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EFFECTS OF REMITTANCES ON HOUSEHOLD FOOD INSECURITY IN PAKISTAN

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ABSTRACT

This study examines the effect of remittances on household food insecurity in Pakistan. The household food insecurity measures using the food insecurity experience scale survey module (FIES-SM), consisting of eight yes/no questions about people's access to adequate food. The study uses a sample of 24,809 households from the Pakistan Social and Living Standards Measurements (PSLM) (2018-19) for empirical results. The research applies the Ordered Logit model to estimate the impact of remittances and other covariates on food insecurity. The study's findings show that the proportion of food insecurity in the remittance-receiving household is less than in non-receiving households. The remittance-receiving household has less probability of severe, moderate, and mild food insecurity than non-receiving households. Moreover, the study's findings suggest that increased remittances lower the probability of severe, moderate, and mild food insecurity. The effect of remittances is more prominent in mild food-insecure households than in severe and moderate ones. The study makes some relevant recommendations based on the study's findings to combat food insecurity in Pakistan.

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INTRODUCTION

Food security is subject to people's access by all socio-economic means to nutritious and sufficient safe food required for a healthy and active life. This definition points out four pillars of food security (accessibility, availability, utilisation, sustainability), which are essential to achieving food security. One of the most basic needs shared by all human beings is access to adequate food. Yet despite considerable efforts over the past century to end hunger globally, it remains a tireless problem that nearly (795 million people) worldwide face food insecurity (Ballard et al., 2019). Food insecurity harms mental and physical health and causes malnutrition, diabetes, anxiety and depression

(Seligman et al., 2019). Food insecurity is considered economically essential, but it is impossible to find who and where food insecure are and what they are doing to survive. In adults, food insecurity has been linked to health problems, including low nutrient intakes, micronutrient deficiencies, obesity, diabetes, hypertension, and hyperlipidemia. Moreover, food-insecure mothers are far more likely to report adverse health outcomes compared to food-secure adults (Gundersen and Ziliak, 2015). According to facts of the Global Hunger Index (GHI), in 2022, Pakistan was at 88th among the 119 countries facing severe food insecurity. According to Food Security Information Network (FSIN) (2020), a report on food crises, figure

out that 96,000 people in Pakistan are disabled due to the presence of severe food insecurity. However, Pakistan is taking significant measures to prevent the population from food insecurity by making progress in food production. However, we can still not achieve minimal food insecurity due to high population, higher inflation, lower per capita income, climate change, and unfair food distribution methods. In measuring food insecurity for people worldwide, no one instrument captures all the aspects of food insecurity. Only combining multiple interventions will thoroughly explain the causes and effects of food insecurity. SDG 2 aims to achieve food security, end hunger and maintain nutrition status for all people in 2030 (Cafiero et al., 2018). The UN (FAO) launched a project known as the Voices of the Hungry project in 2013. The project aims to develop an experiential-based survey analysis method and support to ensure universal access to food through the Food Insecurity Experience Scale (FIES).

According to a national nutrition survey, 36% of households in Pakistan are food insecure. The higher prevalence of food insecurity is due to lower purchasing power. The lower purchasing power is a potential source of food insecurity, while lower purchasing power is associated with labour migration to combat food insecurity. The amount of remittances benefited both at the household and macro levels. The amount of remittances supports the economy and better the foreign exchange position of Pakistan. These remittances also increase economic growth at the macro level and poverty when utilised at the household level. However, the effect of remittances at the household level is a heated debate among the researchers, especially to include a food insecurity-related section in the nationally representative survey named PSLM-HIES 2018-2019 questionnaire. Including food insecurity-related information in a nationally representative survey is an opportunity to explore the effects of remittances on food insecurity. For this purpose, this study explores the effect of remittances on household food insecurity.

Labour migration is pulled by higher wages in external economies, increasing the standard of living in the migrant household (Shair and Majeed, 2020; Shair and Mumtaz, 2023). Although the effect of remittances on poverty has been examined, its effect on food insecurity is untapped. Therefore, this study estimates and compares food insecurity in remittance-recipient and non-recipient households. Moreover, this study aims to

quantify the effect of remittances on the food insecurity level in remittance-receiving households.

The scope of the study is related to Sustainable Development Goal (SDG) 2, which aims to end hunger and promote food access for everyone. The study's findings will help the government and policymakers design policy interventions to combat food insecurity and improve the livelihood of people experiencing poverty. Moreover, the study will extensively explain the importance of the opportunity of 'access to migration' of a family member to fight food insecurity at the household level, which is essential in contributing to economic transformation.

