

## NON-AGRICULTURAL EMPLOYMENT STRUCTURE AND HOUSEHOLD FOOD INSECURITY IN PAKISTAN

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### Abstract

*This study examines how non-agricultural employment structure influences household food insecurity in Pakistan using nationally representative PSLM 2019–20 data. Food insecurity is measured through the Food Insecurity Experience Scale (FIES), and a Linear Probability Model is applied to assess differences across employment categories of household heads. The results show that employers and self-employed workers are significantly less likely to experience food insecurity compared with wage-employed households, with employers being the most secure group. Urban households face lower food insecurity than rural households, but the protective effect of non-agricultural employment is relatively stronger in rural settings. Provincial heterogeneity further indicates that the magnitude of these effects varies across regions. Overall, the findings highlight that employment choice and location jointly shape household vulnerability. Policies supporting enterprise development, stable non-agricultural livelihoods, and improved labour conditions may contribute meaningfully to reducing food insecurity in Pakistan.*

**Keywords:** *Non-agricultural employment, Food insecurity, Employment structure, Urban–rural heterogeneity*

### INTRODUCTION

Household food insecurity continues to pose a major challenge in developing economies, where access to adequate and nutritious food is strongly influenced by the nature, stability, and quality of employment. Evidence shows that food insecurity is not driven only by low income but also by broader structural and livelihood-related vulnerabilities, including labour market exclusion, discrimination, social marginalisation, and stress-related coping behaviours (Adams & Nkoro, 2021; Geda, 2023; Letta et al., 2025; Ejaz et al., 2025). The type of employment a household relies on plays a critical role in shaping income stability, risk exposure, and the ability to withstand shocks. Secure, paid employment or well-established non-agricultural enterprises may provide stable earnings and social capital, whereas informal, unstable, or low-quality work often increases vulnerability to economic stress and food insecurity (Ahmad & Khan, 2021; Fetene & Kedir, 2024; Monteza-Quiroz et al., 2025). This highlights the importance of understanding employment structure as a key determinant of food security outcomes.

The literature shows that food insecurity is shaped by a combination of livelihood conditions, structural constraints, and social vulnerabilities. Letta et al. (2025) demonstrate that traditional vulnerability assessment tools often fail to predict which households become food insecure after major shocks, while simpler data-driven approaches perform better. Their findings stress the importance of accurate targeting and reliable FIES-based measurement when analysing household vulnerability. Behavioural and social consequences are also evident. Izudi et al. (2026) show that food insecurity increases the likelihood of hazardous alcohol consumption, reinforcing its psychological strain dimension. Rocha-Rojas et al. (2025) further report that perceived discrimination significantly increases the probability of moderate and severe food insecurity, mainly through labour market exclusion and reduced economic opportunities.

Social and community factors play an important buffering role. Monteza-Quiroz et al. (2025) provide evidence that stronger social capital significantly reduces the probability of food insecurity, while Katiforis et al. (2025) show that households often adjust internally by prioritising children's nutrition and relying on support networks, though such strategies create emotional stress. Broader structural challenges are also documented. Mazenda (2025) finds that multidimensional energy poverty raises food insecurity risk, while higher income and infrastructure access help reduce vulnerability. Similarly, Ahmed (2024) shows that climate shocks reduce agricultural income and increase FIES-measured food insecurity, highlighting the role of income stability.

Evidence from Ethiopia supports the relevance of labour structure. Wubetie et al. (2024) reveal that food insecurity remains widespread and spatially clustered, improving where urbanisation and non-agricultural enterprises expand. Ria et al. (2025) also show that wealth, education, land ownership, shocks, and family size play important roles in determining food insecurity. From a labour perspective, Martey and Koomson (2025) find that time poverty associated with unpaid work increases food insecurity, while time poverty linked to paid work reduces it, suggesting that the nature and quality of work matter. Beyene et al. (2025) further show that women’s empowerment and non-farm income reduce vulnerability, while Bogale and Shimelis (2009) underline the importance of income, assets, and household characteristics.

The Pakistani literature provides direct contextual relevance. Anwar, Shair and Hussain (2024) show that households relying on coping strategies during crises are more likely to be food insecure, reflecting underlying fragility. Shair et al. (2023) find that safety net beneficiaries remain more food insecure, although higher transfer levels can ease mild insecurity. Finally, Shair et al. (2024) demonstrate that low education, low income, large household size, migration status, and socioeconomic disadvantage significantly increase household vulnerability, whereas higher-income and female-headed households tend to be more secure.

Although existing literature recognises that employment structure, income stability, and household characteristics shape food insecurity, most studies focus on agriculture, shocks, or general socioeconomic drivers rather than comparing how different non-agricultural employment types influence food security outcomes. Limited evidence systematically contrasts the experiences of employers, self-employed workers, and paid employees in Pakistan’s changing labour context (Ahmad & Ali, 2016; Naeem & Hameed, 2019; Qasim & Tariq, 2020; Broz, 2022; Marc et al., 2022; Senbeta, 2023; Tesfay, 2021; Letta et al., 2025; Martey and Koomson, 2025; Shair et al., 2024). This study addresses this gap by examining whether employment choice reduces, worsens, or has no effect on household food insecurity.

The study specifically analyses three dimensions. First, it investigates the effect of employment type on household food insecurity. Second, it explores whether this relationship varies across Pakistan’s four provinces, reflecting diverse economic structures and vulnerabilities. Third, it examines the interaction between employment type and region, assessing whether the effects differ between urban and rural settings. Understanding these dynamics is important for labour planning, social protection, and policies aimed at strengthening household food security.

