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Socioeconomic Status and Household Food Security: A Wealth Quantile Analysis

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Abstract

Food insecurity remains a major challenge in developing countries, where household access to adequate food is closely linked to socioeconomic conditions. This study examines the relationship between household wealth and food insecurity using data from the Pakistan Social and Living Standards Measurement Survey 2019-2020. Socioeconomic status is measured through an asset-based wealth index and classified into five wealth quintiles. A Logistic regression Model is employed to estimate the association between wealth and household food insecurity while controlling for geographic and demographic factors. The results reveal a clear and monotonic wealth gradient. Households in higher wealth quintiles are significantly less likely to experience food insecurity than those in the poorest group, and this pattern remains robust across all model specifications. The findings highlight the importance of long-term economic resources in shaping food security outcomes and suggest that policies aimed at strengthening household asset ownership and economic resilience are essential for reducing food insecurity.

Keywords: Food insecurity; Wealth quintiles; Socioeconomic status; Asset-based wealth index; Pakistan

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1. Introduction

Food security remains a pressing global development concern, particularly in low- and middle-income countries where economic instability and social inequality continue to shape households' access to adequate and nutritious food. Although global food production has improved over time, many households still face difficulties in securing sufficient, safe, and nutritious food on a regular basis. Recent research highlights that food insecurity is not only about food availability, but is strongly influenced by households' socioeconomic position, which determines their ability to access food in a stable and dignified manner (Brunet et al., 2025).

At the household level, food insecurity reflects the interaction of economic constraints, social vulnerability, and limited resilience to shocks. Households with restricted resources often rely on coping strategies such as reducing meal sizes, compromising food quality, or prioritizing certain members. While these responses may reduce short-term hunger, they tend to increase long-term nutritional risks and reinforce vulnerability (Sánchez-Céspedes et al., 2022). Such patterns suggest that food insecurity is deeply structural and rooted in persistent socioeconomic disadvantage rather than temporary consumption gaps.

Socioeconomic status plays a central role in shaping food security through its influence on household resources and consumption stability. Evidence from developing-country contexts shows that households with poorer living conditions are significantly more likely to experience food insecurity, especially during periods of economic stress and systemic shocks (Orjiakor et al., 2023). These risks are further intensified in settings where social protection systems are weak and informal labor markets dominate, limiting households' ability to smooth consumption when incomes fluctuate. Accurate measurement of socioeconomic status is therefore essential for understanding food security dynamics. While income and consumption-based indicators are widely used, they are often volatile, prone to recall error, and costly to collect. Asset-based wealth indices provide a practical alternative by capturing long-term economic standing through ownership of durable assets and housing characteristics. These indices reflect accumulated resources that act as buffers against shocks and offer a more stable indicator of sustained socioeconomic position (Hjelm et al., 2016). The use of wealth quintiles derived from asset indices has become common in demographic and development research. Ranking households along an ordinal wealth spectrum allows researchers to examine gradients in welfare outcomes more clearly. Empirical evidence shows that food insecurity declines steadily as households move from lower to higher wealth quintiles, indicating that food insecurity is not a binary condition but varies systematically across socioeconomic levels (Gadiso et al., 2023).

Wealth-related disparities extend beyond food access to diet quality, nutrition, and overall well-being. Studies from developing regions demonstrate that higher socioeconomic status is associated with better dietary diversity and improved nutritional outcomes, while households at the lower end of the wealth distribution face multiple, overlapping disadvantages (Amugsi et al., 2016; Sanchez-Céspedes et al., 2022). These findings emphasize the importance of analyzing food security using a distributional lens rather than relying solely on average effects. Distribution-sensitive approaches further show that socioeconomic influences on food outcomes are not uniform across the population. Quantile-based analyses reveal that the effects of socioeconomic status differ across segments of the welfare distribution, with stronger impacts often observed among poorer households (Wubetie et al., 2023). This perspective is particularly relevant for food security research, where small

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improvements in socioeconomic position can generate substantial gains for the most vulnerable groups.

The broader nutrition and public health literature also identifies socioeconomic status as a key structural determinant of food-related outcomes. Evidence from Asia indicates that socioeconomic inequalities shape both food access and health risks, with pronounced disparities emerging along wealth and income lines (Yu et al., 2020). These patterns suggest that effective food security policies must address underlying economic and social hierarchies rather than focusing solely on food supply.

In South Asia, food insecurity remains closely linked to household socioeconomic conditions. Poorer households face greater exposure to food price volatility and limited dietary diversity. Regional reviews emphasize that sustainable improvements in food security require addressing structural socioeconomic constraints alongside nutrition-sensitive interventions (Yadav et al., 2024). Recent macro-level evidence further highlights the role of inequality and economic instability in worsening food insecurity. Rising income inequality, uneven economic growth, and food price shocks have intensified food insecurity across countries, particularly among households with limited coping capacity (Günal et al., 2025). At the micro level, poverty and income inequality continue to restrict households' ability to maintain stable food consumption (Debebe & Zekarias, 2020).

South Asian studies also show that household wealth, education, and demographic characteristics strongly influence food access and nutritional outcomes, with effects varying across socioeconomic groups (Bhusal & Sapkota, 2022). Asset ownership, in particular, strengthens households' ability to sustain food consumption during economic stress (Gupta et al., 2021). Quantile-based evidence further supports the use of wealth ranking to capture these gradients (Sotsha et al., 2019).