Literature Review

One of the aspects of food security that has been subjected to the most incredible amount of empirical research is the topic of food security's determinants and consequences. For instance, Eicher-Miller et al. (2009) found that lack of food security in the household causes the problem of iron in children. In households where there is a lack of consistent access to nutritious food, children aged 12 to 15 years old face an increased risk of anaemia and malnutrition, which is three percentage points higher. According to the study's findings, providing children with enough access to food and treating them fairly can lower the likelihood that they will have haemoglobin. Laraia and Kushel (2010) examined the implications of food insecurity and found that anaemia might be decreased by increasing one's consumption of food and nutrients. People tend to become overweight over time due to the repetitive nature of food insecurity. This might cause issues with overeating and a concentration of energy. As a direct consequence of this, chronic illnesses such as obesity and diabetes may emerge. Gundersen and Ziliak (2015) explored that if a person does not have consistent access to food, they are more likely to experience abnormalities such as anaemia, hostility, and anxiety. In addition, children and adults who lack consistent access to enough food have a 1.4% higher risk of developing asthma, depression, and behavioural issues than those who do not face these challenges. According to the study of Gebreyesus et al. (2018), women who live in households where there is a lack of consistent access to nutritious meals have a greater tendency to suffer from anxiety than men do. The study by Ebadi et al. (2018) was conducted in the Global South countries. The logistic

regression findings suggest households lacking remittances are more likely to be food insecure than those with remittances. Similarly, Obi et al. (2020) found that remittance-receiving households are relatively food-secured. The findings further suggest that although dietary diversity is observed in the remittance-receiving household, remittance-receiving households are less likely to eat less nutritious food or even worried about meeting food requirements due to a shortage of money. The study of Mora-Rivera and Van-Gameren (2021) suggests that internal and international remittances are important for reducing food insecurity. At the same time, the effect of international remittances is greater than that of internal remittances. Although remittance is a coping strategy to reduce food insecurity, it is not a sufficient or stable source of food insecurity reduction. A similar exercise was carried out by Smith and Floro (2021) to evaluate the effect of domestic and international remittances on low and middle-income countries' food insecurity levels. The study's findings suggest that the effect of international remittances is higher than that of domestic remittances, especially in lower-income countries than in middle-income countries.

Sulemana et al. (2019) found that international remittances are positively associated with higher food security levels, and a higher frequency of receiving the remittances has a more positive effect on food security. In a similar study, Moniruzzaman (2020) investigated the fact that remittance-receiving households are more likely to be food-secured because remittances are positively associated with food-related expenditure. It gives some insights for the household to use remittances as a coping strategy to absorb the food-related shock and improve the quality of diet intake.

Abadi et al. (2018) found that remittance-receiving households have a lower Coping Strategies Index (CSI). The lower value of the CSI indicates the presence of stable and secure resources to access food. The study's findings suggest that remittance-receiving households have lower anxiety related to insufficient food intake while having a higher capacity for quality food. In a similar study, Mabrouk and Mekni (2018) found that remittance was positively associated with food security's access, utilisation, and stability dimensions while negatively associated with availability.

The effect of remittances on different socio-economic outcomes has been carried out previously. For example,

in Pakistan, the available studies according to our knowledge are (Zhou et al., 2019; Rasheed et al., 2022; Rasul and Hussain, 2015; Shair et al., 2023a, 2023b: 2023d). These studies are limited to the determinants of food insecurity related to socio-economic factors and did not use the FIES scale of food insecurity. This study attempts to fill this gap by examining the welfare effect of remittances on household food insecurity in Pakistan. The literature in the context of Pakistan is almost untapped on the effect of remittances on different degrees of food insecurity.

METHODOLOGY

Regression model

To accomplish the research goals, the regression analysis is relevant to obtain the desired outcomes. In the microdata setting, the choice of regression model is contingent upon the nature of the dependent variable. In the study, the dependent variable is food insecurity, quantified using the eight questions of food insecurity experience scale survey module (FIES-SM) developed by the Food and Agriculture Organization. The dependent variable follows ordinal food security categories, such as mild, moderate, and severe food insecurity. The said household will be food secure if it responds 'no' to all eight questions; mild food insecure if it responds 'yes' to any question 1 to 3; moderate food insecure if it responds 'yes' to any question 4 to 6; severe food insecure if responded 'yes' to question 7 or 8. For further description of the construction of food insecurity (see Shair et al., 2023a, 2023b, 2023c).

