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The Effect of Food and Financial Remittances on Household Food Security in Northern Nigeria

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Research Article

Keywords: Food remittances, financial remittances, labour, Food Consumption Score, Nigeria

Posted Date: May 9th, 2023

DOI: https://doi.org/10.21203/rs.3.rs-2887464/v1

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Abstract

Remittances from migrants are an important livelihood strategy to mitigate the impact of adverse economic conditions, particularly in developing countries and rural areas. This study examines how migration and remittances affect household food security by analysing data collected from 180 farmers in northern Nigeria in 2018. The descriptive results show that households use remittances mainly for health care and education. Remittances are most commonly provided in the form of finances and food. Binary logit regression results show that food remittances have a significant positive impact on food security status. Financial remittances did not have a statistically significant impact on food security. As the number of migrants in a household increases, the probability that the household is food secure decreases. The propensity scores matching result also showed that migrant households receiving food remittances were more food secure. In light of these findings, we emphasized the need to include both financial and food remittances in studies to understand the effect on food security.

1. Introduction

Malnutrition affects approximately 842 million people worldwide, or about 12% of the global population (Abdullah et al., 2019). In 2019, 234 million people in sub-Saharan Africa were chronically undernourished, the highest number of any region. In addition, the recent COVID-19 pandemic and the sharp rise in prices and energy due to the war in Ukraine are further exacerbating food poverty.

Remittances are important for improving the economic conditions of households in low-income economies (Obi et al., 2020; Williams et al., 2013). However, previous empirical studies report conflicting results on the impact of remittances on food security. On the one hand, studies conducted in Nigeria, Malawi, Mali, Bangladesh, Ghana and Burundi report that the receipt of remittances has a positive and significant effect on household food security status due to raising affordability and higher food diversity (Obi et al, 2020; Sulemana et al., 2018; Abadi et al., 2018; Ebadi et al., 2018; Canessa and Giannelli., 2021). On the other hand, studies conducted in Tanzania and Nepal have reported that receiving remittances has a negative and significant impact on household food security status (Mabrouk and Mekni 2018; Duda et al., 2018). This may be because migration has led to a shortage of labour, which has a negative impact on local food production capacity. In addition, financial remittances may not be used to purchase food or to invest in farm/production, thus reducing the potential effect on improving household food security in the long term. It is therefore important to distinguish between the effect of different types of remittances such as financial or food remittances.

Many studies are focused on financial remittances while there is less attention on food remittance effects. Food remittances are an important component in addressing household food security, economic and social life, but they go largely unnoticed as they take place within the family and outside market channels (Djurfeldt, 2015, 2022). Little attention has been paid to the contribution of food remittances to overall welfare, particularly food security (Crush & Caesar, 2018; Onyango et al., 2021). In this study, we aim to fill the gap by exploring how migration and remittances affect household food security. We

examine the impact of both financial and food remittances on food security in a country emerging from a protracted crisis. The empirical findings are collected in a structured survey collecting data from 180 farmers living in the Bauchi State, one of the regions of Nigeria facing serious challenges, including climate change and conflict and food insecurity, which have contributed to high levels of (food) poverty and massive migration. We use Nigeria as a case study since it is a country with a high prevalence of food insecurity, remains highly depended on remittances and is harshly affected by conflicts. Nigeria is also one of the top six remittance destination countries in the world and the largest remittance recipient country in the world, with an estimated official inflow of US$25.4 million, accounting for 60% of all remittances sent to sub-Saharan Africa (World Bank, 2019; Fonta et al., 2021; PwC, 2019). Nigeria's food security has deteriorated in recent years, with poor and borderline food consumption (reported by 44%) almost as high as at the height of the Boko Haram political and religious unrest crisis (NBS, 2020; WFP, 2020). This is the case of countries experiencing protracted crises and hit by multiple shocks which are more inclined to use remittances as a means of coping with food insecurity. During food crises, migration and remittances are two important coping strategies that can improve household food security (Ebadi et al., 2018; de Brauw and Ambler 2018; Sikder and Higgins 2017; Obi et al., 2020). Thus, food crises are arguably a major driver of international migration in low-income countries (FAO, IFAD, IOM and WFP 2019).

In this paper, we explore the food security of the household and estimate the factors influencing food security. We consider that the number of migrants and the associated financial and food remittances received affects food security. Thus, the study is novel in that it pays attention to the different types of remittances and provides a possible explanation for the ambiguous results of previous studies on the impact of remittances on food security. The results of this study provide recommendations for policymakers in countries of the global south facing threats from conflicts and food insecurity. Considering the results, the paper offers hints on how to adjust ways to maintain effective remittance channels and additional policies that promote land ownership equity, access to extension services and support of minority ethnic groups.

The rest of the paper is structured as follows: section 2 presents the literature review which serves as a basis for the hypotheses. Section 3 consists of methods and section 4 of the results accompanied by a separate section of discussions while section 6 concludes the paper.

