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Improving health in Tajikistan: Remittances trump other income

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Improving health in Tajikistan: remittances trump other income

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Improving health in Tajikistan: remittances trump other income

Sophia Kan*

Abstract

This paper investigates the impact of remittances on health outcomes in Tajikistan and finds a positive effect. While existing literature shows that remittances increase health care expenditure, expenditure alone is an incomplete proxy for health outcomes. Moreover, existing literature on health outcomes focuses mainly on infants and children, leaving out a significant share of the population. Our study explores the impact of remittances on proxies of health outcomes beyond expenditure for all household members (adults and children). We use an IV-approach to control for the endogeneity of remittances, and find that on average, remittances have a much larger effect than other sources of income on health expenditure and health outcomes. We also explore two possible transmission channels for how remittances affect health and find that remittances do not affect the likelihood of purchasing medicine in lieu of seeking care when ill; instead remittances have a positive and significant effect on the likelihood of seeking direct medical care.

JEL codes: I15, F22, R23
Keywords: health, migration, remittances, Tajikistan

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1. Introduction

The purpose of this paper is to investigate the role of remittances in helping households bridge the financial gap left by the lack of public health care financing. Households are the sole financiers for their entire health care bill in many countries and for poor households without financial assistance, even relatively small health care expenses can lead to serious hardship. This challenge is magnified when high poverty levels confound access to health care. We analyze the case of Tajikistan, a country with one of the world's highest private contributions to health expenditure (70% of total health care spending) and where nearly 50% of people live below the national poverty line. Many Tajik families, however, also receive remittances from abroad.

The novelty of our paper can be broken down into three parts. First, while many studies focus on the link between remittances and health expenditure (e.g. Amuedo-Dorantes et al., 2007; Mora & Taylor, 2006; Valero-Gil, 2009), we attempt to extend the existing literature by adding additional variables that help to explain health outcome. We do this by exploiting the rich survey data from the World Bank Living Standards Measurement Study (LSMS) to include a range of health outcome proxies. Second, the literature that explores the impact of remittances on health outcomes focuses largely on child and infant health status (e.g. Antón, 2010; Chauvet, Gubert, & Mesplé-Somps, 2013). In contrast, our analysis addresses the entire household. Lastly, we address the salience of remittances in improving household health outcomes by identifying the difference in impact between remittances and other income sources. In doing so, we add empirical evidence to the literature that argues that different sources of income are used in different ways.

Remittances permeate daily life in Tajikistan, making it the most remittance-dependent country in the world. While larger remittance corridor countries such as India (68.8 billion USD, 3.7% of GDP) and Mexico (23.4 billion USD, 2.0% of GDP) lead the ranks in terms of absolute volume, Tajikistan receives the highest volume of remittances as a percentage of GDP, approximately 47.5% in 2012 (World Bank, 2014).[1] This is due to the sizeable emigrant population—nearly one million emigrants—of which over 90% work in Russia. These migrants represent 20% of the Tajik working-age population (World Bank, 2009). Given the pronounced and widespread role of remittances in the country, we investigate whether remittances play a role in offsetting the cost of health care and improve health outcomes for Tajik households.

Research on remittances is typically plagued by empirical challenges due to the endogenous nature of remittances when evaluating household indicators as an outcome variable. Our study is no different. To address endogeneity, we employ an instrumental variables (IV) OLS approach using migrant density in the home country as an instrument, and then an IV-Tobit model as a robustness check. The instrument, migrant density, is a proxy for information and network effects in the migrant's community of origin (Chang, Dong, & MacPhail, 2011; Démurger & Xu, 2011; Piracha, Randazzo, & Vadean, 2013). The intuition behind this instrument is that living in a community with strong informational networks (measured by the

[1] The measurement is an estimate for both unofficial and official remittances, since as much as 87% are believed to be sent through official channels, such as banks and official money transfer organizations (ILO, 2010).

density of migrants in that area) increases the likelihood of both migrating and securing a job. It may also decrease various living expenses such as rent through communal usage. The combined effect of these network-based influences decrease the cost of migration while increasing income (a network can facilitate securing employment) which increases the amount of money remitted.

