9. Conclusion

[S]ince government is necessary to mankind, they believe, that the common size of human understanding is fitted to some station or other; and that Providence never intended to make the management of public affairs a mystery to be comprehended only by a few persons of sublime genius.

(Swift, 1726)

9.1: OVERVIEW
Child undernutrition is one of the most topical issues facing the Indian economy. It has many puzzling facets that have attracted great scholarly attention but are yet to be understood clearly. In this thesis, we have examined different aspects of child undernutrition in India. Measurement of undernutrition has a rich history, with roots in the science of nutrition and relevance in economics and politics. While much of the literature on measurement has dealt with the aptness of growth references and growth standards, recent studies have attempted to look beyond the headcount of undernourished by drawing from the literature on poverty measurement. We have proposed a new measure of undernutrition, the mean of squared deprivation gaps (MSDG) and have argued for its suitability by drawing explanations from the biomedical literature on the subject. In Chapter 3 we have made state-wise comparisons of the value of our measure of undernutrition vis-à-vis the simple headcount or average figures. The fourth chapter has looked into the determinants of child nutrition, not only modelling the conditional mean, but also treating the conditional quantiles of nutritional status as the dependent variable. We have attempted to find out the correlates of child nutrition, investigating how their effects vary along the distribution of nutritional status. Using the recently applied technique of quantile regression in the context of IHDS data, we have particularly looked into the roles of household economic status and public policies in determining child undernutrition and have come up with the finding that nutritional policies often do not cater to the worst affected children. The fifth chapter has introduced the issue of inequality in child nutrition. Discussing the difference between and the debate around pure (univariate) and socioeconomic (bivariate) inequalities in health, we have elaborated our findings on the former type of
inequality in child nutrition. In the sixth chapter, we have proposed a new measure of the latter type of inequality, based on our undernutrition measure MSDG. The literature on nutritional inequalities has so far concentrated on inequalities along single dimensions of social power such as wealth, caste and gender. In the seventh chapter, we have tried to analyse the issue of multivariate, intersectional inequalities in child nutrition in India. Given the well-documented reality of gender disparity in India, we have probed deeper into the apparent non-significance of gender in the determination of child nutrition in India. Applying the framework of intersectionality introduced in Chapter 7, the eighth chapter has examined how gender interacts with caste and class in shaping child nutrition. We have found that gender disparity is widespread particularly among non-poor upper caste Hindus.

9.2: MAJOR FINDINGS OF THE STUDY

Figure 9.1 summarizes the issues studied in this thesis. We look beyond averages and focus on the distribution of nutritional status in our analysis of measurement and determination. We provide a comprehensive description of nutritional inequality (comprising univariate, bivariate and multivariate inequalities).

Figure 9.1: Schematic Representation of Research Issues
9.2.1: Findings on Measurement of Child Undernutrition in India
As soon as we move to our measure of child underweight, the MSDG, we observe changes in the relative performance of the states. Although there is a strong positive correlation between state ranks according to average underweight and those according to MSDG (Spearman’s rank correlation coefficient being 0.93, significant at 1% level), only three states are able to retain their ranks when we use the MSDG instead of the average underweight rates as the ranking parameter. For instance, the relative positions of states like Andhra Pradesh and Assam do not remain as impressive when we incorporate the dimensions of intensity and severity of child underweight. Uttaranchal, Karnataka and Rajasthan also perform worse with respect to MSDG than simple average rates. The exactly opposite picture is observed in West Bengal, Orissa, Gujarat and Maharashtra, whose performances look better when we consider the distribution of the underweight children. However, irrespective of the ranking criterion, Kerala, Tamil Nadu and Punjab retain the top three positions while Madhya Pradesh, Bihar, Jharkhand and Chhattisgarh have the worst outcomes.

9.2.2: Findings on Determination of Child Undernutrition in India
Albeit most of the literature on determinants of nutritional status of children has relied on conventional least squares regression techniques, the resulting estimates of covariate effects on the conditional mean of nutritional z-scores may not always indicate the size and nature of these effects on the lower tail of the z-score distribution. To focus directly on the lower tail, some recent studies have wielded binary response models (logit or probit) for low nutritional status (typically defined as anthropometric z-scores below the fixed cut-off of -2). Quantile regression complements these earlier methods of analysis and offers a more complete picture of the differential effects of covariates by modelling a series of conditional quantile functions.