2. Literature Review

Theories that underpin remittance can be traced back to Lucas and Stark (1985), who hypothesized that migrant workers' remittance impulses are classified as *pure altruism*, *pure self-interest*, *and* tempered altruism or enlightened self-interest, referred to as *insurance*, in between these two extremes. In pure altruism, remittances rise in accordance with decreases in family income due to poverty. In addition, Depoo (2014) explained the insurance motive of migrants because of inherent factors that enable mutual benefits from migration to both migrants and migrants' families.

Migration and remittances

Migration is seen as an investment by individuals or households in which the income gains and benefits from migration must outweigh the costs of migration (Borjas, 1989). On the one hand, the remittances, skills, knowledge and experience that migrants acquire while living abroad can be invested in their households and, more broadly, in their home country. On the other hand,

some studies find that financial remittances are often not used to buy food but to pay for health, education and clothing or invest in on-farm production capacity. The effect of financial remittances on food security is ambiguous (see introduction) and consequently, we hypothesize the following:

H1: Financial remittances have no impact on food security

Food remittances are important for household food security, but they go largely unnoticed as they flow unrecorded within the family (Djurfeldt, 2015, 2022). Studies conducted in Ghana, Malawi, Kenya and India reported that food remittances have a positive effect on the food security status of receiving households (Kuuire et al., 2013; Crush & Caesar, 2018). On the other hand, a study conducted in Zimbabwe reported that food remittances have a negative effect on the food security status of receiving households (Crush & Tawodzera, 2017). Given that the majority of studies found a positive effect of food remittances on food security, we hypothesize the following:

H2: Food remittances increase household food security.

Several recent studies conducted in Nigeria, Ghana, Kyrgyzstan, North Macedonia and Ethiopia found that an increase in the number of migrants in households improved food security by increasing remittances sent to the household (Ajaero et al., 2018; Clemens and McKenzie, 2018; Kumar et al., 2017; Abadi et al., 2018). Migration can lead to labour shortages or high labour costs, resulting in low output and income, and thus increased food insecurity (Salau et al., 2020). We hypothesize that;

H3: The higher the number of migrants in the household, the higher the food security.

Access to resources and food security

In addition to remittances, other factors that increase capital and human resources may affect food security and need to be included in models. Studies conducted in Kenya, Nigeria, Ethiopia and South Africa found that access to credit from rural communities or associations had a positive effect on household food security status (Ingutia and Sumelius, 2022; Kehinde & Kehinde, 2020; Ngema et al., 2018). Several studies conducted in Nigeria, Uganda and Ghana found that providing credit and loans to farmers improved household food security (Danso-Abbeam et al., 2018; Ogunniyi et al., 2020; Twongyirwe et al., 2019; Adenagon et al., 2018). On the other hand, a study conducted in Pakistan reported that access to credit had a negative significant effect on household food security status (Muhammad, 2010).

Human capital is of paramount importance, especially in capital-poor areas. Studies on the number of working-age adults in a household and its food security status have found that an increase in the number of working adults has a positive significant effect on household food security status (Coleman-Jensen and Mark, 2013; Abdullah et al., 2019). In line with these studies, we raise our hypothesis for a positive relationship between human capital and food security.

Land ownership has an impact on food security. Studies in Malawi, Burundi, Ghana, Kenya, Bangladesh, Mali and Nigeria found that increasing household assets (wealth) positively improve household food security status (Kehinde et al., 2021; Mutisya et al., 2015). Studies in the Philippines, Ethiopia, Pakistan, Zambia and Nigeria have found that smallholder land ownership positively increases household food security status (Shiferaw et al., 2014; Jabbar et al., 2020; Nkomoki et al., 2019; Ogunniyi et al., 2020). We expect a positive relationship between food security and the size of land ownership.

Farm group membership is seen as an important institution and a way for smallholder farmers to access information, secure finance and sell their produce. Studies conducted in Tanzania and Kenya have reported that information from farmer groups has a positive and significant effect on the household food security status of smallholder farmers. (Ma and Abdulai, 2016; Larsen and Lilleør, 2014; van den Berg et al., 2020). In our study, we expect that participation in farmers' organizations and groups increases their food security status.

Access to extension services contributes to the food security status of smallholder households as it enables improved agricultural performance and exposes farmers to improve agricultural practices which in turn improves food security. Empirical evidence from Malawi, Ghana, Chad, Nigeria, Malawi and Nepal shows that increasing farmers' access to agricultural extension services improves their household food security status (Danso-Abbeam et al., 2018; Corsi et al., 2017; Ogunniyi et al., 2020). Our hypothesis is that farmers having access to advisory services are less prone to food insecurity.

The ethnicity of the household head may influence the food security status of the household. For instance, studies conducted by Ajaero et al. (2018); Morales et al. (2021); Niles et al. (2021) reported that being of a major ethnic group has a positive and significant effect on the household food security status. This implies that majority ethnic groups in society are more likely to be food secure than their minority counterparts.

Household head characteristics

The gender of the household head plays an important role in determining the food security status of the household. Female-headed households may be more food secure in communities where women have access to land, credit and other resources. Previous studies conducted in Sudan and Nigeria found that female-headed households were more food secure than male-headed households (Ogunniyi et al., 2020; Abdullah et al., 2019). However, this is not empirically valid in societies/communities where women are marginalised and have no or poor access to land rights and resources. Several studies conducted in Nigeria, Kenya, Brazil, Ghana, South Africa and Pakistan have found that male household heads are more

likely to be food secure than female household heads (Abdullah et al., 2019; Mustapha et al., 2018; Ebadi et al., 2018; Maziya et al., 2017; Abdullah et al., 2018). In this study, considering the country's conditions, we expect that female-headed households are more prone to food insecurity compared to their counterpart.

