



## Impact of Socio-Economic Shocks on Food Insecurity: A Case Study of Pakistan

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### ABSTRACT

Despite these efforts, food insecurity remains a significant development concern in Pakistan, exacerbated by socioeconomic shocks such as COVID-19, the Russia-Ukraine conflict, the 2022 floods, inflation, and climate change. This study compares the multidimensional food insecurity situation in the nation by analyzing nationally representative Household Integrated Economic Survey (HIES) data for 2018–19 and 2024–25. A Multidimensional Food Insecurity Index (MFII) was constructed based on four dimensions: availability, accessibility, utilization, and stability. The findings reveal that although food-secure households increased slightly from 15.8% to 18.17%, moderate food insecurity became the dominant category, rising from 34.8% to 38.78%, indicating that many households remained food insecure rather than becoming food secure. Serious food insecurity remained high at 32.99%, while 9.32% of households continued to face alarming food insecurity. On the provincial level, multidimensional food insecurity continued to be high in Balochistan and Khyber Pakhtunkhwa province, with the number of moderate food insecure increasing from 17.65% to 41.94% and 18.71% to 40.09%, respectively. The results indicate that, even with government support, socio-economic shocks are still affecting the resilience of households and clearly highlight the importance of adopting specific policies that can enhance long-term multidimensional food security in the country.

## Introduction

Food insecurity continues to be one of the most intractable development problems of the twenty-first century, and its deteriorating state as a result of socio-economic stress has become a growing priority for policymakers, researchers, and development practitioners. According to the Food and Agriculture Organization (FAO), food security exists when "all people, at all times, have physical and economic access to sufficient, safe and nutritious food for an active and healthy life, and with the food preferences they have, and these foods meet their dietary needs" (FAO, 2023). This definition emphasizes the four interdependent dimensions of food insecurity: availability, accessibility, utilization, and stability and has largely replaced earlier one-dimensional views that focused only on aggregate food supply.

The COVID-19 pandemic, climate-related disasters, inflation and supply chain disruptions have increased food insecurity across the world collectively (WFP, 2024). The agriculture-based economy, informal labor markets and agricultural exposure to floods and droughts have made Pakistan more susceptible (Anwar et al., 2020; Ahmed & Raza, 2019). The catastrophic floods of 2022 not only caused damage to crops, infrastructure, and rural livelihoods but also led to a decline in purchasing power in the hands of households due to rising inflation and depreciation of the exchange rates (State Bank of Pakistan & World Bank, 2023).

This, in turn, exacerbated the situation of food insecurity, especially in sensitive areas like Balochistan, interior Sindh and southern Punjab (Asian Development Bank, 2017; National Nutrition Survey, 2018). Existing empirical literature in Pakistan has many important limitations, particularly because food insecurity is multidimensional. Most studies consider only a single category of shocks, e.g. price (Ahmed & Raza, 2019), climatic (Anwar, Sabir, & Sarwar, 2020), or pandemic (Rehman, Jingdong, & Hussain, 2021) shocks into an analytical framework without considering all the channels together to account for all types of shocks. Likewise, a multitude of studies have used only a single dimension of food security, typically calories or food variety, and ignored other aspects of food security, including utilization and stability (Hoddinott, 1999; Dercon, 2002). Furthermore, a lot of the evidence sources are based on provincial or small-scale surveys, which are difficult to extrapolate to formulate national policy (Bashir & Schilizzi, 2013; Nazli & Hamid, 2014).

While much attention has been paid to spatial differences in development research (Anselin, 1988; Fotheringham, Brunsdon, & Charlton, 2002), few studies have systematically investigated the spatial clustering and spatial heterogeneity of food insecurity within Pakistan. This study aims to fill these gaps by examining food insecurity from a multidimensional perspective based on data from the Household Integrated Economic Survey (HIES) 2024-25 and 2018-19, obtained from 30,123 and 24,809 households, respectively, across Pakistan. The study builds on the four dimensions of food insecurity – availability, access, utilization, and stability – and constructs a Multidimensional Food Insecurity Index (MFII) which is then validated through Principal Component Analysis (PCA), Multiple Correspondence Analysis (MCA) and standard reliability diagnostics. It also explores the socio-economic, demographic and infrastructural factors affecting food insecurity through binary and ordered logistic regression models and further elaborates the analysis with the help of Global Moran's I and Geographically Weighted Regression (GWR) models to explore the spatial clustering and locational variation of the food insecurity situation in Pakistan's 141 districts. The multidimensional measurement, the econometric modeling and the spatial analysis give a more comprehensive understanding of the combined effect of structural vulnerability and socio-economic shocks on household food insecurity.

