

Introduction



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Despite a significant increase in the per capita food production in India, hunger and malnutrition are still quite high. The recent SDG Index of the NITI Aayog (Government of India, 2020–21) shows the SDG-2 Index score in 2020–21 for the country stands at 47 as against the target of 100. Indeed, in most of the SDG-2 indicators the country stands well below the target. For instance, 50.4% of pregnant women aged 15–49 years and 28.4% of adolescents aged 10–19 years are anaemic, both of which are twice their respective target levels. The indicators for children are even more alarming. The report shows that 33.4% and 34.7% of children under 5 years are underweight and stunted, respectively, as against their target values of 1.9% and 6%. Even the related indicators for agriculture production show that the country lags the targets significantly. Per hectare production of rice and wheat in the country is about 3 tonnes, whereas the target is 5.3 tonnes, and the gross value added per worker in agriculture at constant prices stood at ₹71,000 against a target of ₹122,000. The only bright spot is that the percentage of beneficiaries covered under the National Food Security Act (NFSA), 2013, is 99.5% just a shade below the target of 100%. This clearly shows that India is at a high risk of missing the target of achieving the SDG 2.1 target of zero hunger by 2030. The same NITI Aayog report also shows that there is significant variation across the States and Union Territories on all these indicators, highlighting the need to achieve food security by adopting a targeted approach for providing balanced and adequate nutrition to all citizens across the country.

Food security refers to ensuring ‘that all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food that meets their food preferences and dietary needs for an active and healthy life’ (FAO, 1996). As per the

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Food and Agriculture Organization of the United Nations, there are four pillars of food security, viz., availability, access, utilization, and stability (FAO, 2006).

Given this definition of food security, achieving SDG 2 requires an integrated approach through coordination and concerted efforts from a host of stakeholders. This book takes such an integrated approach by examining diverse aspects of food and nutrition security. While being rooted largely in Economics, the book takes a multidisciplinary perspective spanning Agricultural Economics, Nutrition, Crop Sciences, Anthropology and Law.

Starting from the evolution of India's policy response for hunger and nutrition security, it examines calorie intake norms, and takes stock of the food insecurity status in some of the poorest regions of the country. It then moves on to cross-sectoral issues related to nutrition such as dietary diversity, bio-fortification, and crop insurance. Next, it explores the gender dimensions of nutrition through the lenses of gender budgeting and women's empowerment. Finally, the book provides an interdisciplinary perspective on food security relating to the socio-legal aspects of right to health, and subjective wellbeing in terms of life experience, attitude, and satisfaction.

Thus, the book reflects the diversity in disciplines in terms of the questions posed, the data sets used, the methodology followed and brings out a rich set of findings and policy recommendations for achieving the SDG 2.1 target of zero hunger by 2030. The chapters in the book are grouped into five parts covering various broad themes:

- I. Food security, nutrition, hunger—policies, concepts, and measurement;
- II. Status of food security in the poorest part of India;
- III. Cross-sectoral impacts on nutrition;
- IV. Gender dimensions of health and nutrition;
- V. Inter-disciplinary perspective on food security.

In what follows, we provide the context for each of the themes, the gaps addressed by the chapters, and their major findings.

1 Food Security, Nutrition, Hunger—Policies, Concepts, and Measurement

Chronic food shortages and widespread poverty were the order of the day in India during the colonial era and for several years after Independence. Rising food production was both a necessity and policy priority for Independent India. The introduction of Green Revolution technologies was a major milestone in India's policy response to ease food availability at the aggregate level. Tracing the evolution of public policy response after independence with respect to SDG-2 covering hunger, nutrition, and food security is crucial to understand what has been achieved and what remains to be accomplished. Several indicators are used to examine the state of food and nutritional security in the light of the efficiency and environmental concerns. As the situation evolved over time, so did the concepts and policies, with overlaps between notions

of food and nutritional security, and poverty. Often these overlapping concepts and policies are overlooked by students, researchers, and sometimes even policymakers while examining the progress made. Measuring progress, however, is not without its challenges. A critical issue here is one of specifying minimum requirement norms for various nutrients against which deficiencies can be assessed. Various types of macronutrients and micronutrients in adequate amounts are required for proper functioning and growth. Specification of the adequate nutrient level for a population group is not straightforward because of inter- and intra-individual variations in nutritional need. The chapters in Part-I of the book are devoted to discussing the policies and concepts of nutritional adequacy, food security, and poverty.

