Migration and Development

ISSN: 2163-2324 (Print) 2163-2332 (Online) Journal homepage: http://www.tandfonline.com/loi/rmad20

International remittances and household food security in Sub-Saharan Africa

Iddisah Sulemana, Ebenezer Bugri Anarfo & Peter Quartey

To cite this article: Iddisah Sulemana, Ebenezer Bugri Anarfo & Peter Quartey (2018): International remittances and household food security in Sub-Saharan Africa, Migration and Development, DOI: 10.1080/21632324.2018.1560926

To link to this article: https://doi.org/10.1080/21632324.2018.1560926

Published online: 25 Dec 2018.

MIGRATION AND DEVELOPMENT
https://doi.org/10.1080/21632324.2018.1560926

Routledge
Taylor & Francis Group

ARTICLE

International remittances and household food security in Sub-Saharan Africa

Iddisah Sulemana[a], Ebenezer Bugri Anarfo[b] and Peter Quartey[c]

[a]Department of Economics, University of Ghana, Legon, Accra, Ghana; [b]Department of Finance, Business School, Business School, Ghana Institute of Management & Public Administration, Achimota, Accra, Ghana; [c]Institute of Statistical, Social and Economic Research, University of Ghana, Legon, Accra, Ghana

ABSTRACT

The impact of international remittances on various social, economic and political phenomena has been studied by scholars. A limited number of these studies have examined whether international remittances influence household food security. However, most of these studies are country-specific. Other studies explore specific regions or towns within a country. Cross-country studies on the topic are lacking. We attempt to fill this gap by examining data for over 48,000 people in 32 Sub-Saharan African countries. Our results reveal two facts: First, we find that receiving international remittances is positively associated with more household food security. Second, and more remarkably, the frequency of receiving remittances matters more for this relationship. Accordingly, we conclude that while international remittances are important for improving household food security, the frequency with which they are received is more important.

ARTICLE HISTORY
Received 15 October 2018
Accepted 18 December 2018

KEYWORDS
Food security; household welfare; remittances; Sub-Saharan Africa

1. Introduction

Food insecurity has become a global concern for world leaders and policymakers (Abdullah et al., 2017).[1] The number of people who are malnourished has increased to about 842 million, approximately 12% of the total population of the world (Abdullah et al., 2017; FAO, 2013). The most afflicted countries with respect to food insecurity are developing countries. This is particularly true for African and Asian countries where more than 92% of the world's undernourished and malnourished people live (FAO, 2013). It has been estimated that about 226.4million and 552 million malnourished people live in Africa and Asia, respectively (FAO, 2013). Thus, Africa currently faces a major problem of how to feed her ever-increasing population (Rukuni, 2002). Furthermore, about 90% of the rural population in Africa primarily rely on agriculture for their livelihood (Rukuni, 2002).

With climate change and other agroecological factors threatening adequate food supply, meeting the food requirements of rural households has become an enormous challenge (Rukuni, 2002). Due to the deleterious consequences of food insecurity and hunger, Goal 2 of the Sustainable Development Goals (SDGs) aims to 'End hunger,

CONTACT Iddisah Sulemana idsulemana@ug.edu.gh Department of Economics, University of Ghana, P. O. Box LG 57, Legon, Accra, Ghana

achieve food security and improved nutrition and promote sustainable agriculture' while Goal 3 seeks to 'Ensure healthy lives and promote well-being for all at all ages' (United Nations Environment Programme, 2015). In this regard, international remittances have become a major source of household income and development finance in Africa (e.g. Mabrouk & Mekni, 2018). Indeed, a major issue that has gained much momentum in the last two decades globally is the role international remittances play in influencing many socio-economic phenomena (Adams & Page, 2005; Gupta, Pattillo, & Wagh, 2009; Quartey, 2006a, 2006b; Taylor, 1999). These studies have mostly focused on the effect of remittances on poverty reduction (Adams & Page, 2005; Gupta et al., 2009), child growth (Carletto, Covarrubias, & Maluccio, 2011), employment (Taylor, 1999), household investment and expenditures (Adams, 2006; Adams & Cuecuecha, 2010), and economic growth (Chami, Hakura, & Montiel, 2012; Pradhan, Upadhyay, & Upadhyaya, 2008). Ironically, most of the empirical studies that examine the nexus between remittances and food insecurity are single-country studies (see Babatunde & Martinetti, 2011; Regmi & Paudel, 2016).

While the quantity of international remittances to African countries has been increasing tremendously over the years, remittances and their effect on food security have received little attention (e.g. Mabrouk & Mekni, 2018). A limited number of studies have examined the effect of food and international remittances on household food security. It is for this reason that this study seeks to explore the association between self-reports of international remittances and household food security in Sub-Saharan Africa. Moreover, considering that single-country studies do not permit for the general applicability of study findings, we believe that employing a large dataset covering 32 countries for over 48,000 people provides a better picture for understanding the association between remittances and household food security in Sub-Saharan Africa.

2. Background literature

Remittances are private financial assistance to households for which no *quid pro quo* is required in economic value (Addison, 2005; Quartey, 2006a, 2006b). Remittances tend to have a counter-cyclical nature in the sense that they serve as a major source of consumption smoothing strategies for households (Quartey, 2006a). There is an increasing body of empirical evidence that shows that migrants' remittances are critical for the survival of households in several developing and emerging economies (e.g. Konseiga, 2006; Quartey, 2006b; Quartey & Blankson, 2003). Some empirical studies have investigated the effect of remittances on food security (e.g. Atuoye, Kuuire, Kangmennaang, Antabe, & Luginaah, 2017; Babatunde & Martinetti, 2011; Lacroix, 2011; Mabrouk & Mekni, 2018; Regmi & Paudel, 2016, 2017). For instance, studies have found that remittances increase the level of food consumption, food security and welfare among remittance-receiving households (Quartey & Blankson, 2004; Generoso, R2015; Quartey, 2006b; Regmi & Paudel, 2016, 2017; Atuoye et al., 2017).

Kuuire, Mkandawire, Arku, and Luginaah (2013) examined the role of food remittances within the context of household food security in Ghana and suggest a tendency for rural poor families to depend on food remittances as a strategy for coping with chronic household food insecurity amidst poverty, changing patterns of rainfall and declining soil fertility. Similarly, Atuoye et al. (2017) investigated the relationship between residential remittances

and food security in the Upper West region of Ghana and found that, relative to urban non-remittance receiving households, urban remittance-receiving households and rural households (whether they received remittances or not) were significantly more likely to indicate being severely food insecure. Additionally, they found that household survival strategies (including migration and remittances) were necessary but not sufficient conditions for ameliorating the precarious food insecurity problems in the region leading them to suggest development of alternative livelihoods in the region.

Other empirical studies have confirmed that remittances improve household food security in Nigeria (Babatunde & Martinetti, 2011), Mali (Generoso, R2015), Bangladesh (Regmi & Paudel, 2016), Nepal (Regmi & Paudel, 2017) and Africa generally (Mabrouk & Mekni, 2018). Thus, the empirical literature reveals that remittances do impact the lives of households (e.g. Adams & Page, 2005; Gupta et al., 2009; Koc & Onan, 2001; Quartey, 2006b; Regmi & Paudel, 2016). Not only are remittances often used to satisfy basic needs such food and shelter, they are also used for investment in small-scale businesses, livestock farming and education, etc. (Russell, Jacobsen, Stanley, & Mundial, 1990; Diatta and Mbow, 1999). While the effect of remittances on income inequality remains unclear (Gustafson and Makonnen, 1993; Chimhowu, Piesse, & Pinder, 2004), it seems consensual in the literature that remittances reduce poverty (Adams & Page, 2005; Anyanwu & Erhijakpor, 2010; Koc & Onan, 2001). For instance, using data for 71 developing countries, Adams and Page (2005) found that a '10% increase in per capita official international remittances will lead to a 3.5% decline in the share of people living in poverty' (p. 1645).

