

Regional Disparities in Food Security: An Empirical Analysis of Pakistan's Provinces and Region

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Abstract: *Pakistan is an agricultural country. Despite self-sufficiency in major staples, the food security situation in Pakistan is very alarming. Moreover, the incidence of food insecurity is not uniform throughout the country. Therefore, the purpose of this study is to analyse the severity of food insecurity at the national and provincial levels across regions. The data on various indicators from HIES/PSLM for 2018-2019 is taken from HIES/PSLM. The food insecurity index is estimated to capture the extent of food insecurity at national, provincial and regional levels based on a dietary intake assessment approach. The provincial analysis indicates that the conditions of food insecurity in Sindh are worse than in other provinces. Similarly, the rural regions are more food insecure than the urban regions. The study points out that the ruling governments in Pakistan must pay crucial importance to this matter to provide people with physical and economic access to food.*

Keywords: Pakistan, Regional Disparities,

Introduction

Food insecurity has become a global and social phenomenon, affecting millions of people. The term food insecurity is related to the unavailability of adequate and nutritious food to everyone. Earlier, the concept of food insecurity was merely limited to the self-insufficiency in food supply (Aurino et al., 2020). However, the availability of the food cannot assure access to the food. Food security is based on the four main components: i) Availability; food availability is related to the activities of production, distribution and exchange. (Rehman et al., 2018). ii) Access: Food access is related to the capacity of an individual or household to acquire nutritious and sufficient food. It includes both physical and economic accessibility. It is determined by three elements. Firstly, affordability is related to the price of goods, income or wealth of a household (Mehmood et al., 2023). Secondly, allocation requires government policies to allocate the resources properly to remote areas. Lastly, people's preferences are determined by custom, taste, advertisement, female labour participation etc. (Jensen et al., 2022). iii) Utilization: Food utilisation is determined by three factors: nutritional values, social value and food safety. (Ishaq, Khalid & Eatnaz, 2018). iv) Stability: Stability refers to the adequate supply of food to all the people at national, sub-national and household levels. Stability is based on the agricultural

production that is directly affected by natural shocks, e.g. droughts, floods, etc. (Abdullah et al., 2019).

In Pakistan, the major focus on food security has remained on the supply side to capture the insufficiencies in the supply of food. Pakistan is ranked as the eighth country most vulnerable to climate change. From the supply side, climate change is considered the major determinant of the unviability of food (FAO et al., 2019). However, the irregularity, as depicted by low food security in many developing countries, despite the adequate storage of food at the national and international level, is one of the reasons for directing the issue of food security from macro to household level (micro level).

The agricultural sector is one of the largest contributors in terms of share of GDP and workforce. According to the estimates for 2019, the agriculture sector contributes 38.5% to the workforce and 18% to the GDP¹. In the term of food productivity, Pakistan rank at 8th, 10th for rice, 5th for sugar ad 4th for milk (Ministry of Health & UNIEF National Survey, 2019)

Despite the self-sufficiency in major staples, only 63% of the households are food secure. About 25% of the population lives under the poverty line, which means that about 55 million people are unable to meet their basic needs.

As per the Global Hunger Index 2024, Pakistan ranks 109th among 127 countries. With a score of 27.9, Pakistan has a *serious* hunger level. Pakistan, along with seven countries, cumulatively account for two-thirds of the undernourished population. As per the global food security index 2022, Pakistan's position is 84th among 113 countries. The index shows a more critical state in terms of food quality and safety, as well as low sustainability and adaption.

The study contributes to the literature by constructing the incident to capture food insecurity both at the national and provincial levels and segregating further into rural and urban regions.

Review of Literature

Food insecurity, rather than food security, has reemerged as a pressing concern on the global agenda. The implication of food security has evolved beyond the scope of hunger and poverty; in fact, it has incorporated growth, development, human rights, productivity and health (Hameed et al., 2020). The issue of food security came to attention in the 1970s. Still, during that period, it was more considered a supply-side issue. Still, later in the 1980s, the focus shifted to food insecurity, and demand-side issues were explored with a special focus on individuals and households (Ishaq et al., 2018).

