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The Impact of International Remittances on Food Security during the COVID-19 Pandemic: Evidence from Malawi

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The Impact of International Remittances on Food Security during the COVID-19 Pandemic: Evidence from Malawi¹

Abstract: This is the first paper to study the impact of international remittances on household food security after the COVID-19 pandemic outbreak. Using nationally representative quarterly panel data from the *Malawi High-Frequency Phone Survey on COVID-19*, it employs an instrumental variable approach to address the endogeneity of the international migrant remittances. The results show a positive and significant impact of remittances on food security, especially in households headed by a female member during the pandemic outbreak year. These results are robust to the use of different food security measures and to controlling for the influence of social safety nets.

Keywords: International Migration, International Remittances, Food Security, COVID-19 Pandemic, Malawi

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1. Introduction

International remittances have a fundamental role supporting the economic development of low- and middle-income countries. As a result of the increasing movement of workers beyond their own country's frontiers, this source of income is commonly sent on a regular basis² (Yang 2011) and constitutes the most direct economic benefit retrieved from migration by households in the home countries (Russell 1986; McKenzie and Yang 2015). The importance of remittances was threatened by the COVID-19 pandemic that questioned its resilience.

The pandemic crisis produced a negative shock that directly hit the whole world, contrarily to previous crisis which only impacted specific geographies, either remittances-sending or remittances-receiving countries.³ In fact, the long periods of lockdown enacted as containment mechanisms against the COVID-19 pandemic generated radical changes in the labor market. Non-essential activities were forced to closure, causing large income losses that placed international migrants in a particularly vulnerable position.⁴ While migrants with temporary contracts were typically not provided with social protection to face unexpected losses, foreign workers with informal positions did not even benefit from unemployment support measures and those with an irregular condition in the host country were not qualified for social protection (Bisong et al. 2020).

² On an empirical framework developed by Docquier and Rapoport (2006), the authors split the motivations behind sending remittances into individualistic and family related. On the one hand, individualistic reasons may have the following natures: altruistic, allowing households in the home country to benefit from increasing consumption (Stark 1995), exchange both for services that household members are provided with and for compensating the costs associated to migrants' education (Poirine 1997; Ilahi and Jafarey 1999), to assure inheritance from older members (Hoddinott 1994; Osili, 2004). On the other hand, familiar motives are related with investment on family business (Yang 2011) and insurance against adverse shocks (Cox et al. 1987; Gubert 2002).

³ The Ebola crisis (2014-2016) had the epicenter in West Africa while global financial crisis (2007-2008) was centered on developed countries, where financial systems are more integrated. Other examples are the 1997 Asian financial crisis addressed by Yang (2008a) as well as natural disasters namely rainfalls (Yang and Choi 2007) and hurricanes (Yang 2008b).

⁴ Ratha (2021) addresses the lockdown effect on the labor market of the United States, that is the country with more international migrant workers, according to the International Organization for Migration (see <https://worldmigrationreport.iom.int/wmr-2020-interactive/>). The author refers that employment have declined 15 percent for natives while it dropped 21 percent for foreign workers.

In addition, travel prohibition and post office closure hindered sending remittances via informal channels (Ratha 2021), while the desire to keep supporting family by formal methods required higher costs that also hurt remittance volumes (Ratha et al. 2011; Ratha et al. 2021).

Despite the increasing stock of international migrants from low- and middle-income countries even just a few months after the onset of the pandemic,⁵ initial macroeconomic predictions have pointed to the sharpest decline ever recorded of remittance flows to their home nations (Ratha et al. 2020).⁶ Sub-Saharan Africa, that represents the world poorest population, was the most affected region with 12.5 percent decrease in the volume of remittances, driven by the 27.7 percent decline registered in Nigeria alone. Average remittances sent to low- and middle-income countries just dropped 1.6 percent, from \$548 billion in 2019 to \$540 billion in 2020 (Ratha et al. 2021),⁷ highlighting a rather stable pattern during the pandemic.⁸

Macroeconomic data only includes formal remittance channels that require migrants and respective households to have an open bank account to enable transfers. Instead, most low-skilled migrants rely on cash transfers through informal channels, such as in-person travel, international merchandise containers, and money transfer operators that are not covered by official remittance data (Adams and Page 2005; Ratha 2021; World Bank 2021).⁹

⁵ United Nations Department of Economic and Social Affairs, *International Migrant Stock 2020*. Data downloaded from <https://www.un.org/development/desa/pd/content/international-migrant-stock> [Last retrieved on October 15th, 2021].

⁶ Remittances considered on international balance of payments result from the sum between workers' remittances and compensation of employees (Yang 2011). The first component constitutes the set of transfers either cash or in-kind regular migrants send to their home countries while compensation of employees corresponds to the income received by temporary migrant workers, who are not settled in the host country.

⁷ In the last 25 years, remittances have also declined in the following occasions: 2.3 percent in the aftermath of the 1997 Asian financial crisis; 4.8 percent in 2009 due to the global financial crisis; and 1.3 percent in 2016 (Ratha et al. 2021). The historical maximum was reached in 2019.

⁸ Remittances inclusively overtook the sum of both foreign direct investment and official development aid for the first time ever. According to Ratha et al. (2021), low- and middle-income countries received \$179 billion of official development assistance and \$259 billion of foreign direct investment, that verified a decline higher than 30 per cent in 2020. This comparative data confirms the lower volatility of remittances in response to economic shocks, pointed out by Ratha (2003).

⁹ The following example provide evidence on official data's drawbacks: macroeconomic data revealed that remittances received by The Gambia were increasing during the COVID-19 pandemic, but the households were indeed receiving less (Avdiu and Meyer 2021).

In the pandemic context, this opened a knowledge gap that can only be filled through a microeconomic approach that examines household-level data documenting patterns of remittances since the outbreak, as well as the real impact of these remittances on households.

This paper aims to contribute to the literature precisely by studying the impact of international remittances on households' food security within a pandemic context, in which this phenomenon has not been previously addressed. For this purpose, household panel data from Malawi will be used to evaluate how remittances influenced food security during the COVID-19 pandemic year outbreak.

The remainder of the paper is structured as follows: Section 2 provides a literature review regarding the effect of international remittances on food security, with a particular emphasis attributed to the Malawian context in Section 3. Afterwards, Section 4 presents the data while Section 5 demonstrates the methodology. Section 6 provides the results analysis and Section 7 concludes the research study.

2. Literature Review

The increase of international remittances to developing nations (Ratha et al. 2021) has raised concern on the impact of these flows on households in home countries. This interest is also stimulated by the emergence of trustworthy survey data (Gibson and McKenzie 2017). Despite the research gap exploring the effect of remittances on food security¹⁰ (Crush 2013), additional studies have contributed to extend the literature beyond Zezza et al. (2011), who verified that remittances increase households' total income, thus allowing to improve their nutrition level.¹¹

¹⁰ The concept of food security is associated with the availability of enough food both in terms of quantity and quality, by prompting the households' access to healthy and nutritious aliments. Additionally, a food secure household does not face hungry episodes, assuming capability to satisfy food needs (see <https://www.fao.org/3/w3613e/w3613e00.htm>).

¹¹ Beyond food security, the impact of remittances has been assessed on a range of dimensions, including poverty and inequality (Adams and Page 2005; Acosta et al. 2008; Adams et al. 2008), agricultural production (Wouterse 2010; Atamanov and Van der Berg 2012), health care (Amuedo-Dorantes and Pozo 2011; Ponce et al.

