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Effect of Remittances on Healthcare of Left-Behind Parents

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ABSTRACT: This study investigates the impact of remittances on the health status of parents left behind in their communities by their children. While the existing literature explores the effects of remittances through health expenditure, this study contributes to the literature by analysing the causal effects of remittances on the level of access to healthcare services and health outcomes. Using three waves of the Bangladesh Integrated Household Survey coupled with a fixed-effects instrumental variable approach, we find that demand for healthcare declines with rising remittances and that remittances decrease acute illness, hinting that remittances may improve preventative health measures. Finally, the findings suggest to policymakers the importance of greater investments in the public health system to make it accessible for all, especially for non-remittance-receiving households.

KEYWORDS: remittance, left-behind parents, healthcare facilities, Bangladesh

1. INTRODUCTION

In many places, especially in most developing countries, financing for healthcare is a serious concern. Poverty or economic hardship is one of the major obstacles for people trying to pay for healthcare because, in developing countries, people mostly depend on out-of-pocket payments for their total health expenditure (McIntyre, Thiede, Dahlgren & Whitehead, 2006; O'Donnell et al., 2008; Wagner et al., 2011). Previous research has found that the transfer of remittances can be a good funding source and potential financing tool for the domestic mobilisation of health care expenditures (World Health Organization, 2010).

This study aims to examine the impact of remittances on healthcare use and its influence on health outcomes. The focus of this paper is on the left-behind parents of migrants in sending communities. The elderly in most developing countries rely on their children for personal care and financial support (Adhikari, Jampaklay & Chamratrithirong, 2011). Additionally, outward migration of adult children is common in these countries. Through the inflow of remittances, migration of adult children can benefit left behind older family members by reducing economic risks, improving health care, nutrition, and overall positive changes in their life. For example, evidence from Indonesia suggests that adults in emigrant households are significantly less susceptible to being underweight as remittance arrives than those in non-migrant households (Lu, 2013).

A handful of papers investigate the relationship between remittances and the health of left behind elderly parents. In South Africa, remittance-receiving households are found to have better health outcomes for left behind elderly parents (Adhikari et al., 2011). Similarly, evidence from Thailand suggests that elderly parents with migrant children are also more to access health facilities because remittances make healthcare more affordable (Adhikari et al., 2011). Thus, the related literature indicates that although the left behind elderly parents are potentially adversely affected by a lack of family care, remittances benefit them by buying them access to better health facilities and living standards.

We contribute to the remittance literature by analysing its effect on (i) access to healthcare and (ii) health outcomes of left-behind parents in Bangladesh. Most existing studies find that remittances increase healthcare expenditure, we differ from this approach by focusing on access to healthcare facilities. Although access and expenditure are correlated, expenditure alone is an incomplete proxy for health outcomes. Studying access to healthcare measures the use of healthcare facilities, whereas health expenditure measures gross and out-of-pocket expenses that can include factors that do not act as inputs into the health production function (Jiang et al., 2013). Thus, access to health facilities is a more conservative measure of health outcomes than health care expenditure. This study also analyses three illness conditions separately to more comprehensively explore health outcomes because they allow us to directly measure wellbeing in terms of health. Understanding remittances' impact on acute illness is especially important because illness variables are measures of poor health status by lack of access to healthcare, and it also reflects health status determined by access to preventative and maintenance care. Therefore, this study uses three symptoms of poor physical health, prolonged fever, diarrhoea and persistent cough as illness variables.

This study empirically tests the hypotheses that the transfer of remittance may relax household financial constraints, allowing left-behind parents to access healthcare facilities more and improve their physical and mental health outcomes. For the empirical analysis, this research focuses on the case of Bangladesh, a country where a growing proportion of aging individuals is challenging public and social institutions (Islam et al., 2021). Bangladesh is also undergoing an epidemiological transition where non-communicable diseases are increasingly common causes of mortality and morbidity (Islam, 2011). Additionally, remittances in Bangladesh are steadily increasing, becoming an essential part of household's livelihood strategies (Islam et al., 2021). Therefore, remittance income could be an important factor in improving healthcare for the population of Bangladesh.

This study uses the Bangladesh Integrated Household Survey (BIHS) data, a nationally representative three-wave panel conducted in 2011, 2015 and 2018. The empirical analysis uses a fixed-effects approach to control for time-invariant omitted variables bias at the individual level. The study addresses potential endogeneity with instrumental variables. It is possible, for example, that a household member decided to migrate and send remittances to help an ill parent. We mitigate this problem with an instrumental variable -- the channel of sending remittance from destination areas which can be referred to the personal transfer through friends and relatives for sending cash remittances to parents living in their home country. We show evidence supporting the validity of this instrument.

Our core regressions point to a negative association between healthcare utilisation and remittances. We interpret this finding as suggesting that remittance receiving households have better health outcomes and inputs, such as better-quality food. We show evidence supporting our hypothesis. We show a negative association between remittances and acute illness, implying that remittances decrease the frequency of acute illness for left-behind parents. We also show that remittance receiving households increase their expenditure on food, especially buying nutritious and regular food such as cereals, pulses, vegetables, oil, meat, fish, egg, milk, and fruits. In doing so, we also contribute to a small literature that focusses on remittances and food security in developing countries (Hussein, Law & Fraser, 2021). This is an important contribution given a paucity on information in developing countries on the nexus between migration, remittances and food.

The remainder of this paper is structured as follows. The next section provides an overall summary of the healthcare system in Bangladesh. Section 3 describes data, variables and an estimation strategy. Section 4 presents the empirical results, followed by a discussion and conclusion.

2. HEALTH, DEMOGRAPHICS AND REMITTANCES IN BANGLADESH

After Bangladesh's declaration of independence in 1971 as a unitary state and parliamentary democracy, its health system has gone through a number of reforms and established an extensive health infrastructure in the public and private sectors (Ahmed et al., 2015). Bangladesh has achieved impressive improvements in population health status by reducing child and maternal deaths, increasing immunisation coverage, and increasing the rate of survival from infectious diseases including malaria, tuberculosis, and cases of diarrhoea. However, several factors continue to play an important role in hindering the expected improvement in the overall health status of Bangladeshis.