In Chap. 2 titled '*Evolution of India's Policy Response to Hunger, Nutrition and Food Security since Independence*', Panda takes a walk through the history of policy response in India towards hunger, nutrition, and food security, the various concepts and measurement indicators that have guided policy, and some of the challenges that the country continues to face. Panda begins with a discussion of the various concepts that are at the base of SDG-2 such as Nutrition adequacy, malnutrition, hunger, and food security, and the related issue of poverty. After providing an overview of the policies, he then takes stock of the country's achievements relating to nutritional and food security and the continuing challenges that the country faces, the most recent being the COVID-19 pandemic and its impact. It is argued that the set of macro- and micro-level policy interventions have helped the country has made significant progress at both national- and individual-level nutrition and food security. However, the progress has come at a very high cost in terms of both fiscal and natural resources, especially water. The chapter highlights the need to evaluate policy alternatives that could be more efficient in terms of delivering benefits to the need at lower costs.

Several aspects of the nutrition situation in India remain to be answered satisfactorily. One such issue is the apparent lack of correlation between calorie intake deficiency and anthropometric outcomes on the one hand and the higher rates of prevalence of undernutrition (POU) in states that are ahead in economic and health metrics on the other. Earlier studies, while identifying these puzzling patterns, have not provided a satisfactory explanation for these phenomena. Siddiqui and Rahman attempt to provide an explanation in Chap. 3 titled '*In the pursuit of an appropriate calorie intake norm for Indian States*'.

They hypothesize that these phenomena are accounting artefacts that arise from the use of a nationally determined minimum dietary energy requirement (MDER). They argue that spatial variation in environmental and contextual factors such as epidemiological environment, health infrastructure, and level of mechanization of state economies, could cause the calorie requirement to differ spatially. People living in states with lower disease environment and better health infrastructure tend to have lower calorie intake. This pattern is consistent with biomedical literature that suggests people living in infectious environments tend to suffer from intestinal problems, which reduces their calorie absorption capacity efficacy and hence they tend to consume more calories to meet a given level of need. Similarly, with state economies showing significant differences in their structure and level of mechanization, the level of physical activity also could vary substantially, and consequently the need for

calories. For all these reasons, the calorie requirement may not be uniform across the country, and there is a need to work out state-specific calorie requirement norms. Towards establishing this, they estimate a multilevel model that combines information at the household and state levels. They use the consumption survey data for the year 2011–12 and the Survey on Drinking Water, Sanitation, Hygiene and Housing Condition 2012, both from the National Sample Survey Office.

Their results show that the economic status of a household, female-headed households, age of the head of household, access to public distribution system, and availability of cultivable land (for rural households only) all have a significant positive influence on calorie intake in both rural and urban areas. The socio-religious category of a household also matters for calorie intake in rural areas, but not in urban areas. Unlike the individual household's economic status, the state's economic status has a negative effect on calorie intake. This is because state's economic status is strongly correlated with both better health infrastructure and a higher level of mechanization. The epidemiological environment of states captured through the prevalence rate of infectious diseases has a positive effect on calorie intake. These results on the environment and contextual factors suggest that calorie requirements could vary across states.

Using the multilevel models, Siddiqui and Rahman then compute state-specific MDERs and rework the POU. They find that the PoUs estimated using state-specific MDERs are more consistent with the economic status of the states. Further, they also show a significant correlation with anthropometric indicators of nutrition status, except wasting. These results demonstrate the need for state-specific MDERs to assess the nutrition status of individual status and hence of the country as a whole.

2 Status of Food Security in Poorest Part of India

There is a direct link between poverty and hunger; therefore, targeting the hotspots of poverty to tackle food security and hunger seems an obvious option. Bihar and Jharkhand (formed from erstwhile combined Bihar) have historically been among the most backward states in India in terms of both economic and human development indicators. This situation continues despite significant improvements in economic performance and government efforts at improving social development. The per capita state domestic product of these two states is only 36 and 62% of the national average in 2020–21, and their multidimensional poverty rates are 52 and 42%, respectively. Two-fifths of under-five children in these states are underweight compared to one-third at all-India level. A greater proportion of women in these two states are thin than in the country as a whole. And these two states hold the last two positions in terms of the composite SDG Index of the NITI Aayog (Government of India, 2020–21). All round progress in these two states, therefore, is a sine qua non for India to achieve SDG targets. Tracking the progress requires an understanding of the spatial dimensions of the problem of food insecurity at grassroots level and the strong and

weak points of policy intervention. Two chapters in Part-II of the book are focused on these two poorest states of the country.