Studies have shown that food insecurity has *four levels*; Global, National, Household and individual level (Warr, 2014) and four dimensions (Ishaq et al., 2018). These dimensions are classified as, i) food availability (Wahab & Applanaidu, 2015), ii) access to food (Sen,1981), iii) food utilisation and food stability [(Applanaidu and Baharudin., 2014) & (Wahab & Applanaidu, 2015), (Ramay, 2014)].

Mahmood et al. (2023) have discussed and estimated the determinants of food insecurity at the household level in Pakistan. They proposed that key determinants that impacted food insecurity are the household's size, income, assets and level of education of the head of the family. Moreover, the gender, inflationary pressure and natural shocks were also discussed as main causes of food insecurity. They further estimated the effects of floods and droughts that have significant impact in rising inflation and consequently leading to food insecurity. These factors combined, severely contributed in household food insecurity.

Kibria et al., (2023) conducted a survey based study to determine the factors effecting of food insecurity in Pakistan. The survey provided a comparison between the rural and urban region where they studied are relationship between poverty and food insecurity in Pakistan. Food insecurity and poverty were observed in terms of household health conditions, quality of life, nutritional intake, and chronic disease.

These factors show significant impact on extent of food insecurity and ultimately the household wellbeing.

Kiran and Jabbar (2022) concluded that the food insecurity situation has further worsened over some time. On the provincial level, analysis reported that Baluchistan is the most food insecure province, and KPK is doing better in terms of food security than other provinces. The analysis was further extended to the district level.

Household Food Insecurity Access Scale (HFIAS) developed by USAID was deployed by Pervaiz, Manzoor and Pervaiz (2022) to analyse the post-pandemic food insecurity situation in Pakistan. It is reported that deteriorated economic conditions coupled with the devastating effects of the pandemic have further intensified the food insecurity condition in Pakistan.

Ateeq-Ur-Rehman et al. (2018) reported that climate change is the main challenge to agricultural productivity and livelihood, which, in turn, leads to food insecurity. The study by Magsi, Magsi, and Sheikh (2017) determined the impact of seawater intrusion and land degradation on food insecurity. The impact of globalisation, remittances, etc, on the farmer's income has also been explored to determine the hedge against food insecurity (Rasul & Abid, 2015). Ashraf et al. (2013) found that massive flood threatens people's livelihoods, resulting in a shortage of intake of subsistence food. The study also found that flooding leads to the use of contaminated commodities, especially water, which leads to further health issues.

The work of Arshad and Shafqat (2012) highlighted the importance of the agroecosystem in managing the agricultural landscape, which leads to food security. The potential determinants to increase physical and economic access to food, for example, poverty, transportation facilities, and population displacement have also been explored by the studies (Khan & Ali, 2011)

The incidence of food security can also be studied from the microeconomic (household) perspective. The microeconomic (household) perspective is related to the physical and economic accessibility of the household to the subsistence and quality of food. Several studies determine the factor that affects the household's status of food insecurity (Iram & Butt (2004). Abdullah et al. (2019) have determined the factors of food insecurity in rural areas. Azeem, Muger, Schilizzi (2016) and Bashir et al. (2013) estimated the effect of socioeconomic factors of households on food insecurity. The study was based on Punjab at the provincial level and further segregated to the district level. Ahmed, Ying, and Bashir (2015) determine the impact of coping strategies like borrowing from friends and reducing the other expenditures on food insecurity for the micro growers in Punjab. The study of Asghar & Muhammad (2013) has compared the food insecurity status of farm and general households.

Methodology:

The study comprises the formation of the index to determine food insecurity at the national, provincial and regional levels. The index is based on the Dietary Intake Assessment (daily recommended calorie requirement). Further, headcount ratio, food insecurity gap, and square of food insecurity gap indices are constructed to analyse the incidence of food insecurity in depth.

A number of studies adopted the dietary intake assessment approach (DIA), which utilises calorie intake adequacy to address the household's status of food insecurity.² The person's daily energy (calories) requirement varies with the person's age and gender. The Programming Commission (Nutritious Cell) define the subsistence level calorie intake per adult as 2350 at the national level. However, at the regional level, the Planning and Commission define the threshold level of 2150 calories per adult in rural areas and 2459 in urban areas.

The index formation to capture the incidence of food insecurity requires the conversion of the quantity of food intake into the calorie intake. For this purpose, a food composition table (Government of Pakistan, 2001) is used. The table provides the number of calories in 100 grams; thus, calories per gram are computed for every food item.

