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Prevalence of Undernutrition and Evidence on Interventions: Challenges for India

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Abstract

India as a country has shown very limited progress in reducing undernutrition and more so when there are several policies that have been in place to address different components of undernutrition. Further economic growth that has been higher and sustained for a fairly long period of time in the past two decades has had a limited effect on making its contribution towards improving nutrition.

In the Indian context, the challenge to reducing undernutrition is twofold. Firsty, the evidence on the prevalence of undernutrition as well as its trend over the years varies by indicators and by regions. Secondly, the information base on the feasibility, viability and the impact of the central or the state level programmes dealing with undernutrition is very weak. This makes it difficult to draw inferences and conclusions about how changes are effected, what needs to be given priority when economic resources are limited, and the regional challenges involving manpower in implementing the schemes.

Thus, evidence based policy making is imperative and the institutional mechanism around this has to be strengthened. The public policy should not focus entirely on economic policy but needs to make use of social policies to reduce undernutrition. Focussing on key sectors like agricultural production and prices, food distribution networks, water, sanitation, and hygiene with the involvement of multiple agents like households, communities, local governments, NGOs is essential to address the multiple dimensions of undernutrition prevalent in India. What we learn from other countries is that economic growth does not directly transfer into reduction in undernutrition unless there is an effective horizontal and vertical integration of the intervention strategies focussing towards scaling up.

Keywords: *Undernutrition, States, India, Public Policy*
JEL Code: *I1, I3, O1*

INTRODUCTION

In the global map of child and maternal undernutrition[1] a dark shade for India depicts her poor status (UNICEF, 2013). Global Hunger Index which includes two child related undernutrition indicators as its component, indicated India in a 'very alarming' state in 1990s while in 2012 India moved to a somewhat lower rank to the 'alarming' state (IFPRI, 2013). As this report and other recent studies highlight that in spite of substantial reduction in child undernutrition (60 percent in 1990 to 40 percent in 2011 in underweight rates), India continues to have the largest share of stunted, underweight and wasted children and that the pace of reduction could have been faster. Prevalence of undernutrition as assessed by dietary energy supply shows India to have a somewhat better rank but improvements in the last two decades have been very minimal.

In the Indian context, several policies to achieve nutritional security is in place - poverty and food security programmes, democratic and federal system of political processes, well-established statistical systems and in more recent times a high rate of economic growth. Yet, the erstwhile Prime Minister of India had to refer to the current state of undernutrition in India as a national 'shame'.[2]

It is needless to mention that economically well-off regions have low values in the indicators for undernutrition but the relationship with income is somewhat tenuous when regions/countries are on the path of development. In the Indian context, it is observed that different aspects and measures of undernutrition are quite often not highly correlated so rankings of population sub-groups or regions based on different indicators are not the same. Furthermore, the pace of change varies across different regions and for different indicators. This makes it difficult to draw inferences and conclusions about how changes are effected and also which aspect of undernutrition needs to be given priority if at all prioritisation becomes a necessity arising mainly out of limited economic resources.

Most importantly, since improving nutrition deals not just with access and availability of food and health care services but also food habits, hygienic practices and

[1] In this study undernutrition/undernourishment is used to define low levels of nutritional intakes or outcomes and malnutrition/malnourishment is used to indicate both under and over nutrition. Further undernutrition in most instances focuses on children than on adults.

[2] Prime Minister Dr. Manmohan Singh's Speech at the release of HUNGaMA (Hunger and Malnutrition) Report in 2011. http://pib.nic.in/newsite/erelease.aspx?relid=79457

socio-cultural norms in the communities so the institutional framework set up to intervene and bring about changes depend on both formal and informal governance systems. Therefore more localised evidence-based approach becomes an essential feature of the policy design to improve nutrition security for a large country like India. Given the varied evidences on reduction of undernutrition across the world what stands out in a broad sense is that the interventions have to be multi-sectoral to address the multiple dimensions of nutritional deprivation. Drawing upon recent studies conducted in this area, this paper has attempted to document the relationship between evidence, the policy interventions in a given institutional setting that have been put in place to address undernutrition and subsequent impacts observed in that context.

Section 2 gives a broad overview of the linkage between nutrition and development emphasizing the role of governance in strengthening this relationship. Section 3 presents a comparison of a few undernutrition indicators for groups of nations over a period of time. Section 4 highlights the regional trends and pattern of undernutrition in India separately for child and adult nutrition indicators. Section 5 looks at the evidence on the factors affecting undernutrition along with a discussion of existing policies and programmes in this context. Section 6 analyses the intake indicators of undernutrition and the challenges around that. Section 7 is a brief conclusion with possible areas for research in public policy to address the problem of undernutrition in the Indian context.

NUTRITION AND SUSTAINABLE DEVELOPMENT

A two way linkage between undernutrition and underdevelopment is well-established now. Undernutrition results in economic losses both at the macro-level and individual level. For instance, a report by world bank cites that loss to gross domestic product for a country can be as high as 3-4 percent while individual losses are estimated to be more that 10 percent of lifetime earnings[3]. Higher growth of per capita GDP usually translates into faster rates of poverty reduction which is accompanied by reduction in undernutrition. The instances where economic growth had not translated into large reductions in poverty and/or undernutrition is when the macro-growth results in unequal distribution of wealth, weak institutional delivery of public goods like water, sanitation and basic health services, lack of strong political leadership and cultural factors affecting food habits and care behaviour.

[3] Please see, http://siteresources.worldbank.org/NUTRITION/Resources/281846-1131636806329/NutritionStrategyOverviewSection.pdf. (Accessed on 22-3-2014)

The high level of child undernutrition is in part due to the mother's poor nutritional status. If the poor nutritional status during early childhood is not addressed by proper intervention then it continues further into adolescence leading to poor nutritional status as an adult which then is passed on to the offspring. This inter-generational linkage makes undernutrition an important goal for sustainable development and not just a developmental goal (Horton and Lo, 2013). Undernutrition prevents the people and countries to reach their full potential. A recent study conducted by Save the Children for India indicates that chronically undernourished children are 20 percent less literate resulting in their earning 20 percent less wages than others thus making these adults economically poor[4]. The global economic burden of undernutrition is estimated up to $125 billion by 2030 with India accounting for nearly one-third of that. The economic cost to India due to micronutrient malnutrition is estimated between 0.8 percent and 2.5 percent of India's GDP.

By and large regions which have shown a high rate of economic growth leading to reductions in poverty have shown sharp decline in undernutrition rates- Thailand, Brazil, China and Vietnam to name a few such countries. India has been an exception wherein economic growth has translated into limited decline in poverty rates with far lesser impact on undernutrition. The success stories of these other countries cannot be attributed merely to a direct translation of economic growth into reduction in undernutrition but largely a focussed approach in scaling up due to an effective horizontal and vertical integration of the intervention strategies (Braun *et. al.,* 2008). In India, specific nutrition/food oriented programmes like Integrated Child Development Services (ICDS), Mid-day Meals Program or Public Distribution System (PDS) have had limited success in addressing food and nutrition security in a sustained manner among poor households. The challenge to address undernutrition in the Indian context appears manifold as it is not restricted to just access to affordable diets. Addressing the problem of undernutrition involves social, economic and behavioural issues with a proactive involvement of the state to scale up, improve targeting and strengthen the implementation of various programs.

A series of articles in 2013 *Lancet series* on maternal and child nutrition, stress upon a strong national and global commitment with collective action by all stakeholders as the only way forward (Taylor, et al., 2013). Leading economists have been

[4] Please see, http://www.savethechildren.ca/document.doc?id=351

demonstrating that according the problem of undernutrition as top priority globally or nationally would enhance well-being in the most cost-effective manner (Challenge paper on Hunger and Malnutrition: Copenhagen Consensus[5]). The causes of undernutrition and the technological pathways (including medicines) for reducing undernutrition have been well-identified but the fact is that the delivery channels and implementation of the necessary conditions to achieve this involves social, cultural and political features (Haddad, 2011 and Mohammed, 2012). This particularly holds true for a country as large and diverse like India leading to differed pace of reduction in undernutrition and varied levels of malnutrition within the country.

What comes to the fore repeatedly is the South Asian enigma - referring to the poor status of women resulting in poor undernutrition status for mothers bringing in a life-cycle of low nutritional status. A second social feature is the deep deficiency among some minority population groups deprived of access to public goods in a systematic manner resulting in their poor nutritional indicators with slow changes in them.

Early feeding practices, immunization habits and inadequate dietary diversity could be largely attributed to cultural factors but one cannot undermine the indirect role of governance in creating awareness. In these situations the role of state is as a facilitator in bringing about changes through informal institutions like the families or communities and semi-formal networks like self-help groups or neighbourhood groups. A more direct form of governance would involve formal institutions to improve purchasing power leading to affordability, or better distribution networks resulting in sustained accessibility to more quantity and high quality diets or access to water, sanitation and hygiene (or WASH) improving the absorption of the nutrient intakes.

Thus, a key feature of governance is to be able to coordinate with the complex web of formal and informal structures with firmness rather than being rigid in its power structures and hierarchies. The government has to play a significant role in order to upscale so that leapfrogging could happen. Though there exists a clear link between economic prosperity and different forms of nutritional deprivation but this development-undernutrition linkage becomes very distinct only at the highest level of economic status either for the countries or households. Despite achieving high growth and having good administrative capabilities as well as scientific and technical knowhow India has not been able to reduce undernutrition rates among children that countries like China, Vietnam or

[5] Please see, http://www.copenhagenconsensus.com/research-topic/hunger-and-malnutrition

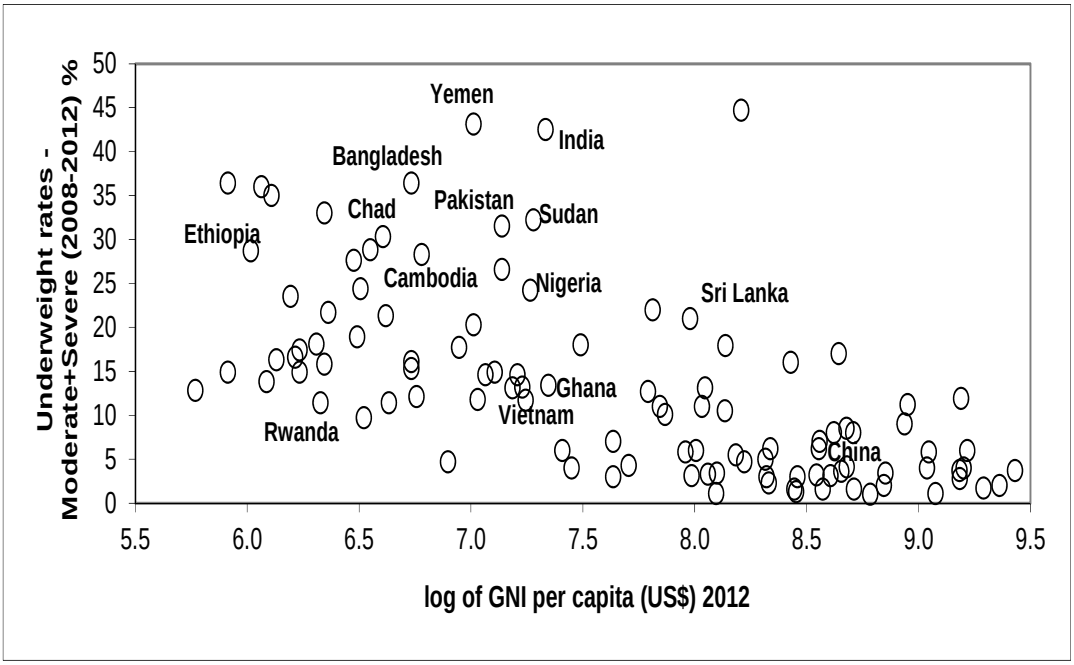
Peru have done in the recent years during their periods of high/moderate growth (IFPRI, 2013). Localised approach to policy planning including collection and monitoring of evidence and program outputs to improve nutritional security seems to be the key (Braun *et. al.*, 2008).

Even though there are several studies discussing evidence-based nutrition interventions beginning from the adolescent girls, to pregnant mothers and finally for infants and children (Bhutta *et. al.*, 2013), these are based on country-level studies with some evidence exclusively for the Indian context. It is apparent that neither the programs are evaluated periodically for nutritional impacts nor do we have a clear understanding of cost-effective ways of dealing with this problem. Though given the huge burden of undernutrition, cost considerations should not affect interventions at the outset, but cost-effectiveness becomes essential in the current socio-political environment of rent seeking and arresting leakages from programs is a matter of real concern.

INTERNATIONAL TRENDS IN DIMENSIONS OF NUTRITIONAL DEPRIVATION

Figure 1 below shows India's current status vis-à-vis other nations using one measure of undernutrition namely, underweight rates among children. What is rather stark from the figure is that though there is an adverse relationship between underweight rates and incomes but that is not a very strong one particularly at lower levels of per capita GDP. Countries like Sudan, Nigeria and Vietnam with near similar levels of per capita GDP as India have lower underweight rate and so do several other nations with far lower levels of per capita GDP like Pakistan, Bangladesh, Cambodia, Rwanda and Ethiopia.

