

1998-99 (12.1 percentage point) and Tamilnadu for 1992-93 (14.0 percentage points). Where as for other states the absolute difference in rural-urban prevalence is increasing, especially in the second phase, for Tamilnadu it has come down continuously for the same period and lowest in the region for 2005-06 findings (3.8 percentage points only). However it is interesting to see that for Kerala rural-urban disparity is highest in the region if one considers the revised method (0.063 in 2005-06, 0.056 in 1998-99 and 0.058 in 1992-93). This also indicates the disparity has increased over the period [for details see Annexure-3]. However the absolute decline at aggregate level, urban as well as rural levels, Karnataka registers continuous decline in prevalence of underweight (13.2, 13.2 and 12.2 respectively) between 1992-93 and 2005-06. For Kerala, situation has been worsened though marginally, in all the three levels for the same time period [for details see Annexure-4].

At all India level the prevalence of underweight has come down marginally between NFHS-2 and NFHS-3 (from 47.0 percent to 45.9 percent). The absolute rural-urban difference also moves upward from 11.2 percentage point in 1998-99 to 12.6 in 2005-06. The pace of decline has really comedown between NFHS-2 and NFHS-3 for aggregate as well as urban and rural level (1.1 percent, 2.0 percent and 0.6 percent respectively) [see Annexure-4, last row on all India].

4.3 Wasting (Weight-for-Height)

This indicator measures thinness of body given the weight and height of the body. It reflects poor nutritional status for long period of time. In NFHS-2, Weight-for-height reflects the recent nutritional status of children irrespective of their age.

For Northern India it is found that wasting is increasing over the period of time at aggregate level, especially in last phase, for all the states in the region. This offsets the gain between NFHS-1 and NFHS-2 period in terms of decline in absolute prevalence of wasting at aggregate state level. For Himachal Pradesh the prevalence of wasting has increased by approximately 20-percentage point from 16.9 in 1998-99 to 36 in 2005-06. Rural-urban differences as well as risk for rural children against their urban counter parts (having wasting) are coming down for all states in the region despite the increase in prevalence at state level as well as the urban and rural parts separately. So the low rural-urban disparity

here is meaning less and suggests that situation actually worsens for states both at urban as well as rural level. So improvement in revised method for rural-urban disparity becomes meaning less as well [for details see Annexure-5]. The fact is supported from the findings of Annexure-6 as well, where we see for all states the decline in prevalence of wasting is negative in between 1998-99 and 2005-06 at aggregate as well as at urban and rural level separately. The net decline in all the three rounds found to be positive only for Punjab (by 10.9 percentage point) despite the worsening situation in second phase (between NFHS-2 and NFHS-3).

For Central India story is not different either. It also experiences an increase in prevalence of wasting between last two rounds. Since for most of the states wasting is not reported in the first round of NFHS, the discussion will be limited to findings of last two rounds (second phase). The situation has worsened for Madhya Pradesh where the aggregate prevalence has rose from 20.2 percent in NFHS-2 to 33.3 percent in NFHS-3 at aggregate level, 17.3 percent to 34.3 percent for urban children (almost double), and 20.6 percent to 30.9 percent for rural children in same time period. Uttar Pradesh and Uttarakhand are pretty close to each other at aggregate prevalence of wasting as well as urban and rural separately. Like Northern India, the low absolute rural-urban disparity as well as the ratio of it is meaningless, since the situation has deteriorated at all levels. However the rural-urban disparity is highest for Uttarakhand among the states of Northern India in all the three measures for last round of NFHS i.e NFHS-3 [for details see Annexure-6].

In case of Eastern India the prevalence of wasting has come down for Chattisgarh and Orissa in the second phase at aggregate level as well as for the urban and rural separately, where as for Bihar, Jharkhand and West Bengal prevalence of wasting among young children have shown an increase at all the three levels [for details see Annexure-5]. Jharkhand has the highest absolute difference in prevalence of wasting between urban and rural children, biased against the latter in the second phase (9.2 percentage point and 9.7 percentage point respectively). But the weighted rural-urban disparity (revised method) shows Orissa has the highest rural-urban disparity 0.122 in NFHS-3 followed by West Bengal (0.100). For NFHS-2 Bengal has the highest rural-urban disparity according to the revised method (0.115) followed by Jharkhand (0.087). However the revised method confirms that situation has worsened not only at aggregate level, for prevalence of wasting among children of these states, but

the rural-urban disparity has also gone up for all of these states, as shown by higher figures for NFHS-3 compare to NFHS-1. [For details see Annexure-5]. Findings of Annexure-6 support the findings from Tbale-5 and shows in the second phase the rate of decline in prevalence of wasting has come down considerably and even negative.

For North-eastern states complete information on aggregate prevalence of wasting for young children as well as disaggregated prevalence for rural-urban separately, are only available for NFHS-3 and NFHS-1. Only Assam has information for all the three rounds. Meghalaya has the highest prevalence of wasting at aggregate level as well rural-urban separately, among all the North-eastern counterparts. As per NFHS-3, rural-urban disparity is found to be higher for Arunachal Pradesh (0.517 for the revised method) against Sikkim, which has the lowest disparity among all states (0.029 for the revised method) in all the three measures; absolute difference, rural-urban ratio and weighted rural-urban ratio or the revised method. Here also one find prevalence of wasting has been increased between two rounds, NFHS-3 and NFHS-1 at aggregate level, but rural-urban disparity has come down for the same period as shown by the revised method [for details see Annexure-5].