## DATA AND VARIABLES

### DATA SOURCE

This study utilizes data from the Pakistan Social and Living Standards Measurement (PSLM) Survey 2019-20, a nationally representative household survey undertaken by the General Directorate of Statistics, Pakistan Bureau of Statistics to collect data on socioeconomic conditions, the living standards, and wellbeing indicators of the population across the country. The survey includes detailed information on employment status and household situation, and thus is suitable for analysis of the relationship between livelihoods and food insecurity. The analytical sample is comprised of 99,040 households which include 63,306 that have paid employees, 32,725 that are self-employed in non-agricultural activities and 3,009 that are non-agricultural employers. This large and diverse sample is suitable for strong comparison across categories of employment.

### VARIABLE DESCRIPTION

This study uses household and individual information to examine the relationship between employment type and food insecurity, as summarised in Table 1. The dependent variable is household food insecurity, as measured using the Food Insecurity Experience Scale (FIES) and coded to be a binary outcome. The most important explanatory variable is the type of employment of the head of household involved in non-agricultural activities, i.e. employers, self-employed workers and paid employees, the last being the reference point. In addition, the analysis controls for household size, province, and residential region, and household head characteristics such as gender, age, and marital status, to allow for differences in demographics and socioeconomic characteristics between households.

**Table 1: Definition of Variables**

Variable	Definition / Measurement	Coding
Food insecurity status	Household food insecurity measured using the Food Insecurity Experience Scale (FIES). Indicates whether the household experienced food insecurity during the reference period.	Binary variable: 1 = Food insecure, 0 = Otherwise
Employment type	Employment status of the household head engaged in non-agricultural activities.	

Employer	Household head owns a non-agricultural enterprise employing others.	1 = Yes, 0 = No
Self-employed	Household head runs a non-agricultural enterprise without employing others.	1 = Yes, 0 = No
Paid employee	Household head works as a wage or salaried worker in a non-agricultural occupation.	1 = Yes, 0 = No (reference category)
Household characteristics		
Household size	Total number of household members living in the household.	Continuous
Province	Province in which the household resides.	Dummy variables
Punjab	Household resides in Punjab province.	1 = Yes, 0 = No
Sindh	Household resides in Sindh province.	1 = Yes, 0 = No
Khyber Pakhtunkhwa	Household resides in Khyber Pakhtunkhwa province.	1 = Yes, 0 = No
Balochistan	Household resides in Balochistan province.	1 = Yes, 0 = No (reference category)
Region	Residential location of the household.	Dummy variables
Urban	Household located in urban area.	1 = Yes, 0 = No
Household head characteristics		
Female head	Gender of the household head.	1 = Female, 0 = Male
Age of household head	Age of the household head in completed years.	Continuous
Marital status of household head	Marital status of household head.	Dummy variables
Never married	Household head has never been married.	1 = Yes, 0 = No (reference category)
Formerly married	Household head is divorced, separated, or widowed.	1 = Yes, 0 = No
Currently married	Household head is currently married.	1 = Yes, 0 = No

## METHODOLOGY

To investigate the link between the type of employment and household food insecurity, the type of employment was estimated in a Linear Probability Model (LPM) with a binary dependent variable. The outcome variable is food insecurity status (food insecure = 1, otherwise = 0) based on the FIES measure. The main explanatory variables are also indicators representing the type of employment of the household head in non-agricultural activities: employer and self-employed, of which the reference is paid employee. The model also includes controls for household size, province, region, and household head characteristics to account for observable differences across households.

Formally, the LPM can be written as:

$$FI_i = \alpha + \beta_1 \text{Employer}_i + \beta_2 \text{SelfEmployed}_i + \gamma_1 \text{HHSIZE}_i + \gamma_2 \text{Punjab}_i + \gamma_3 \text{Sindh}_i + \gamma_4 \text{KPK}_i + \gamma_5 \text{Urban}_i + \gamma_6 \text{FemaleHead}_i + \gamma_7 \text{AgeHead}_i + \gamma_8 \text{FormerlyMarried}_i + \gamma_9 \text{CurrentlyMarried}_i + \varepsilon_i,$$

where  $FI_i$  is the probability that household  $i$  is food insecure, Balochistan, rural region, male head and never married are the reference categories in control variable setting. The Coefficients of the model are interpreted in terms of changes in the probability of being food insecure associated with a one-unit change in each of the regressors and standard errors are adjusted for the binary nature of the dependent variable.

## DESCRIPTIVE ANALYSIS

### DESCRIPTIVE STATISTICS

Table 2 shows the descriptive statistics of the important variables used in the analysis. Overall, 17.9 percent of households are food insecure, which means that nearly one in five households struggle to meet needs of adequate food. The distribution of non-agricultural types of employment indicates that the vast majority of household heads are paid employees (63.9 percent), followed by self-employed workers (33.0 percent), with only 3.0 percent of the

population being employers. This implies that most of the non-agricultural livelihoods are either wage-based or in small-scale self-employment with relatively few households engaged in the ownership of enterprises.

The average household size is approximately 5.3 with significant variation between households. In terms of the provincial distribution, nearly half of the sample lives in Punjab (48.7 percent), followed by Sindh (25.4 percent), Khyber Pakhtunkhwa (16.7 percent) and Balochistan (9.1 percent). A majority of households reside in rural areas (60.7 percent), 39.3 percent in urban settings, indicating the overall demographic pattern of Pakistan.

