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FINANCIAL TRANSFERS AND FOOD SECURITY: THE PROTECTIVE ROLE OF EXTERNAL REMITTANCES IN PAKISTAN

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Abstract

This study examines whether external remittances help reduce household food insecurity in Pakistan and how this effect varies across regions, remittance levels, and rural–urban settings. Using nationally representative PSLM 2019-20 data and a set of linear probability models, the results show that higher monthly international remittance inflows significantly lower the probability of household food insecurity. The effect is robust across alternative specifications and remains meaningful after controlling for demographic, regional, and labour market factors. The findings also reveal important heterogeneity. Remittances are more effective at moderate and higher transfer levels, indicating diminishing marginal benefits, and their protective strength varies across provinces. Rural households face higher baseline risk, but both rural and urban households benefit similarly from rising remittances. Overall, the evidence suggests that international remittances act as an important financial buffer, supporting household consumption stability and food security in Pakistan, particularly when transfers are substantial and sustained.
Keywords: External Remittances, Household Food Insecurity, Pakistan, Regional Heterogeneity, Rural–Urban Differences

1. Introduction

Food insecurity continues to pose a serious concern in Pakistan, even as the country strives to improve living standards and strengthen its development efforts. According to the World Food Programme (2024), the nutrition and hunger situation in Pakistan remains serious, with the country ranked 109 out of 127 nations on the 2024 Global Hunger Index. Approximately 20.7 percent of the population is undernourished, and around 40 percent of children under five years of age are stunted, reflecting prolonged nutritional deprivation and

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its implications for child growth and development. In addition, nearly half of a typical household's monthly expenditure goes toward food, while 82 percent of the population cannot afford a healthy diet, underscoring the deep challenges many households face in meeting basic dietary needs. These conditions highlight the fragile nature of food security in Pakistan and the continued need for effective financial support and social protection mechanisms.

Rising food insecurity in Pakistan has pushed many households to seek alternative livelihood strategies, including external migration. When local income opportunities are limited and basic food needs are difficult to meet, families often send members abroad in search of more stable earnings (Alam et al., 2025). Migration, in turn, generates remittances that play a crucial protective role. These transfers support national foreign exchange reserves while directly strengthening household consumption capacity. Importantly, remittance inflows have increased significantly, rising from about USD 10 billion in 2010 to nearly USD 35 billion in 2024 (World Bank, 2025). This sharp growth highlights remittances as a vital financial lifeline that can help reduce household vulnerability to food insecurity.

While these rising financial inflows suggest that remittances may help households manage food needs, their actual effectiveness depends on how households receive and use them, as well as the broader economic and social conditions in which they operate. The literature provides useful insights into whether these transfers consistently translate into better food security outcomes or whether their impact varies across contexts. Existing evidence shows that external remittances can play an important role in shaping household food security, although their effects are not always uniform. Armah et al. (2025) find that money remittances are associated with slightly lower food insecurity, particularly after COVID-19, while food remittances are linked with higher insecurity. Their study shows that cash inflows support food access but are often insufficient under severe shocks, as many migrant households still face moderate to severe food insecurity (Armah et al., 2025).

Pakistan-focused studies offer relevant insights. Awan et al. (2015) show that international migration and remittances significantly improve household welfare by increasing expenditure on food, health, education, and assets. This suggests that remittances enhance purchasing power and may ease food constraints (Awan et al., 2015). Evidence on coping behaviour further strengthens this argument. Anwar, Shair and Hussain (2024) reveal that households relying on coping strategies such as reducing food or selling

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assets tend to be more food insecure. More stable financial support is therefore more protective than distress-based strategies (Anwar et al., 2024). Consistent with this, Shair et al. (2024) show that participation in safety-net programmes significantly reduces the likelihood of food insecurity, particularly among poorer households.

Heterogeneity in Pakistan is also important. Shair et al. (2024) report strong disparities across income groups, education levels, household size, and migrant status, with poorer and migrant households facing higher risks while wealthier households are more secure. They also highlight remittances as a relevant income source in some regions (Shair et al., 2024). International evidence supports these dynamics. Moniruzzaman (2025) finds that remittance-receiving households in Bangladesh have better food security outcomes, while Smith and Floro (2021) show that international remittances reduce food insecurity across low- and middle-income countries.

Studies from Africa emphasise conditional effects. Remittances improve food security, particularly where vulnerability is high (Sulemana, Anarfo & Doabil, 2022), and are especially effective when households face multiple shocks (Zingwe et al., 2023). For Pakistan, macro-level evidence shows that foreign remittances reduce rural poverty in the short run, implying better ability to meet basic needs (Liu et al., 2020). Overall, the literature suggests that remittances generally support household welfare and can reduce food insecurity, particularly in vulnerable and shock-prone contexts. However, their effectiveness may depend on household characteristics and broader economic conditions.

This study is important because Pakistan continues to face persistent food insecurity while relying heavily on external remittances as a key household support mechanism. Understanding whether remittances actually help families manage food needs is therefore both timely and policy-relevant. The first objective is to examine whether external remittances reduce the likelihood of food insecurity among remittance-receiving households, focusing on the effect of monthly remittance inflows. The second objective is to assess regional heterogeneity by exploring differences across provinces and between rural and urban settings, recognising that the benefits of remittances may not be uniform across geographic and socio-economic contexts. The third objective considers a set of additional analytical dimensions, including the linear and non-linear effects of remittances, the role of remittance quartiles, and differential effects across urban and rural households. The significance lies in providing evidence on whether remittances serve as a meaningful

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financial buffer, helping policymakers and development actors better recognise their potential role in supporting household welfare and food security in Pakistan.

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2. Data and Methodology

2.1. Data Source and Sample

This study is based on nationally representative data from the Pakistan Social and Living Standards Measurement (PSLM) Survey 2019-20. The PSLM is a reliable source for analysing household welfare as it provides information in detail about living conditions, income source, demographic characteristics and consumption patterns across the country. From this survey, a total of 9002 households were included in the final analytical sample. The sample is representative of rural and urban populations and includes all the major provinces to enable meaningful comparison between different rural and urban regions with different socio-economic conditions.