For empirical analysis, this study uses the simple Ordered Logit model (OLogit) estimation technique to examine the impact of remittances on the household's food insecurity. The econometric model used for this study is as follows:

$$FIL_i = \beta_0 + \beta_1 REM_i + \beta_2 HHMALE_i + \beta_3 HHAGE_i + \beta_4 HHMARRIED_i + \beta_5 HHEDU_i + \beta_6 HHSIZE_i + \beta_7 HHIINCOME_i + \beta_8 URBAN_i + \beta_9 POVERTY_i + \beta_{10} PROVINCE_i + \varepsilon_i \dots \dots (1)$$

$$FIL_i = \beta_0 + \beta_1 REM - AMNT_i + \beta_2 HHMALE_i + \beta_3 HHAGE_i + \beta_4 HHMARRIED_i + \beta_5 HHEDU_i + \beta_6 HHSIZE_i + \beta_7 OIINCOME_i + \beta_8 URBAN_i + \beta_9 POVERTY_i + \beta_{10} PROVINCE_i + \varepsilon_i \dots \dots (2)$$

Here FIL_i is an ordinal categorical variable, varied from severe food insecurity to moderate, mild, and finally, food security. Here FIL_i is related to four levels of food insecurity ($FIL_i = 1$ for severe food insecure household,

2 for moderate food insecure, 3 if the household is mild food insecure, 4 if the household is food secured). REM_i is a binary variable for the receipt of remittances, $REM - AMNT_i$ is a continuous variable used to estimate

the impact of the amount of remittances on food insecurity. While the description of other socio-economic, demographic and regional variables is also given in Table 1.

Table 1. Definition of the variable.

Variable	Measurement	Type
FIL	1 if the household is severely food insecure, 2 if household is moderately food insecure, 3 if the household is mild food insecure, 4 if the household is food secured	Ordinal categories
REM	1 for remittance-receiving households, 0 for non-receiving	Binary
REM-AMNT	Monthly remittances received in rupee: this variable will be used for remittance-receiving household	Continuous
HHMALE	1 for male-headed households, 0 otherwise.	Binary
HHAGE	Age of household's head in years	Continuous
HHMARRIED	1 for married household head, 0 otherwise.	Binary
HHEDUS	1 if the household head is illiterate, 2 if the head is primary, 3 for middle, 4 for secondary, 5 for higher	Nominal categorical variable
HHSIZE	Household size	Continuous variable
URBAN	1 for urban households, 0 for rural	Binary
HHINCOME	Monthly income of the household	Continuous variable
OIINCOME	Monthly non-remittance income of the household	Continuous
POVERTY	1 for the poor household, 0 otherwise	Binary
PROVINCE	1 for the household from Sindh, 2 for Balochistan, 3 for Punjab, 4 for KPK	Nominal categorical variable

Ordered Logit model

Food insecurity, which is ordinal, is a dependent variable in the study. The literature analyses ordinal data using an ordered Logit framework. However, which method to use depends on convenience and the research topic. This study uses the ordered logit framework to determine the dependent variable's ordinality.

$$Y_i^* = X_i\beta + \varepsilon_i$$

A regression model that may be used with a response variable that has an ordinal value is called an ordered Logit model (OLM). The levels (1, 2, 3..., j) of food insecurity make up the values of the categorical dependent variable (level of food insecurity), where J is an integer. In this context, a score of 4 indicates a severe level of food insecurity, a score of 3 indicates a moderate level of food insecurity, a score of 2 indicates a mild level of food insecurity, and a score of 1 indicates food security. The variable food insecurity, denoted by the symbol Y_i^* , can be calculated as;

$$Y_i = X_i\beta + \varepsilon_i \dots \dots \dots (3)$$

Where y_i is the level of food insecurity in the household, which can range from 4 (food secure) to 3 (mild food insecure) to 2 (moderate food insecure) to 1 (severe food insecure), x_i is the vector of observed nonrandom explanatory variables that determine the level of food insecurity in the household, and ε_i is a random error term with a mean of 0 and a variance of 1 in the model. The household decision between the alternatives (0, 1, 2... j) and in connection to various thresholds point μ_j ($\mu_0 = -\infty \mu_j = \infty$). This is recognised in the models below;