In Chap. 4 titled '*Mapping the Food Security Situation in Rural Bihar and Jharkhand: Insights from Two Food Security Atlases*', Sharma et al. demonstrate the use of cartographic representation to locate the areas within these two states where food insecurity is alarmingly high. They explore the spatial dimensions of the three main dimensions of food security, viz., availability, access, and utilization, across the districts of Bihar and Jharkhand, and identify the regions/districts whose rural areas are most food insecure. Towards this, they draw information on 15 indicators from multiple secondary data sets covering rainfall, agricultural output, irrigation, agricultural labour, urbanization, social composition, household expenditure levels, access to roads, safe drinking water, toilets, female literacy, health care facilities, disease, and health behaviour. Using this information, they construct separate indices of food availability, food access, and food utilization at the district level. Additionally, they also construct an overall index of food security by combining three outcome indicators, viz., underweight children under age 5, women body mass index, and anaemic children in the age group 6–59 months. Using these dimension-specific and overall food security indices, they categorize the districts into five types, highly insecure, insecure, moderately secure, secure, and highly secure. Districts that are highly insecure or insecure are considered as priority districts. Finally, they use principal components analysis to identify policy variables that influence food security.

They find large inter-district inequalities across all three dimensions of food security. More than half the districts, 22 out of 38 districts in Bihar and 14 out of 24 districts in Jharkhand appear in the priority list of districts for policy attention. Among the 22 priority districts in Bihar, the situation in 8 districts (Sitamarhi, Saharsa, Banka, Madhepura, Gaya, Purnia, Araria, and Jamui.) is 'alarming' in that they are insecure or highly insecure in terms of both food security dimensions and outcomes. Of the 14 priority districts in Jharkhand, the food security situation is alarming in 6 districts (Dumka, Deoghar, Jamtara, Pakur, and Sahibganj in the Santhal Pargana region and Pashchimi Singhbhum in the Kolhan region). In these 'alarming' districts, policy attention has to be comprehensive covering both food security dimensions and food security outcomes. In the remaining districts in the priority list, policy attention is required either in terms of the food security dimensions or in terms of food security outcomes.

Sharma et al. also identify the critical variables that need policy attention. They find that the set of variables that needs to improve is not the same in both states. In Bihar, female literacy, dependency ratio, disease and health behaviour, access to toilets, non-agricultural employment, and irrigation are important for food security. In Jharkhand, however, value of agricultural output, availability of health institutions, and dependency ration are the key indicators influencing food security. Further, both states need special welfare programmes for vulnerable communities and food-insecure regions.

Bihar is predominantly rural with about 89% of its population residing in rural areas. It ranks second last in terms of SDG-2 and has a lowest overall development index among the states in India. Malnutrition continues to remain a matter of grave

concern in the state. A total of 43% of the children under the age of five were stunted and 23% of them were wasted in 2019–21 according to National Family and Health Survey-5. Food insecurity is a complex phenomenon having multipronged dimensions with an important element of malnutrition and poor health. The diversified food consumption is a proxy indicator of food and nutrition security.

Chap. 5 titled '*Food Security in Rural Bihar: Some Findings from a Longitudinal Survey*' by Dutta et al. analyses the status of food and nutritional security in rural Bihar since 1998. The study is based on a longitudinal survey conducted by the Institute for Human Development. Using this survey, they evaluate the changes in household expenditure on food items in rural Bihar during 18 years across various socio-economic groups along with households' perception on food security. Additionally, they conducted a rapid telephonic survey to understand the impact of COVID-19 on households' food security and the effectiveness of the government programmes in supplementing food and nutrition shortages. They have measured food security using four indicators, viz., Household Dietary Diversity Score, Food Frequency Score, Household Food Insecurity Experience Scale and Recommended Dietary Allowance.

Dutta et al. find that there is a need of expanding the food basket. Households predominantly depend on cereals and vegetables to meet their energy and nutrient requirements, with relatively low consumption of other food items such as pulses, fruits, edible oils, milk, and other protein-rich food items. Over one-third of the households have low dietary diversity, i.e. they consume only 4 food groups out of 12 food groups. Shift in the cropping pattern from cereals towards millets and other food items (oil seeds, vegetables, etc.) is required for improving dietary diversity. Access to kitchen gardens (household or community) can greatly help in improving the dietary diversity of households. Migration has played an important role in improving the food security of the rural population. However, COVID-19 adversely affected migrant households much more than non-migrant households.

They also identify that there is significant scope in further strengthening PDS by eliminating the exclusion of beneficiaries and gradually including pulses, millets, edible oils, etc. The Mid-Day Meal Scheme and ICDS also need improvement in their functioning. For better utilization of consumed food, there is an urgent need to improve water and sanitation situation to tackle malnutrition in Bihar.