The first issue is associated with inadequate public financing. Currently, the government of Bangladesh spends US$26.60 per capita on health, and the pace of growth is faster than per capita GDP, suggesting that people are bound to spend more on health than domestic products (Ahmed et al., 2015). On average, Bangladeshi citizens must pay 63.3% of the total cost, while the government pays the rest (Molla & Chi, 2017). Further, the budget for the health sector was reduced from 7% to less than 5% of the total government budget in 2013 (Ahmed et al., 2015). Therefore, limited government funding and high out-of-pocket costs create a significant financial burden for impoverished families, sometimes forcing them to either forego treatment or go into debt. In this context, this study analyses whether remittances help to improve remittance-receiving households' access to the healthcare system.

In addition to inadequate financial allocation for the healthcare system, Bangladesh is facing the double burden of communicable and non-communicable diseases that are more common in developing countries (Falkingham, 2004). Poor hygiene habits, contaminated food, malnutrition and infectious diseases such as tuberculosis and pneumonia are also serious problems in Bangladesh. For example, about half of children aged 6 to 59 months suffer from anaemia, four out of every 10 are stunted, and one in three children are underweight (Muhammad, Chowdhury, Arifuzzaman & Chowdhury, 2017). Adult deaths due to infectious diseases are quite high in number. For instance, tuberculosis is responsible for an estimated 70,000 deaths each year in Bangladesh (Luby, Brooks, Zaman, Hossain & Ahmed, 2008).

Bangladesh is also undergoing a demographic transition that has important health implications. The size and share of the old age population (60+) continue to increase, the ratio of elderly dependents (aged 60+) to child dependents (aged 0–14) has sharply increased since 2010 (Islam, 2016). Population projections suggest that the number of elderly people will be close to the number of children under the age of 15 in 2050 (Islam, 2016).

Remittances could, therefore, be an important factor in healthcare development in Bangladesh. According to the World Bank (2014), Bangladesh is one of the top 10 remittance-recipient countries. Since 1976, international remittances in Bangladesh have increased steadily. World Bank estimates suggest that more than seven million Bangladeshis are currently living abroad, which implies that 10–16% of the Bangladeshi labour force in 2020 was working abroad (Islam, Islam & Chakroborty, 2004). On average,

the country has been receiving remittances through official channels worth over US$14.5 billion (Hayes et al., 2015). That amounts to around 11% of Bangladesh's GDP in 2013 (Islam et al., 2004). Given the extraordinarily high inflow of remittances in Bangladesh, this study examines whether households leverage remittances to pay for healthcare and whether remittances influence health outcomes.

3. DATA AND METHOD

3.1 Data

The empirical analysis of this study is based on the BIHS database. The BIHS is a comprehensive, nationally representative survey of a panel of households conducted in rural Bangladesh in 2011/2012, 2015 and 2018. All waves of the panel are designed and implemented by the International Food Policy Research Institution (IFPRI). The BIHS samples are collected through various levels stratified random sampling and are designed to be representative of rural Bangladesh throughout all seven of the country's administrative divisions. Around 6,500 households are surveyed from 325 villages in Bangladesh. The sample includes 2,028 left-behind parents of migrants observed in all three waves.

3.2 Method

This study examines several aspects of the health of left-behind parents. Left-behind parents are defined here as those who are living in the originating country or place of residence where one or more children have emigrated either within the country or abroad. To measure left-behind parents' healthcare-seeking behaviour and status, four separate dependent variables are used. These comprise three symptoms of poor physical health: (i) prolonged fever, (ii) diarrhoea and (iii) persistent cough, and one variable to capture demand for healthcare: access to healthcare facilities. The three outcome variables are captured using a four-weeks-prior-to-the-survey reference period. They are measured with dummy variables equal 1 if 'the person is suffering from the disease' and 0 otherwise. Access to health facilities is captured with a dummy variable based on a question that asked respondents if they 'visit the hospital facility regularly'.

In the preferred specifications, the sample consists of parents with migrant children. About 8 percent of total households have migrant member, thus our sample decreases from over 32,000 in the original IFPRI dataset to 2,960. We undertake robustness exercises, however, with the full sample.

Our core regressions test whether receiving remittances affects access to healthcare and the health outcomes of those parents. The main regressor of interest is a variable capturing how much money a household received in total in the past 12 months from an adult migrant family member who has left the household for six months or more within the last five years, either within the country or abroad.

Our estimation strategy focuses on a reduced form equation with individual-level fixed effects model that control for time-invariant omitted variables. In our context, omitted variables include confounding factors at the individual and household levels that can influence both health and remittances/migration. At the individual level, for example, fixed effects capture any long-term health condition that may confound the relationship between remittances and health outcomes. Further, the model controls for geographical differences by including dummies for administrative regions of Bangladesh and region-specific time trends to allow for the fact that these trends could be different for different regions in Bangladesh.

Table 1 illustrates summary statistics for the main variables used in the empirical results. It shows health status, healthcare behaviour and background characteristics of left-behind parents according to the migrant status of the child or children. Over 87% of left-behind parents have access to healthcare facilities. Around 77% of households receive remittances and 23% of the total volume of remittance has been transferred to the left-behind parents through personal delivery by friends and family.

Table 1: Descriptive Statistics

Variable	Observations	Mean	Std. Dev.	Min	Max
Access to health facility	32,332	0.878	0.326	0	1
Remittance-receiving households	32,332	0.770	0.292	0	1
Medium of remittance (personal delivery)	32,332	0.228	0.257	0	1
Left-behind parents' age	32,332	44.850	11.62	38	93
Left-behind parents' sex	32,332	0.422	0.492	0	1
Occupation of left-behind parents					
Wage labour	32,332	0.038	0	0	1
Salaried worker	32,332	0.022	0	0	1
Self-employed	32,332	0.027	0	0	1
Trader	32,332	0.029	0	0	1
Producing food	32,332	0.004	0	0	1

Raising poultry	32,332	0.001	0	0	1
Farming	32,332	0.235	0	0	1
Non-earning occupation	32,332	0.644	0	0	1
Workplace	32,332	0.933	0.249	0	1

Note. BIHS data from IFPRI.