Figure 1: Underweight Rates and Per Capita GNI: India's Position

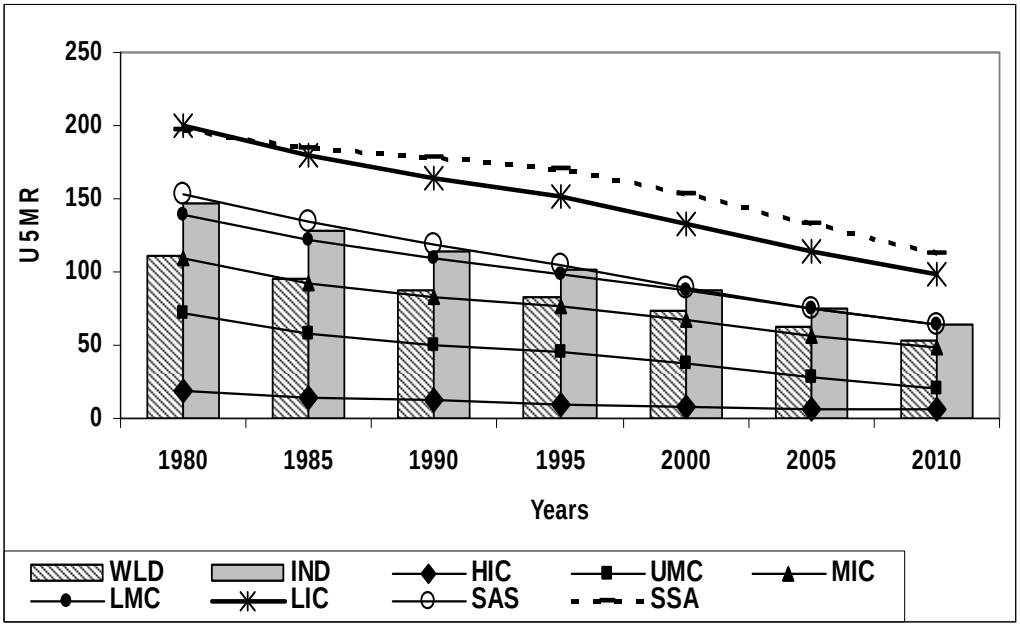


Source: Based on data from the report of the State of the World's Children (UNICEF, 2013).

Undernutrition is among the main causes of under-five mortality (U5MR) in many developing countries including India (Black *et. al.,* 2008, Arnold *et. al.,* 2009). Figure 2a compares the changes in U5MR for groups of countries classified on the basis of income (GDP) levels in the last four decades. Poorer regions of the world with high mortality rates in the 1980s have all been able to show reductions over these years. However, huge gaps exist across nations with values in 2010 about two times lower than that in 1985 for middle/lower-middle/low income countries but the high/upper-middle income countries had further brought it down by three times from their already low starting values. Though the graph appears to give a convergence but one observes that the Low Income Countries (LIC) had about 11 times higher value then the High Income Countries (HIC) in 1980 which increased to 16 times in 2010. Rates for India (and that of South Asia) are close to the low-income countries[6]. Sub-Saharan Africa (SSA) is clearly far higher in the values showing a slow decline in its values.

[6] The country divisions into economic groups are according to 2012 Gross National Income per capita, calculated using the World Bank Atlas method. The groups are: low income (LIC), $1,035 or less; lower middle income (LMC), $1,036 - $4,085; upper middle income (UMC), $4,086 - $12,615; and high income (HIC) $12,616 or more.

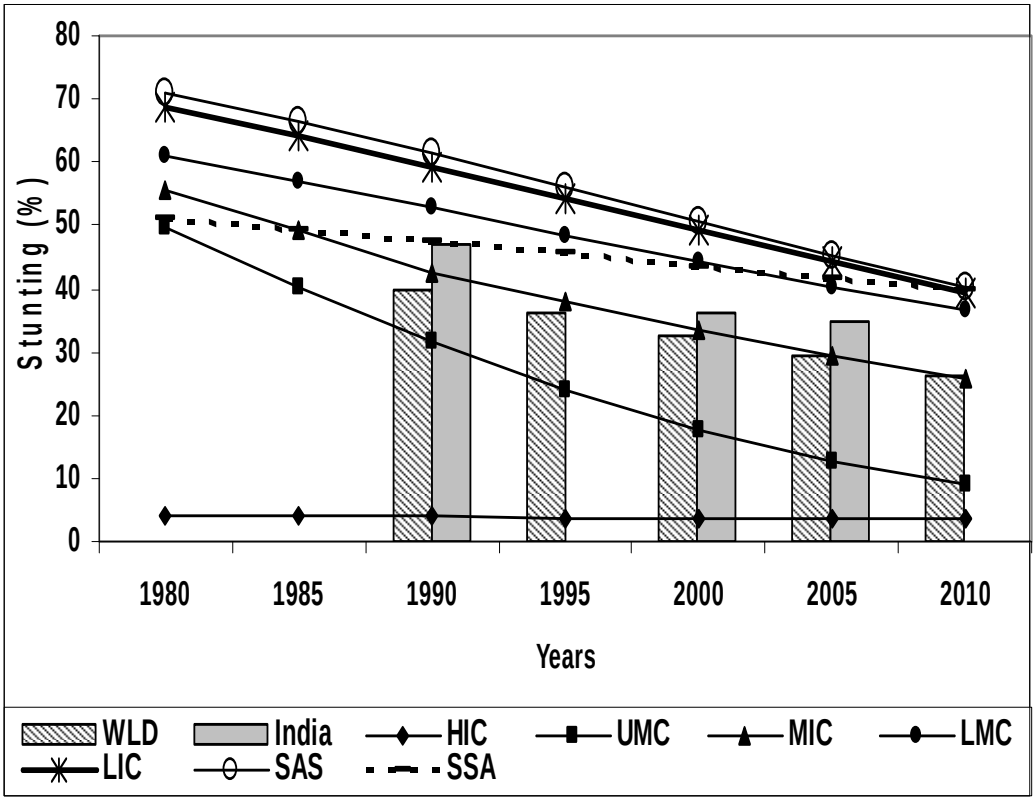
Figure 2a: Under Fiver Mortality Rates (U5MR)



Note: U5MR is defined as mortality rates for children below five years per 1000 live births
WLD-World; IND-India; HIC-High Income Countries; UMC-Upper Middle Income Countries; MIC-Middle Income Countries; LMC-Lower Middle Income Countries; LIC-Lower Income Countries; SAS-South Asia; SSA-Sub Saharan Africa.
Source: World Development Indicators.

Figure 2b looks at a more proximate measure of undernutrition which is stunting rates among 0-3 year olds. Stunting is a measure of chronic undernutrition and for this indicator even to start with in the 1980s, the high income countries have fairly low values, while the Upper Middle Income Countries (UMC) countries are the ones who seem to have made the most significant progress in the past forty years with a reduction of about 40 percentage points while all other countries though varied in their early rate have declined similarly by about 30 percentage points. Even close to the top, one observes that UMC and Middle Income Countries (MIC) were only five percentage points apart in the 1980s while by 2010 they are 15 percentage points apart. The remaining (lower income) countries do show some decline in the rates but Sub-Saharan Africa (SSA) which was close to UMC and MIC has clearly lost out. South Asia (SAS) tops the list with a very modest decline in the values but unlike U5MR has higher stunting rates than SSA. Though the rates have declined but there is a clear divergence in these regional groups over these four decades in the case of stunting.

Figure 2b: Stunting Rates, 0-3 Year Old

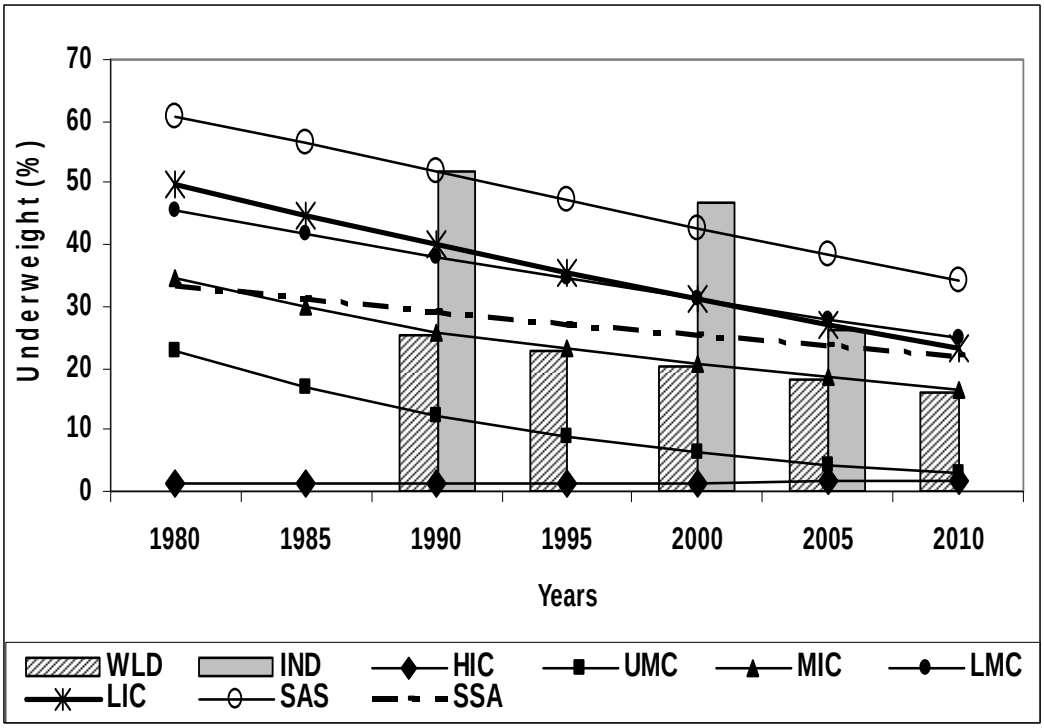


Note: Stunting rate is the percentage of children under age 3 whose height for age (stunting) is more than two standard deviations below the median for the international reference population ages 0-59 months. The data are based on the WHO's new child growth standards released in 2006.

Source: World Development Indicators.

Underweight is a short term indicator of undernutrition and has shown larger declines over these four decades compared to stunting as seen in Figure 2c. South Asia stood out with a vey high value of 69 percent in 1980 far higher than all other regions - unlike stunting where lower income countries started on a similar footing as this region. Though SAS continues to be on the top of the group it has also shown the largest decline in percentage points. The lower and low income countries are about 10 percentage point lower that SAS and this gap does not seem to have been bridged over these years. With substantially lower rates for SSA compared to SAS, the changes have been rather minimal.

Figure 2c: Underweight Rates, 0-5 Year Old

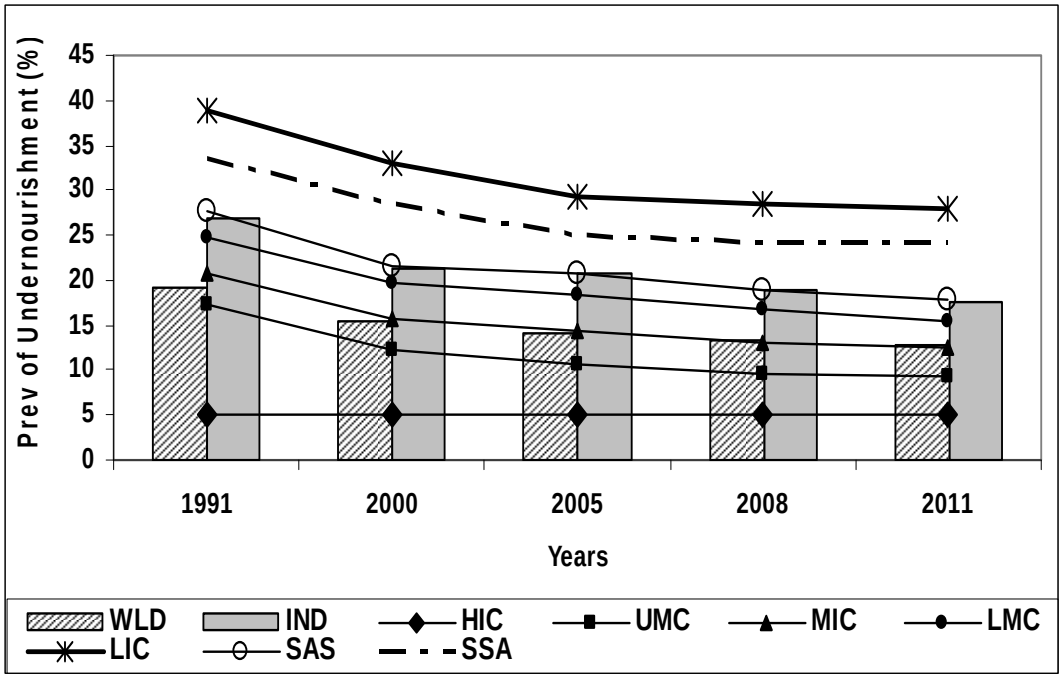


Note: Underweight rate is the percentage of children under age 5 whose weight for age is more than two standard deviations below the median for the international reference population ages 0-59 months. The data are based on the WHO's new child growth standards released in 2006.
Source: World Development Indicators.