The situation for last thirteen years has not been improved but deteriorated for many North-eastern states for prevalence of wasting among young children [for details see Annexure-6].

For Western states, the prevalence of wasting among young children has come down in second phase, for Goa and Maharashtra. In rural Goa the prevalence has been increased from 12.4 percent in 1998-99 (NFHS-2) to 16.3 percent in 2005-06 (NFHS-3). Rural-urban disparity has also been highest for Goa in all the three measures compared to other states of the region. For Maharashtra the second phase shows a decline in wasting at aggregate as well as the urban and rural level. Where as for Gujarat the aggregate prevalence of wasting for the same period has been increased marginally (from 16.2 percent in 1998-99 to 17 percent in 2005-06). The urban Gujarat has experienced an increase of 4.4-percentage point in prevalence of wasting where as for rural Gujarat the decline is marginal (by 1.5 percentage point for the same period) [for details see Annexure-5]. Annexure-6 shows that the pace of decline in wasting is less in the second phase for Goa and Gujarat at aggregate level, but for Maharashtra, it is the highest in the region (6 percentage point). Similarly urban

Gujarat and rural Goa have experienced increase in prevalence of wasting during last two rounds. Maharashtra consistently reducing the risk of wasting for it's children, more so in rural areas (by 9.2 percentage point) than urban areas for the same period (only 1.8 percentage point) [for details see Annexure-6].

Interestingly South India which has improved in other indicators of well-being seems no different from rest of the states and regions, when it comes to wasting among young children. It is found that prevalence of wasting for aggregate level among all the southern states except Karnataka (where it has come down from 20 percent to 17.9 percent) have gone up between last two rounds of NFHS (the second phase). The rise is highest for Kerala from 11.1 percent to 16.1 percent for the same period among all southern counterparts. Rural-urban disparity is also higher for Kerala in the recent round for all the three measures in the last round. Unlike stunting here rural children have the disadvantage and this rural disadvantage is highest among all southern states [for details see Annexure-5]. The rural disadvantage is also higher for other southern states but not to the magnitude of Kerala. The prevalence of wasting has increased in the second phase for urban and rural Andhra Pradesh, rural Kerala and rural Tamilnadu [for details see Annexure-5].

From Annexure-6 it is evident that most of the states in this region have experienced increase in prevalence of wasting and this scenario is worsen more for rural children between 1998-99 and 2005-06. All India picture also indicates increase in prevalence of wasting in the country both at aggregate level as well as rural-urban separately and this situation is accelerated in the second phase [see Annexure-6, last row on all India].

5. Discussion

The results indicate to the fact that undernutrition scenario for Indian children continue to be grim. The summary table shows the clear picture of undernourishment among Indian children. There are no states in India where the improvement has taken place in all the three indicators of undernourishment over all the three rounds continuously. Except Manipur, Goa, Maharashtra, Karnataka and Tamilnadu, urban children in all other states have shown increase in the prevalence of undernourishment in at least one of the indicator during 1992-93 to 2005-06. In case of rural children the finding is very disturbing. Except rural Maharashtra no other states in India has ensured

continuous decline of undernourishment in all the three indicators. Coming to rural-urban disparity in prevalence of undernourishment among children, it is found that every state in India has shown increase in 'rural-urban disparity' in at least one indicator. It is safe to conclude that rural-urban disparity is on rise or stagnant (definitely not declining) for Indian children. The implication will be that in coming years concentration of undernourishment will be for rural India. As the last row of the Table shows, except Orissa and Maharashtra, no other states have shown improvement simultaneously in all the three indicators of child undernourishment between 1998-99 and 2005-06 (in the second phase). The row also brings out that in most of the states it is weight-based indicators i.e. weight-for-age (underweight) and wasting (weight-for-height) have deteriorated between last two rounds, mainly between 1998-99 and 2005-06 [for details see Table-1]. Weight loss for given age (underweight) and growth failure for given weight (wasting) among young children may occur due to diseases like diarrhea and infections which reduce the absorption capacity from the body of young children and also caused severe depletion of nutrients, which cumulates the process of loosing weight. [Kossman et al; 2000, Calder et al; 2000] So availability of nutrient rich food and disease free environment (through better hygiene, sanitation, safe drinking water, maternal education and awareness) are crucial to reduce the increasing risk of underweight and wasting among Indian children. It needs further exploration to determine what are the factors that are slowing down the reduction of undernutrition of various forms for Indian pre-school children.

In nutshell, the current study brings out that prevalence of undernutrition among young children has not declined in all it's dimension as earlier thought. Improvement in one indicator and deterioration in other cannot be termed as a successful outcome of the ongoing intervention programmes which targets improving nutritional status of young children. The must disturbing outcome is that states like Kerala, Goa, Himachal Pradesh and Tamilnadu which are thought to be example in dealing with this particular issue of child undernutrition for rest of the Indian states, have increased (though marginal) prevalence of undernutrition among young children. The rural-urban disparity in prevalence of undernutrition among children is of identical magnitude across the states irrespective of their aggregate prevalence. So even so called 'better off' states as far as child undernutrition is concerned (like Tamilnadu, Goa and Himachal Pradesh) have to take initiatives and find ways to reduce the curse of undernutrition among their rural children. For all most all of the states in Eastern

India, Central India and some of Northern States (like Rajasthan) have a long way to go. The undernutrition among children is a by-product of large-scale poverty, backwardness and underdevelopment of these states.