Education assists individuals in comprehending and addressing agricultural production challenges. Empirical studies conducted in Malawi, Burundi, Pakistan, Ghana, Kenya, India and Nigeria show that increased educational attainment of the household head increases food security status, (Ebadi et al., 2018; Kehinde et al., 2021; Gebru et al., 2020; Herrmann et al., 2018; Mutisya et al., 2016). We expect that higher education of the head would equip the household with knowledge and know-how and enable them to cope better with food insecurity situations.

With regard to the age of the household head on food security, studies conducted in Nigeria and Pakistan have shown that increasing age increases household food security status (Mustapha et al., 2018; Herrmann et al., 2018; Abdullah et al., 2019). On the other hand, studies conducted in Nigeria, South Africa and Central America found that increasing age decreases household food security (Oduniyi and Tekana, 2020; Alpizar et al., 2020). In this study, we support the thesis that a younger household age increases the odds of a better food security level.

3. Methodology

3.1. Sampling approach

The study was conducted in Bauchi State, which is located in the Sudan Savannah and some parts of the Northern Guinea Savannah zone of Nigeria. Agriculture is the main occupation of the indigenous people of Bauchi State (BSADP, 2010). It occupies 5.3% of the total land mass of Nigeria, of which only about 68% is currently cultivated (NBS, 2018). The population of Bauchi State is estimated at 6.5 million. In the state, 61.5% of the population lives below the poverty line (BSADP, 2010).

The sample was selected using a multi-stage selection procedure that included purposive and simple random sampling techniques. First, the study area (Bauchi State) was divided into three agricultural zones: Western (Zone A), Central (Zone B) and Northern (Zone C). In the second stage, two Local Government Areas (LGA) were randomly selected from each zone: Bauchi and Toro from Zone A, Misau and Dambam from Zone B, and Katagum and Jama' from Zone C. Two council wards (a subdivision of local government in Nigeria represented by a councilor) were then randomly selected from each of the LGA's for twelve council wards. Fifteen households were selected from each council ward, giving a total sample size of 180 migrant and non-migrant households. Table 1shows the number of households selected from each Local Government Area (LGA).

Table 1
Sample Selection

Agricultural Zones selected in Bauchi state	LGAs	Wards	Household heads
Western (Zone A)	Bauchi	2 Wards	30
	Toro	2 Wards	30
Central (Zone B)	Misau	2 Wards	30
	Dambam	2 Wards	30
Northern (Zone C)	Katagum	2 Wards	30
	Jama'are	2 Wards	30
3 Zones	**6 LGAs**	**12 Wards**	**180**
Source: Own authors elaboration, LGA: Local Government Area			

3.3. Data collection

Data were collected through a structured questionnaire survey used to interview heads representing migrant (90) and non-migrant (90) households. The questionnaire included three sections: i. socio-economic and demographic characteristics, ii. food consumption patterns, and iii. livelihood activities. Prior to data collection in July 2018, the questionnaire was pretested with 18 individuals. Data collection took place in August 2018. Face-to-face interviews were carried out by the researcher, most of which were conducted in Hausa (the mother tongue of the study area).

3.4. Data analysis

3.4.1. The model

A binary probit model was used to determine food security factors in Bauchi state, Nigeria, using Stata 13 statistical software. Marginal effects are presented in the results part.

The binary probit model in the following form was used:

$Yik = \beta 1 Xi + \varepsilon i$ (1)

where *Xi* represents a set of all explanatory variables presented in Table 2, β_1 is a vector of estimated parameters and εi is an error term. Yik is the level of consumption score where 0 = poor and borderline food security with FCS up to 35; 1 = acceptable food security with FCS higher than 35 points.

The system of equations describing binary choices of small-scale farmers is given as follows:

$Yik = \{1 if Yik > 0$

0 *otherwise*(2)

The regression model was tested for the presence of multicollinearity using a variance inflation factor (VIF)

Causality Effect

As migration and remittances are not randomly assigned during household sampling, econometric challenges need to be considered in order to empirically estimate the impact of migration on food security. The impact of remittances on food security raises the possibility of reverse causality or a bi-directional relationship between food security and remittances.

Given that 133 million Nigerians, or 63% of the population, are multidimensionally poor (UNDP, 2022), food security may also encourage migration and remittances for reasons such as education or labour migration, which could lead to spurious conclusions from the measured impact of migration and remittances on food security (McKenzie and Sasin, 2007). Studies addressing the impact of this issue on food security (Azzarri and Zezza, 2011; Babatunde and Martinetti, 2011) recommend the use of propensity score matching (PSM), which also addresses self-selection (Carletto et al., 2011). Using cross-sectional data, additional bias and sensitivity to unobservable factors can be found using various tests (Abadi et al., 2018). Abadi et al. (2015) estimate the treatment effect of remittance-receiving households on household food security in the case of a binary treatment variable using the PSM approach (Rosenbaum and Rubin, 1983; Dehejia and Wahba, 1999).