Household head characteristics indicate that the majority of households are male-headed (98.5 percent) and the average age of the head is 41 years. With respect to marital status, the vast majority of household heads currently are married (94.8 percent), while only a small proportion of household heads are never married (2.1 percent) or formerly married (3.1 percent). Together, these statistics paint a clear picture of the sample and show significant variability across employment categories, demographics and regional contexts, which is important to understanding differences in household food insecurity outcomes.

**Table 2: Descriptive statistics**

Variable	Obs	Mean / Proportion	Std. Dev.	Min	Max
Food insecurity status	99,040				
Food insecure (1 = Yes)	99,040	0.179	0.383	0	1
Employment type (Non-agricultural)	99,040				
Employer (1 = Yes)	99,040	0.030	0.172	0	1
Self-employed (1 = Yes)	99,040	0.330	0.470	0	1
Paid employee (1 = Yes)	99,040	0.639	0.480	0	1
Household characteristics					
Household size (persons)	99,040	5.309	2.367	1	37
Province	99,040				
Punjab (1 = Yes)	99,040	0.487	0.500	0	1
Sindh (1 = Yes)	99,040	0.254	0.435	0	1
Khyber Pakhtunkhwa (1 = Yes)	99,040	0.167	0.373	0	1
Balochistan (1 = Yes)	99,040	0.091	0.288	0	1
Region	99,040				
Rural (1 = Yes)	99,040	0.607	0.488	0	1
Urban (1 = Yes)	99,040	0.393	0.488	0	1
Household head characteristics					
Male head (1 = Yes)	99,040	0.985	0.121	0	1
Age of household head (years)	99,040	41.061	11.148	15	98
Marital status of household head	99,040				
Never married	99,040	0.021	0.143	0	1
Formerly married	99,040	0.031	0.172	0	1
Currently married	99,040	0.948	0.221	0	1

**DESCRIPTIVE STATISTICS BY EMPLOYMENT TYPE**

Table 3 gives a comparative picture of household and demographic features for three non-agricultural groups of employment-employers, self-employed workers, and paid employees. There seems to be a strong gradient in food insecurity. Employers have the lowest prevalence of food insecurity (11.4%), followed by self-employed households (15.0%), and paid employees have the highest level of food insecurity (19.7%). This suggests that enterprise ownership and self-employment may offer rather more robust economic resilience than wage-based employment, although the burden of food insecurity remains evident across all the groups.

Household structure also differs for types of employment. Employers and self-employed households have slightly larger household sizes (5.58 and 5.53 respectively) than paid employees (5.18). Provincial distribution shows that the highest share of employers and self-employed workers is located in Punjab while the share of paid employees is relatively high in Sindh. Employers are slightly more concentrated in Balochistan in comparison with the two other groups. These variations reflect the way regional economic conditions may influence the mix of job choices. Urban-rural patterns show some significant differences. More than half of employers reside in urban areas (56.2%), relative to 42.4% of the self-employed and the paid employees which is 36.9%. A higher proportion of paid employees and self-employed are in rural areas, however. This means that enterprise ownership is more urban-

centred while wage employment and small-scale self-employment are more prevalent in the rural areas (Walsh, 2022; Sharma & Das, 2024).

Household head characteristics also show some meaningful contrasts. Almost all households are male-headed across groups, but employers are on average older (43.5 years), followed by the self-employed (42.6 years) and paid employees (40.2 years). This age pattern might reflect experience, asset accumulation and progression into enterprise ownership as time goes on. Marital status distributions are similar, with the majority of heads in all groups being currently married, although employers have a slightly larger percentage of married household heads. Overall, the descriptive evidence is suggestive of employers being in a better position in terms of food security and socioeconomic characteristics, followed by the self-employed, and paid employees appearing to be more vulnerable. These differences highlight the importance of studying the linkages between food insecurity outcomes and the type of employment in a more rigorous econometric context.

**Table 3: Descriptive statistics of employment type**

Variable	Employer (n = 3,009)	Self-employed (n = 32,725)	Paid employee (n = 63,306)
Food insecurity status			
Food insecure (1 = Yes)	0.114	0.150	0.197
Household characteristics			
Household size (persons)	5.581	5.525	5.184
Province			
Punjab	0.496	0.546	0.457
Sindh	0.226	0.193	0.287
Khyber Pakhtunkhwa	0.162	0.174	0.164
Balochistan	0.116	0.086	0.093
Region			
Rural	0.438	0.576	0.631
Urban	0.562	0.424	0.369
Household head characteristics			
Male (1 = Yes)	0.994	0.988	0.983
Age (years)	43.53	42.58	40.16
Marital status of household head			
Never married	0.025	0.017	0.023
Formerly married	0.023	0.031	0.031
Currently married	0.952	0.952	0.946

### CROSS-TABULATION

Table 4 summarises the distribution of food security status across the three non-agricultural employment categories. Overall, 82.10 percent of households are food secure and 17.90 percent are food insecure. However, these averages mask clear differences by employment type. Among employers, 88.57 percent of households are food secure and only 11.43 percent are food insecure. For the self-employed, 84.99 percent are food secure and 15.01 percent are food insecure. In contrast, paid employees have the lowest proportion of food secure households (80.30 per cent) and the highest proportion of food insecure households (19.70 per cent).

These patterns indicate a gradient in the outcomes of food security. Households with non-agricultural employers at their head seem to be the most protected, followed by self-employed, whereas paid employees are at the highest risk of food insecurity (Ali & Rehman, 2015; Walsh, 2022). One possible interpretation is that employers and, to some extent, self-employed workers may benefit from greater control over their work, more flexible income sources, or better opportunities to adjust output and prices when conditions change. Paid employees, on the other hand, depend more directly on wage income, which may be more vulnerable to job loss, wage cuts, or informal employment arrangements.