Because poor people tend to spend a relatively larger proportion of their income on food (Lacroix, 2011) and because remittances augment household incomes (Adams & Page, 2005; De & Ratha, 2012; Gupta et al., 2009; Regmi & Paudel, 2016), remittances could improve the food security situation of the receiving households (Lacroix, 2011; Regmi & Paudel, 2016). As Regmi and Paudel (2016) put it succinctly 'Food insecurity is related to poverty. Increased food production does not guarantee food security if households cannot afford to purchase food. Therefore, as long as the availability of remittances improves the house hold poverty situation, overall food security for households can be improved' (p. 146).

There is also evidence to the effect that not only do remittances typically accrue to households in the lower income brackets within a country but that remittances help such households climb up on their income quintiles (De & Ratha, 2012). Remittances may also help households to build their asset ownership (Adams, 1998; Guo, 2011; Rose, Gundersen, & Oliveira, 1998). Thus, *a priori*, we expect that households who receive international remittances frequently will tend to report higher food security. Virtually all these studies are micro-level studies and focus on a particular country or a region or town within a country. An exception is Mabrouk and Mekni (2018) who tested the effect of remittances on food security in Africa at the macro-level using World Bank data. To the best of our knowledge, the present paper is the first cross-sectional microeconomic study to examine the relationship between international remittances and food security, especially in Sub-Saharan Africa.

3. Data and empirical strategy

We used data from the Round 6 of the Afrobarometer Surveys conducted in 2016. The surveys explore public attitudes toward economic conditions, democracy, governance and other phenomena among Africans. The Round 6 of the surveys were conducted in 36 African countries.[2] However, because this study focuses on Sub-Saharan Africa, Algeria, Egypt, Morocco and Tunisia were excluded from the analysis. The original dataset had 53,936 respondents. After dropping observations for missing responses for the variables of interest, the study is based on a total of 48,080 respondents. Of all the Rounds in the Afrobarometer Surveys, the question on receiving remittances was only asked in Rounds 4 and 6. Our choice of Round 6 is informed by the fact that it covered more countries with a sample size almost twice the size of Round 4.

3.1. Dependent variable

Our dependent variable is the food security status of the household. Food availability is a major issue especially for less developed countries in Africa (Mabrouk and Mekni, 2018; Verpoorten, Arora, Stoop, & Swinnen, 2013). Due to the multidimensional nature of food security, it is challenging to measure food security accurately for the purposes of policy design, implementation and monitoring. However, consistent with prior studies, our measure of food security is based on a survey question that asked respondents to indicate the frequency of them or anyone in their household going without enough food to eat over the past year (see e.g. Mpesi & Muriaas, 2012; Verpoorten et al., 2013). It was presented as follows: 'Over the past year, how often, if ever, have you or anyone in your family: Gone without enough food to eat?' [0 = Never, 1 = Just once or twice, 2 = Several times, 3 = Many times, 4 = Always]. For ease of interpretation, we reverse coded these responses so that higher figures mean being more food secure.

3.2. Main independent variable of interest

The main independent variable of interest is remittances. It gauges the frequency with which the respondent or someone in their household receives international remittances. Respondents were asked the following: 'How often, if at all, do you or anyone in your household receive money remittances from friends or relatives living outside of the country?' [5 = At least once a month 4 = At least every three months 3 = At least every six months 2 = At least once a year 1 = Less than once a year, 0 = Never].[3]

3.3. Control variables

We control for other factors that the literature identifies as determinants of household food security. Older people may be more or less food secure (Generoso, 2015) suggesting a non-linear relationship between age and food security (Kuwornu, Suleyman, & Amegashie, 2013). In Africa, women generally tend to have less economic power relative to men and lack entitlement to access land and other productive resources (Kerr, 2005). Therefore, gender (especially if the respondent is the household head) may influence household food security status (e.g. Kassie, Ndiritu, & Stage, 2014; Kerr, 2005; Regmi & Paudel, 2016, 2017).

Educated people may also be more food secure (Generoso, 2015; Regmi & Paudel, 2016). Unemployment may also lead to food insecurity through education and lower household income (Etana & Tolossa, 2017; Loopstra & Tarasuk, 2013). Some prior studies have also shown that asset ownership including home ownership influences the food security situation of households (e.g. Guo, 2011; Rose et al., 1998). We constructed asset ownership as a summed score index for ownership of radio, television, motor vehicle, car, or motorcycle, and mobile phone. Other variables that could influence food insecurity included in the study are electricity connection (Habtewold, 2018), access to piped or safe drinking water (Iram & Butt, 2004) and whether the respondent's town of residence was rural or urban (e.g. Verpoorten et al., 2013).

3.4. Econometric model

Because of the ordinal nature of the dependent variable, we follow the approach proposed by McKelvey and Zavoina (1975). In this approach, based on an individual's characteristics and economic circumstances, their food security status (FSS) can be transformed into some normally distributed latent index FSS_i^* with mean μ_i and variance equal to 1 – i.e. $FSS_i^* \sim N(\mu_i, 1)$ (McKelvey and Zavoina, 1975; see also Regmi & Paudel, 2016, 2017). Because FSS_i^* is a proxy for the individual's true, unobserved FSS_i, we can model FSS_i^* as a function of remittances and the control variables discussed above. Therefore, the econometric model is specified as follows:

$$FSS_{ij}^* = \alpha + \beta * REMIT_{ij} + \gamma * \sum_{i=1}^{n} CONTROLS_{ij} + \delta_j + \varepsilon_{ij} \tag{1}$$

where *FSS* denotes household food security status, REMIT is remittances and *CONTROLS* represent the control variables. α is a vector of thresholds, and β and γ are vectors of parameters to be estimated. *i* and *j* index the individual and country, respectively, and country fixed effects are captured by δ_j while ε_{ij} is the idiosyncratic error term. The unobserved FSS can be translated into observed FSS via the following model:

$$FS_i = \begin{cases} 0 \ if \ -\infty \leq \ FSS_i^* \leq \tau_0 \\ 1 \ if \ \tau_0 \leq \ FSS_i^* \leq \tau_1 \\ 2 \ if \ \tau_1 \leq FSS_i^* \leq \tau_2 \\ \vdots \\ 5 \ if \ \tau_4 \leq \ FSS_i^* \end{cases} \tag{2}$$

such that $i = 1, 2, 3, \ldots, 5$ are the food security categories and τ_i represents the various thresholds.

Table 1. Variable descriptions, expected signs and summary statistics.