Finally, another measure of undernourishment used as a component in the Global Hunger Index is estimated by Food and Agricultural Organisation (FAO). This indicator concerns nutrition intake called as the prevalence of undernourishment and defined as those individuals who consume below a certain per capita caloric norm. At the country level this largely reflects the supply side aspect of the commodities that constitute the source of calories of the individuals. The LIC have the highest prevalence of undernourishment (Figure 2d) and SSA follows it[7]. All other regions are close to each other in terms of the rates and also present a static picture with regard to changes over time.

[7] Please see, http://www.fao.org/economic/ess/ess-fs/fs-data/en/

Figure 2d: Prevalence of Undernourishment



Note: Prevalence of undernourishment shows the percentage of the population whose food intake is insufficient to meet dietary energy requirements continuously.

Source: World Development Indicators (http://data.worldbank.org/indicator/SN.ITK.DEFC.ZS).

A comparison of these different indicators for undernutrition shows that ranking of regions and the pace with which the changes take place can be different for different indicators making it clear that factors which bring about changes in them are not very similar and that interventions have to be multi-pronged so that all nutrition related indicators are affected.

REGIONAL TRENDS AND PATTERNS OF UNDERNUTRITION IN INDIA

Child Nutrition Indicators

India has been among the few countries in the world that has put in place fairly large-scale interventions to address the problem of food insecurity in general and undernutrition among children in particular. The foremost issue that stands out in the current state of affairs is that these safety measures have not been able to address the problems adequately and even during recent periods of high economic growth in India

the expected changes in the undernutrition indicators have not taken place. Some part of this conundrum also revolves around the nature of information available and its quality so at to assess variations and changes. Issues concerning data gaps have to be addressed as timely dissemination of information is an essential requirement for planning and resource allocation.

Beginning with underweight and stunting among very young children in India, the three waves of National Family Health Surveys (NFHS) in 1992-93, 1998-99, and 2005-06 are the only source of nation-wide information that help us understand the spread. The age-groups covered vary: 0-4 years, 0-3 years and 0-5 years, in the three respective surveys making direct comparability difficult. Also the measures and states covered (particularly in the first) vary across these surveys. Using the lowest common base of 0-3 years, Deaton and Dreze (2008) find that underweight rate (below two standard deviation based on NCHS standard) was about 52 percent in 1992-93, declined to about 47 percent in 1998-99 with near similar rate of 46 percent in 2005-06. Height for age data for children was not collected for all the states in 1992-93 and hence comparable figures with the remaining two years for the stunting rates at all India level in 1992-93 are not available. Stunting rates declined from 45.5 percent in 1998-99 to 38.4 percent in 2005-06. With the revision of standards by World Health Organisation (WHO, 2006), the changes were observed as follows: for underweight it declined from 42.7 percent in 1998-99 to 40.4 percent in 2005-06 and for stunting it declined from 51 percent to 44.9 percent during the same period.

Few observations worth noting are that irrespective of the reference and the indicator used child undernutrition rates have declined. However the differences in reference or the normative threshold for identifying the undernourished either for underweight or stunting gives different undernutrition rates which vary across indicator as well as the amount of decline. Further stunting rates are higher than underweight rates using the WHO reference. The reference value for assessing undernourishment has been discussed in the literature quite extensively by experts in the field of nutrition and medical science as well as social sciences like economics and anthropology for several indicators of undernutrition (Fogel, 2004; King *et. al.*, 2007; Meenakshi and Viswanathan, 2013). Recently Panagariya (2012) contested that the revised standard for stunting based on the WHO recommendation would be inappropriate for the Indian context due to differences in the genetic composition of Indians compared to many other regions of the world. The arguments revolve around the fact that stunting is also observed among the richest sections of the households in the 2005-06 NFHS data and hence a faulty

reference value. In a similar vein Deaton (2007a) indicates that the standard for birth weight in most parts of the developing world is 2.5 kilograms but in the developed countries it is one kg higher as the parents have larger body structure and 2.5 kilograms would be considered as severely undernourished with the newborn requiring immediate medical attention and care.

It becomes very relevant from the policy perspective as these differing standards would pose difficulties in planning for the resources as the target population varies. Equally important to know is why stunting rates have declined in a differing manner when compared to underweight rates and how do these changes vary across states.

Even if one were to focus on one or two measures of undernutrition the factors that cause undernutrition do not correlate strongly or that these factors explain only some part of the variation in undernutrition rate, howsoever measured. Harris and Kohli (2009) indicated several outlier-states to the factors that are usually associated with lower undernutrition using the NFHS-3 data. Kerala had lower rates of access to clean drinking water; Tamil Nadu had abysmally low spread of good sanitation and these two states have lower undernutrition rates among children compared to other states[8]; while immunisation rates were fairly good in Orissa but not commensurate with the level of high child undernutrition; or that West Bengal which had far higher numbers for institutional deliveries but did not 'match up' to the undernutrition levels among children.

As one moves to a higher level of spatial disaggregation, more such contrasts begin to appear. Dreze and Khera (2012) made an assessment of district level comparisons in Human Development Index (HDI) with Child Development Index (CDI) [9] estimated by them for 2005-06. The CDI had four component indicators: probability of surviving until age five capturing survival until age five; proportion of children fully immunised in the age group of 12-23 months capturing access to basic health care as well as health seeking behaviour; proportion of children aged 12-35 months who were not underweight capturing short-term nutrition adequacy; and female literacy rate in the 10-14 age group capturing the gendered dimension of well-being. Since the CDI is an

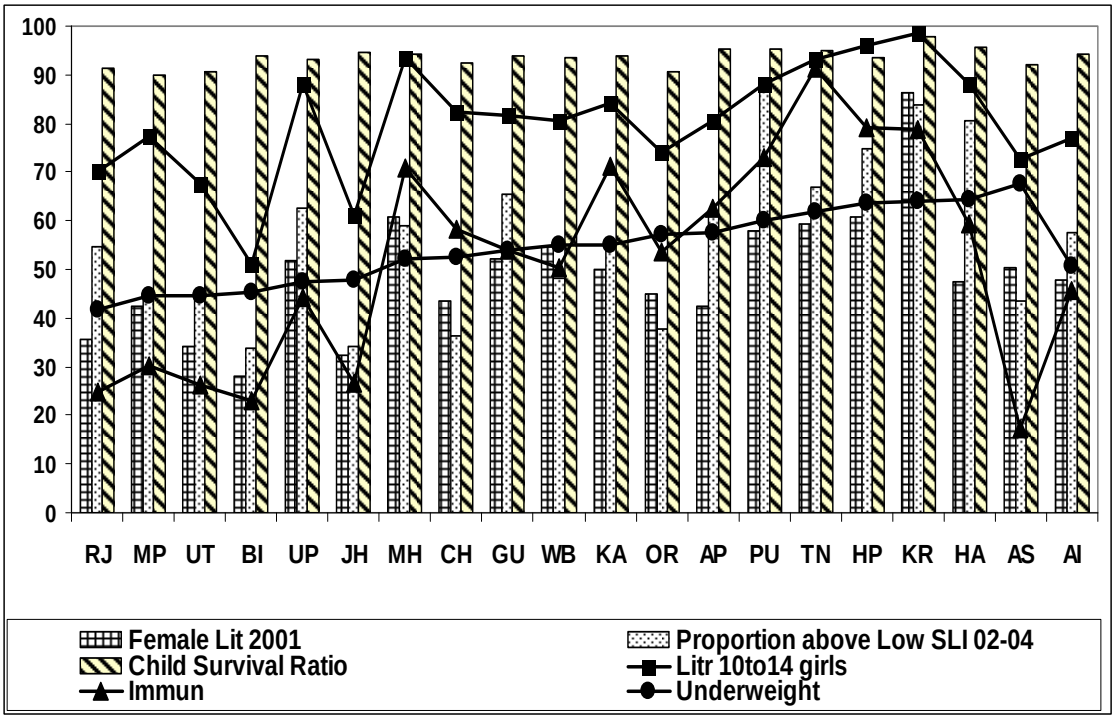
[8] In the absence of further analysis of this paradox one can perhaps infer from Harris and Kohli (2009) that strong political leadership and a focussed approach towards right feeding and care practices largely influenced by mother's literacy status compensates for the poor conditions of water quality or sanitation.

[9] This is a normalised variant of the "Achievements of Babies and Children" (ABC) index, introduced in the *Focus On Children Under Six* (FOCUS) report.

index, indicating the well-being of children, when converted into quintiles of the index, a district belonging to top quintile is better off than that belonging to the lower quintile.

The state level comparisons between components of HDI and CDI reproduced from Dreze and Khera (2012) for the states indicates that though there is reasonable association among them but an economic indicator (standard of living index based on asset holdings) did not show a strong association with underweight rates (Figure 3).

Figure 3: Components of HDI and CDI



Note: The states are arranged in increasing order of underweight.
Source: Deeze and Khera (2012).

Based on the quintiles of CDI estimated at the district level three typologies for states could be formed:

(1) All districts in the bottom two quintiles: Uttar Pradesh, Rajasthan, Madhya Pradesh, Chattisgarh, Bihar, Jharkhand, West Bengal, Orissa.

(2) Some districts in the top two quintiles and a few in the lower 2 or 3 quintiles: (northern) Gujarat, (western) Maharashtra, (Northern) Karnataka, (Central)

Andhra Pradesh, (southern) Uttaranchal. The regions in brackets indicate the lower quintile CDI values within these states.

(3) All districts in the top two quintiles: Himachal Pradesh, Punjab, Haryana, Kerala and Tamil Nadu.

Contiguous districts showed similar quintile values but so were there discrete jumps in CDI values as well between adjacent districts belonging to different states, for instance, when one moved from Madhya Pradesh to Maharashtra or to Gujarat and from Orissa to Andhra Pradesh. One can infer perhaps from this that state level factors influencing either public service delivery or implementation of programmes make a difference as studies do not seem to have focussed on this aspect particularly. More data at the district levels on undernutrition as well as programmatic features like access and implementation of programmes would help in further understanding the role of governance and this has to be analysed after controlling for the influence of spatial characteristics like agricultural productivity or urbanisation.

However at the lower level of regional disaggregation within states several contrasts appear among the different components of the CDI which indicates that state level policies lack effectiveness in ensuring an even spread in its implementation. For instance the spread of two different indicators child underweight and child mortality rates are not very similar across districts of India. Even in the better off southern belt underweight rates were high in a few districts of Tamil Nadu, Andhra Pradesh and Karnataka while in some districts of Orissa, West Bengal, Chattisgarh far lower rates were observed than in the neighbouring regions. Similarly one would expect U5MR and female literacy in the 10-14 years to be adversely correlated but there were several pockets within states where one observed high values of the former but moderate values of the latter and vice-versa.

UNICEF and Indicus Analytics estimated another child development index which is not available in the public domain for further assessment. This index however was used to identify 100 focus districts which were the poorly performing districts by the HUNGaMA study[10] capturing aspects of *Hung*er *a*nd *Ma*lnutrition among 0-5 year olds. This is among the most recently (2010) available district level estimates but focussing

[10] See www.naandi.org from where this report was downloaded and also www.hungamaforchange.org for more details.

only on 100 poorly performing districts for India with a comparison of two districts from three other best states – Himachal Pradesh, Kerala and Tamil Nadu[11].

Here also several contrasts tend to appear across different indicators of child nutritional and health status which would require policy planning at a regional level rather than following a more centralised approach. Undoubtedly the two districts of Kerala fair very well in all indicators of undernutrition but this was not entirely true for the two districts in the best states of Himachal Pradesh and Tamil Nadu. One observed that underweight rates were similar across the four district of Himachal Pradesh and Kerala at about 16 percent-17 percent but was ten percentage points higher in the two districts of Tamil Nadu.

The stunting rates and under-five mortality rates vary lot more across the districts than other indicators like underweight rates and mid-upper-arm-circumference (MUAC). It was also observed that the contrasts in district rankings are fairly sharp when indicators from HUNGaMA and U5MR for 2010-11 from annual health survey (census) are compared. There are districts in Jharkhand that have values for U5MR as low as that in the two districts of Kerala. There were several districts with lower levels of undernutrition but substantially high U5MR and vice-versa. For instance, Madhepura in Bihar had U5MR of 103 and a stunting rate of 53 percent and underweight rate of 40 percent while Munger (best district chosen for this state) had these values as 68, 55 percent and 35 percent respectively- far lower value for U5MR but comparable values for undernutrition indicators as Medhepura. Similarly comparing two districts of Uttar Pradesh, Rae Bareli had U5MR of 83 with 71 percent stunting rate (among the highest value in all the focus districts) and 41 percent underweight rate; in contrast to this, Mirzapur which had 112 as U5MR, stunting rate of 47 percent but a similar rate for underweight. Comparing these two districts in Uttar Pradesh with Coimbatore which is part of the highly industrialized belt of Tamil Nadu the values were 91, 30 percent and 27 percent for these three indicators respectively. Even in Kerala one observed a 5 percentage point difference in stunting rates while all other indicators have same values in the two districts. Thus there is still lot of unevenness and variations across regions of India something that needs to be smoothened out as one would observe that all the HIC countries have similar values for such indicators while this may not be the case for other countries.

