

Policy Narratives on Food and Nutrition Security

Policy Brief

ABSTRACT

Food and nutrition security has always been a challenging policy issue in Pakistan. It is going to be a matter of serious concern in the post Covid-19 scenarios. In this policy brief, we have examined literature and best practices for tracing plausible policy narratives so as to ensure food and nutrition security of masses on sustainable basis. The idea of “basket of policies” has been coined in four dimensions of food security. This contains 24 policy options that may be workable across micro, meso and macro lines. In food availability dimension, inputs price volatility and government intervention at micro level, regulatory arrangements and institutional strengthening at meso level while incentives for adaptation to climate change at macro level have been identified. For food accessibility dimension, price regulation mechanism, employment creation and poverty reduction policy dossier has been proposed. For nutritive food utilization, dietary diversity may be the solution along with balanced food consumption. Similarly, food sustainability demands deep focus on improving the livelihood of people through people-centric governance. All such public policy options need to be converged for sustainable solutions. In this way, we have logically deduced that instead of isolated strategies, a holistic basket of policies for all dimensions of food and nutrition security need to be concurrently launched in the country in the post pandemic scenario. This may be operated efficiently and effectively in close coordination of provincial and federal administrative units.

Introduction

Food is the basic requirement and fundamental right of mankind. A comprehensive definition of food security given by Food and Agriculture Organization (1996) under the International Covenant on Economic, Social and Cultural Rights emphasized food availability, accessibility and sustainability.¹⁻⁴ All citizens should have safe and sustained food system so that they could optimize their genuine preferences, enjoy self-sufficiency and equitable access to food.² The specific projects, programs, interventions, actions and policies as administered by countries targeting food security are achievable or ascertainable at least for some definite time period.³ The United Nation's Article 25 under the Universal Declaration of Human Rights asserted that "food is a fundamental human right". Economic development, peace, security and most especially human development at large depend on the status of food security in the country. Public policies that underpin uninterrupted growth in food systems (from food supply to food consumption) are the key drivers of inclusive economic growth, development and guaranteeing resilience.⁴ The assessments of policies generally focus on cost estimates to government while the benefits to malnourished are not necessarily sufficient to guarantee food security because institutional inefficiency and market players may damage the likelihood of the impact of good policies.⁵

The market system has violently been disturbed as its key players are on the verge of bankruptcy due to the outburst of the pandemic. The sudden outbreak of Covid-19 has increased the vulnerability of already poor masses towards food and nutrition security. Poverty and inequality are expected to be sharply high. There is dire need of paradigm shift in the policy domains so as to create resistance against such pandemics. We need to realize that the serious challenges of the coronavirus (Covid-19) may have long-lasting effects associated to socio-economic fabric (health to increasing mortality rate, food supply chain to food security and psychological pressure to social confinement/lockdowns). The coronavirus has accelerated human sufferings through economic disruption. It has been projected that global annual GDP growth has shrunk to 2.4 percent in 2020.⁶ However, "quarantine" has been considered as a solution to this pandemic. Lockdown and maintaining social distancing with good hygiene are to some extent

remedial steps to combat Covid-19.⁷ Quarantine plays a significant role in controlling coronavirus.⁸ The pandemic has disturbed business activities leading to a surge in prices of different commodities and creating unemployment that has negatively affected the socio-economic conditions around the globe.⁹

The pandemic has pushed the world into uncharted territory that demands health preservation practices from the leaders of the world.¹⁰ Covid-19 could infect the global population of 7.0 billion with 40 million deaths. The world's Gross Domestic Product (GDP) will be in the range of 3-5 percent in the mild scenario. A further lockdown will account for 2-2.5 percent GDP growth globally while service-oriented economies like Greece, Spain and Portugal will be at high risk.¹¹ A profile of 182 countries shows that each country varies in capacity and response to detect and prevent the outbreak. Half of the countries show readiness and have strong operational capacities in place. It requires mitigation strategies focusing on the elderly by reducing their 60 percent social contacts and 40 percent from the wider population might minimize this burden by half and thereby save 20 million lives.¹² The pandemic cost may be minimized by investing at large in public health systems particularly in the less developed economies where such systems are weak and density of population is high.¹³ This situation demands an effective response through holistic approach in policy formulation and implementation.

Either directly or indirectly, all the dimensions of food security are being affected by the pandemic. We tested that isolated policy patterns are no more workable until all dimensions of food security are taken in the policy agenda simultaneously. We have attempted to figure out a comprehensive policy paradigm and allied narratives in the light of published work. Policy options for all four dimensions of food and nutrition security have been identified across micro, meso and macro lines. Direct and indirect policy drivers have been accounted for in the policy formulation and implementation. This unique effort steers deep understanding on workable policy narratives.

A Policy Model of Change

The theories of change are the approaches for theory-oriented evaluation.¹⁴ The theory of change is based on "hope to change somewhat".¹⁵ Food security is a multi-sectoral and multi-dimensional phenomenon

that expands far beyond food production, availability and demand.¹⁶ Agriculture is the most influential area of intervention in the context of human development and food security.¹⁷⁻¹⁸ Demand and supply are the two key aspects of agriculture that are under serious threat from Covid-19.¹⁹ The major determinants of demand are purchasing power, population growth, subsidies, food products' prices, social welfare programs and schemes. The supply shifters are food production size at domestic level, food imports and food distribution.²⁰ In the coming decades, increasing pressure is expected on global food systems both from demand side (burgeoning population and per-capita consumption) and supply side (large inputs competition and climate change challenge). Therefore, development thinkers may be looking for actions regarding food systems, reducing food waste, moderating demand, improving governance and food production on a large scale.²¹ This is in addition to provision of access to healthcare units and enhancing education, especially of girls. This might have positive impact in improving well-being and livelihoods of the deprived.²² A policy model of change for food and nutrition security initiates the process of change at different levels (micro, macro and meso). Alpha policies are explicitly linked to the element of security while beta policy instruments are connected to food and nutrition.

Assumptions

This policy model of change for food and nutrition security is based on following assumptions.