In the model, the reference group of the independent variable is 'households with migrants that do not receive remittances'. To estimate the effect of remittances on the health status and healthcare service behaviour of left-behind parents, the analysis uses a linear probability model (LPM) coupled with an IV strategy. The main empirical specification is summarised as follows:

$$P_{i,j,t} = \beta_0 + \beta_1 R_{i,j,t} + \beta_2 X_{i,j,t} + \theta_j + \varepsilon_{i,j,t} \quad (1)$$

where i stands for the individual, j for household, and t for year. $P_{i,j,t}$ is the outcome variable of left-behind parents' treatment-seeking behaviour and other physical illness, $R_{i,j,t}$ is the treatment variable (remittance) and $X_{i,j,t}$ is a vector of control variables, Finally, θ_j is the parents' fixed effect, and $\varepsilon_{i,j,t}$ is the error term. The models are estimated using strata clusters at the individual level as strata reduce the standard error and clusters increase variance, therefore, the standard error (Abadie, Habecker, Gelpi-Acosta & Dombrowski, 2019).

The coefficient estimate attached to remittances in equation (1) is potentially endogenous because of (i) time-variant unobservable or (ii) reverse causation. Remittances, for example, can increase the probability of access to treatments for left-behind parents, or worsening health status of left-behind parents could incentivise a household member to migrate and send remittances in the first place.

We address this concern with an instrumental variable strategy. We use informal personal fund transfers by migrants through their relatives and friends to their home country, which can only affect health outcomes indirectly through remittances. The reasoning behind using this as an instrument is that informal channels of sending remittances make the process of transferring money quicker, as migrant families often need the money on short notice (Ullah & Panday, 2007). Moreover, Bangladeshi migrants do not often use formal transfer channels is the high transfer cost (Mannan & Wei, 2009). Although informal channels have been debated due to concerns about risks, there are some potential advantages of informal remittance channels in terms of costs, speed, accessibility and anonymity (Kapur, 2003; Mannan, 2004; Pieke, Van Hear & Lindley, 2005), possibly influencing the pattern of remittance behaviours of migrants.

4. DATA FINDINGS AND DISCUSSION

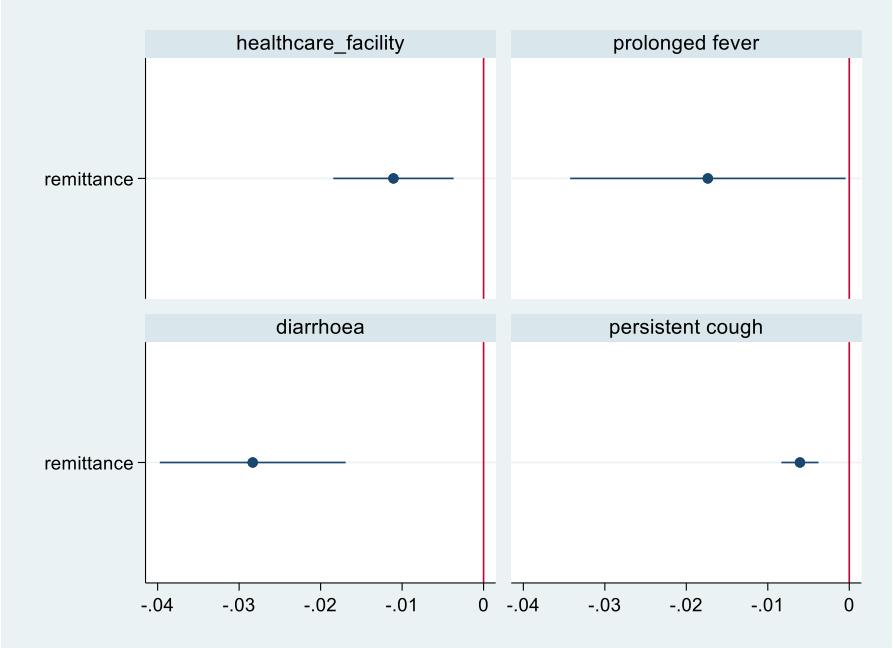
4.1 Baseline Results

Table 2 reports benchmark LPM results for four dependent variables. Column 1 shows that a 1% increase in remittances is associated with a 0.01 percentage point decrease in the probability of accessing a health facility, ceteris paribus. However, migration status is positively correlated to the health facility. Also, the interaction between remittance and migration statistically significant and has positively related to the health facility. Thus, this result suggests that left-behind parents who receive remittances from their migrant children are likely to access health facilities more. Nevertheless, the results from three other columns (2-4) indicate that parents from those households less likely suffer from diseases. To present these regression results more effectively, Figure 1 graphically presents the LPM estimation result of equation (1), considering margins in the x-axis with a 90% confidence interval.

Table 2: Access to health care facility and health status among left behind parents according to the remittance received in the household (LPM result)

	(1)	(2)	(3)	(4)
VARIABLES	**Health facility**	**Prolonged fever**	**Diarrhoea**	**Persistent cough**
Remittance	-0.011***	-0.017**	-0.028***	-0.006***
	[-2.93]	[-2.01]	[-4.87]	[-5.20]
Migration status	0.31**	-0.11*	0.01*	0.21*
	[20.03]	[-7.03]	[-6.90]	[-6.93]
Migration#Remittance	0.29**	-0.15**	-0.11**	-0.12**
	[16.03]	[-9.04]	[-8.33]	[-9.35]
R-squared	0.40	0.43	0.43	0.41
Other controls	yes	yes	yes	yes
Observations	32,332	32,332	32,332	32,332

Note. Robust z-statistics are in brackets for IV, ***, ** and * denote 1, 5 and 10 percent level of significance, respectively. All regressions include other control variables and parents fixed effects. Also, standard errors are clustered at the individual level.



Note: Dependent variable is Remittance receiving in the households. All regressions include other control variables and parents fixed effects. Also, standard errors are clustered at the individual level.

Figure 1: Effect of remittances on access to health care facility and health status (LPM results)

From Figure 1, it is found that the coefficient for healthcare facility access for left-behind parents remains on the left side of the line and does not pass the confidence intervals (the vertical red line), which indicates that the coefficient is statistically significant. Thus, the results show that remittance significantly decreases the access to a healthcare facility for left-behind parents after controlling for individual characteristics and illness variables. Nevertheless, we should be restrained in interpreting this result due to the possible endogeneity of remittances in LPM estimation. In addition, the model is controlled for year and region variation, but the results indicate that the effect of remittances on access to a health facility is lesser compared to the year of 2011 (see Table A1 in Appendix). The significance of the interaction between region and year show that the entire relationship between remittances and access to a health facility is due to time and region variation.