Propensity score matching

There are three steps in PSM. First, the propensity scores for migration and remittance are calculated using a probit model (Duda et al., 2018). Second, to reduce bias a comparison group of households receiving remittances (treatment) is matched with the control group of households not receiving remittances using the Nearest Neighbor Matching algorithm (NNM). Third, the Average Treatment Effect on the Treated (ATT) of households receiving remittances on their household's food security status is computed. The difference in outcome using food security indicators (Food Consumption Score) at the household level between remittance-receiving and non-remittance-receiving households' level was calculated. Propensity scores are generally shown as follows:

$$ATT = \frac{PSM}{ATT} = E\{E\left[Y^1|M = 1, \mathrm{p}\left(X\right)\right] - E[Y \quad |\mathrm{M} = 0, p(\mathrm{X})]\,|\mathrm{M} = 1\} \quad (2)$$

3.4.2. The variables used in the model

The dependent variable is food security status, operationalised by the Food Consumption Score (FCS), which is the sum of the number of times a food group from the household dietary score was eaten in the previous seven days (information on the frequency of consumption in the previous week of cereals, tubers, pulses, vegetables, fruits, meat and fish, milk, sugar and oil), multiplied by the weight (importance in the diet) assigned to each group by the World Food Programme (WFP, 2006). In our study, the scores are divided into three categories: poor, borderline and acceptable. The food consumption score was

divided into two categories in the study because we had very few respondents in the borderline category, so it was added to the poor categories (1 = poor and borderline 1 to 35, 2 = acceptable > 35). Higher scores indicate better food security.

The explanatory and control variables were selected based on findings of the literature review. There are various factors influencing food security related to the farm and household characteristics, farm head characteristics and access to financial and non-financial remittances. The following figure depicts the various factors affecting food security.

The explanatory variables are the following i. the number of migrants in the household ii. the access to financial remittances iii. the access to food remittances. The control variables used for the study are classified into four groups which consist of i. household head characteristics (age, gender, marital status, ethnicity and education level) ii. household characteristics –number of adults of working age iii. farm characteristics (land ownership and wealth) and iv. access to information, services and credit (extension service, information from group farmers, access to government credit and credit from the rural community). See Table 2for the type of variables and their mean values.

Table 2
Variables description and mean value

Variables	Description	Mean
Treatment variables: Remittances and migration		
Food remittances	Farmers receive very often or often food from migrant member(s)	0.71
Financial remittances	Farmers receive very often or often money from migrant member(s)	0.76
Number of migrants	Number of migrants	2.49
Food security indicators		
Food consumption score	0 = poor and borderline (up to 35), 1 = acceptable (> 35)	0.89
Household head characteristics		
Age	Age of household head (years)	59.95
Primary education	Respondent achieved a primary level of education in maximum	0.16
Secondary education	Respondent achieved a secondary level of education	0.36
Tertiary education (reference)	Respondent achieved a tertiary level of education - diploma or degree	0.48
Gender	0 = male, 1 = female	0.26
Marital status	0 = not married; 1 = married	0.76
Ethnicity	0 = not Hausa 1 = Hausa	0.52
Household characteristics		
Number of adults of working age	Number of adults 18–65 years old	4.67
Farm characteristics		
Land ownership	Percentage of owned agricultural land	91.41
Access to resources		
Access to extension service	How often did you use extension services? Scale of 1 to 5, 5 = very often, 1 = never	2.21
Information from group farmers	How often did you use sources of information from farmers' groups? Scale of 1 to 5, 5 = very often, 1 = never	4.46
Source: Survey results		

Variables	Description	Mean
Access to governmental credit	Access to governmental loan (yes = 1, no = 0)	0.25
Credit from a rural community	Respondent received credit from the rural community (yes = 1, no = 0)	0.28
Source: Survey results		

Table 3compares the socio-demographic characteristics of migrant (treatment) and non-migrant (control) households. The results show a significant difference between the age of migrant and non-migrant households. The average household size of migrant households was 9.70 persons, while that of non-migrant households was 9.78 persons. Migrant households own on average 89.55% of the agricultural land they cultivate, while non-migrant households own 93.13%. Non-migrant households have more access to extension services and credit than migrant households. The food consumption score of migrant households is 56.34, while that of non-migrant households is 51.49.

Table 3
Socio-demographic characteristics of the migrant and non-migrant household

	Migrant households (n = 90)	Non-migrant households (n = 90)	Mean difference	t-value
Variables	**Mean ± (S.D)**	**Mean ± (S.D)**		
Age in years	59.05 (7.05)	60.78 (7.52)	-1.73	-1.50
Gender	0.23 (0.43)	0. 29 (0.46)	-0.26	-0.79
Household size	9.70 (3.65)	9.78 (3.85)	-0.08	-0.14
Working age in the household	4.42 (2.20)	4.90 (2.67)	-0.49	-1.26
Educational Qualification	2.43 (0.92)	2.40 (1.00)	0.03	0.20
Land ownership	89.55 (17.48)	93.13 (14.22)	-3.59	-1.43
Agric land under cultivation	5.31 (2.17)	5.16 (2.00)	0.16	0.47
Access to extension service	2.20 (1.26)	2.23 (0.92)	-0.03	-0.20
Access to credit	0.21 (0.41)	0.25 (0.44)	-0.05	-0.68
Credit from rural community	0.26 (0.44)	0 .29 (0.45)	-0.02	-0.41
Information from group farmers	4.53 (0.62)	4.39 (0.64)	0 .15	1.47

Source: Field survey Note: *** 1% level of significance; **5% level of significance; *10% level of significance
Standard deviations are reported in parentheses.