- Nutrition security is the part of food security and has interdependence rather than compartmentalization.
- An integrated and holistic policy framework is required to address the complex nature of food and nutrition security.
- Fruitful policy outcomes result through the collaboration of interlinked institutions, task forces, actions, programs, plans, monitoring and evaluation of policies' implementation mechanism inside and outside tracks.
- Positive angle and normative side of political economy are required to be ascertained in the spectrum of food and nutrition security.
- Policy trade-off needs to be taken into consideration for arriving at holistic approaches.

Food and nutrition insecurity has been a serious global challenge that reflects the shortcomings of

governments in fulfilling their obligation of ensuring adequate food availability, accessibility, quality and maintaining highest health standards of their people.²³ The nutrition dimension is an integral part of food security. The impact of Covid-19 on dietary intake and nutrition has gone beyond individual, community and national levels to the global spectrum. It is need of the hour to maintain mental and physical health of individuals and develop resilience in communities for national as well as global food security.²⁴ The households with lower dietary diversity have been found with a high proportion of confirmed cases of Covid-19 than high dietary diversity of households in Hubei Province of China. However, certain dietary preferences in relation to Covid-19 have also been observed which leave a significant impact on household dietary diversity score.²⁵ Dietary consumption pattern may be highly and positively correlated to food and nutrition security. The evidence during Covid-19 showed that people whose dietary consumption pattern has been diverse, their chances of recovery are increased. These preliminary findings need to be further testified for arriving at some plausible policy narrative.

Food and nutrition security phenomena is quite different in urban and rural areas. The peri-urban and its populations of South Africa possessed limited dietary intakes and more food insecurity because of unemployment, high poverty levels and absence of land possession.²⁶ If Covid-19 pandemic continues for a long time, unemployment, poverty and starvation are expected to rise at an alarming rate along with mental health issues under severe stress and suicidal compulsions.²⁷ In the Global South, informal settlements are the least equipped for Covid-19 because of poor condition of basic needs including water, sewers, toilets, waste collection, drainage, and secure and adequate housing.²⁸ Food insecurity increased in urban households of Iran as compared to rural with 5.6 percent receiving less than necessary kilojoules and there is required priority of rural-urban migration in the urban plan of development.²⁹ The significant impact of Covid-19 on health has been observed in informal urban settlements of the United Kingdom. It is expected to be more severe if measures are not executed timely. Public health provision with social and economic government programs for informal economy and informal settlements are required.³⁰ It has also been observed that the urban population is a bigger victim of this pandemic than that

of the countryside and rural population. So, the policy framework needs to be designed accordingly.

Policy Narratives for Food Availability

At micro-level, food availability is related to production which is further linked to input prices. Conventional food policies only focus on supply of food and food availability that is largely determined by food production.³¹ Production of food is affected and determined by farm costs and prices of inputs and resource availability including land, water and technology.³² Price is the leading determinant of consumers' economic welfare and income level of farmers, exporters and importers involved in agriculture sector.³³ The subsidized modern inputs would support farmers to cover their costs rather than providing credits to them directly.³⁴ Adaptation of improved variety of crops increases productivity but due to water shortage vulnerability may rise and increase the volatility of revenue.³⁵ However, efficient pesticide application for seeds and standard mixtures of fertilizers and nutrients depend on experience and skills of the farmers.³⁶ Narrowing the yield gap and minimizing food loss strengthens the domestic food system, especially in Asia and Africa. A policy that favors the supply chains globally guarantees stable and adequate supply of food.³⁷

Food availability at meso level is emphasized by government actions regarding price regulation and market functioning. A 'zero budget' is cognated with affordability of financial inputs through which poor farmers overcome their inability of access to important inputs owing to high costs of production, soaring interest rates and market prices volatility.³⁸ The alarming situation of human sufferings requires good intention of institutions and governments to transform policy focus by switching off economic growth and switching on economy of conservation for sustainable future for all.³⁹ The partial integration in trade can support to increase export rather than focusing on domestic availability of food in hunger-hit regions. Hence trade integration is main part of adaptation while it needs careful implementation mechanism to get maximum benefits for all regions.⁴⁰

In the post-pandemic world, it is going to be more important for policymakers to keep themselves ready for the emerging challenges. The sustainability of food production is attainable through minimization of biodiversity losses and unavoidable trade-offs

between the environment and human axis that belongs to Sustainable Development Goals (SDGs) of the UN.⁴¹ Basic strategies as adopted by China which include efficiency in food production, optimal application of fertilizers, and food loss reduction may also be employed in Pakistan to become environmental friendly. It requires coordinated and radical actions for sustainable environment and production.⁴² Food production and food supply are the most important components of food availability. However, climate change has been jeopardizing the dream of uninterrupted food supply that ensures food availability.

Food availability at macro level is largely focused on population management and climate change. Numerous policy measures have been adopted in a better way in the areas of malnutrition and climate change but lie outside the spectrum of health and climate. It demands coordination among sectors at multi-levels within and outside the governments.⁴³ However, production gap will increase food insecurity in the future particularly in the post pandemic world and can be controlled by creating awareness about family size and tackling the growth rate of population.⁴⁴ The price volatility of agriculture commodities may increase inflation that itself puts agriculture production at risk by affecting income, productivity, profitability and growth.⁴⁵ Seasonality and location with its climate and agricultural practices are among factors that affect food availability in any locality.⁴⁶

Agriculture is vital for GDP and employment for Asia to safeguard food security while policy analysts need to focus on generating mitigation measures to reduce climate change impacts in future.⁴⁷ A holistic approach must include transparent assessment and mechanisms for monitoring the risks in order to transform the existing system of hazard-oriented to risk-oriented. Moreover, conflict resolution in goals is required particularly in biodiversity, environment protection, human health and food production by avoiding single or isolated solutions for each policy and performance of value chain for food.⁴⁸ Food availability is fundamental for all dimensions of food security.