In Pakistan, food insecurity remains widespread despite improvements in aggregate food production. Empirical studies show that food insecurity is strongly associated with low income, limited education, large household size, and weak socioeconomic status (Shair et al., 2024). During economic crises, households often rely on erosive coping strategies that increase vulnerability and are linked with higher food insecurity risk (Anwar et al., 2024). In contrast, income diversification through remittances has been shown to reduce food insecurity by strengthening household resources and smoothing consumption (Ahmad et al., 2024). This study examines household food security using an asset-based wealth quintile framework. It focuses on wealth gradients rather than binary poverty classifications. The objective is to assess how food security varies across wealth quintiles. The study also aims to measure the extent of inequality in food security outcomes across the socioeconomic distribution. By doing so, it provides evidence to support more targeted and effective policy interventions that account for differing levels of household vulnerability.

2. Data and Methods

This study is based on the data of the Pakistan Social and Living Standards Measurement (PSLM) Survey 2019-2020. The PSLM is a nationally representative household survey conducted by the Pakistan Bureau of Statistics and made available on its official website. The survey is detailed on household socioeconomic conditions, including food security status and asset ownership. The analytical sample is comprised of 157,456 households, 130,658 of which are considered food secure and 26,798 food insecure.

In order to find out the relationship between socioeconomic status of household and food insecurity, logistic regression model is used in this study. The use of a logit regression model is appropriate because of the nature of the outcome variable (binary) and the possibility

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of interpreting the estimated coefficients directly and intuitively in terms of changes in the probability of being food secure or mildly food insecure. Formally, the model is specified as:

$$FI_i = \alpha + \beta_1 WealthQuintile_i + \mathbf{X}_i'\boldsymbol{\gamma} + \varepsilon_i$$

where FI_i is a binary indicator equal to 1 if household i is food secure or mildly food insecure and 0 otherwise. $WealthQuintile_i$ represents the household's socioeconomic status measured through asset-based wealth quintiles. $\mathbf{X}_i$ is a vector of control variables that includes household head characteristics, household size, place of residence, and provincial fixed effects. $\varepsilon_i$is the error term. The definition of variables used in the study is presented in Table 1.

Table 1: ***Definition Of Variables***

Variable	Type	Definition
Food insecurity (binary)	Outcome variable	Binary indicator of household food insecurity. Coded 1 if the household is food secure or mildly food insecure, and 0 if the household is moderately or severely food insecure, based on the PSLM food insecurity module.
Wealth quintile	Ordinal (1–5)	Asset-based wealth index constructed from ownership of 33 durable assets reported in the PSLM 2019-2020 questionnaire, including housing characteristics, utilities, and household possessions. Higher values indicate greater asset ownership. Household socioeconomic status measured by ranking the wealth index and dividing households into five quintiles: 1 = Poorest, 2 = Poor, 3 = Middle, 4 = Rich, 5 = Richest.
Province: Punjab	Binary	Equals 1 if the household is located in Punjab; 0 otherwise.
Province: Sindh	Binary	Equals 1 if the household is located in Sindh; 0 otherwise.
Province: Khyber Pakhtunkhwa	Binary	Equals 1 if the household is located in Khyber Pakhtunkhwa; 0 otherwise.
Province: Balochistan	Binary	Equals 1 if the household is located in Balochistan; 0 otherwise.
Urban residence	Binary	Equals 1 if the household resides in an urban area; 0 if rural.
Female household head	Binary	Equals 1 if the household head is female; 0 otherwise.
Illiterate household head	Binary	Equals 1 if the household head has no formal education; 0 otherwise.
Age of household head	Continuous	Age of the household head measured in completed years.
Never married	Binary	Equals 1 if the household head has never been married; 0 otherwise.
Formerly married	Binary	Equals 1 if the household head is widowed, divorced, or separated; 0 otherwise.
Currently married	Binary	Equals 1 if the household head is currently married; 0 otherwise.
Household size	Continuous	Total number of individuals residing in the household at the time of the survey.

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3. Descriptive Analysis of Household Socioeconomic Status and Food Insecurity

3.1 Descriptive Profile of Outcome and Key Covariates

Figure 1 presents kernel density estimates of the household wealth index by food security status. The figure shows a clear and systematic difference in the distribution of wealth between food-secure and food-insecure households. Food-insecure households are heavily concentrated at the lower end of the wealth index, with the density peaking at very low wealth values and declining sharply as wealth increases. In contrast, food-secure households exhibit a right-shifted distribution, with higher density across middle and upper wealth levels and a longer right tail.

This division shows that food security is much more probable among households which possess more assets. The wealth index analyzed here is based on the ownership of 33 durable assets measured in the PSLM survey such as housing features, utilities and household ownership. These non-perishable assets pool long term economic potential as opposed to the transient economic variability, and thus the index of wealth is a robust proxy of the long-term socioeconomic status.

The low overlap between the two distributions points to a sharp wealth gradient in the result of food security. The more the assets one owns, the smaller the chances of being food insecure. The graphical data confirms the application of asset-based wealth quintiles in the empirical analysis since it proves that food insecurity is highly clustered among those households with continuously low assets holdings, unlike being randomly distributed in the population. In general, the figure supports the thesis that durable assets have a leading role in determining household resilience and food access. Households that have accumulated more assets are in a better position of absorbing economic shocks and ensure that their food consumption is stable whereas asset poor households are extremely susceptible to food insecurity.