3 Cross-Sectoral Impacts on Nutrition

Nutritional outcomes are known to be influenced by several factors that cut across diverse sectors of the economy and through multiple cross-cutting channels. These factors could be on the demand side relating to the consumption pattern, especially the intake of nutritionally rich and desirable food items or could be on the supply side influencing the availability of various food items. The three chapters in Part-III of the book explore some of the cross-sectoral impacts on nutrition.

One aspect of the malnutrition problem among children in India is the high prevalence of stunting, which decreased a measly 3 percentage points between 2015 and

2019–21. Milk being an animal-sourced food (ASF), is known to play an important role in the growth of young children. Unlike other ASF such as meat or even eggs, milk is widely accepted even by vegetarians and is an important constituent of the diets of most Indians, with the exception of some tribal populations. Despite this, rigorous analysis of milk consumption patterns and its association with nutritional outcomes, in particular stunting among children, is lacking. Several questions remain open to rigorous analysis. For instance, what is the milk consumption frequency and pattern across age groups, gender, locations (urban vs. rural), and socio-economic groups? What are the factors that influence the probability of milk consumption? Does bovine ownership and breastfeeding status matter for milk consumption? And finally, what is the nature of association, if any, between milk consumption and nutritional outcomes, in particular stunting among children?

Viswanathan and Purohit explore some of these questions in Chap. 6 titled '*Milk Consumption Pattern of Young children: A Relook at the Indian Evidence*'. They use data on Consumption Expenditure for the year 2011–12 from National Sample Survey Organisation (NSSO) and the National Family Health Survey-4 for the year 2015–16 to analyse the milk consumption patterns and to explore the nature of association, if any, between milk consumption and nutritional outcomes with a focus on stunting among children. The authors focus on milk consumption of children in the age group 6–23 months as their nutrient intake during the first 1000 days has long-term impacts on their growth.

The data shows several interesting patterns on milk consumption. Among the households that report milk consumption, the modal frequency of milk consumption is twice per day, even though about two-thirds of children in rural areas and over half the children in urban areas have not consumed milk in the past 24 h. Currently breastfeeding children is high among children in the 6–23 months age group, and it declines relatively slowly with age in rural areas than in urban areas. Milk consumption by children in the last 24 h is significantly higher for better-educated mothers, increasing from 33% (38%) for no education to 52% (58%) for secondary and above education in rural (urban) areas. Looking across economic classes, breastfeeding declines as wealth index rises, but reverse pattern is observed with regard to milk and dairy products consumption. To understand the rich–poor gap, Viswanathan and Purohit estimate a series of logit models that control for several of these covariates. These estimates show that the odds for milk consumption in the last 24 h are 3–4 times higher for richer children in rural areas than children from the poorest households and that this gap declines when controlled for mother's education level and milk availability.

To understand the frequency of milk consumption, Viswanathan and Purohit estimate the Zero Inflated Poisson (ZIP) model to allow for the high number of zero consumption reported in the data. The ZIP model estimates show that currently breastfed is positively associated with no milk consumption, while consumption of other food items in the last 24 h is negatively associated. Further, mother's education level, bovine ownership, and economic status are positively associated with milk consumption. The ZIP model also shows that the frequency of milk intake increases

with age of the children, mother's education, and economic status, while currently breastfeeding reduces the frequency.

Finally, to explore the association between milk consumption and height-for-age Z-scores (HAZ) Viswanathan and Purohit estimate linear regression models allowing for the possibility that frequency of milk consumption could be endogenous due to its association with other socio-economic variables and controlling for child, mother, household, and regional characteristics. The results show that each frequency of milk consumption is significantly positive and that the effect is larger at higher frequencies. Interestingly, bovine ownership of milk availability in the district is not directly associated with HAZ, though they are good instruments for milk consumption frequency.

India has recently experienced triple burden of malnutrition consisting of micronutrient deficiency along with undernutrition and obesity (Jain & Agnihotri, 2020). This issue of the triple burden of malnutrition is relatively new and is not sufficiently discussed in the academic literature (Kumar et al., 2021). Therefore, there is a need to map the prevalence of the triple burden of malnutrition and the factors affecting the malnutrition in India.

The country attempts to address the malnutrition problem through several measures. The measures like income and food supplements by the central and state governments already exist; however, long-term strategies are required to tackle the issue sustainably. Bio-fortification is a promising strategy in this line. Biofortification improves the nutritional content of food crops through breeding or genetic engineering (Nestel et al., 2006; White & Broadley, 2005) and is cost-effective (Meenakshi et al., 2010), more sustainable than nutrient supplementation (Bouis, 1999). Nevertheless, the adoption of released biofortified crop varieties at farm level is quite minimal. Considering the vast potential that this technology holds in tackling the issue of malnutrition, there is a need to understand the impact of biofortified crops in improving the health outcomes of children and women and to solicit consumer's awareness, perception, and willingness to pay towards it. Singh et al. seek to do this in Chap. 7 titled '*Exploring the prevalence of undernutrition and consumers' knowledge, preferences, and willingness to pay for bio-fortified food*'.