Policy Narratives for Food Accessibility

At micro level, food accessibility is directly connected to economic and physical accessibility. Food accessibility is related to affordability, parceling and

preferences for food that make people capable of transforming their hunger.⁴⁹ Amartya Sen's seminal work on "Entitlement Approach" has advanced policy narrative from domestic food availability to food accessibility.⁵⁰ Food accessibility encompasses income, buying capacity and expenditure of individuals or households.⁵¹ Financial and political crises have also been strongly linked to food insecurity which may accelerate after the corona crisis. Stable accessibility to sufficient food is affected by stagnant growth, inflation, unemployment and low income.⁵² Inflation caused considerable impact on decline in purchasing power of the people and thus on decrease in share of calories.⁵³ Therefore, economic accessibility is the cornerstone for ensuring food baskets and ultimately safeguarding food accessibility. This is the formidable policy challenge in Pakistan which may be handled by incorporating micro imperatives of macro policies.

Food accessibility at meso level focuses on price regulation, education and health facilities. The continuous efforts in the form of food programs at governmental or private level and policy interventions have been incorporated to contain food insecurity.⁵⁴ Food accessibility has emerged as a big challenge while child malnutrition depends on health, food and healthcare facilities.⁵⁵ Nutrition security is the determinant of food security the attributes of which are linked to right to food in addition to availability, affordability, accessibility and quality.⁵⁶ The Covid-19 outbreak has shown health crisis, long-lasting social impacts and incurred serious economic losses. Inequalities regarding access to quality health care is also a matter of concern.⁵⁷ The pandemic scenarios may result in resilience-based food systems in which agri-food systems may evolve opportunities. A paradigm shift of safe food practices will be reinforced by keeping safety habits.⁵⁸ The adequacy of emergency system of food that must be aligned with emergency operations of food is workable policy implication to protect the insecure individuals.⁵⁹ Therefore, a rational twist is required in monetary policy to bring broader fruitful results without shrinking food baskets of common people.

Similarly, at macro level, food accessibility emphasized on poverty and unemployment. The simulation of International Food Policy Research Institute (IFPRI) shows that a fall of one percent growth in world economy would result in pushing more than 14 million people into extreme poverty due

to business and productivity paralysis while this number might increase to 22 million if trade is disrupted.⁶⁰

The policy imperatives should be based on legislation about women's rights. Women can be more effective in credit management particularly in agriculture and separate women education can enhance female literacy rate.⁶¹ Women's contribution towards households' food and nutrition security are generally acknowledged by communities but are not reflected in policy formulation and implementation. The persistence of malnutrition despite economic growth needs revisit of social structures to ensure gender equality.⁶² Unfortunately, Covid-19 is reversing the decades long struggle for poverty reduction all over the world including Pakistan while market tampering is causing food prices to rise with deleterious nutrition effects.⁶³ The twin evils of macroeconomics (unemployment and inflation) and poverty may create a vicious food insecurity circle through which malnutrition is resultantly the dreadful outcome.

Policy Narratives for Food Utilization

The dimension of food utilization is associated with dietary diversity and malnutrition at the very micro level. It is an outcome of feeding practices, food prepared, and equitable intra-household distribution of food.⁶⁴ Dietary diversity is the key driver of nutrient adequacy and various food groups contribute to nutritious diet.⁶⁵⁻⁶⁶ Health is fundamental for prosperous and productive social order.⁶⁷ It has been noted that the menace of food insecurity and urbanization in Nigeria require integrated policy kit based on urban food scheme, infrastructural network and food policy thoughtfulness.⁶⁸ The local micro-economy food production and supply chain to distribution reinforcement is the need of the time in the short term.⁶⁹ Diet quality, food prices, consumption patterns and health facilities are the key factors that could determine the effectiveness of food utilization. Block screeners of dietary food is a very useful approach to determine households' food supply.⁷⁰ The geographical pattern of food purchasing indicates that people whose diet intake is not well aligned with dietary guidelines are at high risk.⁷¹ Therefore, dietary diversity and diet plan may be the key policy indicators to increase the impact of food utilization.

At meso level, food utilization stresses nutrition knowledge and food consumption patterns. Food

security on sustainable grounds can be achieved by food aid alignment with cash transfer scheme and consultancy with local communities.⁷² The complexity of food security and its sustainability is associated with wealth and income inequalities with malnutrition.⁷³ Food choices are influenced by numerous factors including food availability, resources, financial matters and beliefs.⁷⁴ However, at macro level, social and cultural patterns as well as healthcare are the key determinants of food utilization. An inadequate water supply access is associated with household food insecurity. Social harmony is required to raise perceived social support as has been noted in Brazil.⁷⁵ This can be replicated anywhere else in the developing world. The potential of social harmony is substantially available in the country which needs to be mobilized through some institutional arrangements. (See Figure 1)

Poor dietary choices and inactivity is associated with the very likelihood of having high blood pressure. Public health strategies emphasize that individuals' dietary patterns are to be controlled to prevent them from high blood pressure.⁷⁶ Moreover, obesity epidemic is evident due to urbanization, limited resources, less physical activities and inadequate nutritious diet. Therefore, a joint effort for high-level policy by government, communities, organizations and international institution is required to positively change behaviours of the societies.⁷⁷ However, the principal barriers were lack of willpower and hectic lifestyle in the adaptation of healthy diet in adolescents while students who had nutrition knowledge consumed low fats and were cautious of cholesterol in their meals.⁷⁸ The food systems in some regions are structurally traditional under the influence of prevailing social, environmental and socio-economic transitions.⁷⁹ On the other side, rapid rise of population and urbanization is a matter of concern to stimulate poverty and adverse impact on food security and nutritional requirements particularly in the urban dwellers.⁸⁰ The growing debate on food and nutrition security has been encompassing "triple burden malnutrition". We need to know that nutrients is constituent, nutritious is descriptor and nutritional security is a condition.⁸¹ The biggest challenge in 2050 will be nutritious diet rather than the provision of sufficient calories. Therefore, policymakers should focus on the quality of meals along with ensuring food affordability, availability and dietary diversity.⁸²