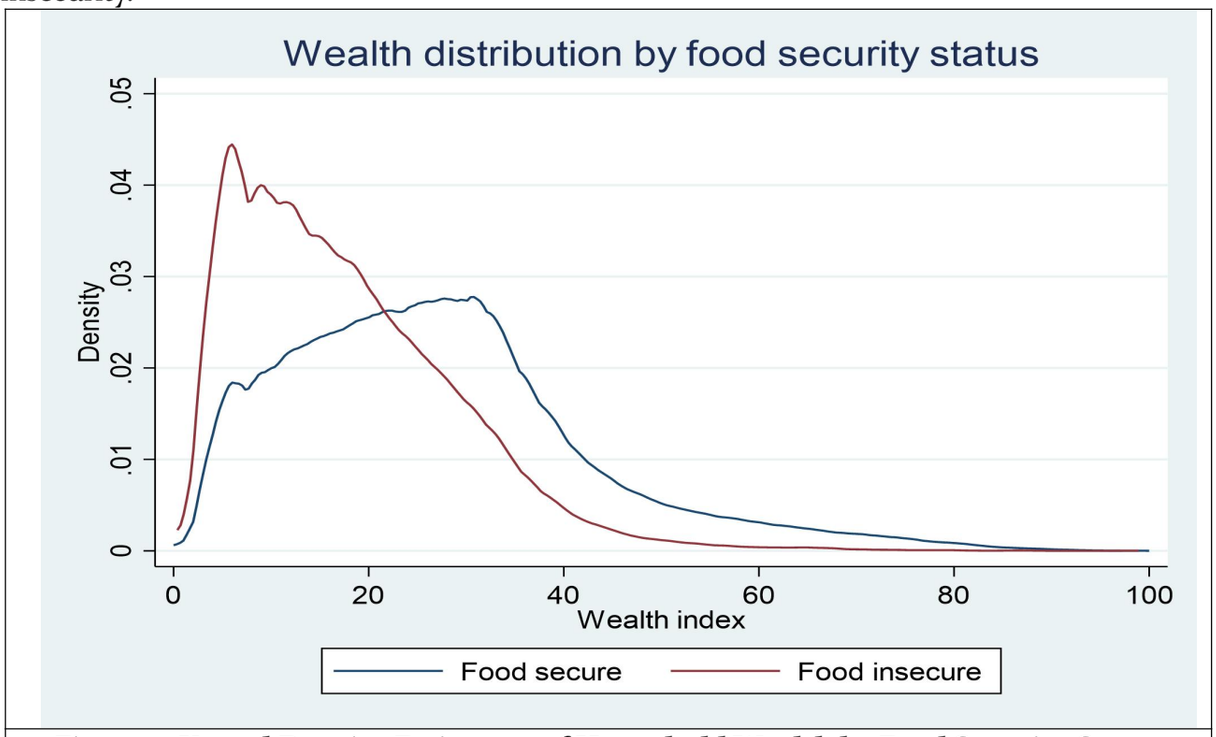

Figure 1. Kernel Density Estimates of Household Wealth by Food Security Status

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Figure 2 shows the extent of household food insecurity by wealth quintiles, and reveals a strong and consistent socioeconomic gradient of food insecurity. Food insecurity is highest among households in the poorest wealth quintile of households (31.67% of households are food insecure). The prevalence decreases progressively with increasing wealth to reach the level of 22.54% for poor households, 15.29% for middle quintile households and 10.31% for rich households. Among the richest households, food insecurity is at its lowest, at just 5.26%. The upper panel emphasizes this monotonous decline in food insecurity as households move up along the distribution of wealth. The pattern shows that food insecurity is heavily concentrated among asset-poor households and that it becomes less and less common as socioeconomic status increases. The extent of this drop is significant, with the poorest households being food-insecure around six times more than the richest households.

The evidence in the lower panel complements this evidence by showing the proportion of food secure and food insecure households in each wealth quintile. Among the poorest households, around 68.33% are food secure while almost one-third of the households are facing food insecurity. In contrast, food security increases noticeably with wealth with 77.46% in poor quintile, 84.71% in middle quintile and 89.69% in rich quintile. Among the richest households, the food security stands almost at 94.74%.

Together, the two panels clearly demonstrate that household wealth is strongly associated with food security outcomes. The gradual shift from food insecurity to food security across quintiles reflects the role of long-term economic resources in protecting households from food-related vulnerability. These descriptive results reinforce the relevance of using asset-based wealth quintiles to capture socioeconomic differences in food access and highlight that food insecurity in Pakistan is not randomly distributed but closely linked to persistent wealth inequality.