Variable	Description	Expected sign	Mean	S. D.	Range
Food security (ordinal)	Ordinal variable based on the question "Over the past year, how often, if ever, have you or anyone in your family: Gone without enough food to eat?"[5] [0 = Always, 1 = Many times, 2 = Several times, 3 = Just once or twice, 4 = Never]	n.a.	3.0298	1.1821	0–4
Food security (binary)	Binary variable equal to unity if respondent indicated 'Never' to the question question "Over the past year, how often, if ever, have you or anyone in your family: Gone without enough food to eat?; and zero otherwise	n.a.	0.5235	0.4995	0–1
Remittances	Ordinal variable based on the question 'How often, if at all, do you or anyone in your household receive money remittances from friends or relatives living outside of the country?' [0 = Never, 1 = Less than once a year, 2 = At least once a year, 3 = At least every six months, 4 = At least every three months, 5 = At least once a month]	+	0.6033	1.4022	0–5
At least once a month	Unity if respondent or someone in their household receives money from friends or relatives abroad at least once a month; zero otherwise	+	0.0507	0.2194	0–1
At least every three months	Unity if respondent or someone in their household receives money from friends or relatives abroad at least every three months; zero otherwise	+	0.0384	0.1922	0–1
At least every six months	Unity if respondent or someone in their household receives money from friends or relatives abroad at least every six months; zero otherwise	+	0.0287	0.1670	0–1
At least once a year	Unity if respondent or someone in their household receives money from friends or relatives abroad at least once a year; zero otherwise	+	0.0396	0.1950	0–1
Less than once a year	Unity if respondent or someone in their household receives money from friends or relatives abroad less than once a year; zero otherwise	+	0.0307	0.1726	0–1
Never	Unity if respondent or someone in their household had never received money from friends or relatives abroad; zero otherwise		0.8118	0.3909	0–1
Age	Age of respondent (in years)	+/-	37.1165	14.5183	18–103
Female	Unity if female; zero otherwise	-	0.5021	0.5000	0–1
Education	Highest educational attainment (0 = No formal education, 9 = 9 = Post-graduate)	+	3.5829	4.4336	0–9
Unemployed	Unity if unemployed; zero otherwise	-	0.2405	0.4274	0–1
Asset ownership	Index of asset ownership including radio, television, motor vehicle, car, or motorcycle and mobile phone	+	2.1270	1.2102	0–4
Electricity connection	Unity if respondent's household had electricity; zero otherwise	+	0.5438	0.4981	0–1
Access to piped water	Unity if respondent had access to piped water; zero otherwise	+	0.5727	0.4947	0–1
Urban	Unity if respondent resided in an urban town; zero otherwise	+	0.7410	0.4381	0–1

4. Results and discussion

The descriptions, expected signs and summary statistics for the variables used in the study are reported in Table 1. The mean score for food security was 3.029 on a 0–4 scale suggesting that the majority of the respondents reported being food secure. The mean frequency of receiving international remittances was 0.6033, which lies between 0 (= Never) and 1 (= Less than once a year). A further examination of the categories of

receiving remittances reveals that about 81.18% of respondents had *never* received remittances while 3.07% had received remittances less than once a year. Additionally, 3.96%, 2.87%, 3.84% and 5.07% of them had received remittances less than once a year, at least once a year, at least every six months, at least every three months and at least once every month, respectively. Regarding the socio-demographic characteristics of the respondents, their ages ranged from 18 to 103 years with an average of 37 years, 50.21% were female, the mean educational attainment was some secondary school education and 24.05% of them reported being unemployed. The mean score for asset ownership was 2.120 suggesting that the average respondent owned about two of the assets listed. About 54.38% of them had electricity connection while 57.27% of them had access to piped or safe drinking water. Finally, 74.10 % of the respondents resided in an urban town.

Figure 1 illustrates the proportion of respondents in each country who had never gone without enough food to eat. In other words, these respondents reported being completely food secure. The data reveal significant variations in food security across the countries in the sample. These ranged from a low of 29.75% in Gabon to a high of 96.69% in Mauritius. Thus, across the countries studied, Gabon recorded the least level of food security while Mauritius was the most food secure country. Less than half of respondents reported being food secure in 10 of the countries – Burundi (33.92%), Gabon (29.75%), Liberia (33.58%), Lesotho (47.56%), Madagascar (35.48%), Malawi (39.60%), Mozambique (41.69%), Niger (43.13%), Sierra Leone (48.29%) and Togo (49.66%) – while the rest had at least 50% of their respondents indicating being food

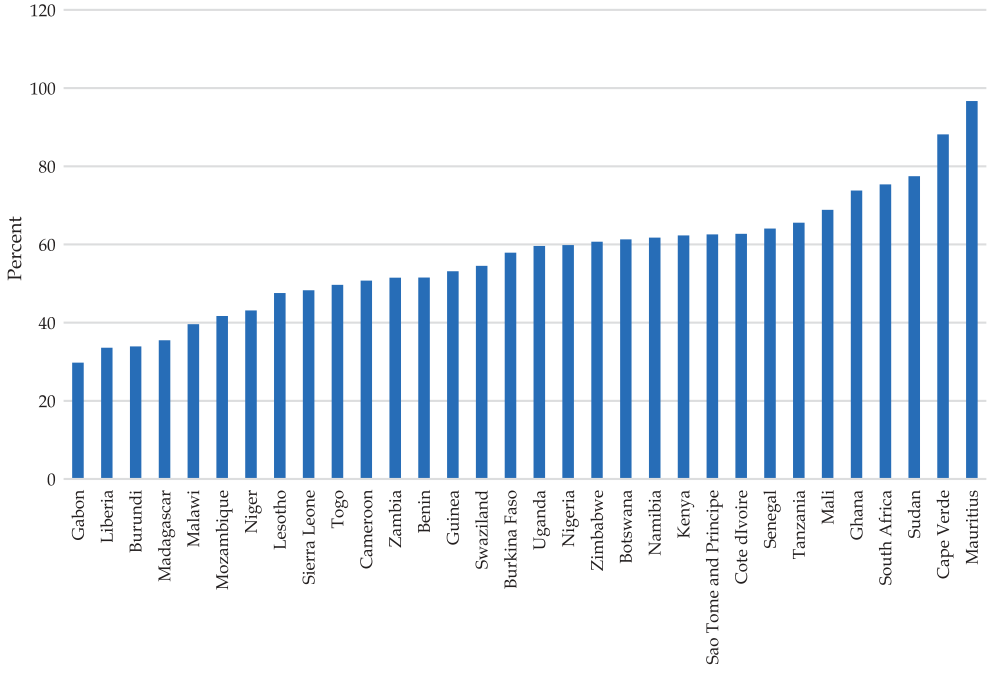

Figure 1. Proportion of respondents who had *never* gone without enough food to eat.