	Migrant households (n = 90)	Non-migrant households (n = 90)	Mean difference	t-value
Variables	**Mean ± (S.D)**	**Mean ± (S.D)**		
Food consumption score	56.34 (12.51)	51.49 (14.22)	4.84**	2.28

Source: Field survey Note: *** 1% level of significance; **5% level of significance; *10% level of significance
Standard deviations are reported in parentheses.

4. Results

4.1 Remittances importance and type

The households which are part of the sample received most often financial remittances (47.5% of households very often and 28.1% often), followed by food (15% of households very often and 25% often) and clothes (2.5% often and 20.6% often).

Table 4
Types of Remittance Migrants Provide to Households (n = 90)

Variables	Food	Financial	Farm input	Clothes
Very often	15.0*	47.5	3.8	2.5
Often	25.0	28.1	6.3	20.6
Sometimes	44.0	19.4	27.0	55.6
Seldom	6.3	2.5	33.8	12.5
Never	8.8	2.5	28.7	8.8

Source: Field Survey ***Figures presented are percentages**

Table 5 shows the perceived importance of the use of financial remittances for household expenditures. Results show that farmers in the study area use financial remittances mainly for health expenses (70% household important), education (66% important), and food purchases (57.5% important).

Table 5
Perceived Importance of Financial Remittance Used to the Household (n = 90)

Variables	Important	Neutral	Unimportant
Buying seed	33.8	18.1	48.1*
Buying fertilizer	33.1	30.0	36.9
Health expenses	70.0	21.2	8.8
Education	66.3	21.3	22.5
Buying food	57.5	18.1	24.4
Household maintenance	38.8	23.8	37.5
Buying clothes	34.4	26.9	38.1
Buy pesticide	18.1	28.1	58.1
Source: Field Survey, ***Figures presented are percentages			

4.2. Determinants of household food security

As described earlier a binary probit model was used in order to analyze the main factors influencing the food security level. Table 6 shows the main determinants via the marginal effect and accompanying standard errors.

Treatment variables

The results of the binary probit model show that households that receive food remittances are 8.6% more likely to be food secure than those that do not (Table 6). Financial remittances do not have a statistically significant impact on food security. As the number of migrants per household increases, the probability of the household being food secure decreases - but the marginal effect is small.

Control variables

If the head of the household belongs to the ethnic majority, the probability of the household being food secure increases in our model. The lower the level of education, the more likely the household is to be food insecure. The effect of land ownership is influential in achieving food security. The results show a statistically significant positive effect between land ownership and food security among migrant households. Land size improves household food security. In addition, access to extension services has a statistically significant positive effect on the food security of migrant households. Access to extension services is associated with a 7.2% increase in migrant household food security.

Table 6
Determinants of Household Food Security in Migrant Households

Variables	Marginal effect	Std. Err.
Gender	0.051	0.484
Age	0.000	0.032
Primary education	-0.190***	0.676
Secondary education	-0.165**	0.619
Ethnic	0.096**	0.426
Number of migrants	-0.029*	0.143
Number of adults of working age	-0.007	0.088
Financial remittances	-0.013	0.494
Food remittances	0.086*	0.443
Land ownership	0.003**	0.013
Access to extension service	0.072**	0.289
Information from group farmers	0.008	0.326
Access to credit from rural community	-0.031	0.422
Access to governmental credit	0.076	0.663
Constant	-1.419	2.704
LR chi^2	46.36	
Pseudo R^2	0.428	
Statistical significance: * = 10% level ** =5% level *** = 1% level		

4.3 Impact of food and financial remittances on household food security

The results of the propensity score matching (Table 6) showed the average treatment effect of food remittance on the level of food security in the household. The results showed that receiving food remittances has a statistically significant positive impact on household food security, with an increase of about 7 points in food consumption scores among households that receive food remittances compared to households that do not. Furthermore, our findings showed that remittances of money have no statistically significant impact on the food security of households. indicating a small improvement in their household's food security, or an increase of 0.086 food consumption scores. Figures 2 and 3

illustrate the estimates and distribution of Kdensity and propensity scores for food and financial remittances in relation to households' food security status.