The overall purpose of the study is to understand the impact of socio-economic shocks and their structural causes on the multidimensional food insecurity of Pakistani households. In particular, the study is set to create and validate a multidimensional food insecurity index, identify the socio-economic, demographic and infrastructural determinants of each dimension of food insecurity, analyze the spatial clustering of the food insecurity across the provinces and districts and recommend evidence-based, spatially differentiated policy recommendations for enhancing household resilience. The study is based upon the hypothesis that food insecurity in Pakistan is not random, but it is systematically created by failures in household entitlements such as income, employment, education, access to water, gender, and geographically clustered vulnerabilities. Such a comprehensive approach would also offer better empirical support for developing specific policy responses to enhance food security and the resilience of households to future socio-economic and environmental shocks.

## **Literature Review**

The literature on socio-economic shocks and food insecurity has gained considerable momentum in Pakistan since the mid-2010s, when the focus shifted from general vulnerability theory to empirically testing its predictions using Pakistani household data. Among the earlier studies in this more recent wave, Malik, Nazli and Whitney (2015) evaluated the effect of income volatility of rural households in Pakistan on food insecurity's Utilization dimension and found that households facing the income gap between harvests regularly decreased their intake of food groups during the lean periods, creating an early empirical association between short-term income shocks and the Utilization dimension of food insecurity in Pakistan in particular.

In the same vein, Ahmed and Farooq (2016) conducted a study on the impact of livestock disease outbreaks on the welfare of rural households in the southern parts of Punjab and Sindh to assess how the outbreak of livestock diseases impacts on food availability and food expenditure capacity of rural households, livestock providing dual services of a productive asset, savings instrument and a buffer against shocks in these regions. In its country profile on climate change impacts in Pakistan (2017), the Asian Development Bank (ADB) widened the shock lens to the macro-climatic level, and found that agricultural-dependent households in southern Punjab and Balochistan are highly exposed to slow-onset shocks like drought and rapid-onset shocks like flash flooding due to their weak irrigation systems and lack of formal weather insurance.

The National Nutrition Survey (2018) then gave the first large scale nutrition evidence to support these locational patterns of nutrition, finding that child stunting and wasting rates were significantly higher in the drought exposed interior districts of Sindh and southern Punjab, the area that the ADB had identified as being at risk of climate shocks, thereby making a direct link between exposure to climatic shocks at the household level and exposure at the macro level. During the decade, as the decade went on, the focus shifted to price and market shocks, and then climatic shocks and asset shocks.

While food and fuel price inflation is recognized to affect real purchasing power, particularly negatively for urban households that are net consumers rather than producers of food, as shown by Ahmed and Raza (2019), the channel of price inflation is known as the entitlement channel, which differs from the agricultural production shocks studied in rural areas. Looking at the availability and utilization aspects of food security, Anwar et al. (2020) specifically for Sindh have shown that when a climate change shock such as recurrent drought occurs in a district, it brings the three factors of crop failure, loss of livestock and reduced safe drinking water access together; all of which contribute in a significant way to chronic malnutrition among children in the affected areas.

In the immediate aftermath of the first waves of the COVID-19 pandemic, Rehman, Jingdong, and Hussain (2021) observed an immediate rise in urban food insecurity in Pakistan due to COVID-19-induced lockdowns and labor market disruptions. The Pakistan Bureau of Statistics (2021) also reported an unprecedented increase in self-reported household food insecurity indicators at the national level relative to pre-pandemic baselines, marking a shift in food security outcomes caused by a covariate macroeconomic shock of this magnitude. More recent literature (from 2022 onward) has more frequently examined newer and more complex entitlement channels alongside the already mentioned shock categories.

In conclusion, the findings by Khan, Ali and Bakhsh (2022) suggest that mobile phones and digital communication technologies had a positive impact on income diversification and food availability for rural households, and digital inclusion acts as a protective factor against income and price shocks. Using digital connectivity to enhance the resilience of households also lowered transaction costs and boosted market participation, which enabled quicker recovery from adverse events, as shown by Maqbool, Iqbal and Yasmeen (2023). Mahmood, Sultana and Zafar (2023) found that households' economic resilience, reflected in non-food expenditure capacity, was strong.

Using nationally representative panel data, Hussain and Bibi (2025) found that the effects of compound shocks (such as a climatic shock followed in the same year by a price shock) on dietary diversity were significantly greater and more long-lasting than the effects of shocks of either type alone, supporting the theoretical poverty-trap effect predicted by the earlier vulnerability literature.