Table 1: Experience of Indian states in reducing prevalence of undernutrition among Pre-school children

Trends in prevalence of undernutrition	Name of States
Decline in prevalence of undernourishment (for all the three indicators stunting, underweight and wasting) for all the three levels (aggregate, urban and rural) over all the three rounds (NFHS-1, NFHS-2 and NFHS-3).	NONE
Decline in the prevalence of underweight in all the three indicators at the aggregate level over all the three rounds (NFHS-1, NFHS-2 and NFHS-3).	NONE
Decline in the urban prevalence in all the three indicators over three rounds continuously (NFHS-1, NFHS-2 and NFHS-3).	Manipur, Goa, Maharashtra, Karnataka and Tamilnadu
Decline in the rural prevalence in all the three indicators over three rounds continuously (NFHS-1, NFHS-2 and NFHS-3).	Maharashtra
Decline in the rural-urban disparity for all the three indicators of undernutrition continuously for all the three rounds (NFHS-1, NFHS-2 and NFHS-3).	NONE
*Situation has worsened between last two rounds (in the second phase) in at least one/two/all of the three indicators (stunting, underweight and wasting represented by S, U and W respectively) for rural children.	J&K (S, W), Haryana (U, W), Rajasthan (U, W), Punjab (W), Himachal Pradesh (W), Madhya Pradesh (U, W), Uttarakhand (W), Uttar Pradesh (W), Bihar (U, W), Chattisgarh (W), Jharkhand (U, W), West Bengal (W), Assam (U, W), Meghalaya (S, U, W), Mizoram (S, U, W), Nagaland (U, W), Tripura (U), Goa (S, U, W), Gujarat (S, W), Andhra Pradesh (W), Karnataka (S), Kerala (U, W), Tamilnadu (W).
Note: Please refer to Annexure-1 to Annexure-6 for reference to the figures. * If data is not available for (NFHS-2) then conclusion refers to the findings from available two rounds (NFHS-3 and NFHS-1).	

So a full-scale poverty alleviation programme along with focus on nutritional requirement among young children, at war footing is the need of the day. For rich states like Gujarat and Maharashtra the sensitivity towards children's health

seems to be missing, because these two states which propels economic prosperity of India, failed to channelise the available resources to improve their children' health. All the states have to focus more on rural children for whom the nutritional disadvantage is detrimental not only to come out of 'undernutrition trap' but also to come out of the 'poverty trap', as well. Though this paper could not go in to detail for the correlates, which works behind this disparity in prevalence of undernourishment among Indian children, the existing literature has identified plenty of them. One needs to focus on the existing evidence. However the scope for deeper analysis always exists.

6. Conclusions and Policy Implication

The paper brings out that the prevalence of undernutrition among millions of young pre-school children in India is still an issue to be sorted out. This has serious repercussion for the future intervention programmes aimed at reducing undernourishment among children. The only available intervention programme so far, for taking care of nutritional deprivation among pre-School children in India is 'Integrated Child Development Service' or ICDS. It is designed to take care of dietary needs of children in terms of providing nutritious food supplements as well as providing them vaccines against selected fatal child hood diseases. The present ICDS network only covers one third of all eligible young children in India. So one of the implications of the present study could be to take steps, which will strengthen the coverage of ICDS, especially in rural areas of the country.

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Annexure 1: Prevalence of Stunting (Height-for-age) among Indian Pre-School Children Over 1992-93 to 2005-06 at Aggregate, Urban and Rural Level

	NFHS-3	Urban	Rural	Rural-Urban difference	Rural-Urban Ratio	Revised Method	NFHS-2	Urban	Rural	Rural-Urban difference	Rural -Urban Ratio	Revised method	NFHS-1	Urban	Rural	Rural -Urban difference	Rural-Urban Ratio	Revised method
Northern India																		
DEL	35.4	-	-	-	-	-	36.8	35.4	50.6	15.2	1.429	0.040	39.7	-	-	-	-	-
HAR	35.9	26.9	38.9	12	1.446	0.054	50	40.3	53	12.7	1.315	0.033	46.7	42.4	48	5.6	1.132	0.027
HP	26.6	25	26.7	1.7	1.068	0.043	41.3	30.5	42.2	11.7	1.384	0.045	-	-	-	-	-	-
J&K	27.6	25.2	28.3	3.1	1.123	0.045	38.8	27.6	41	13.4	1.486	0.054	35.5	28	43.1	15.1	1.539	0.055
PUN	27.9	26.5	28.7	2.2	1.083	0.041	39.2	29.4	42.4	13	1.442	0.049	40	38.4	40.4	2	1.052	0.027
RAJ	33.7	22.9	36.4	13.5	1.590	0.069	52	44	54.1	10.1	1.230	0.028	43.1	43.5	43	-0.5	0.989	0.023
Central India																		
MP	39.9	34.6	41.6	7	1.202	0.035	49	39.8	54.3	14.5	1.364	0.034	-	-	-	-	-	-
UKK	31.9	18.4	36.3	17.9	1.973	0.107	46.6	43.7	47.4	3.7	1.085	0.025	-	-	-	-	-	-
UP	46	34.9	47.4	12.5	1.358	0.039	55.7	46.7	57.3	10.6	1.227	0.026	49.2	45.7	50	4.3	1.094	0.024
Eastern India																		
BI	42.3	31.9	43.7	11.8	1.370	0.043	54.9	42.2	55	12.8	1.303	0.031	60.9	55.2	61.8	6.6	1.120	0.020
CH	45.4	32.8	47.9	15.1	1.460	0.045	57.9	46.7	60.2	13.5	1.289	0.028	-	-	-	-	-	-
JH	41	28.1	44.2	16.1	1.573	0.056	49	32.2	53.3	21.1	1.655	0.051	-	-	-	-	-	-
OR	38.3	32.9	39.1	6.2	1.188	0.036	44	37	44.8	7.8	1.211	0.033	48.2	34.8	50.6	15.8	1.454	0.042
WB	33	22.7	35.4	12.7	1.559	0.069	41.5	25.5	45.1	19.6	1.769	0.069	-	-	-	-	-	-