[11] The reference districts are Hamirpur and Mandi in Himachal Pradesh; Pathanamthitta and Thiruvananthapuram in Kerala; Coimbatore and Kancheepuram in Tamil Nadu.

If one were to look further in terms of spatial disaggregation to the village level as was done for Uttarakhand in Gangopadhyay *et. al.* (2005) then child undernutrition rates were far more widespread while poverty rates were far more localised. Stickiness in undernutrition indicators and the inability of the governance systems to redress it effectively are also noted in well-performing states like Kerala. Recent media reports of about 35 infant deaths in the past year or so in the (only) tribal block, Attapady in Kerala has been attributed to malnutrition and poor health status of mother[12]. Maternal mortality and anaemia in this region has been reported to be far higher than the state's low average values and being attributed to improper functioning of *anganwadis* and primary health centers more so in the past couple of years in this region.

The messages are clear in that we need effective public policy in the poorer and vulnerable regions of the country and nothing can be taken for granted that things will not go wrong. An alert media is essential to highlight sudden changes or gaps and in also calling for the administrative machinery to respond and be accountable. At the same time awareness in the community towards lack of facilities and their ability to mobilise themselves to demand for better and sustained provision of public services are also important factors in ensuring low undernutrition rates.

Thus, on the one hand we do observe that at the state level contiguous regions exhibit poor values on several dimensions of the undernutrition indicators but at a disaggregated level of districts or villages the association between sub-components of the broad indicator exhibits large heterogeneity. Under these circumstances, planning and resource allocation based on the proximate factors that would help reduce the level of undernutrition becomes more complex. This would not only require more expertise at the regional levels to tackle the problems but also coordination across different governmental departments and across the three tiers of administrative set-up.

Adults Nutrition Indicators

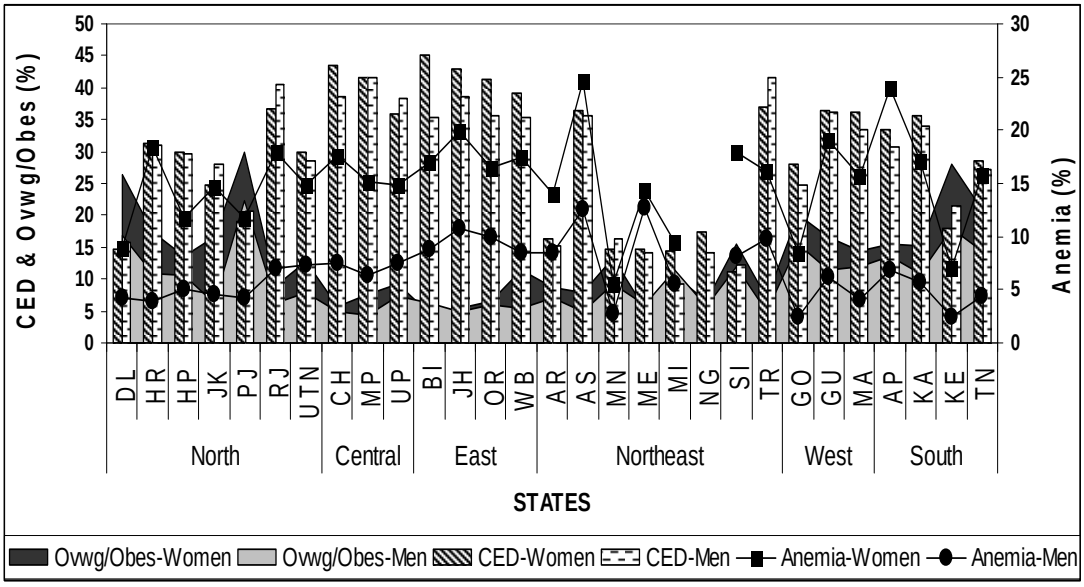
Chronic Energy Deficiency and Anaemia

The assessment of nutritional status of adults is through the anthropometric indicators like height and weight or iron deficiency. Chronic energy deficiency (CED) or undernutrition among adults are those whose body mass index (BMI) is less than 18.5 where BMI is the ratio of body weight (in kg) to squared height (in meters). Figure 4

[12] See the report, http://www.thehindu.com/news/national/kerala/another-child-dies-malnutrition-death-toll-goes-up-to-35/article4703266.ece

shows variations in CED rates across states and between men and women. CED rates are higher in the central and eastern states which account for a large proportion of poor and that the rates are higher for women than men. In comparison to this in some of the richer regions/states of the country the overweight and obesity rates are higher than the CED with higher prevalence rates among women than men. Expectedly these regions have lower CED and the gender gaps in it are also not that prominent. In comparison to this moderate and severe anaemia rates are nearly similar in most states between 10 percent and 20 percent except in Kerala where the gap between men and women is also the least. The north-eastern states seem to be doing far better in the anaemia rates. States like Andhra Pradesh and Assam have very high rates when compared to CED and also in gender gaps. If mild anaemia is taken into consideration then rates surge quite significantly for all the states with increasing gender gaps (IIPS, 2007). Further, Jose (2008a) found that anaemia among pregnant women went up in all the states anywhere between 8-15 percent between 1998-99 and 2005-06 except Tamil Nadu. However, CED declined in most states (except in Assam, Bihar and Madhya Pradesh) but the decline was less than ten percentage points in all these states.

Figure 4: Gender Differences in Malnutrition, 2005-06



Note: CED- Chronic Energy Deficiency: BMI<18.5; Ovwg/Obes-Overweight/Obese: BMI≥25; Moderate and Severe Anaemia: Haemoglobin<10g/dl.

Source: IIPS(2007).

When compared to studies based on child undernutrition, those based on adult nutritional status are fewer. One of the reasons for this is that data on adult nutritional status on a nationwide basis has been made available since 1998 from the NFHS-2. Women in households with better standard of living were always better off and one's own education as well as that of her husband's also mattered to having a higher BMI using either the NFHS-2 data (Kumar *et. al.,* 2009) or NFHS-3 data (Seshadri, 2009). Even after controlling for economic status, social status in terms of caste and religion mattered and that women from scheduled caste and tribe households were worse off while Muslim women were better off compared to the (majority) Hindu women (Roy *et. al.,* 2004). Arnold *et. al.* (2004) use the qualitative information on dietary habits, found that women who consume milk or curd everyday were less likely to be CED than other women even after controlling for wealth status. Jose (2008b) and Dahiya (2013) show that those women who were better empowered captured by different aspects of freedom in decision making had higher BMI. However, Jose also found that this was true more in the southern, western and northern states of India where the CED rates are anyway lower while in the central and east Indian states comprising of Uttar Pradesh, Madhya Pradesh, Bihar, Orissa and West Bengal the autonomy in decision making did not matter. In a more recent study Viswanathan and Meenakshi (2013) focusing on rural women find that women who are employed in farm work or agricultural work are worse off and women having access to better sanitary conditions and having better education even in rural areas had an advantage of a higher BMI.

The impact of low BMI of a pregnant woman as well as her anemic condition on the new born child's weight and undernutrition of the child has been well-documented. Hence there are intervention programmes for pregnant and lactating women through ICDS as well as *Janani Suraksha Yojana* (the safe motherhood programme) under NRHM. However, access and evaluation of its impact on mother and child's health seems very limited[13]. Since women in better-off and among richer households are having higher rates of overweight and obesity compared to men there is a double burden of malnutrition. To this extent to address both undernutrition as well as overnutrition, awareness and access to appropriate medical care including insuring against chronic diseases could help reduce the impact of the disease burden. There could be gender biases in health seeking and health care behaviour even among the middle and upper income households given the deeply entrenched social hierarchies. Hence studies are required to this extent to not

[13] Nandi and Ramanan (2012) have assessed this scheme and find that child survival has improved but the findings focus more on an unintended consequence of the programme namely, a slowing of the demographic transition in large population states.

only document the disease burden as well as the access to health care and awareness to maintain good health.

Trends in Heights and Gender Dimorphism

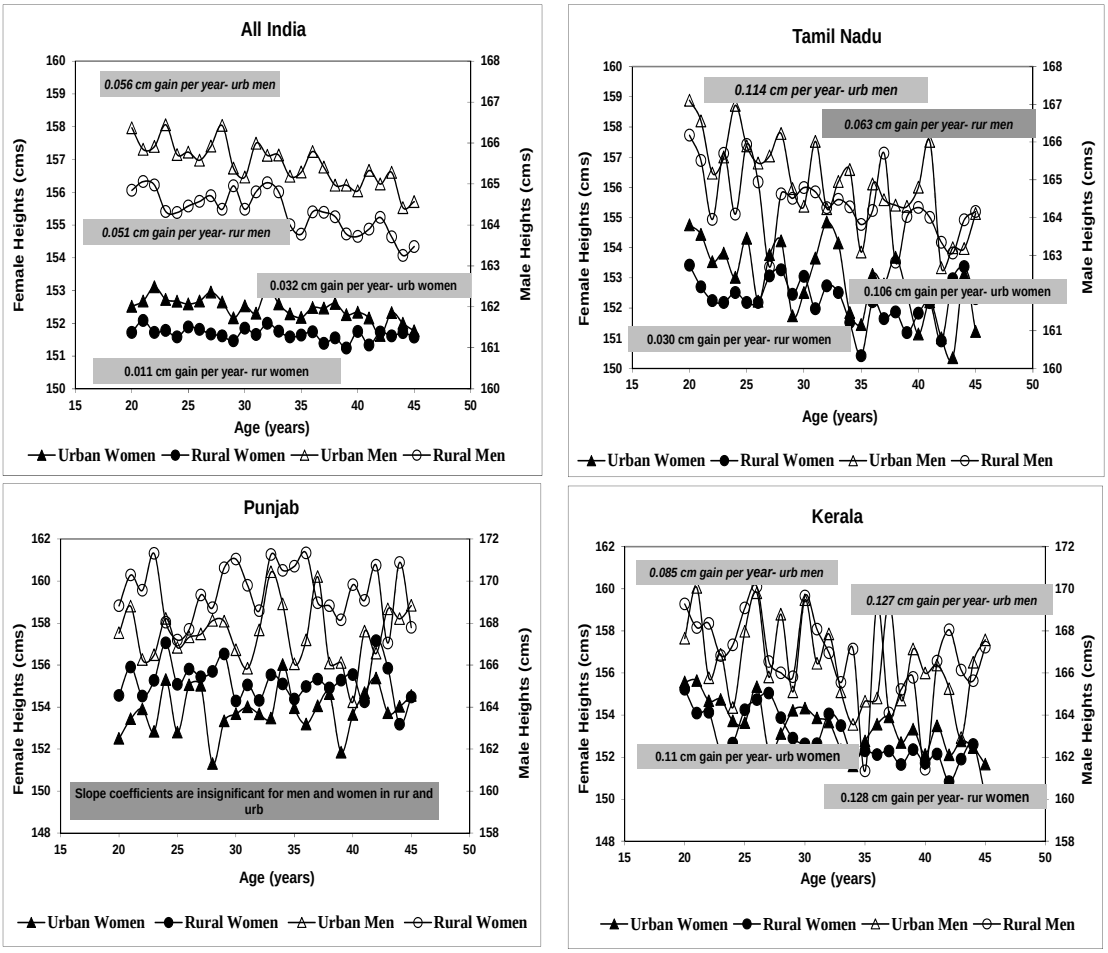
Nutritional status and nutritional intakes are inter-linked and the two are most often highly correlated - smaller stature requires lower intakes while improved nutritional intakes improve the nutritional outcomes. This has been the major contention of Fogel's work that improvements in stature and decline in mortality in the 18th and 19th century Europe was primarily due to the increase in supply of per capita calories (Fogel, 2004). On the one hand, stagnant or slow progress in the indicators of nutritional status may not be due to lack of food security alone; on the other hand, even with a 'limited' and yet balanced food intake nutritional status is likely to improve with cleaner local environment, personal hygiene and improved access to health care (Deaton, 2007). Komlos (1985) coined the term biological standard of living to capture the fact that variations in height can be affected by adverse or positive shocks at the time of birth and / or during the period of high physical growth.

Some of the findings based on patterns and trends in adult Indian heights is summarised here. Deaton (2007) showed that there is considerable variation in heights across nations with South Asian women being among the shortest while Africans are among the tallest within the developing nations. More importantly this does not correlate well with the dietary intake pattern or mortality rates prevalent in these regions. Bhalotra (2007) showed that heights (at maturity) of Indian women on an average increased by 0.8cm between 1950 and 1965 but stagnated for the cohorts born in 1965–1975. Based on NFHS-2 data Kerala showed a secular increase in heights while Punjab and Haryana showed declines in height and most other parts of the country showed changes close to the average all India changes. Infant mortality rate and per capita income of the state at the time of birth explained some of the variation in final heights reached by these women.

Viswanathan and Sharma (2009) and Viswanathan (2012) summarise the literature in this context featuring the regional, social, and religious aspects of changes and variations in heights. Regional differences in heights exist with the northern states having taller men and women but there are also differences in how the heights improve over time. As shown in Figure 5 below, there is a clear upward increase in heights for men and women but the increases are more prominent among men than among women and more in rural than in urban. However, states like Tamil Nadu and Kerala show more

gains for women than all India and the rural urban differences are also not that prominent. In Punjab one does not find noticeable trends in height but along with Haryana, it is the only other state which shows taller men and women in rural areas than in urban areas.