The Pearson chi-square statistic confirms that these differences are not random. The chi-square value of 411.8 with a p-value below 0.001 indicates a statistically significant association between employment type and food insecurity status. In other words, the probability of being food insecure is systematically related to whether the household

head is an employer, self-employed, or a paid employee. This cross-tabulation provides strong descriptive evidence that employment choice within the non-agricultural sector is closely linked to household food security, which justifies the more detailed econometric analysis in the following sections.

**Table 4: Food Insecurity Status by Employment Type (Non-Agricultural Sample)**

Employment type	Secure (n)	Insecure (n)	Total	Secure (%)	Insecure (%)
Employer (non-agri)	2,665	344	3,009	88.57	11.43
Self-employed (non-agri)	27,814	4,911	32,725	84.99	15.01
Paid employee	50,834	12,472	63,306	80.30	19.70
Total	81,313	17,727	99,040	82.10	17.90
Pearson Chi-square (2) = 411.8032, p < 0.001					

## RESULTS AND DISCUSSION

### BASELINE REGRESSION MODEL

Table 5 reports seven Linear Probability Models estimated to examine how non-agricultural employment type relates to household food insecurity. The models are built stepwise. Model 1 includes only employment type, while Models 2 and 3 gradually add household size and province dummies. Model 4 introduces the urban–rural indicator, and Models 5–7 further control for the gender, age, and marital status of the household head. This progression allows us to see whether the association between employment type and food insecurity is robust to the inclusion of additional household, locational, and demographic controls.

In all seven models, employment type is a strong and consistent predictor of food insecurity. Using paid-employed household heads as references, the coefficient on employers is negative and highly significant in all specifications. For the baseline model, being an employer is associated with an 8.3 percentage point lower probability of food insecurity compared with a paid employee, and this association is still sizeable after adding all controls, settling at around 6.4 percentage points in Model 7. This pattern implies that the ownership of enterprising in non-agricultural activities is associated systematically with reduced risk of food insecurity, even after controlling for household size, province, region and characteristics of the head of the household.

Self-employed members of households show a protective effect as well, but of a smaller magnitude than employers. In Model 1, self-employment in non-agriculture has been linked to a lower probability of food insecurity by about 4.7 percentage points compared to paid employment. As we go on adding more controls, the coefficient gradually decreases but continues to be statistically significant, in the 3.7 percentage points range, in Model 7. This means that although self-employed households remain less likely to be food insecure than paid-employee households, the disparity is less pronounced than it is for employers.

Taken together the seven models provide a consistent story: in the non-agricultural sector employment choice is important to food security. While employers are the least likely to be food insecure, the self-employed are the next in line, the most vulnerable group are paid employees (Kingston, 2020). The persistence of these effects, and the fact that they attenuate only slightly with more controls, suggests that the association is not solely attributable to differences that can be observed in the household size, location, and demographic composition, but rather that employment structure plays a meaningful role in the outcome of food insecurity.

The finding that non-agricultural employers are less likely to face food insecurity than other employment groups can be explained by the relative economic advantages associated with enterprise ownership. Employers generally possess greater control over production decisions, pricing, and output levels, which helps them better manage fluctuations in income and market shocks. They are also more likely to have accumulated capital, diversified income streams, and stronger business networks, all of which can enhance financial stability. These advantages translate into more reliable purchasing power for food, enabling employer households to better protect themselves against uncertainty and rising living costs.

Similarly, the result showing that self-employed workers are less food insecure than wage-employed households reflects the advantages of autonomy and flexibility in non-agricultural self-employment. While self-employed households may not have the same level of financial security as employers, they still enjoy more control over working conditions and income opportunities compared with wage workers, who depend on fixed or uncertain salaries. Wage-employed workers, particularly in informal or low-paid sectors, often face unstable earnings, job insecurity, and weaker bargaining power, which heightens their vulnerability to economic stress. In contrast, even modest entrepreneurial activity can allow self-employed households to adapt, diversify income sources, and sustain food access more effectively than those relying solely on wages.

The results in Table 5 also demonstrate how household, provincial, and demographic characteristics are related to food insecurity, after taking into account the type of employment. Household size is positively and sympathetically associated with food insecurity. Once controls are added, a coefficient becomes statistically significant, and an increase from about 0.1 to 0.4 percentage points in the later models. This results in a finding that larger households are slightly more likely to be food insecure, holding other factors constant, which is consistent with greater pressure on household resources.