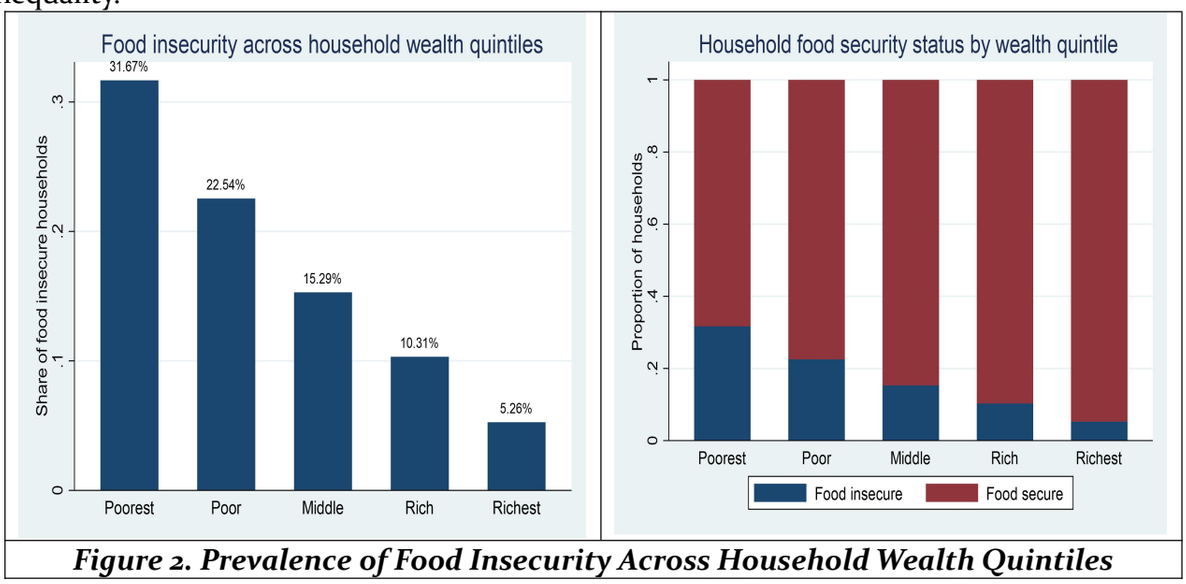

Figure 2. Prevalence of Food Insecurity Across Household Wealth Quintiles

3.2. Descriptive statistics of socioeconomic status, food insecurity and covariates

Table 2 summarizes the main characteristics of the 157,456 households included in the analysis and gives a quick picture of both socioeconomic position and household demographics. Starting with socioeconomic status, the mean wealth quintile is 3.00 (SD = 1.41), which implies that, on average, households sit around the middle of the wealth distribution, with substantial spread across the full range from 1 (poorest) to 5 (richest). This variation is important because it provides enough contrast to examine how food security changes across wealth levels.

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Food security conditions demonstrate an overall picture in the sample. The average value of food insecurity (1 = insecure) is 0.17 (SD = 0.38), which means that roughly 17% of households are in an insecure category according to the coding used in the study. In comparison, the mean of food secure (1 = secure) is 0.83 (SD = 0.38), showing that some 83% of households are classified as food secure. As these are binary indicators, the standard deviation close to 0.38 is to be expected and is a reflection of the 0's and 1's in the population.

According to the provincial distribution, half of sample belongs to Punjab (mean = 0.50) followed by Sindh (0.22) and Khyber Pakhtunkhwa (0.18) whereas Balochistan (0.10) accounts for about one tenth of households. These proportions are important because food security and wealth conditions can differ from one province to the next due to differences in livelihoods, infrastructure and service access. Inclusion of provincial indicators helps ensure that observed wealth - food security patterns are not just the result of regional composition.

Residence status indicates that the sample is mostly rural. The mean of rural residence is 0.68 for 68% of households being rural and 32% of households being urban (mean = 0.32). This rural majority is relevant because rural households often experience different food access circumstances than urban households, including dependence on agricultural income, exposure to climate shocks and different access to markets. Household head characteristics are also a useful context. Most households are headed by men. (male household head= 0.91 and female household head = 0.09) Nearly 44% of household heads have illiteracy (mean = 0.44), which is a large proportion and indicates that educational disadvantage is prevalent in the sample. The average age of the household head is 44.34 years (SD = 13.42) which is a large range from 14 to 99, suggesting that there is great variability in household life-cycle stages which may influence earning capacity and dependence needs.

Marital status patterns indicate that the majority of household heads are currently married (0.91), formerly married household heads comprise 7% of heads (0.07) and never married heads comprise 2% of heads (0.02). These categories can be important for household stability, labor supply, and systems of support. Finally, the average household size is 5.43 members (SD = 2.61) with a range of 1-42, indicating the existence of some meaningful diversity in household composition. Larger households may have higher consumption needs and this may generate pressure in food security, when resources (if not growing proportionately) are scarce.

Overall, Table 2 indicates a large and diverse national sample with meaningful variation with respect to wealth, geography, and household structure. This variance is a good foundation for investigating the heterogeneity of food insecurity across wealth quintiles with a control for location in provinces, rural-urban residence, and major demographic characteristics.

Table 2: ***Descriptive Statistics of Key Study Variables***

Variable	Obs	Mean	Std. Dev.	Min	Max
Wealth quintile (1 = poorest, 5 = richest)	157,456	3.00	1.41	1	5
Food insecurity (1 = insecure)	157,456	0.17	0.38	0	1
Food secure (1 = secure)	157,456	0.83	0.38	0	1
Province - Khyber Pakhtunkhwa	157,456	0.18	0.38	0	1
Province - Punjab	157,456	0.50	0.50	0	1
Province - Sindh	157,456	0.22	0.42	0	1
Province - Balochistan	157,456	0.10	0.29	0	1
Rural residence (1 = rural)	157,456	0.68	0.46	0	1
Urban residence (1 = urban)	157,456	0.32	0.46	0	1
Male household head (1 = male)	157,456	0.91	0.28	0	1

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Female household head (1 = female)	157,456	0.09	0.28	0	1
Illiterate household head (1 = yes)	157,456	0.44	0.50	0	1
Age of household head (years)	157,456	44.34	13.42	14	99
Never married	157,456	0.02	0.14	0	1
Formerly married	157,456	0.07	0.25	0	1
Currently married	157,456	0.91	0.28	0	1
Household size	157,456	5.43	2.61	1	42

Table 3 compares key households characteristics in food secure and food insecure groups and establishes the socioeconomic differences very clearly. The clearest disparities are found in wealth, education, and rural-urban location, and contribute to the fact that food insecurity is found to be concentrated among poorer households.