However, to incorporate the real calorie availability, it is necessary to make adjustments as per household size (Claro et al., 2010). For this purpose, calorie availability per adult is obtained by dividing household daily calorie availability by adult equivalent units.

The index is thus formed by dividing the daily calorie availability per adult by a threshold level.

$$Z_i = \frac{Y_i}{R}$$

Where, Z_i Is food insecurity status of the household.

Y_i Is daily calories availability of i^{th} household per adult equivalent.

R is the subsistent level of calorie requirement of a household per adult equivalent.

If the value of Z_i Is less than 1, it means that Y_i (calories availability) is less than R (threshold level) so that the person is food insecure. In contrary, if of Z_i is greater than 1 or equal to 1, Y_i (calories availability) would be greater than or equal to R (threshold level); thus, the person is said to be food secure.

On the basis of scaling of index, the dummy variable is created by assigning the value '1' if the i^{th} is food insecure and '0' otherwise.

Moreover, to capture the detailed aspects of food insecurity, other indicators, including headcount ratio, food insecurity gap, and square of food insecurity gap, are formulated.

Head Count Ratio for Food Insecure Household

The headcount ratio for food-insecure households can define the percentage of the household whose calorie intake falls below a threshold level.

$$HCR_{FI} = \frac{M}{N} * 100$$

Where M is the number of food-insecure households.

N is the total number of households.

Head Count Ratio for Food Insecure Household

In oppose to head count ratio for food insecure household, it shows the percentage of the household whose calories intake is above subsistence level.

$$HCR_{FS} = \frac{P}{N} * 100$$

Where P is the Number of food-secured households.

N is the total number of households.

Food Security Gap

The food security gap measures the extent to which a household falls below the subsistence level to declare it as food secure.

$$FSG = \frac{1}{M \sum_{i=1}^m G_i}$$

Where G is

$$G_i = \frac{R-Y_i}{R}$$

Where M is the total number of goods in secure households.

G measures the difference between the available and required calorie intake.

Squared Food Security Gap

It measures the severity of food insecurity in households.

$$SFSG = \frac{1}{M \sum_{i=1}^m G_i}$$

Where G is

$$G_i = \left[\frac{R-Y_i}{R} \right]^2$$

Where M is the total number of goods in secure households.

G measures the difference between the available and required calorie intake.

Results and Discussion

The Incidence, Extent and Severity Of Household Food Insecurity at the National and Provincial Level

The incidence, extent and severity of food insecurity and its provincial ranking are shown in Table 1 below. Moreover, the calorie availability per adult equivalent of households at the national and provincial levels is also given below.

“The example of the low level of secondary job is gardener; security guard, etc., “

Table 1: The Incidence, Extent and Severity at National and Provincial Level.

Country/ Province (National and provincial level)	Food Insecurity Index (Food Insecure)	Household Calorie Availability per AEU (Food insecure)	HCR	Rank	FIG (%)	SFI
Pakistan	0.75	1802	66.19	-----	22.52	6.69
Punjab	0.75	1803	63.18	3	22.43	6.7
Sindh	0.72	1731	75.35	1	26	8.22
KPK	0.80	1893	64	2	19	4.68
Balochistan	0.76	1835	62.16	4	22	5.7

The overall food insecurity *and* hunger situation in the country is very serious; almost 67% of households are food insecure, which means that they are not able to meet minimum subsistence calories. These results are in line with the findings of the National Nutrition Survey's report (2011). The survey reported that nearly 60% of Pakistan's population is food insecure, which means that approximately two-thirds of the population faces food insecurity.

On average, the per day calorie availability in Pakistan is 1802 kcal Per adult, which meets 75% of the

minimum subsistence requirement. So consequently, there is a gap of 25% of the population that is below the subsistence calorie requirement. So, in theoretical terms, food insecurity can be eradicated if resources are properly mobilised and distributed to the remaining 25% of food-insecure households. The severity of food insecurity among food-insecure households in Pakistan is, on average, 6.69%, which comes into moderate severity.

The incidence, extent, and severity of the households at the provincial level in each of the provinces are discussed in detail below.