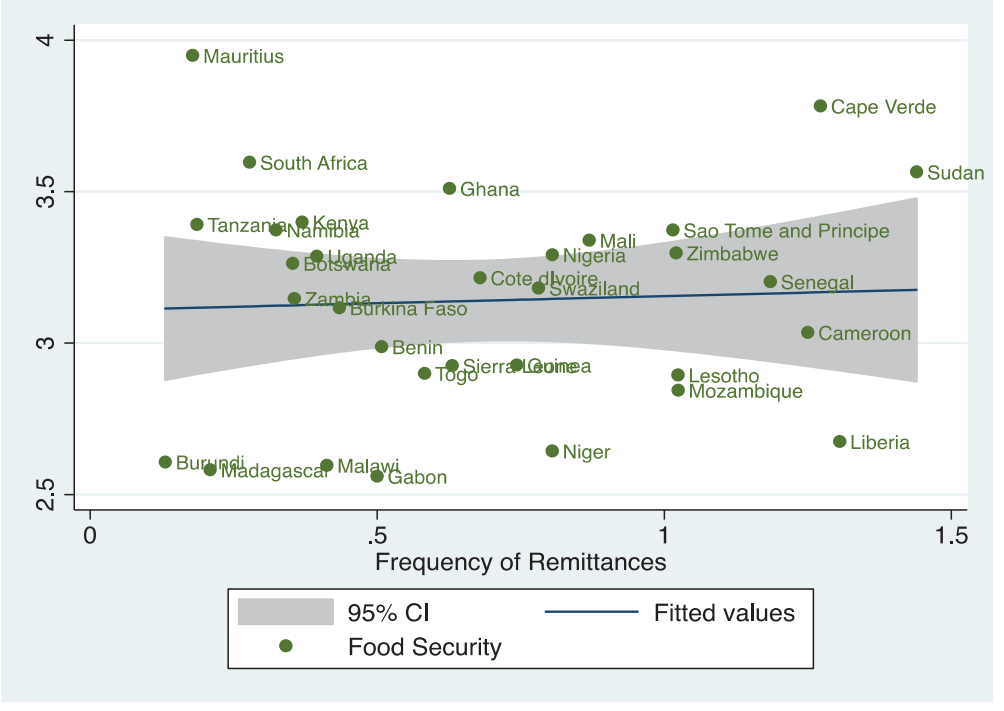

Figure 2. Relationship between remittances and food security.

secure. At least 70% of respondents reported being food secure in Ghana (73.78%), South Africa (75.35%), Sudan (77.45%), Cape Verde (88.15) and Mauritius (99.69%).

We computed the average scores for the frequency with which respondents received international remittance and their household food security status. Figure 2 shows the scatterplot for this exercise. The fitted line is slightly positively sloped and does not seem to show a very strong positive correlation between remittances and food security. Some of the food secure countries are also among the least remittances-receiving countries (e.g. Mauritius and South Africa) while others are high remittance-receiving but reported low food security (e.g. Liberia, Cameroon, Lesotho, Mozambique, etc.). These variations suggest the need to control for country fixed effects in the regression analysis.

In what follows, we present the results of the ordered logistic regressions. Table 2 reports the results when we ran food security status on remittances while controlling for other covariates. Here, the frequency of remittances was treated as an ordinal variable. Therefore, a positive and significant coefficient on remittances implies that an increase in the frequency of receiving remittances (say, from "never" to "less than once a year", etc.) is associated with higher food security. After controlling for other covariates, the results indicate a coefficient on remittances of 0.0486 and 0.0724 for the models with and without country fixed effects, respectively. They are both statistically significant at the 0.1% level. The interpretation is that a unit increase in the frequency of remittances is correlated with a 0.0486 and a 0.0724 increase in the respondent's food security status in the models with and without country fixed effects, respectively. However, given the

Table 2. Parameter estimates and marginal effects for the effect of international remittances on food security in Africa.

	Coefficient	Marginal effects					Coefficient	Marginal effects				
Variable	Food security	Always	Many times	Several times	Just once or twice	Never	Food security	Always	Many times	Several times	Just once or twice	Never
Frequency of remittances												
Remittances	0.0486***	−0.0012***	−0.0043***	−0.0043***	−0.0012***	0.0110***	0.0724***	−0.0018***	0.0062***	−0.0059***	−0.0014***	0.0153***
	(0.0066)	(0.0002)	(0.0006)	(0.0006)	(0.0002)	(0.0015)	(0.0069)	(0.0002)	(0.0006)	(0.0006)	(0.0001)	(0.0015)
Control variables												
Age	−0.0376***	0.0009***	0.0033***	0.0033***	0.0009***	−0.0085***	−0.0400***	0.0010***	0.0034***	0.0033***	0.0008***	−0.00847***
	(0.0031)	(0.0001)	(0.0003)	(0.0003)	(0.0001)	(0.0007)	(0.0032)	(0.0001)	(0.0003)	(0.0003)	(0.0001)	(0.0007)
$Age^2/100$	0.0031***	−0.0089***	−0.0303***	−0.0300***	−0.0081***	0.0768***	0.3378***	−0.0084***	−0.0289***	−0.0275***	−0.0067***	0.0715***
	(0.3444)	(0.0009)	(0.0031)	(0.0030)	(0.0008)	(0.0077)	(0.0352)	(0.0009)	(0.0030)	(0.0029)	(0.0001)	(0.0074)
Female	0.0271	−0.0007	−0.0024	−0.0024	−0.0006	0.0061	0.0037	−0.0001	−0.0003	−0.0003	−0.0001	0.0008
	(0.0180)	(0.0004)	(0.0016)	(0.0016)	(0.0004)	(0.0041)	(0.0183)	(0.0005)	(0.0016)	(0.0015)	(0.0004)	(0.0039)
Education	0.0206***	−0.0005***	−0.0018***	−0.0018***	−0.0005***	0.0047***	0.0213***	−0.0005***	−0.0018***	−0.0017***	−0.0004***	0.0045***
	(0.0029)	(0.0001)	(0.0003)	(0.0003)	(0.0001)	(0.0007)	(0.0030)	(0.0001)	(0.0003)	(0.0002)	(0.0001)	(0.0006)
Unemployed	−0.3541***	0.0088***	0.0315***	0.0312***	0.0084***	−0.0800***	−0.3027***	0.0075***	0.0259***	0.0247***	0.0060***	−0.0641***
	(0.0207)	(0.0006)	(0.0019)	(0.0018)	(0.0005)	(0.0046)	(0.0215)	(0.0006)	(0.0019)	(0.0018)	(0.0004)	(0.0045)
Asset ownership	0.3694***	−0.0092***	−0.0328***	−0.0326***	−0.0088***	0.0834***	0.3350***	−0.0083***	−0.0287***	−0.0273***	−0.0067***	0.0709***
	(0.0088)	(0.0003)	(0.0008)	(0.0008)	(0.0003)	(0.0019)	(0.0092)	(0.0003)	(0.0008)	(0.0007)	(0.0002)	(0.0019)
Electric connection	0.3175***	−0.0079***	−0.0282***	−0.0280***	−0.0075***	0.0717***	0.2607***	−0.0065***	−0.0223***	−0.0212***	−0.0052***	0.0552***
	(0.0217)	(0.0006)	(0.0019)	(0.0019)	(0.0005)	(0.0049)	(0.0246)	(0.0006)	(0.0021)	(0.0020)	(0.0005)	(0.0052)
Access to piped water	0.2259***	−0.0056***	−0.0201***	−0.0199***	−0.0054***	0.0510***	0.2120***	0.00525***	−0.0181***	−0.0173***	−0.0042***	0.0449***
	(0.0199)	(0.0005)	(0.00177)	(0.0018)	(0.0005)	(0.0045)	(0.0219)	(0.0006)	(0.0019)	(0.0018)	(0.0004)	(0.0046)
Urban	−0.0666**	0.0017**	0.0059**	0.0059**	0.0016**	−0.0150**	−0.0255	0.0006	0.0022	0.0021	0.0005	−0.0054
	(0.0202)	(0.0005)	(0.0018)	(0.0017)	(0.0005)	(0.0046)	(0.0229)	(0.0006)	(0.0020)	(0.0019)	(0.0005)	(0.0005)
Country fixed effects	No	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R^2	0.0440						0.0730					
LR chi^2	5407.33***						8972.69***					
Log likelihood	-58728.38						-56945.699					
N	48,080						48,080					

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Standard errors are in parentheses.

ordinality of the food security score, it makes more sense to interpret results in terms of marginal effects. Therefore, the marginal effect of a unit increase in remittances on each of the categories of food security are reported.