Empirical evidence demonstrated the central role of remittances to enhance nutrition intake in Vietnam (Nguyen and Winters 2011), as well as in rural Tanzania (Isoto and Kraybill 2017). Similarly, a sample of farming households in Nepal allowed Regmi and Paudel (2017) to observe that those collecting remittances from outside the country had a higher food security status. A more recent study by Mora-Rivera and van Gameren (2021) used household data to explore the relative effects of internal and international remittances in rural Mexico. Applying an instrumental estimation strategy, the authors pointed out that remittances from outside the country propitiate a greater reduction of food insecurity, which is particularly explained by the influence exerted from having households headed by a female member who bridges male emigration.

Notwithstanding considerable literature providing empirical evidence on a positive impact of international remittances on food security, such analysis is not indisputable in every context. Indeed, Karamba et al. (2011) employed an instrumental variable method to examine this specific remitting effect using data retrieved from the Ghana Living Standard Survey between 2005 and 2006. Their analysis demonstrates that remittances do not increase food security. Instead, the opposite is verified since the positive income effect is employed in unhealthy food consumption expenditure. Another empirical project centered on Ecuador supports the negative influence of remittances on food expenditures, particularly in female headed households (Göbel 2013).

A recent research analysis distinguishes itself from the aforementioned studies since it focuses on the persistent impact of remittances on food security status within the context of a food crisis.¹² Obi et al. (2020) retrieved data from the Nigerian General Household Survey

2011), education (Amuedo-Dorantes and Pozo 2010; Alcaraz et al. 2012; Ambler et al. 2015), but also labor market (Funkhouser 2006; Urama et al. 2017) and investment (Yang 2008a; Adams and Cuecuecha 2010).

¹² Food crises are referred by the authors as the result of either natural disasters or conflicts, to which economic instability is added.

implemented from 2015 to 2016 and adopted an instrumental identification strategy that allowed them to conclude towards the positive effect of remittances on food security in the short run but with continuing impact in the long-term. The evidence provided by the authors reveals that remittances reduced anxiety to accomplish food needs and shifted households' consumption pattern towards a healthier nutrition intake. Additionally, the authors pointed out to a higher remittance dependency in rural communities, on the one hand, and female-headed households, on the other.

Furthermore, the importance of remittances on households' food security within the context of the COVID-19 pandemic was initially studied by Akim et al. (2021), who centered their analysis on Nigeria. Using survey data both before and after the outbreak, the authors focused on the role of past remittances to attenuate the labor market shock on food security. They found that remittances could successfully mitigate the impact of the pandemic in the short-term food security, hence agreeing with the positive remittance effect evoked by most of the previous literature. Indeed, the literature still lacks evidence on the impact of international remittances received during the current pandemic crisis. The analysis having Malawi in the epicenter aims, therefore, to fulfill such gap in the academic research.

3. Country Context: Malawi

Malawi (see Figure A1 in the Appendix) is one of the poorest countries in the world. It had a GDP per capita of 625.3 USD¹³ in year 2020¹⁴ and ranked 174th among 189 countries in the United Nations' 2019 Human Development Index.¹⁵

¹³ The Malawian GDP per capita was inclusively less than half of the whole Sub-Saharan African region, whose value was 1485.5 USD in 2020, according to the World Bank (2021).

¹⁴ World Bank, *GDP per capita (current US\$) – Malawi*. Data downloaded from <https://data.worldbank.org> [Last retrieved on November 30th, 2021].

¹⁵ Human Development Report Office 2020, *Human Development Index (HDI) Ranking*. Data downloaded from <http://hdr.undp.org/en/data> [Last retrieved on November 30th, 2021].

This East African country provides a context with characteristics worth of study. First, the growing number of Malawian emigrants has been accompanied by a remarkable expansion of remittance inflows to Malawi over the previous decades, raising from 0.1 to 2.2 percent of the gross domestic product (GDP) between 1994 and 2020.¹⁶ Second, the country recorded a 13.08 percent remittances decline, indeed harsher than the average growth in the Sub-Saharan Africa from 2019 to 2020 (Ratha et al. 2021). Third, food security issues are very common in Malawi, particularly caused by food price spikes (Ellis and Manda 2012).¹⁷

International migration from Malawi flows mostly to neighboring countries in the Southern Africa Development Community.¹⁸ This suggests that native migrants traditionally move to regions where they are culturally connected, particularly South Africa, that has historically received Malawians to work in mines and farms (Thomas and Inkpen 2013).

Indeed, literature on remittances and the impact on food security is sparsely addressed within the context of Malawi. By recognizing this research gap, Kangmennaang et al. (2018) studied the influence of remittances on both household welfare and food security within a sample of 1000 households from rural communities in Northern and Central Malawi between July and September 2014. Employing a propensity score matching technique to correct for selection bias, the authors verified that remittances produced a higher and positive effect on food security rather than on wealth. Notwithstanding the importance of this research study, further examination needs to be pursued in order to obtain more evidence on the causality between international migrant remittances and food security with regards to Malawian households.

¹⁶ KNOMAD, *Remittances Data*. Data downloaded from <https://www.knomad.org/data/remittances> [Last retrieved on September 15th, 2021].

¹⁷ According to Ellis and Manda (2012), food security crisis occurred in 2001-2002, 2004-2005, and 2007-2009 emerged due to maize price spikes of, respectively, 354 percent, 218 percent, and 395 percent.

¹⁸ This regional community is constituted by the following countries: Angola, Botswana, Comoros, Democratic Republic of Congo, Eswatini, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Tanzania, Zambia, and Zimbabwe.

4. Data

4.1 Data Sources

To examine the impact of international remittances on food security in Malawi, the empirical analysis relies on data retrieved from the *High-Frequency Phone Survey on COVID-19* conducted with Malawian households between May 2020 and June 2021 by the Malawi National Statistics Office with the World Bank's support.¹⁹ As alternative to face-to-face questionnaires when severe conditions do not allow direct contact, this phone survey was implemented monthly to assess the socioeconomic impacts of the pandemic in the country in real-time.²⁰ Besides household characteristics, the survey encompasses different modules throughout its rounds, but only the ones covering remittances and food security are considered, in accordance with the purpose of this study.²¹ The sample of households was drawn from the previous face-to-face nationally representative survey.

Since mobile phone questionnaires cannot be long to avoid overwhelming the household respondent, the number of questions included in each survey round is limited, particularly affecting the remittances coverage degree. For this reason, the survey rounds assessing the COVID-19 impact do not include questions on the value and origin of remittances nor concerning the number and destination of migrants per household. Instead, data is just available on whether each household had received remittances from abroad since the pandemic outbreak in the baseline round, and afterwards in reference to the month preceding the interview.

¹⁹ World Bank, *Malawi - COVID-19 High Frequency Phone Survey of Households (HFPS) 2020*. Ref: *MWI_2020_HFPS_v10_M*. Dataset downloaded from www.microdata.worldbank.org [Last retrieved on September 25th, 2021].

²⁰ The survey data was collected through computer-assisted telephone interviewing (CATI) software, that matches household respondents with call center interviewers according to linguistic and availability criteria, also assuring control of quality mechanisms by combining each interview with accurate data input fields.

²¹ Rounds include modules such as the knowledge regarding government measures against the pandemic, access to services, employment, non-farm business, income losses, livestock, and social safety nets.

Additionally, the empirical analysis complements the phone survey data with the *Malawi Fifth Integrated Household Survey*, particularly the community questionnaire that was implemented through direct contact with each local representative before the pandemic.²² This survey was also supported by the World Bank and implemented by the Malawi National Statistics Office. It is nationally representative, covering questions at the community-level.²³

4.2 Descriptive Statistics

Survey modules on food security and remittances income were not, indeed, implemented monthly. For this reason, a quarterly panel data from the second quarter of 2020 to the fourth quarter of 2020 is constructed.²⁴ This dataset allows studying the impact of remittances on food security during the COVID-19 outbreak year. The sample of households that is considered at the baseline is kept in the following survey rounds. However, the number of households successfully interviewed differs across rounds, thus originating an unbalanced panel data, whose household coverage is 1729 in the second quarter of 2020, declining to 1624 in the following quarter and to 1589 in the fourth quarter of 2020. Moreover, the set of variables included in the empirical analysis can be found in Table A1 in Appendix.