- 1 if $y^*_i \leq \mu_2$ Severe food insecure
- 2 if $\mu_2 < y^*_i \leq \mu_3$ Moderate food insecure
- 3 if $\mu_3 < y^*_i \leq \mu_4$ Mild food insecure
- 4 if $y^*_i > \mu_4$ Food secure

The following indicators are used to code food insecurity: 4 indicates complete safety from hunger, 3 indicates only a slight risk of being hungry, 2 indicates

only a moderate risk, and 1 indicates an extreme risk of going hungry. In this particular scenario, the likelihood of a response for a certain household I is calculated as a function of the total number of categories (j).

$$P\{y_i = j | x_i\} = P[u_{j-1} < y^* \leq u_j] \\ = F(u_{j-1} | x_i \beta) F \frac{e^{(a_j + x_i \beta)}}{1 + e^{(a_j + x_i \beta)}} \dots \dots \dots (5)$$

The F represent standard logistic cumulative distribution function, β are the regression coefficient for x_i , and a_j is the intercept for j logit. The empirical application of the regression of the OLM is expressed as;

$$g(y) = \text{logit}(Y) = a_j + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_n x_n \\ + \varepsilon_i \dots \dots (5)$$

Data and descriptive analysis

Data source

This study utilises secondary data from Pakistan Social Living Standard Measurement (2018-19). The 2018-19 survey targets 24,809 households and 1802 urban and rural primary sampling units. This survey focuses on the second sustainable development target indicator, 2.1.2 (moderate and severe food insecurity). The PSLM client module employed the Food Insecurity Experienced Scale Survey Model for the first time. (2018-19). Eight questions are asked of Pakistani households that experienced food insecurity last year due to a lack of money and other resources.

Descriptive analysis

The lack of economic opportunities is a push factor in labour migration. The migration is a collective decision of the household to raise the standard of living and avoid poverty and food insecurity. Food insecurity is due to a lack of access to purchases at the minimal subsistence level. However, labour migration can play a vital role in stabilising access to food over time. The fact can be confirmed in Figure 1: the food insecurity level in the remittance-receiving household is 22%, while in the non-remittance-receiving household, it is 38% and 37% in the whole sample. Amongst the food-insecure households, almost 8% of non-remittance-receiving households are severely food insecure, while 2% are remittance-receiving households. Likewise, there is a higher prevalence of moderate food insecurity in the remittance-receiving household than in the non-receiving household. On the other hand, among the remittance-receiving food-insecure households, mild

food insecurity is 61%, while it is 46% in the non-receiving food-insecure households.

A comparison of the remittance-receiving households reveals that the monthly remittance amount is 29,393 PKR. However, the monthly remittance received is higher for food-secured households than those insecure. It implies that differences in the amount of remittance received are also a potential source of food security/insecurity across the household. The monthly remittances in the food-secure household are 31,489PKR and 22,087PKR for the food-insecure household. The monthly amount of non-remittance income in the remittance-receiving household is 18,574PKR. However, The monthly amount of remittances in the food-secure household is 19,767PKR and 14,414PKR for the food-insecure household.

The monthly household income is 33,079PKR in the whole sample, 47,669PKR in remittance-receiving households, and 31,987PKR in the non-receiving households. The monthly household income is higher for the remittance-receiving food-secure household than the remittance-receiving food insecure. The estimated difference is almost 15,000PKR. Similarly, income differences are observed in households with non-receiving food security and food insecurity. The estimated difference is almost 17,000PKR.

Descriptive Statistics

We presented the descriptive statistics of the variable used in the study in Table 2 across the household categories. The demographics of the households across the whole sample, remittance-receiving households, non-receiving household, food secure remittance-receiving, food secure non-receiving, food insecure remittance-receiving, and food insecure non-receiving. The household head's demographic consists of age, education, and gender. In contrast, a household's demographic includes area, province, household size, and poverty status. The variation in the household size is minimal across the household categories. Most of the respondents are from the Punjab, and among the food secure receiving and non-receiving groups, most are from the Punjab. 62% food secure remittance-receiving and 55% food secure non-receiving are from the Punjab. Almost 3 out of 10 households are from the urban area across the household categories. In the study, 21% of households are poor in the remittance-receiving food secure household, while 78% are non-receiving food

insecure households. The monthly remittance amount in the remittance-receiving food-secure household is 50% more than in the remittance-receiving food-insecure household. Similarly, the non-remittance income is also higher in the remittance-receiving food-secure household than in the remittance-receiving food-insecure household. Food insecurity is lower in the remittance-

receiving household than in the non-receiving household. Amongst the food-insecure households, severe food insecurity is higher in the non-remittance-receiving household than in the remittance-receiving household. Moreover, moderate and mild food insecurity levels are higher in the non-remittance-receiving household than in the remittance-receiving household.