For the models without country fixed effects, the results reveal that a unit increase in the frequency of remittances is associated with a 0.12%, 0.43%, 0.43% and 0.12% decline in the probability of reporting having gone without enough food to eat always, many times, several times and just once or twice, respectively. However, a unit increase in the frequency of receiving remittances is associated with a 1.10% increase in the probability that the respondent had never gone without enough food to eat. When we included country fixed effects, the coefficient as well as marginal effect for each food security category increased slightly in magnitude. Specifically, a unit increase in remittances is associated with a 0.0724 increase in reporting being food secure with the marginal effects being 0.18%, 0.62%, 0.59%, 0.14% and 1.53% for always, many times, several times, just once or twice and never going without enough food to eat, respectively.

We reran the models but treated the frequency of receiving remittances as ordinal. The results are reported in Table 3. The *never* category is the reference group for remittances. For the model without country fixed effects, the results reveal that, relative to respondents who had never received remittances, receiving remittances at least once a month is associated with a 0.4432 increase in food security, and this association is statistically significant at the 0.1% level. We, however, did not find significant differences between respondents who had never received remittances on the one hand and those who had received remittances less than once a year, at least once a year, at least every six months and at least every three months. With respect to the marginal effects, relative to the base category, respondents who received remittances at least once every month were 0.92%, 3.49%, 3.99% and 1.46% less likely to report having gone without enough food to eat always, many times, several times and just once or twice, respectively, but 9.86% more likely to report having never gone without enough food to eat.

The results are largely identical to those reported in Table 2 when we include country fixed effects (see Table 3). The magnitudes of the coefficients increase marginally. For instance, relative to those who indicated never receiving remittances, those who received remittances at least once every month were 1.08%, 4.04%, 4.54% and 1.60% significantly less likely to report always, many times, several times and just once or twice going without enough food to eat, respectively, but 11.26% more likely to indicate having never gone without enough food to eat. The only other change is that respondents who received remittances at least once a year were now significantly more likely to report being food secure compared to those who had never received remittances.

Taken together, these results reveal that remittances are positively correlated with household food security but that the frequency of receiving remittances also matters for this relationship. People who receive remittances frequently are less likely to be food insecure and more likely to be food secure. The results suggest that those who receive remittances less frequently are not significantly better off than those who do not receive remittances at all. This is consistent with the idea that remittances may improve household food security by augmenting household income. Therefore, if remittances are received less frequently, then household incomes are also supplemented less frequently and this may not help the food security situation of those households. This intuition is consistent with Friedman's (1957) permanent income hypothesis. In this regard,

Table 3. Parameter estimates and marginal effects for the effect of international remittances on food security in Africa.

		Marginal effects						Marginal effects				
Variable	Coefficient	Always	Many times	Several times	Just once or twice	Never	Coefficient	Always	Many times	Several times	Just once or twice	Never
Frequency of remittances (Ref = Never)												
At least once a month	0.4432***	−0.0092***	−0.0349***	−0.0399***	−0.0146***	0.0986***	0.5388***	−0.0108***	−0.0404***	−0.0454***	−0.0160***	0.1126***
	(0.0443)	(0.0008)	(0.0031)	(0.0040)	(0.0018)	(0.0096)	(0.0456)	(0.0008)	(0.0030)	(0.0039)	(0.0018)	(0.0093)
At least every three months	0.0536	−0.0013	−0.0047	−0.0048	−0.0013	0.0121	0.1333**	−0.0032**	−0.0112**	−0.0110**	−0.0029*	0.0283**
	(0.0472)	(0.0011)	(0.0041)	(0.0042)	(0.0012)	(0.0107)	(0.0484)	(0.0011)	(0.0039)	(0.0041)	(0.0012)	(0.0103)
At least every six months	−0.1056	0.0028	0.0098	0.0092	0.0021	−0.0240	−0.0060	0.0002	0.0005	0.0005	0.0001	−0.0013
	(0.0528)	(0.0015)	(0.0050)	(0.0046)	(0.0009)	(0.0120)	(0.0541)	(0.0014)	(0.0047)	(0.0044)	(0.0001)	(0.0115)
At least once a year	0.0361	−0.0009	−0.0032	−0.0032	−0.0009	0.0082	0.1538**	−0.0037***	−0.0129**	−0.0128**	−0.0034**	0.0327**
	(0.0458)	(0.0011)	(0.0040)	(0.0041)	(0.0011)	(0.0104)	(0.0468)	(0.0010)	(0.0038)	(0.0039)	(0.0012)	(0.0099)
Less than once a year	−0.0216	0.0006	0.0020	0.0019	0.0005	−0.0049	0.0517	−0.0013	−0.0045	−0.0042	−0.0010	0.0110
	(0.0512)	(0.0013)	(0.0047)	(0.0045)	(0.0011)	(0.0116)	(0.0524)	(0.0013)	(0.0045)	(0.0043)	(0.0011)	(0.0111)
Control variables												
Age	−0.0372***	0.0009***	0.0033***	0.0033***	0.0009***	−0.0084***	−0.0398***	0.0010**	0.0034***	0.0032***	0.0008***	−0.0084***
	(0.0031)	(0.0001)	(0.0003)	(0.0003)	(0.0001)	(0.0007)	(0.0032)	(0.0001)	(0.0003)	(0.0003)	(0.0001)	(0.0007)
$Age^2/100$	0.3383***	−0.0084***	−0.0301***	−0.0298***	−0.0080***	0.0763***	0.3364***	−0.0083***	−0.0288***	−0.0274***	−0.0067***	0.0712***
	(0.0344)	(0.0009)	(0.0031)	(0.0030)	(0.0008)	(0.0077)	(0.0352)	(0.0009)	(0.0030)	(0.0029)	(0.0007)	(0.0074)
Female	0.0254	−0.0006	−0.0022	−0.0022	−0.0006	0.0057	0.0024	−0.0001	−0.0002	−0.0002	−0.0000	0.0005
	(0.0180)	(0.0004)	(0.0016)	(0.0016)	(0.0004)	(0.0041)	(0.0183)	(0.0005)	(0.0016)	(0.0015)	(0.0004)	(0.0039)
Education	0.0206***	−0.0005***	−0.0018***	−0.0018***	−0.0005***	0.0047***	0.0213***	−0.0005***	−0.0018***	−0.0017***	−0.0004***	0.0045***
	(0.0029)	(0.0001)	(0.0003)	(0.0003)	(0.0001)	(0.0007)	(0.0030)	(0.0001)	(0.0003)	(0.0002)	(0.0001)	(0.0006)
Unemployed	−0.3552***	0.0089***	0.0316***	0.0313***	0.0084***	−0.0801***	−0.3028***	0.0075***	0.0259***	0.0246***	0.0060***	−0.0641***
	(0.0207)	(0.0006)	(0.0019)	(0.0018)	(0.0005)	(0.0046)	(0.0216)	(0.0006)	(0.0019)	(0.0018)	(0.0004)	(0.0045)
Asset ownership	0.3709***	−0.0093***	−0.0330***	−0.0327***	−0.0088***	0.0837***	0.3355***	−0.0083***	−0.0288***	−0.0273***	−0.0067***	0.0710***
	(0.0088)	(0.0003)	(0.0008)	(0.0008)	(0.0003)	(0.0019)	(0.0092)	(0.0003)	(0.0008)	(0.0007)	(0.0002)	(0.0019)
Electric connection	0.3188***	−0.0080***	−0.0283***	−0.0281***	−0.0075***	0.0719***	0.2605***	−0.0065***	−0.0223***	−0.0212***	−0.0052***	0.0551***
	(0.0217)	(0.0006)	(0.0019)	(0.0019)	(0.0005)	(0.0049)	(0.0246)	(0.0006)	(0.0021)	(0.0020)	(0.0005)	(0.0052)
Access to piped water	0.2232***	−0.0056***	−0.0198***	−0.0197***	−0.0053***	0.0503***	0.2116***	−0.0052***	−0.0181**	−0.0172***	−0.0042***	0.0448***
	(0.0199)	(0.0005)	(0.0018)	(0.0018)	(0.0005)	(0.0045)	(0.0219)	(0.0005)	(0.0019)	(0.0018)	(0.0004)	(0.0046)
Urban	−0.0661**	0.0016**	0.0059**	0.0058**	0.0016**	−0.0149**	−0.0249	0.0006	0.0021	0.0020	0.0005	−0.0053
	(0.0202)	(0.0005)	(0.0018)	(0.0018)	(0.0005)	(0.0046)	(0.0229)	(0.0006)	(0.0020)	(0.0019)	(0.0005)	(0.0048)
Country fixed effects	No	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R^2	0.0445						0.0734					
LR chi^2	5464.83***						9017.55***					
Log likelihood	-58699.63						-56923.266					
N	48,080						48,080					