The important variables utilized in the analysis such as household food insecurity, external remittances, demographic characteristics, and labour market status are defined in Table 1, which also reports their descriptive statistics. This helps ensure clarity about the way each variable is measured and used in the empirical analysis.

Table 1: ***Definition of Variables***

Variable	Definition
Food insecurity status	Binary indicator of household food security, where 1 = household is food insecure and 0 = household is food secure.
Remittance amount (PKR)	Total monthly external remittances received by the household in Pakistani Rupees.
Log remittances	Natural logarithm of remittance amount, used to address skewness and enable proportional interpretation.
Remittance quartiles (Q1–Q4)	Categorical variables dividing remittance-receiving households into four groups based on remittance level, from lowest (Q1) to highest (Q4).
Province dummies (KP, Punjab, Sindh, Balochistan)	Regional identifiers coded as binary indicators representing the household's province of residence.
Region (Rural/Urban)	Binary classification indicating whether a household resides in a rural or urban area.
Household size	Total number of members living in the household.
Age of household head	Age in completed years of the household head.

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Male head / Female head	Binary indicators identifying the gender of the household head.
Marital status (Never married / Formerly married / Currently married)	Categorical variables representing the marital status of the household head.
Employed	Binary indicator showing whether the household head is currently employed.
Unemployed	Binary indicator showing whether the household head is not working but actively seeking employment.
Not in labour force	Binary indicator showing household heads who are neither employed nor seeking work (e.g., elderly, homemakers, disabled).

2.2. Econometric Model

The dependent variable in this study is household food insecurity, which is measured as a binary variable. A household is considered to be food insecure if it has difficulty in accessing adequate/ sufficient food as reported. Given this two-state definition of variable, the analysis uses a Linear Probability Model (LPM), which permits the interpretation of the coefficients as changes in the probability of being food insecure. The key explanatory variable is the log of the monthly external remittances (PKR) received by the household, which helps overcome the skewness in remittance values and enables proportional interpretation of the values.

The first objective is to analyze whether the presence of external remittance inflows makes food insecurity less likely of remittance-receiving households. The baseline model is given by:

$$FI_i = \alpha + \beta \ln(Remittance_i) + \gamma X_i + \mu_r + \epsilon_i \quad (1)$$

where FI_i denotes food insecurity status, $\ln(Remittance_i)$ is the natural logarithm of monthly external remittances, X_i represents household characteristics, μ_r captures regional effects, and ϵ_i is the error term. To explore whether the impact of remittances varies across contexts, separate models are estimated for each province and for urban and rural sub-samples. For provinces:

$$FI_{ip} = \alpha_p + \beta_p \ln\left(Remittance_{ip}\right) + \gamma_p X_{ip} + \epsilon_{ip} \quad (2)$$

For urban–rural comparison:

$$FI_{iu} = \alpha_u + \beta_u \ln(Remittance_{iu}) + \gamma_u X_{iu} + \epsilon_{iu} \quad (3)$$

where p denotes province and $u$represents urban or rural households.

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The third objective addresses the question of understanding whether the impact of external remittances on household food insecurity is same for all households or if it varies according to the level and context of the financial inflows. The first specification measures possible non-linear effects of remittances by introducing both the log of remittance inflows and its square. If the squared coefficient is statistically significant, then that means that the impact of remittances does not rise at a constant rate. A negative squared term would imply diminishing marginal benefits, meaning that the impact of the initial increase of the amount of money sent is a stronger protective effect which gradually lessens at higher levels. On the contrary, a positively squared term would suggest rising marginal benefits, where bigger remittance inflows would produce bigger drops in food insecurity.

$$FI_i = \alpha + \beta_1 \ln(Remittance_i) + \beta_2 [\ln(Remittance_i)]^2 + \gamma X_i + \epsilon_i \quad (4)$$

A significant squared term captures increasing or diminishing returns.

The second specification evaluates the distributional effects by replacing the continuous remittance variable by quartile indicators. Using the lowest quartile as the reference category makes it possible to compare across households which receive different amounts of remittances. Negative and statistically significant coefficients on higher quartiles would suggest that households who receive higher amounts of remittances have a lower probability of being food insecure, compared to groups who receive the lowest amounts of remittances. This helps to show whether the benefits are concentrated among households with higher inflows or whether smaller transfers are already adequate to bring about meaningful improvements.

$$FI_i = \alpha + \delta_1 Q2_i + \delta_2 Q3_i + \delta_3 Q4_i + \gamma X_i + \epsilon_i \quad (5)$$

with Q1 as the reference category.

The last one is the final specification of urban-rural differences in the slope of impact with an interaction term between remittances and an urban dummy. The coefficient on the interaction term measures whether the marginal effect of remittances is different for urban and rural households. Coefficient being positive and significant would mean that remittances are less effective in urban areas compared to rural areas, whereas a negative and significant coefficient would mean that they play a more protective role in the urban context. If the interaction term is not significant, this means that remittances mitigate food insecurity by the same amount in both places.

$$FI_i = \alpha + \beta \ln(Remittance_i) + \theta Urban_i + \lambda[\ln(Remittance_i) \times Urban_i] + \gamma X_i + \epsilon_i \quad (6)$$

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The interaction term λ captures whether remittances have a different marginal effect in urban and rural settings.

3. Descriptive Analysis

3.1. Descriptive Statistics

The descriptive statistics in Table 1 give an overview of the 9,002 remittance receiving households and set the context for the empirical analysis. The food insecurity indicators indicate that approximately 93.6 per cent of the households are considered food secure and 6.4 per cent are food insecure. Although the proportion of food insecure households is relatively small, it still comprises a meaningful proportion of the sample, which may indicate that food insecurity is a concern even among households with external remittance income.

External remittances are highly varied among households. The average monthly inflow of remittances is about PKR 28,623, and there is a high standard deviation that shows considerable inequality in the size of transfers. The minimum amount of remittance reported is PKR 833 and the maximum is PKR 1,250,000, which implies the existence of very small and very large flow of remittance. The mean and standard deviation of the log remittance variable are 9.82 and 1.06, respectively, which confirms the skewedness of the data and the suitability of log transformation in the regression analysis. The remittance quartiles are fairly evenly distributed, with 25.0 percent of households falling in the lowest quartile, 30.5 percent in the second quartile, 20.1 percent in the third and 24.5 percent in the highest quartile. Such distribution helps the study to compare the outcomes of different degrees of remittance intensity.