The wealth gap is high and persistent for both measures of wealth. Food secure households have a mean wealth index of 27.03 (SD = 15.50) whereas the mean wealth index for food insecure households is merely 17.55 (SD = 11.11). This compares to a difference of approximately 9.5 points on a scale of 0-100, suggesting food insecure households have much less assets, along with much weaker long term economic capacity. The same pattern is visible in wealth quintiles. Food-secure households average 3.16 (SD = 1.40), which is slightly above the middle quintile, whereas food-insecure households average only 2.23 (SD = 1.24), placing them closer to the poorer end of the distribution. In simple terms, food insecurity is much more common among households that sit in the lower wealth ranks.

Regional composition also differs, though the gaps are smaller than for wealth. Among food-secure households, 19% are from Khyber Pakhtunkhwa (mean = 0.19), compared to 15% among food-insecure households (0.15). Punjab accounts for the largest share in both groups, but it is slightly higher among food-secure households (51%) than among food-insecure households (47%). In contrast, Sindh and Balochistan represent a relatively larger share of food-insecure households: Sindh rises from 22% among food-secure to 25% among food-insecure households, and Balochistan increases from 9% to 12%. This pattern is suggestive of the fact that food insecurity might be more concentrated in some provinces, although wealth and rural residence likely account for a large portion of these differences. Place of residence indicates another distinct divide. Food insecurity is more rural in nature: 73% of the food insecure households are rural (mean = 0.73, SD = 0.44), compared to 67% of food secure households (0.67, SD = 0.47). The urban share goes in the opposite direction. Urban households account for 33% of the food secure population (0.33), whereas they only account for 27% of the food lost population (0.27). This implies rural households are, on average, more vulnerable to food insecurity, presumably because of low asset ownership, fluctuating incomes and less robust access to services and markets.

In terms of the gender of the household head, the two groups are quite similar. Male-headed households predominate in both categories (91% of the food-secure and 92% of the food-insecure households). Female headed households are 9% in the food secure and 8% in the food insecure. These small differences mean that, in this sample, food insecurity is not largely the result of headship gender alone, although gender may continue to be important once other socioeconomic factors are controlled for.

Education, on the other hand, displays a severe contrast. Of households that are food secure, 41% of household heads are illiterate (mean = 0.41, SD = 0.49). Among households that are food insecure, this increases to 58% (0.58, SD = 0.49). This 17 point gap is considerable and points to the role of human capital in ensuring food security for households. Illiteracy often indicates lower potential to earn, lower mobility due to limited ability to change jobs, and

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decreased access to information and opportunities, all of which may result in lower potential to maintain stable food consumption.

The age of the head of the household is slightly lower in food-insecure households. Food secure households have an average age of the head, 44.69 years (SD = 13.45) and for food insecure households, the average age of the head is 42.62 years (SD = 13.18). The difference is modest, but it may reflect life-cycle effects, where younger households have not yet accumulated assets or stable livelihoods. Household size is almost the same across groups: 5.44 persons (SD = 2.64) for food-secure households and 5.37 persons (SD = 2.44) for food-insecure households. This suggests that differences in food security are less about household size in raw terms and more about economic capacity, asset ownership, and human capital.

Overall, Table 3 paints a consistent picture. Food-insecure households are clearly poorer in terms of assets and wealth ranking, more likely to live in rural areas, and much more likely to have an illiterate household head. These descriptive gaps are also very similar to the wealth-gradient figures and serve as a good basis for the econometric analysis that follows.

Table 3: ***Descriptive Statistics by Food Security Status***

Variable	Food Secure		Food Insecure	
	Mean	SD	Mean	SD
Wealth index (0–100)	27.03	15.50	17.55	11.11
Wealth quintile (1–5)	3.16	1.40	2.23	1.24
Khyber Pakhtunkhwa	0.19	0.39	0.15	0.36
Punjab	0.51	0.50	0.47	0.50
Sindh	0.22	0.41	0.25	0.43
Balochistan	0.09	0.29	0.12	0.33
Rural residence (1 = rural)	0.67	0.47	0.73	0.44
Urban residence (1 = urban)	0.33	0.47	0.27	0.44
Male household head (1 = male)	0.91	0.28	0.92	0.27
Female household head (1 = female)	0.09	0.28	0.08	0.27
Illiterate household head (1 = yes)	0.41	0.49	0.58	0.49
Age of household head (years)	44.69	13.45	42.62	13.18
Household size (persons)	5.44	2.64	5.37	2.44

3.3. Cross-Tabulation

Table 4 provides a very clear wealth gradient in household food security. The pattern is the same for all the quintiles: as the households shift from the poorest to the richest group, there is a steady increase in food security, and a sharp decrease in level of food insecurity. This is precisely what we would expect if long-term socioeconomic status is strongly related to the ability of a household to access adequate food.

Starting with the poorest quintile, out of 31573 households poor, 21574 are food secure which is 68.33%. At the same time, 9,999 households are food insecure, or 31.67%. In other words, almost one in three households in the poorest group is food insecure, which illustrates how concentrated vulnerability is at the bottom of the wealth distribution.

In the case of the poor quintile, the situation improves. Out of the total households (31,422), 24,340 (77.46%) are food secure and 7,082 (22.54%) are food insecure. Compared to the poorest quintile this is a drop of roughly 9 percentage points in food insecurity (from 31.67% to 22.54%), suggesting that even a small increase in socioeconomic position is linked to a noticeable improvement in food security.

The gradient is even greater in the middle quintile. Among 31,480 households, 26,667 (84.71%) are food secure and 4,813 (15.29%) are food insecure. This means that food insecurity falls by

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another 7.25 percentage points compared to the poor quintile, and it is now closer to about one in six households.