In response to the inflationary shock of 2022–23, Yousaf, Kiani, and Shahzad (2025) investigated the resilience of male- and female-headed households to the shock and found that female-headed households were significantly less resilient to the shock than male-headed households, mainly due to limited capacity to rebuild depleted resources via formal credit and wage employment. Most recently, Iqbal et al. (2026), using new data from the HIES, confirmed that income and price shocks slowed the recovery of rural households' incomes and assets, with digital financial inclusion (mobile cash transfers and financial services) having a measurable impact on reducing the recovery time.

They also reiterated earlier findings by Khan et al. (2022) and Maqbool et al. (2023) that mobile-based cash transfers and savings products have a protective effect, though the effect was significantly weaker in the most geographically remote districts of Balochistan and interior Sindh, where financial services availability and mobile network penetration remain low. While studying the eleven-year timeframe, there is a clear movement towards more compound and covariate shock analysis and more integrated analysis of shocks across income, climatic, and digital and financial channels, and from a pure focus on shocks on the income and climatic dimension a growing recognition of digital and financial inclusion as a new entitlement pathway. A study that brings these pieces together in a single, nationally representative, multidimensional framework that will allow researchers to examine how the different types of shocks and channels of entitlement influence food security outcomes for all dimensions simultaneously remains relatively understudied a gap this study aims to fill with the use of HIES 2024–25 microdata.

## **Methodology**

The methodological framework used to construct the Multidimensional Food Insecurity Index (MFII) for Pakistani households and to identify its underlying determinants compares food insecurity outcomes between two points in time.

The methodology proceeds in three stages. First, four dimension-specific indices—Availability, Accessibility, Utilization, and Stability—are constructed separately for the Household Integrated Economic Survey (HIES) 2018–19 and HIES 2024–25. Because the indicators comprise both continuous variables (such as income and expenditure) and categorical variables (such as dietary frequency and asset ownership), Principal Component Analysis (PCA) is applied to continuous indicators, while Multiple Correspondence Analysis (MCA) is applied to categorical indicators, following standard practice for mixed-type household survey data (Kolenikov & Angeles, 2009; Asselin, 2009).

Second, MFII is constructed in the Food Insecurity Multidimensional Index (FIMI) by combining the four-dimensional indices to the dual-cutoff counting methodology developed by Alkire and Foster (2011) and adapted to food security by Napoli (2011).

**Table 1: Data description**

| Dimension     | Variables         | Definition                                            | Units     |
|---------------|-------------------|-------------------------------------------------------|-----------|
| Accessability | Food_exp          | Total expenditure on food of a household              | In Rupee  |
|               | t.income          | Total income earned by household                      | In Rupee  |
|               | Dist_mark         | Distance to market from household                     | km        |
|               | HH_size           | Size of Household                                     | Numbers   |
| Availability  | head Age          | Age of Head                                           | Numbers   |
|               | Cul_land          | Do any of household cultivate land                    | Yes or no |
|               | Live_stock        | Is there any livestock in household                   | Yes or no |
|               | Total_livestock   | Total value of livestock of a household               | In Rupee  |
| Utilization   | Crop_prod         | Total production of crops                             | Numbers   |
|               | Cat. Protein_food | Includes meat, poultry, fish, and eggs                | Yes or no |
|               | Cat.Cereals_food  | Includes wheat, rice, maize, and bread                | Yes or no |
|               | Cat.Vegetables    | Includes leafy greens, roots, and seasonal vegetables | Yes or no |
| Stability     | Cat.Fruits        | Includes fresh, dried, and local seasonal fruits      | Yes or no |
|               | Cat.Pulses        | Includes lentils, beans, chickpeas, and split peas    | Yes or no |
|               | Cat.Oils_sugars   | Includes cooking oil, ghee, butter, sugar, and sweets | Yes or no |
|               | Enough_food       | household worried about not having enough food to eat | In Rupee  |
|               | Healthy_food      | Unable to eat healthy food                            | Yes or no |
|               | Resources         | Ran out of food because lack of resources             | Yes or no |
|               | Money_issue       | Lack of food due to. Money                            | Yes or no |
|               | Employ_stats      | Employment status of a household head                 | Yes or no |

Source: HIES SURVEY (Pakistan bureau of statistics)

The results from both rounds of the survey are compared to look for changes in household food insecurity from 2018-19 to 2024-25. Both data sets are constructed in the same manner so that a statistically valid and time-wise comparable evaluation of food insecurity in Pakistan can be made.

### Conceptual Framework

The four pillars of food security (Availability, Accessibility, Utilization and Stability) as introduced by the Food and Agriculture Organization (FAO, 2023) and adapted by Napoli (2011) are used. Availability is indicated by the physical presence of adequate food, such as land cultivation, livestock ownership, and crop production. Accessibility is the economic and physical capacity of a household to access food and is calculated using food expenditure, income, market distance and household composition. Utilization is an indicator of dietary diversity and nutrition outcomes, while Stability is the regularity of food access (as reflected by food inadequacy, resource availability, and job security). This framework was used uniformly for the two rounds of the HIES survey.