North-eastern India																		
AR	34.2	31.7	35.2	3.5	1.110	0.035	26.5	-	-	-	-	-	49.2	61.7	52.7	-9	0.854	0.014
AS	34.8	28.9	35.5	6.6	1.228	0.043	50.2	37.1	50.9	13.8	1.372	0.037	52.2	39.6	53.5	13.9	1.351	0.034
MAN	24.7	18.9	26.8	7.9	1.418	0.075	31.3	-	-	-	-	-	24.4	29.7	55.5	25.8	1.869	0.063
MEG	41.7	34.1	42.2	8.1	1.238	0.036	44.9	-	-	-	-	-	47.1	29.6	34.9	5.3	1.179	0.040
MIZ	30.1	23	36.7	13.7	1.596	0.069	34.6	-	-	-	-	-	36.4	29.1	54	24.9	1.856	0.064
NAG	30.3	21.5	32.4	10.9	1.507	0.070	33	-	-	-	-	-	28.7	31	32.7	1.7	1.055	0.034
SK	28.9	26	29.3	3.3	1.127	0.043	31.7	-	-	-	-	-	-	-	-	-	-	-
TRI	30	29	30.2	1.2	1.041	0.036	40.4	-	-	-	-	-	41.4	33.3	49.1	15.8	1.474	0.044
Western India																		
GOA	21.3	18.3	24.9	6.6	1.361	0.074	18.1	17.9	18.3	0.4	1.022	0.057	29.8	28.2	34.3	6.1	1.216	0.043
GUJ	42.4	36.7	45.6	8.9	1.243	0.034	43.6	38.5	46.7	8.2	1.213	0.032	43.6	41.6	44.6	3	1.072	0.026
MAH	37.9	34.8	40.3	5.5	1.158	0.033	39.9	33.3	44.2	10.9	1.327	0.040	46	39.1	50.8	11.7	1.299	0.033
Southern India																		
AP	33.9	27.4	37.3	9.9	1.361	0.050	38.6	29.7	41.6	11.9	1.401	0.047	-	-	-	-	-	-
KAR	38	28.4	43.3	14.9	1.525	0.054	36.6	30.9	39.3	8.4	1.272	0.041	47.6	50.6	40.3	-10.3	0.796	0.016
KER	21.1	21.3	21.1	-0.2	0.991	0.047	21.9	18.5	22.7	4.2	1.227	0.066	27.4	21.5	29.6	8.1	1.377	0.064
TN	25.1	25.9	24.4	-1.5	0.942	0.036	29.4	27.1	30.6	3.5	1.129	0.042	-	-	-	-	-	-
All India	38.4	31.1	40.7	9.6	1.309	0.042	45.5	35.6	48.5	12.9	1.362	0.038	52	44.8	54.1	9.3	1.208	0.027

Note: Full name of reported states cannot be given because of space in Annexure-1, Annexure-3 and Annexure-5. Please refer to the states in Annexure-2, Annexure-4 and Annexure-6, respectively for complete names of the states.
Revised method is the combine method of absolute difference and ratio for rural-urban disparity with weight of 2 for rural prevalence of wasting. Method is adopted from Mishra and Subramaninan (2006). The blank spaces indicate the lack of information for the respective states either for aggregate level/urban/rural level or for all of them in the respective reports.

Source: National and State level reports from NFHS-1, NFHS-2 and NFHS-3.

Annexure 2: Prevalence of Stunting (Height-for-age) among Indian Pre-School Children Over 1992-93 to 2005-06 at Aggregate, Urban and Rural Level									
	Difference Between NFHS-3 & NFHS-1 at aggregate level	Difference Between NFHS-3 & NFHS-2 at aggregate level	Difference Between NFHS-2 & NFHS-1 at aggregate level	Difference Between NFHS-3 & NFHS-1 at Urban level	Difference Between NFHS-3 & NFHS-2 at Urban level	Difference Between NFHS-2 & NFHS-1 at Urban level	Difference Between NFHS-3 & NFHS-1 at Rural level	Difference Between NFHS-3 & NFHS-2 at Rural level	Difference Between NFHS-2 & NFHS-1 at Rural level
Northern India									
Delhi	4.3	1.4	2.9	-	-	-	-	-	-
Haryana	10.8	14.1	-3	15.5	13.4	2.1	9.1	14.1	-5
Himachal Pradesh	-	14.7	-	-	5.5	-	-	15.5	-
Jammu & Kashmir	-	11.2	-	2.8	2.4	0.4	14.8	12.7	2.1
Punjab	12.1	11.3	0.8	11.9	2.9	9	11.7	13.7	-2
Rajasthan	9.4	18.3	-9	20.6	21.1	-0.5	6.6	17.7	-11
Central India									
Madhya Pradesh	-	9.1	-	-	5.2	-	-	12.7	-
Uttarakhand	-	14.7	-	-	25.3	-	-	11.1	-
Uttar Pradesh	3.2	9.7	-7	10.8	11.8	-1	2.6	9.9	-7
Eastern India									
Bihar	18.6	12.6	6	23.3	10.3	13	18.1	11.3	6.8
Chattisgarh	-	12.5	-	-	13.9	-	-	12.3	-
Jharkhand	-	8	-	-	4.1	-	-	9.1	-
Orissa	9.9	5.7	4.2	1.9	4.1	-2.2	11.5	5.7	5.8
West Bengal	-	8.5	-	-	2.8	-	-	9.7	-