Table 2. Descriptive statistics.

Variables	Whole sample	Remittance-receiving	Non-remittance-receiving	Remittance-receiving food insecure	Remittance-receiving food secure	Non-remittance-receiving food insecure	Non-remittance-receiving food secure
Age	44.35	44.08	44.37	44.8	43.87	42.96	45.24
Male (=1)	0.97	0.86	0.97	0.89	0.85	0.97	0.97
Married (=1)	0.88	0.69	0.9	0.74	0.68	0.9	0.89
Primary (=1)	0.16	0.15	0.16	0.16	0.15	0.18	0.15
Middle (=1)	0.14	0.18	0.13	0.15	0.19	0.11	0.15
Secondary (=1)	0.22	0.28	0.22	0.17	0.31	0.15	0.26
Higher (=1)	0.08	0.09	0.08	0.05	0.11	0.02	0.11
Household size	6.45	6.95	6.42	7.76	6.72	6.48	6.38
KPK (=1)	0.18	0.42	0.16	0.69	0.34	0.23	0.12
Punjab (=1)	0.47	0.54	0.47	0.27	0.62	0.34	0.55
Sindh (=1)	0.25	0.03	0.27	0.03	0.03	0.33	0.23
Balochistan (=1)	0.09	0.01	0.1	0.01	0.01	0.1	0.1
Urban (=1)	0.36	0.33	0.36	0.25	0.35	0.27	0.42
Poverty (=1)	0.55	0.27	0.57	0.51	0.21	0.78	0.44
(Income monthly)	33079	47669	31987	36260	50943	21699	38388
Remittance (=1)	0.07	1	0	1	1	0	0
Remittances monthly	29393	29393	0	22087	31489	0	0
Non-remittance income	18574	18574	0	14414	19767	0	0
Food insecure	0.37	0.22	0.38	1	0	1	0
Severe food insecure	0.08	0.02	0.08	0.11	0	0.21	0
Moderate food insecure	0.12	0.06	0.13	0.28	0	0.33	0
Mild food insecure	0.17	0.14	0.18	0.61	0	0.46	0

RESULTS AND DISCUSSION

Effect of Remittances on Household Food Insecurity

The marginal effects of the variable of interest and other independent variables are given in columns 2-6 (Table 3). Column 2 indicates the effect of remittances and other variables on the severity of food insecurity by

considering the dependent variable ranging from 1-4, where 1 indicates severe food insecurity, 2 mild, 3 mild and 4 food secure. This implies that an increase in the value of dependent variables in column 2 indicates an improvement in food insecurity status from severe to mild.



Figure 1. Descriptive of food insecurity across the household categories.

The coefficient of the variable of interest 'remittances' indicates that remittance-receiving households have 1.07% less probability of severe food insecure, 2.06% less probability of moderate food insecurity, 2.79% less probability of mild food insecurity, and 5.92% more probability of the food security. It indicates the presence of higher income in the remittance-receiving household due to the higher earnings of migrants in the foreign country. The remittance-receiving household has more probability of food security because remittance is a stable source of income, and the presence of remittance income increases the household income, raising the household's living standard and consumption.

The age of the head of household is negatively associated with the degree of food insecurity, i.e., the likelihood of severe, moderate, and mild food insecurity. However, the age of the head of household is positively associated with the likelihood of food insecurity. The coefficient of the age suggests that an increase in age by one year increases the probability of food security by 0.12%. The increase in age is linked with learning by doing and observing the economic situation of households and the economy maturely and then adjusting the household income, consumption and food security status.

The male-headed household is more likely to be food insecure than the female one. The lower level of food insecurity in the female-headed household suggests that the female's role in household management is essential. In developing economies, females are more responsible for household production, and women's empowerment in the decision-making of consumption, saving, and production plays a vital role in the stable food security of the household.

The coefficient of the household head education is statistically significant. Also, it suggests that across the education categories, a higher education head has 2.5% less probability of severe food insecure, 5% less probability of moderate food insecure, 7.6% less probability of mild food insecure, and 15.2% more probability of food insecure when compare with the illiterate head of household. It represents that an increase in education level lowers the incidence of severe, moderate, and mild food insecurity while increasing the probability of incidence of food security. It can be explained that the higher education of the household head will help in higher earning, better utilisation of resources for more income and ensure food insecurity by stable consumption.