The three other health outcome proxy variables are heterogeneously related to remittances, which are also presented in both Table 2 and Figure 1. Starting with the first illness variable, prolonged fever (in the second column), it is found that a 1% increase in remittances leads to a decrease of 0.02% in prolonged fever. The results also found a similarly significant association between diarrhoea and persistent cough.

4.2 IV Estimation results

After LPM estimation, the current study next addresses the endogeneity issue between remittance, health status and hospital presentation of left-behind parents, which may arise from omitted variable or simultaneity biases. Table A2 in the Appendix shows results from the first-stage regression. The remittance channel instrument's coefficients are significant at the 1% level. The instrument meets the relevance criteria shown by running a weak identification test using the Kleibergen-Paap Wald rk F statistic, measuring 250 and 160, which is larger than the threshold of 10 (Table 3). The regression also controls for other control variables that may be endogenous with respect to both remittance and the health outcome variables.

Table 3: Access to health care facility and health status among left behind parents according to the remittance received in the household (IV result)

	(1)	(2)	(3)	(4)
VARIABLES	**Health facility**	**Prolonged fever**	**Diarrhoea**	**Persistent cough**
Remittance	-0.19***	-0.020	-0.028*	-0.14*
	[-4.59]	[-0.30]	[-1.87]	[-1.93]
Migration#Remittance	-0.045**	-0.036*	-0.012*	-0.092
	[-1.31]	[-5.29]	[-3.33]	[-1.35]
R-squared	0.27	0.11	0.15	0.14
First stage				

Remittance channel	0.372***	0.375***	0.375***	0.375***
	[5.31]	[4.03]	[4.03]	[4.03]
Other controls	yes	yes	yes	yes
First stage F-stat	250	160	160	160
Observations	32,332	32,332	32,332	32,332

Note. Robust z-statistics are in brackets for IV, ***, ** and * denote 1, 5 and 10 percent level of significance, respectively. All regressions include other control variables and parents fixed effects. Also, standard errors are clustered at the individual level.

As displayed in Table 3, the IV estimation results show a significant relationship between remittances and each dependent variable. Holding the other control variables constant, remittance receipt is negatively and significantly associated with access to a healthcare facility. Column 1 shows that a 1% increase in remittance leads to a 0.19% reduction in access to a health facility for left-behind parents. It is inferred that healthcare is inelastic to income, which also implies that healthcare is a necessity for the citizens of Bangladesh. In other words, the effect of income has through remittances is less responsive to healthcare facility access. If income is increased through remittances, it has no impact on access to healthcare because medical treatment is essential for survival. In addition, remittances can increase the well-being of receiving households by smoothing consumption and improving living conditions. As a result, remittances reduce left-behind parents' access to a healthcare facility (Amuedo-Dorantes, 2014). Moreover, the result is also consistent for the interaction term between migration and remittances. Thus, migrant children's remittances do not increase access to the health facilities for their left-behind parents. However, it is noted that parents from remittance-receiving households are less likely to suffer from problems with their limbs, skin and significant weight loss issues (see table A3 in appendix). From this, it can be inferred that remittance can facilitate healthier lifestyles and proper healthcare.

Although the LPM results show a heterogenous relationship of health outcomes with remittance, the results may be biased by endogeneity issues corrected by the IV method. IV results also show a similar association between the remittance receipts and physical health outcomes of left-behind parents. While the coefficient's magnitude is miniscule, it indicates that households with remittances show a statistically significant negative relationship with the illness variables (i.e., diarrhoea and persistent cough). This could be due to the fact that remittances might have greater investments in preventative healthcare measures that may help those parents left behind to improve their dietary nutrient intake and maintain better to prevent sickness. This also shows a sign of positive income elasticity for going to a healthcare facility; with the increased income through remittances, parents are more likely to go to the doctors and less likely to have illnesses.

The other illness variable, prolonged fever, shows no significant relationship between remittances and the likelihood of suffering from continued fever. The reason might be that self-medicating can be a result of increasing private healthcare expenditure in Bangladesh (Mahumud, Sultana & Sarket, 2015). Thus, remittances may be being spent on medicine, or they may make healthcare more affordable.

4.3 Robustness Test

This section examines the robustness of the model. As a robustness check, migrant status is included as a control variable. The model did not include migrant status (i.e., whether the household has any migrant members for six months or more within the last five years, either within the country or abroad) in the main specification since it creates additional endogeneity problems and multicollinearity. However, the reason to include migration status as a control variable is that households with migrants may be very different to households with migrants that send remittances since a migrant member from an affluent family might never send remittances.

Table 4: Access to a Health Care Facility and Health Status among left-behind parents according to the remittance received in the household, controlling for migration status (IV Result)

Variables	(1)	(2)	(3)	(4)
	Dependent Variables			
	Health facility	Prolonged fever	Diarrhoea	Persistent cough
Remittance	–0.042***	–0.019	–0.016*	–0.032*
	[–2.78]	[–0.74]	[–1.24]	[–0.32]
Migration status	0.032***	–0.015	-0.012	–0.037*
	[2.92]	[–0.78]	[–1.21]	[–1.87]
Migration#Remittance	–0.03	–0.01	–0.014*	–0.02*
	[–1.08]	[–0.28]	[–1.38]	[–1.08]
Other controls	yes	yes	yes	yes
Observations	11,285	11,285	11,285	11,285
R-squared	0.24	0.14	0.02	0.05
First stage F-stat	250	270	270	270

Note. Robust z-statistics are in square brackets [ ] for IV. ***, ** and * denote 1%, 5% and 10% level of significance, respectively. All regressions include other control variables and parents' fixed effects. Standard errors are clustered at the individual level.

Table 4 presents the IV results of the robustness test, including the migration status as a control variable (see full Table A4 in Appendix). The findings show that remittances lead to a decrease in healthcare use after controlling for migration. However, left-behind parents from a migrant household have better access to a healthcare facility, which indicates that migrants may belong to wealthy families. Moreover, remittances' impact on health outcomes comes as expected after controlling for migration, which suggests that parents from remittances-receiving households are less likely to be suffering from acute illnesses, and migration status does not affect the trend of this result. Therefore, after the robustness test with the migration status, the result remains largely unchanged in both the direction and significance of the effects.