Where a dimension contained both continuous and categorical indicators, the PCA-derived and MCA-derived sub-indices were combined following Asselin (2009). Dimensions consisting of only categorical variables were constructed using MCA alone. All dimension indices were then normalized using Min–Max normalization:

$$\text{Dimension Index} = (\text{Actual Value} - \text{Minimum Value}) / (\text{Maximum Value} - \text{Minimum Value})$$

This ensured comparability across all four dimensions before aggregation.

### Construction of the Multidimensional Food Insecurity Index

The MFII follows the Napoli (2011) adaptation of the Alkire–Foster (2011) methodology. First, a deprivation cutoff is established for each dimension, where households below the threshold are classified as deprived (1) and others as non-deprived (0). Second, the number of deprivations experienced by each household is counted across the four equally weighted dimensions.

$$MFII_i = \frac{1}{4} [(Ava_i^3 + Acc_i^3 + Uti_i^3 + Stab_i^3)^{\frac{1}{3}}]$$

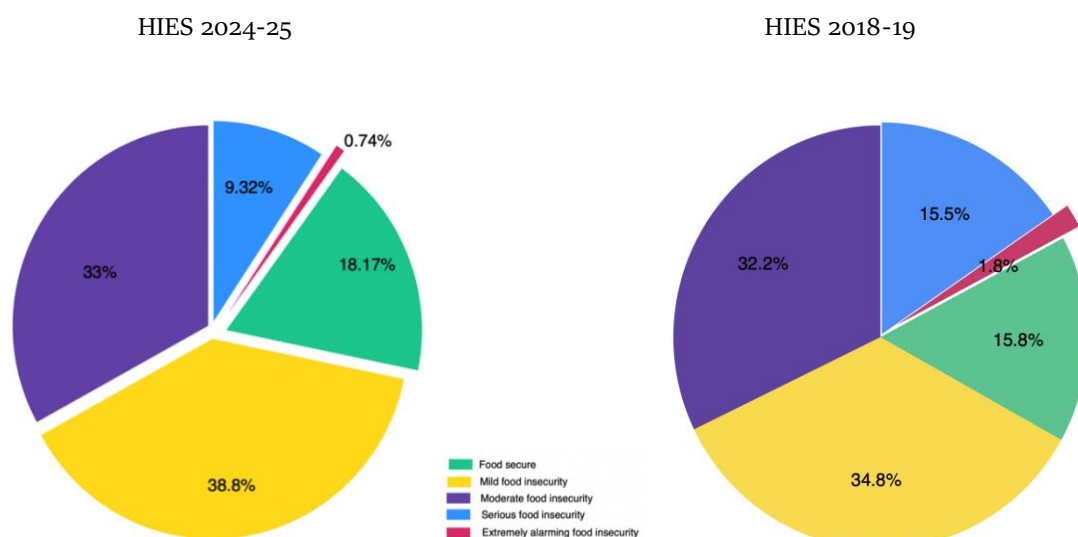
$Ava_i$ = Availability;  $Acc_i$ = Associability;  $Uti_i$ =Utilization; and  $Stab_i$ = Stability

Finally, households are classified according to deprivation intensity. Households deprived in zero dimensions are classified as food secure; those deprived in one dimension as moderately food insecure; in two dimensions as seriously food insecure; in three dimensions as alarmingly food insecure; and in all four dimensions as extremely alarmingly food insecure. This five-category classification follows Napoli (2011) and preserves the breadth of multidimensional deprivation that would be overlooked by a simple binary food security measure

## Results

Figure 1 presents the overall distribution of multidimensional food insecurity in Pakistan using HIES 2018-19 and HIES 2024-25. These results show a significant improvement in the food security of the households during the study period. Food security status of the household improved with an increase in the proportion of food secure households from 6.56% to 18.17%, indicating the improvement in the food availability, accessibility, utilization and stability. The same has been observed by the Pakistan Economic Survey (MoF, 2024) and the World Food Programme (2024) who have attributed the recovery to economic normalization after Covid, better harvests, and increased social protection systems. Moderate food insecurity increased from 25.49% to 38.78%, suggesting that many households shifted from severe to less severe food insecurity, a pattern also reported by FAO et al. (2024). Conversely, serious food insecurity declined from 37.23% to 9.32%, alarming food insecurity fell sharply from 27.88% to 9.32%, and extreme food insecurity decreased from 2.84% to 0.74%, indicating a substantial reduction in the severity of multidimensional food insecurity.