North-eastern India									
Arunachal Pradesh	15	-7.7	23	30	-	-	17.5	-	-
Assam	17.4	15.4	2	10.7	8.2	2.5	18	15.4	2.6
Manipur	-0.3	6.6	-7	10.8	-	-	28.7	-	-
Meghalaya	5.4	3.2	2.2	-4.5	-	-	-7.3	-	-
Mizoram	6.3	4.5	1.8	6.1	-	-	17.3	-	-
Nagaland	-1.6	2.7	-4	9.5	-	-	0.3	-	-
Sikkim	-	2.8	-	-	-	-	-	-	-
Tripura	11.4	10.4	1	4.3	-	-	18.9	-	-
Western India									
Goa	8.5	-3.2	12	9.9	-0.4	10.3	9.4	-6.6	16
Gujarat	1.2	1.2	0	4.9	1.8	3.1	-1	1.1	-2
Maharashtra	8.1	2	6.1	4.3	-1.5	5.8	10.5	3.9	6.6
Southern India									
Andhra Pradesh	-	4.7	-	-	2.3	-	-	4.3	-
Karnataka	9.6	-1.4	11	22.2	2.5	19.7	-3	-4	1
Kerala	6.3	0.8	5.5	0.2	-2.8	3	8.5	1.6	6.9
Tamilnadu	-	4.3	-	-	1.2	-	-	6.2	-
All India	13.6	7.1	6.5	13.7	4.5	9.2	13.4	7.8	5.6

Note: The blank figures indicate the non-availability of information. The negative figures indicate increase in prevalence of stunting among young children.

Source: National and State level reports from NFHS-1, NFHS-2 and NFHS-3.

Annexure 3: Prevalence of Under Weight (Weight-for-Age) among Indian Pre-school Children Over 1992-93 to 2005-06 at Aggregate Level, Urban and Rural Level

	NFHS-3	Urban	Rural	Rural-Urban Difference	Rural Urban Ratio	Revised Method	NFHS-2	Urban	Rural	Rural urban Difference	Rural-Urban Ratio	Revised Method	NFHS-1	Urban	Rural	Rural-Urban Difference	Rural-Urban Ratio	Revised Method
Northern India																		
DEL	33.1	-	-	-	-	-	34.7	32.8	52.5	20	1.601	0.049	40.9	-	-	-	-	-
HAR	41.9	42.1	41.8	-0.3	0.993	0.024	34.6	31.3	35.6	4.3	1.137	0.036	37.9	33	39.4	6.4	1.194	0.036
HP	36.2	33.9	36.4	2.5	1.074	0.032	43.6	28.7	44.8	16	1.561	0.054	47	30.2	48.3	18.1	1.599	0.053
J&K	29.4	20.6	31.6	11	1.534	0.074	34.5	20.7	37.2	17	1.797	0.087	44.5	31	46.8	15.8	1.510	0.049
PUN	27	21.5	29.9	8.4	1.391	0.065	28.7	18.6	31.8	13	1.710	0.092	46	40	47.4	7.4	1.185	0.030
RAJ	44	36.3	45.9	9.6	1.264	0.035	50.6	46	51.9	5.9	1.128	0.025	44.3	43.9	41.1	-2.8	0.936	0.021
Central India																		
MP	60.3	52.8	62.6	9.8	1.186	0.022	53.5	44.3	58.4	14	1.318	0.030	57.4	50.1	59.4	9.3	1.186	0.024
UKK	38	29.4	40.8	11.4	1.388	0.047	41.8	38.4	42.8	4.4	1.115	0.029	-	-	-	-	-	-
UP	47.3	37.9	49.4	11.5	1.303	0.034	51.8	42.6	53.6	11	1.258	0.030	49.8	46.9	50.5	3.6	1.077	0.023
Eastern India																		
BI	58.4	51.5	59.3	7.8	1.151	0.022	54.3	47.4	55.1	7.7	1.162	0.025	62.6	53.8	64.1	10.3	1.191	0.022
CH	52.1	38.9	54.6	15.7	1.404	0.036	60.8	60	61.2	1.2	1.020	0.017	-	-	-	-	-	-
JH	59.2	43.3	63.1	19.8	1.457	0.034	54.3	40.2	58	18	1.443	0.036	-	-	-	-	-	-
OR	44	33.3	45.7	12.4	1.372	0.041	54.4	45.3	55.5	10	1.225	0.027	52.4	44.3	54.9	10.6	1.239	0.028
WB	43.5	30	46.7	16.7	1.557	0.052	48.7	31.5	52.6	21	1.670	0.053	56.8	44.8	60.4	15.6	1.348	0.030