4.4 Testing the Hypothesis in an Alternative Channels

Having found evidence of a significant association between remittances and access to health outcomes, the study now extends the analysis by investigating a proposed mechanism through which remittances improve health status: better diet and nutrition. It now tests whether remittances allow households to buy better quality or more nutritious food, which may lead to less use of healthcare facilities. To test this mechanism, the model regresses the variable 'food expenditure', taking the total monthly value (in BDT) of food purchases with households receiving remittances and a set of control variables.

Table 5: Food Expense as the Main Reason for Less Healthcare Use for Left-Behind Parents

Variables	(1) Food expense	(2) Food expense
	LPM	**IV**
Log (remittance)	1.90*** [0.75]	1.05*** [0.61]
Other controls	yes	yes
Observations	2,959	2,959
R-squared	0.37	0.22
First stage F-stat		130

Note. Robust t-statistics are in brackets, ***, ** and * denote 1%, 5% and 10% level of significance, respectively. All regressions include other control variables and parents' fixed effects. Standard errors are clustered at the individual level.

Table 5 (see the full Table A5 in the Appendix) shows that remittances significantly increase the food expenses in remittance-receiving households, which is one of the determinants for less healthcare use. Column 1 shows the results from LPM regression, and column 2 shows IV regressions with control variables. Across all specifications, it is found that remittances have a positive association with food expenses as the main reason for less access to a healthcare facility and having fewer acute illnesses. Thus, these findings suggest that remittances may be spent on quality food. Therefore, this result supports the hypothesis that remittances help to improve dietary and nutrition intake and maintain better healthcare to prevent sickness for those parents left behind.

Table 6: Health Expenditure among left behind parents according to the remittance received in the household

Variables	(1) Health expenditure	(2) Health expenditure
	LPM	**IV**
Log (remittance)	1.70*** [0.85]	1.5*** [0.68]
Other controls	yes	yes
Observations	2,959	2,959
R-squared	0.37	0.22
First stage F-stat		220

Note. Robust t-statistics are in brackets, ***, ** and * denote 1%, 5% and 10% level of significance, respectively. All regressions include other control variables and parents' fixed effects. Standard errors are clustered at the individual level.

Lastly, we analyse whether remittances positively affect health outcomes through health expenditure instead of access to a health facility. Table 6 shows that remittances have positive effect on health expenditure, through this channel, reduce the likelihood of being ill. However, this result of increased health expenditure contradicts the result of access to healthcare facility. This different result may be driven by self-medicating. In other words, left-behind parents can increase expenditure on medication with remittances, which allow them to manage some basic illnesses without seeking medical care. Thus, overall results suggest that

remittances increase health expenditure, but do not increase the access to health facility, which is an essential for elderly parents for their better health.

5. CONCLUSION

This study examined Bangladeshi households' use of remittances to pay for healthcare for parents left behind by migrant children and the relationship between remittance and hospital presentations, and different physical health outcomes. A key contribution to the literature is the analysis of various measures of health outcomes, including access to a health facility, instead of only health expenditure. The findings show that remittances do not positively affect parents' access to a healthcare facility, which implies that even if the income through remittances gets higher, healthcare or medical treatment tends to be inelastic as it is necessary for survival. Remittances also help households achieve a standard of living such that illness is less likely.

From the analysis, a negative and significant relationship was also found between remittances and the likelihood of being sick from acute disease symptoms like diarrhoea and persistent cough. Therefore, the results support the hypothesis that remittances promote a healthier life with access to better nutrition and preventative health measures. Overall, the findings suggest that healthcare in Bangladesh is inelastic in relation to income, which implies that healthcare is a necessity for the citizens of Bangladesh. Conversely, remittances reinforce expenditure on medication, which shows significant changes in income elasticities on health expenditure, allowing households to take preventative measures for acute illnesses. However, given the data set's limitations, this study cannot fully comment on the reasons behind less healthcare use, as left-behind parents may be using remittances to improve their diet or physical fitness. This mechanism is alternatively tested through food expenses, suggesting that increased food expenditures in remittance-receiving households may cause left-behind parents to stay healthier and less likely to go to medical facilities. Whether left-behind parents are self-medicating or there are other reasons for their increased access to medical care could be investigated for future research.

The findings from this study have several policy implications. First, healthcare in Bangladesh is a necessity for its citizens. Therefore, policymakers should pay close attention to the system of social insurance that could enhance the well-being of families. Additionally, governments and institutions in sending communities should be more concerned about the vulnerability of their elderly population. They should initiate programs that focus on enhancing the well-being of families and decreasing morbidity among the elderly. Programs should also focus on reducing the differences in the use of healthcare-seeking behaviour between elderly populations whose children are present in the community and those whose children have migrated.

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APPENDIX

Table A1: Access to health care facility and health status among left behind parents according to the remittance received in the household (LPM result)