Table 1 presents the descriptive statistics with regards to each quarter considered in this study. The variables are measured at the household-level except those regarding the existence of a post office, a commercial bank, and a microfinance institution. These ones are considered at the community-level.

²² World Bank, *Malawi – Fifth Integrated Household Survey 2019-2020*. Ref: *MWI_2019_IHS-V_v05_M*. Dataset downloaded from www.microdata.worldbank.org [Last retrieved on September 29th, 2021].

²³ Data is available on 101 Malawian communities, dispersed around the following three regions: Northern, Central, and Southern.

²⁴ Each of the three quarterly periods has data from a different round of the Malawi High-Frequency Phone Survey. The second quarter of 2020 relies on data from the baseline survey round, that occurred between May 26th and June 14th; the third quarter corresponds to round 3, implemented from August 12th to August 27th; and the fourth quarter refers to round 5, that was carried out from October 29th to November 16th. To complement the reasoning, the annual quarters are the following: 1st quarter – January, February, March; 2nd quarter – April, May, June; 3rd quarter – July, August, September; 4th quarter – October, November, December.

Table 1: Descriptive statistics

		2nd Quarter 2020	3rd Quarter 2020	4th Quarter 2020
Food security	Mean	0.4328	0.4913	0.5111
	Std. Dev.	(0.3314)	(0.3460)	(0.3412)
International remittances	Mean	0.0740	0.0388	0.0422
	Std. Dev.	(0.2619)	(0.1932)	(0.2010)
Urban	Mean	0.3569	0.3670	0.3675
	Std. Dev.	(0.4792)	(0.4821)	(0.4823)
Household size	Mean	4.9647	5.0770	5.1120
	Std. Dev.	(2.2906)	(2.2741)	(2.2518)
Number of children	Mean	2.4280	2.5727	2.6230
	Std. Dev.	(1.7505)	(1.7691)	(1.7636)
Number of elderly	Mean	0.3794	0.1385	0.1366
	Std. Dev.	(0.7489)	(0.4032)	(0.3994)
Head gender	Mean	0.6258	0.5825	0.5985
	Std. Dev.	(0.4841)	(0.4933)	(0.4904)
Assistance within country	Mean	0.2776	0.1256	0.2147
	Std. Dev.	(0.5219)	(0.3634)	(0.4840)
Cash transfers	Mean	0.0087	0.0179	0.0214
	Std. Dev.	(0.0928)	(0.1325)	(0.1447)
Free food	Mean	0.0185	0.0055	0.0245
	Std. Dev.	(0.1348)	(0.0743)	(0.1548)
Other in-kind transfers	Mean	0.0574	0.0197	0.0202
	Std. Dev.	(0.2327)	(0.1390)	(0.1406)
Post office	Mean	0.1491	0.1482	0.1488
	Std. Dev.	(0.3563)	(0.3554)	(0.3560)
Commercial bank	Mean	0.0975	0.0969	0.0951
	Std. Dev.	(0.2967)	(0.2960)	(0.2935)
Microfinance institution	Mean	0.2866	0.2877	0.2854
	Std. Dev.	(0.4523)	(0.4528)	(0.4518)
Observations		1729	1624	1589

Household food security status is measured through a variable encompassing food concern, consumption in terms of quality and quantity, forced need to skip meals, and ability to suppress hungry in the previous month before the interview. Information on these categories is provided with more detail in Table A2 in Appendix. The variable was obtained through a principal component analysis evolving all items, and afterwards normalized within a scale from zero to one, where the maximum value indicates that the household is food secure. Considering the second quarter of 2020, food security had a mean of 0.4328, which demonstrates that the

average Malawian household was far from being food secure. This value raised to 0.4913 in the third quarter of 2020 and to 0.5111 in the final quarter of the respective year.

International remittances are measured through a dummy variable that takes 1 when the household received remittances in the month prior to the interview. It is evident a clear downward with regards to the percentage of households with remittances from abroad Malawi, particularly in the third quarter of 2020, after the onset of the pandemic and resulting mobility restrictions. While 7.40 percent of the household sample had received remittances from abroad in the second quarter of 2020, such percentage declined to 3.88 in the following quarter. Lastly, 4.22 percent of households received international remittances in the fourth quarter of the pandemic outbreak year.

According to the descriptive statistics from Table 1, the sample of Malawian households is mostly from rural rather than urban areas and has an average size of 5 members with more than 2 children while the mean of elderly constituents is close to 0. Moreover, 58.25 to 62.58 percent of households are headed by a male member, that takes the value 1 while female head is represented by the value 0. Other income sources beyond international remittances are illustrated by a variable indicating monetary assistance received in the previous month from either family or non-family individuals living in Malawi. It takes 1 if the household received support from one of these sources, 2 if received from both sources, and 0 otherwise. The mean of this variable varies between 0.1256 and 0.2776 across the 2020 quarters.

Social safety nets are included as dummy variables denoting whether were received or not. Indeed, 0.87 percent of households collected cash transfers in the second quarter of 2020 while such percentage increased to 1.79 and 2.14 percent in the following quarters. The percentage of households receiving free food varies between 0.55 and 2.45 while 5.74 percent

of the sample obtained other in-kind transfers in the second quarter of 2020 despite the decline to 1.97 percent in the third quarter and the slight increase to 2.02 in the fourth quarter.

Lastly, 15 percent of the communities in Malawi benefited from the presence of a post office while 10 percent had a commercial bank and 29 percent had a microfinance institution. It is important to note that the choice of variables followed previous literature on the determinants of food security, addressing as well possible concerns undermining the econometric approach that follows.

5. Methodology

5.1 Empirical Model

The impact of international remittances on food security status of each Malawian household h in the quarterly period t , that ranges from the second quarter of 2020 to the fourth quarter of 2020, is estimated through the following panel regression:

$$Food_Security_{ht} = \beta_0 + \beta_1 International_Remittances_{ht} + X'_{ht}\theta + \delta_c + \tau_t + \varepsilon_{ht} \quad (1)$$

The dependent variable $Food_Security_{ht}$ is the variable measuring the household food security status. Since it is normalized, the closer the value is to 1, the more food secure is the household, while 0 indicates that the respective household is food insecure.

The explanatory variable $International_Remittances_{ht}$ is a dummy variable that has value 1 if the Malawian household had received remittances from outside the country in the month before the survey took place, and 0 otherwise.

The vector X'_{ht} encompasses two categories of time-varying control variables. On the one hand, it considers household characteristics, including household size, number of children, and number of elderly members. It comprises, on the other hand, monetary assistance from

family members and non-family individuals living in Malawi. Additionally, the variable δ_c represents community characteristics, associated with the presence of post offices, commercial banks, and microfinance institutions. The dummy variable τ_t allows to control for time-specific fixed effects while ε_{ht} refers to the disturbance term. The empirical model is estimated through fixed effects at the regional administrative level to which robust standard errors clustered at the regional level are added to correct for heteroskedasticity across panel observations.²⁵

5.2 Estimation Issues and Identification Strategy

The econometric specification raises identification issues that have to be addressed in order to produce consistent estimates. International remittances may be endogenous regarding household food security status,²⁶ taking into account that the causal relationship might occur on both directions (Mora-Rivera and van Gameren 2021). Remittances are expected to impact household food security status, but the opposite verifies also true since food insecure households may require international migrants to send more remittances (Adams 2011). Households in the home country can also send additional members to work outside the country, aiming to receive more remittance money (Wagle and Devkota 2018).