The provincial distribution shows that the majority of the households in the sample belong to Khyber Pakhtunkhwa (44.8 percent) and Punjab (52.1 percent) whereas only a small portion belong from Sindh (2.4 percent) and Balochistan (0.7 percent). This is reflected in the nature of regional balance of external remittance receipt that is available in the data base, and what is reflected is that the results are mainly being driven by the households of Khyber Pakhtunkhwa and Punjab. In terms of type of settlement, 78.8 percent of households reside in rural areas and 21.2 percent in urban areas, indicating that there is a strong rural concentration.

Household and demographic characteristics are used to further describe the socio-economic profile of the sample. Average household size is around six persons, but there is a large range of 1 to 42, indicating the presence of small and very large families. The average age of the household

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head is 48.9 years of age with a great variance across the life cycle. Around 58.8 percent of households are headed by men and 41.2 percent by women. Most household heads are currently married (86.9 percent), while 10.2 percent are formerly married and 2.9 percent have never married.

Labour market status suggests that a relatively small share of household heads are employed (38.5 percent), while 2.3 percent are unemployed and a large proportion, 59.2 percent, are not in the labour force. This pattern points to limited direct labour income for many households and underlines the potential importance of external remittances as a complementary or primary source of livelihood and support for food security.

Table 1: ***Descriptive Statistics (N = 9,002 households)***

Variable	Mean	Std. Dev.	Min	Max
Food insecurity status				
Food secure (0)	0.936	0.245	0	1
Food insecure (1)	0.064	0.245	0	1
External remittances (PKR)				
Remittance amount	28,623.0	35,662.2	833	1,250,000
Log remittances	9.817	1.063	6.73	14.04
Remittance quartiles				
Lowest quartile (Q1)	0.250	0.433	0	1
Second quartile (Q2)	0.305	0.460	0	1
Third quartile (Q3)	0.201	0.400	0	1
Highest quartile (Q4)	0.245	0.430	0	1
Province				
Khyber Pakhtunkhwa	0.448	0.497	0	1
Punjab	0.521	0.500	0	1
Sindh	0.024	0.153	0	1
Balochistan	0.007	0.083	0	1
Region				
Rural	0.788	0.409	0	1
Urban	0.212	0.409	0	1
Household & demographic characteristics				
Household size	6.033	3.551	1	42
Age of household head	48.90	15.23	15	99
Male head	0.588	0.492	0	1
Female head	0.412	0.492	0	1

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Marital status of head				
Never married	0.029	0.168	0	1
Formerly married	0.102	0.303	0	1
Currently married	0.869	0.338	0	1
Labour market status				
Employed	0.385	0.487	0	1
Unemployed	0.023	0.150	0	1
Not in labour force	0.592	0.491	0	1

3.2. Cross-Tabulation

Table 2 shows a clear and systematic relationship between the level of external remittances and household food insecurity. In the lowest remittance quartile, almost one in ten households (9.51 percent) are food insecure. As we move up the remittance distribution, the share of food insecure households steadily declines. In the second quartile, food insecurity falls to 8.68 percent, and it drops further to 3.71 percent in the third quartile. In the highest quartile only 2.54 per cent of households are food insecure with more than 97 per cent being food secure. Overall, 6.39 percent of all households in the sample that receive remittances experience food insecurity, but this aggregate conceals large variation across quartiles.

These patterns indicate that positive remittance inflows are associated with improved food security outcomes. Households with larger amounts of external transfers tend to have adequate food access, but households in the lowest quartile continue to be more vulnerable. The Pearson chi-square statistic ($\chi^2 = 136.75$, $p < 0.001$) confirms that the differences in food insecurity between remittance quartiles are statistically significant rather than as a result of random variation. Taken together, the cross-tabulation shows that external remittances seem to play a protective role and that this protection seems to be more pronounced the higher the amount of remittances. This descriptive evidence is consistent with the study's key hypothesis that the inflow of remittances contributes to decreasing the probability of household food insecurity.

Table 2. ***Food Insecurity Across External Remittance Quartiles (N = 9,002)***

Remittance Quartile	Food Secure	Food Insecure	Total
Lowest quartile	2,037 (90.49%)	214 (9.51%)	2,251
Second quartile	2,505 (91.32%)	238 (8.68%)	2,743
Third quartile	1,739 (96.29%)	67 (3.71%)	1,806
Highest quartile	2,146 (97.46%)	56 (2.54%)	2,202

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Total	8,427 (93.61%)	575 (6.39%)	9,002
Pearson Chi-square (3) = 136.75, p < 0.001			

4. Results and discussion

4.1. External Remittance Inflows on Household Food Insecurity

The results in Table 4 are presented under seven model specifications to give careful and progressive assessment of the relationship between external remittances and household food insecurity. Running more than one model is critical as it makes it possible to determine if the impact of remittances is stable when other controls are added into the analysis. Model 1 starts with a simple specification with only remittances, but as models are incrementally developed, provincial dummies, urban-rural, household demographics such as household size, age, gender and marital status of household head, and finally labour market characteristics are introduced. This stepwise approach helps to evaluate robustness: if the coefficient of interest is consistently the same in terms of sign, magnitude and significance across models, this suggests that the effect of remittances is not being driven by omitted variables or specific model assumptions, which increases confidence in the findings.

In all the seven models, the log of monthly external remittances is found to have a consistently negative and highly significant association with household food insecurity. The coefficient is between -0.021 and -0.022 and is statistically significant at the 1 percent level in all the specifications. In the context of the Linear Probability Model, this means that a one-unit increase in the logarithm of monthly remittances (roughly a proportional increase in the inflows of remittances) is associated with a weighted reduction of about 2.1 to 2.2 percentage points of the probability of a household being food insecure. The stability of this effect, despite controlling for province, settlement type, household composition, demographic characteristics and labour market status, implies that remittances serve a meaningful protective role. In simple terms, if external remittance inflows are higher this is systematically associated with a lower probability of food insecurity, thus strengthening the argument that remittances are an important financial buffer supporting household consumption and access to food.