	(1)	(2)	(3)	(4)
VARIABLES	**Health facility**	**Prolonged fever**	**Diarrhoea**	**Persistent cough**
Remittance	-0.011***	-0.017**	-0.028***	-0.006***
	[-2.93]	[-2.01]	[-4.87]	[-5.20]
Migration status	0.31**	-0.11*	0.01*	0.21*
	[20.03]	[-7.03]	[-6.90]	[-6.93]
Migration#Remittance	0.29**	-0.15**	-0.11**	-0.12**
	[16.03]	[-9.04]	[-8.33]	[-9.35]
Parent's age	-0.00047	-0.0036***	-0.0012***	-0.00093
	[-1.38]	[-5.24]	[-3.30]	[-1.36]
Parent's sex (male)	0.0025	0.013	-0.026*	0.12***
	[0.21]	[0.46]	[-1.71]	[4.51]
Parent's occupation	0.00021	-0.0065	0.00070	0.012*
	[0.061]	[-0.94]	[0.19]	[1.68]
Parent's education (highest class passed)	0.000099	0.00013	0.00032**	0.00042
	[0.77]	[0.48]	[2.14]	[1.58]
Parent's workplace (rural)	-0.0063	0.093*	-0.019	-0.037
	[-0.26]	[1.80]	[-0.68]	[-0.72]
Hearing problem	-0.0042	-0.019	0.024	-0.069*
	[-0.21]	[-0.46]	[1.06]	[-1.66]
Speaking problem	0.066*	-0.15*	0.032	0.015
	[1.69]	[-1.85]	[0.70]	[0.19]
Eyesight problem	0.0030	-0.021	0.0026	0.0018
	[0.24]	[-0.80]	[0.18]	[0.067]
Limb problem	-0.15***	-0.020	-0.032	-0.0096
	[-3.88]	[-0.27]	[-0.77]	[-0.13]
Significant weight loss	-0.030**	-0.25***	-0.042***	-0.039
	[-2.52]	[-9.68]	[-3.00]	[-1.51]
Generalized skin rash	-0.083***	0.073	-0.069**	-0.036
	[-2.74]	[1.31]	[-2.27]	[-0.66]
Year (2015)	-0.14***	-0.079	-0.035	-0.16**
	[-4.51]	[-1.17]	[-0.93]	[-2.42]
Regions:				
Chittagong	-0.45	92.6**	18.7	14.4
	[-0.022]	[2.13]	[0.78]	[0.33]
Dhaka	-14.0	-47.0	-32.7	-76.1*
	[-0.72]	[-1.15]	[-1.46]	[-1.88]
Khulna	21.8	-35.6	-76.3***	-99.1**
	[0.91]	[-0.73]	[-2.83]	[-2.04]
Rajshahi	94.6***	-10.7	-3.94	-67.5
	[3.98]	[-0.22]	[-0.14]	[-1.38]
Rangpur	44.4	-103	40.4	-52.5

	[1.37]	[-1.50]	[1.06]	[-0.77]
Sylhet	-127***	14.3	-12.7	15.7
	[-5.67]	[0.31]	[-0.50]	[0.34]
Interactions:				
Barisal#year	-0.063***	0.0072	-0.0063	0.0078
	[-5.67]	[0.31]	[-0.50]	[0.34]
Chittagong#year	-0.063***	-0.039*	-0.016	0.00065
	[-6.12]	[-1.74]	[-1.27]	[0.029]
Dhaka#year	-0.056***	0.030	0.0099	0.046**
	[-5.66]	[1.45]	[0.85]	[2.18]
Khulna#year	-0.074***	0.025	0.032**	0.057**
	[-6.09]	[1.00]	[2.30]	[2.30]
Rajshahi#year	-0.11***	0.013	-0.0044	0.041*
	[-9.19]	[0.50]	[-0.32]	[1.65]
Rangpur#year	-0.085***	0.059*	-0.026	0.034
	[-5.25]	[1.68]	[-1.37]	[0.98]
Constant	128***	-13.4	13.1	-15.3
	[5.73]	[-0.29]	[0.51]	[-0.33]
Observations	2,960	1,425	1,425	1,425
R-squared	0.40	0.43	0.43	0.41

Note. Robust t-statistics are in brackets for LPM, ***, ** and * denote 1, 5 and 10 percent level of significance, respectively. All regressions include other control variables and parents fixed effects. Also, standard errors are clustered at the individual level.

Table A2: First stage results

	(1) Remittance	(2)
VARIABLES	without illness	with illness
Remittance channel	0.372***	0.375***
	(0.0199)	(0.0200)
Parent's age	7.81e-05	-2.12e-05
	(0.000446)	(0.000447)
Parent's sex	0.00883	0.00580
	(0.0163)	(0.0164)
Parent's occupation	0.0203***	0.0182***
	(0.00455)	(0.00458)
Parent's education	-0.000264	-0.000341**
	(0.000168)	(0.000170)
Parent's workplace	0.133***	0.131***
	(0.0318)	(0.0318)
Hearing problem		-0.0151
		(0.0266)
Speaking problem		-0.00182
		(0.0518)
Eyesight problem		0.0541***
		(0.0167)
Limb problem		0.0657
		(0.0494)
Significant weight loss		-0.0198
		(0.0158)

Generalized skin rash		0.0226
		(0.0400)
Year (reference 2011)	0.0452	0.0381
	(0.0422)	(0.0423)
Regions:		
Barisal	-0.0692*	-0.0794**
	(0.0357)	(0.0358)
Chittagong	0.124***	0.120***
	(0.0331)	(0.0334)
Dhaka	-0.139***	-0.147***
	(0.0326)	(0.0328)
Khulna	-0.104**	-0.105**
	(0.0454)	(0.0454)
Rajshahi	-0.187***	-0.183***
	(0.0407)	(0.0411)
Rangpur	-0.173***	-0.170***
	(0.0626)	(0.0628)
Interactions:		
Barisal#year	0.0169	0.0358
	(0.0589)	(0.0592)
Chittagong#year	0.00605	0.00838
	(0.0543)	(0.0543)
Dhaka#year	0.260***	0.271***
	(0.0520)	(0.0525)
Khulna#year	-0.00670	0.00184
	(0.0637)	(0.0642)
Rajshahi#year	0.0212	0.0322
	(0.0634)	(0.0634)
Rangpur#year	0.214**	0.225***
	(0.0856)	(0.0858)
Observations	2,960	2,960

Note. Standard errors are in brackets ***, ** and * denote 1, 5 and 10 percent level of significance, respectively. All regressions include other control variables and parents fixed effects.