Policy Narratives for Food Sustainability

The debate on sustainability of food security has been richly made as is explored from the existing body of literature. At micro level, food sustainability is connected to the income status of the household and the control of emissions regarding climate change. It encompasses three areas that include continuity in something, orientation (normative and positive) and relationships (involved others, nature and future generations) that are socially, naturally and timely contingent.⁸³ The projected global population is 9 billion and per capita consumption power might be more than double. This is coupled with serious challenges of food insecurity, human health and environmental protection that are deeply interwoven creating undue pressure.⁸⁴ Food production based Greenhouse Gases (GHGs) are estimated to be 25 percent of the total and global agriculture is polluting marine and fresh waters along with agrochemicals.⁸⁵

Food security related policies are required to emphasize efficient management to counter economic shocks and fortification of national institutions in order to ameliorate food access and provision of "Right to Food".⁸⁶ Policies are required to bring shift of taxes from super-poorer to super-richest. The inverted U-shape Kuznets curve is showing divergent trend among high-income economies.⁸⁷ In 2050, the traditional diet consumption patterns would be replaced. This would cause 80 percent increase in agriculture GHGs globally from production and clearing of global land.⁸⁸ The global shift in diet that intends to be largely animal-based products will lead to over-extraction of resources, increased land use and GHG emissions.⁸⁹ (See Figure 1)

Sustainable food supply can be materialized through seafood. Demand and supply shifts reflect that edible seafood would increase by 21 million to 44 million tonnes by 2050. However, the potential of production depends upon policy formulation, technological advancement and how demand behaves.⁹⁰ Nutritional sustainability demands a clarion call for seeking driving nodes of food system and definite calculation of environmental carrying capacity at personal, local and national levels to launch effective nutrition solutions.⁹¹ The dream of food sustainability is highly dependent on climate change scenarios while mitigation and adaptation are key solvent along with creating balance in the ecosystem.

It has been acknowledged that human actions have been devastating the ecosystem, perishing biological traits, genes and species outrageously.⁹² Sustainable food and nutrition security are related to food system's capacity to render F&NS in socially, economically and environmentally sustainable manner.⁹³ Food production needs multiscale dimensions that must be integrated with biological systems, medical and food sciences, ecology, agronomy and Earth sciences. The role of ICT and *natura* life science will be more effective rather than solemn restructuring based on efficiency trade-off in agriculture.⁹⁴ Sustainable development scenario reflects that wealthy countries are performing well in most of the sustainable development indicators but poorly in health sector, food waste and environmental degradation.⁹⁵ Pricing and levying tax on food commodities can substantially be important for emission control and mitigating the potential impact of climate change.⁹⁶ Analysis of various options indicates that no single factor is adequate, however a synergistic form of mechanism can be sufficient to mitigate the pressure on environment.⁹⁷ At meso level, food sustainability accentuates to address climate change, uncertainty and inequality both of political and economic nature.

The condition of sustainability is fairly satisfied when cost, duration and dependent activities chain is met with demand.⁹⁸ Adverse trade-off exists between climate mitigation and food security. However, a research study found that strict climate mitigation policy is being implemented evenly in all regions and sectors. This would bring adverse impact on hunger and food consumption globally than direct impact of climate change.⁹⁹ Ecosystem survival and efficient functioning with sustainability should not be jeopardized at the cost of unlimited human wants. Otherwise, the whole natural cycles will be at risk and ultimately humanity will face unrecoverable cost.

Conclusion

An interdisciplinary approach in line with micro, meso and macro policy tools in all four dimensions of food security is required to be addressed in rational ways. The policy package explained here emphasized on holistic approach regarding all dimensions and actions are aligned so as to achieve food availability, while government needs to control price in inputs market like fertilizers, pesticides, water irrigation. It will be more effective if targeted subsidy to the potential

farmers with targeted inputs in specified areas is provided.

Democratic governance is a necessary condition for accomplishing this task along with efficient institutional performance. Amidst rising population along with weak economic and physical accessibility, demand for food would be seriously escalating in the years to come. Mitigation and adaptation measures should be highly encouraged. Farmers will have to be motivated on a large scale in their practices at farm levels to minimize the effects of climate change. Uninterrupted food supply is a fundamental and necessary stipulation for the other dimensions of food security and ultimately the whole narrative of food and nutrition security. (See Figure 1 for further insight)

Food accessibility can be achieved through increasing purchasing power of the people on the one hand and by managing food inflation on the other hand. This is only possible if income status is improved. Education and health facilities may be the likely determinants along with increasing employment opportunities and alleviation of poverty. Food utilization objectives can be achieved through promoting dietary diversity, reducing malnutrition, change in consumption patterns, and balance diet plan or nutrition knowledge along with giving importance to healthcare. Revisiting our social and cultural values is highly imperative as these may be affecting food preferences under the pandemic.

Last but not the least, food sustainability is the cornerstone because it stands large on the performance of the rest of the dimensions of food security. Its assurance in the world of coronavirus is quite difficult. However, its achievability lies primarily in emissions control, happiness of the people, efficient management in the tradeoff between human and ecosystem by limiting negative human actions and gaining positive response from the nature.

Food security is the cornerstone and its provision is fundamental for the societal survival and stability. In reality, the whole building of food security stands on four pillars and if any one of them is paralyzed, rest of the pillars will no longer support the whole building block. Hence, we can conclude that food availability is a necessary condition but not sufficient to ensure food accessibility. Similarly, food accessibility is necessarily important for food utilization; so is the case with food utilization and sustainability. In this

way, a complete basket of public policies in integrated forms may be the holistic recipe for addressing food and nutritional security in Pakistan. Actionable plans need to be framed on the basis of the proposed policy

narratives through the joint coordination of various provincial and federal ministries involved in the defined areas of various dimensions of food and nutrition security.