**Figure 1: Comparison of Multidimensional Food insecurity level in Pakistan 2018-19 and 2024-25**



Source: Author's own calculation

The level of food insecurity has declined over time, even as the macroeconomic pressures have remained, based on these reductions. The World Bank (2024) and WFP (2024) also report similar decreases in food insecurity in Pakistan after post-flood recovery interventions. Overall, the results suggest a positive trend in multidimensional food security in Pakistan over the two rounds of the survey. However, a substantial proportion of households (6% of all) were moderately food insecure, reflecting the continued challenge of food insecurity in the development process, as observed throughout the world by FAO et al. (2024).

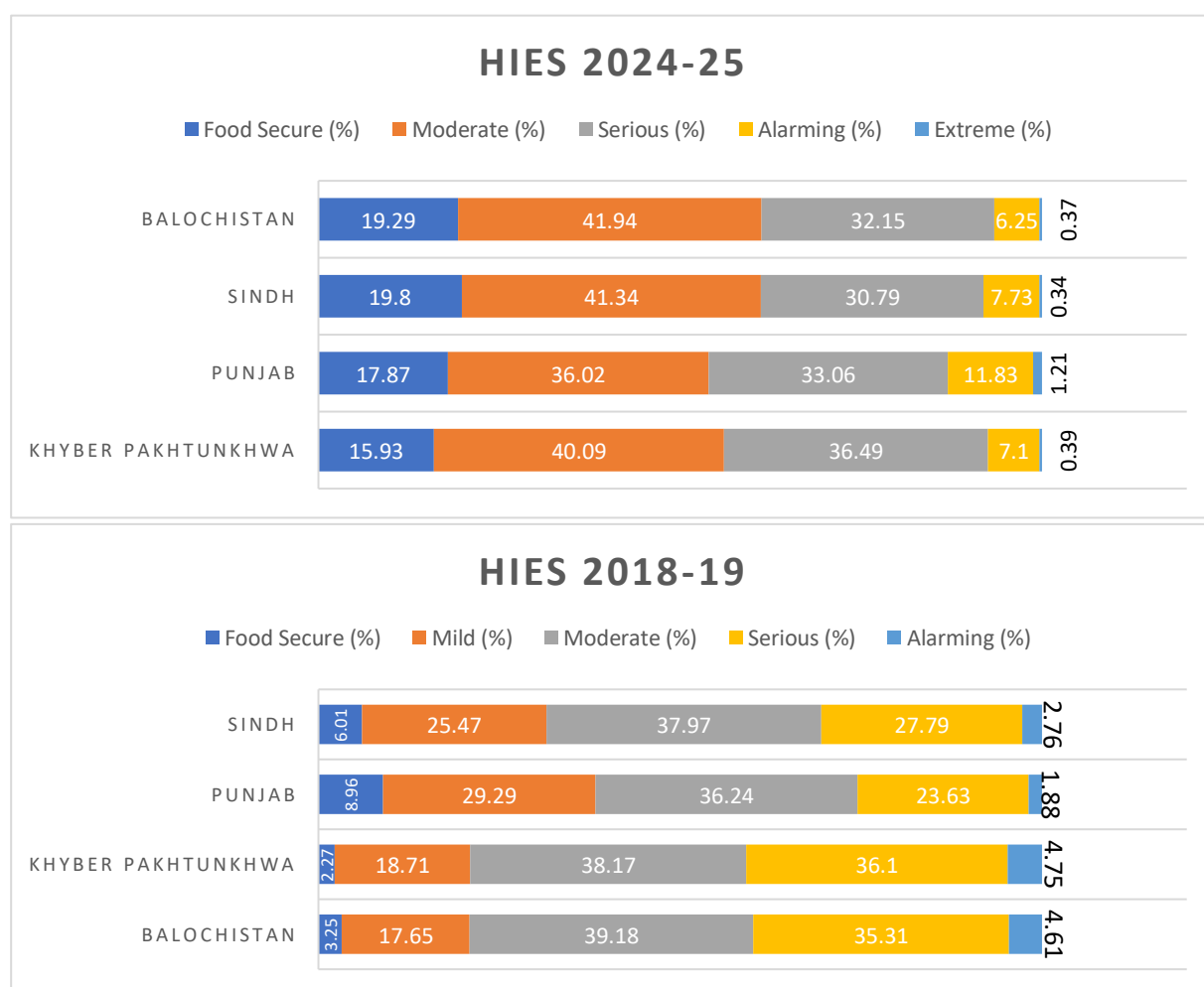
Figure 2 provides a comparison of provincial multidimensional food insecurity based on HIES 2018-19. There are huge disparities between regions. Households in the moderate (39.18%) and serious (35.31%) levels of food insecurity were the highest in Balochistan, while 4.61% of households were in the alarming category. Food security for 3.25% of households. These results align with previous studies that have emphasized the negative impacts of chronic socioeconomic deprivation, poor infrastructure, limited market integration, and climate vulnerability in Balochistan (FAO, 2023; Government of Pakistan, 2022).