In remittance-receiving households in Pakistan, higher international remittance inflows can play a meaningful protective role against food insecurity. Remittances serve as an additional and often stable source of income that helps households overcome local labour market limitations, price shocks, and income volatility. When families receive higher financial transfers from abroad, their purchasing power improves, allowing them to secure

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sufficient and better-quality food. These inflows also help smooth consumption, particularly during periods of economic stress, rising inflation, or seasonal income uncertainty. As a result, households are better able to maintain regular food access without relying on erosive strategies such as reducing meal quantity, compromising on diet quality, or selling productive assets.

Moreover, higher remittances may strengthen broader household welfare conditions that indirectly support food security. Improved income allows households to meet essential expenditures beyond food, including health, education, housing, and utilities, which together contribute to a more stable living environment. In rural areas, remittances can substitute for constrained agricultural earnings and compensate for environmental and climate-related shocks. In urban areas, they can help offset higher living costs. Overall, the evidence suggests that within remittance-receiving households, larger and more consistent external transfers reduce financial stress and vulnerability, which translates into a lower likelihood of experiencing food insecurity in Pakistan.

The additional covariates listed in Table 4 also give us interesting information about the factors that influence the probability of being food insecure and the role of regional location, household characteristics, and demographic factors in combination with remittance inflows. The provincial controls show clearly geographical differences. Compared with the reference category (Khyber Pakhtunkhwa), households in Punjab have a significantly low probability of being food insecure for all specifications. The magnitude is found to be in the range of about 1.4 to 2.3 percentage points and the effect is quite significant thus pointing towards relatively better food security conditions in Punjab. By contrast, Sindh is not statistically different from Khyber Pakhtunkhwa in any specification, and could be considered to show no meaningful difference from Khyber Pakhtunkhwa once other factors are controlled. Balochistan is an exception to this, in the opposite direction: households in this province are consistently and significantly more likely to be food insecure (coefficients of the order of 0.10). This means about a 10 percentage point increase in the probability of food insecurity compared to Khyber Pakhtunkhwa, which shows the vulnerability of the province in terms of structure.

Also, settlement status makes a difference. The coefficient on Urban is negative and statistically significant in all of the models that include it. This means that urban households have a 1.8 to 1.9 percentage point lower chance

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of having food insecurity compared to rural households due to a better access to markets, income opportunities and services in urban areas. Household structure displays what is anticipated.

Household size is positively and significantly related to food insecurity, that is, larger households have more pressure on the resources and are more likely to be food insecure. The effect is small in magnitude and consistent across models.

Demographic characteristics of the household head show more complex effects. Age is marginally negatively associated with food insecurity in the fuller models, indicating that slightly older household heads may be benefiting from higher levels of experience, networks or income stability. The gender of the head shows some advantages to female-headed households by showing the negative coefficient indicates lower probability of food insecurity, although this effect is reduced when other controls are added.

Regarding marital status, households with formerly married heads are more likely to be food insecure, possibly the result of loss of partner income or social support, while currently married heads do not differ significantly from the base category. Labour market status does not seem to have significant independent effects; neither unemployment nor non-participation is statistically significant when other variables and remittances are held constant.

Overall, these results indicate that food insecurity in remittance-receiving households is determined not only by financial transfers, but also by household location and who heads the household. Provincial disparities, rural disadvantage, the pressure of household size and some demographic vulnerabilities remain despite the input of remittances.

Table 4. ***Estimates of LPM on the impact of remittances on food insecurity***

VARIABLES	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Ln(Remittances)	-0.022***	-0.021***	-0.021***	-0.022***	-0.022***	-0.021***	-0.021***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Punjab		-0.023***	-0.020***	-0.015***	-0.014**	-0.015***	-0.015***
		(0.005)	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)
Sindh		-0.007	0.006	0.012	0.013	0.011	0.011
		(0.017)	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)
Balochistan		0.093***	0.099***	0.102***	0.103***	0.100***	0.100***
		(0.031)	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)

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Urban			-0.019***	-0.019***	-0.019***	-0.018***	-0.018***
			(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Household size				0.002***	0.002***	0.002**	0.002**
				(0.001)	(0.001)	(0.001)	(0.001)
Age					-0.000	-0.000**	-0.000*
					(0.000)	(0.000)	(0.000)
Female						-0.012*	-0.007
						(0.007)	(0.008)
Formerly married						0.036*	0.035*
						(0.020)	(0.020)
Currently married						0.027	0.026
						(0.017)	(0.017)
Unemployed							0.004
							(0.018)
Not participate							-0.007
							(0.006)
Constant	0.279***	0.281***	0.284***	0.274***	0.281***	0.270***	0.270***
	(0.024)	(0.024)	(0.024)	(0.024)	(0.025)	(0.029)	(0.029)
Observations	9,002	9,002	9,002	9,002	9,002	9,002	9,002
R-squared	0.009	0.013	0.014	0.014	0.014	0.015	0.015

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

4.2 Regional Heterogeneity

The results in Table 5 indicate that the protective effect of the external remittances on food insecurity is observed in all regions but varies in strength by province and type of settlement. On the full sample, a higher log of monthly remittances is, thus, associated with a significantly lower probability of food insecurity, with a coefficient of -0.021. This means that higher remittance inflows mean that a remittance receiving household is less likely to be food insecure, even after controlling for household characteristics and labour market status.

This effect is still strong and significant for both Khyber Pakhtunkhwa (-0.026) and Punjab (-0.015) which means that remittances clearly have a protective role in these two provinces. In Sindh, the coefficient is also negative (-0.020), but weakly significant, meaning that the relationship is similar but

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less precise, which is probably because there are only few observations. In Balochistan the coefficient on remittances is negative but not significant which may reflect the low sample size (63 households) and higher underlying structural vulnerability that remittances cannot offset.