Beyond reverse causality, other methodological issues are associated with the impact of remittances (Adams 2011). Selection bias is expected to occur since richer families can afford sending more members to work outside the country and, therefore, tend to be more food secure from the beginning. Moreover, omitted variable bias is only partially addressed by the controls added to the regression model while simultaneity may occur as well since food security depends on households' income, which in turn affects the decision to emigrate.

²⁵ The household phone survey covers 26 out of 28 Malawian administrative regions as it did not record answers from the less populated districts. Additionally, it comprises 4 major cities including the capital Lilongwe and Blantyre City, which are the most populated ones. This leads, therefore, to a total of 30 regions.

²⁶ More generally, remittances may be endogenous to a diverse set of outcomes, such as investment (Adams and Cuecuecha 2010), and health care expenditures (Kapri and Jha 2020).

These endogeneity issues are addressed through the instrumental variables' estimation method. According to this approach, one may find a variable strongly correlated with the endogenous regressor, that is the only channel through which the instrument can impact the dependent variable, hence allowing to satisfy the exclusive restriction assumption. This method has been widely used by empirical studies that have emphasized the crucial role of nationals settled in the destination country as drivers of remittances sent by migrants (Remi and Paudel 2017). Indeed, international networks can share helpful information that allows recent migrants to reduce costs (Taylor et al. 2003), also affecting their remit behavior (Atamanov and Berg 2012; Batista and Narciso 2018).

The instrumental variable proposed to identify the causal impact of remittances on food security is therefore based on previous literature. It relies on an interaction variable that allows to account for the panel household data underlying this empirical study. The first term of the interaction corresponds to the networks outside Malawi which are proxied through a lagged dummy variable that assumes the value 1 whether the respective Malawian community had more people leaving the community compared to those who entered there during the period between 2013 and 2019.²⁷ Taking into account that this interaction term absorbs the effects of both internal and international migration, income received from family and other individuals within the country is controlled for, thus allowing to minimize concerns about the instrument validity. This variable is retrieved from the community survey that takes part of the *Malawi Fifth Integrated Household Survey*.²⁸

²⁷ Community-based variables have been used in previous literature to instrument the impact of remittances (Taylor et al. 2003; Batista and Vicente 2011; Brown and Leevs 2011; Batista, Mc-Indoe and Vicente 2017; Mora-Rivera and van Gameren 2021).

²⁸ The original survey question for this variable was formulated to account for four possible responses: if each of the 101 Malawian communities dispersed across the country had more people leaving, more people entering, the same level of arrivals and departures or no departures nor arrivals. It was afterwards remodulated into a dummy that is 1 for negative net migration, and 0 otherwise.

Considering that the number of households receiving remittances differs over the quarter periods whereas the communities' net migration is given as permanent, there emerges the need to have a varying term interacting with the networks proxy. Therefore, the second interaction term, that is retrieved from the World Bank, corresponds to the quarterly cost of sending remittances.²⁹ This fee aggregates the foreign exchange rate and operational costs from banks, money transfer operators, mobile operators, and post offices (World Bank 2021). Data is just available at a country-level for the corridor from South Africa to Malawi,³⁰ which is not indeed an issue since South Africa was the destination of more than 80% Malawian emigrants between 2008 and 2018.³¹

The relevance of the proposed instrument variable is primarily studied through the following first stage regional fixed effects regression, with robust standard errors, clustered at the regional level:

$$International_Remittances_{ht} = \beta_0 + \beta_1 IV_{ct} + X'_{ht}\theta + \delta_c + \tau_t + \varepsilon_{ht} \quad (2a)$$

$$\text{where } IV_{ct} = (Negative_Net_Migration_c * Remit_Cost_t) \quad (2b)$$

The instrumental interaction variable is expected to be negatively correlated with the endogenous regressor due to the burden exerted by the increased remittances costs (Adams and Page 2005; Freund and Spatafora 2008; Ratha et al 2011). Furthermore, the second stage of the regional fixed effects within regression is the following:

$$Food_Security_{ht} = \beta_0 + \beta_1 \widehat{IV}_{ct} + X'_{ht}\theta + \delta_c + \tau_t + \varepsilon_{ht} \quad (3)$$

²⁹ World Bank, *The World Bank, Remittance Prices Worldwide*. Dataset downloaded from <http://remittanceprices.worldbank.org> [Last retrieved on November 20th, 2021].

³⁰ For clarification, remittances sending costs within the corridor South Africa – Malawi are the following: 15.38 percent in the second quarter of 2020; 16.26 percent in the third quarter of 2020; and 16.28 percent in the fourth quarter of 2020.

³¹ National Statistics Office, *2018 Malawi Population and Housing Census – Malawi Data Dissemination Platform*. Data downloaded from <https://www.malawicensus.mw> [Last retrieved on November 15th, 2021].

This corresponds to the regression model subsequently performed to examine the causal impact of the international remittances instrumented variable on the household food security status, hence providing the main results of the empirical analysis. Furthermore, the estimation will be performed employing robust standard errors, clustered at the regional level.

6. Results

6.1 Preliminary Evidence

Estimation results from the regional fixed effects regression (1) are provided in Table 2. Column (1) presents the estimates of the short model. Controls regarding household characteristics, other income sources, and community characteristics are added in columns (2), (3), and (4), respectively. Estimates with all controls are illustrated in column (5), while column (6) represents the complete model with time fixed effects.

Table 2: Impact of international remittances on food security

	(1)	(2)	(3)	(4)	(5)	(6)
International remittances	0.0789*** (0.0271)	0.0854*** (0.0258)	0.0885*** (0.0294)	0.0812*** (0.0282)	0.0962*** (0.0290)	0.1028*** (0.0284)
Constant	0.4731*** (0.0014)	0.5030*** (0.0181)	0.4813*** (0.0019)	0.4528*** (0.0069)	0.4968*** (0.0195)	0.4522*** (0.0170)
Controls						
Household characteristics	No	Yes	No	No	Yes	Yes
Other income sources	No	No	Yes	No	Yes	Yes
Community characteristics	No	No	No	Yes	Yes	Yes
Time dummies	No	No	No	No	No	Yes
Observations	4940	4940	4939	4866	4865	4865
R-squared overall	0.0032	0.0144	0.0058	0.0161	0.0295	0.0386

Notes: Regressions are estimated using pooled OLS with regional fixed effects. Food security is measured as an index that varies between 0 and 1. International remittances are measured as an indicator variable that takes value 1 when households received any international remittances in the previous month. Household characteristics encompass the household size, the number of children (aged < 18), and the number of elderly (aged > 64). Other income sources refer to the assistance received in the preceding month from people living in Malawi and it takes value 1 when households received monetary support from either family or non-family individuals, 2 when received from both sources, and 0 otherwise. Community characteristics include dummy variables for the presence of a post office, a commercial bank, and a microfinance institution in communities. Column (6) considers the second quarter of 2020 as the base group and includes time dummies for the third and fourth quarters of 2020. *p<0.1; **p<0.05; ***p<0.01 with robust standard errors, clustered at the regional level in parenthesis.

The impact of international remittances on Malawian households' food security denotes a positive and significant magnitude across the estimated regressions: estimates range from a 7.89 to 10.28 percentage points increase in food security. The positive coefficient is consistent with the previous literature, according to which remittances fortify food security status.