The distribution pattern was similar in KP, with 38.17% of households being moderately food insecure and 36.10% being seriously food insecure. The proportion of food-secure households was 2.27%, which was high multidimensional deprivation. Similar regional variations are reported by WFP (2023) and UNDP (2023).

The situation of food security was relatively favorable in Punjab. Overall, the province saw the lowest percentage for serious food insecurity (23.63%) and 8.96% of households were food secure. Moderate food insecurity was the largest category (36.24%). Similarly, the Pakistan Economic Survey (MoF, 2023) has found that Punjab's agricultural productivity has been relatively higher, markets were more connected, and household income levels were higher as well. Sindh was placed in between, with 37.97% of households being moderately food insecure and 27.79% being seriously food insecure. While food security was found to be improving as compared to Balochistan and Khyber Pakhtunkhwa, the vulnerability was still considerable, with rural districts most vulnerable to climatic shocks (FAO, 2023; World Bank, 2023).

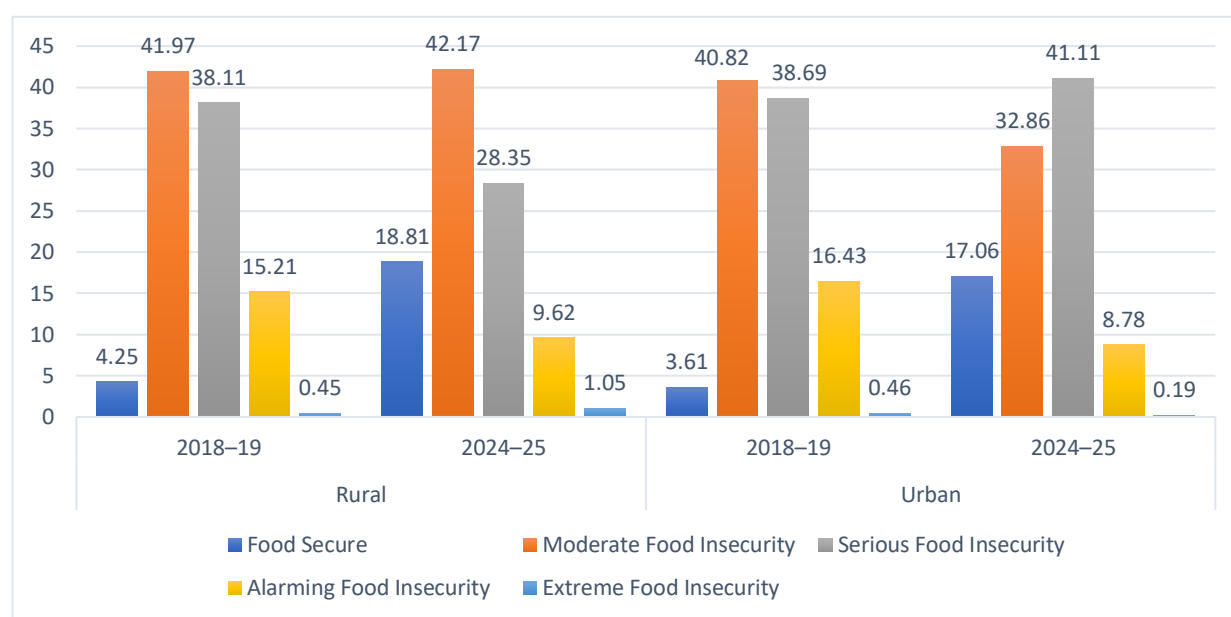
Provincial variations confirm that multidimensional food insecurity is strongly associated with differences in infrastructure development, agricultural productivity, poverty incidence, and exposure to climate-related risks.