The rural-urban divide provides additional information. The effects of remittances are very similar in rural and urban Pakistan: the coefficient on log remittances is -0.020 in both subsamples, and highly significant. This implies that, conditional on receiving remittances, an increase in external inflows reduces the probability of food insecurity in both settings by about two percentage points.

However, the regional dummies show important differences in the overall risk environment. In the full sample, households in Punjab are significantly less likely to be food insecure than those in Khyber Pakhtunkhwa, while those in Balochistan are more likely to be food insecure. In the rural model, Sindh and Balochistan show particularly high food insecurity relative to Khyber Pakhtunkhwa, whereas in the urban model, Sindh has a lower probability and Balochistan does not differ significantly.

These patterns suggest that remittances help reduce food insecurity across regions, but they operate on top of very different baseline conditions. Provinces with higher structural disadvantage, especially rural Sindh and rural Balochistan, remain more vulnerable overall, even when controlling for remittance inflows.

Table 5. ***Remittances Impact On Food Insecurity Across Regional Heterogeneity***

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	**Full sample**	**KPK**	**Punjab**	**Sindh**	**Balochistan**	**Rural Urban**	**Urban**
Ln(Remittances)	-0.021***	-0.026***	-0.015***	-0.020*	-0.011	-0.020***	-0.020***
	(0.002)	(0.004)	(0.003)	(0.012)	(0.038)	(0.003)	(0.004)
Punjab	-0.015***					-0.021***	-0.000
	(0.006)					(0.006)	(0.013)
Sindh	0.011					0.179***	-0.035*
	(0.018)					(0.036)	(0.021)
Balochistan	0.100***					0.179***	-0.013
	(0.031)					(0.041)	(0.044)
Urban	-0.018***	-0.027*	-0.001	-0.246**	-0.331**		
	(0.007)	(0.014)	(0.007)	(0.046)	(0.125)		
Household size	0.002**	-0.000	0.005***	-0.007	0.001	0.002*	0.001

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	(0.001)	(0.001)	(0.001)	(0.009)	(0.016)	(0.001)	(0.002)
Age	-0.000*	0.000	-0.001**	-0.002	0.004	-0.000	-0.001**
	(0.000)	(0.000)	(0.000)	(0.001)	(0.004)	(0.000)	(0.000)
Female	-0.007	-0.012	-0.003	-0.043	-0.167	-0.008	-0.013
	(0.008)	(0.013)	(0.010)	(0.046)	(0.179)	(0.009)	(0.014)
Formerly married	0.035*	0.006	0.044*	0.292*	-0.019	0.015	0.094***
	(0.020)	(0.034)	(0.025)	(0.152)	(0.284)	(0.024)	(0.033)
Currently married	0.026	0.023	0.025	0.206	-0.157	0.022	0.039
	(0.017)	(0.027)	(0.022)	(0.141)	(0.229)	(0.021)	(0.027)
Unemployed	0.004	0.001	-0.000	-0.049	0.512**	0.003	0.006
	(0.018)	(0.026)	(0.025)	(0.092)	(0.239)	(0.022)	(0.028)
Not participate	-0.007	-0.001	-0.011	0.002	0.022	-0.001	-0.021*
	(0.006)	(0.011)	(0.008)	(0.042)	(0.153)	(0.008)	(0.012)
Constant	0.270***	0.314***	0.190***	0.388**	0.315	0.248***	0.266***
	(0.029)	(0.048)	(0.036)	(0.185)	(0.403)	(0.035)	(0.050)
Observations	9,002	4,031	4,692	216	63	7,093	1,909
R-squared	0.015	0.012	0.011	0.219	0.218	0.019	0.027

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

Figure 1 visually summarises how external remittances affect household food insecurity across different regional and settlement contexts in Pakistan. The baseline estimate shows a clearly negative coefficient, indicating that higher external remittance inflows are associated with a lower probability of food insecurity. This supports the main result that remittances have a protective role by building the ability of households to maintain consumption and ensuring the family can obtain adequate food.

When the effect is considered regionally, the pattern is broadly similar, but with some variation in magnitude and statistical precision. The estimate for Khyber Pakhtunkhwa and Punjab both appear negative and precise with narrow confidence intervals. This would suggest that remittances are consistently linked to improved food security in these provinces. The effect for Sindh is also negative but weaker, reflecting greater uncertainty, probably because of a smaller number of observations. In Balochistan, however, the coefficient remains negative but the confidence interval is much broader and crosses the value of zero. This suggests that despite the tendency of remittances to shift food in a positive direction, this is not statistically accurate in this region, potentially because of structural vulnerabilities and small sample size.

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The rural-urban comparison reveals that the estimated effect of remittances is negative and virtually the same in rural and urban settings suggesting that higher inflows of remittances lower food insecurity in rural as well as urban households. However, the confidence intervals also indicate that the effect is estimated with slightly greater precision in rural areas, where households might rely more on remittances because of fewer opportunities for local income.

Overall, Figure 1 confirms three important messages. First, remittances have a consistent effect on reducing the probability of food insecurity. Second, this effect is stronger in different provinces with clear benefits in Punjab and Khyber Pakhtunkhwa and less clear benefits in Sindh and Balochistan. Third, the protective impact of remittances is present in both rural and urban Pakistan, which highlights their relevance as a financial support mechanism of food security.