Figure 5: Variations in Adult Heights (20-40 years), Men and Women in 2005/06



Source: Author's estimation from NFHS-3.

Gap in heights between men and women relative to the height of men defined as gender dimorphism had increased over time in India for some states on the basis of NNMB data as shown in Moradi and Guntupalli (2013) while Deaton (2008) also observed similar changes at all India levels based on NFHS-3 data. Brennan *et. al.* (1997) showed that among the indentured workers who settled in South Africa from South Asia and

other parts of Africa in late 18th century, men and women showed improvements in heights compared to the their own country averages but the gender gap was evident among the Indian immigrants. Viswanathan and Sharma (2009) using the NFHS-3 data show that SC/ST women and men in Kerala show a secular change in heights over time which was not observed in Bihar. However, in Kerala the improvements in heights had a similar gradient as that for 'other' castes but there was no catching up. Viswanathan (2012) showed that Muslim men and women have a height advantage as had been observed in the case of life expectancy at birth and infant mortality rates (Sachar Committee Report, 2006). Clearly, all of this indicates that adult heights can be used as a long term measure of well-being which focuses on the individual and captures changes over time, across social groups and gendered differences.

Most studies have tried to link changes in adult heights to changes in economic conditions or adverse shocks like rainfall deficit or drought (either at the household or regional level) around the time of birth. A few studies have also highlighted that sometimes positive or adverse shocks in later periods of growth also influence final heights. Among this an important finding for policy intervention is that women who have had child birth during teenage loose about 1-2 cms in final heights and that after controlling for education the effect of teenage birth was not observed. This indicated that educating girls that is, sending them to school would have postponed early child-birth resulting in improving their stature (Viswanathan and Sharma, 2009).

Thus adult heights and BMI can be used as a measure to study intra-household inequality capturing aspects of gender discrimination in the long and short term which is more difficult to measure in the case of nutritional intakes. A strong contention in some studies has been that heights are genetically determined and that inter-group and inter-regional comparisons may be flawed. This contention needs to be understood in the context that there has been remarkable improvements in adult heights in particular in the 20th century in the developed nations strongly influenced by the increased availability of food, improvement in the economic situation of the households, scientific developments in the control of diseases and health care delivery systems and better environmental conditions (Fogel, 2004; Steckel, 1995; Sunder and Woitek, 2005). In recent times, the newly industrialised countries have also been able to achieve the standards of the developed nations in a short span of time due to the influence of these (non-genetic) factors.

FACTORS AFFECTING OUTCOME INDICATORS OF UNDERNUTRITION

Non-monetary Factors

The usual determinants like feeding practices, mother's education, access to *anganwadi* services and immunisation rates and the lack of hygiene and sanitation emerged as factors for poor undernutrition indicators in the states but if one were to see it at a finer level of disaggregation there are lot of variations across districts within a given state. Even though the focus of many studies was on understanding mother related aspects affecting undernutrition but one gets very little insight on the extent to which this factor alone could help reduce undernutrition. More importantly from a perspective of intervention even if the intensity of significance of these factors is unknown, it will be essential to know what aspects of governance could lead to a more uniform and increased spread of mother's knowledge and what are the socio-cultural and economic barriers.

Mother's Education: Mother's education or female literacy has always shown up as an important indicator of undernutrition in almost all the studies. However a discerning feature as shown in the HUNGaMa report is that the declines are gradual and slow starting from no literacy up to the 9th standard. The tipping point seems to come in after the completion of 10th standard wherein the undernutrition rates are halved compared to mothers who cannot read. This can be seen across all the regions of the study area as shown in Table 1 below.

Table 1: Stunting and Underweight Rates Across Mother's Education Level, 2010

Mother's Education Level	100 Focus Districts		Best Districts in Focus States		Best Districts in Best States	
	UWR	STR	UWR	STR	UWR	STR
None, Cannot Read	44.7	62.9	38.6	53.2	32.9	47.0
<5	40.3	58.3	44.7	50.2	39.0	43.1
5-7	38.2	57.4	32.2	44.3	23.6	37.2
8-9	34.5	52.8	27.8	38.3	25.7	34.2
10+	26.9	42.6	17.6	27.1	16.9	28.2

Note: UWR- Underweight rates (percent), STR-Stunting Rates (percent).
Source: HUNGaMA Survey.

Sanitation

More recently Spears (2011) identified that quality of sanitation captured by open defecation is a crucial factor that explains a large part of the variations in stunting based on both international and Indian evidence. This work shows that on the one hand good

sanitary conditions are equivalent to four times the effect shown by the GDP growth and that other factors like water quality or electricity, breastfeeding practices or female literacy or food availability matter in explaining stunting when sanitation and GDP are controlled for. Chambers and Von Medeazza (2013) while discussing these feature highlight that along with the three A's of nutritional status, two more A's antibodies and allopathogens are also important in determining the stunting rates. They further explain that how in such an environment even the better off would be affected and hence stunting rates can also be observed among children belonging to richer sections of the household.

From the governance perspective, Spears and Lamba (2012) show that in rural districts with better implemented Total Sanitation Campaign, infant mortality and stunting had both declined and that children exposed to this campaign in early life showed higher cognitive achievements by the age of six. He also found that the effect of this campaign was higher for urban areas than rural and in more dense urban regions than less dense ones. However, several unanswered questions remain: what explains higher stunting rates in rural areas than urban, and how does the impact of sanitation continue to older children as stunting rates increase with age as noticed in all parts of the world. Finally, as the study was largely focusing on stunting rates one also needs to understand what keeps this problem away for underweight as gain in body weights should also be affected by disease environments. In a study of variations in women's BMI, Viswanathan and Meenakshi (2013) found that poor sanitation as captured by open defecation affects women's BMI in rural India with BMI being lower by about 2 points compared to all other forms of sanitary conditions. Dahiya (2013) finds that the same variable is significant for all BMI quantiles in a quantile regression model explaining variations in women's BMI in ural and urban India. Finally, though Spears (2011) indicates that access to health services does not make difference to stunting (after sanitation and GDP are controlled for) as health condition of these children might be extremely poor but this does not seem to be convincing as states vary in access to public and private health services, and more so in urban areas and among the not so poor households.

Income/Expenditure and Undernutrition

Since the finding by Behrman and Deolalikar (1987), that household income has a very limited relevance in reducing undernutrition (in this case caloric intakes), this aspect has been explored time and again using different indicators of economic status and indicators of undernutrition. The results for India still point towards a limited role for economic status or economic growth in improving nutrition related deprivation measures. Deaton

and Dreze (2009) using data for the period 1983 to 2004/05 show that calories derived from cereals are becoming less responsive to changes in income and has been further substantiated by Meenakshi and Viswanathan (2013) including more recent data for 2009/10. Based on child undernutrition indicators, Subramanyam *et. al*. (2011) find that economic wealth of the household does impact the nutritional status of the child but state level growth in domestic product (economic growth) failed to have any influence in reducing undernutrition based on the NFHS-3 data. The pathway of economic growth not resulting in higher incomes in the hands of all the people and also in the inability to provide public services like better sanitation and clean water or even health services could be the missing link. Mishra and Ray (2013) find that a multi-dimension indicator of deprivation consisting of expenditure dimension as well as nutrition dimension like stunting and mother's BMI did reduce during the post reform period of 1993/94 to 2004/05 but the expenditure component of the dimension had a very small share in the changes and hence caution against the use of only consumption based measures of well-being in the Indian context.

Governance and Undernutrition

The evidences from the above-mentioned studies are useful in locating the variations in different dimensions of undernutrition but very limited inference can be drawn on aspects of governance that vary at the regional level. It is increasingly important that studies like *HUNGaMA* which focussed on select districts and few dimensions of the causal factors for persistent undernutrition should also gather more information on aspects of service delivery and the awareness and capability of local communities to seek for better services.

We require more disaggregated regional level assessment conducted at periodic intervals to understand (a) the biological and epidemiological constraints to different dimensions of undernutrition, (b) the relevance of programmes and inter-linkages among them to address these different dimensions, (c) the level of interaction among the different agencies like the family, the community and the personnel involved in implementing the programmes and (d) the overarching socio-cultural and governance structures that attach importance to addressing nutritional deprivations. In one such study using a similar framework, Menon *et. al.* (2009a) assessed three different states: Tamil Nadu, Karnataka, and Bihar.

The distinguishing feature for the three states was the presence of long-standing nutrition programme in Tamil Nadu but had about 30 percent stunting rates for 0-5 year

olds in 2005-06, Karnataka being a high growth state with an intermediate rate of stunting at about 40 percent while Bihar with persistent high poverty rates during the decade preceding the survey and a stunting rate of about 50 percent. The study groups the domains that determine or enhance the nutritional status for children into biological/epidemiological aspects, programmatic features of the intervention focusing on Integrated Child Development Services (ICDS) and the socio-political environment. Low nutritional status of the mother, weak coverage of antenatal care services, lower immunization rates and inadequate coverage of ICDS keep Bihar at the lowest level. On the other hand, poor infant feeding practices, dietary adequacy of very young children particularly Vitamin A and iron intake, good sanitary habits including appropriate treatment of diarrhoea, focusing on supplementary nutrition rather than on creating awareness and age-specific interventions were not up to the benchmarks specified to address undernutrition even in the two southern states. The governance system and institutional framework varied substantially between the three states arising out of differences in allocation of financial resources-high in Tamil Nadu but underutilized central funds in Bihar; managerial capacity and infrastructure being superior in Tamil Nadu, with lack of convergence with other health services in Bihar while inadequate training of the ICDS functionaries both at the doorstep of delivery as well as at the supervisory level was found inadequate in all the three states. Harris and Kohli (2009) in their study of inter-state comparisons on reduction of malnutrition from a political economy perspective found that in Tamil Nadu compared to many other states as far as nutrition program and food security is concerned there was a higher degree of 'programmatic politics' and a lesser degree of 'clientelist politics' allowing scope for a better participation of the less privileged while creating an entrepreneurial environment on the one hand and maintaining a better balance between centralized and decentralized aspects of governance.

The conceptual framework for public policy required for reducing poverty in general and malnutrition in particular as in Birner (2008) identified that the supply side factors for allocation of public resources have to be complemented by demand-side factors to bring about effective changes addressing all the communities in a region. The limitations of the supply-side factors in improving child undernutrition by the ICDS program was also recognized in GoI (2007) and included creating awareness in the local community about the entitlements and the involvement particularly of mothers and women self-help groups (SHG) in managing the day-to-day functioning of ICDS. Menon *et. al.* (2012) find that more gaps existed in implementation of these features for the ICDS scheme in Bihar than in Karnataka which already had in place local level

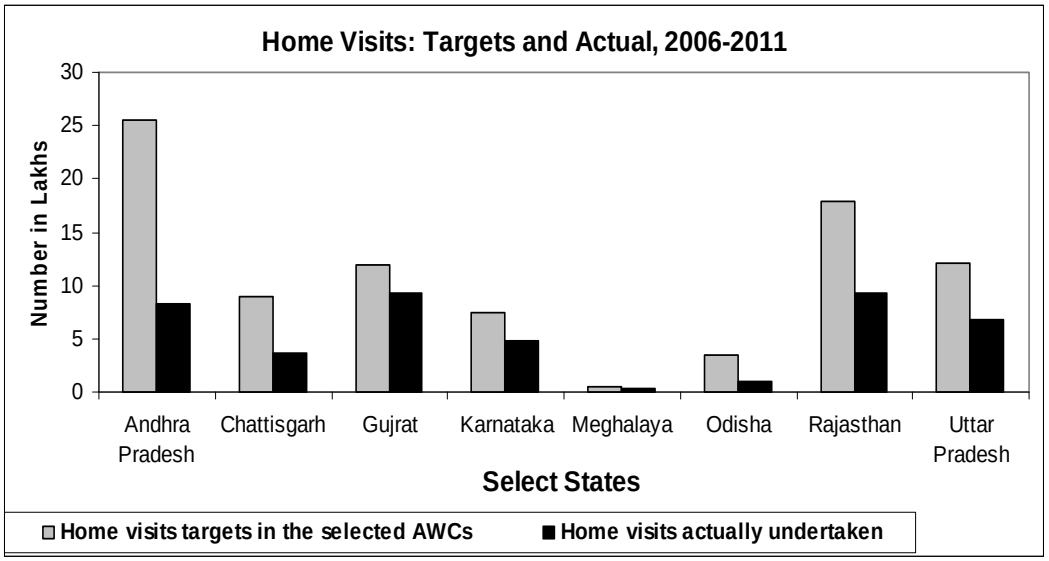
functionaries and a good network of women SHGs. In spite of this, political interference seemed to be the key challenge in allocating public resources at the local level in Karnataka. In a broader context Palaniswamy and Krishnan (2008) found that in a state like Karnataka where there was lot more commitment to decentralization including allocation of grants to village *panchayats* elite capture by dominant castes was rather common which led to a skewed distribution of resource allocation resulting in lower targeting efficiency. As Walton (2009) argues that technical solutions to undernutrition are well known but the service delivery mechanism within the institutional framework in the Indian context is misaligned with the local needs and is 'enmeshed with patronage and populism'. The reforms that have taken place in India to reduce rent-seeking and sharing in the business environment is yet to happen between the state and social groups involved in public service delivery. Bringing about this change for reducing undernutrition as Walton (2009) mentions could be more challenging due to multifarious nature of this problem involving multiple sectors and agencies and more importantly it appears that very slow progress is being made in this direction.