**Table 5: LPM model estimates on the impact of employment types on food insecurity**

VARIABLES	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Employment type (ref: Paid-employed )							
Employer	-0.083*** [0.007]	-0.083*** [0.007]	-0.083*** [0.007]	-0.070*** [0.007]	-0.068*** [0.007]	-0.064*** [0.007]	-0.064*** [0.007]
Self-employed	-0.047*** [0.003]	-0.047*** [0.003]	-0.046*** [0.003]	-0.041*** [0.003]	-0.040*** [0.003]	-0.037*** [0.003]	-0.037*** [0.003]
Household size		0.001 [0.001]	0.001*** [0.001]	0.001* [0.001]	0.001*** [0.001]	0.004*** [0.001]	0.004*** [0.001]
Ref: KPK							
Punjab			0.020*** [0.003]	0.034*** [0.004]	0.033*** [0.004]	0.035*** [0.004]	0.034*** [0.004]
Sindh			0.033*** [0.004]	0.062*** [0.004]	0.062*** [0.004]	0.060*** [0.004]	0.060*** [0.004]
Balochistan			0.048*** [0.005]	0.054*** [0.005]	0.055*** [0.005]	0.052*** [0.005]	0.052*** [0.005]
Urban				-0.063*** [0.003]	-0.063*** [0.003]	-0.059*** [0.003]	-0.059*** [0.003]
Female					0.137*** [0.010]	0.146*** [0.010]	0.116*** [0.011]
Age						-0.002*** [0.000]	-0.002*** [0.000]
Ref: never married							
Formerly married							0.052*** [0.012]
Currently married							0.006 [0.009]
Constant	0.197*** [0.002]	0.194*** [0.003]	0.167*** [0.004]	0.176*** [0.005]	0.172*** [0.005]	0.230*** [0.006]	0.227*** [0.010]
Observations	99,040	99,040	99,040	99,040	99,040	99,040	99,040
R-squared	0.004	0.004	0.005	0.011	0.013	0.015	0.016

Standard errors in brackets, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Provincial differences are robust and long-term Using Khyber Pakhtunkhwa as the reference category, the probabilities of food insecurity in Punjab, Sindh and Balochistan are higher in all the relevant models. The estimated effect is the lowest in Punjab (around 2-3.5 percentage points) and the highest in Balochistan (around 5.2 percentage points) with Sindh in between (around 6 percentage points). These results suggest that compared with the province of Khyber Pakhtunkhwa, households in the other provinces experience systematically higher food insecurity, which may reflect differences in economic structure, prices and access to services.

The urban-rural gap variable shows a clear and sizable effect. The negative and significant coefficient on “Urban” (around -6.3 to -5.9 percentage points) indicates that urban households are less likely to be food insecure than

rural households, after accounting for employment type, province, and other characteristics. This supports the view that rural households face more constraints in terms of income opportunities, markets, and services.

Household head characteristics also matter. When head gender is included, female-headed households are significantly more likely to be food insecure, with coefficients between 0.137 and 0.146 before age and marital status are added, and about 0.116 in the full model. This implies that, compared with male-headed households, female-headed households face a 11–15 percentage point higher probability of food insecurity, even after other controls. At the same time, the age of the household head has a small negative effect: each additional year of age reduces the likelihood of food insecurity by about 0.2 percentage points. Older heads may benefit from experience, networks, or more stable livelihoods.

Marital status shows a mixed pattern. Relative to never-married heads, formerly married heads (widowed, divorced, or separated) have a significantly higher probability of food insecurity (about 5.2 percentage points), while currently married heads do not differ significantly from the reference group. This suggests that disruption of marital status is associated with greater vulnerability, possibly due to income loss or reduced support.

The R-squared values are low, rising from 0.004 in the simplest model to 0.016 in the full specification. This is typical in micro-level probability models with a binary outcome and does not undermine the relevance of the estimated coefficients. Instead, it reflects the fact that many unobserved factors also influence food insecurity. Overall, these results show that, beyond employment type, household size, province, urban–rural location, and head characteristics all contribute in meaningful ways to explaining differences in food insecurity across households.

Figure 1 visually summarises the estimated effects of employment type on the probability of household food insecurity across the seven Linear Probability Models. The plot shows two sets of coefficients, one for employers and one for self-employed workers, with paid employees serving as the reference category. Each dot represents the coefficient from a particular model, while the horizontal lines indicate the 95 percent confidence intervals.

The results show a consistent negative relationship between non-agricultural employment types and food insecurity. For employers, all coefficients lie between roughly  $-0.08$  and  $-0.06$  across specifications, indicating a substantially lower probability of food insecurity compared with paid employees. Although the magnitude slightly declines the more controls are introduced, the effect is strong and statistically precise in all models.

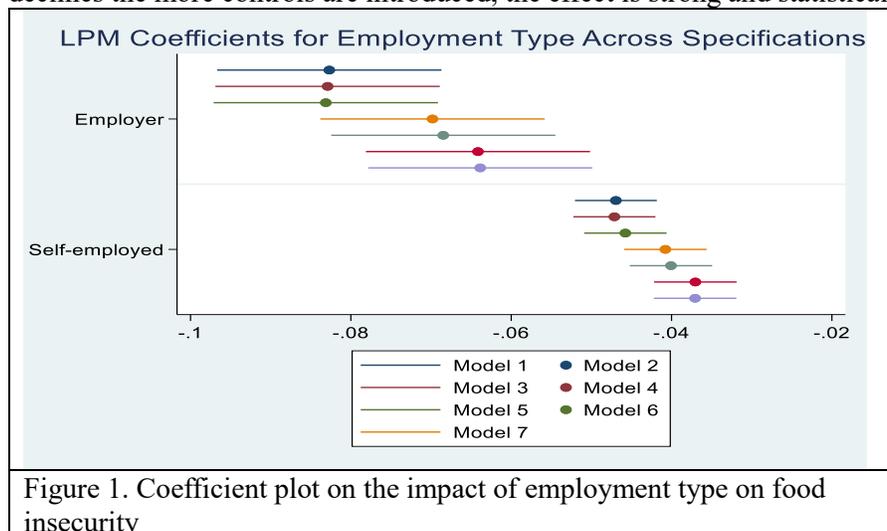


Figure 1. Coefficient plot on the impact of employment type on food insecurity

A similar but smaller pattern is seen for the self-employed category. Their coefficients lie between approximately  $(-0.05)$  and  $(-0.03)$ , i.e. self-employed households are also less likely to be food insecure than households with paid employees, but the difference is smaller than the difference for their employers. Again, the coefficients remain consistently negative and statistically significant across all model specifications, which strengthens the credibility of the findings.