The household size has a positive relationship with the probability of food insecurity and a negative relationship with the probability of food security. A one-unit increase in the household's size increases the probability of food severe food insecurity by 0.62%, increases the probability by 1.14% for moderate, 1.43% increases in probability for mild food insecure households, and decreases the probability of food security by 3.2%.

The household from Punjab has 0.1% less probability of severe food insecurity, 1.3% less probability of moderate food insecurity, 1.6% less probability of mild food insecurity, and 3.6% more probability of food security compared with the household from Balochistan. The households from the relatively developed provinces have more opportunities for livelihood and higher income, which ensures food insecurity than those from less developed provinces. The coefficient of the urban area is insignificant, indicating that the difference in the probability of food insecurity or security across the urban-rural household is not different. Although a household from an urban area has less probability of food insecurity and a higher probability of food security, this effect is statistically insignificant.

The poor household has a 0.36% higher probability of severe food insecurity, 0.67% higher probability of moderate food insecurity, 0.84% higher probability of mild food insecurity, and 1.86% less probability of food security. The higher presence of food insecurity in poor households indicates multiple types of deprivations due to a lack of resources and the inability to meet the minimum level of living. The coefficient of the log of monthly income suggests that at an average value of the log of monthly income, a one unit increase in the log of income leads to a 7% decrease in the probability of severe food insecure, 13.4% decrease in the probability of the moderate food insecurity, 16.8% decrease in the probability of mild food insecurity, and 37% increase in the probability of the food security. This higher income is an indicator of higher purchasing power, and higher purchasing power is directly linked with access to safe and nutritional food.

Effect of amount of Remittances on Household Food Insecurity

We presented the marginal effect of the Logit model in Table 4 to examine the effect of the amount of remittances on food insecurity and the degree of food insecurity. The marginal effects of the variable of

interest and other independent variables are presented in columns 2-6 of table 4. Column 2 of Table 4 indicates the effect of remittances and other variables on the severity of food insecurity by considering the dependent variable ranging from 1 to 4, where 1 indicates severe

food insecurity, two mild, three mild and four food secure. This implies that an increase in the value of dependent variables in column 2 indicates an improvement in food insecurity status from severe to mild and then food security.

Table 3. Estimates of the OLogit Model.

Variables	Coefficient	Severe (mfx)	Moderate (mfx)	Mild (mfx)	Food secure (mfx)
Age	0.0056*** (0.001)	-0.0002*** (0.0000)	-0.0004*** (0.0001)	-0.0006*** (0.0001)	0.0012*** (0.0002)
Male (=1)	-0.4406*** (0.0871)	0.0155*** (0.0025)	0.0303*** (0.0052)	0.043*** (0.0083)	-0.0888*** (0.0159)
Married (=1)	-0.0226 (0.0479)	0.0009 (0.002)	0.0018 (0.0037)	0.0022 (0.0047)	-0.0049 (0.0104)
Primary (=1)	0.22*** (0.0392)	-0.0087*** (0.0015)	-0.0165*** (0.0028)	-0.0217*** (0.0039)	0.0468*** (0.0081)
Middle (=1)	0.4634*** (0.0453)	-0.0168*** (0.0015)	-0.0327*** (0.0029)	-0.0453*** (0.0044)	0.0948*** (0.0086)
Secondary (=1)	0.5385*** (0.0399)	-0.02*** (0.0014)	-0.0385*** (0.0026)	-0.0526*** (0.0039)	0.111*** (0.0077)
Higher (=1)	0.8031*** (0.0779)	-0.0253*** (0.0019)	-0.0505*** (0.0038)	-0.076*** (0.0067)	0.1518*** (0.0121)
Household size	-0.1455*** (0.0074)	0.0061*** (0.0003)	0.0114*** (0.0006)	0.0143*** (0.0008)	-0.0319*** (0.0016)
KPK (=1)	-0.8826*** (0.0554)	0.049*** (0.004)	0.0806*** (0.0006)	0.0773*** (0.0041)	-0.2068*** (0.0134)
Punjab (=1)	0.1639*** (0.0543)	-0.0069*** (0.0023)	-0.0128*** (0.0042)	-0.0161*** (0.0053)	0.0358*** (0.0118)
Sindh (=1)	-0.4267*** (0.0543)	0.0199*** (0.0028)	0.0357*** (0.0048)	0.0409*** (0.005)	-0.0965*** (0.0125)
Urban (=1)	0.0068 (0.0321)	-0.0003 (0.0013)	-0.0005 (0.0025)	-0.0007 (0.0032)	0.0015 (0.007)
Poverty (=1)	-0.0852* (0.0437)	0.0036* (0.0018)	0.0067* (0.0034)	0.0084* (0.0043)	-0.0186* (0.0095)
Log (Income monthly)	1.7059*** (0.0483)	-0.0719*** (0.0024)	-0.1338*** (0.0042)	-0.1678*** (0.0055)	0.3735*** (0.0104)
Remittance (=1)	0.2836*** (0.0662)	-0.0107*** (0.0022)	-0.0206*** (0.0044)	-0.0279*** (0.0065)	0.0592*** (0.0131)
/cut1	13.1836 (0.4570)				
/cut2	14.4471 (0.4575)				
/cut3	15.5239 (0.4588)				
Log-likelihood	-22718.995				
Wald chi ²	5120.95				
Prob > chi ²	0.0000				
Pseudo R ²	0.1269				
Number of obs	24806				
Frequency		1,865	3,067	4,304	15,570