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Standard errors are in parentheses.

households who receive remittances frequently (say, monthly) could construe them (remittances) as part of their permanent income while those who receive remittances occasionally would treat them as transitory income. Since consumption is based on permanent income rather than transitory income, the more frequent a household receives remittances, the lower is the likelihood that they would be food insecure. Finally, it may be that remittances cushion households from the impact of economic shocks on their welfare (Quartey, 2006b; Regmi & Paudel, 2017).

The results for the control variables as reported in Table 2 were very similar to those reported in Table 3. These results were also consistent with the results of prior studies except for the effect of gender on food security which turned out to be null. We found a non-linear relationship between age and food security in the sense that while an increase in age is initially negatively correlated with food security, at latter ages, age is positively correlated with being more food secure (Generoso, 2015; Kuwornu et al., 2013). Respondents with higher educational attainments were significantly more likely to report being food secure (and less likely to be food insecure). It may be that these respondents have more income than their less educated counterparts because poverty is more pervasive among uneducated or undereducated people (Generoso, 2015; Regmi & Paudel, 2016, 2017). Unemployed people were also less likely to report being food secure. This may be due to the income losses from being unemployed (Etana & Tolossa, 2017; Loopstra & Tarasuk, 2013). Respondents who owned more assets also tended to be more food secure than those who owned no or fewer assets (e.g.Habtewold, 2018).

We also find that access to electricity is positively correlated with being food secure thereby corroborating the results of prior studies (e.g. Habtewold, 2018). For instance, Habtewold (2018) found that, in Ethiopia, households that had electricity connection were about 4% more likely to report being food secure relative to those who did not. Our results reveal that those who had electricity were between 5.51% and 7.20% more likely to be food secure than those who lacked electricity connection. The results also indicate that respondents who had access to piped water were significantly more likely to report being food secure (e.g. Iram & Butt, 2004). Finally, we find that urban dwellers were significantly less likely to be food secure relative to their rural counterparts (see Teka-Tsegay, Rusare, & Mistry, 2014).

5. Robustness checks

To check the robustness of our results, we did the following: First, we ran OLS regressions for food security. This allowed us to test for multicollinearity by checking the variance inflation factors (VIFs). Second, we created a binary dependent variable equal to 1 if the respondent or anyone in their household had never gone without enough food to eat and 0 otherwise. We then ran linear probability models (LPM) for this binary dependent variable while checking for multicollinearity. Finally, we ran logistic regressions for the binary dependent variable. In all these models, we excluded the country fixed effects.

The results are presented in Table 4 and are consistent with those reported in Tables 2 and 3. We find that a unit increase in receiving remittances is associated with a 0.0267 increase in food security, and this effect is statistically significant at the 0.1% level. Additionally, respondents who received remittances at least once every month were

Table 4. OLS, LPM and binary logistic regression results for the effect of international remittances on food security in Africa.

	OLS	OLS	LPM	Binary Logit			
Variable	Estimate	Estimate	Estimate	Estimate	Marginal effect	Estimate	Marginal effect
Frequency of remittances							
Remittances	0.0267***			0.0439***	0.0100***		
	(0.0037)			(0.0070)	(0.0016)		
Frequency of remittances (Ref = Never)							
At least once a month		0.2236***	0.0896***			0.4120***	0.0918***
		(0.0235)	(0.0100)			(0.0461)	(0.0101)
At least every three months		0.0310	0.0122			0.0532	0.0121
		(0.0267)	(0.0114)			(0.0504)	(0.0114)
At least every six months		−0.0486	−0.0264			0.1166*	0.0266*
		(0.0307)	(0.0131)			(0.0573)	(0.0130)
At least once a year		0.0349	−0.0020			−0.0103	−0.0023
		(0.0263)	(0.0112)			(0.0493)	(0.01122)
Less than once a year		0.0045	−0.0188			−0.0835	−0.0190
		(0.0297)	(0.0126)			(0.0556)	(0.0127)
Control variables							
Age	−0.0226***	−0.0224***	−0.0086***	−0.0378***	−0.0086***	−0.0375**	−0.0085***
	(0.0017)	(0.0018)	(0.0008)	(0.0034)	(0.0008)	(0.0034)	(0.0008)
$Age^2/100$	0.1992***	0.1981***	0.0812***	0.3570***	0.0810***	0.3548***	0.0804***
	(0.0199)	(0.0199)	(0.0085)	(0.0373)	(0.0084)	(0.0373)	(0.0084)
Female	0.0160	0.0151	0.0070	0.0325	0.0074	0.0310	0.0070
	(0.0104)	(0.0104)	(0.0044)	(0.0196)	(0.0044)	(0.0196)	(0.0044)
Education	0.0083***	0.0083***	0.0032***	0.0151***	0.0034***	0.0152***	0.0034***
	(0.0012)	(0.0012)	(0.0005)	(0.0026)	(0.0006)	(0.0026)	(0.0006)
Unemployed	−0.2023***	−0.2026***	−0.0843***	−0.3672***	−0.0833***	−0.3692***	−0.0837***
	(0.0121)	(0.0121)	(0.0052)	(0.0227)	(0.0051)	(0.0227)	(0.0051)
Asset ownership	0.2179***	0.2183***	0.0823***	0.3515***	0.0797***	0.3534***	0.0801***
	(0.0050)	(0.0050)	(0.0021)	(0.0095)	(0.0020)	(0.0095)	(0.0020)
Electric connection	0.1920***	0.1922***	0.0737***	0.3027***	0.0687***	0.3034***	0.0687***
	(0 .0128)	(0.0128)	(0.0054)	(0.0234)	(0.0053)	(0.0234)	(0.0053)
Access to piped water	0.1201***	0.1185***	0.0678***	0.2945***	0.06679***	0.2912***	0.0660***
	(0.0117)	(0.0117)	(0.0050)	(0.0217)	(0.0049)	(0.0217)	(0.0049)
Urban	−0.0376**	−0.0371**	−0.0113	−0.0515*	−0.0117*	−0.0508*	−0.0115*
		(0.01168)	(0.0045)	(0.0220)	(0.0050)	(0.0220)	(0.0050)
Adj. R^2/Pseudo R^2	0.1049	0.1056	0.0913	0.0677		0.0685	
F-statistic/LR chi^2	564.51***	406.64***	346.24***	4502.89***		4555.51	
Log likelihood	48,080	48,080	48,080	-31022.031		−30995.718	
N				48,080		48,080	

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Standard errors are in parentheses.

significantly more likely to be food secure relative to those who never received remittances. The LPM and logistic regression results also confirm the previous results. A unit increase in receiving remittances is associated with a 1% increase in the probability that the respondent was food secure (i.e. had never gone without enough food to eat). Furthermore, relative to those who had never received remittances, we find that respondents who received remittances at least once every month and at least once every six months were 9.18% and 2.66%, respectively, more likely to report being food secure. The results for all the control variables were also identical to those reported in Tables 2 and 3. Finally, the VIFs were all less than 2 except for age and age squared suggesting that multicollinearity was not present in the data.[4] Therefore, we conclude that our results are robust.