Table 7
Average treatment effect of food and financial remittance on households' food security status

Variable sample	Treated	Controls	Difference	Std. Err.	T-value
Food remittances FCS unmatched	56.338	51.494	4.844	2.125	2.280**
ATT	56.581	49.608	6.973	3.444	2.020**
Financial remittances FCS Unmatched	54.529	51.641	2.888	2.502	1.150
ATT	53.524	53.438	0.086	3.741	0.020
Source Authors own elaboration Matching Algorithm: Nearest Neighbor Matching, Statistical significance: * = 10% level ** =5% level *** = 1% level, treatment: households with food and financial remittances total sample n = 180; Standard errors are bootstrapped by 100 replications					

5. Discussion

The results of the survey show that migrant households most often received remittances, followed by food and clothing. This finding is consistent with the findings of (Ajaero et al., 2018; Javed et al., 2017), who all found that the majority of remittances received by households from migrant family members are in the form of money, followed by food and then clothes. The migrant stallholders use remittances mainly for health expenses, education, and food purchases. This is consistent with the findings of (Ajaero et al., 2018; Dhakal and Maharjan, 2018; Javed et al., 2017), whom all stated in their studies conducted in Nigeria, Nepal, Pakistan and the Philippines that the most common uses of remittances are for food purchase, health care, and education of household members.

The results of our study show that financial remittances did not have a statistically significant impact on food security in our model. This supports our first hypothesis. The main reason, which is also validated through the descriptive results, is that financial remittances are used especially for health and education expenditures and less for buying food. Another reason can be that household heads can turn to misuse the money sent to them on things that are not necessary rather than their basic need. This is consistent with other studies finding that remittances are used for conspicuous consumption (Carling, 2008; Kakhkharov and Ahunov, 2022) such as the case of high spending on weddings for gaining higher households' social status through obvious wealth displays. Another argument can be the overestimated importance of financial remittances in other studies (Konte, 2018; Cazachevici et al., 2020) and the inability to consider alternative sources of income for the household. As Mora-Rivera & van Gameren, (2021) find in their review, although financial remittances are a crucial coping mechanism, they are insufficient to end the precarious food insecurity experienced by poor households in rural areas.

In our study, the results of the average treatment effect result revealed that migrant households receiving remittances food remittances are secure compared to households not receiving remittances. This finding supports hypothesis 2, emphasizing the fact that food remittances are an important type of remittance received in the study area and have a significant positive impact on food security status in our model. This is consistent with the findings of (Obi et al., 2020; Duda et al., 2018; Djurfeldt 2022; Sulemana et al., 2018; Giannelli and Canessa, 2021), who found that migrant households were more food secure than non-migrant households when received food remittances. For example, Djurfeldt (2015) reported that food remittances are part of a complex web of interrelations that characterizes social safety nets in the Global South which helps to improve household food security status. Similarly, Kuuire et al. (2013) reported that food remittances had a positive influence on the quantity, frequency, and kind of food consumed.

The study findings show that the increase in the number of migrants in a household has a significant negative impact on the household's food security status. This may be due to a loss of labour in the migrant household and shortage and higher costs for labour (Salau et al., 2020). Therefore, Hypothesis 3 (The higher the number of migrants in the household, the higher the food security) is rejected.

The findings from control variables shed light on the other determinants influencing food security. As expected, the results of the binary logit model showed that people from smaller ethnic groups were less likely to be food secure. This is consistent with the findings of a study conducted in Nigeria (Ajaero et al., 2018). This may be due to the fact that ethnic minorities in Bauchi State are discriminated against, marginalised and poorly represented in political structures and decision-making bodies (Folmi, 2017).

Food-secure households had the highest educational attainment, while food-insecure households had the lowest. This finding is consistent with the findings of other studies (Mutisya et al., 2016), which reported that household heads with no formal education, primary and secondary education, and no tertiary education were more likely to report being in the severely food insecure category than those with tertiary education.

Land ownership is a positive predictor of food security. This is consistent with (Shiferaw et al., 2014; Jabbar et al., 2020; Nkomoki et al., 2019; Ogunniyi et al., 2020), who reported that land ownership improves household food security.

Access to extension services is statistically significant and positively associated with improved food security among migrant households. This is consistent with the findings of (Danso-Abbeam et al., 2018; Corsi et al., 2017; Ogunniyi et al., 2020), who reported that access to extension services is likely to improve food security in farming households by providing farmers with improved technologies and production protocols.

6. Conclusions

The study examines how migration and remittances affect household food security status, using data collected from a survey in 2018 in the state of Bauchi, northern Nigeria. Using the food consumption score (FCS) indicator, a binary probit model was used to explore factors influencing household food security.

Our findings point to two intriguing issues. We discover that receiving financial remittances is not affecting food security while households receiving food remittances were found to be more food secure than those who did not. The results provide the basis for an interventional approach from policymakers aiming to increase the effectiveness of financial remittances. In order to drive financial remittances into investments there is a need to provide complementary grants for matching the existing use of remittances with additional financial means for larger farm investments. Agriculture support policies should consider the unlocked potential of migrants' families by targeting them with investing grants. This is likely to ensure that remittances are put to the best possible use. Matching grants should be accompanied by advisory services in order to increase the ability of the receiving households in becoming more literate toward technology use and address better the human labor gaps shrined due to consistent migratory movement.

Furthermore, the results revealed that households with higher land ownership have a significant positive relationship with their household food security. Thus, an emphasis on reviewing the land use act policy is required to better address the traditional marginalization and inequalities in land ownership in order to increase access to food for landless households. Considering the fragility of the land market and the slow progress of land reforms, support for incentivizing land rental is fruitful for strengthening farmers' food security. These programs should focus on people from minority ethnic groups who were less likely to be food secure.