In the rich quintile, food security becomes the dominant situation. Out of 31,490 households, 28,242 (89.69%) are food secure and 3,248 (10.31%) are food insecure. Here, only about one in ten households faces food insecurity, which is a major improvement compared to the poorest households. Finally, in the richest quintile, food insecurity becomes relatively rare. Out of 31,491 households, 29,835 are food secure (94.74%), while only 1,656 are food insecure (5.26%). This means food insecurity is reduced to roughly one in twenty households in the richest group. Put differently, the poorest households face food insecurity at about six times the rate observed among the richest households (31.67% vs. 5.26%).

The total row confirms the overall prevalence in the full sample of 157,456 households. In all, there are 130,658 food secure (82.98%) and 26,798 food insecure (17.02%) households. The results of the Pearson chi-square test further indicate that the relationship between wealth quintile and food security status is not only large in magnitude but statistically strong as well. The reported value $\chi^2(4) = 9{,}600.00$ with $p < 0.001$ indicates a highly significant relationship, meaning the differences across wealth quintiles are far too large to be explained by random variation.

Overall, Table 4 provides strong descriptive evidence that household wealth is closely linked to food security outcomes. The steady shift from insecurity to security across quintiles suggests that long-term economic resources and asset ownership play a key role in protecting households from food-related vulnerability. This table therefore provides a strong justification for using wealth quintiles as the main socioeconomic indicator in the regression analysis.

Table 4: Food Insecurity Across Wealth Quintiles

Wealth Quintile	Secure (n)	Secure (%)	Insecure (n)	Insecure (%)	Total (n)
Poorest	21,574	68.33	9,999	31.67	31,573
Poor	24,340	77.46	7,082	22.54	31,422
Middle	26,667	84.71	4,813	15.29	31,480
Rich	28,242	89.69	3,248	10.31	31,490
Richest	29,835	94.74	1,656	5.26	31,491
Total	130,658	82.98	26,798	17.02	157,456
Pearson Chi-square: $\chi^2(4) = 9{,}600.00$; $p < 0.001$					

4. Results and Discussion

Table 5 reports eight logit regression model specifications that progressively add controls to test whether the association between wealth status and food insecurity is robust. Model (1) includes only wealth quintiles. Model (2) adds province. Model (3) adds region (urban-rural). Model (4) adds gender of the household head. Model (5) adds illiteracy. Model (6) adds age. Model (7) adds marital status. Model (8) adds household size. The idea is simple: if the wealth gradient remains strong across all eight models, then wealth is not just proxying for geography or household demographics, but has an independent and stable association with food insecurity.

Focusing only on wealth quintile effects (with the poorest as the reference group), the results show a clear, monotonic pattern in every model. In Model (1), households in the poor quintile have a coefficient of -0.466 (SE = 0.018, $p < 0.01$), meaning they have a substantially lower likelihood of being food insecure relative to the poorest group. The reduction becomes larger as wealth rises. The middle quintile shows -0.943 (0.020, $p < 0.01$), the rich quintile shows -1.394 (0.022, $p < 0.01$), and the richest quintile shows the largest difference at -2.122 (0.028, $p < 0.01$). This step-by-step increase in magnitude is exactly what we expect if food

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insecurity is strongly concentrated among households with the lowest long-term economic resources.

What is most important is that this pattern does not go away when controls are added. Even after controlling for province and rural-urban residence (Models 2-3), the coefficients for wealth are large and highly Significant. For instance, in Model (3), the resulting estimated effects are -0.510, -1.033, -1.521, and -2.315 for poor, middle, rich, and richest respectively (all $p < 0.01$). This means that the differences in wealth in food insecurity are not merely a function of the places people live in; they remain after we control for regional and provincial variation.

The same story is continued as characteristics of the household head are added. When gender, illiteracy and age are included (Models 4-6), the wealth gradient is very stable. In Model (6), the coefficients are -0.467 (poor), -0.950 (middle), -1.405 (rich) and -2.146 (richest) which are statistically significant at 1% level. Adding the status of marriage and household size (Models 7-8) also does not alter the main conclusion. In the fully adjusted Model (8), the wealth effects are still strong: -0.470 (SE = 0.019), -0.953 (0.021), -1.410 (0.024), and -2.146 (0.032) are all significant ($p < 0.01$). Overall, Table 5 indicates a very consistent wealth gradient in all eight models. Moving from the poorest to higher wealth quintiles is linked to increasingly less food insecurity, and this relationship is maintained after accounting for geography and household demographics. The strength of the stability of the wealth coefficients between Models (1) to (8) can be used to increase confidence in the result, and suggest that long-term socioeconomic position, measured through wealth quintiles, is an important correlate of household food security in the sample.

Figure 3 shows coefficient plots from the Logit Models, and reveals an obvious and stable socioeconomic gradient in food insecurity in all specifications. Relative to the poorest households, those in the higher wealth quintiles have consistently lower probabilities of food insecurity and this is greater at higher wealth levels. The negative coefficients for the poor, middle, rich and especially the richest quintiles are remarkably similar across Models 1 to 8 despite the inclusion of further controls. The confidence intervals overlap very closely between specifications, showing great robustness. Overall, the number visually supports the view that household wealth is a strong and robust predictor of food insecurity, irrespective of geographic, demographic and household-level characteristics.