6. Summary and conclusion

In this paper, we investigated whether international remittances influence household food security in 32 Sub-Saharan African countries using data for over 48,000 people. Our results reveal two interesting issues. First, we find that receiving international remittances is associated with more household food security. Second and more interestingly, that the frequency of receiving remittances matters more for this relationship. Put differently, our results unveiled that people who receive remittances frequently are less likely to report being food insecure and more likely to be food secure. Therefore, we conclude that while international remittances are important for improving household food security, the frequency with which they are received is more important. It should, however, be noted that the data we have used do not contain actual monetary values of remittances received. However, our operationalization of remittances is consistent with how some prior studies have constructed the variable (see e.g. Ivlevs, Nikolova, & Graham, 2018; Kamau, 2017). Accordingly, we speculate that the results may not differ significantly if actual remittances received were used instead.

To the extent that food insecurity is a source of political instability as disgruntled citizens may resort to violence and protests to register their plight (Deaton & Lipka, 2015), perhaps, African governments could take advantage of international remittances to reduce political upheavals by improving the food security situation of their citizens. Furthermore, the FAO (2016) notes that curbing food in security can reduce extremism and terrorism. Therefore, by solving the food insecurity problem, Sub-Saharan African governments could curtail extremism and terrorism in the region. Finally, this study has demonstrated that international remittances could play a crucial role in achieving Goals 2 and 3 of the SDGs which aim to 'End hunger, achieve food security and improved nutrition and promote sustainable agriculture' and to 'Ensure healthy lives and promote well-being for all at all ages', respectively (United Nations Environment Programme, 2015).

Notes

1. Variously defined, food security means access and provision of nutritionally sufficient food for all members of the household for healthy life gain through socially acceptable means (Food and Agriculture Organization FAO, 2013).
2. They include: Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Cote d'Ivoire, Gabon, Ghana, Guinea, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritius, Mozambique, Namibia, Niger, Nigeria, São Tomé and Príncipe, Senegal, Sierra Leone, South Africa, Sudan, Swaziland, Tanzania, Togo, Uganda, Zambia and Zimbabwe.
3. We note that this variable is ordinal in nature and as such, we ran some models treating it as ordinal.
4. The high VIFs for age and age squared were 25.79 and 25.70, respectively. This is normal and expected because age squared is a quadratic term for age.
5. The original coding had the following responses: 0 = Never, 1 = Just once or twice, 2 = Several times, 3 = Many times, 4 = Always. They were recoded for ease of interpretation.

Disclosure statement

No potential conflict of interest was reported by the authors.

Notes on contributors

Iddisah Sulemana is a Lecturer in the Department of Economics at the University of Ghana. He holds a PhD in Applied Economics from the University of Missouri, USA. He has worked at USAA Bank in San Antonio, Texas (USA) as a Credit Risk Analyst. His research interests are in economic growth, development economics, political economy issues, the environment, and subjective well-being. He is well published in reputable international journals including *Ecological Economics*, *Economic Analysis and Policy*, *Journal of Environmental Economics and Policy*, *The Journal of Development Studies*, *International Journal of Social Economics*, *Journal of Environmental Psychology, Journal of Happiness Studies, Social Indicators Research* and *International Journal of Happiness and Development*.

Ebenezer Bugri Anarfo is a Lecturer of Finance in the Business School of the Ghana Institute of Management and Public Administration (GIMPA). His current status is All But Dissertation (ABD) at the University of Ghana where his submitted doctoral dissertation is under review for approval for him to graduate in July 2019. In addition to obtaining an MBA in Finance from GIMPA, Ebenezer worked there as a graduate teaching and research assistant. His research interests are in the areas of FDI, monetary policy, financial inclusion, financial sector development and regulation, economic growth and development, capital structure, event studies, and mergers and acquisitions. His research works have been published in international journals including the *African Development Review, European Journal of Accounting, Auditing and Finance Research, Asian Economic and Financial Review, Journal of Accounting and Finance, Ghana Journal of Development Studies, etc.*

Peter Quartey is Professor of Economics and Head of Economics at the Institute of Statistical Social and Economic Research (ISSER) at the University of Ghana. He holds a PhD in Development Economics from the University of Manchester (UK). He is also the immediate past Head of Department of the Economics Department of the University of Ghana. He has many publications in internationally recognized journals on research areas such as Financial and Monetary Sector, Private Sector Development including SMEs, Development Finance, Migration and Remittances and Poverty Analysis. Prof. Quartey is an active member of the African Economic Research Consortium and the Global Development Network.

References

Abdullah, Zhou, D., Shah, T., Ali, S., Ahmad, W., Din, I. U., & Ilyas, A. (2017). Factors affecting household food security in rural Northern Hinterland of Pakistan. *Journal of the Saudi Society of Agricultural Sciences*. doi:10.1016/j.jssas.2017.05.003

Adams, R. H., Jr. (1998). Remittances, investment and rural asset accumulation in Pakistan. *Economic Development and Cultural Change*, *47*(1), 155–173.

Adams, R. H. (2006). International remittances and the household: Analysis and review of global evidence. *Journal of African Economies*, *15*(2), 396–425.

Adams, R. H., & Cuecuecha, A. (2010). Remittances, household expenditure and investment in Guatemala. *World Development*, *38*(11), 1626–1641.

Adams, R. H., & Page, J. (2005). Do international migration and remittances reduce poverty in developing countries? *World Development*, *33*(10), 1645–1669.

Addison, E. K. Y. (2005). The macroeconomic impact of remittances. In T. Manuh (Ed.), *At/lome in the world, international migration and development, in contemporary Ghana and West Africa* (pp. 118–138). Legon, Accra, Ghana: Sub-Saharan Publishers.

Anyanwu, J. C., & Erhijakpor, A. E. (2010). Do international remittances affect poverty in Africa? *African Development Review*, *22*(1), 51–91.

Atuoye, K. N., Kuuire, V. Z., Kangmennaang, J., Antabe, R., & Luginaah, I. (2017). Residential remittances and food security in the Upper West Region of Ghana. *International Migration*, *55* (4), 18–34.

Babatunde, R. O., & Martinetti, E. C. (2011). Impacts of migrant remittances on food security and nutrition of farming households in Kwara State, Nigeria'. Contributed paper for the international conference: Shocks in developing countries. June 30 – July 1, 2011, Paris, France.

Carletto, C., Covarrubias, K., & Maluccio, J. A. (2011). Migration and child growth in rural Guatemala. *Food Policy*, *36*(1), 16–27.