6.2 Instrumental Variable Analysis

Taking into account the potential endogeneity of remittances in the econometric analysis, as described in the previous section, the results from regression (3), that applies an instrumental variable approach, are presented in Table 3. Column (1) evidences the isolated impact on food security from households receiving international remittances. Column (2) includes household characteristics to assess the influence exerted by familiar composition while results from just controlling for assistance provided by family and other individuals living in Malawi are presented in column (3). In column (4), remittances are exclusively controlled for community characteristics. On the other hand, column (5) includes all the previous controls together to examine how the remittances effect is impacted. Lastly, column (6) adds time dummy variables to control for fixed effects throughout the 2020 quarters since the pandemic outbreak.

The instrumental variable resulted from the interaction between proxied international Malawian networks and quarterly remittances cost is always statistically significant. The first stage F-statistics across the estimated regressions are above the critical value of 10, which means that the instrument is strong (Staiger and Stock 1997). Therefore, the causal identification of the remittances impact on household food security is consistently estimated resorting to this instrumental interaction term.

According to Table 3, the impact of remittances was positive and significant at the 10 percent level for the estimations in column (4), that includes community characteristics, and column (6) with all control and time dummy variables, notwithstanding the insignificance

denoted in columns (1), (2), (3), and (5). These estimates corroborate the theoretical evidence according to which remittances raise households' disposable income that allows to improve food security patterns (Ratha et al. 2011; Isoto and Kraybill 2017; Mora-Rivera and van Gameren 2021). Indeed, significance levels declined comparing to the estimates from Table 2 since the effect was mostly suffering from endogeneity.

Table 3: Impact of instrumented international remittances on food security

	(1)	(2)	(3)	(4)	(5)	(6)
International remittances	1.3412 (0.9884)	1.2443 (0.9105)	1.3875 (1.0187)	1.2751* (0.7654)	1.2188 (0.7421)	1.2654* (0.7510)
Constant	0.4088*** (0.0508)	0.4374*** (0.0561)	0.4284*** (0.0405)	0.3871*** (0.0424)	0.4407*** (0.0371)	0.3769*** (0.0503)
Household characteristics						
- Household size	-	0.0145 (0.0104)	-	-	0.0123 (0.0078)	0.0122 (0.0078)
- Children	-	-0.0319*** (0.0121)	-	-	-0.0311*** (0.0093)	-0.0318*** (0.0093)
- Elderly	-	-0.0710** (0.0297)	-	-	-0.0601*** (0.0205)	-0.0459** (0.0188)
Other income sources						
- Assistance within country	-	-	-0.1062* (0.0615)	-	-0.0957** (0.0459)	-0.0910** (0.0433)
Community characteristics						
- Post office	-	-	-	0.1010*** (0.0303)	0.1000*** (0.0281)	0.1004*** (0.0280)
- Commercial bank	-	-	-	-0.0267 (0.0467)	-0.0241 (0.0470)	-0.0251 (0.0470)
- Microfinance institution	-	-	-	0.0442 (0.0337)	0.0403 (0.0321)	0.0422 (0.0323)
Time dummies	-	-	-	-	-	Yes
F-statistic	18.25	21.52	19.43	26.94	31.16	29.17
Observations	4866	4866	4865	4866	4865	4865
R-squared overall	0.0032	0.0052	0.0041	0.0052	0.0092	0.0118

Notes: Regressions are estimated using the Instrumental Variable method with regional fixed effects. Food security is measured as an index that varies between 0 and 1. International remittances are measured as an indicator variable that takes value 1 when households received any international remittances in the previous month. Household characteristics encompass the household size, the number of children (aged < 18), and the number of elderly (aged > 64). Other income sources refer to the assistance received in the preceding month from people living in Malawi and it takes value 1 when households received monetary support from either family or non-family individuals, 2 when received from both sources, and 0 otherwise. Community characteristics include dummy variables for the presence of a post office, a commercial bank, and a microfinance institution in communities. Column (6) considers the second quarter of 2020 as the base group and includes time dummies for the third and fourth quarters of 2020. *p<0.1; **p<0.05; ***p<0.01 with robust standard errors, clustered at the regional level in parenthesis.

With regards to household characteristics, the variable corresponding to the household size is estimated to have had a positive but insignificant effect while both the number of children and elderly produced a negative and significant impact on households' food security status. This means that Malawian households with more children and elderly members were less food secure between the second and the fourth quarter of 2020. Similarly, national income sources evidence a negative and significant magnitude, which may indicate that internal remittances could have been spent to satisfy non-food needs instead.

On the other hand, the presence of a post office in Malawian communities contributed to an increase regarding the food security status at the 1 percent significance level. Contrarily, estimates regarding microfinance institutions as well as commercial banks do not evidence any significant effect. For the study's purpose, this may indicate that the access to remittances through informal channels allowed to enhance food security in Malawian households rather than formal remittance vias.

6.3 Heterogeneous Effects Analysis

This section reports the heterogeneous impact deduced by whether households received international remittances. Considering that female members have been pointed out as more prone to allocate a higher percentage of income on food consumption (Azzarri and Zezza 2011), it becomes pertinent to study heterogeneity regarding the gender of the household head. Estimates from Table 4 allow to demystify the food security effects from having either a male or a female member deciding the allocation of income. In this regard, columns (1.1) and (2.1) represent the isolated impact of the remittances variable while columns (1.2) and (2.2) provide the estimation results for the model with all control and time dummy variables.³²

³² Since most Malawian households live in rural areas (Murendo et al. 2020), an additional heterogeneous analysis regarding the effects by urban and rural settings was estimated. Indeed, no effects were found.

Coefficients associated with the male household head estimation are positive but not significant. Contrarily, the impact of remittances on food security of female headed households is positive and significant at the 10 percent level for the aggregate model in column (2.2). These estimates verify the intrinsic importance exerted by the female role to enhance a food security condition within Malawian households.

Table 4: Heterogeneous impact of international remittances on food security

	Male Household Head		Female Household Head	
	(1.1)	(1.2)	(2.1)	(2.2)
International remittances	1.4522 (1.3983)	1.6346 (1.2353)	1.6311 (1.0505)	1.2578* (0.7048)
Constant	0.4389*** (0.0528)	0.4264*** (0.0505)	0.3357*** (0.0758)	0.2885*** (0.0800)
Household characteristics				
- Household size	-	-0.0059 (0.0078)	-	0.0283** (0.0128)
- Children	-	-0.0110 (0.0082)	-	-0.0490*** (0.0161)
- Elderly	-	-0.0311 (0.0360)	-	-0.0724*** (0.0223)
Other income sources				
- Assistance within country	-	-0.1075** (0.0512)	-	-0.0636 (0.0477)
Community characteristics				
- Post office	-	0.1090*** (0.0345)	-	0.1126*** (0.0347)
- Commercial bank	-	-0.0339 (0.0665)	-	-0.0196 (0.0482)
- Microfinance institution	-	0.0342 (0.0368)	-	0.0527 (0.0410)
Time dummies	-	Yes	-	Yes
F-statistic	10.78	13.60	14.36	22.37
Observations	2940	2939	1926	1926
R-squared overall	0.0018	0.0078	0.0071	0.0210

Notes: Regressions are estimated using the Instrumental Variable method with regional fixed effects. Food security is measured as an index that varies between 0 and 1. International remittances are measured as an indicator variable that takes value 1 when households received any international remittances in the previous month. Household characteristics encompass the household size, the number of children (aged < 18), and the number of elderly (aged > 64). Other income sources refer to the assistance received in the preceding month from people living in Malawi and it takes value 1 when households received monetary support from either family or non-family individuals, 2 when received from both sources, and 0 otherwise. Community characteristics include dummy variables for the presence of a post office, a commercial bank, and a microfinance institution in communities. Column (6) considers the second quarter of 2020 as the base group and includes time dummies for the third and fourth quarters of 2020. *p<0.1; **p<0.05; ***p<0.01 with robust standard errors, clustered at the regional level in parenthesis.