Sindh has the highest food security index compared to other provinces, at 72%. The food severity index is 8.22, which puts Sindh in the high-severity range, indicating extreme hunger and food deficiency.

KP has the highest average calorie availability among food-insecure households (1893) and the lowest severity (SFI of 4.68). This indicates relatively better conditions for food-insecure populations in this province.

Punjab, despite having the largest population, shows moderate levels of food insecurity (SFI of 6.7), with household calorie availability similar to the national average (1803 calories).

On the basis of incidence, Balochistan is regarded as the least food-insecure province among all the other provinces. Whereas as far as the extent and severity of food Insecure households are concerned, it is ranked third among the Provinces. The severity of food insecurity on average is 5.7 among the food insecure households in Balochistan. This indicates widespread but less severe food insecurity.

Incidence, Extent and Severity of Household Food Insecurity at A Regional Level (Rural)

Table 2: The Incidence, Extent and Severity at the Regional Level (Rural).

Country/ Province (Rural)	Food Insecurity Index (Food Insecure)	Household Calorie Availability per AEU (Food insecure)	HCR	Rank	FIG (%)	SFI
Pakistan	0.63	1830	78	-----	22	8
Punjab	0.59	1830	78	3	22	8
Sindh	0.73	1752	75	1	25	9
KPK	0.62	1915	81	2	19	5
Balochistan	0.57	1867	79	4	21	6

The incidence, extent and severity of food insecurity in rural households and the ranking of provinces on its basis are shown in table # 2. The results of overall rural households of Pakistan indicate that 63% of the rural population is food insecure, with an average calorie availability of 1830 kcal/AEU, falling 22% short of the minimum subsistence requirement (2100–2200 kcal). The severity of food insecurity is **8%**, indicating moderate challenges for food-insecure households.

Now, further estimation of the rural region of each province provides insight into the extent and severity of food insecurity; it can provide guidelines for policymakers to target each area as per its requirements and conditions. Sindh, again, is classified as the most food-insecure rural household. On average, the incidence of food insecurity is the highest, i.e., 73%. These households meet 74% of the minimum subsistence, which is 1752 kcal per adult equivalent approximately. The severity of food insecurity is 9% which falls in the high severity category. To deal with this intense scenario, there is a need for agricultural reforms such as drought-resilient crop varieties, social protection programs, and easy market access.

KPK ranks second in incidence (62%), but has the highest calorie availability (1915 kcal) and the lowest

severity (5%), showing relatively better food security conditions. The incidence of food insecurity can be further improved by investing in infrastructure and supporting marginalised farmers.

Punjab has moderate incidence (59%) and severity (8%). Households meet 78% of caloric needs, leaving a 22% deficit. In order to improve the situation further, non-agriculture income sources must be promoted to reduce the dependency on crops. As Punjab is considered to cater to the country's major food production, the farmers must be educated, and new technologies must be introduced to them.

Lastly, Balochistan has the lowest incidence (57%), but calorie availability (1867 kcal) is still below the subsistence level, with households falling 21% short. The severity of food insecurity is 6%, ranking better than Sindh and Punjab. Though Balochistan has the lowest incidence of food insecurity, it still faces significant challenges due to remoteness and resource scarcity.

The Incidence, Extent and Severity of Food Insecurity at a Region Level (Urban)

Table 3: The Incidence, Extent and Severity at the Regional Level (Urban).

Country/ Province (Urban level)	Food Insecurity Index (Food Insecure)	Household Calorie Availability per AEU (Food insecure)	HCR	Rank	FIG (%)	SFI
Pakistan	0.75	1769	73.25	-----	24.89	8.4
Punjab	0.75	1773	70	3	25	8
Sindh	0.72	1709	80.85	1	28	9
KPK	0.79	1860	69.01	4	20	6
Balochistan	0.76	1790	73.11	2	24	7.8

Table # 3 shows the incidence, extent and severity of food insecurity in urban households in each province.

The incidence of food insecurity in the overall urban region of Pakistan is approximately 74%, with households meeting 75% of the minimum subsistence average. The caloric availability on average to the food insecure urban households of Pakistan is 1769 kcal per adult equivalent. The extent of food insecurity shows that, on average, Pakistani urban households consume 24% fewer calories than the minimum subsistence requirement. The severity of food insecurity among the food insecure urban households in Pakistan is 8.4%.