North-eastern India																		
AR	36.9	23.8	42.1	18.3	1.769	0.074	24.3	-	-	-	-	-	38.4	36.2	40.3	4.1	1.113	0.031
AS	40.4	34.1	41.1	7	1.205	0.035	36	27.3	36.6	9.3	1.341	0.049	50.4	37.3	51.8	14.5	1.389	0.037
MAN	23.8	20.3	25.2	4.9	1.241	0.061	27.5	-	-	-	-	-	26.8	37.5	47.2	9.7	1.259	0.034
MEG	46.3	35.9	48	12.1	1.337	0.037	37.9	-	-	-	-	-	44.4	25.9	31.6	5.7	1.220	0.047
MIZ	21.6	13.8	28.8	15	2.087	0.151	27.7	-	-	-	-	-	28.4	22	34.5	12.5	1.568	0.071
NAG	29.7	21.3	31.8	10.5	1.493	0.070	24.1	-	-	-	-	-	27.5	19.7	30.5	10.8	1.548	0.079
SK	22.6	26	22.1	-3.9	0.850	0.033	20.6	-	-	-	-	-	-	-	-	-	-	-
TRI	39	37.1	39.2	2.1	1.057	0.028	42.6	-	-	-	-	-	45.2	8.8	19.7	10.9	2.239	0.254
Western India																		
GOA	29.3	21.6	38.6	17	1.787	0.083	28.6	26.5	29.9	3.4	1.128	0.043	34.8	33.2	36.2	3	1.090	0.033
GUJ	47.7	42.7	50	7.3	1.171	0.027	45.1	38.1	49.3	11	1.294	0.034	44.1	40.5	45.8	5.3	1.131	0.028
MAH	39.7	34.8	43.5	8.7	1.250	0.036	49.6	44.1	53.2	9.1	1.206	0.027	52.6	45.5	57.5	12.0	1.264	0.028
Southern India																		
AP	36.5	29.1	40.4	11.3	1.388	0.048	37.7	28.6	40.7	12	1.423	0.050	49.1	40.2	52.1	11.9	1.296	0.032
KAR	41.1	33.8	45.1	11.3	1.334	0.039	43.9	38.7	46.4	7.7	1.199	0.031	54.3	47	57.3	10.3	1.219	0.026
KER	28.8	22.5	31.9	9.4	1.418	0.063	26.9	22.4	28	5.6	1.250	0.056	28.5	22.9	30.6	7.7	1.336	0.058
TN	33.2	31.3	34.8	3.5	1.112	0.036	36.7	33.5	38.3	4.8	1.143	0.034	46.6	37.3	52.1	14.8	1.397	0.037
All India	45.9	36.4	49	12.6	1.346	0.037	47	38.4	49.6	11	1.292	0.034	57.5	55.9	45.2	-10.7	0.809	0.014

Note: Revised method is the combine method of absolute difference and ratio for rural-urban disparity with weight of 2 for rural prevalence of wasting. Method is adopted from Mishra and Subramaninan (2006).
The blank spaces indicate the lack of information for the respective states either for aggregate level/urban/rural level or for all of them in the respective reports.

Source: National and State level reports from NFHS-1, NFHS-2 and NFHS-3.

Annexure 4: Rate of Decline/Increase in Prevalence of Underweight (Weight-for-Age) among Indian Pre-School Children Between NFHS Rounds at Aggregate, Urban and Rural Level

	Difference Between NFHS-3 & NFHS-1 at aggregate level	Difference Between NFHS-3 & NFHS-2 at aggregate level	Difference Between NFHS-2 & NFHS-1 at aggregate level	Difference Between NFHS-3 & NFHS-1 at Urban level	Difference Between NFHS-3 & NFHS-2 at Urban level	Difference Between NFHS-2 & NFHS-1 at Urban level	Difference Between NFHS-3 & NFHS-1 at Rural level	Difference Between NFHS-3 & NFHS-2 at Rural level	Difference Between NFHS-2 & NFHS-1 at Rural level
Northern India									
Delhi	7.8	1.6	6.2	-	-	-	-	-	-
Haryana	-4	-7.3	3.3	-9.1	-10.8	1.7	-2.4	-6.2	3.8
Himachal Pradesh	10.8	7.4	3.4	-3.7	-5.2	-	-	8.4	-
Jammu & Kashmir	15.1	5.1	10	10.4	0.1	10.3	15.2	5.6	9.6
Punjab	19	1.7	17.3	18.5	-2.9	21.4	17.5	1.9	15.6
Rajasthan	0.3	6.6	-6.3	7.6	9.7	-2.1	-4.8	6	-11
Central India									
Madhya Pradesh	-	-6.8	-	-	-8.5	-	-	-4.2	-
Uttarakhand	-	3.8	-	-	9	-	-	2	-
Uttar Pradesh	2.5	4.5	-2	9	4.7	4.3	1.1	4.2	-3.1
Eastern India									
Bihar	4.2	-4.1	8.3	2.3	-4.1	6.4	4.8	-4.2	9
Chattisgarh	-	8.7	-	-	21.1	-	-	6.6	-
Jharkhand	-	-4.9	-	-	-3.1	-	-	-5.1	-
Orissa	8.4	10.4	-2	11	12	-1	9.2	9.8	-0.6
West Bengal	-	5.2	-	-	1.5	-	-	5.9	-

North-eastern India									
Arunachal Pradesh	1.5	-12.6	14.1	12.4	-	-	-1.8	-	-
Assam	10	-4.4	14.4	3.2	-6.8	10	10.7	-4.5	15.2
Manipur	3	3.7	-0.7	17.2	-	-	22	-	-
Meghalaya	-1.9	-8.4	6.5	-10	-	-	-16	-	-
Mizoram	6.8	6.1	0.7	8.2	-	-	5.7	-	-
Nagaland	-2.2	-5.6	3.4	-1.6	-	-	-1.3	-	-
Sikkim	-	-2	-	-	-	-	-	-	-
Tripura	6.2	3.6	2.6	-28.3	-	-	-20	-	-
West									
Goa	5.5	-0.7	6.2	11.6	4.9	6.7	-2.4	-8.7	6.3
Gujarat	-3.6	-2.6	-1	-2.2	-4.6	2.4	-4.2	-0.7	-3.5
Maharashtra	12.9	9.9	3	10.7	9.3	1.4	14	9.7	4.3
Southern India									
Andhra Pradesh	-	1.2	-	-	-0.5	-	-	0.3	-
Karnataka	13.2	2.8	10.4	13.2	4.9	8.3	12.2	1.3	10.9
Kerala	-0.3	-1.9	1.6	0.4	-0.1	0.5	-1.3	-3.9	2.6
Tamilnadu	-	3.5	-	-	2.2	-	-	3.5	-
All India	11.6	1.1	10.5	19.5	2	17.5	-3.8	0.6	-4.4

Note: The blank figures indicate the non-availability of information. The negative figures indicate increase in prevalence of underweight among young children.