The authors use data from National Family Health Survey (NFHS-4 and -5) fact-sheets to analyse the malnutrition status at national, state, and district levels. Three malnutrition indices (Normalized Child Malnutrition Index (NCMI), Normalized Adult Malnutrition Index (NAMI), and Combined Normalized Malnutrition Index (CNMI)), were constructed and used to compare the performances between NFHS-4 and -5 across the states. To identify the factors determining the malnutrition incidence in India, a district-level multivariate regression analysis was undertaken.

To understand the utility of biofortified crops in improving the health outcomes of children and women, a systematic review and meta-analysis was undertaken. An ex ante assessment of the health benefits of biofortification through the case of rice biofortification with zinc was also carried out. Further, to solicit the consumers' acceptance, a cross-sectional survey was conducted to assess consumers' awareness, willingness to pay for biofortification, and its benefits.

The study reports that country has made a moderate improvement in reducing the incidence of stunting, wasting, and underweight in children and the incidence of thin adults. The issue of obesity and anaemia has emerged as significant concerns. The northern and southern regions of the country were identified to be better nourished in general than the eastern and western regions. The malnutrition hotspots using district-level maps were also identified. With respect to determinants of malnutrition in children under 5, electricity access, sanitation facility, use of iodized salt, women's education, and institutional birth had a negative and statistically significant relationship with stunting. In contrast, the women with BMI below normal showed a positive relationship with stunting. For wasting, the socio-economic variables and the variables on mothers' health and child nutrition immediately after birth significantly affected the prevalence. The results point that mothers' nutrition is a crucial determinant of child nutrition. Women's education also helps reduce the incidence of malnutrition indicators.

The meta-analysis shows a positive impact of consumption of biofortified food on nutritional outcome of women and children. The ex ante health benefits assessment of biofortification reveals almost doubling zinc intake without increasing rice consumption. A savings of lost DALYs to the extent of 5.25 million is estimated by consuming biofortified food by the target population. However, awareness for biofortified food was less than 40% and a sizable number of respondents believed that biofortified foods are harmful to humans and the environment. The results reiterate the importance of biofortification programmes and help to determine the future course of action in intervention studies and points towards an urgent need for creating awareness among the consumers.

Weather-related shocks and stresses in agricultural production can affect small-scale as well as large-scale enterprises in rural areas. During times of production losses and related income crisis, farmers may resort to choosing low-risk or low-return crops and inadequate production methods. It may also affect the inter-temporal resource allocation, such as reducing food consumption or the use of healthcare services, or the withdrawal of children from school, which may eventually erode their future-earning capacity, aggravating their vulnerability and perpetuating the vicious cycle of poverty.

Crop insurance (CI) can play a critical role not only in mitigating crop production-related uncertainties a farming household may face during a particular cropping season but may also reduce the cost of risk-bearing to stabilize farmer's income over time. CI as a shock absorber can help the agricultural households in maintaining a threshold amount of consumption and demand for health services especially for women. However, in India, a large section of the farmers lacks proper insurance services.

The available literature generally focuses on the demand for CI and its impact on input use and also on food security. However, there is a need to focus on identifying the effect of CI on health-seeking practices and nutritional outcomes of the vulnerable populations, pregnant women and children. Sengupta and Rooj address this issue in Chap. 8 *'Does Crop Insurance Promote Nutrition and Good Health among Women and Children in the Agrarian Households of India?'*.

The authors focus on several measures of health-seeking practices, including prenatal and postnatal health care variables. Both secondary and primary data analysis is carried out to ascertain the effect of crop insurance adoption on women's health-seeking behaviour during pregnancy and household and child nutritional statuses. The study based on secondary data uses district-level data on crop insurance adoption paired with individual-level data on health outcomes to assess the role of crop insurance on the health-seeking behaviour of women in their reproductive age. The crop insurance information from the NSSO (70th round) aggregated at the district level, and women health care use information and child nutritional status from DLHS-4 at the individual level were merged using district identifiers to obtain comprehensive data containing individuals matched across different districts. In addition, a primary survey was conducted in 400 households from two districts of Bihar to examine the impact of government's income support programme on health-seeking practices by households, women, and children and food security.