* 10 % level of significance, ** 5% level of significance, *** 1% level of significance

The coefficient of the variable of interest, 'amount of remittances,' indicates that an increase in household remittances lowers the probability of severe, moderate, and mild food insecurity and increases the probability of food security. An increase in remittance by 1 log point lowers the probability of severe food insecurity by 0.3%, moderate food insecurity by 2%, and mild food insecurity by 4%. On the other hand, an increase in log remittances by 1 unit increases the probability of food security by 6%. It indicates the presence of higher income in the remittance-receiving household due to the higher earnings of migrants in the foreign country. An increase in the amount of remittances increases the probability of food security because remittance is a stable source of income and presence of remittance income increase the household income which raise the household's living standard and consumption.

The age of the head of household is negatively associated with the degree of food insecurity, i.e. the likelihood of severe, moderate, and mild food insecurity. The male-headed household is more likely to be food insecure than the female one. The lower level of food insecurity in the female-headed household suggests that the female's role in household management is important. In developing economies, females are more responsible for household production, and women's empowerment in the decision-making process of consumption, saving, and production plays a vital role in the stable food security of the household.

The coefficient of the household head education suggests that a higher education head has 0.86% less probability of severe food insecure, 2.7% less probability of

moderate food insecure, 7.1% less probability of mild food insecure, and 10% more probability of food insecure when compare with the illiterate head of household. It represents that an increase in education level lowers the incidence of severe, moderate, and mild food insecurity while increasing the probability of incidence of food security. It can be explained that the higher education of the household head will help in higher earning, better utilisation of resources for more income and ensure food insecurity by stable consumption. The household size and marital status of the head of household, province, and urban area are statistically insignificant. On the other hand, poor households have a 1.08% higher probability of severe food insecurity, 3.17% probability of moderate food insecurity, 7.11% probability of mild food insecurity, and 11.36% less probability of food security. Food insecurity in poor households indicates multiple types of deprivations due to a lack of resources and the inability to meet the minimum living level in the poor remittance-receiving household. The coefficient of the log of monthly non-remittance income suggests that at an average value of the log of monthly non-remittance income, a one unit increase in the log of non-remittance income leads to a 0.26% decrease in the probability of severe food insecure, 0.79% decrease in the probability of the moderate food insecurity, 1.92% decrease in the probability of mild food insecurity, and 2.98% increase in the probability of the food security. This higher non-remittance income indicates higher purchasing power, which is directly linked with access to safe and nutritional food.

Table 4. Estimate of OLogit model for remittance-receiving household.

Variables	Coefficient	Severe (mfx)	Moderate (mfx)	Mild (mfx)	Food secure (mfx)
Age	0.004 (0.0048)	-0.0001 (0.0001)	-0.0002 (0.0002)	-0.0004 (0.0005)	0.0006 (0.0007)
Male (=1)	-0.5886** (0.2963)	0.0064** (0.0028)	0.0196** (0.008)	0.0509** (0.0222)	-0.0769** (0.0324)
Married (=1)	-0.1926 (0.2032)	0.0025 (0.0026)	0.0076 (0.0078)	0.0186 (0.0192)	-0.0286 (0.0294)
Primary (=1)	0.2718 (0.2244)	-0.0034 (0.0026)	-0.0102 (0.0078)	-0.0255 (0.02)	0.0391 (0.0302)
Middle (=1)	0.6182*** (0.2255)	-0.007*** (0.0023)	-0.0214*** (0.0068)	-0.0548*** (0.018)	0.0831*** (0.0262)
Secondary (=1)	0.728*** (0.2047)	-0.0086*** (0.0024)	-0.0262*** (0.0071)	-0.0659*** (0.0172)	0.1007*** (0.0255)
Higher (=1)	0.8844***	-0.0086***	-0.0268***	-0.0713***	0.1067***