Overall, Figure 1 reinforces the main conclusion that employment choice matters for household welfare. Both employers and self-employed workers experience lower food insecurity risks compared with wage-employed households, and these relationships remain stable even after progressively controlling for household, regional, and demographic characteristics.

## HETEROGENEITY ANALYSIS

Table 6 shows that the protective role of non-agricultural employment against food insecurity is robust but varies across provinces. In the baseline model that pools all provinces, households headed by employers are about 6.4 percentage points less likely to be food insecure than those headed by paid employees, while self-employed households are 3.7 percentage points less likely to be food insecure. Both effects are large, negative, and highly significant, confirming that within the non-agricultural sector, employers are the least vulnerable group, followed by the self-employed, with paid employees as the most food insecure.

**Table 6: Heterogenous impact of employment types on food insecurity across province**

	(1)	(2)	(3)	(4)	(5)
VARIABLES	Baseline	KPK	Punjab	Sindh	Balochistan
Employment type (ref: Paid-employed )					
Employer	-0.064*** [0.007]	-0.108*** [0.017]	-0.049*** [0.010]	-0.076*** [0.015]	-0.040* [0.022]
Self-employed	-0.037*** [0.003]	-0.025*** [0.006]	-0.042*** [0.004]	-0.021*** [0.006]	-0.065*** [0.009]
Household size	0.004*** [0.001]	-0.002** [0.001]	0.005*** [0.001]	0.011*** [0.001]	0.000 [0.002]
Ref: KPK					
Punjab	0.034*** [0.004]				
Sindh	0.060*** [0.004]				
Balochistan	0.052*** [0.005]				
Urban	-0.059*** [0.003]	-0.072*** [0.008]	-0.033*** [0.004]	-0.109*** [0.005]	-0.038*** [0.010]
Female	0.116*** [0.011]	0.004 [0.035]	0.098*** [0.014]	0.212*** [0.025]	0.269*** [0.081]
Age	-0.002*** [0.000]	-0.001*** [0.000]	-0.002*** [0.000]	-0.002*** [0.000]	-0.004*** [0.000]
Ref: never married					
Formerly married	0.052*** [0.012]	0.044 [0.036]	0.060*** [0.015]	0.010 [0.027]	-0.012 [0.059]
Currently married	0.006 [0.009]	0.025 [0.021]	0.006 [0.011]	-0.007 [0.021]	-0.050 [0.034]
Constant	0.227*** [0.010]	0.220*** [0.022]	0.229*** [0.012]	0.312*** [0.022]	0.422*** [0.035]
Observations	99,040	16,554	48,267	25,184	9,035
R-squared	0.016	0.012	0.010	0.034	0.019

Standard errors in brackets, \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

The provincial models show significant differences between the strength of these effects. In Khyber Pakhtunkhwa, the coefficient for employers is of the largest magnitude (-0.108), thus indicating that an individual being an employer makes them less likely to be food insecure by more than 10 percentage points compared to being in paid employment. In Punjab and Sindh too, employers have a clear edge, though to a lesser extent (around minus 4.9 and minus 7.6 percentage points respectively). In Balochistan, the employer effect is also negative (-0.040) but also statistically significant at 10 percent level; however, the employer effect is weaker showing that the ownership of enterprise does offer some protection but not as much as other provinces.

For the case of the self-employed, the empirical pattern is slightly different. Self-employment is associated with lower food insecurity in every province, but the size of the effect varies. In Punjab and Balochistan, self-employed households experience relatively larger reductions in food insecurity (around -4.2 and -6.5 percentage points),

while in Khyber Pakhtunkhwa and Sindh the margins are smaller (about  $-2.5$  and  $-2.1$  percentage points). Overall, these results suggest that non-agricultural enterprise ownership and self-employment consistently reduce food insecurity compared with wage work, but the extent of this advantage depends on the provincial economic context and opportunities available in each region.

Figure 2 illustrates how the relationship between employment type and food insecurity varies across provinces, using wage-employed households as the reference group. The left panel shows the coefficients for employers, while the right panel presents the coefficients for the self-employed. In both cases, all plotted coefficients are less than the zero line, indicating that employers and self-employed households are consistently at a lower probability of being food insecure than wage-employed households for all provinces.

For employers, the most striking protective effect is seen in Khyber Pakhtunkhwa, which has the most negative coefficient, indicating that it has a significantly lower probability of food insecurity compared to wage workers. Punjab and Sindh also demonstrate substantial negative impacts, though of a smaller order than in Khyber Pakhtunkhwa. Balochistan shows a negative but less powerful effect with wider confidence intervals, meaning greater uncertainty, which could be due to the smaller sample size or more volatile economic conditions in the province.

The right panel depicts a similar, but more moderate, pattern for the self-employed. Self employment is associated with reduced risk of food insecurity across all provinces but the magnitude differs. The effect seems to be stronger in Punjab, Khyber Pakhtunkhwa and Sindh while in Balochistan the advantage is negative but smaller and less accurate. Across both panels, the baseline estimates are close to provincial estimates, which lends further credibility to the main findings.

Overall, the data in Figure 2 appears to highlight the key point that non-agricultural employers are the most food secure group, followed by the self-employed households, and wage-employed households are the most vulnerable. However, the magnitude of this advantage varies depending on the economic context in the province, which again suggests that local labour market conditions and opportunities influence the transformation of employment type on household food security.