Moreover, household size is estimated to have exerted a positive and significant impact, contradicting the expected negative effect (Nguyen and Winters 2011). Similar to the results from Table 3, the presence of children and elderly in Malawian households contributed negatively to food security status at the 1 percent significance level. These estimates point, therefore, to the importance of working-age adult members to promote a food secure household contrarily to dependent members. On the other hand, assistance from family and non-family individuals do not evidence a significant magnitude. With regards to community characteristics, the existence of a post office is also significant at the most restricted conventional level, reinforcing the importance of informal remittance channels comparing to formal vias, which were not relevant to enhance food security in households headed by a female member as well.

6.4 Robustness Checks

The sensitivity of the results is evaluated through a robustness checks analysis. Table 5 presents the estimates from a modified measurement of the food security variable. Instead of the normalized indicator constructed from a principal component analysis, the dependent variable is computed as the raw score stemmed from the sum of the binary responses to the eight dimensions asked in the phone survey. Since this study considers that an affirmative response displays food security, a score of eight indicates that the household is food secure while a null raw score suggests that the household is at the most severe status of food insecurity.

Indeed, the estimates on the impact of international remittances do not remain significant for the period between the second and the fourth quarters of 2020, as described in column (1). Contrarily, estimates from column (2) evidence that remittances received in the pandemic outbreak year by households with female head persist significant at the 10 percent level. The heterogeneous result is, therefore, the only that is robust to a different measurement of the dependent variable.

Table 5: Robustness check on the dependent variable of food security

	2020 Effect	Female Household Head
	(1)	(2)
International remittances	10.0849 (6.2878)	10.6164* (6.0332)
Constant	2.7879*** (0.4179)	2.0427*** (0.6854)
Household characteristics		
- Household size	0.1086* (0.0607)	0.2481** (0.1042)
- Children	-0.2708*** (0.0745)	-0.4221*** (0.1319)
- Elderly	-0.3721** (0.1537)	-0.6171*** (0.1822)
Other income sources		
- Assistance within country	-0.7436** (0.3585)	-0.5484 (0.3983)
Community characteristics		
- Post office	0.8060*** (0.2276)	0.8975*** (0.2896)
- Commercial bank	-0.1871 (0.3977)	-0.1557 (0.4155)
- Microfinance institution	0.3591 (0.2666)	0.4339 (0.3367)
Time dummies	Yes	Yes
F-statistic	29.17	22.37
Observations	4865	1926
R-squared overall	0.114	0.0199

Notes: Regressions are estimated using the Instrumental Variable method with regional fixed effects. Food security is measured as the raw score resulted from the sum of binary responses to the eight categories of food security. International remittances are measured as an indicator variable that takes value 1 when households received any international remittances in the previous month. Household characteristics encompass the household size, the number of children (aged < 18), and the number of elderly (aged > 64). Other income sources refer to the assistance received in the preceding month from people living in Malawi and it takes value 1 when households received monetary support from either family or non-family individuals, 2 when received from both sources, and 0 otherwise. Community characteristics include dummy variables for the presence of a post office, a commercial bank, and a microfinance institution in communities. Column (6) considers the second quarter of 2020 as the base group and includes time dummies for the third and fourth quarters of 2020. *p<0.1; **p<0.05; ***p<0.01 with robust standard errors, clustered at the regional level in parenthesis.

On the other hand, a new vector of dummy variables, also retrieved from the *High-Frequency Phone Survey on COVID-19*, is introduced in the regression model of Table 6 to assess the effect of social safety nets attributed to households by institutions such as the Malawian government, religious entities, and non-governmental organizations.

Table 6: Robustness check on the inclusion of social safety nets to examine the impact of international remittances on food security

	2020 Effect (1)	Female Household Head (2)
International remittances	1.2606* (0.7673)	1.2871* (0.7412)
Constant	0.3783*** (0.0502)	0.2894*** (0.0823)
Household characteristics		
- Household size	0.0119 (0.0079)	0.0285** (0.0132)
- Children	-0.0310*** (0.0094)	-0.0490*** (0.0165)
- Elderly	-0.0456** (0.0191)	-0.0726*** (0.0226)
Other income sources		
- Assistance within country	-0.0886** (0.0438)	-0.0627 (0.0492)
Social safety nets		
- Cash transfers	-0.0325 (0.0612)	-0.0731 (0.1055)
- Free food	-0.0924*** (0.0295)	-0.0648 (0.0662)
- Other in-kind transfers	-0.0233 (0.0410)	-0.0323 (0.0488)
Community characteristics		
- Post office	0.1005*** (0.0277)	0.1122*** (0.0349)
- Commercial bank	-0.0272 (0.0483)	-0.0226 (0.0497)
- Microfinance institution	0.0427 (0.0321)	0.0523 (0.0409)
Time dummies	Yes	Yes
F-statistic	28.20	22.07
Observations	4860	1925
R-squared overall	0.0123	0.0210

Notes: Regressions are estimated using the Instrumental Variable method with regional fixed effects. Food security is measured as an index that varies between 0 and 1. International remittances are measured as an indicator variable that takes value 1 when households received any international remittances in the previous month. Household characteristics encompass the household size, the number of children (aged < 18), and the number of elderly (aged > 64). Other income sources refer to the assistance received in the preceding month from people living in Malawi and it takes value 1 when households received monetary support from either family or non-family individuals, 2 when received from both sources, and 0 otherwise. Social safety nets comprise dummy variables that assume the value 1 when households received cash transfers, free food, and other in-kind transfers, respectively, in the previous month. Community characteristics include dummy variables for the presence of a post office, a commercial bank, and a microfinance institution in communities. Column (6) considers the second quarter of 2020 as the base group and includes time dummies for the third and fourth quarters of 2020. *p<0.1; **p<0.05; ***p<0.01 with robust standard errors, clustered at the regional level in parenthesis.

Social safety nets include not only free food and other in-kind transfers, but also cash transfers, that encompass the government social transfer program and the COVID-19 urban cash intervention, among other cash transfers.³³ This new set of variables is considered since households receiving institutional support within the country might have potentially relied less on international remittances to face food needs.

The negative coefficients of the social safety nets variables, particularly free food in column (1), suggest that these income support measures did not raise food security. Households covered by social support initiatives could have spent a lower proportion on food (Brune et al. 2017) or instead received a small amount that was not directly spent on food consumption. Importantly, the estimation results from Table 6 confirm that the 10 percent significance level of the remittances instrumented variable impact on food security is robust to safety nets for the 2020 effect, in column (1), and for female headed households in column (2).

7. Concluding Remarks

The analysis regarding the impact of remittances on food security at a household level within a crisis context is sparsely addressed by academic research. Moreover, at the best of the literature knowledge, no research study has been centered on such impact after the COVID-19 outbreak. Therefore, this paper aimed to fulfil the literary gap by studying the nexus between remittances and food security within a developing country where, on the one hand, remittances declined during the pandemic, and, on the other hand, food security levels are traditionally low.

Having Malawi as the study country, the empirical research has relied on nationally representative data from the *High-Frequency Phone Survey on COVID-19*. An important initial

³³ The Malawian government social cash transfer program, that is known as Mtukula Pakhoma, constitutes an initiative from the Minister of Gender, Community Development and Social Welfare to protect the population under severely poor conditions (See <https://mtukula.com/>). The COVID-19 Urban Cash Intervention, popularized in Malawi as Mzati Pa Covid, is focused on the support of the urban population who suffer from job precariousness. See United Nations. “Emergency Appeal: Malawi” Report, May-October 2020.

result relates to the decline of households receiving international remittances, thus corroborating evidence from official macroeconomic data, according to which remittance flows have decreased abruptly.