The results show a clear and consistent relationship between household wealth and food insecurity. Relative to the poorest households, those in higher wealth quintiles face a much lower likelihood of food insecurity. The effect becomes stronger at each step up the wealth ladder. Households in the poor, middle, rich, and richest groups all show progressively larger reductions in food insecurity. This pattern indicates that food insecurity follows a smooth socioeconomic gradient rather than a simple poor versus non-poor divide. Even modest improvements in long-term economic position are associated with meaningful gains in food security. This wealth gradient remains stable as additional controls are added to the model. After accounting for province and rural–urban residence, the estimated effects of wealth change very little. The same holds when household head characteristics such as gender, education, and age are included. Even in the fully adjusted model that controls for marital status and household size, the wealth coefficients remain large and highly significant. This stability suggests that wealth is not merely capturing where households live or who heads them. Instead, it reflects deeper and more persistent economic advantages.

From a theoretical perspective, this pattern is expected. Wealth captures long-term economic capacity rather than short-term income flows. Asset-rich households are better able to smooth consumption and cope with food price increases or income shocks. They can draw

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on savings or assets when conditions worsen. Poor households lack these buffers and remain more exposed to food insecurity. The persistence of the wealth effects after extensive controls indicates that wealth captures structural resilience. This makes asset-based wealth a particularly relevant indicator for understanding food insecurity.

Table 5: ***Estimates of Logit regression model on socioeconomic status and food insecurity***

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	**M1: Wealth quintiles only**	**M2: + Province**	**M3: + Region**	**M4: + Gender**	**M5: + Illiterate**	**M6: + Age**	**M7: + Marital status**	**M8: + HH size**
Poorest (base)								
Poor	-0.466***	-0.465***	-0.510***	-0.510***	-0.476***	-0.467***	-0.464***	-0.470***
	(0.018)	(0.018)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)
Middle	-0.943***	-0.946***	-1.033***	-1.033***	-0.971***	-0.950***	-0.944***	-0.953***
	(0.020)	(0.020)	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)
Rich	-1.394***	-1.414***	-1.521***	-1.521***	-1.434***	-1.405***	-1.396***	-1.410***
	(0.022)	(0.023)	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)
Richest	-2.122***	-2.155***	-2.315***	-2.315***	-2.193***	-2.146***	-2.132***	-2.146***
	(0.028)	(0.028)	(0.030)	(0.030)	(0.031)	(0.031)	(0.031)	(0.032)
Punjab		0.278***	0.238***	0.238***	0.251***	0.249***	0.228***	0.255***
		(0.020)	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)	(0.021)
Sindh		0.140***	0.026	0.027	0.049**	0.032	0.009	0.043*
		(0.022)	(0.023)	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)
Balochistan		0.255***	0.220***	0.221***	0.219***	0.202***	0.186***	0.207***
		(0.027)	(0.027)	(0.027)	(0.027)	(0.027)	(0.027)	(0.027)
Urban			0.299***	0.299***	0.310***	0.309***	0.302***	0.310***
			(0.017)	(0.017)	(0.017)	(0.017)	(0.018)	(0.018)
Female				0.008	-0.050*	-0.059**	-0.201***	-0.182***
				(0.026)	(0.026)	(0.026)	(0.030)	(0.030)
Illiterate					0.233***	0.264***	0.261***	0.258***
					(0.015)	(0.015)	(0.015)	(0.015)
Age						-0.005***	-0.007***	-0.008***
						(0.001)	(0.001)	(0.001)
Formerly married							0.402***	0.400***
							(0.061)	(0.061)
Currently married							0.063	0.032
							(0.052)	(0.052)
Household size								0.025***

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								(0.003)
Constant	-0.769***	-0.956***	-0.927***	-0.928***	-1.105***	-0.898**	-0.881***	-0.959***
	(0.012)	(0.020)	(0.021)	(0.021)	(0.024)	(0.032)	(0.057)	(0.058)
Observations	157,456	157,456	157,456	157,456	157,456	157,456	157,456	157,456
Pseudo_R2	0.0688	0.0704	0.0724	0.0724	0.0741	0.0748	0.0756	0.0761

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

The geography indicates that there are apparent and sustained disparities in food insecurity. Following the inclusion of provincial controls, all extended models show strong and statistically significant relationships in households in Punjab and Balochistan. The coefficients of Punjab vary between 0.228 and 0.278, whereas those of Balochistan vary between 0.186 and 0.255 and are all significant at the 1% level. However, this effect on Sindh is less stable and strong. It is substantial in the basal specification (0.140) but small and, in general, insignificant after the addition of household characteristics. Those trends indicate that provincial context is important, and its impact differs according to the region.

Rural-Urban gap has always been one of the most consistent relationships of food insecurity. After adding region, the urban indicator becomes positive and has very significant values in all the later models, with coefficients very close to 0.299 to 0.310. This stability implies that there exists a systematic difference in food security between urban and rural households, despite the wealth, education, and demographics. The fact that this effect is consistent with all specifications indicates that the food security of households is generally conditioned by location-related factors including access to markets, cost of living, and employment patterns.

Other factors that contribute to food insecurity are household head attributes. The significance of female headship is not quite significant in the first specification but becomes negative and statistically significant once education, age and marital status have been incorporated. The coefficient in the full models is -0.201 and -0.182 and this implies that food insecurity is lower in comparison to male headed families after composition is taken into consideration. The positive correlation between illiteracy and all years is also very high and significant with coefficients that vary between 0.233 and 0.264 which is a good indication that education is one of the strong protective factors in food insecurity.

There are also life-cycle and household structure variables which are important. The age coefficient is negative and statistically significant and varies between -0.005 and -0.008 across models implying that older household heads experience lower food insecurity on average. The positive effect of former married family heads is large, approximately 0.40, which shows that they are much more vulnerable than the reference group. Lastly, the household size has a positive and important impact in the full model (0.025) thus, suggesting that bigger households have more pressure in terms of food security when the resources do not rise in the same proportion.