The analysis indicates that crop insurance has substantial implications for women's of reproductive age in their healthcare-seeking practices. The women in districts with higher crop insurance adoption seek more antenatal care and are more likely to opt for institutional delivery and receive postnatal care in a private facility. The primary survey data analysis reveals that households who are beneficiaries of the PM-Kisan Samman Nidhi Yojna report a greater level of food security. Women from beneficiary households seek higher early antenatal care and children received higher immediate postnatal care in these households. Thus, crop insurance and income support programmes provide a hedge against crop loss and positively impact food security, healthcare-seeking practices by women in their reproductive age, and improves child nutritional outcomes.

4 Gender Dimensions of Health and Nutrition

Gender equality is a fundamental human right, and a necessary foundation for a peaceful, prosperous, and sustainable world. Therefore, achieving gender equality and empowerment is one of the goals of the Sustainable Development Goals (SDGs). The role of gender equality and empowerment to achieve food and nutrition security is well recognized. In Part-IV of the book, the gender dimensions of health and nutrition are explored.

Given the challenges in reducing gender inequality, there was a global consensus at the Fourth World Conference on Women in 1995 to integrate a gender perspective in budgetary policies of the countries. Gender budgeting or gender responsive budgeting (GRB) is defined as 'an approach to budgeting that uses fiscal policy and administration to promote gender equality, and girls' and women's development' (Stotsky, 2016). There are different approaches towards GRB and they have continuously evolved across countries in the framework adopted. The gender budgeting has been observed to be closely interlinked with economic development in emerging

economies (Nolte et al., 2021). Although there is large literature on defining, implementing, and justifying gender budgeting, there are very few resources on measuring its performance and impact on health outcomes.

In Chap. 9 '*Are gender budgets necessary for reducing inequalities in health outcomes*' Gupta et al. try to address this gap by looking into whether selected major health outcomes improved in countries that adopted GRB and one did not adopt GRB. The chapter also explores and attempts to understand the impact of GRB adoption by India on health inequalities and other possible factors affecting gender inequalities in health sector. The authors explore four indicators, viz., gender inequality index, maternal mortality ratio, all-cause mortality ratio for males and females, and treatment-seeking behaviour by gender, to understand the possible health impact. To understand whether government efforts in adopting GRB have translated into better outcomes, the good governance index was used to track India's progress in reducing gender gaps.

They argue that to bridge the gender inequality gap in health outcomes there is a need to upsurge the resources for health and universal health care (UHC). Countries that have been able to increase their health spending and expand UHC have made good progress on health outcomes and inequalities. It is possible to expand UHC through higher health allocations by governments, with the associated reduction in out-of-pocket spending. It is suggested to emphasize gender-responsive budgeting (GRB) in fewer targeted areas such as labour markets, political empowerment, and specific programmes targeting genders, instead of forcing all allocations to follow GRB guidelines.

Despite much higher growth rates and a larger GDP, India fares poorer on women's undernutrition compared to several sub-Saharan African countries (Coffey, 2015). The 'dual burden' problem, and the much larger incidence in rural areas are important characteristics of the nutrition status among Indian women. In 2015–16, in the country as a whole 23% of women were underweight and 21% overweight, while in rural areas 27% were underweight and 15% overweight. Importantly, while the underweight percentage is declining, the obesity problem is rising even among the poor. In the literature, access to food, agricultural income and prices and feminization of agriculture are seen as important pathways linking agriculture to nutritional outcomes. Feminization of agricultural labour force is expected to improve women's empowerment, which in turn would enable them to influence household decisions in a manner that positively impacts the nutritional and health status of all household members, especially the girl child and women themselves. Intersectional inequalities in different dimensions such as gender, region, religion, caste, and class, are known to affect health and several other developmental outcomes.

In Chap. 10 titled '*Revisiting Women's Empowerment as an Agriculture-Nutrition Pathway Using the Framework of Intersectionality*', Mukhopadhyay brings a new perspective of intersectional inequalities to examine the question of women's empowerment and how it affects the agriculture-nutrition pathway. The author examines how empowerment of women in agricultural households varies across social dimensions, and how these intersectional inequalities shape empowerment and nutritional

outcomes. The study makes use of the second round of the India Human Development Survey (IHDS) for the year 2011–12.

The study covers two social dimensions: (a) economic class measured as per capita income quintiles out of which the bottom two quintiles are treated as poor and the rest of the quintiles as non-poor; and (b) social groups defined along caste and religious lines. Based on the economic class and the social groups, 10 intersectional categories are then developed for the study. Women's empowerment is measured using three indices: (i) Survey-based Women's emPOwERment index (SWPER) that looks at the attitude towards women in a parsimonious way; (ii) Index of Women's Empowerment (IWE), which is a more detailed measure covering economic domain, human resources, social resources, decision making within households including relating to sexual/reproductive domain, attitude towards socio-cultural norms and phenomena; and (iii) Index of Women's Empowerment in Nutrition (IWEN) covering aspects such food (knowledge, resources, and agency), health (knowledge, resources, and agency), institutions (membership, participation, access to information and services), and fertility (knowledge, resources, and agency).