Fig. 1| Summary illustration of food security and basket of public policies

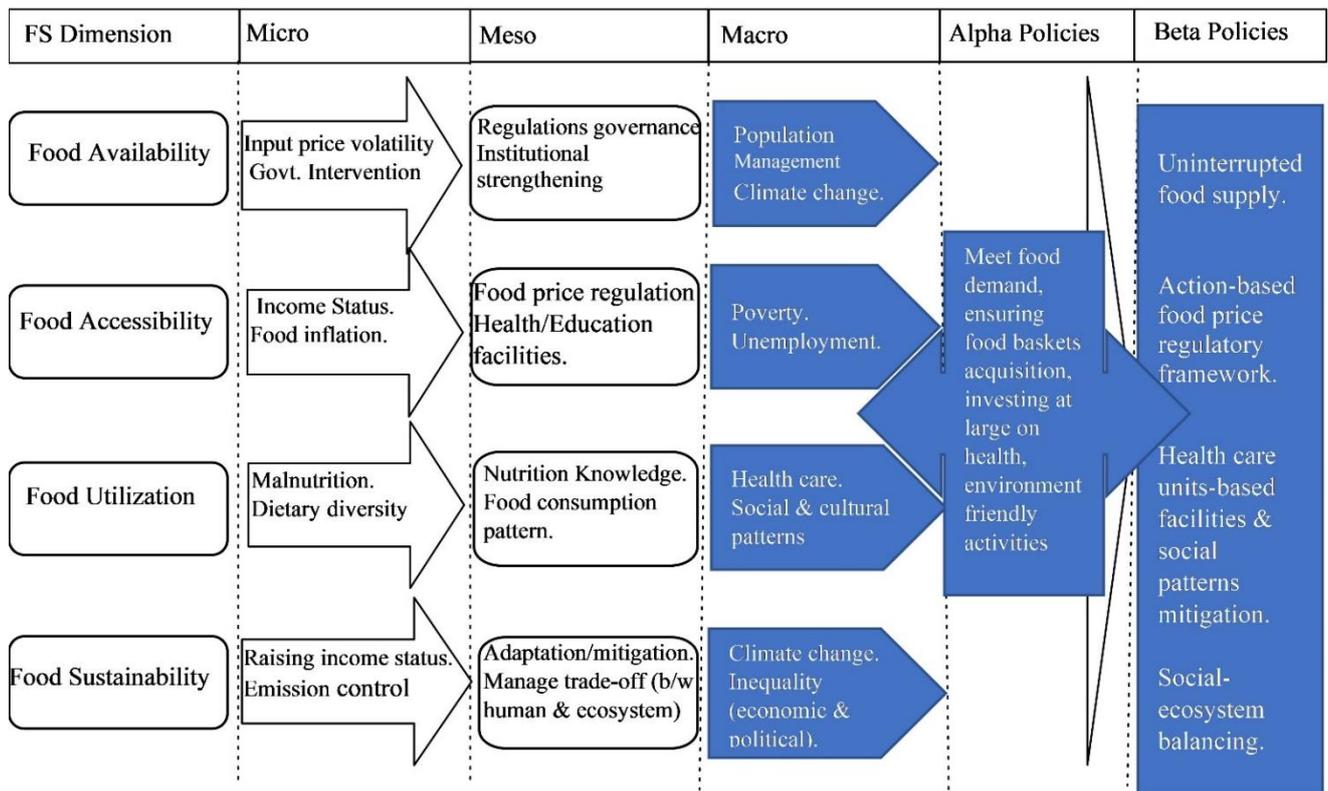


Figure 1 illustrates the summary of food security and basket of public policies. Our in-depth understanding has segregated all dimensions of food security into four main key dimensions. Further there is extracted sub-dimension of each component of food security to develop a basket of public policies in the spectrum of food and nutrition security. Micro, meso and macro sub-dimensions of food and nutrition security related to public policies may be evolved systematically. Alpha and beta policy drives are also important in the whole basket of policies.

REFERENCES

1. Shaw, D.J. (2007). World Food Summit, 1996. In *World Food Security* (pp. 347-360). Palgrave Macmillan, London.
2. Practical, G. (2008). *An Introduction to the Basic Concepts of Food Security*.
3. Frankenberger, T.R., & Verduijn, R. (2011). *Integrated Food Security Phase Classification (IPC)*.
4. Qureshi, M.E., Dixon, J., & Wood, M. (2015). Public policies for improving food and nutrition security at different scales. *Food Security*, 7(2), 393-403.
5. Molnar, J.J. (1999). Sound policies for food security: The role of culture and social organization. *Applied Economic Perspectives and Policy*, 21(2), 489-498.
6. Lea, R. (2020). The March Budget: A holding operation, amid coronavirus-related economic uncertainties. *Arbuthnot Banking Group*, 9.
7. Tian, H., Liu, Y., Li, Y., Wu, C.H., Chen, B., Kraemer, M.U., & Wang, B. (2020). An investigation of transmission control measures during the first 50 days of the Covid-19 epidemic in China. *Science*.
8. Khan, N., Fahad, S., Faisal, S., & Naushad, M. (2020). Quarantine Role in the Control of Corona Virus in the World and Its Impact on the World Economy. Available at SSRN 3556940.
9. McKee, M., & Stuckler. (2020). If the world fails to protect the economy, Covid-19 will damage health not just now but also in the future. *Nat Med* (2020). <https://doi.org/10.1038/s41591-020-0863-y>.
10. Walker, P.G., Whittaker, C., Watson, O., Baguelin, M., Ainslie, K.E.C., Bhatia, S., & Cucunuba, Z. (2020). The global impact of Covid-19 and strategies for mitigation and suppression. WHO Collaborating Centre for Infectious Disease Modelling, MRC Centre for Global Infectious Disease Analysis, Abdul Latif Jameel Institute for Disease and Emergency Analytics, Imperial College London.
11. McKibbin, W.J., & Fernando, R. (2020). The global macroeconomic impacts of Covid-19: Seven scenarios.
12. Fernandes, N. (2020). Economic effects of coronavirus outbreak (Covid-19) on the world economy. Available at SSRN 3557504.
13. Kandel, N., Chungong, S., Omaar, A., & Xing, J. (2020). Health security capacities in the context of Covid-19 outbreak: An analysis of International Health Regulations annual report data from 182 countries. *The Lancet*.
14. Koleros, A., & Mayne, J. (2019). Using actor-based theories of change to conduct robust contribution analysis in complex settings. *Canadian Journal of Program Evaluation*, 33(3).
15. Valters, C. (2014). Theories of change in international development: Communication, learning, or accountability. *JSRP Paper*, 17.
16. Reddy, C.S. (Ed.). (2015). *Food security and food production: institutional challenges in governance domain*. Cambridge Scholars Publishing.
17. Abdelhedi, I.T., & Zouari, S.Z. (2018). Agriculture and Food Security in North Africa: A Theoretical and Empirical Approach. *Journal of the Knowledge Economy*, 1-18.
18. Kogo, B.K., Kumar, L., & Koech, R. (2020). Climate change and variability in Kenya: a review of impacts on agriculture and food security. *Environment, Development and Sustainability*, 1-21.
19. Siche, R. (2020). What is the impact of Covid-19 disease on agriculture? *Scientia Agropecuaria*, 11(1), 3-6.
20. Reddy, C.S. (Ed.). (2015). *Food security and food production: institutional challenges in governance domain*. Cambridge Scholars Publishing.
21. Godfray, H.C.J., & Garnett, T. (2014). Food security and sustainable intensification. *Philosophical Transactions of the Royal Society B: biological sciences*, 369(1639), 20120273.
22. Ezeh, A.C., Bongaarts, J., & Mberu, B. (2012). Global population trends and policy options. *The Lancet*, 380(9837), 142-148.
23. Ayala, A., & Meier, B.M. (2017). A human rights approach to the health implications of food and nutrition insecurity. *Public Health Reviews*, 38(1), 1-22.
24. Naja, F., & Hamadeh, R. (2020). Nutrition amid the Covid-19 pandemic: A multi-level framework for action. *European Journal of Clinical Nutrition*, 1-5.