Our exclusion restriction is that, conditional on the control variables included, the migrant network at home does not have an effect on the health outcomes of household members left behind. A key concern with this exclusion restriction is that migrant density could be correlated with advanced health knowledge through spillovers. Migrants may have been exposed to more advanced health knowledge in Russia, and this in turn could affect health outcomes, that is, villages with migrant networks have better health knowledge. We argue that this concern does not apply to our instrument for two reasons. First, because of Tajikistan's historical relationship with Russia, and the fact that both health and education information was mandated by Moscow, the information and health system that dictate cultural health practices and norms would not be significantly different between the same socio-economic groups in the two countries. A second reason is that most Tajik migrants work as unskilled laborers, often without a work permit. Of the group of migrants who work legally, 55% work in construction, and 18% work in unskilled positions. Their quality of life is thus arguably the same or even worse than the quality of life at home, including knowledge and access to health care. An additional threat to the exclusion restriction is that the density of migrants might influence access or the quality of medical facilities and care in the area. To address this, we control for community-level infrastructure variables such as access to clean water, sewage, and telephones; and community-level variables on health institutions such as whether the community has a hospital, doctor, or drugstore. The instrument is explained in detail in Section 4.

The key findings of this paper are that first, remittances are not fungible; households spend remittances differently than other income sources. Second, remittances have a positive and significant effect on health outcomes, and the magnitude of the impact is larger than the coefficient for other sources of income. Third, remittances tend to impact health via direct services rather than medicine expenditure. This is an interesting finding given the recent surge in medicine expenditure and could help health policymakers to better hone their resources.

This paper is organized as follows. Section 2 discusses the differences between remittances and income, and why remittances need to be analyzed separately from income. It also briefly summarizes the relevant literature and outlines the knowledge gaps. Section 3 describes the data and describes the basic summary statistics of our analysis. Section 4 contains the empirical strategy of the IV specification, estimation techniques, transmission channel analysis, and results. Section 5 concludes.

2. Remittances and its link to health

International remittances account for a significant share of global and developing country capital flows. In 2010, remittances surpassed Official Development Aid of 131 billion USD, totaling more than 440 billion USD, of which 325 billion USD flowed to developing countries (World Bank, 2011). Foreign direct investment (FDI), which is considered one of the largest

funding channels into developing countries, was only marginally greater in 2010, at 524.8 billion USD (UNCTAD, 2011). It has even been estimated that a 10% increase in migrants of a given remittance-receiving country would lead to a 2.1% decrease in the number of people living below the one-dollar-a-day poverty threshold for that country (Adams & Page, 2005). Remittances also constitute a large share of household incomes for many countries, including Tajikistan, thus our motivation for investigating whether remittances differ from other sources of income.

Whether remittances are in fact different from wage-based income may seem unclear at first. For example, in South Africa, Case and Deaton (1998) found that a pension scheme cash transfer for the elderly was spent in the same way as other household income. The authors regressed various expenditure categories (food, clothing, housing, alcohol and tobacco, schooling, transport, and health) as well as remittances, insurance, and savings on pension income and non-pension income, and found no difference between the two. Yet in Tajikistan, we find that remittances differ from other sources of income, and find striking differences in the magnitude of impact on health outcomes between remittances and other sources of income.

One argument that explains the differences between remittances and other sources of income is that remittances, unlike wages, are not procyclical. Instead, remittances are often countercyclical with respect to the recipient country or used as a form of insurance to mitigate economic shocks (World Bank, 2006; Yang & Choi, 2007). For example, Yang and Choi (2007) find that in the Philippines, remittances acted as an insurance mechanism for migrant households; income shocks actually increased the volume of remittances being sent. Consumption levels of remittance-receiving household thus remained unchanged during the income shock. A subsequent macroeconomic analysis of 87 countries in the period 1975-2004 found that remittances help to smooth consumption by providing insurance against natural disasters, agricultural shocks, and financial instability (Combes & Ebeke, 2011). Similar analyses by Amuedo-Dorantes and Pozo (2006), Clarke and Wallsten (2003), and Gubert (2002) confirm this finding.