Table A3: Access to health care facility and health status among left behind parents according to the remittance received in the household (IV result)

	(1)	(2)	(3)	(4)
VARIABLES	**Health facility**	**Prolonged fever**	**Diarrhoea**	**Persistent cough**
Remittance	-0.19***	-0.020	-0.028*	-0.14*
	[-4.59]	[-0.30]	[-1.87]	[-1.93]
Migration#Remittance	-0.045**	-0.036*	-0.012*	-0.092
	[-1.31]	[-5.29]	[-3.33]	[-1.35]
Parent's age	-0.00045	-0.0036***	-0.0012***	-0.00092
	[-1.31]	[-5.29]	[-3.33]	[-1.35]
Parent's sex (male)	0.0018	0.013	-0.027*	0.12***
	[0.14]	[0.47]	[-1.74]	[4.14]
Parent's occupation	0.0037	-0.0066	0.00092	0.015**
	[1.01]	[-0.94]	[0.24]	[2.06]
Parent's education (highest class passed)	0.000051	0.00013	0.00032**	0.00039

	[0.39]	[0.48]	[2.14]	[1.47]
Parent's workplace (rural)	0.024	0.092*	-0.018	-0.016
	[0.93]	[1.74]	[-0.61]	[-0.30]
Hearing problem	-0.0067	-0.019	0.025	-0.067
	[-0.32]	[-0.47]	[1.07]	[-1.62]
Speaking problem	0.083**	-0.15*	0.032	0.019
	[2.07]	[-1.87]	[0.71]	[0.23]
Eyesight problem	0.011	-0.021	0.0028	0.0052
	[0.84]	[-0.81]	[0.19]	[0.20]
Limb problem	-0.13***	-0.021	-0.031	0.0018
	[-3.47]	[-0.28]	[-0.76]	[0.024]
Significant weight loss	-0.033***	-0.25***	-0.043***	-0.042*
	[-2.65]	[-9.72]	[-3.03]	[-1.66]
Generalized skin rash	-0.078**	0.073	-0.070**	-0.042
	[-2.51]	[1.32]	[-2.29]	[-0.76]
Year (2015)	-0.14***	-0.079	-0.034	-0.16**
	[-4.20]	[-1.19]	[-0.94]	[-2.37]
Regions:				
Barisal	0.016	0.11**	-0.012	0.022
	[0.57]	[2.16]	[-0.43]	[0.43]
Chittagong	0.043	0.25***	0.056*	-0.0010
	[1.61]	[4.80]	[1.92]	[-0.019]
Dhaka	-0.014	0.049	-0.021	-0.100**
	[-0.55]	[0.98]	[-0.76]	[-2.01]
Khulna	-0.015	0.098	-0.065*	0.059
	[-0.44]	[1.43]	[-1.73]	[0.87]
Rajshahi	-0.020	0.14**	0.015	-0.17***
	[-0.62]	[2.13]	[0.43]	[-2.61]
Rangpur	-0.043	0.027	0.12**	-0.16
	[-0.86]	[0.27]	[2.26]	[-1.59]
Interactions:				
Barisal#year	-0.27***	0.029	-0.026	0.027
	[-5.91]	[0.32]	[-0.51]	[0.30]
Chittagong#year	-0.25***	-0.16*	-0.062	0.0051
	[-5.90]	[-1.76]	[-1.28]	[0.057]
Dhaka#year	-0.19***	0.12	0.041	0.20**
	[-4.50]	[1.43]	[0.88]	[2.42]
Khulna#year	-0.30***	0.099	0.13**	0.24**
	[-6.09]	[1.00]	[2.32]	[2.41]
Rajshahi#year	-0.44***	0.050	-0.018	0.16
	[-8.88]	[0.50]	[-0.33]	[1.59]
Rangpur#year	-0.29***	0.23*	-0.10	0.17
	[-4.36]	[1.66]	[-1.34]	[1.20]
Observations	2,960	1,425	1,425	1,425
R-squared	0.27	0.11	0.15	0.14
First stage F-stat	250	160	160	160

Note. Robust z-statistics are in brackets for IV, ***, ** and * denote 1, 5 and 10 percent level of significance, respectively. All regressions include other control variables and parents fixed effects. Also, standard errors are clustered at the individual level.

Table A4: Access to health care facility and health status among left behind parents according to the remittance received in the household with controlling for migration status (IV result)

VARIABLES	(1) **Health facility**	(2) **Prolonged fever**	(3) **Diarrhoea**	(4) **Persistent cough**
Remittance	-0.042***	-0.019	-0.016*	-0.032*
	[-2.78]	[-0.74]	[-1.24]	[-0.32]
Migration status	0.032***	-0.015	-0.012	-0.037*
	[2.92]	[-0.78]	[-1.21]	[-1.87]
Migration#Remittance	–0.03	–0.01	–0.014*	–0.02*
	[–1.08]	[–0.28]	[–1.38]	[–1.08]
Parent's age	-0.00042***	-0.0043***	-0.00041***	-0.0027***
	[-2.75]	[-17.1]	[-3.11]	[-10.5]
Parent's sex (male)	0.0037	0.021**	-0.0022	0.064***
	[0.64]	[2.01]	[-0.39]	[5.91]
Parent's occupation	0.000096	-0.0011	0.0012	0.0083***
	[0.067]	[-0.49]	[0.99]	[3.66]
Parent's education (highest class passed)	0.00018***	0.00014	0.00019***	0.00055***
	[3.09]	[1.43]	[3.84]	[5.71]
Parent's workplace (rural)	-0.045***	0.031*	-0.0016	-0.037**
	[-4.36]	[1.85]	[-0.18]	[-2.12]
Hearing problem	0.014	-0.0063	0.0073	0.022
	[1.53]	[-0.42]	[0.93]	[1.42]
Speaking problem	-0.021	-0.076***	0.017	-0.051*
	[-1.31]	[-2.71]	[1.15]	[-1.77]
Eyesight problem	0.0025	0.013	0.0022	0.042***
	[0.42]	[1.30]	[0.43]	[4.20]
Limb problem	0.040***	-0.034	0.013	0.031
	[2.77]	[-1.48]	[1.06]	[1.34]
Significant weight loss	-0.023***	-0.28***	-0.048***	-0.092***
	[-4.48]	[-31.6]	[-10.5]	[-10.3]
Generalized skin rash	-0.0012	0.12***	-0.0067	0.028
	[-0.084]	[6.38]	[-0.69]	[1.46]
Year (reference 2011)	-0.28***	-0.095***	-0.029**	-0.18***
	[-19.5]	[-3.80]	[-2.25]	[-6.95]
Regions:	0.0011	0.15***	-0.015	0.030
Barisal	[0.078]	[6.50]	[-1.19]	[1.23]
	-0.0013	0.11***	0.033**	-0.034
Chittagong	[-0.088]	[4.18]	[2.43]	[-1.29]
	-0.0055	0.049**	-0.021*	-0.077***
Dhaka	[-0.42]	[2.22]	[-1.82]	[-3.45]
	0.0010	0.097***	-0.0065	0.098***
Khulna	[0.075]	[4.11]	[-0.53]	[4.08]
	0.0031	0.075***	0.0096	-0.030
Rajshahi	[0.20]	[2.92]	[0.71]	[-1.15]
	0.00080	0.090***	0.025	-0.075**
Rangpur	[0.042]	[2.69]	[1.42]	[-2.21]
Interactions:				
Barisal#year	-0.15***	-0.020	0.014	0.13***