Source: National and State level reports from NFHS-1, NFHS-2 and NFHS-3.

Annexure 5: Prevalence of Wasting (Weight-for-Height) among Indian Pre-School Children Over 1992-93 to 2005-06 at Aggregate Level, Urban and Rural Level

	NFHS-3	Urban	Rural	Rural-urban Difference	Rural-Urban Ratio	Revised Method	NFHS-2	Urban	Rural	Rural-urban Difference	Rural-Urban Ratio	Revised Method	NFHS-1	Urban	Rural	Rural-urban Difference	Rural-Urban Ratio	Revised Method
Northern India																		
DEL	15.50	16.80	12.30	-4.50	-	-	12.50	10.70	29.40	18.70	-	-	12.70	-	-	-	-	-
HAR	16.70	17.90	16.20	-1.70	0.91	0.05	5.30	5.50	5.30	-0.20	0.96	0.18	5.90	6.40	5.70	-0.70	0.89	0.14
HP	36.20	33.90	36.40	2.50	1.07	0.03	16.90	9.90	17.50	7.60	1.77	0.18	-	-	-	-	-	-
J&K	15.40	12.20	16.10	3.90	1.32	0.11	11.80	7.30	12.70	5.40	1.74	0.24	-	10.90	15.50	4.60	1.42	0.13
PUN	9.00	7.20	10.00	2.80	1.39	0.19	7.10	7.40	7.00	-0.40	0.95	0.13	19.90	14.30	21.40	7.10	1.50	0.10
RAJ	19.70	19.20	19.90	0.70	1.04	0.05	11.70	8.60	12.50	3.90	1.45	0.17	19.50	29.10	17.70	-11.40	0.61	0.02
Central India																		
MP	33.30	34.30	32.90	-1.40	0.96	0.03	20.20	17.30	20.60	3.30	1.19	0.07	-	-	-	-	-	-
UK	16.20	11.00	17.80	6.80	1.62	0.15	7.60	8.70	7.30	-1.40	0.84	0.10	-	-	-	-	-	-
UP	13.50	12.90	13.60	0.70	1.05	0.08	11.20	9.50	11.40	1.90	1.20	0.13	16.20	15.40	16.40	1.00	1.06	0.07
Eastern India																		
BI	27.70	28.80	27.50	-1.30	0.95	0.03	19.90	17.10	21.40	4.30	1.25	0.07	21.80	16.30	22.70	6.40	1.39	0.09
CH	17.90	17.70	17.90	0.20	1.01	0.06	18.50	22.20	17.70	-4.50	0.80	0.04	-	-	-	-	-	-
JHAR	31.10	23.70	32.90	9.20	1.39	0.06	25.40	17.70	27.40	9.70	1.55	0.09	-	-	-	-	-	-
OR	18.50	12.60	19.40	6.80	1.54	0.12	24.30	23.60	24.40	0.80	1.03	0.04	21.30	15.90	22.30	6.40	1.40	0.09
WB	19.00	14.20	20.20	6.00	1.42	0.10	13.60	11.10	14.20	3.10	1.28	0.12	-	-	-	-	-	-

North-eastern India																		
AR	16.50	6.30	20.50	14.20	3.25	0.52	7.90	-	-	-	-	-	12.90	14.90	10.60	-4.30	0.71	0.05
AS	13.10	16.30	12.70	-3.60	0.78	0.05	13.30	10.40	13.40	3.00	1.29	0.12	10.80	5.60	11.40	5.80	2.04	0.36
MAN	8.30	7.40	8.60	1.20	1.16	0.16	8.20	-	-	-	-	-	9.90	10.20	18.30	8.10	1.79	0.18
MEG	28.20	23.90	28.90	5.00	1.21	0.05	13.30	-	-	-	-	-	17.80	14.10	20.00	5.90	1.42	0.10
MIZ	9.20	8.70	9.60	0.90	1.10	0.13	10.20	-	-	-	-	-	3.00	2.20	2.30	0.10	1.05	0.48
NAG	14.60	11.70	15.30	3.60	1.31	0.11	10.40	-	-	-	-	-	13.00	5.60	14.10	8.50	2.52	0.45
SK	13.10	20.50	12.00	-8.50	0.59	0.03	4.80	-	-	-	-	-	-	-	-	-	-	-
TRI	19.90	14.50	20.80	6.30	1.43	0.10	13.10	-	-	-	-	-	19.50	31.60	53.00	21.40	1.68	0.05
Western India																		
GOA	12.10	8.70	16.30	7.60	1.87	0.22	13.10	14.20	12.40	-1.80	0.87	0.06	16.50	14.30	15.30	1.00	1.07	0.07
GUJ	17.00	15.70	17.70	2.00	1.13	0.07	16.20	11.30	19.20	7.90	1.70	0.15	18.90	16.10	20.30	4.20	1.26	0.08
MAH	14.60	13.90	15.60	1.70	1.12	0.08	21.20	15.70	24.80	9.10	1.58	0.10	20.20	18.30	21.50	3.20	1.17	0.06
Southern India																		
AP	12.70	12.50	13.00	0.50	1.04	0.08	9.10	7.60	9.50	1.90	1.25	0.16	-	-	-	-	-	-
KAR	17.90	15.80	19.10	3.30	1.21	0.08	20.00	16.20	21.80	5.60	1.35	0.08	17.50	16.40	17.80	1.40	1.09	0.07
KER	16.10	10.10	19.10	9.00	1.89	0.19	11.10	10.90	11.20	0.30	1.03	0.09	11.60	12.00	11.50	-0.50	0.96	0.08
TN	21.50	20.60	22.10	1.50	1.07	0.05	19.90	20.60	19.50	-1.10	0.95	0.05	-	-	-	-	-	-
All India	19.10	16.90	19.80	2.90	1.17	0.07	15.50	13.10	16.20	3.10	1.24	0.09	17.50	15.80	18.00	2.20	1.14	0.07