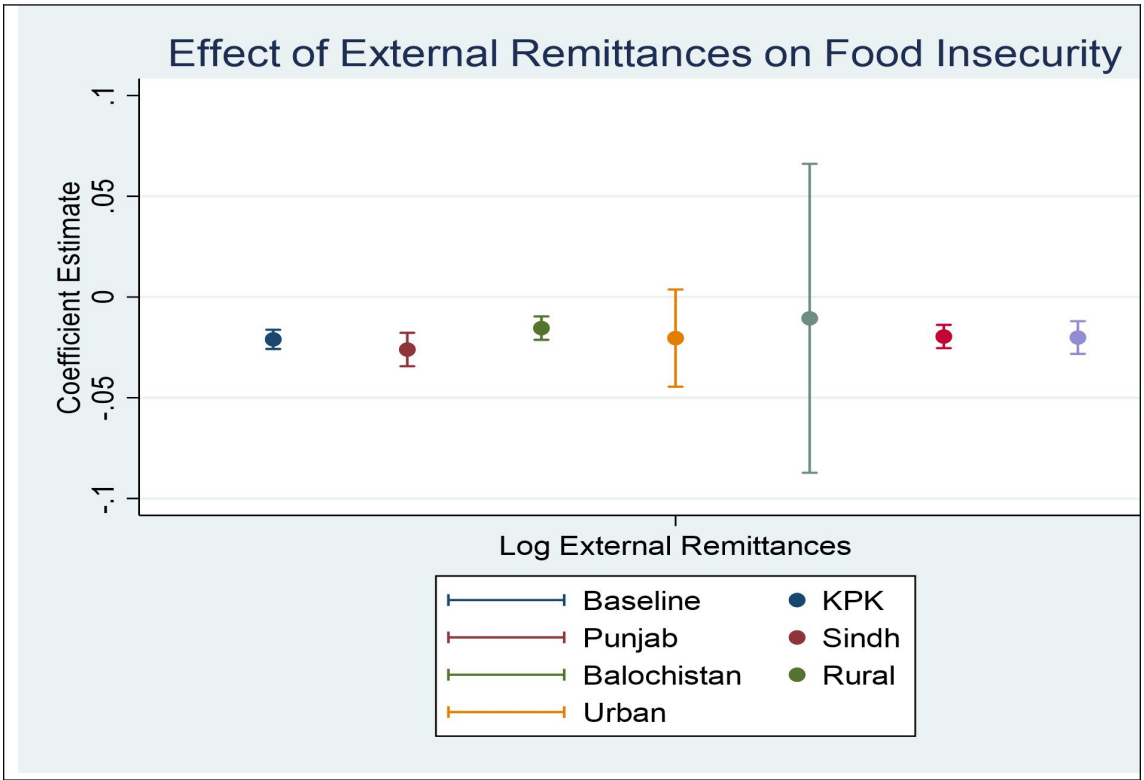

Figure 1. Remittances impact on food insecurity across regional heterogeneity

4.3 Non-linear and Distributional Effects of Remittances on Food Insecurity

Table 6 first reports the linear effect of external remittance in household food insecurity. In the linear specification (Column 1), the coefficient on the log of

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monthly remittances is -0.021 and it is highly significant. This shows that with higher remittance inflows, there is a lower likelihood of food insecurity. In the practical world, the effect of a proportional increase in external remittances is that the probability of a remittance-receiving household being food insecure decreases by about two percentage points.

The result is robust even after controlling for provincial location, type of settlement, household characteristics and demographic factors, adding to the notion that remittances provide a meaningful financial cushion to strengthen household consumption and food access. The quadratic specification of the outcome in Column 2 gives us a more detailed insight by testing whether this effect is constant or varies with the level of remittances. In this case, we find the coefficient of the log of remittances is positive (0.098) while the squared term is negative and significant (-0.006).

Taken as a whole these coefficients reflect a non-linear relationship with declining returns to. Remittances mitigate food insecurity at lower and moderate magnitudes of inflow, but the magnitude of this protective effect diminishes as remittance amounts continue to increase. This suggests that while more income from remittances does help households achieve food security, the biggest gains are at the bottom in the range of income distribution where households may be closer to subsistence constraints. At higher levels of income, remittances are likely to result in spending on broader welfare improvements rather than creating further dramatic reductions in food insecurity.

Overall, the evidence presents the remittances have a consistent protective effect on households from food insecurity, but the marginal benefits are stronger for households receiving smaller transfer amounts to moderate amounts.

Figure 2 compares the linear and non-linear effects of external remittances on household food insecurity and helps to understand how the risk changes as remittance inflows increase. The linear line has a steady decline, indicating that as the log of monthly remittances increases, so does the probability of food insecurity, but less and less. This corresponds with the results of regression analysis, which show that increasing external remittances increase the likelihood of not experiencing food insecurity.

The quadratic curve provides the nuance. At very low levels of remittance, the curve is slightly upward sloping, indicating that very low levels of remittances do not confer high levels of protection, and may be associated with continued vulnerability. However, the curve changes direction and falls

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as remittances rise. Using the estimated coefficients this turning point happens at about log 8.17, which is roughly PKR 3,500 per month. Beyond this level, the predicted probability of food insecurity starts to drop. Importantly, the average remittance value in the sample is log 9.82, which is equivalent to about PKR 18,000 - 20,000 a month. This is well beyond the threshold, which simply means that most remittance-receiving households are on the "declining" side of the curve where increases in remittances have a significant effect of reducing food insecurity in Pakistan. Overall, the figure confirms that once the remittances are of meaning, they are an effective financial shield and the greater the inflows, the lower is the probability of food insecurity of the household.