	[-7.33]	[-0.61]	[0.83]	[3.75]
Chittagong#year	-0.097***	-0.016	-0.045**	0.11***
	[-4.74]	[-0.44]	[-2.40]	[3.08]
Dhaka#year	-0.15***	0.020	0.026	0.21***
	[-8.39]	[0.67]	[1.64]	[6.84]
Khulna#year	-0.16***	0.022	0.031*	0.19***
	[-8.11]	[0.66]	[1.80]	[5.53]
Rajshahi#year	-0.13***	-0.0087	0.0036	0.13***
	[-5.80]	[-0.24]	[0.19]	[3.46]
Rangpur#year	-0.17***	-0.0073	-0.0018	0.17***
	[-6.61]	[-0.17]	[-0.079]	[3.79]
Observations	11,285	11,285	11,285	11,285
R-squared	0.24	0.14	0.02	0.05
First stage F-stat	250	270	250	250

Note. Robust z-statistics are in brackets for IV, ***, ** and * denote 1, 5 and 10 percent level of significance, respectively. All regressions include other control variables and parents fixed effects. Also, standard errors are clustered at the individual level.

Table A5: Food expense as the main reason for less healthcare utilisation for left-behind parents

VARIABLES	(1) Food expense	(2) Food expense
	LPM	**IV**
Log (remittance)	1.90***	1.05***
	[0.75]	[0.61]
Parent's age	2.32***	0.40*
	[2.66]	[1.87]
Parent's sex (male)	83.9***	32.8***
	[2.63]	[3.97]
Parent's occupation	-8.89	1.27
	[-0.99]	[0.62]
Parent's education (highest class passed)	-0.51	-0.62***
	[-1.55]	[-7.63]
Parent's workplace (rural)	-181***	-132***
	[-2.90]	[-9.20]
Hearing problem	116**	-13.3
	[2.24]	[-0.99]
Speaking problem	-115	-56.9**
	[-1.15]	[-2.30]
Eyesight problem	-94.4***	-4.55
	[-2.90]	[-0.51]
Limb problem	286***	27.8
	[2.97]	[1.28]
Significant weight loss	132***	21.4***
	[4.29]	[2.95]
Generalized skin rash	234***	33.3
	[3.00]	[1.63]
Year (2015)	-773***	-743***
	[-9.37]	[-64.2]
Regions:		
Barisal	330,608***	-427***
	[6.35]	[-29.8]

Chittagong	57,906	-294***
	[1.15]	[-21.4]
Dhaka	17,247	-457***
	[0.28]	[-38.5]
Khulna	-111,671*	-568***
	[-1.82]	[-41.7]
Rajshahi	-102,692	-530***
	[-1.23]	[-34.2]
Rangpur	-68,204	-610***
	[-1.18]	[-37.2]
Interactions:		
Barisal#year	-34.1	137***
	[-1.19]	[5.91]
Chittagong#year	-198***	-124***
	[-7.48]	[-5.65]
Dhaka#year	-62.8**	172***
	[-2.46]	[8.79]
Khulna#year	-42.7	343***
	[-1.36]	[15.8]
Rajshahi#year	21.3	221***
	[0.69]	[8.95]
Rangpur#year	16.9	497***
	[0.40]	[18.7]
Observations	2,959	2959
R-squared	0.37	0.22
First stage F-stat		130

Note. Robust t-statistics are in brackets for IV, ***, ** and * denote 1, 5 and 10 percent level of significance, respectively. All regressions include other control variables and parents fixed effects. Also, standard errors are clustered at the individual level.

Table A6: Health Expenditure among left behind parents according to the remittance received in the household

	(1)	(2)
VARIABLES	Food expense	Food expense
	LPM	**IV**
Log (remittance)	1.70***	1.5***
	[0.85]	[0.68]
Parent's age	2.32***	0.40*
	[2.66]	[1.87]
Parent's sex (male)	83.9***	32.8***
	[2.63]	[3.97]
Parent's occupation	-8.89	1.27
	[-0.99]	[0.62]
Parent's education (highest class passed)	-0.51	-0.62***
	[-1.55]	[-7.63]
Parent's workplace (rural)	-181***	-132***
	[-2.90]	[-9.20]
Hearing problem	116**	-13.3
	[2.24]	[-0.99]
Speaking problem	-115	-56.9**
	[-1.15]	[-2.30]
Eyesight problem	-94.4***	-4.55

	[-2.90]	[-0.51]
Limb problem	286***	27.8
	[2.97]	[1.28]
Significant weight loss	132***	21.4***
	[4.29]	[2.95]
Generalized skin rash	234***	33.3
	[3.00]	[1.63]
Year (2015)	-773***	-743***
	[-9.37]	[-64.2]
Regions:		
Barisal	330,608***	-427***
	[6.35]	[-29.8]
Chittagong	57,906	-294***
	[1.15]	[-21.4]
Dhaka	17,247	-457***
	[0.28]	[-38.5]
Khulna	-111,671*	-568***
	[-1.82]	[-41.7]
Rajshahi	-102,692	-530***
	[-1.23]	[-34.2]
Rangpur	-68,204	-610***
	[-1.18]	[-37.2]
Interactions:		
Barisal#year	-34.1	137***
	[-1.19]	[5.91]
Chittagong#year	-198***	-124***
	[-7.48]	[-5.65]
Dhaka#year	-62.8**	172***
	[-2.46]	[8.79]
Khulna#year	-42.7	343***
	[-1.36]	[15.8]
Rajshahi#year	21.3	221***
	[0.69]	[8.95]
Rangpur#year	16.9	497***
	[0.40]	[18.7]
Observations	2,959	2959
R-squared	0.37	0.22
First stage F-stat		220

Note. Robust t-statistics are in brackets for IV, ***, ** and * denote 1, 5 and 10 percent level of significance, respectively. All regressions include other control variables and parents fixed effects. Also, standard errors are clustered at the individual level.