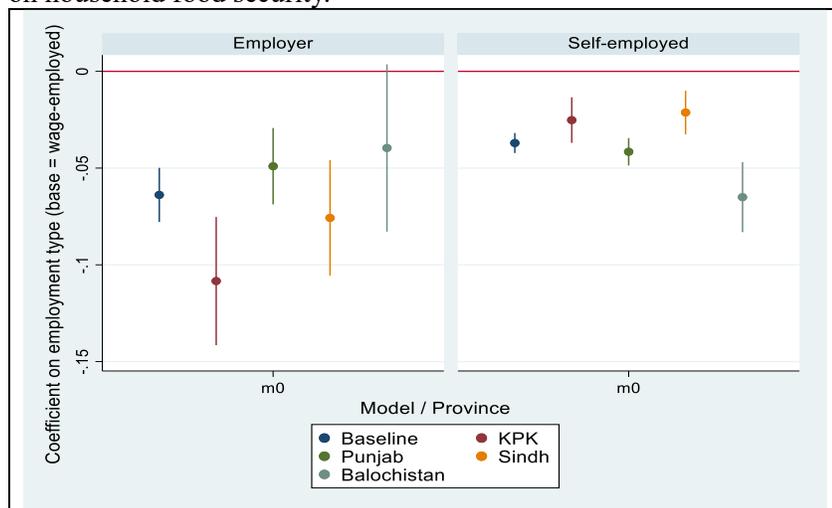


Figure 2. Heterogenous impact of employment types on food insecurity across province

### INTERACTION EFFECTS OF EMPLOYMENT STRUCTURE AND REGION ON FOOD INSECURITY

Table 7 shows the findings of the Linear Probability Model of the joint relationship between employment type and place of residence on household food insecurity. Using paid employees as the reference category, the results indicate that employers as well as self-employed workers are both significantly less likely to experience food insecurity. Being an employer lowers the likelihood of food insecurity by around 8.5 percentage points and being self-employed lowers the likelihood of food insecurity by around 4.8 percentage points, holding other factors constant. These large and statistically significant effects validate the results that within the non-agricultural sector, enterprise owners and self-employed workers have a clear economic advantage over wage-employed households.

The model also depicts a strong urban advantage. Households living in urban areas are 6.9 percentage points less likely to be food insecure than rural households. However, the interaction effects show that the employment type benefits are not homogenous in space. The positive and significant coefficient on “Employer × Urban” suggests that the protective effect of being an employer is weaker in urban areas than in rural areas. A similar pattern appears for self-employed households, where the “Self-employed × Urban” term indicates a smaller reduction in food insecurity for urban self-employed households compared with their rural counterparts.

Taken together, these results suggest two key insights. First, non-agricultural employers and self-employed workers are consistently better protected against food insecurity than wage workers. Second, this advantage is relatively stronger in rural areas. One possible explanation is that enterprise ownership and self-employment may generate proportionately greater economic security in rural settings where wage jobs are often unstable and poorly paid. In urban areas, although food insecurity is generally lower, competition, higher living costs, and more volatile business conditions may reduce the relative advantage of these employment types. Overall, the findings highlight that employment choice and location jointly shape household well-being, and policy responses should recognise that employment-based resilience differs across rural and urban contexts.

**Table 7: Impact of employment type and urban-rural interaction on household food insecurity**

Variables	Coefficient	Std. Error	t-Statistic	p-value	95% Confidence Interval
Employment type (Ref = Paid employee)					
Employer (non-agri)	-0.0846	0.0107	-7.93	0.000	-0.1055 , -0.0637
Self-employed (non-agri)	-0.0475	0.0034	-14.04	0.000	-0.0542 , -0.0409
Region (Ref = Rural)					
Urban	-0.0691	0.0033	-21.23	0.000	-0.0755 , -0.0628
Interaction: Employment × Region					
Employer × Urban	0.0403	0.0143	2.81	0.005	0.0122 , 0.0684
Self-employed × Urban	0.0260	0.0053	4.93	0.000	0.0157 , 0.0364
Household characteristics					
Household size	0.0038	0.0005	7.03	0.000	0.0028 , 0.0049
Punjab	0.0337	0.0035	9.57	0.000	0.0268 , 0.0406
Sindh	0.0596	0.0041	14.57	0.000	0.0516 , 0.0676
Balochistan	0.0522	0.0050	10.42	0.000	0.0424 , 0.0620
Female HH head	0.1159	0.0114	10.21	0.000	0.0937 , 0.1382
Age of HH head	-0.0019	0.0001	-15.99	0.000	-0.0021 , -0.0016
Formerly married	0.0517	0.0117	4.41	0.000	0.0287 , 0.0747
Currently married	0.0054	0.0086	0.63	0.530	-0.0114 , 0.0222
Constant	0.2314	0.0096	24.17	0.000	0.2127 , 0.2502
Observations: 99,040 R-squared: 0.0159 Adjusted R-squared: 0.0157 F-statistic: 122.82 (p < 0.001) Root MSE: 0.3803					

Table 8 reports the predicted probabilities of household food insecurity by employment category and place of residence. The numbers confirm a clear ranking across employment types. Among rural households, employers have the lowest predicted probability of food insecurity at 13.6 percent, followed by the self-employed at 17.3 percent, while paid employees face the highest risk at 22.0 percent. The same pattern is true for urban areas: the likelihood that a person will be food insecure is 10.7 percent for those who are employers, 13.0 percent for those who are self-employed, and 15.1 percent for those who are paid employees. All the estimates are precisely measured with very low standard errors and p-values under 0.01.