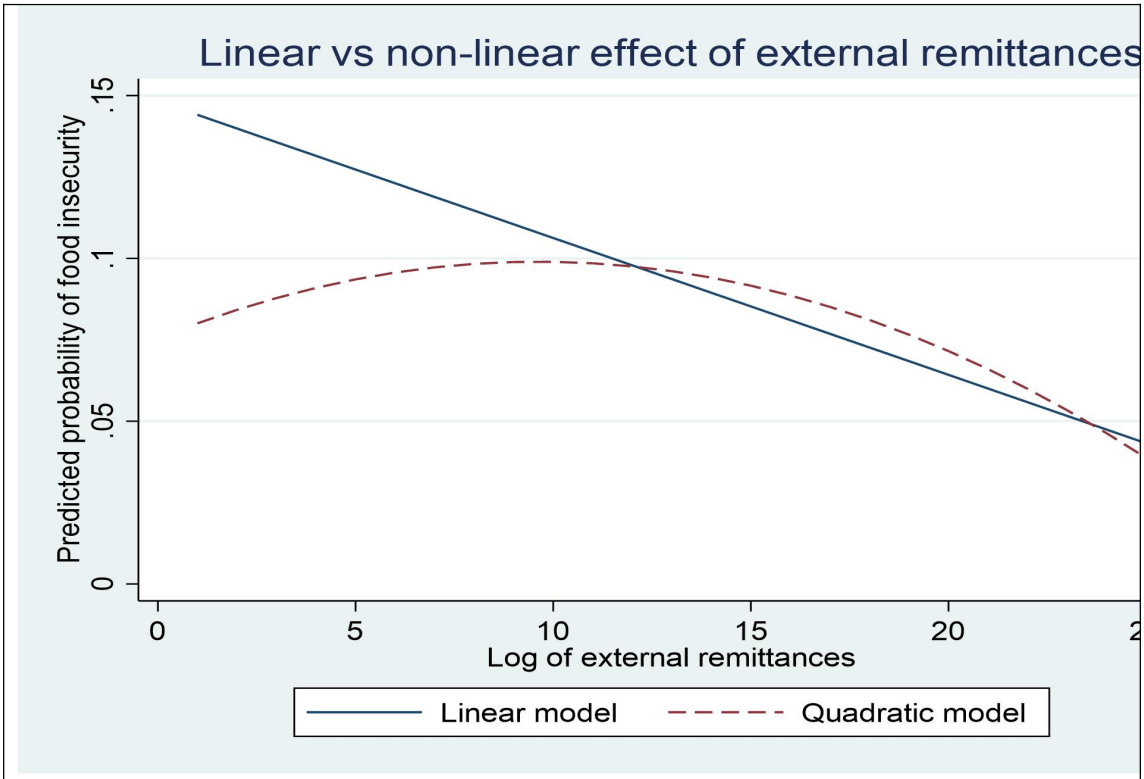

Figure 2. Comparison of linear and non-linear impact of remittances on food insecurity

Model 3 focuses on the aspect of remittances effects on food insecurity by investigating whether the effect on food insecurity is different among households that receive different levels of external transfers. Instead of considering remittances as a continuous measure, households are grouped into four quarters as the lowest quartile (Q1) is used as the reference group. This approach enables us to observe if large inflows of remittances offer a

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greater level of protection against food insecurity, and if there is a threshold above which the benefits of remittances are greater.

The results depict a clear gradient. Households in the second quartile (Q2) have a slightly lower probability of food insecurity than households in the lowest quartile, although the effect is not statistically significant. This implies that small or modest increases in remittance inflows may not be adequate to induce large increases in food security. However, the effect becomes very strong at higher levels. For the households of the third quartile (Q3), the likelihood of food insecurity is considerably less at a decrease of approximately 5.8 percentage points compared to the lowest remittance group. The effect is even larger for households in the top quartile (Q4) where the probability of food insecurity is decreased by approximately 6.7 percentage points. Both Q3 and Q4 effects are very significantly statistically significant.

These findings suggest that remittances start to play a much stronger protective role once households go beyond lower transfer levels. In other words, very small remittance flows do not significantly alter outcomes in terms of food security, while medium to high remittance inflows have a significant impact in reducing the chances of households experiencing food insecurity. This pattern is in line with the finding that meaningful and sustained external financial support enables families to ensure adequate food access, smooth consumption, and cope better with economic shocks.

Model 4 considers the potential difference in the impact of external remittances on food insecurity across rural and urban households by estimating separate slopes for rural and urban households. The results indicate that the coefficients on the interaction terms are negative and quite significant for both groups. For the rural households, the coefficient on log remittances is -0.021 and for the urban households, the coefficient is -0.020. This suggests that in rural areas as well as urban areas in Pakistan, a rise in monthly external remittances is correlated with a significant decrease in the likelihood of household food insecurity.

The similarity in magnitude between the two coefficients indicates that the slope of the relationship is nearly identical for all types of settlement. In practical terms, remittances have the effect of an important financial buffer, regardless of whether households are living in urban or rural areas. The estimates suggest that a proportional rise in remittance inflows reduces food insecurity by about two percentage points in both cases. This is a noteworthy finding, as it suggests that because households receive remittances, the benefits in terms of improved food security are broadly similar across

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geographical settings, despite the differences in underlying living conditions, income opportunities and vulnerabilities. Overall, Model 4 shows that the role of external remittances in protection is not location-specific but general and goes through the rural households as well as the urban households of Pakistan.

Table 6. ***Non-Linear And Distributional Effects Of External Remittances On Household Food Insecurity***

	(1)	(2)	(3)	(4)
VARIABLES	**Linear**	**Quadratic**	**Quartiles**	**Rural-Urban slope**
Ln(remittances)	-0.021***	0.098***		
	(0.002)	(0.033)		
Ln(remittances)-squared		-0.006***		
		(0.002)		
Rural*Ln(remittances)				-0.021***
				(0.003)
Urban*Ln(remittances)				-0.020***
				(0.005)
Lowest remittance quartile (base)				
Q2			-0.011	
			(0.007)	
Q3			-0.058***	
			(0.008)	
Q4			-0.067***	
			(0.007)	
Punjab	-0.015***	-0.014**	-0.012**	-0.015***
	(0.006)	(0.006)	(0.006)	(0.006)
Sindh	0.011	0.016	0.013	0.011
	(0.018)	(0.018)	(0.018)	(0.018)
Balochistan	0.100***	0.106***	0.104***	0.100***
	(0.031)	(0.031)	(0.031)	(0.031)
Urban	-0.018***	-0.017***	-0.018***	-0.025
	(0.007)	(0.007)	(0.007)	(0.055)
Female	-0.007	-0.008	-0.007	-0.007
	(0.008)	(0.008)	(0.008)	(0.008)
Age	-0.000*	-0.000*	-0.000*	-0.000*
	(0.000)	(0.000)	(0.000)	(0.000)

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Household size	0.002**	0.002**	0.002***	0.002**
	(0.001)	(0.001)	(0.001)	(0.001)
Formerly married	0.035*	0.035*	0.032	0.035*
	(0.020)	(0.020)	(0.020)	(0.020)
Currently married	0.026	0.027	0.024	0.026
	(0.017)	(0.017)	(0.017)	(0.017)
Unemployed	0.004	0.005	0.008	0.004
	(0.018)	(0.018)	(0.018)	(0.018)
Not participate	-0.007	-0.006	-0.004	-0.007
	(0.006)	(0.006)	(0.006)	(0.006)
Constant	0.270***	-0.284*	0.091***	0.272***
	(0.029)	(0.154)	(0.018)	(0.032)
Observations	9,002	9,002	9,002	9,002
R-squared	0.015	0.017	0.021	0.015

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

Figure 3 shows the response of predicted probability of food insecurity in a household to change in external remittances in rural and urban Pakistan. The downward trend for both lines is a clear and consistent pattern: the greater the log of monthly remittances, the less likely we would see food insecurity in both settings. This confirms the results of the regression analysis showing that remittances are a protective financial resource to maintain better access to food as inflows increase.