The results show that with an increase in the number of migrants in a household, the probability of the household being food secure decreases. Therefore, further consideration should be given to assessing the human labor gap by exploring the coping mechanism of the farmers.

The lack of baseline and recall data on household income, productivity, and food security before the study is a limitation. As a result, future studies should include baseline data to obtain more robust and reliable data. Future studies should use factual and counterfactual analysis (treatment and control) to reduce selection bias in the current study. The study calls for longitudinal research. While empirical findings for more food remittances can best address food security needs (when compared to financial remittances), in the long run, it is interesting to estimate the relative effect of financial remittances to improve farming conditions/capacities.

Declarations

Acknowledgment

The study gratefully acknowledges the Faculty of Tropical AgriScience, Czech University of Life Sciences Prague, for funding data collection through the Internal Grant Agency (grant number: 20223113). Thank you for all your help with the questionnaire design, data analysis, and result discussion, Miraslova Bavorova. Furthermore, I would like to thank Drini Imami and Edvin Zhllima for their help during my Erasmus+ stay at the University of Agriculture Tirana in developing the methodology and discussing the results.

Conflicts of interest

The authors stated that there is no conflict of interest.

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Figures

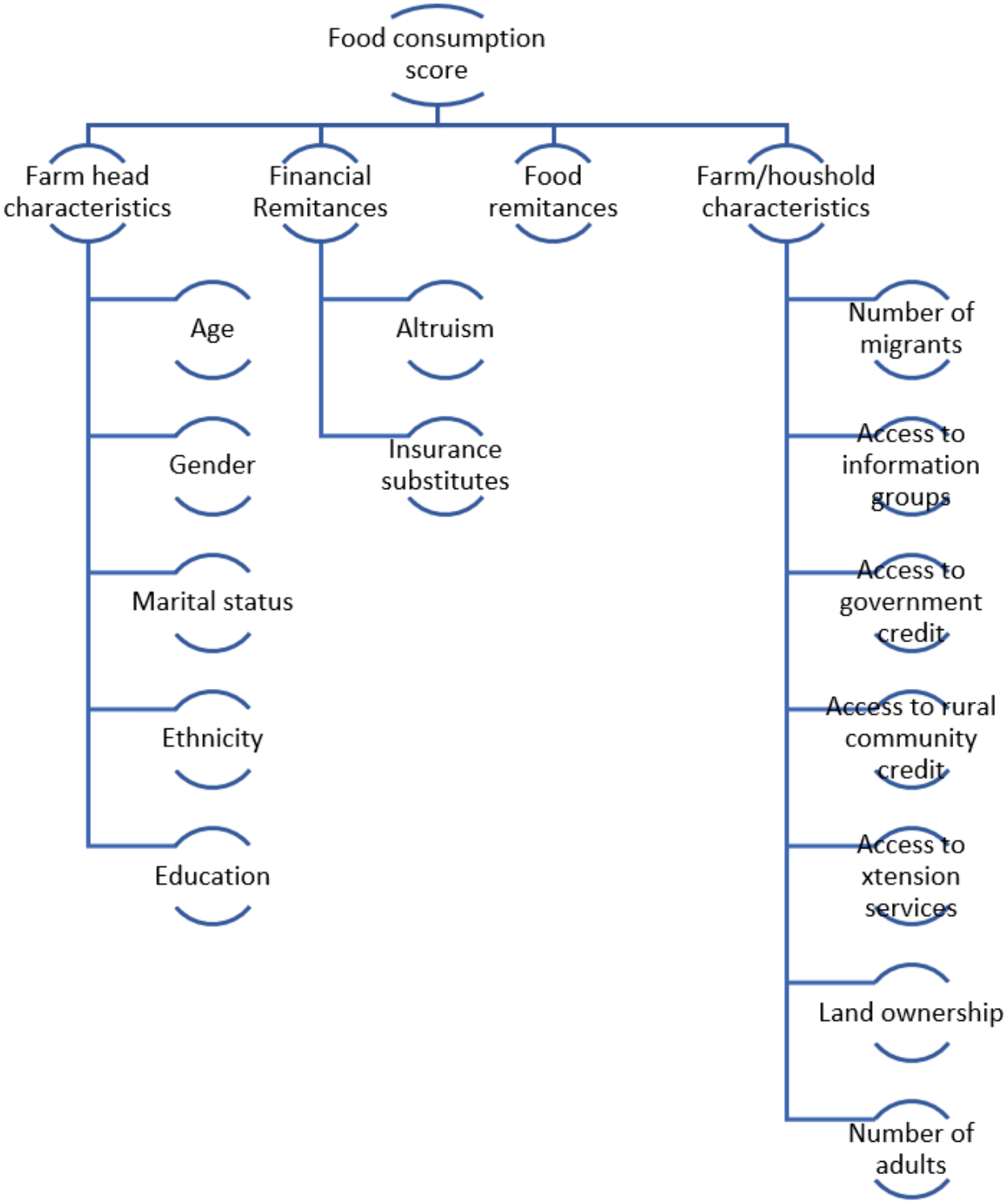


Figure 1

Conceptual framework for illustrating factors influencing food security

Source Authors own elaboration

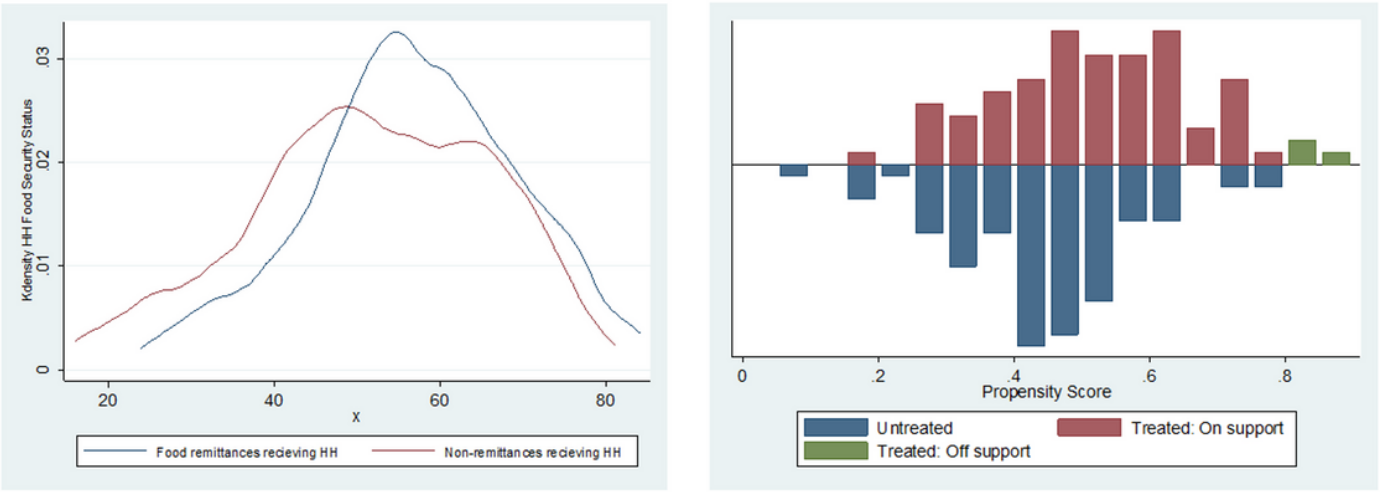


Figure 2

Kdensity estimate and propensity scores distribution between food remittance and non-remittance receiving households on their household food security status.

Source Authors' own elaboration

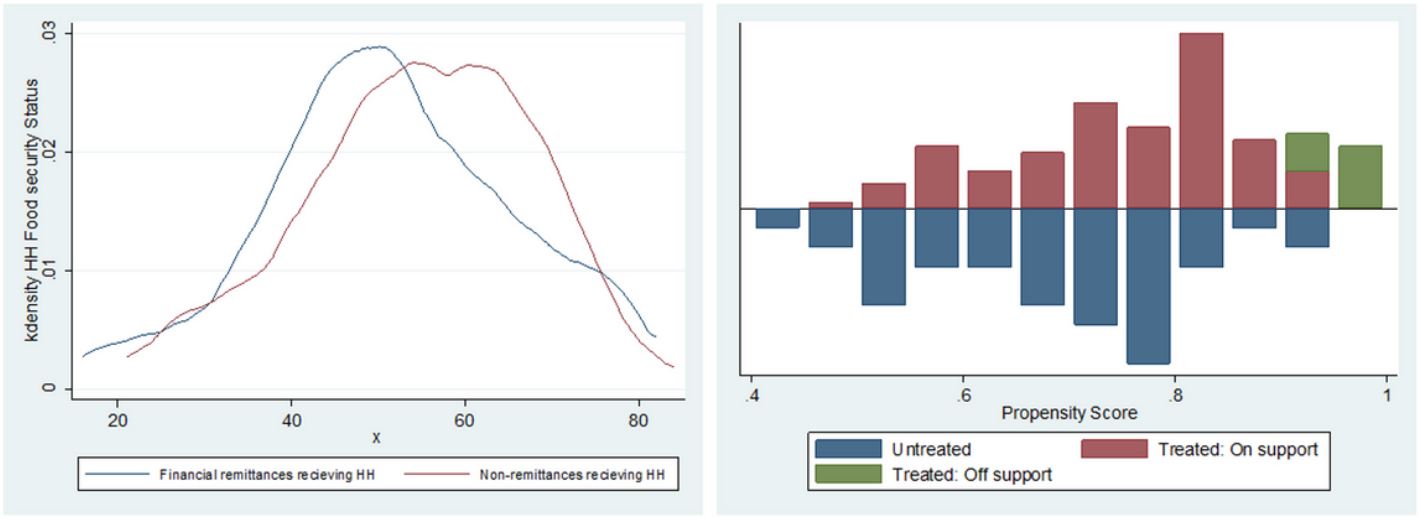


Figure 3

Kdensity estimate and propensity scores distribution between financial remittance and non-remittance receiving households on their household food security status.

Source Authors' own elaboration