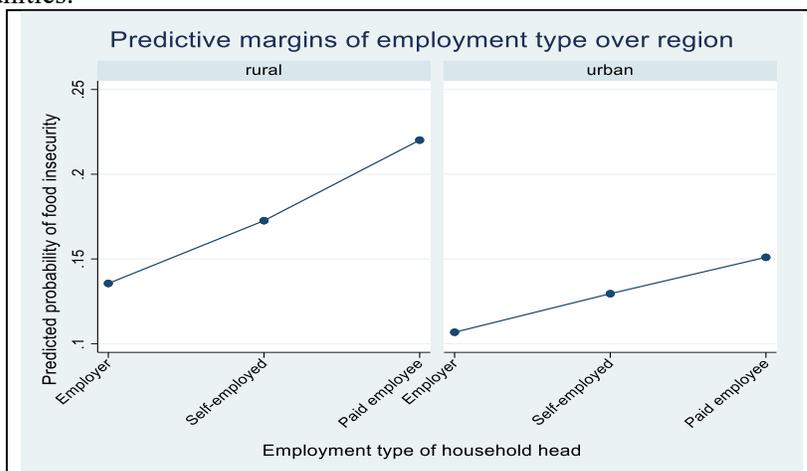
The table also highlights an urban advantage within each employment category. Moving from rural to urban areas, the predicted probability of food insecurity falls by about 2.9 percentage points for employers (from 13.6 to 10.7 percent), 4.3 percentage points for the self-employed (from 17.3 to 13.0 percent), and 6.9 percentage points for paid employees (from 22.0 to 15.1 percent). This suggests that wage-employed households gain the most from

urban residence, although they remain the most vulnerable group overall. Taken together, these results reinforce two key conclusions: non-agricultural employers are the most food secure, followed by self-employed workers, and paid employees face the greatest risk; and across all employment types, urban location further reduces the likelihood of household food insecurity.

**Table 8: Probabilities of household food insecurity by employment type and urban-rural residence**

Employment Category	Region	Predicted Probability	Std. Err.	t-stat	p-value	95% Confidence Interval
Employer	Rural	0.136	0.0105	12.91	0.000	0.115 – 0.156
Employer	Urban	0.107	0.0093	11.52	0.000	0.089 – 0.125
Self-employed	Rural	0.173	0.0028	61.25	0.000	0.167 – 0.178
Self-employed	Urban	0.130	0.0033	39.66	0.000	0.123 – 0.136
Paid employee	Rural	0.220	0.0019	114.15	0.000	0.216 – 0.224
Paid employee	Urban	0.151	0.0026	58.88	0.000	0.146 – 0.156

Figure 3 presents the predicted probabilities of household food insecurity by employment type, separately for rural and urban areas. The figure shows a clear and consistent ranking across both regions. Employers have the lowest probability of food insecurity, followed by self-employed households, while paid employees face the highest risk. This gradient suggests that greater control over economic activity and earnings, as seen among employers and self-employed workers, is associated with better household food security compared with wage-dependent employment. The rural panel shows higher overall levels of food insecurity. Among rural households, the probability rises from about 14 percent for employers to around 17 percent for the self-employed, and reaches about 22 percent for paid employees. The same pattern is seen in the urban panel at lower levels: about 11 percent for employers, 13 percent for the self-employed, and 15 percent for paid employees. This shows that urban residence enhances food security across all groups of employment, which is likely to be linked to improved access to markets, services, and income opportunities.



**Figure 3. Probabilities of household food insecurity by employment type and urban-rural residence**

Taken together, Figure 3 is confirming two important insights. First, employment choice within the non-agricultural sector is important: employers are the most protected, followed by self-employed while the wage-employed are the most vulnerable group. Second, urban households are consistently better off than rural households, even though differences in vulnerability across employment categories remain in both settings. These findings highlight the importance of both the structure of employment and the place of residence on household food security outcomes.

## CONCLUSION

This study examined how non-agricultural employment structure shapes household food insecurity in Pakistan using nationally representative PSLM 2019–20 data. The results provide clear evidence that employment choice matters for household welfare. Employers and self-employed workers experience significantly lower probabilities of food insecurity compared with wage-employed households, with employers being the most secure group. These

findings suggest that greater control over income generation, business autonomy, and the potential to diversify earnings play an important role in reducing vulnerability to food insecurity.

The analysis also shows meaningful spatial differences. Urban households are generally less food insecure than rural households, reflecting better access to economic opportunities, markets, and services. However, the employment advantage is relatively stronger in rural areas, indicating that enterprise ownership and self-employment provide important resilience where wage opportunities are often limited, informal, or unstable. Provincial heterogeneity further reveals that the strength of employment-based protection varies across regions, shaped by local economic structures and opportunities.

Overall, the study highlights that strengthening non-agricultural employment quality and promoting sustainable enterprise development can contribute to improving food security. Policies that support small businesses, reduce barriers to entrepreneurship, and enhance income stability for the self-employed may help reduce vulnerability. At the same time, improving job security and earnings for wage workers, particularly in rural and informal sectors, remains essential.

Finally, although the study provides robust evidence, it is based on cross-sectional data and focuses on employment status at one point in time. Future research could explore the dynamics of employment transitions, job quality, and longitudinal effects on food security. There is also scope to examine gendered employment structures, informality, and the role of social protection alongside labour market outcomes. Despite these limitations, the study offers important empirical insights and reinforces the role of employment structure as a key determinant of household food security in Pakistan.

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