At lower remittance levels, the predicted probability of food insecurity is starting off as higher for rural households than for urban households, reflecting their more vulnerable baseline conditions. However, both are very close to parallel lines, which means that the rate of decline in food insecurity with an increase in remittances is very similar in rural and urban areas. In other words, despite their initial disadvantage, rural households benefit from remittances in much the same way as urban households. The confidence intervals also overlap substantially, to reinforce that the difference in slopes is not statistically large.

There are overall two things that emerge in Figure 3. First, remittances are effective regardless of where households are located with respect to reducing food insecurity. Second, although urban households experience less baseline risk, rural and urban households experience similar reductions in food insecurity as remittance inflows rise. This explains the wide-ranging and inclusive protective function of external remittances across Pakistan's many settlement contexts.

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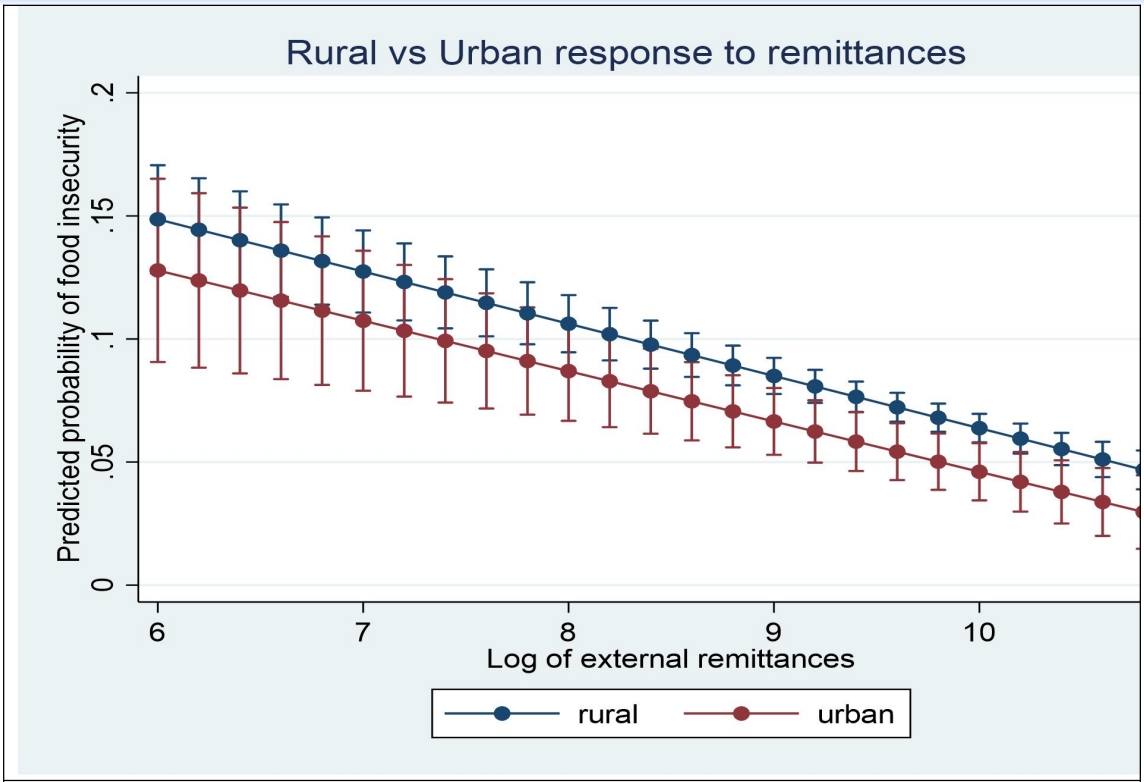

Figure 3. Differential impact of remittances across regional setting

5. Conclusion

Conclusion

This study examined whether external remittances help protect Pakistani households from food insecurity and whether this effect differs across regions, income levels of remittances, and rural–urban settings. Using nationally representative PSLM 2019–20 data and multiple econometric specifications, the results provide consistent evidence that higher international remittance inflows are associated with a lower probability of household food insecurity. The effect remains robust across a series of models, suggesting that remittances serve as an important financial buffer that helps households stabilise consumption, meet essential needs, and reduce vulnerability to shocks.

The analysis also shows that this protective effect is not uniform across all contexts. Remittances have a clear and significant impact in provinces such as Punjab and Khyber Pakhtunkhwa, while the effect is weaker and less precise in Sindh and Balochistan, reflecting structural and contextual disadvantages. The results further reveal that remittances exhibit diminishing marginal benefits: small remittances provide limited protection, but once

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households move into medium and higher remittance ranges, the likelihood of food insecurity declines substantially. Quartile results reinforce this, showing large reductions in food insecurity among households in the upper remittance groups. Importantly, the rural–urban analysis indicates that although rural households face higher baseline risk, the slope of improvement is very similar across both settings, meaning households in both areas benefit almost equally from rising remittances.

Overall, the findings highlight that international remittances play an important role in supporting household welfare and food security in Pakistan. However, their effectiveness is stronger when remittances are meaningful in size and when broader structural disadvantages are not overwhelming. Policymakers may therefore consider strategies that facilitate safe migration, reduce transaction costs, encourage formal remittance channels, and link remittance flows with complementary social protection and livelihood support, especially in vulnerable regions. Strengthening these channels can enhance the ability of remittances to serve not only as a coping mechanism but also as a sustainable pillar of household resilience and food security.

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