Kernel density plots suggest that SWPER is bimodal, while IWE and IWEN are multimodal, and all three of them are positively skewed. The author then estimates quantile regression models to capture the effect of intersectionality on these empowerment indices. These regressions show that the way empowerment is measured can affect the conclusions drawn. For instance, women belonging to Brahmin agricultural households are worse off than women from other social groups according to SWPER, whereas this finding does not hold true when empowerment is viewed through IWE or IWEN. The latter two being more comprehensive bring out the role played by intersectional inequality on other dimensions such as resource and access, on women's empowerment. Logistic regressions estimated by the authors to study the association between empowerment and women's health status, however, do not give clear results. While BMI is higher for women with higher empowerment scores as expected, the results also show that higher values are IWEN and do not necessarily reduce the likelihood of being overweight.

5 Inter-Disciplinary Perspective on Food Security

Thus far, the chapters in Part-I–IV of the book essentially add to the knowledge base on the issues of hunger and nutrition from the perspective of economics as a discipline. The way the questions are posed in these chapters, the literature that they refer to, the analytical methods that they use, and the policy messages that they bring to fore all have an economics flavour. But the issues of hunger and nutrition have been studied by other researchers from disciplines as well. In the final Part-V of the book two such inter-disciplinary perspectives are brought to fore. One from the perspective of law/legal studies, and the other from anthropology.

Urban poor are affected by chronic poverty and are highly vulnerable to different forms of shocks, including those arising from pandemic. It has been reported that

by 2035 the majority of individuals in extreme poverty will live in urban areas (UN, 2019). Urban centers are characterized by cash-based economies and access to an income is therefore essential for household food and nutrition security.

India is bound to ensure food security and health for all under the Constitution of India and the other national legal frameworks. However, inadequacies in the nation's obligation to guarantee availability and accessibility of quality food to ensure physical wellbeing to all are being evident from its position in the recent Food Security Index, as well as Health Index. Consequently, there is a need to analyze the status of food insecurity and its impact on urban poor under a legal framework and success of the Government initiatives with reference to SDGs.

Keeping this in mind in Chap. 11 Shanthakumar and Dhanya explore the '*Socio-legal Analysis of the Impact of Food Insecurity and Hunger on Right to Health of Urban Poor Living in the State of Gujarat*'. They aim to analyze the status of food insecurity and its impact on urban poor living in Gujarat, and also the journey of 'right to food' as a fundamental human right under the Indian Legal system and success of the Government initiatives with reference to Sustainable Development Goals.

The authors have adopted both doctrinal and empirical methodologies. The primary survey data was collected from 400 urban poor in five districts of Gujarat for understanding the perception of respondents towards food insecurity. The study points out that the government action has failed to tackle the food insecurity issues faced by the urban poor in Gujarat because the entire focus is on the rural population. The authors suggest that a reasonable interference can be attuned to the prevailing situation, including appropriate food accessibility. The approach administered should be suitable and dealing with the elements of food insecurity, alongside the indispensable political adhesion to attain required success.

The analysis of primary survey data of urban poor shows very low awareness and accessibility to food security schemes. The majority among the surveyed category of respondents was migrant workers, they were out of reach of access to free ration schemes. In addition, the urban poor faced challenges like unavailability of clean drinking water, shelter, clothing, quality education, healthcare, and many other basic needs. The authors also reported that almost 90% of respondents agree that they consume less food and are unable to feed their children enough food due to lack of money. In times of food crisis especially during the lockdown due to COVID-19 pandemic, less than 10% of the respondents turn to government for assistance and almost half of the respondents (47%) have gone without food for two days.

To improve implementation of the schemes/programmes it is being suggested to take necessary steps to expand the coverage of existing welfare schemes to include migrant workers also. The implementation of 'One Nation One Ration Card Yojana' needs to be expedited, adequate number of awareness programmes needs to be initiated, and educating the urban poor about the formalities to be furnished to avail such benefits are required. More decentralized approach is required to the implementation of the welfare schemes on food, nutrition, and healthcare.