The impact of remittances on food security in Malawi was estimated through an instrumental variable approach. According to the estimation results, the effect of remittances was positive and significant between the second and the fourth quarters of 2020. This result is robust to social safety nets but not to the raw measurement of the dependent variable. On the other hand, heterogeneous results suggest that remittances received by households with female head contributed significantly to improve food security, with robustness for both food security measurement and income support incentives.

Overall, the decline of international remittances received after the pandemic outbreak did not impede the impact on food security improvement, namely in Malawian households headed by a female member. This effect is accompanied by the negative influence exerted by children and elderly in the household. In contrast, the household size contributed positively, particularly through the presence of working-age adults while the importance of informal remittances channels is confirmed by the significant impact of post offices in the places where households live. Indeed, external validity cannot be guaranteed since remittances have varied differently across countries, with the same applying to food security. Further research is, therefore, required to examine whether these results apply to other developing countries.

8. References

- Acosta, Pablo, Cesar Calderon, Pablo Fajnzylber, and Humberto Lopez. 2008. "What is the impact of international remittances on poverty and inequality in Latin America?" *World Development*, 36(1): 89-114.
- Adams Jr., Richard, and John Page. 2005. "Do international migration and remittances reduce poverty in developing countries?" *World Development*, 33(10): 1645-1669.
- Adams Jr, Richard H., Alfredo Cuecuecha, and John Page. 2008. "The impact of remittances on poverty and inequality in Ghana." *World Bank Policy Research Working Paper* 4732.
- Adams Jr, Richard H., and Alfredo Cuecuecha. 2010. "Remittances, household expenditure and investment in Guatemala." *World Development*, 38(11): 1626-1641.
- Adams Jr, Richard H. 2011. "Evaluating the economic impact of international remittances on developing countries using household surveys: A literature review." *Journal of Development Studies*, 47(6): 809-828.
- Akim, Al-mouksit, Firmin Ayivodji, and Jeffrey Kouton. 2021. "Do Remittances Mitigate COVID-19 Employment Shock on Food Insecurity? Evidence from Nigeria." *Center for Economic Policy Research*, 78: 88-122.
- Alcaraz, Carlo, Daniel Chiquiar, and Alejandrina Salcedo. 2012. "Remittances, schooling, and child labor in Mexico." *Journal of Development Economics*, 97(1): 156-165.
- Ambler, Kate, Diego Aycinena, and Dean Yang. 2015. "Channeling Remittances to Education: A Field Experiment among Migrants from El Salvador." *American Economic Journal: Applied Economics*, 7(2): 207-32.

- Amuedo-Dorantes, Catalina, and Susan Pozo. 2010. "Accounting for remittance and migration effects on children's schooling." *World Development* 38(12): 1747-1759.
- Amuedo-Dorantes, Catalina, and Susan Pozo. 2011. "New evidence on the role of remittances on healthcare expenditures by Mexican households." *Review of Economics of the Household*, 9(1): 69-98.
- Atamanov, Aziz, and Marrit Van den Berg. 2012. "Heterogeneous effects of international migration and remittances on crop income: Evidence from the Kyrgyz Republic." *World Development*, 40(3): 620-630.
- Avdiu, Besart, and Moritz Meyer. 2021. "How COVID19 changed the path of remittances in The Gambia." *World Bank*.
- Azzarri, Carlo, and Alberto Zezza. 2011. "International migration and nutritional outcomes in Tajikistan." *Food Policy*, 36(1): 54-70.
- Batista, Catia, and Pedro C. Vicente. 2011. "Do migrants improve governance at home? Evidence from a voting experiment". *World Bank Economic Review*, 25(1): 77-104.
- Batista, Catia, Tara McIndoe-Calder, and Pedro Vicente. 2017. "Return Migration, Self-Selection and Entrepreneurship". *Oxford Bulletin of Economics and Statistics*, 79(5): 797-821.
- Batista, Catia, and Gaia Narciso. 2018. "Migrant remittances and information flows: evidence from a field experiment." *The World Bank Economic Review*, 32(1): 203-219.
- Bisong, Amanda, Pamella Eunice Ahaiwe, and Esther Njoroge. 2020. "The impact of COVID-19 on remittances for development in Africa". European Centre for Development Policy Management Discussion Paper 269.

- Brown, Richard P., and Gareth Leeves. 2011. "Comparative effects of migrants' remittances on composition of recipient household income in two small, island economies." *Applied Economics*, 43(27): 3965-3976.
- Brune, Lasse, Xavier Giné, Jessica Goldberg, and Dean Yang. 2017. "Savings defaults and payment delays for cash transfers: Field experimental evidence from Malawi." *Journal of Development Economics*, 129: 1-13.
- Cox, Donald. 1987. "Motives for private income transfers." *Journal of Political Economy*, 95(3): 508-546.
- Crush, Jonathan. 2013. "Linking food security, migration and development." *International Migration*, 51(5): 61-75.
- Docquier, Frédéric, and Hillel Rapoport. 2006. "The Economics of Migrants' Remittances." *Handbook of the Economics of Giving, Altruism and Reciprocity*, 2: 1135-1198.
- Ellis, Frank, and Elizabeth Manda. 2012. "Seasonal food crises and policy responses: A narrative account of three food security crises in Malawi." *World Development*, 40(7): 1407-1417.
- Freund, Caroline, and Nikola Spatafora. 2008. "Remittances, transaction costs, and informality." *Journal of Development Economics*, 86(2): 356-366.
- Funkhouser, Edward. 2006. "The effect of emigration on the labor market outcomes of the sender household: a longitudinal approach using data from Nicaragua." *Well-Being and Social Policy*, 2(2): 5-25.
- Gibson, John, and David McKenzie. 2017. "How reliable are survey estimates of remittances? Evidence from a cross-reporting survey exercise." *Migration Studies*, 5(1): 97-115.

- Göbel, Kristin. 2013. "Remittances, expenditure patterns, and gender: parametric and semiparametric evidence from Ecuador." *IZA journal of Migration*, 2(1): 1-19.
- Gubert, Flore. 2002. "Do migrants insure those who stay behind? Evidence from the Kayes area (Western Mali)." *Oxford Development Studies*, 30(3): 267-287.
- Hoddinott, John. 1994. "A model of migration and remittances applied to Western Kenya." *Oxford Economic Papers*, 46(3): 459-476.
- Ilahi, Nadeem, and Saqib Jafarey. 1999. "Guestworker migration, remittances and the extended family: evidence from Pakistan." *Journal of Development Economics*, 58(2): 485-512.
- Isoto, Rosemary E., and David S. Kraybill. 2017. "Remittances and household nutrition: Evidence from rural Kilimanjaro in Tanzania." *Food Security*, 9(2): 239-253.
- Kangmennaang, Joseph, Rachel Bezner-Kerr, and Isaac Luginaah. 2018. "Impact of migration and remittances on household welfare among rural households in Northern and Central Malawi." *Migration and Development*, 7(1): 55-71.
- Kapri, Kul, and Stuti Jha. 2020. "Impact of remittances on household health care expenditure: Evidence from the Nepal Living Standards Survey." *Review of Development Economics*, 24(3): 991-1008.
- Karamba, Wendy R., Esteban J. Quiñones, and Paul Winters. 2011. "Migration and food consumption patterns in Ghana." *Food Policy*, 36(1): 41-53.
- McKenzie, David, and Dean Yang. 2015. "Evidence on policies to increase the development impacts of international migration." *The World Bank Research Observer*, 30(2): 155-192.
- Mora-Rivera, Jorge, and Edwin van Gameren. 2021. "The impact of remittances on food insecurity: Evidence from Mexico." *World Development*, 140: 105349.