Another argument for why remittances are different from other sources of income is the temporary nature of remittances. The temporary nature of remittances changes spending behavior, leading households to increase the volume of short-term investments (Chopra, Civilize, & Frenk, 2009). One possible explanation for this behavior is that the sender earmarks remittances for specific uses. Amuedo-Dorantes et al. (2007), for example, find that in Mexico, health care expenses are the primary reason for migrants to remit money home, far ahead of food and maintenance.[2] Conversely, receivers may treat remittances differently from other sources of income even if not prompted by the sender. This can be largely explained by theories of 'mental accounting' by Thaler (1985) where people subjectively separate the sources of income for different purposes. Because people use income differently depending on the source of the income, mental accounting and how people spend and manage money

[2] Using data from the Mexican Migration Project 93, their study finds that over 46% of remitters cite health care as the primary reason for sending money home, followed by 29% for food and maintenance, and then 7% for construction or repair of dwelling.

violates the principle of fungibility.[3] Conversely, but still leading to the same conclusion, is the permanent income hypothesis by Friedman (1957) that transitory income (such as remittances) does not affect consumption. The hypothesis is based on the assumptions that transitory income and transitory consumption are neither correlated with each other nor with permanent income (Meghir, 2004). Remittances would therefore lead to an increase in savings, and thus have a smaller effect on consumption than regular income.

In short, remittances are unique, and carry their own savings and expenditure idiosyncrasies. Amongst scholars who then study remittances, there has been contention over the impact of remittances on socio-economic development. In the 1950s, scholars held an optimistic view that remittances had a positive effect and that migration alone led to a transfer of capital from the north to the south. Those optimists believed that migrants would remit not only money, but also education, "rational and democratic ideas", and make productive investments in their home countries upon return (De Haas, 2007). In the 1970s and 1980s, however, scholars became increasingly pessimistic, arguing that remittances are mainly used for short-term consumption rather than long-term investment (Kireyev, 2006). Since the 1990s, and more recently, the pessimistic view have been largely refuted with a wave of cross-country empirical studies adding to the literature that remittances—via contribution towards product investments—indeed reduce poverty across the globe (see Acosta, Calderón, Fajnzylber, & Lopez, 2008; Acosta, Fajnzylber, & Lopez, 2007; Adams & Page, 2005; IMF, 2005; Rao & Hassan, 2011), as well as regional studies in Asia Pacific (Jongwanich, 2007) and Africa (see Anyanwu & Erhijakpor, 2010; Gupta, Pattillo, & Wagh, 2009). Analyses of household data have also found that remittances have a positive effect on several welfare measures. For example, in Guatemala, international remittance-receiving households (RRHs) spend 194% more on education, 81% more on housing and in general, less money on food than non-remittance-receiving households (NRRHs) (Adams & Cuecuecha, 2010).

In terms of the literature specific to the impact of remittances on health, there are two main research areas: the impact of remittances on health *expenditure* and the impact on health *outcomes*. With respect to the first research area, several empirical studies find that a rise in remittances increases the share of health expenditure (e.g. Amuedo-Dorantes et al., 2007; Cardona Sosa & Medina, 2006; Ermira Hoxha Kalaj, 2013; Mora & Taylor, 2006; Valero-Gil, 2009). In Guatemala, Adams and Cuecuecha (2010) found that international RRHs spend 3.1 percentage points more on health care than NRRHs. Specific to Tajikistan, Clément (2011) finds that while receiving remittances (both domestic and international) led to a slight increase in health expenditures, it did so only for the second income quintile. In contrast to Clément, our study finds an increase in health expenditure across quintiles. The difference in results may stem from a difference in empirical strategy. While Clément conducts a propensity score matching analysis that controls for observable heterogeneity, this paper uses an IV method, which also controls for unobservable heterogeneity. Additionally, Clément uses data from the Tajikistan Living Standards Measurement Study from 2003, while this paper makes use of data from 2007.

[3] As a crude illustration, someone that earns 100 dollars through hard labor may spend their earnings very differently from someone who finds 100 dollars on the street while walking home from work.

While expenditure is a common proxy for health outcomes, the impact of it also depends on the effectiveness of the overall health care system. Health outcomes are additionally heavily affected by health behavior, which may be unrelated to both the health system and health expenditures levels. Babazono and Hillman (1994) compare OECD countries using 1988 data and find that expenditure did not predict health outcomes. More recently, in Ecuador, Ponce, Olivié, and Onofa (2011) find that while RRHs spent more on health products such as vaccines and medicine, it does not affect long-term child health outcomes or access to healthcare when sick. This paper also uses expenditure as a proxy for health outcomes, but attempts to provide a more comprehensive analysis by including additional proxies such as days unable to work and self-assessments of wellbeing.