Now, in the province-wise analysis of urban regions, Sindh's urban areas face the most acute food insecurity challenges of all provinces. Approximately 80.85% of urban households are food insecure, the highest incidence in the country. Calorie availability is only 1709 kcal per adult equivalent, the lowest among provinces, leaving a 28% deficit in the required caloric intake. The severity of food insecurity is also the highest at 9%. This reflects challenges such as high levels of urban poverty, inefficient food distribution systems, and limited market access in urban slums. This result is also found to be consistent with the National Nutrition Survey's report (2011), which termed Sindh to be the mossy food-insecure province in Pakistan despite the availability of 14 million acres of cultivable land.

In Punjab, 70% of urban households are classified as food insecure, with an average calorie availability of 1773 kcal per adult equivalent. The severity of food insecurity in urban Punjab is 8%, slightly below the national average. While Punjab's urban areas generally have better infrastructure and access to resources compared to other provinces, food insecurity persists due to income disparities, high food prices, and limited access to affordable and nutritious food for low-income households.

KPK has the lowest incidence of urban food insecurity, with 69.01% of households classified as food insecure. Calorie availability is the highest among provinces at 1860 kcal per adult equivalent, leaving a 20% deficit, the smallest shortfall in the country. The severity of food insecurity is also the lowest at 6%, reflecting relatively better food access and nutritional conditions. However, significant portions of

the urban population still struggle to meet minimum caloric requirements, indicating the need for continued efforts to strengthen food systems.

Urban Balochistan exhibits moderate food insecurity compared to other provinces. Approximately 73.11% of households are food insecure, with an average calorie availability of 1790 kcal per adult equivalent, slightly higher than the national urban average. The calorie deficit stands at 24%, while the severity of food insecurity is 7.8%, indicating a moderately challenging situation. Urban food insecurity in Balochistan is compounded by infrastructure limitations, high transportation costs, and income inequality.

Moreover, these results are also consistent with Asghar and Muhammad (2013), Ahmed and Farooq (2010), and Ishaq, Khalid, and Eatnaz, 2018, because the overall analysis has indicated that urban areas are more food insecure as compared to rural areas. One reason for this is the variation in the physical activity of households in rural and urban areas. Another explanation is the change in urban consumer basket over time. Due to changes in lifestyle and cost of living, there is a dynamic change in the food consumption patterns of people living in urban areas.

The results of provincial statistics are also no different from the results in previous studies (Ishaq et al., 2018; Ateeq et al., 2020; Kiran & Jabbar, 2022), where the Sindh province is shown at a very miserable place in terms of food insecurity. The probable reasons can be the higher dependency ratio, smaller land holdings, lower level of education of household heads, large household sizes, and lack of livestock ownership of households in Sindh, in contrast to the other provinces. Moreover, there is no considerable difference in the state of food insecurity in other provinces.

Conclusion and Policy Recommendations:

This study has determined the severity of food insecurity at the national, provincial, and regional levels in Pakistan, besides exploring the potential causes of food insecurity by using data from HIES/PSLM for 2018-2019. The study has developed the food insecurity index to capture the extent of food security at the national, provincial and regional levels based on the dietary intake assessment approach. The results of the study showed the situation of overall food insecurity is alarming in Pakistan, as 67% of the households were found to be food insecure. The state of food insecurity is worse in Sindh in terms of incidence, extent, and severity than in Punjab, Balochistan, and KPK. In terms of regional analysis, rural households are comparatively more food secure than urban households.

The policy interventions are needed in the following dimensions to improve the status of food security in the country. It is more of a supply-side movement issue, so it requires enough food to be available to all the people everywhere in the country. For this purpose, the government must pay attention to agricultural production techniques, provide cheap technology and agricultural inputs, take possible actions toward natural shocks, and improve the infrastructure as well as transportation facilities to supply enough food everywhere. The government must take necessary actions to increase economic access to food. Economic access to food requires enough resources to purchase food. The quality food should be available to people at affordable prices. In order to deal with the food insecurity problem, the government must deal with food distribution inefficiencies and develop a proper supply chain system. Lastly, attention must be paid to providing employment opportunities to people so that they can meet their basic health needs.

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