Using quantile regression we have found that while the presence of government facilities is able to make a positive difference for the relatively well-off children, not much benefit accrues to the worse affected children. While children at the lower end of the distribution of well-being derive significant benefits from the
existence of AWC’s, mere existence of a health sub-centre, that remains open at least once a week, fails to make any effect on their status. Moreover, government facilities are overall ineffective for such children. In contrast, while relatively better off children do not derive significant benefits from the presence of AWC’s, healthcare facilities and government infrastructure in general do contribute to promote their well-being. Public initiatives, (particularly healthcare programmes) need to target the children at risk and design special intervention programmes for them so that the benefits actually reach the most deserving. Contrary to the findings of the previous literature, we find a consistent and positive effect of household incomes throughout the distribution of nutritional status. Poverty alleviation programmes would thus be effective to improve the lot of the worst affected segments of the child population.

9.2.3: Findings on Inequality in Child Undernutrition in India

As described in Figure 9.1, we have analysed three types of inequality in nutritional status, namely univariate, bivariate and multivariate.

Univariate Inequality

In Chapter 5, we have examined which factors have an equalizing effect and which factors further increase the dispersion in child nutrition. While parental education decreases pure inequality in nutrition, maternal age and access to piped water operate as disequalizing forces. Again, deprivation of children belonging to lower age groups and backward castes is significantly greater at the lower end of the distribution. Pure inequality does not differ significantly across gender. Maternal stature and toilet facilities also make no significant contribution to the dispersion. Coming to our research question on the role of private incomes and public services in equalizing nutrition, we find that while increase in household wealth reduces dispersion in nutrition, the public facility index, G, fails to make any significant impact on inequality. As on the level of nutrition, public factors also have divergent effects on pure inequality. While the presence of public AWCs has been successful in reducing nutritional inequality, the existence of health sub-centres has had a disequalizing effect on children’s nutrition.
Bivariate Inequality

The MSDG is suitably decomposable across population subgroups and allows the demarcation of the relative contributions of the subgroups to total undernutrition. Using this feature, we have calculated the MSDG for each quintile and the share of each wealth quintile in total MSDG. Using those values, we have calculated the CI_{MSDG} to assess the extent of wealth-related inequality in child underweight, which is now measured as a composite concept. Although we have illustrated our case using the level of household wealth as the basis of group formation, this approach can be extended to study health inequalities across groups formed on the basis of gender, place of residence (rural/urban), social class, educational attainment, income levels or other relevant parameters.

Comparing our estimates of CI_{MSDG} with those of CI_G, we observe that there is a reversal in ranks of all states except Uttar Pradesh and Punjab. Kerala, the best performer with respect to average underweight, is no longer one of the worst in terms of equity. Although Punjab still has a high degree of socioeconomic inequality in child underweight, Tamil Nadu, the state with the third lowest average underweight, goes through a drastic rank reversal, moving up the league table by eight places. Maharashtra, Kerala, Uttarakhal and Assam gain six, five, three and three ranks respectively. On the contrary, Karnataka, Haryana, Gujarat and Chhattisgarh perform worse by seven, seven, five and four ranks respectively when we go by CI_{MSDG} instead of its conventional counterpart, CI_G.

We observe that the trade-off between average underweight and wealth-related inequality (which is much discussed in health-equity research) is dampened when we try to account for wealth-related inequality in the various dimensions (instead of just levels) of underweight. Spearman’s rank correlation coefficient between state ranks according to average underweight and those according to concentration index of underweight MSDG is -0.46, which is not significant at 1% or 5% level. The corresponding figure for average underweight and CI_G is -0.8, significant at 1% level.
**Multivariate Inequality**

In Chapter 7, we have explored the differences in intersectionality in different social settings by making \( \binom{8}{2} = 28 \) pair-wise comparisons among the eight groups (PSG, PSB, POG, POB, NPSG, NPSB, NPOG, NPOB) at three levels of rural geography: north, south and the entire country. Investigating the relative strengths of various inequalities, we have found that while class inequalities dominate caste inequalities and caste inequalities dominate gender inequalities in all levels of stunting in rural North India (the same result being reflected when we consider all-India rural data), the importance of caste and wealth inequalities is similar for any stunting in rural south India. In contrast, caste inequalities dominate class inequalities and class inequalities dominate gender inequalities in severe stunting in rural South India.

The next chapter elaborates on gender inequality in the intersectional framework and concludes that policy makers need to be aware of the differential way in which gender bias operates in different sub-groups of the population, classified according to religion, caste and economic class. Gender inequality deserves attention in spite of the overall non-significance of the child’s sex as a covariate of nutritional status. Moreover, children in different social settings need customized policy attention instead of a one-size-fits-all approach. For instance, non-poor ST girls deserve special attention, though they are not victims of wealth related disadvantage. Again, though non-poor upper caste Hindu girls have better nutritional status than girls from other social settings, their situation deserves the attention of policy makers, given the bias that operates in favour of non-poor upper caste Hindu boys.