A useful and fairly current information provided by the Controller and Auditor General (CAG, 2012) report on the functioning of ICDS took four years for assessment and tabling of the report in the Parliament that covered 67 districts in 13 states. A very brief summary indicates a rather dismal picture of the working and management of the scheme. Anywhere between 1/3rd to ½ of *anganwadi* centers (AWC) did not have a proper building, a separate space for cooking and classroom, toilets or clean drinking water, weighing kits, medical kits or pre-school education kits. Gap in expenditure per child being as high as Re. 1 compared to the prescribed norm, inadequacies in maintenance of growth charts, targeting inefficiencies and availability of staff. The monitoring system from the central ministry of Women and Child Development (WCD) lacked either in evaluation of the scheme or its impact assessment. The recommendations of CAG for rectifying and remedying some of these, point largely towards a centralized approach which has anyway been found to be inadequate in several aspects. For instance, the ministry seemed unaware if the states were providing the required dietary allowance (RDA) as per the feeding norms revised in 2009 (Table 6.7 of the CAG report).

Time and again ICDS has been criticized mainly for the fact that it has remained a supplementary nutrition programme while bringing in awareness and educating the people and involving them in different aspects of child care and nutrition is considered to be a very important component for child's over all growth and development. The Pratichi

Foundation (2010) in a three-district study in West Bengal on ICDS performance found that supplementary nutrition dominated; with the nutrition awareness, mother's meetings and home visits being very weak. In this sense, the community mobilisation component of ICDS that involves 'Information, Education and Communication (IEC)' was found to be lacking in fully utilizing the expenditure allocated to it. More importantly the CAG study found that there had been no evaluation of this component and what constraints remained in implementing this component effectively. On a year to year basis states like Tamil Nadu spent anywhere between 40-60 percent of the amount allocated for this component while Punjab spent about 45-55 percent between 2006-2009 and less than 10 percent in the following two years. On the other hand states like Jharkhand, Goa, Delhi and West Bengal did not spend any money on this component and in states like Uttar Pradesh improper utilization of funds was also noted. Looking at house visits shown in Figure 6 most of the study-states showed shortfalls by AWWs in house visits compared to the targeted and on the other hand West Bengal showed 3 times more visits than the targeted. Similarly there was wide variation in mother's meetings with Madhya Pradesh not even setting any target. Poor remuneration for AWWs and lack of training and supervision has been reported as the dominant reason for such lapses. Among other components like organizing health check-ups etc. by and large most states took the initiatives but lack of coordination was observed among Lady Health Visitor, Medical Officer in charge of the Public Health Center and Child Development Project officers.

Figure 6: Gap between Target and Actual Home Visits: ICDS



Source: CAG (2012).

In sum it was found that among the 13 study states covered in this report Madhya Pradesh, Bihar and Uttar Pradesh figure lot more in various aspects of 'inadequate' governance of this scheme and its financial management in terms of returning unutilised funds but overall one finds that richer states like Andhra Pradesh or Gujarat appeared no different compared to Orissa or Rajasthan in several administrative matters.

What is quite striking is the reported statistics on nutritional status of those children accessing AWCs services across all states mentioned in the report as provided by the Ministry. The figures show how varying the year to year data on undernutrition are. A state like Gujarat seemed to have reduced the moderately malnourished among these children from 69 percent in 2006-07 to 34 percent in 2010-11 while the severely malnourished which remained at about 0.68 percent from 2006-07 to 2008-09 and then increased marginally to 0.74 percent in 2009-10 and then to 4.6 percent in 2010-11![14] In fact in 2010-11 several states reported far higher percentage and number of severely malnourished children among those weighed compared to what was reported in the previous four years. What went wrong is not easy to assess as the Ministry does not provide this information on a regular basis but seems to have provided it to the CAG report only as a special case. Clearly release of information of this kind as well as at a more disaggregated level would attract the attention of the citizens and could be used to pressurise local authorities to implement, monitor and evaluate the scheme in a better manner. Even in a state like Tamil Nadu or Maharashtra where individual growth monitoring is being practiced, timely display of this information on proportion of children whose growth is faltering or all those who are catching up on growth is not available in public domain.

Catch-up Growth and Interventions

There is no doubt that a large part of the nutritional deprivation sets in very early in life and the first thousand days after birth are considered to be very crucial particularly for linear growth or for stunting. The ICDS programme is largely geared to address that phase of growth and most of the data gathered to assess the depth and breadth of undernutrition focus largely on children up to the age of 5 years. However, several

[14] Debroy (2013) points to a decline in moderately malnourished children in Gujarat by 2010-11 based on this report as an important achievement by this state ignoring the substantial increase in severely malnourished in this period. An assessment of underweight children across states based on this information provided by Ministry of WCD would be flawed as it covers only those children who were weighed at the AWCs. Since the weights have to be recorded regularly over the months it is also unclear if the data reported was at the same month of a given year or was it an average for that year in the states.

changes can be effected even at an older age including stunting which is the most prevalent form of undernutrition and is sticky in the sense that it has shown slower rate of change across the world after a certain level has been reached and is also more widespread even among the richer sections of the population in developing regions (Deaton and Dreze, 2009 and Webb and Block, 2011).

The relevance of heights in cognitive development and psychosocial abilities has been mentioned in several studies including recent evidence using the Young Lives data for four countries (Ethiopia, Peru, Vietnam and Andhra Pradesh in India) by Dercon and Sanchez (2008). Bharat (2011) found that compared to underweight, stunting mattered more in school performance assessed on the basis of performance in Math scores among 7-11 year olds in India based on the India Human Development Survey data for 2005-06.

The previous section largely discussed the correlates of undernutrition among small children and the governance issues related to it. A second and an important aspect that would be of interest from policy perspective would be to understand the phenomenon of 'catching-up' growth (or the lack of it) that is, the possibilities of reduction in undernutrition rates as the child grows older and the factors associated with it.

A brief summary of such a feature from the HUNGaMA report could be used to highlight this. In this report three groups of districts had been considered: (A) the group of (two) best districts each from the best-states mentioned above; (B) the group of (one) best-district from each of the states where the focus districts are from; (C) group of all other focus districts.

Stunting rates increase in all the groups peaking around 24-35 months with the group C district showing the least decline. The Group A and B districts start off at the similar rates within the first six months of birth but the latter group shows more increases in stunting rates as they grow and more so among the group C districts. In contrast to this, underweight rates are lower than stunting rates in all the groups but the districts in group B which had values close to that in group A in the first six months diverge out substantially and then get back closer by the age of five years which is also observed for the districts in group C. Marginal increases happen in all the groups but at different ages while the increases are far lesser than in stunting rates. Similarly, one observes that a fairly good proportion of children born with low birth weight are not undernourished by

either measure while undernourishment is also observed among those children who were above 2.5 kgs at the time of birth.

A follow up study in these regions among the same set of households would be useful to understand how the same group of children grow up and what determines the possibilities of moving out of undernourishment. Not many studies exist in India that have been able to assess and document the possible pathways through which this could happen with the exception of a recent study using Young-Lives data conducted in the state of Andhra Pradesh (Himaz, 2009). Firstly, it has been possible to document that there exist a sizeable number of children who fall-out of undernutrition due to the longitudinal nature of information collected in this survey. Two rounds of panel data on 7-12 year old children was collected which included anthropometric data and dietary intakes along with other socio-economic and infrastructure variables. Secondly, the study found that for children who catch-up, the protein and micro-nutrient content of the food intake is higher than those who do not show any change or show worse rates. The catching-up occurred more in the better-off region of the coastal district but was not observed in other districts. Among the (socially) excluded groups, girls were more likely to loose out that is, they were more likely to move into undernutrition even if they were not so before. Kalaisevi (2011) based on the IHDS data set observed that when compared to caloric or fat intake it was the protein intake in the diet of the households that appeared significant in explaining the variations in (z-scores of) height for 7 to 11 year olds across India. This aspect of protein diets playing an important role in determining stunting rates was first observed in Japan when most of the increases in linear growth occurred when protein content of the diets increased (Gopalan, 1992).

Though income may play a significant role in access to qualitative diets it would have been more useful to understand why access to protein based diets varied across the sampled households in the Andhra Pradesh study and whether the change was brought about due to sustained consumption of qualitative diets after controlling for other factors or that the access, affordability, awareness and/or absorption of food changed over the two rounds of this survey.

Studies based on the recent Young-Lives data for Andhra Pradesh show that MDM protects younger children from falling into undernourished state during shocks like drought and improves the overall nutritional status while cognitive skills are also better among those children who have participated in this (Singh, 2008 and Singh *et. al.,* 2012). Deodhar *et. al.* (2010) based on a study of schools in Ahmedabad showed that

inadequate hygiene while cooking and serving food, food safety, additional administrative work for the teachers and involving the students in managing the meal time activities act as hindrance in ensuring the effectiveness of the program. The Ahmedabad study also compared the on-site cooking in a few schools with the (predominantly) centralized cooking done by an NGO. The latter was more hygienic while cooking and provided more variety in the food but had problems in timely delivery during the lunch hour and cold food to far away schools as well as cleanliness while transporting food. Last but of utmost importance was that the diet provided under MDM was not balanced in proteins and fat content as well as micronutrients like Vitamin A, folic acid and iron (Jain and Shah, 2005; Deodhar *et. al.*, 2010; Planning Commission, 2010; Afridi, 2010)

Thus, first and foremost we do not have a recent nation wide data on the number of undernourished children in the age group of 6-12 years. Undoubtedly, MDM would ensure higher food consumption for the children than a direct income transfer or food stamps as a certain quantity and quality (diversified) of diets is ensured for these children and at the same time could also ensure intra-household equality particularly for the girl child. Further, it would avoid the black market sale of food stamps if that is considered as an alternative to such a scheme but most importantly provides nutritious food to the children while incentivizing children to attend school. MDM can also provide the scope for addressing micronutrient deficiencies by maintaining records of deficiencies among such children and monitoring them on a regular basis.

The management of the scheme by a separate set of personnel in the day to administrative matters and health monitoring and tips on general hygiene are essential to enhance the outcome from a nutritional point of view. The nutrient content of the food as mandated by the Supreme Court guidelines in 2001 (SC, 2001) was subsequently enhanced by the Ministry of Human Development (MHRD, 2011). This gives very broad guidelines and ignores the micronutrient aspect of the recommended diets. Focusing primarily on reducing hunger among children many not be adequate but hidden hunger should also be addressed. Thus, additional checks and balances have to provided at a local level to ensure that the food provided are balanced in the nutritional content, are palatable and has enough variety.

INTAKE INDICATORS OF UNDERNUTRITION

Comparing India's Status with Other Developing Countries

India as a country accounts for the largest number of undernourished people at 217 million in 2010-12 accounting for 25 percent of the undernourished in the world (FAO, 2012). The progress in reducing the number of undernourished has been very slow in India and in the South Asian sub-continent in general. India had about 240 million people undernourished in 1990-92 compared to that of China's of about 254 million. By 2000-02, India had 231 million and China 157 million thereby reducing the share of undernourished from 25 percent to 20 percent during that decade while India increased her share from 24 percent to 25 percent. The following decade saw China contributing 18 percent to the world's undernourished and India continued with the same share of 25 percent so that change for India since 1990 till 2010 was a decline of about 9.3 percent. However, the proportion of undernourished in the total population of India declined from about 27 percent to 18 percent in the past two decades showing that progress is insufficient for India to reach the Millennium Development Goal of halving the prevalence of undernourishment by 2015.

The *State of Food Insecurity Report* for 2012 shows that a higher rate of GDP growth rate is necessary for reducing undernourishment but public action in the form of equitable access to resources by the poor, women's empowerment and better design and implementation of the social protection measures is highly important. The report further stresses the need for improved governance systems allowing for increased participation of the poor in the productive process and ensuring human rights and enforcing the law for the effectiveness of the public policies. Since most of the poor are engaged in agricultural activities, agricultural growth seems to be the key to promote reduction in poverty and hence hunger and undernutrition. Clearly India has been lacking in this aspect even though its overall GDP growth has been remarkable in the last two decades.

India's per capita GDP averaged around 4 percent in 1990s, increasing to about 7 percent in the 2000s while the agricultural GDP per capita grew around 3 percent during this entire period (Planning Commission, database[15]). The agricultural GDP per agricultural worker rose from USD 182 to USD 246 between 1999 and 2009 for India in constant 2000 USD based on FAOSTAT data. Thus agricultural productivity also seems to have increased but was not of the same pace as for China or a smaller country like Vietnam. Finally, the decline in undernourishment rates is accompanied not only by

[15] Please see, *planningcommission.nic.in/data/datatable/0205/databook_comp0205.pdf*

increases in per capita per day availability of calories (DES) but also increased dietary diversity. The share of cereals and tubers declined from 65 percent in 1990-1992 to about 60 percent in 2010 indicating the decline has been slow and in fact stagnant in the last few years.