**Figure 2: Multidimensional Food insecurity percentage level in different Provinces.**



Source: Author's own calculation

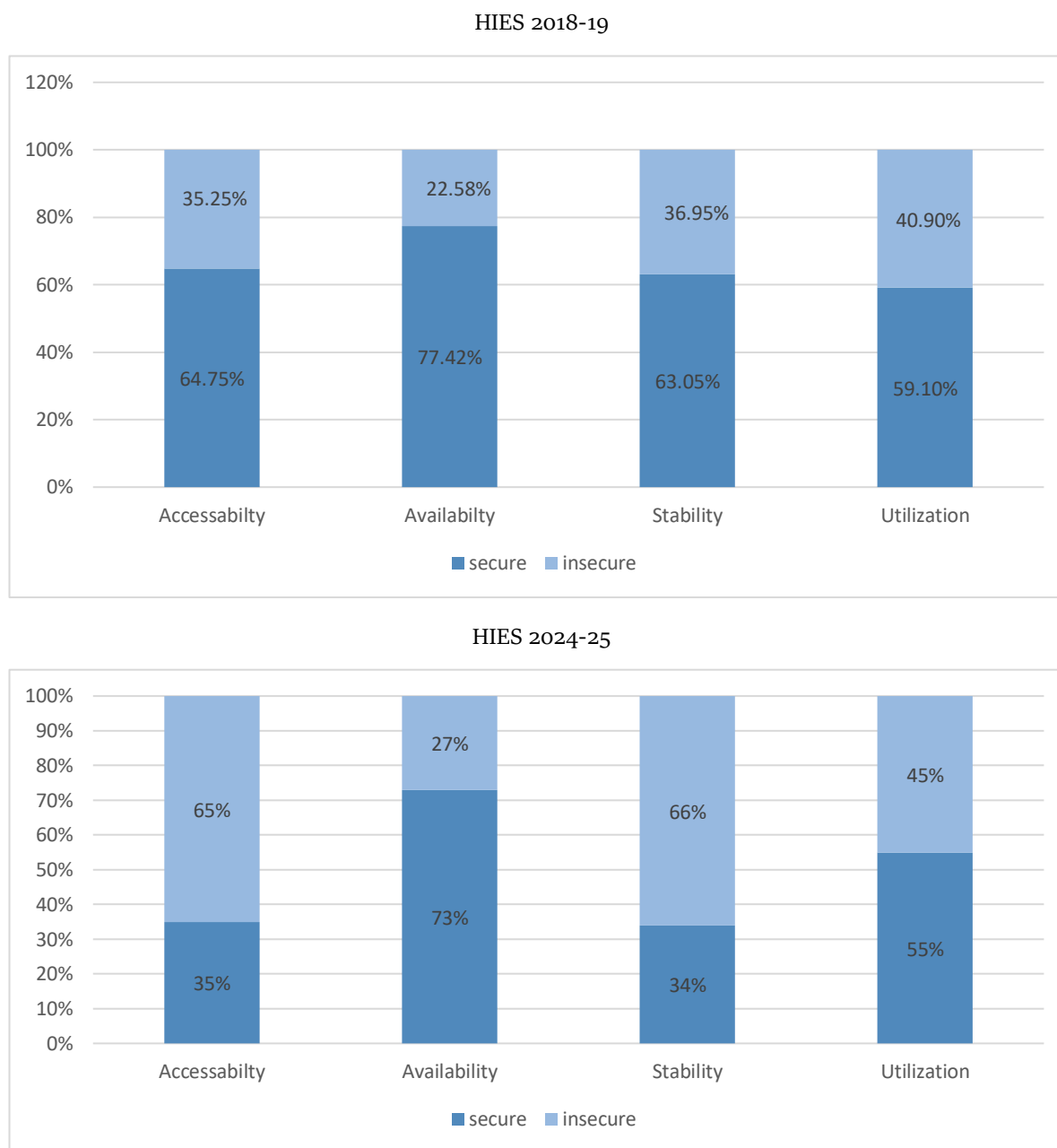
Figure 2 presents provincial food insecurity patterns using HIES 2024-25, indicating improvements across all provinces compared with 2018-19, although regional disparities remain. Balochistan recorded 19.29% food-secure households, with moderate food insecurity remaining the largest category (41.94%), while serious, alarming, and extreme food insecurity declined to 32.15%, 6.25%, and 0.37%, respectively. Sindh showed a similar pattern, with 19.80% food-secure households and 41.34% moderate food insecurity, alongside reductions in serious (30.79%), alarming (7.73%), and extreme (0.34%) food insecurity. Punjab continued to perform relatively better, recording 17.87% food-secure households and the lowest proportion of moderate food insecurity (36.02%). Khyber Pakhtunkhwa also improved, with 15.93% food-secure households, while moderate (40.09%) and serious (36.49%) food insecurity remained the dominant categories.