25. Zhao, A., Li, Z., Ke, Y., Huo, S., Ma, Y., Zhang, Y., & Ren, Z. (2020). Dietary Diversity among Chinese Residents during the Covid-19 Outbreak and Its Associated Factors. *Nutrients*, 12(6), 1699.
26. Chakona, G., & Shackleton, C. (2017). Minimum dietary diversity scores for women indicate micronutrient adequacy and food insecurity status in South African towns. *Nutrients*, 9(8), 812.
27. Mamun, M.A., & Griffiths, M.D. (2020). A rare case of Bangladeshi student suicide by gunshot due to unusual multiple causalities. *Asian Journal of Psychiatry*, 49, 101951.
28. Corburn, J., Vlahov, D., Mberu, B., Riley, L., Caiaffa, W.T., Rashid, S.F., & Jayasinghe, S. (2020). Slum health: Arresting Covid-19 and improving well-being in urban informal settlements. *Journal of Urban Health*, 1-10.
29. Salem, J., & Mojaverian, M. (2017). Study of relationship between food security, urban population and development plans in Iran. *Environmental Resources Research*, 5(2), 143-152.
30. Wilkinson, A. (2020). Local response in health emergencies: Key considerations for addressing the Covid-19 pandemic in informal urban settlements. *Environment and Urbanization*, 0956247820922843.
31. Rola-Rubzen, M.F., & Hardaker, J.B. (2010). Economics and Policy of Food Production. *Peace Studies, Public Policy and Global Security*, Volume X, 34.
32. Ramelli, S., & Wagner, A.F. (2020). Feverish Stock Price Reactions to Covid-19. *Swiss Finance Institute Research Paper*, (20-12).
33. Sassi, M. (2018). The history of food security: approaches and policies. In *Understanding Food Insecurity* (pp. 89-120). Springer, Cham.
34. Sardar Shahraki, A., Ali Ahmadi, N., & Safdari, M. (2019). Economic Analysis of Price Shocks of Production Inputs and Their Impact on Cotton Price in Iran: The Application of Panel Data Vector Auto-Regression (PVAR) Model. *Environmental Energy and Economic Research*, 3(1), 23-36.
35. Malek, K., Reed, P., Adam, J., Karimi, T., & Brady, M. (2020). Water rights shape crop yield and revenue volatility tradeoffs for adaptation in snow dependent systems. *Nature communications*, 11(1), 1-10.
36. Pretty, J., Toulmin, C., & Williams, S. (2011). Sustainable intensification in African agriculture. *International journal of agricultural sustainability*, 9(1), 5-24.
37. Kinnunen, P., Guillaume, J.H., Taka, M., D'Odorico, P., Siebert, S., Puma, M.J., & Kummu, M. (2020). Local food crop production can fulfil demand for less than one-third of the population. *Nature Food*, 1(4), 229-237.
38. Reader, M.A., Revoredo-Giha, C., Lawrence, R.J., Hodge, I.D., & Lang, B.G. (2018). Farmers' spending on variable inputs tends to maximize crop yields, not profit. *International Journal of Agricultural Management*, 7(1), 1-11.
39. Ripple, W.J., Wolf, C., Galetti, M., Newsome, T. M., Green, T.L., Alamgir, M., & Laurance, W.F. (2018). The role of Scientists' Warning in shifting policy from growth to conservation economy. *BioScience*, 68(4), 239-240.
40. Janssens, C., Havlík, P., Krisztin, T., Baker, J., Frank, S., Hasegawa, T., & Valin, H. (2020). Global hunger and climate change adaptation through international trade. *Nature Climate Change*, 10(9), 829-835.
41. Smith, J., Yeluripati, J., Smith, P., & Nayak, D. R. (2020). Potential yield challenges to scale-up of zero budget natural farming. *Nature Sustainability*, 1-6.
42. Hu, Y., Su, M., Wang, Y., Cui, S., Meng, F., Yue, W., & Yang, Z. (2020). Food production in China requires intensified measures to be consistent with national and provincial environmental boundaries. *Nature Food*, 1(9), 572-582.
43. Nilsson, M., Griggs, D., & Visbeck, M. (2016). Policy: map the interactions between Sustainable Development Goals. *Nature*, 534(7607), 320-322.
44. Townsend, B., Schram, A., Baum, F., Labonté, R., & Friel, S. (2020). How does policy framing enable or constrain inclusion of social determinants of health and health equity on trade policy agendas? *Critical Public Health*, 30(1), 115-126.
45. Hussain, A., Zulfiqar, F., & Saboor, A. (2014). Changing food patterns across the seasons in rural Pakistan: analysis of food variety, dietary diversity and calorie intake. *Ecology of food and nutrition*, 53(2), 119-141.
46. Url, T., Sinabell, F., & Heinschink, K. (2018). Addressing basis risk in agricultural margin insurances. *Agricultural Finance Review*.