Changes in Indian Consumption Pattern

Using the adult male's requirement (moderate work norm for rural and sedentary work norm for urban) as the numeraire the ratios for the other members of the household form the scaling factor for calculating the consumer units that is, the adult equivalent household size. Between 1983 and 1999-2000 the mean per consumer unit calorie intakes declined more for the richest quintile and improved for the lowest quintile in rural areas for some states while for urban it improved for both ends of the income quintile as shown in Table 2. Both these changes of course have a similar impact of a reduction in inter-quintile ratio between the bottom most and the topmost.

Table 2: Mean per Consumer Unit per Day Caloric Intakes of the Poorest (Q1) and Richest (Q5) Quintile, 1983, 1993-94 and 1999-2000: Rural and Urban

	Rural						Urban					
	1983		1993-94		1999-2000		1983		1993-94		1999-2000	
	Q1	Q5	Q1	Q5	Q1	Q5	Q1	Q5	Q1	Q5	Q1	Q5
Andhra Pradesh	1902	3430	1824	2952	1783	2827	1451	2734	1427	2315	1852	2912
Bihar	1765	3644	1815	3089	1931	3132	1534	2849	1563	2610	1838	3023
Gujarat	1820	3285	1741	2892	1801	2786	1351	2653	1414	2348	1797	2715
Haryana	2085	4457	2027	3973	2012	3642	1537	3140	1525	2493	2076	2831
Himachal Pradesh	2115	4014	2083	3327	2304	3392	1355	3443	1880	2857	2386	3680
Karnataka	1710	3857	1753	2978	1715	2895	1401	2960	1370	2362	1741	2766
Kerala	1452	3329	1520	2930	1586	2869	1192	3382	1221	2383	1562	2896
Madhya Pradesh	1987	3871	1880	3188	1821	3007	1652	2817	1533	2401	1859	3175
Maharashtra	1981	3292	1709	2890	1822	2731	1486	2845	1458	2289	1930	2712
Orissa	1606	3507	1901	3089	1888	2955	1558	2998	1630	2611	2061	2986
Punjab	2057	4420	2058	3596	2046	3590	1269	3083	1470	2447	1935	3034
Rajasthan	1531	4280	2186	3576	2210	3563	1574	3123	1592	2422	2127	3399
Tamil Nadu	1064	3480	1521	2809	1499	2629	1173	4335	1255	2351	1635	3022
Uttar Pradesh	2017	3934	2062	3451	2119	3475	1482	2741	1567	2620	1864	3116
West Bengal	1412	3550	2011	3136	1828	2978	1412	2756	1556	2356	1901	2925

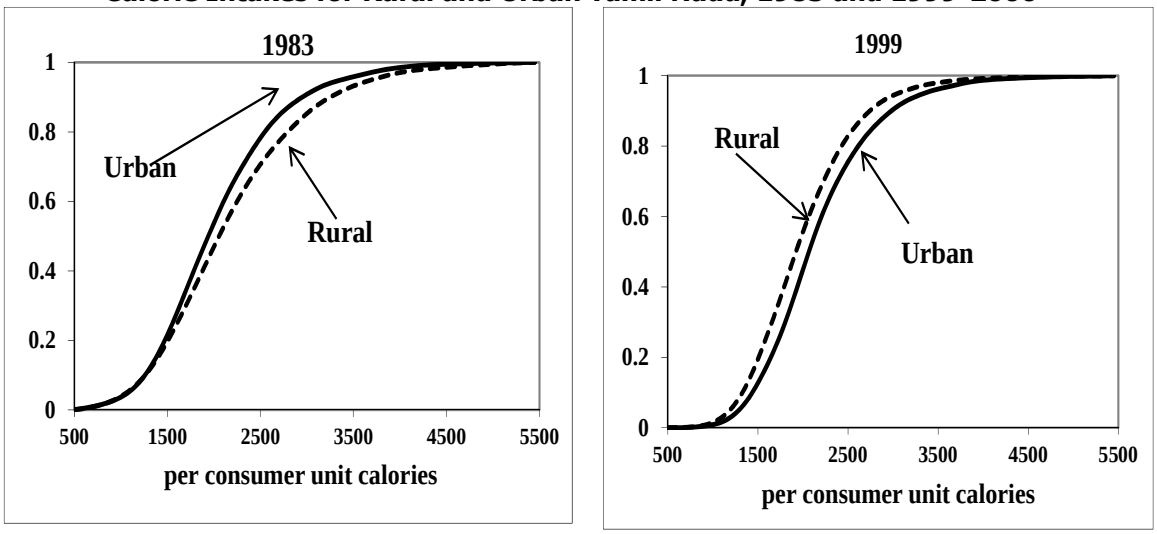
Notes: For rural areas the norm specified for moderate work is chosen while for urban it is based on sedentary work norm as given in Gopalan et al (2002). These norms are different only for the adult male and female and are the same for children in different age groups and the methodology to arrive at these numbers are discussed in Viswanathan and Meenakshi (2006).

Source: Authors' own calculations based on unit record data for the respective NSS rounds.

Rural-urban comparisons over time present an interesting picture. The observed intakes in most states for urban lagged behind the rural in the early 1980s and this was to be expected given that the urban activity levels are lower than rural. However this

situation changed by 1999-2000 despite accounting for differences in both household composition and (average) activity levels as seen in Table 2 for the bottom 20 percent and top 20 percent. There is a clear first order stochastic dominance of rural over urban in 1983 for all states while exactly the reverse holds for all the states with exceptions like Punjab and Haryana. This is illustrated for the state of Tamil Nadu in Figure 7.

Figure 7: Cumulative Distribution Function of per Consumer Unit per Day Calorie Intakes for Rural and Urban Tamil Nadu, 1983 and 1999-2000



Source: Author's own estimates.

Punjab and Haryana are the two states which in 1999-2000 also continued to have a higher domestic product from agriculture while a turn around in this structural composition of the domestic product for all other states have taken place by this period. Also to be noted that these two states have higher average rural heights for men and women as shown in an earlier section.

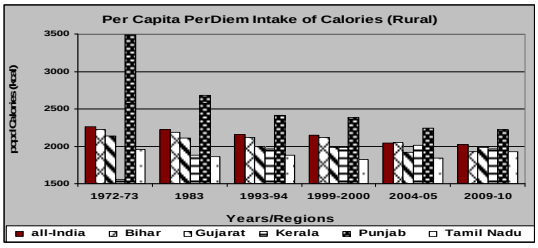
The regional pattern of macronutrients (calories, proteins and fats) shows that there is a decline in per capita caloric consumption and that the different states as well as rural and urban areas seem to be converging towards similar per capita per diem caloric intakes (Figure 8). Protein intakes had gone up for southern states like Kerala and Tamil Nadu while Punjab has shown a drastic decline along with a milder decline in Bihar and Gujarat. The changes in fat intakes show substantial increases in all regions but there is no convergence as yet. There does not seem to exist studies that correlate regional intake patterns with adult BMI and heights as we do observe that regions like

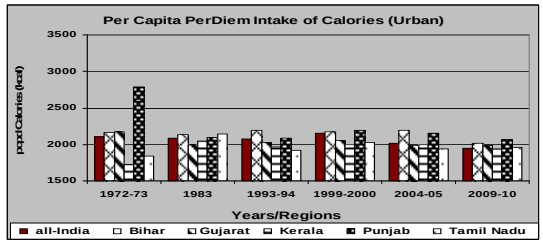
Kerala and Tamil Nadu show increases in protein intakes which have shown large improvements in adult heights but these regions have also increased their fat consumption substantially with increase in obesity.

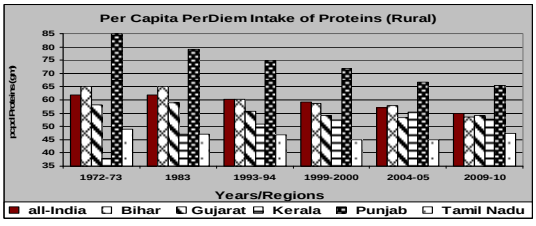
The important findings on patterns and trends of other nutrient intakes from these studies are mentioned below.

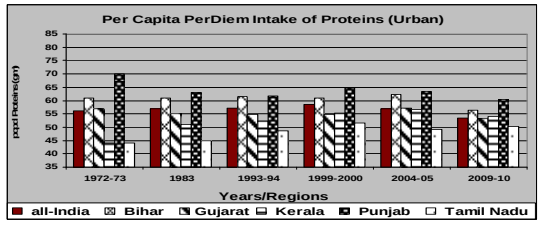
Proteins: In absolute terms intake of protein declines in several states particularly in rural areas. In several states even the richest quintile in the rural areas show a doubling in deprivation rates while in a few states like Kerala, Punjab and Rajasthan there is a decline in deprivation rates. Though cereals still account for a large share but there has been some improvement in the share from milk and milk products due to a marginal improvement in the quantity of intakes (Meenakshi and Viswanathan, 2003 and Sharma, 2006). The contrast between rural and urban areas is rather substantial more so in states where the deprivation rates are rather high in rural and worsened over time. The urban areas show a large decline in the share of proteins from cereals but their share from milk and milk products double while that from pulses and oilseeds which are anyway far higher than rural to begin with, improves further. Thus, if one identifies the reasons for the differing directions of change in rural and urban areas it will help in devising an appropriate intervention policy suited to the local demand and tastes.

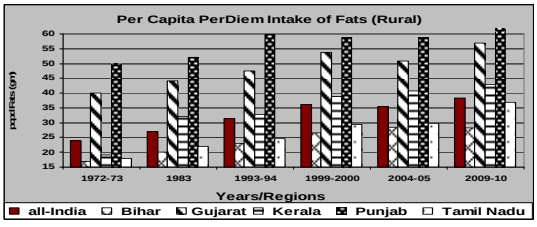
Figure 8: Per Capita Per Diem Consumption of Calorie, Protein and Fats, 1972-73 to 2009-10, Select States

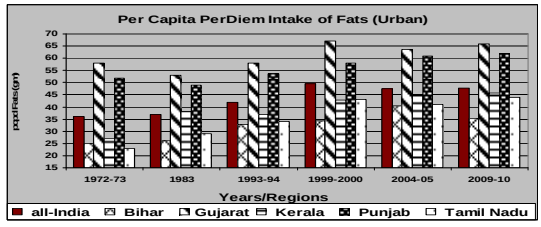












Source: Various rounds of NSSO.

Lipids and Fats: Dorin (1999) studies the consumption of lipids (a rare way of assessing fat intakes) in India.[16] In 1996 he found that about 16 percent of the DES is contributed by supply of lipids which is only marginally higher than the recommended rate of 15 percent. Of this more than 70 percent had come from plant products while in the developed countries the share from plant products was only about 40 percent and the remaining from animal products. The study highlights strong impact of regional tastes and preferences on the supply of the different types of lipids across India and varying levels of intake. In the southern states vegetable oils are predominant, in the north it is mainly butter and ghee, in the west milk forms the main source while the rural areas of

[16] Lipids are a concentrated source of energy: while on an average, one gram of carbohydrates or proteins provides 4 kilo-calories, one gram of lipids produces 9 kilo-calories. Lipids are consumed either in their 'visible' form as butter, oil and margarine or in their 'invisible' form as components of other foods like cereals, meat or milk. On the one hand, lipids are also a source of fatty acids which, enhance the acceptance of food and its palatability but equally importantly carry and help the absorption of fat-soluble vitamins like A, D, E and K. On the other hand, a diet particularly rich in lipids, especially of animal origin which have a large content of saturated fatty acids is conducive to obesity and to cardio-vascular diseases.