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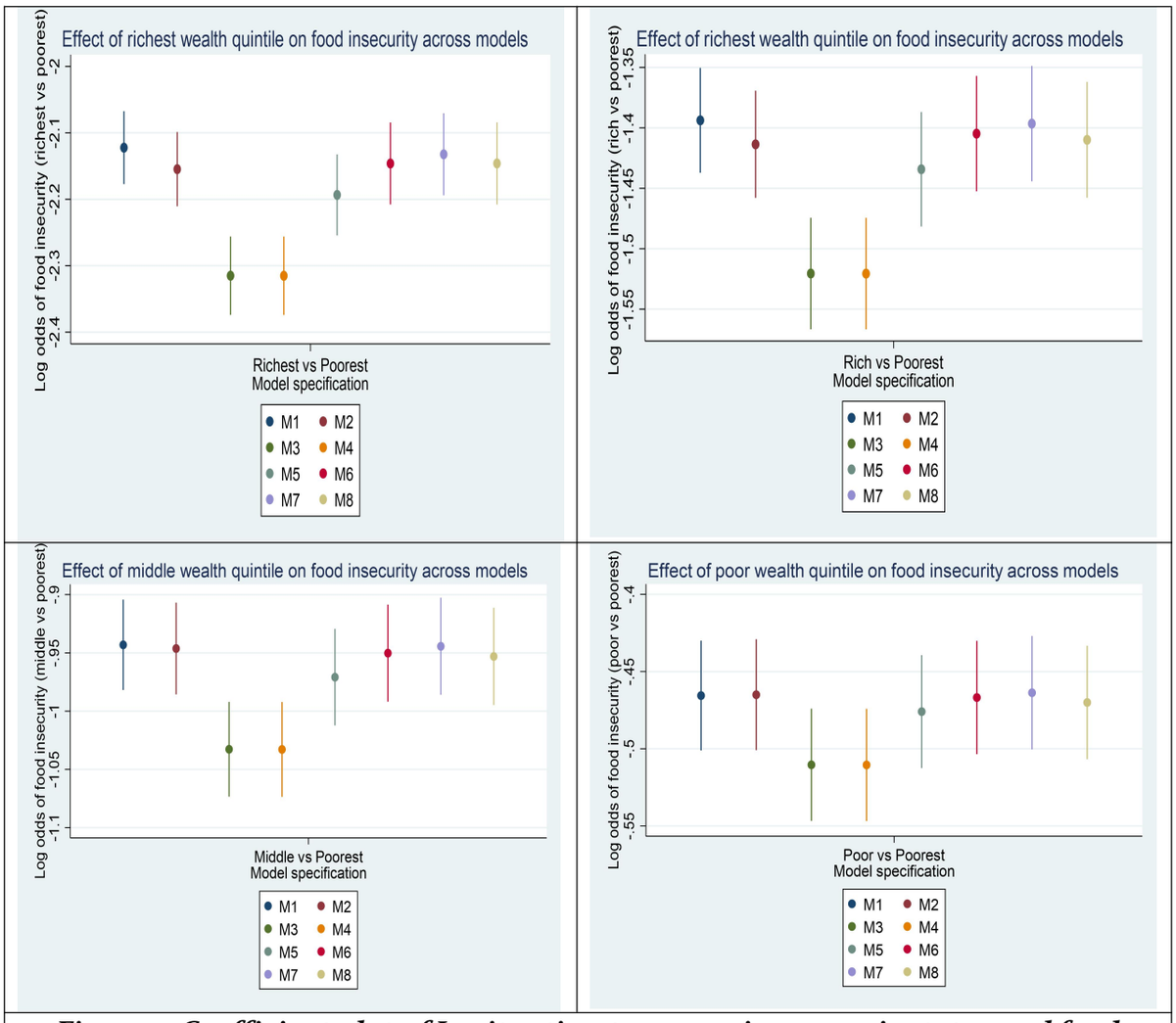

Figure 3. Coefficient plot of Logit estimates on socioeconomic status and food insecurity

5. Conclusion

This study examined the relationship between household socioeconomic status and food insecurity using an asset-based wealth quintile framework. The results provide strong and consistent evidence of a clear wealth gradient in food insecurity. Households positioned higher in the wealth distribution are significantly less likely to experience food insecurity than those in the poorest quintile. This pattern is monotonic and robust, indicating that food insecurity declines steadily as long-term economic resources improve.

A key contribution of the study lies in demonstrating that wealth matters independently of geography and household demographics. The wealth effects remain large and statistically significant even after controlling for provincial location, rural–urban residence, and household head characteristics such as gender, education, age, marital status, and household size. This persistence suggests that wealth captures structural economic advantages rather than temporary or compositional factors. Asset ownership provides households with the capacity to smooth consumption, absorb income and price shocks, and maintain stable food access during periods of stress.

The findings also reinforce the importance of moving beyond binary poverty classifications in food security analysis. Food insecurity is not confined to a single group but follows a

continuous socioeconomic gradient. Even modest differences in wealth are associated with meaningful differences in food security outcomes. An asset-based approach therefore offers a more nuanced understanding of vulnerability and highlights the heterogeneity that exists within the broader population.

From a policy perspective, the results suggest that strategies aimed at reducing food insecurity should not focus solely on short-term food assistance. While such measures remain important, especially during crises, longer-term interventions that support asset accumulation, livelihood stability, and economic resilience are likely to yield more sustainable improvements in food security. Targeting households in lower wealth quintiles can help address the underlying structural inequalities that perpetuate food insecurity.

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