**Figure 3: Multidimensional Food insecurity percentage level Region wise**

Source: Author's own calculation

Figure 3 compares multidimensional food insecurity between rural and urban households using HIES 2018-19 and 2024-25. The results indicate improvements in both regions, although the patterns differ. In rural areas, food-secure households increased from 4.25% to 18.81%, while serious food insecurity declined from 38.11% to 28.35% and alarming food insecurity from 15.21% to 9.62%. Moderate food insecurity remained the dominant category (41.97%). In urban areas, food-secure households also increased substantially from 3.61% to 17.06%, whereas moderate, alarming, and extreme food insecurity declined from 40.82% to 32.86%, 16.43% to 8.78%, and 0.46% to 0.19%, respectively. However, serious food insecurity increased slightly from 38.69% to 41.11%, suggesting that many urban households continue to face rising living costs despite improvements in the most severe categories.

Regional differences are the result of the impact of COVID-19, the Russia-Ukraine conflict, the floods in 2022, exchange rate depreciations and high inflation. Agricultural losses affected the rural households more and urban households experienced less purchasing power and unemployment, which increased food prices. There were some government interventions, such as the Benazir Income Support Programme (BISP), humanitarian food assistance, and post-flood rehabilitation programmes that helped ease the situation of food insecurity in both regions (World Bank, 2024; FAO et al., 2024; WFP, 2024).

**Figure 4: Food security and insecurity percentage level in different dimensions.**

Source: Author's own calculation

Figure 4 reveals it had the best results in both survey periods. Approximately 73% of households were food secure and 27% food insecure in 2018-19. The proportion of food-secure households rose to 77.42%, while food insecurity decreased to 22.58% in 2024-25, marking an improvement in agricultural production, food supply chain, and market availability after the recovery from the post-COVID economic crisis (MoF, 2024; FAO et al., 2024). There was also a significant improvement in the accessibility of food. A total of 65% of households were food insecure while almost 35% were food secure in 2018-19. The impact of the rising purchasing power of households, recovery of the labour market, and support from social protection programmes like the Benazir Income Support Programme (World Bank, 2024; WFP, 2024) resulted in improved food security rates in 2024-25 (64.75%/35.25%). The utilization dimension was the lowest in both survey rounds. The rate of food secure households was 55% and the rate of food insecure households was 45% in 2018-19. While in 2024-25 food security improved to 59.10%, 40.90% of households continued to face food insecurity due to inadequate dietary diversity, sanitation, access to safe drinking water, and health care (UNICEF, 2023; FAO, 2023). Likewise, the food stability of households has also significantly improved, even though the number of food-secure households still remains lower than the national average, as it rose from 34% in 2018-19 to 63.05% in 2024-25, while food insecurity among households dropped from 66% to 36.95%.

However, more than a third of households are still facing food access instability, as a result of climate change, inflation and market volatility (IPCC, 2023; FAO et al., 2024).

## Conclusion

The observed difference in multidimensional food security in two HIES should be interpreted in light of the prevailing macroeconomic and environmental conditions in Pakistan. COVID-19 pandemic, the Russia-Ukraine War, record inflation, exchange rate depreciation, catastrophic floods in 2022 and frequent climate disasters are the events that occurred in Pakistan during this time period. These shocks affected agricultural output, food systems, labour markets, household incomes and food affordability, changing the food security situation in the country (World Bank, 2024; FAO et al., 2024). The percentage of food-secure households grew from 6.56% to 18.17%, but this growth was not an absolute increase; rather, it was a transition from severe to moderate food insecurity. The COVID-19 lockdowns caused fewer job opportunities, affected household purchasing power and disrupted food distribution systems (World Bank, 2021; FAO et al., 2021). Wheat, edible oils and fertilizers, fuel and agriculture inputs prices had significantly risen, as had domestic food inflation, before recovery was possible due to the Russia-Ukraine conflict (FAO, 2022; IMF, 2024). The floods also affected the agricultural land, livestock, infrastructure, and transport, resulting in economic losses of more than US\$30 billion and aggravating food insecurity, especially in Sindh and Balochistan (Government of Pakistan, 2022; UNDP, 2023). The food insecurity situation, however, deteriorated in serious (37.23% to 32.99%), alarming (27.88% to 9.32%) and extreme (2.84% to 0.74%) categories, indicating a decline. This is attributed to the following: the Benazir Income Support Programme (BISP), subsidized wheat distribution, humanitarian food assistance and post-flood recovery programmes (World Food Programme, 2024; Government of Pakistan, 2024). Regional inequalities continued with Balochistan and KPK being more vulnerable due to structural poverty, inadequate infrastructure and climatic exposure, while Punjab fared better in comparison. The food dimension had the best score, with food accessibility showing the greatest gains (35% to 64.75%), while food stability had the largest declines (34% to 63.05%). Overall, the food security situation in Pakistan in 2024–25 indicates a recovery but not full resilience as moderate food insecurity continues to be prevalent due to ongoing inflation, climate change and economic uncertainty.

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