**9.3: LIMITATIONS OF THE STUDY**

Though in the fourth, seventh and eighth chapters we work on the covariates of nutritional status, we cannot draw conclusive evidence on the effect of each and every covariate. This is because of difference in data sources and subsets of analysis. Given the huge difference in rural and urban anthropometric scores of children, rural rates of decline in undernutrition also being much lower than urban rates, we have focused exclusively on rural children in the fourth and seventh
chapters. However, while the former analyses IHDS data, the latter works on NFHS-3 data. We have used IHDS data in the fourth chapter since it contains information on household per capita consumption (not available in NFHS-3) that we needed for 2SLS analysis. In the eighth chapter, we have used NFHS-3 data on the all-India population of children. The purpose of this chapter was to explain the inconclusive evidence of gender disparity in stunting status among the child population of India, investigating gender disparity in different gender-religion-caste-class groups. To disaggregate the different social settings, we had two economic classes, two religious groups and four caste groups. Thus we first had Hindu and Non-Hindu children (the latter taken as one class due to small sample size). Next we had sixteen groups of children in the caste-based Hindu society. Only all-India data would permit such a detailed classification.

As in most other studies on determinants of child nutrition, R-squared values in our analyses are also typically very low. This hints that in spite of attempting a complete specification, our models have failed to capture certain unobservable behavioural and cultural factors. Collection of primary data might be helpful in this regard. However, the framework of household model does not permit the treatment of direct inputs into the nutrition production function as covariates.

We have worked with cross-section data which has enabled us to delineate the covariates of child nutrition without hinting at the direction of causality in econometric parlance. For that we would need to analyse panel data on relevant variables.

Though we have worked on nutritional inequalities at substantial length (in the fifth, sixth, seventh and eighth chapters), we end with the cautionary note that the notion of deprivation seems to be more meaningful than that of inequality in the context of non-income indicators such as health outcomes. While numerous studies have dealt with nutritional inequalities, applying modified variants of commonly used income-inequality measures to the continuous distribution of anthropometric z-scores, we point out that the interpretation of the monotonicity property of the
nutritional distribution substantially differs when we consider the distribution of z-scores (in contrast to the income distribution). While greater incomes are unambiguously more valuable to the individuals throughout the income distribution, we do not have similar evidence from biomedical literature in the context of nutritional distributions. While the increasing severity of physiological outcomes is well documented as we move further below the cut-off of -2, we do not know how the physiological improvements behave above the said cut-off. An increase above the cut-off of +2 however is considered to be physiologically detrimental and the consequences of overweight and obesity are again well-documented. This peculiarity of the nutritional distribution might render the variants of income-inequality measures not so meaningful. Deprivation measures such as the MSDG seem to aptly describe the situation because of its exclusive focus below the cut-off of -2. However, this problem does not assume much practical relevance in case of India since the proportion of children above the cut-off of +2 is negligible here. Also, the problem is overcome when we consider group inequality measures based on percentage of undernourished children in each group. Following this logic, category-based studies on covariates seem to have a natural advantage over person-based studies using OLS, 2SLS and QR.

We conclude that ranking the performance of spatial units such as countries and states on the basis of nutritional inequality measures alone does not seem to reveal much. However, measures of inequality may be combined with average figures (indicating the level of deprivation) in order to indicate the relative performance of regions. Such measures would typically resemble the achievement index studied in Chapter 6.

9.4: SCOPE OF FURTHER RESEARCH

We conclude from our analysis in the previous chapters that a primary survey might illuminate the role of cultural and behavioural factors at the household and community level in shaping nutritional outcomes of children. As discussed in the previous section, we have worked with cross-section data which helped us delineate the covariates of child nutrition without indicating the direction of
causality. Panel data analysis would enable us to overcome this limitation. NCAER survey data of 1993-94 and IHDS data of 2005, both publicly available, may be suitably merged to form such a panel. Our analysis has been limited to the sole country of India. A cross country analysis (using the publicly available DHS datasets) might help us understand how the covariates operate in different socio-cultural contexts. Using district level data from DLHS-2, further work on spatial inequality in child nutrition would be both revealing and interesting. Using district level data, we may also investigate the role of agriculture in shaping nutritional outcomes of children in India.