47. Jones, A., & Hiller, B. (2017). Exploring the dynamics of responses to food production shocks. *Sustainability*, 9(6), 960.
48. Möhring, N., Ingold, K., Kudsk, P., Martin-Laurent, F., Niggli, U., Siegrist, M., & Finger, R. (2020). Pathways for advancing pesticide policies. *Nature food*, 1(9), 535-540.
49. Bandara, J.S., & Cai, Y. (2014). The impact of climate change on food crop productivity, food prices and food security in South Asia. *Economic Analysis and Policy*, 44(4), 451-465.
50. Sage, C. (2014). Impacts of climate change on food accessibility. *Global Environmental Change*, 709-715.
51. Burchi, F., & De Muro, P. (2016). From food availability to nutritional capabilities: Advancing food security analysis. *Food Policy*, 60, 10-19.
52. Jiang, X., & Chen, Y. (2020). The Potential of Absorbing Foreign Agricultural Investment to Improve Food Security in Developing Countries. *Sustainability*, 12(6), 2481.
53. Pérez-Escamilla, R., Gubert, M.B., Rogers, B., & Hromi-Fiedler, A. (2017). Food security measurement and governance: Assessment of the usefulness of diverse food insecurity indicators for policy makers. *Global Food Security*, 14, 96-104.
54. D'Souza, A., & Jolliffe, D. (2013). Food insecurity in vulnerable populations: coping with food price shocks in Afghanistan. *American Journal of Agricultural Economics*, 96(3), 790-812.
55. Korir L., Rizov M., & Ruto E. (2018) Analysis of Household Food Demand and Its Implications on Food Security in Kenya: An Application of QUAIDS Model. Coventry, UK: Agricultural Economics Society conference in Warwick University.
56. Ali, A., & Erenstein, O. (2017). Assessing farmer use of climate change adaptation practices and impacts on food security and poverty in Pakistan. *Climate Risk Management*, 16, 183-194.
57. Cappelli, A., & Cini, E. (2020). Will the Covid-19 pandemic make us reconsider the relevance of short food supply chains and local productions? *Trends in Food Science & Technology*, 99, 566.
58. Cepal, N. (2020). The 2030 Agenda for Sustainable Development in the new global and regional context: Scenarios and projections in the current crisis.
59. Kaplan, K.H., Kirk, K.J., Lich, K.M., Palde, L.P.R., Van Allen, C., Nantz, E.L., & Healey, B.P. (2020). Accessibility to emergency food systems in south-central Indiana evaluated by spatiotemporal indices of pressure at county and pantry level. *Nature Food*, 1(5), 284-291.
60. Shahidi, F. (2020). Does Covid-19 Affect Food Safety and Security? *Journal of Food Bioactives*, 9.
61. Islam, M.R., Rahman, M.S., Rahman, M.M., Nomura, S., de Silva, A., Lanerolle, P., & Rahman, M.M. (2019). Reducing childhood malnutrition in Bangladesh: the importance of addressing socio-economic inequalities. *Public health nutrition*, 1-11.
62. Rao, N. (2020). The achievement of food and nutrition security in South Asia is deeply gendered. *Nature Food*, 1(4), 206-209.
63. WFP, 2020. Covid-19: Potential impact on the world's poorest people A WFP analysis of the economic and food security implications of the pandemic. <https://docs.wfp.org/api/documents/WFP-0000114040/download/>
64. Nord, M., Coleman-Jensen, A., Andrews, M., & Carlson, S. (2010). Household food security in the United States, 2009 (Economic Research Report No. ERR-108). Washington, DC: United States Department of Agriculture. Economic Research Service.
65. Torheim, L.E., Ouattara, F., Diarra, M.M., Thiam, F.D., Barikmo, I., Hatløy, A., & Oshaug, A. (2004). Nutrient adequacy and dietary diversity in rural Mali: Association and determinants. *European journal of clinical nutrition*, 58(4), 594-604.
66. Azadbakht, L., Mirmiran, P., & Azizi, F. (2005). Variety scores of food groups contribute to the specific nutrient adequacy in Tehranian men. *European journal of clinical nutrition*, 59(11), 1233-1240.
67. Labadarios, D., Davids, Y.D., Mciza, Z., & Weir-Smith, G. (2009). The assessment of food insecurity in South Africa.
68. El Bilali, H., Callenius, C., Strassner, C., & Probst, L. (2019). Food and nutrition security and sustainability transitions in food systems. *Food and Energy Security*, 8(2), e00154.
69. UN. (2020). Shared Responsibility, Global Solidarity: Responding to the socio-economic impacts of Covid-19. https://www.un.org/sites/un2.un.org/files/sg_report_socio-economic_impact_of_covid19.pdf.