The second and smaller body of literature on remittances and health focuses on health outcomes. As previously mentioned, health outcomes are important variables because they allow us to directly measure wellbeing in terms of health. In addition, it also allows us to capture the non-expenditure-related impact mechanisms of remittances, such as changes in what people are consuming, rather than the consumption level. For example, an increase in remittances could provide people with a sense of hope in the future, leading to healthier lifestyle choices. Most studies on health outcomes focus on infant and child health and anthropometrics (see Antón, 2010; Chauvet et al., 2013; Frank & Hummer, 2002; Hildebrandt & McKenzie, 2005; Zhunio, Vishwasrao, Cheng, & Chiang, 2012). While most of the studies find or suggest a positive linkage, the results are mixed. For example, Hildebrandt and McKenzie (2005) find that remittance-receiving families exercise less preventative care than other families (such as vaccinations) but score higher on anthropometric measures such as birth weight and lower infant mortality.

3. Data

This paper uses data from the 2007 World Bank Living Standards Measurement Study (LSMS) for Tajikistan.[4] The LSMS is a household survey that is representative at the national, urban and rural, and five administrative regional levels. To create a nationally representative sample, the sample was divided into 270 clusters of 18 households per cluster, for a total of 4,860 households[5] and was collected between September and November 2007.

Of the 4,860 households, 1,170 (24%) households have a migrant and 582 (49%) of those households received a remittance. The share of remitting migrants is low, which may be attributed to higher start-up costs for more recent migrants, who have less money to remit home, or for long-term migrants that may be remitting in lump-sums which are not captured in the survey. In our sample, 93% of migrants are male, and the average age of a migrant is 28 years. Many of them are long-term migrants, having left Tajikistan between 1988 and 2007, with 47% emigrating in 2006. For many migrants, their stays abroad are precarious, and an estimated 39% live without legal residence status in their destination country.

[4] While there is a second wave in 2009, we are unable to exploit this panel data because only approx. 1,500 households were re-interviewed. In 2009, the sample size for remittance-receiving household drops to 175 households, reducing our ability to make strong inferences about the population.

[5] In our analysis, we include a total of 4,860 households. We remove those without household heads (n=5) and households that have incomes per capita or expenditure per capita above three standard deviations of the mean (n=160), maintaining 99.7% of our sample.

Approximately 25% of households with a migrant reside in urban areas, and the remaining 75% in rural areas. This is consistent with research that finds rural households to be poorer, more vulnerable, and depend on agricultural work or subsistence farming for their livelihoods (Vargas-Lundius, Landly, Villarreal, & Osorio, 2008). Non-remittance-receiving households (NRRH)s are more concentrated in urban areas, 14 percentage points higher than remittance-receiving households (RRH)s.

For RRHs, the mean annual remittance income per capita is 606 USD (for the mean household, 73% of total income), but there is significant variation, with a standard deviation of 691 USD. There is also large variation in terms of the extent to which remittance supplements or replaces other sources of income, hereinafter referred to simply as 'income'. While 31% of households have a remittance to other income ratio below one, meaning that remittances constituted less than half of their total income, the remaining 69% of households received remittances greater than their income (see Appendix A-1). The next largest categories were remittance-to-income ratios between 1 to 1.99 for 17% of households, and 2 to 2.97 for 11%. The remaining 41% of households had ratios from 3 to 20, with 10% of households exceeding a ratio of 20. These represent households where most of their income is composed of remittances.

In terms of the distribution of remittances by income quintiles, there is a general trend that households in the poorest quintiles receive more remittances than households in higher quintiles, especially as a percentage of total income. However, this is trend is strongly decreasing as a share of income. For example, the poorest RRHs receive on average, 3,434 USD per year. The second, third, and fourth income quintiles receive slightly less (respectively, 2,951 USD, 2,559 USD, and 2,651 USD). However, the wealthiest quintile breaks this pattern and has the highest average annual remittance amount of 3,613 USD, which is attributed to some very large remittances in some households.