- Murendo, Conrad, Grace Kairezi, and Kizito Mazvimavi. 2020. "Resilience capacities and household nutrition in the presence of shocks. Evidence from Malawi." *World Development Perspectives*, 20: 100241.
- Nguyen, Minh Cong, and Paul Winters. 2011. "The impact of migration on food consumption patterns: The case of Vietnam." *Food Policy*, 36(1): 71-87.
- Obi, Chinedu, Fabio Bartolini, and Marijke D'Haese. 2020. "International migration, remittance and food security during food crises: the case study of Nigeria." *Food Security*, 12(1): 207-220.
- Osili, Una Okonkwo. 2004. "Migrants and housing investments: Theory and evidence from Nigeria." *Economic Development and Cultural Change*, 52(4): 821-849.
- Poirine, Bernard. 1997. "A theory of remittances as an implicit family loan arrangement". *World Development*, 25(4): 589-611.
- Ponce, Juan, Iliana Olivié, and Mercedes Onofa. 2011. "The Role of International Remittances in Health Outcomes in Ecuador: Prevention and Response to Shocks." *International Migration Review*, 45(3): 727-745.
- Ratha, Dilip. 2003. "Workers' remittances: an important and stable source of external development finance." *Global Development Finance* 2003.
- Ratha, Dilip, Sanket Mohapatra, Çağlar Özden, Sonia Plaza, William Shaw, and Abebe Shimeles. 2011. *Leveraging Migration for Africa: Remittances, Skills, and Investments*. Washington, DC: World Bank.
- Ratha, Dilip, Supriyo De, Eung Ju Kim, Sonia Plaza, Ganesh Seshan, and Nadege Desiree Yameogo. 2020. "Migration and Development Brief 32: COVID-19 Crisis through a Migration Lens." Washington, DC: KNOMAD-World Bank.

- Ratha, Dilip. 2021. "Staying the course on global governance of migration through the COVID-19 and economic crises." *International Migration*, 59(1): 285-288.
- Ratha, Dilip, Eung Ju Kim, Sonia Plaza, and Ganesh Seshan. 2021. "Migration and Development Brief 34: Resilience: COVID-19 Crisis through a Migration Lens." Washington, DC: KNOMAD-World Bank.
- Regmi, Madhav, and Krishna Paudel. 2017. "Food security in a remittance based economy." *Food Security*, 9(4): 831-848.
- Russell, Sharon S. 1986. "Remittances from international migration: A review in perspective." *World Development*, 14(6): 677-696.
- Staiger, Douglas O., and James H. Stock. 1997. "Instrumental variables regression with weak instruments." *Econometrica*, 65(3): 557-586.
- Stark, Oded. 1995. *Altruism and Beyond. An Economic Analysis of Transfers and Exchanges Within Families and Groups*. Cambridge: Cambridge University Press.
- Taylor, J. Edward, Scott Rozelle, and Alan De Brauw. 2003. "Migration and incomes in source communities: A new economics of migration perspective from China." *Economic Development and Cultural Change*, 52(1): 75-101.
- Thomas, Kevin J., and Christopher Inkpen. (2013). "Migration dynamics, entrepreneurship, and African development: Lessons from Malawi." *International Migration Review*, 47(4): 844-873.
- Urama, Nathaniel E., Emmanuel O. Nwosu, Denis N. Yuni, and Stephen E. Aguegbah. 2017. "International migrant remittances and labour supply in Nigeria." *International Migration*, 55(1): 37-50.

- Wagle, Udaya R., and Satis Devkota. 2018. "The impact of foreign remittances on poverty in Nepal: A panel study of household survey data, 1996–2011." *World Development* 110: 38-50.
- World Bank. "Remittance Prices Worldwide Quarterly." Issue 37, March 2021. https://remittanceprices.worldbank.org/sites/default/files/rpw_main_report_and_annex_q121_final.pdf
- Wouterse, Fleur. 2010. "Migration and technical efficiency in cereal production: Evidence from Burkina Faso." *Agricultural Economics*, 41(5): 385-395.
- Yang, Dean. 2008. "International migration, remittances and household investment: Evidence from Philippine migrants' exchange rate shocks." *The Economic Journal*, 118(528): 591-630.
- Yang, Dean. 2008. "Coping with disaster: The impact of hurricanes on international financial flows, 1970-2002." *The BE Journal of Economic Analysis & Policy*, 8(1).
- Yang, Dean, and Hwajung Choi. 2007. "Are Remittances Insurance? Evidence from Rainfall Shocks in the Philippines." *The World Bank Economic Review*, 21(2): 219-248.
- Yang, Dean. 2011. "Migrant Remittances." *Journal of Economic Perspectives*, 25(3): 129-152.
- Zeza, A., Calogero Carletto, Benjamim Davis, and Paul Winters. 2011. "Assessing the impact of migration on food and nutrition security." *Food Policy*, 36(1): 1-6.

Appendix

Figure A1: Map of Malawi



Source: Enciclopaedia Britannica, Inc

Table A1: Description of dependent, independent, and control variables

<i>Variables</i>	<i>Description</i>	<i>Source</i>
Dependent Variable		
Food security	Household food security status - Normalized indicator: 0 = food insecure to 1 = food secure	HFPS
Independent Variable		
International remittances	Remittances received from abroad - Dummy: 1 = received; 0 = did not receive	HFPS
Localization Variable		
Urban	Localization of the household - Dummy: 1 = urban; 0 = rural	HFPS
Household Characteristics		
Household size	Number of members per household	HFPS
Number of children	Number of children (aged < 18) per household	HFPS
Number of elderly	Number of elderly (aged > 64) per household	HFPS
Head gender	Gender of household head (1 = male; 0 = female)	HFPS
Other Income Sources		
Assistance within country	Assistance from family or non-family individuals in Malawi - 1 = received from either family or other individuals - 2 = received from both sources - 0 = not received	HFPS
Social Safety Nets		
Cash transfers	Transfers in cash received by the household - Dummy: 1 = received; 0 = not received	HFPS
Free food	Free food received by the household - Dummy: 1 = received; 0 = not received	HFPS
Other in-kind transfers	In-kind transfers beyond food - Dummy: 1 = received; 0 = not received	HFPS
Community Characteristics		
Post office	Existence of a post office - Dummy: 1 = exists; 0 = do not exist	IHS
Commercial bank	Existence of a commercial bank - Dummy: 1 = exists; 0 = do not exist	IHS
Microfinance institution	Existence of a microfinance institution - Dummy: 1 = exists; 0 = do not exist	IHS

Notes: HFPS refers to the *High-Frequency Phone Survey*, carried out in Malawi while IHS states for the *Malawi Fifth Integrated Household Survey*, particularly focusing on the community level questionnaire. Social safety nets are received from the Malawian government as well as non-government organizations and religious entities. Regarding community characteristics, commercial banks include either the Malawi National Bank or a Savings Bank whereas microfinance institutions encompass SACCO, that states for Savings and Credit Cooperatives, and FINCA, which provides monetary assistance in case of financial need.

Table A2: Description of food security items

<i>Items</i>	<i>Description</i>
Worried	1 = not worried about whether having enough food to eat; 0 = concern
Healthy	1 = able to eat healthy food; 0 = not able to access nutritious food
Few food	1 = no food quantity constraints; 0 = ate few food
Skipped meals	1 = not forced to skip meals; 0 = forced to skip meals
Ate less	1 = ate the adequate proportion of food; 0 = ate less than advised
Run out of food	1 = did not run out of food; 0 = ran out of food
Hungry	1 = able to satisfy their food needs; 0 = hungry but did not eat
Whole day	1 = no member was without eating for a whole day; 0 = did not eat for a whole day

Notes: The binary response to these items is based on the period of a month prior to each interview.