	(0.3047)	(0.0025)	(0.0073)	(0.0194)	(0.028)
Household size	0.0044	-0.0001	-0.0002	-0.0004	0.0007
	(0.0209)	(0.0003)	(0.0009)	(0.0021)	(0.0032)
KPK (=1)	-0.7139	0.0101	0.0303	0.071	-0.1114
	(0.8036)	(0.0121)	(0.036)	(0.0803)	(0.1281)
Punjab (=1)	0.6793	-0.0094	-0.0282	-0.0669	0.1045
	(0.8083)	(0.0119)	(0.0345)	(0.0792)	(0.1253)
Sindh (=1)	-0.0878	0.0012	0.0037	0.0088	-0.0138
	(0.918)	(0.0134)	(0.0401)	(0.094)	(0.1475)
Urban (=1)	0.025	-0.0003	-0.001	-0.0025	0.0038
	(0.1559)	(0.0021)	(0.0063)	(0.0153)	(0.0237)
Poverty (=1)	-0.6801***	0.0108***	0.0317***	0.0711***	-0.1136***
	(0.1837)	(0.0039)	(0.0102)	(0.0205)	(0.0334)
Log (Remittances)	0.4103***	-0.0055***	-0.0167***	-0.0404***	0.0627***
	(0.1128)	(0.0018)	(0.0049)	(0.0113)	(0.0173)
Log (other income)	0.1951***	-0.0026**	-0.0079***	-0.0192***	0.0298***
	(0.0646)	(0.001)	(0.0027)	(0.0064)	(0.0098)
/cut1	1.4453				
	(1.614)				
/cut2	2.9271				
	(1.5967)				
/cut3	4.2613				
	(1.5967)				
Log-likelihood	-898.93333				
Wald chi ² (15)	211.46				
Prob > chi ²	0.0000				
Pseudo R ²	0.1149				
Number of obs	1727				
Frequency		43	107	235	1342

* 10 % level of significance, ** 5% level of significance, *** 1% level of significance

CONCLUSION

The study's findings suggest that food insecurity is higher in non-remittance-receiving households. In contrast, the remittance-receiving household is more food secure than the non-receiving household. The income level of remittance-receiving households is relatively higher. The presence of non-remittance income in the remittance-receiving household is an important factor in raising the income of the remittance-receiving household, which raises access to safe and secure food. We also find food insecurity in the poor remittance-receiving household. Still, food insecurity is relatively lower in the poor remittance-receiving household than in the poor non-remittance-receiving household. The study's findings also suggest that multiple factors affect food insecurity and its degree, especially the amount of remittances within the remittance-receiving household. An increase in household remittances lowers the probability of severe, moderate, and mild food insecurity and increases the

probability of food security. It indicates the presence of higher income in the remittance-receiving household due to the higher earnings of migrants in the foreign country. An increase in the amount of remittances increases the probability of food security because remittance is a stable source of income and presence of remittance income increase the household income which raise the household's living standard and consumption. The effect of remittances is greater in mild remittance-receiving households than in severe ones.

The study confirms the lower prevalence of food insecurity in the remittance-receiving household. For this purpose, equal 'access to migration' to vulnerable households is required. Multiple types of deprivations are also a source of food insecurity. Therefore, any policy measure to combat the poverty will also lower the food insecurity. Based on the findings, the study recommends that relevant stakeholders undertake the measure to increase remittances by exporting skilled labour to combat food insecurity in Pakistan. The role of non-

remittance income is also important to combat food insecurity in the remittance-receiving household. For this purpose, steps need to generate other than remittance income in the remittance-receiving household. The analysis of the study confirms that most food insecure households are mild food insecure in nature across the receiving and non-receiving households. The effect of an increase in remittances is more prominent in mild food-insecure households. Therefore, a targeted increase in remittances in mild food insecurity households can lower overall food insecurity in Pakistan.

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