Wellbeing has been conceptualized differently because of its multidimensional nature. Even though the perspective towards wellbeing is totally relative, it is basically

connected with one's attitude towards quality of life (subjective wellbeing) and life circumstances. Particularly, in societies where economic activities are collective and cooperative endeavours, subjective and collective wellbeing are complementary to each other, such as in fishing societies. Therefore, looking into wellbeing from anthropological lenses is required to place individual life experiences and personal conceptualizations as significant factors from the perspective of culture and socio-ecological settings. In this context, it seems necessary to explore, what people think about wellbeing as rooted in the world of values construed by a unique cultural tradition such as marine fisher-folk societies from an anthropological perspective. Chapter 12 titled '*Subjective wellbeing of women in the Marine fisherfolk of Kerala: Anthropological insights on Life experience, Attitude and Life satisfaction*' by Ramachandran, explores both objective and subjective factors for explaining the state of wellbeing experienced by the women in marine fisherfolk of Kerala.

In societies like marine fishers where subsistence is based on unpredictable resources the infrastructural facilities, supportive environment, certainty in economy, access to non-economic resources, and life experiences are reported as some of the factors substantiating life satisfaction and wellbeing to both women fisherfolk and at community level. For analyzing the mediating effect of three socio-cultural domains such as life experience, attitude, and life satisfaction on different aspects of subjective wellbeing, a primary survey was undertaken. The primary data was collected using questionnaire from 310 women from the marine fisherfolk families in Kozhikode district of Kerala. The questionnaire included a total of 65 closed-ended questions with both binary and multiple responses.

The study reveals that a state of wellbeing for an individual is influenced by support from family along with the intervention of government and other agencies which can provide sustenance in the spheres of education, employment, health, and other infrastructural facilities. The creation of a positive attitude is vital in sustaining aspirations towards one's own wellbeing and the subsequent involvement in sustaining livelihood activities with anthropogenic management of resources.

6 Way Forward

As would be evident, the chapters in this book cover a wide spectrum of issues and come up with several policy recommendations. Some of the important policy messages are as follows:

- i. There is a need to revisit the calorie norms so that the magnitude of hunger and food insecurity is more accurately accounted.
- ii. Policy interventions must distinguish between supply-side constraints to food availability and demand-side factors that affect household access and utilization.
- iii. The government should also identify regions that are food insecurity hotspots and have targeted programmes for those regions.

- iv. Dairy consumption and biofortification are effective means to address malnutrition.
- v. Crop insurance that protects farmers against losses improves health-seeking practices of women at reproductive age, and this improves child nutritional outcomes.
- vi. In the current Indian situation where the overall public expenditure on health is low, gender-responsive budgeting is not as useful as expanding the overall resources available for health and making it universal.
- vii. Existing welfare programmes need to effectively address the needs of marginalized sections of the population such as migrant workers and urban poor for which decentralization of their implementation is required.
- viii. Even as there is a continuous need to improve public welfare programmes from time to time as the context change, it must be recognized that these programmes are not a substitute for family support that is essential for an individual's state of wellbeing. These programmes can at best complement the family support.

Going forward to address the issue of food availability, we need to emphasize reducing post-harvest losses and food wastages along with other factors such as improving productivity, developing climate-resilient crop varieties, etc. Post-harvest losses and food wastages undermine the sustainability of the food systems, as all the inputs of production (such as water, energy, capital, etc.) invested towards the lost and wasted food go to vain. With its hunger and malnutrition, a country like India cannot afford to let such precious resources be wasted.

Further, accessibility to good quality food for balanced and adequate nutrition can be attained by improving the purchasing power of marginalized people, ensuring legal entitlements, and demonstrating genuine political will (FAO, 2008). We are still grappling with pandemic-induced uncertainty and food insecurity, which is further fuelled by the series of shocks such as increased events of climate extreme, rising inflation, and energy crisis in most parts of the World. The ongoing Ukraine-Russia war has added to food insecurity in many countries by disrupting the food supply chains. Therefore, there is a *'need to have new institutions and frameworks, like a global agricultural trading system with sustainable supply chains as part of its mandate. Moreover, in the food and agriculture field, an institution that provides a clear structure for the interaction of science and policy, like IPCC in climate policy (von Braun, 2022)'*.

There is a need to understand food and nutrition security from a multidisciplinary perspective. The apparent lack of correlation between calorie intake deficiency and anthropometric outcomes, and the higher rates of prevalence of undernutrition in economically developed states, can also be examined from the concept of homeostasis in biology. Emerging research suggests that many individuals have a relatively stable set point for their body weight throughout adult life. Understanding of this set point of homeostatic (stabilizing) system that maintains the body's energy balance against fluctuations in food intake is needed in the context of utilization of food (Munshi, 2022). Additionally, the important role of media in building awareness and influencing public opinion through effective and responsible messages and

reporting cannot be ignored. A strong and credible media can help people make informed decisions concerning all the four dimensions of food security.

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