Summary statistics by remittance status is shown in Table 1, including a t-test in differences between the means of RRHs and NRRHs. The currency is listed in US dollars, converted at the 2007 exchange rate of 1 USD = 3.44 Tajikistani Somoni (TJS). The official exchange rate of local currency to US dollars is based on a monthly average of the 2007 period, and 1 USD = 3.44 TJS (World Bank, 2014). The first four variables are all reported in annual terms. Income excludes remittances but includes both cash and in-kind earnings from wages, self-employed work, as well as donations and government benefits (pension, disability, etc.) but do not include remittances. In constructing income, in-kind earnings were included, as they can contribute to health expenditure through in-kind gifts to health care providers. Additionally, government benefits were also included as a significant share, where 37% (1,817 households) received some sort of government transfer, but the levels of these transfers were quite small. Of these households, 87% received a transfer between 0.6 to 290.7 USD, with a mean of 200 USD.

Our sample shows that the two types of households differ significantly in terms of income, medical expenditure, household size, rural or urban location, and land ownership. On average, RRHs have less income per capita but spend more than double on medical expenditures. RRHs also have a smaller household size, live more often in rural areas, and own land. In

terms of household head characteristics, we find that NRRHs have more male heads than RRHs. Heads of NRRHs also worked the last 14 days in greater numbers than RRHs. Lastly, there is a greater portion of RRHs that have a secondary education, but less with a tertiary education. In terms of primary education (grades 1-9), there is no significant difference between the two groups.

Table 1. Summary statistics

	Non-remittance-receiving households				Remittance-receiving households				Mean Comparison	
	Mean	SD	min	Max	Mean	SD	Min	Max	Diff	P-value
Basic HH Characteristics										
Expenditure pc (USD)	982	1,330	0	26,411	1044	1,132	0	13,391	-62	0.190
Income pc (USD)	290	383	0	1,751	238	327	0	1,627	52	0.009
Remittances pc (USD)	0	0	0	0	606	691	12.5	4,360	-606	0.000
Medical exp. pc (USD)	23	127	0	5,133	57	555	0	11,650	-34	0.001
HH size	6.21	2.78	1	21	6.4	2.84	1	18	-0.18	0.130
Rural	0.61	0.48	0	1	0.77	0.41	0	1	-0.16	0.000
Land Ownership	0.55	0.49	0	1	0.72	0.44	0	1	-0.16	0.000
Number of children <14	2.15	1.69	0	11	2.12	1.75	0	10	0.04	0.618
Number of elderly >65	0.302	0.58	0	3	0.29	0.57	0	2	0.30	0.609
Head of HH										
Male	0.82	0.38	0	1	0.7	0.45	0	1	0.11	0.000
Ethnicity: Tajik	0.78	0.41	0	1	0.82	0.37	0	1	-0.04	0.014
Education (highest diploma)										
- primary (1-4)	0.17	0.38	0	1	0.23	0.42	0	1	-0.05	0.001
- secondary (5-10/12)	0.58	0.49	0	1	0.60	0.48	0	1	-0.02	0.323
- tertiary	0.20	0.4	0	1	0.13	0.33	0	1	0.07	0.000
Wage earner	0.39	0.48	0	1	0.27	0.01	0	1	0.11	0.000
Community Data										
Centralized sewage	0.25	0.43	0	1	0.16	0.37	0	1	0.08	0.000
Centralized water supply	0.52	0.49	0	1	0.4	0.49	0	1	0.12	0.000
Availability of basic medicine	0.81	0.38	0	1	0.79	0.4	0	1	0.02	0.180
At least 1 phone	0.67	0.46	0	1	0.64	0.47	0	1	0.02	0.284
Hospitals	0.36	0.83	0	10	0.28	0.49	0	2	0.07	0.029
Doctors	1.52	5.2	0	47	1.22	4	0	47	0.29	0.181
Drugstores	1.2	2.49	0	17	0.84	1.74	0	15	0.36	0.000
Health										
Days unable to work - chronic illness	2.5	7.63	0	60	2.68	7.65	0	50	-0.19	0.574
Days unable to work - sudden illness	1.75	5.26	0	63	1.48	4.02	0	27	0.27	0.224
Currently in good health	0.92	0.24	0	1	0.98	0.08	0	1	-0.05	0.000
Health better than last year	0.9	0.26	0	1	0.96	0.12	0	1	-0.06	0.000