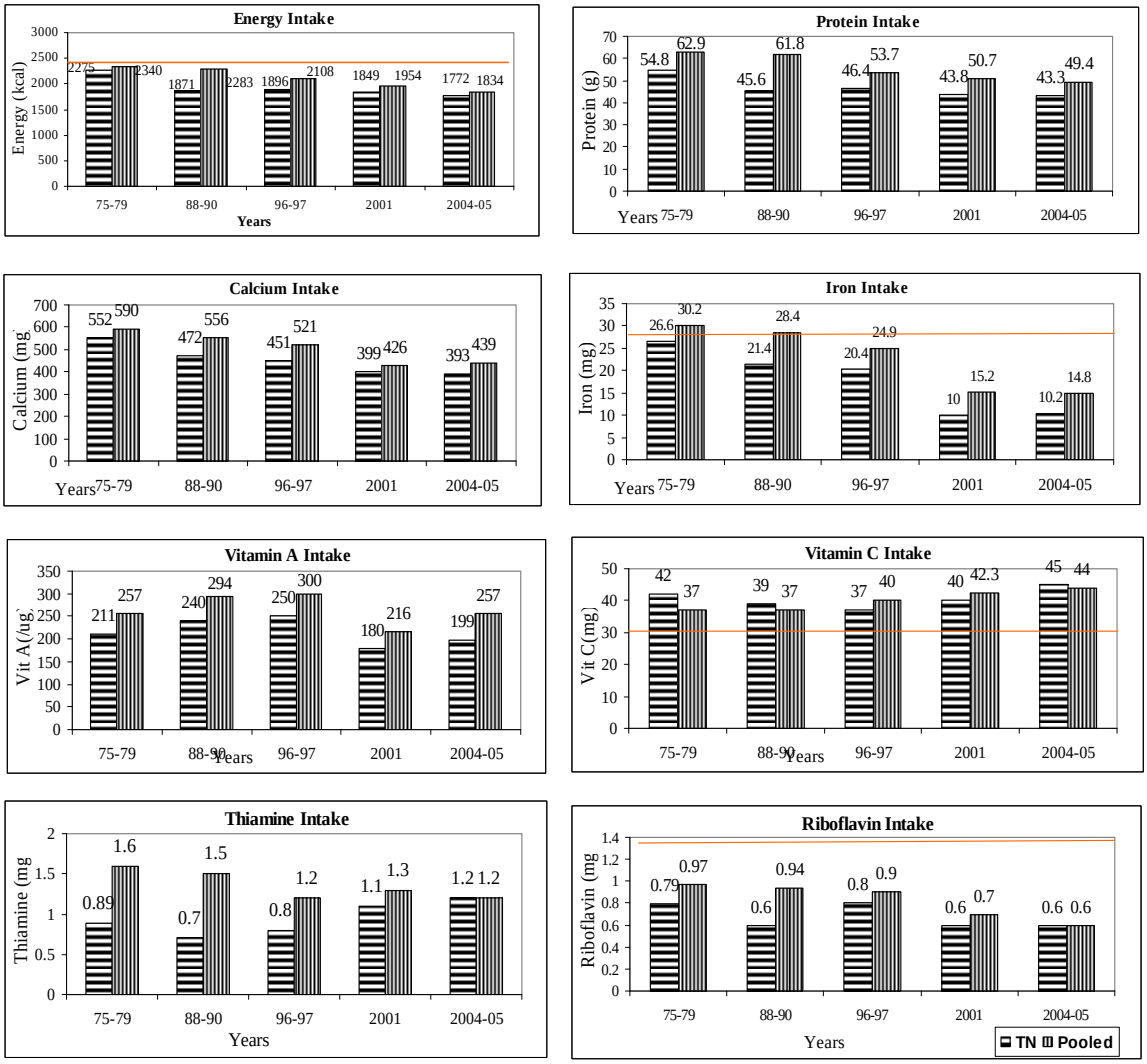
east show nutritional deficiency. Sharma (2006) on the basis of a more recent data of 1999-2000 finds that the average fat intake in the rural areas has gone up since 1983 and has mainly come from the increase in vegetable oils and ghee rather than from other sources. Though the average intake goes up marginally even among the poorest quartile (bottom 25 percent), the head count ratio of fat deprivation is still about 98 percent in all the states except Gujarat, Haryana, Himachal Pradesh, Punjab and Rajasthan where the range varies from 70-80 percent. On the other hand the richest quartile shows a wide variation in the deprivation rates; more than 60 percent of them in Bihar, Orissa and West Bengal while the better off ones mentioned above have rates ranging between 2-5 percent; among the southern states Kerala has very low rates of about 13 percent while the others have it in the range of 30-45 percent. When compared to 1983 these deprivation rates in 1999-2000 declined substantially among the richest quartile for all the states while poorest quartile gained mainly among the better off ones. The changes in urban areas, the inter-state variations and the differentials between economic classes are to be analysed.

Micronutrients- Vitamins and Minerals: Shariff and Mallick (1999) show that in 1993-94 the per day iron intake was below the RDA for 60 percent of rural and 80 percent of urban population. By 1999-2000 there is a further decline in average intake mainly caused by the decline in cereal intake which once again forms the dominant source but other sources like that from green leafy vegetables also do not improve (Sharma, 2006). This study based only on the rural population finds that among the richest 25 percent (and more so among the better off states like Punjab and Haryana) the average intake, head count ratio, depth and severity of deprivation are much larger than the poorest 25 percent; in fact, the last of the two measures do not show a decline in the bottom quartile. This finding is rather different from that of other nutrients. Vitamin A shows a large variation across states as it has many sources and this is affected by the local preferences while cereals constitute just about 50 percent of it. All the southern states along with Gujarat and Maharashtra have far lower intakes compared to the northern states but not all the states show a decline in average intakes for the rural areas. This clearly results in higher deprivation rates among these dates and is further corroborated by the prevalence rate of Bitot spots in these states as shown in Sharma (2006). Vitamin C is the only outlier nutrient whose consumption has increased and hence the decrease in head count ratio between 1983 and 1999-2000 from 68 percent to 44 percent in rural areas covering the major states. States like West Bengal and Bihar have far lower head count ratios while the southern states have the highest at about 50 percent and above.

NNMB data for rural India in some states gives a temporal picture of the changes over time as shown in Figure 9. The comparison between Tamil Nadu and the pooled states shows that iron intakes have declined substantially while Vitamin A intake which declined seems picking up. On the other hand Calcium intake which had declined is still within the Required Dietary Adequacy while Vitamin C has been more stable. These patterns have also not been adequately studied and also the variations across states in this pooled sample as well as across different social and economic strata.

The intervention for micro-nutrient deficiency has to be addressed both by drug based approach and food based approach. ICDS centers and Mid-day meal schemes can provide variety of diets in an appropriate manner to suit the needs of the children taking into consideration palatability, variety and age of the children. Fortified ready to eat food items for these children is being provided but its impact and preference have not been discussed in the literature. Biofortified crops are still at a very nascent stage in the Indian context for the food items consumed by a large mass of the people like rice and wheat. The merits of this aspect of enriching food with higher nutrients so that all the members of the household have access to it have to be understood and the cost of cultivation as well as its uptake for direct human consumption has to be studied. Such programmes are yet to take off in a big way.

Figure 9: Changes in Macro and Micronutrient Intake: Tamil Nadu and 'Pooled' States, Rural



Source: Various reports of NNMB.

Comparing Outcome with Intake Indicators

Furthermore, what is more compelling to note is that average per capita caloric intakes are declining over time while average per capita fat intakes are increasing (GOI, 2006). On the other hand, there is a stronger correlation between underweight and stunting rates of children across states of India while similar indicators for adults - body mass index and heights- have a far lower association (see Tables 3 and 4 below). These two

observations based on the nutritional intake and outcome indicators as well as their limited association with income based measures of well-being are rather peculiar to India. There have been several studies which use only one or the other nutritional indicator to assess its linkage with poverty but very few studies exist that make a combined assessment and the factors that influence it (MSSRF, 2003: Rural and Urban Food Insecurity Atlas).

Table 3: Correlation between Individual Components of Global hunger Index, 2008

	Proportion of Calorie 'poor'	Underweight Rate among 0-3 year old children	Under five Mortality Rate
Proportion of Calorie 'poor'	1		
Underweight Rate among 0-3 year old children	-0.08	1	
Under five Mortality Rate	-0.46*	0.76*	1

Note: * represents significance at 10 percent level of significance and the correlation is estimated across the states of India.

Source: Menon, *et. al.* (2009b).

Table 4: Spearman Rank Correlation between Different Nutrition Indicators Across States of India, 2004-2006

	Mean BMI	Median Heights	PCSDP	Poverty rate	Hgt-2sd	Wgt-2sd	CED	Proportion below 145 cms	Mean PC-calo	mean PC-prot	mean PC-fat
Mean BMI[1,a]	1										
Median Heights[1,a]	0.4677*	1									
PCSDP [b]	0.8314*	0.4365*	1								
Poverty rate [c]	-0.8481*	-0.6034*	-0.6965*	1							
Hgt-2sd [2,a]	-0.7059*	-0.4956*	-0.5722*	0.6749*	1						
Wgt-2sd [2,a]	-0.7615*	-0.3215	-0.6474*	0.7667*	0.8802*	1					
CED [1,a]	-0.9479*	-0.5463*	-0.7281*	0.8246*	0.7696*	0.8719*	1				
Proportion below 145 cms of adult height[1]	-0.5189*	-0.9794*	-0.5140*	0.6368*	0.4809	0.3421		1			
Mean PC-calo [3,d]	0.0667	0.2020	-0.2246	-0.3018*	0.0939	-0.0702	-0.1409	-0.2123	1		
mean PC-prot [3,d]	0.0720	0.4954*	-0.0965	-0.2860	0.1615	0.0825	-0.1579	-0.4895*	0.7614*	1	
mean PC-fat [3,d]	0.6216*	0.7317*	0.6193*	-0.7000*	-0.3098	-0.3649	-0.6298	-0.7825*	0.6368*	0.6368*	1

Notes: BMI: Body Mass Index; PCSDP: Per Capita State Domestic Product; CED: Chronic Energy Deficiency or the percentage of population below BMI of 18.5; hgt-2sd: Proportion of children (0-3 years) below two standard deviation of reference height; wgt-2sd: Proportion of children (0-3 years) below two standard deviation of reference weight; PC-calo: Per Capita Per Diem Caloric Intake; PC-prot: Per Capita Per Diem Protein Intake; PC-fat: Per Capita Per Diem Fat Intake

(1) For adult women between 15-49 years; (2) For children between 0-3 years; (3) Mean of the ratio of household intake to household size

(a) IIPS (2007); (b) and (c) Planning Commission; (d) GOI, 2007.

Source: Author's estimates based on various reports mentioned above.

Food Security and Public Policy

The Public Distribution System in India has largely focussed on cereals and hence the assessment on its impact of nutrients is through caloric intakes. Cereals have also been a good source of proteins and micronutrients in the case of coarse cereals in the predominantly poor households. The changes in consumption patterns away from coarse cereals has affected intake of both these nutrients.

In this context it may be worthwhile to consider a cash transfer scheme so that dietary diversification may be possible if there is access to a diversified diet. Galab and Reddy (2011) found that agricultural households who were able to sell their produce in the market were able to have a more diversified diet compared to those who depended predominantly on their own home-grown consumption. On the other hand in Mexico, the (conditional) cash transfers (Progressa) results in higher consumption of calories while production assistance (Procampo) for small farmers resulted in a more diversified diet coming from their own farm consumption. There is very limited analysis in the Indian context to this effect and no study seem to have been carried out on the impact of various types of farm and non-farm interventions or even about NREGA on the impact of quantity and quality of diets. Khera (2011) in a study of the performance of PDS in a few states of India finds that in regions where there are lower leakages from (universal) PDS, the people have stated a preference for the continuation of it while in regions with targeted PDS along with higher levels of leakage there is a somewhat higher preference for cash transfers.

CONCLUSION

This study is an attempt to organise the information that captures different dimensions of nutritional deprivation through outcome and intake measures at a national and sub-national level as well as for population groups to highlight the spread and intensity of the problem. Simultaneously it also summarises and links the findings across various studies that focus on governance issues addressing nutritional security.

The much talked about estimates by Chen and Ravallion (2008) shows that India accounted for one-third of the world's poor (using the "$ 1.25 a day" poverty line) in 2005 which is about 40 percent of Indian population. The Human Development Index ranks India as 136 among 178 countries and Global Hunger Index ranks India as 65 among 79 developing countries (IFPRI, 2012). These deprivations are clearly in contrast

to the country's GDP growth of above 6 percent in recent times while attracting large foreign direct investment even during the global recession.

Regions and population groups largely dependent on agriculture are usually poorer and more undernourished, assessed either through nutritional intakes or nutritional outcomes or both. This has also been the case for India however it is also observed that regions which are very prosperous in agriculture like Punjab and Haryana have had low undernourishment and poverty rates. Studies have also shown that sustained agricultural growth has a direct impact on poverty reduction leading to a reduction in undernutrition (Christiaensen *et. al.,* 2010, de Janvry and Sadoulet 2009). Given that undernourished are mainly in rural areas engaged primarily in agriculture, this pathway has to be explored while we see a large disconnect between the two as shown by studies conducted by TANDI (IFPRI, 2011). Further access to a diverse food basket alone does not seem to reduce undernutrition in a big way and hence involvement of government departments in a more integrated manner so that clean sanitation and water and access to health facilities in a timely manner with good quality service are provided. Social and cultural aspects that govern intra-household distribution of consumption, the status of women and feeding and care practices in general have to be dealt by creating awareness with demonstration of the impact of best practices. With the involvement of celebrities in the undernutrition campaign, one hopes that some message is carried through in this aspect.

The study emphasizes for a more decentralised approach of data gathering and monitoring and periodic reporting of nutrition indicators and correlated factors so that lagging regions can be separately dealt with. In regions where there is a large burden of undernutrition, the focus should be on involving the local community in service delivery and monitoring particularly the ICDS and Mid-day Meal Schemes which have been successful when the administration involved the community effectively. Adequate staffing and remuneration of the bottom end services and delineation of tasks at various levels of service delivery has to be ensured. Making social audits mandatory in these regions could be a challenge but external agencies can be involved and there may not be dearth of people willing to lend their assistance. Finally in a fast growing country like India with enormous technical and financial capabilities, resources to improve the nutrition outcomes should not be a matter of concern. An alert media supported by a polity and administrative machinery sensitive to the needs of the undernourished is the need of the time.

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