70. Martin-Biggers, J., Koenings, M., Quick, V., Abbot, J.M., & Byrd-Bredbenner, C. (2015). Appraising nutrient availability of household food supplies using Block Dietary Screeners for individuals. *European Journal of Clinical Nutrition*, 69(9), 1028-1034.
71. Dangerfield, F., Lamb, K.E., Oostenbach, L.H., Ball, K., & Thornton, L.E. (2020). Urban-regional patterns of food purchasing behaviour: A cross-sectional analysis of the 2015–2016 Australian Household Expenditure Survey. *European Journal of Clinical Nutrition*, 1-11.
72. Cohen, D. (2005). Achieving food security in vulnerable populations. *BMJ*, 331(7519), 775-777.
73. Ikudayisi, A., Okoruwa, V., & Omonona, B. (2019). From the lens of food accessibility and dietary quality: Gaining insights from urban food security in Nigeria. *Outlook on Agriculture*, 48(4), 336-343.
74. Khaledi, S., Sharma, S., Irwin, C., & Sun, J. (2016). Dietary patterns, nutrition knowledge and lifestyle: associations with blood pressure in a sample of Australian adults (the Food BP study). *Journal of Human Hypertension*, 30(10), 581-590.
75. dos Santos Interlenghi, G., & Salles-Costa, R. (2015). Inverse association between social support and household food insecurity in a metropolitan area of Rio de Janeiro, Brazil. *Public health nutrition*, 18(16), 2925-2933
76. Noronha, D.C., Santos, M.I., Santos, A.A., Corrente, L.G., Fernandes, R.K., Barreto, A.C., & Nascimento, M.V. (2020). Nutrition Knowledge is Correlated with a Better Dietary Intake in Adolescent Soccer Players: A Cross-Sectional Study. *Journal of Nutrition and Metabolism*, 2020.
77. Malik, V.S., Willett, W.C., & Hu, F.B. (2013). Global obesity: trends, risk factors and policy implications. *Nature Reviews Endocrinology*, 9(1), 13-27.
78. Yahia, N., Brown, C.A., Rapley, M., & Chung, M. (2016). Level of nutrition knowledge and its association with fat consumption among college students. *BMC Public Health*, 16(1), 1047.
79. Wester, P., Mishra, A., Mukherji, A., & Shrestha, A.B. (2019). *The Hindu Kush Himalaya Assessment*. Cham: Springer International Publishing: Basel, Switzerland.
80. Nyangasa, M.A., Buck, C., Kelm, S., Sheikh, M., & Hebestreit, A. (2019). Exploring Food Access and Sociodemographic Correlates of Food Consumption and Food Insecurity in Zanzibari Households. *International journal of environmental research and public health*, 16(9), 1557.
81. Ingram, J. (2020). Nutrition security is more than food security. *Nature Food* 1, no. 1: 2-2.
82. Nelson, G., Bogard, J., Lividini, K., Arsenault, J., Riley, M., Sulser, T. B., & Wiebe, K. (2018). Income growth and climate change effects on global nutrition security to mid-century. *Nature Sustainability*, 1(12), 773-781.
83. Becker, C.U. (2012). The meaning of sustainability. In *Sustainability Ethics and Sustainability Research* (pp. 9-15). Springer, Dordrecht.
84. Liu, J., Mooney, H., Hull, V., Davis, S.J., Gaskell, J., Hertel, T., & Li, S. (2015). Systems integration for global sustainability. *Science*, 347(6225), 1258832.
85. Tubiello, F.N., Salvatore, M., CórdorGolec, R.D., Ferrara, A., Rossi, S., Biancalani, R., & Flammini, A. (2014). *Agriculture, forestry and other land use emissions by sources and removals by sinks*. Rome, Italy.
86. Davis, O., & Geiger, B.B. (2017). Did Food Insecurity rise across Europe after the 2008 Crisis? An analysis across welfare regimes. *Social Policy and Society*, 16(3), 343-360.
87. Otto, I. M., Kim, K.M., Dubrovsky, N., & Lucht, W. (2019). Shift the focus from the super-poor to the super-rich. *Nature Climate Change*, 9(2), 82-84.
88. Tilman, D., & Clark, M. (2014). Global diets link environmental sustainability and human health. *Nature*, 515(7528), 518-522.
89. Springmann, M., Clark, M., Mason-D’Croz, D., Wiebe, K., Bodirsky, B.L., Lassaletta, L., & Jonell, M. (2018). Options for keeping the food system within environmental limits. *Nature*, 562(7728), 519-525.
90. Costello, C., Cao, L., Gelcich, S., Cisneros-Mata, M.Á., Free, C.M., Froehlich, H.E., & Mangin, T. (2020). The future of food from the sea. *Nature*, 1-6.
91. Smetana, S.M., Bornkessel, S., & Heinz, V. (2019). A path from sustainable nutrition to nutritional sustainability of complex food systems. *Frontiers in nutrition*, 6, 39.
92. Cardinale, B.J., Duffy, J.E., Gonzalez, A., Hooper, D.U., Perrings, C., Venail, P., & Kinzig, A.P. (2012). Biodiversity loss and its impact on humanity. *Nature*, 486(7401), 59-67.

93. Zurek, M., Hebinck, A., Leip, A., Vervoort, J., Kuiper, M., Garrone, M., & Kuijsten, A. (2018). Assessing sustainable food and nutrition security of the EU food system – an integrated approach. *Sustainability*, 10(11), 4271.
94. Funabashi, M. (2018). Human augmentation of ecosystems: objectives for food production and science by 2045. *npj Science of Food*, 2(1), 1-11.
95. Chaudhary, A., Gustafson, D., & Mathys, A. (2018). Multi-indicator sustainability assessment of global food systems. *Nature communications*, 9(1), 1-13.
96. Springmann, M., Mason-D’Croz, D., Robinson, S., Wiebe, K., Godfray, H.C.J., Rayner, M., & Scarborough, P. (2017). Mitigation potential and global health impacts from emissions pricing of food commodities. *Nature Climate Change*, 7(1), 69-74.
97. Springmann, M., Clark, M., Mason-D’Croz, D., Wiebe, K., Bodirsky, B.L., Lassaletta, L., & Jonell, M. (2018). Options for keeping the food system within environmental limits. *Nature*, 562(7728), 519-525.
98. Zachary, D.S. (2014). On the sustainability of an activity. *Scientific reports*, 4, 5215.
99. Hasegawa, T., Fujimori, S., Havlík, P., Valin, H., Bodirsky, B.L., Doelman, J.C., & Mason-D’Croz, D. (2018). Risk of increased food insecurity under stringent global climate change mitigation policy. *Nature Climate Change*, 8(8), 699-703.

Prepared by:

Tauqeer Ahmad

Ph.D. Scholar, Department of Economics,
PMAS Arid Agriculture University, Rawalpindi.

Dr. Abdul Saboor

Professor of Economics/Dean,
Faculty of Social Sciences,
PMAS Arid Agriculture University, Rawalpindi.

Non-Resident Research Fellow,
Institute of Policy Studies, Islamabad.

For queries:

Naufil Shahrukh

GM Operations
Institute of Policy Studies, Islamabad.
naufil@ips.net.pk | www.ips.org.pk