Source: author's own calculations based on the World Bank LSMS Tajikistan data.
Note: The World Bank LSMS Tajikistan data set contains 4,860 households of which 1,170 have a migrant, and 582 receive remittances. Income per capita does not include remittances. The difference between expenditure and income is most likely driven by a systematic underreporting of income, and the fact that our income variable does not include food consumption, although there are many rural families which likely consume food produced by themselves.

We also include community-level variables on infrastructure that may affect health outcomes, such as centralized sewage and water, the availability of basic medicines, and whether there is at least one landline telephone in the community in which the household lives. Amongst these characteristics, we do not find any significant differences between these two groups in our descriptive analysis.

In terms of our health outcome variable, we rely on a battery of six proxies. The first proxy is the log of health expenditure per capita (*healthexp*), based on the theory that expenditure is a form of investment in health, which leads to better health outcomes. Health expenditure also provides an approximation of an individual's commitment to obtain better health outcomes for themselves. Similar to the findings by Amuedo-Dorantes et al. (2007), Cardona Sosa and Medina (2006), and Valero-Gil (2009), we anticipate that remittances increase health expenditure for Tajik households. We argue that expenditure alone, however, is an insufficient indicator of health outcomes, thus supplementing our analysis with other proxies for health outcome.

The second and third proxies are days that the heads of household are unable to "carry out usual activities" because of a sudden illness [*days_ill*(a)] and chronic illness [*days_ill*(b)]. Inability to work due to sudden illness can be viewed as a proxy for better health via access to needed and targeted health care. An inability to work due to chronic illness, on the other hand, is a proxy for health status based on preventative care and maintenance care. The mechanism by which remittances affects both of these variables is through a greater ability to pay for health care, as well as for factors that may indirectly influence health, such as an increase in food consumption or an investment in education (which lies beyond the scope of our research).

The fourth proxy is the percentage of healthy household members (*healthshare*), where we assume that households have better health outcomes when more household members are also healthy. The fifth proxy is the current health status of household members greater than one year of age, compared with the previous year (*healthlast*). This proxy is a dummy where being at least as healthy, if not in better health, takes the value one, and being worse off takes the value zero. The intuition is that maintaining current or improving health care status is a sign of positive health outcomes. Our final variable (*sicklast4*) complements *healthlast*, and takes the value of one if a member in the household was either sick or had a sudden injury in the last four weeks. This is a proxy for whether remittances generally help households live healthier and safe lives.

4. Empirical strategy and results

We now investigate the impact of remittances and income on several health outcome proxies. The analysis is divided into two parts. In the first part, we use a two-stage least squares (2SLS) regression to regress six health proxies on remittances and income. Our identification strategy includes the use of migrant density as an instrumental variable, which we use in the second step. We then supplement our results with robustness checks including an OLS regression and an IV-Tobit model. To help shed light on one of the transmission mechanism of how remittances improve health outcomes, we narrow our analysis to people who are ill but forgo care in the second part. We use data on why households did not seek care even when they were ill, to understand whether the decision was voluntary or forced (i.e. did they self-medicate and decide not to seek care, or could they not seek care due to an inability to pay). We then analyze the impact of remittances on both groups: households that opted out of seeking care and households who could not afford to pay for health care.

4.1. IV specification and main results

As mentioned earlier, remittances are endogenous with household characteristics because they may be triggered by various unobservable factors, which may be correlated with the error term. Two common sources of this bias include simultaneity and omitted variables. Simultaneity bias refers to the fact that the decision to migrate or remit money is often simultaneously decided with health care decisions, that is, causality runs in both directions. Omitted variable bias could occur when a variable affects both remittance levels and health, i.e. an omitted variable that may correlate with the residual.