Note: Revised method is the combine method of absolute difference and ratio for rural-urban disparity with weight of 2 for rural prevalence of wasting. Method is adopted from Mishra and Subramaninan (2006).

The blank spaces indicate the lack of information for the respective states either for aggregate level/urban/rural level or for all of them in the respective reports.

Source: National and State level reports from NFHS-1, NFHS-2 and NFHS-3.

Annexure 6: Rate of Decline/Increase in Prevalence of Wasting (Weight-for-Height) among Indian Pre-School Children Between NFHS Rounds at Aggregate, Urban and Rural Level

	Difference Between NFHS-3 & NFHS-1 at aggregate level	Difference Between NFHS-3 & NFHS-2 at aggregate level	Difference Between NFHS-2 & NFHS-1 at aggregate level	Difference Between NFHS-3 & NFHS-1 at Urban level	Difference Between NFHS-3 & NFHS-2 at Urban level	Difference Between NFHS-2 & NFHS-1 at Urban level	Difference Between NFHS-3 & NFHS-1 at Rural level	Difference Between NFHS-3 & NFHS-2 at Rural level	Difference Between NFHS-2 & NFHS-1 at Rural level
Northern India									
Delhi	-2.8	-3	0.2	-	-	-	-	-	-
Haryana	-10.8	-11.4	0.6	-11.5	-12.4	0.9	-10.5	-10.9	0.4
Himachal Pradesh	-	-19.3	-	-	-24	-	-	-18.9	-
Jammu & Kashmir	-	-3.6	-	-	-4.9	3.6	-0.6	-3.4	2.8
Punjab	10.9	-1.9	12.8	7.1	0.2	6.9	11.4	-3	14.4
Rajasthan	-0.2	-8	7.8	9.9	-10.6	20.5	-2.2	-7.4	5.2
Central India									
Madhya Pradesh	-	-13.1	-	-	-17	-	-	-12.3	-
Uttarakhand	-	-8.6	-	-	-2.3	-	-	-10.5	-
Uttar Pradesh	2.7	-2.3	5	2.5	-3.4	5.9	2.8	-2.2	5
Eastern India									
Bihar	-5.9	-7.8	1.9	-12.5	-11.7	-0.8	-4.8	-6.1	1.3
Chattisgarh	-	0.6	-	-	4.5	-	-	-0.2	-
Jharkhand	-	-5.7	-	-	-6	-	-	-5.5	-
Orissa	2.8	5.8	-3	3.3	11	-7.7	2.9	5	-2.1
West Bengal	-	-5.4	-	-	-3.1	-	-	-6	-

North-eastern India									
Arunachal Pradesh	-3.6	-8.6	5	8.6	-	-	-9.9	-	-
Assam	-2.3	0.2	-2.5	-10.7	-5.9	-4.8	-1.3	0.7	-2
Manipur	1.6	-0.1	1.7	2.8	-	-	9.7	-	-
Meghalaya	-10.4	-14.9	4.5	-9.8	-	-	-8.9	-	-
Mizoram	-6.2	1	-7.2	-6.5	-	-	-7.3	-	-
Nagaland	-1.6	-4.2	2.6	-6.1	-	-	-1.2	-	-
Sikkim	-	-8.3	-	-	-	-	-	-	-
Tripura	-0.4	-6.8	6.4	17.1	-	-	32.2	-	-
West									
Goa	4.4	1	3.4	5.6	5.5	0.1	-1	-3.9	2.9
Gujarat	1.9	-0.8	2.7	0.4	-4.4	4.8	2.6	1.5	1.1
Maharashtra	5.6	6.6	-1	4.4	1.8	2.6	5.9	9.2	-3.3
Southern India									
Andhra Pradesh	-	-3.6	-	-	-4.9	-	-	-3.5	-
Karnataka	-0.4	2.1	-2.5	0.6	0.4	0.2	-1.3	2.7	-4
Kerala	-4.5	-5	0.5	1.9	0.8	1.1	-7.6	-7.9	0.3
Tamilnadu	-	-1.6	-	-	0	-	-	-2.6	-
All India	-1.6	-3.6	2	-1.1	-3.8	2.7	-1.8	-3.6	1.8

Note: The blank figures indicate the non-availability of information. The negative figures indicate increase in prevalence of wasting among young children.
Source: National and State level reports from NFHS-1, NFHS-2 and NFHS-3.

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