Chami, R., Hakura, D. S., & Montiel, P. J. (2012). Do worker remittances reduce output volatility in developing countries? *Journal of Globalization and Development*, *3*(1), 1–25.

Chimhowu, A., Piesse, J., & Pinder, C. (2004, *Nov*). The impact of remittances. enterprise development impact assessment information service. *Proceedings of the EDIAS conference*, pp. 24–25.

De, P. K., & Ratha, D. (2012). Impact of remittances on household income, asset and human capital: Evidence from Sri Lanka. *Migration and Development*, *1*(1), 163–179.

Deaton, B. J., & Lipka, B. (2015). Political instability and food security. *Journal of Food Security*, *3*(1), 29–33.

Diatta, M. A., & Mbow, N. (1999). Releasing the development potential of return migration: The case of senegal. *International Migration*, *37*(1), 243-266.

Etana, D., & Tolossa, D. (2017). Unemployment and food insecurity in urban Ethiopia. *African Development Review*, *29*(1), 56–68.

FAO. (2013). *The state of food insecurity in the world the multiple dimensions of food security*. Rome: Food and Agriculture Organization of the United Nations.

FAO (2016). Food security, nutrition and peace. Proceedings of the united nations security council meeting. New York, USA.

Friedman, M. (1957). The permanent income hypothesis. In M. Friedman (Ed.), *A theory of the consumption function* (pp. 20–37). Princeton, NJ: Princeton University Press (for NBER).

Generoso, R. (2015). How do rainfall variability, food security and remittances interact? The case of rural Mali. *Ecological Economics*, *114*, 188–198.

Guo, B. (2011). Household assets and food security: Evidence from the survey of program dynamics. *Journal of Family and Economic Issues*, *32*(1), 98–110.

Gupta, S., Pattillo, C. A., & Wagh, S. (2009). Effect of remittances on poverty and financial development in Sub-Saharan Africa. *World Development*, *37*(1), 104–115.

Gustafsson, B., & Makonnen, N. (1993). Poverty remittances in lesotho. *Journal of African Economies*, *2*(1), 49-73.

Habtewold, T. M. (2018). Determinants of food security in the Oromiya Region of Ethiopia. In A. Heshmati & H. Yoon (Eds.), *Economic growth and development in ethiopia. Perspectives on development in the Middle East and North Africa (MENA) Region* (pp. 39-65). Singapore: Springer.

Iram, U., & Butt, M. S. (2004). Determinants of household food security: An empirical analysis for Pakistan. *International Journal of Social Economics*, *31*(8), 753–766.

Ivlevs, A., Nikolova, M., & Graham, C. (2018). Emigration, remittances, and the subjective well – being of those behind. *Journal of Population Economics*. doi:10.1007/s00148-018-0718-8

Kamau, P. (2017). Economic paradox in Kenya: More favourable perceptions amidst economic insecurity. Dispatch No. 169.

Kassie, M., Ndiritu, S. W., & Stage, J. (2014). What determines gender inequality in household food security in Kenya? Application of exogenous switching treatment regression. *World Development*, *56*, 153–171.

Kerr, R. B. (2005). Food security in northern Malawi: Gender, kinship relations and entitlements in historical context. *Journal of Southern African Studies*, *31*(1), 53–74.

Koc, I., & Onan, I. (2001). The impact of remittances of international migrants on the standard of living of the left-behind families in Turkey. In *Conference proceedings, XXIV IUSSP general conference*, Salvador, Brazil (pp. 18–24).

Konseiga, A. (2006). Household migration decisions as survival strategy: The case of Burkina Faso. *Journal of African Economies*, *16*(2), 198–233.

Kuuire, V., Mkandawire, P., Arku, G., & Luginaah, I. (2013). 'Abandoning'farms in search of food: Food remittance and household food security in Ghana. *African Geographical Review*, *32*(2), 125–139.

Kuwornu, J. K., Suleyman, D. M., & Amegashie, D. P. (2013). Analysis of food security status of farming households in the forest belt of the Central Region of Ghana. *Russian Journal of Agricultural and Socio-Economic Sciences*, *3*(1), 39–61.

Lacroix, T. (2011). Migration, rural development, poverty and food security: A comparative perspective. https://halshs.archivesouvertes.fr/halshs-00921812/document. (Accessed September 2, 2018).

Loopstra, R., & Tarasuk, V. (2013). Severity of household food insecurity is sensitive to change in household income and employment status among low-income families. *Journal of Nutrition*, *143* (8), 1316–1323.

Mabrouk, F., & Mekni, M. M. (2018). Remittances and food security in African Countries. *African Development Review*, *30*(3), 252–263.

McKelvey, R. D., & Zavoina, W. (1975). A statistical model for the analysis of ordinal level dependent variables. *Journal of Mathematical Sociology*, *4*(1), 103–120.

Mpesi, A. M., & Muriaas, R. L. (2012). Food security as a political issue: The 2009 elections in Malawi. *Journal of Contemporary African Studies*, *30*(3), 377–393.

Pradhan, G., Upadhyay, M., & Upadhyaya, K. (2008). Remittances and economic growth in developing countries. *The European Journal of Development Research*, *20*(3), 497–506.

Quartey, P. (2006a). *Migrant remittances and household welfare in times of macro-volatility: The case of Ghana (No. 69)*. Legon: Institute of Statistical, Social & Economic Research, University of Ghana.

Quartey, P. (2006b). *The impact of migrant remittances on household welfare in Ghana*. AERC research paper 158. African Economic Research Consortium, Nairobi.

Quartey, P., & Blankson, T., (2003). *The sources and uses of migrant remittances in Ghana*. Institute of Economic Affairs (IEAJ) Research Report, Ghana.

Quartey, P., & Blankson, T. (2004, December). *Do migrant remittances minimize the impact of macro-volatility on the poor in Ghana?* Final report submitted to the global development network.

Regmi, M., & Paudel, K. P. (2016). Impact of remittance on food security in Bangladesh. In A. Schmitz, P. Lynn Kennedy, & T. G. Schmitz (eds.), *Food security in a food abundant world: An individual country perspective* (pp. 145–158). Emerald Group Publishing Limited.

Regmi, M., & Paudel, K. P. (2017). Food security in a remittance based economy. *Food Security*, *9*(4), 831–848.

Rose, D., Gundersen, C., & Oliveira, V. (1998). *Socio-economic determinants of food insecurity in the United States*. NY, United States: Department of Agriculture, Economic Research Service.

Rukuni, M. (2002). Africa: Addressing growing threats to food security. *The Journal of Nutrition*, *132* (11), 3443S–3448S.

Russell, S. S., Jacobsen, K., Stanley, W. D., & Mundial, B. (1990). *International migration and development in Sub-Saharan Africa*. 2. Country Analyses. World Bank Discussion Papers No. 102. The World Bank. Washington, DC.

Taylor, E. J. (1999). The new economics of labour migration and the role of remittances in the migration process. *International Migration*, *37*(1), 63–88.

Teka-Tsegay, Y., Rusare, M., & Mistry, R. (2014). *Hidden hunger in South Africa: The faces of hunger and malnutrition in a food-secure nation*. Oxford: Oxfam GB.

United Nations Environment Programme (2015). *Sustainable development goals*. United Nations Environment Programme: Annual Report. Nairobi, Kenya.

Verpoorten, M., Arora, A., Stoop, N., & Swinnen, J. (2013). Self-reported food insecurity in Africa during the food price crisis. *Food Policy*, *39*, 51–63.