Given the cross-sectional and non-experimental nature of our data set, we use an IV approach which attempts to mitigate the aforementioned endogeneity issues (Angrist & Krueger, 2001). The IV method is also arguably more reliable than other non-experimental techniques when endogeneity is present. For example, McKenzie, Gibson, and Stillman (2010) compared results from a randomized experiment (migration lottery) on the effect of migration on income from Tonga to New Zealand with non-experimental techniques. The IV method led to the least amount of bias, with a 12.8% percentage point difference compared to the experiment, while difference-in-differences led to a 20-22% difference and propensity score matching, 20-36%. Naturally, their results are contingent on finding a strong instrument for migration.

In this paper, we use migrant density as an instrument that strongly correlates with remittances (Pearson's correlation coefficient of 0.183, significant at the 1% level) and arguably has no influence on health outcomes (background on the exclusion restriction is outlined in Section 1).[6] Migrant density refers to the concentration of absent household members (those that are identified as migrants) in the household's local community, rather than the density of migrants abroad. This instrument has been applied in many previous empirical studies from China to Tajikistan (see Binzel & Assaad, 2011; Chang, Dong, & MacPhail, 2011; Sylvie Démurger & Xu, 2011; Randazzo, Vadean, & Piracha, 2013).[7] Specifically, migrant density is calculated as the percentage of households with migrants in each of the 63 *hukumat*[8]. The intuition behind the instrument is that a dense migrant community leads to information sharing and networking. The network lowers the cost of migrating by providing information and helping to facilitate and ease the burdens of securing housing and employment abroad (Comola & Mendola, 2015; Dolfin & Genicot, 2010; McKenzie & Rapoport, 2007; Winters, Janvry, Sadoulet, de Janvry, & Sadoulet, 2001). In fact, Munshi (2003) found that Mexican migrants living in the United States with a migrant network in the United States increases the likelihood of being employed

[6] We also tested two additional instruments, bank density and ethnicity. These instruments, however, have weak explanatory power (R^2), and Wald F statistics below 4 and were therefore left out of our model. Moreover, while adding more instruments may help explain remittances, limiting the number of instruments reduces the bias of two-stage least squares (Angrist & Krueger, 2001). The logic behind bank density is that the more banks that are in the community that the household lives, the easier it is for the household to receive money, and therefore, the migrant may remit more money more frequently. The reason why we use ethnicity is because minorities left Tajikistan during the 1990 civil war, and never returned. This means that most households that have a migrant abroad are Tajiks, and being in a Tajik household may increase the likelihood of receiving a remittance, but shouldn't affect health outcome (Piracha et al., 2013).

[7] Existing studies on remittances have employed various instruments such as distance between remittance-receiving and remittance-sending countries (Adams & Page, 2005), language of target country (Kilic et al., 2009)and per capita count of Western Union outlets (Amuedo-Dorantes et al., 2007).

[8] A *hukumat* is a city or local governing body.

and having a higher paying job. By extending this logic to Tajikistan, if the migrant network in Tajikistan is used to connect migrants in the destination country, then migrants would most likely benefit from the higher wage effect once abroad. The effect of the network then increases the probability of being able to migrate as well as the wages earned abroad, and may decrease the cost of living and setting up abroad, thus decreasing start-up costs and increasing wages. The money saved from this network frees up the migrant's disposable income, or the income allocated to remitting home.

To descriptively confirm whether migrant density has indeed actively influenced migration decisions, we confirmed the links from the LSMS survey data and find that the information links are widespread. Amongst former migrants who returned to Tajikistan, 84.3% of the migrants reported that they obtained information on where to relocate to; or how to find a job either from their family, relatives, neighbors, or friends in Tajikistan and abroad (see Appendix A-2).[9] In a qualitative study, Olimova and Bosc (2003) conducted focus groups with migrant communities in Dushanbe and Isfara and found that there were three basic criteria for Tajik migrants selecting their destination: presence of a Tajik community (which one would come to learn about through the migrant dense communities at home), contacts dating back to the Soviet period, and Soviet-era contacts through organized employment positions (mainly in the labor sector such as fuel and energy). In our sample, the migrant communities are also highly concentrated in Russia, where 517 (58%) live in Moscow, 64 (7%) in St. Petersburg, and 56 (6%) in Ekaterinburg.

Table 2 shows results of the first-stage regression and that the coefficient of the migrant density instrument is 1.93 and significant at the 1% level. The instrument thus seems to meet the relevance criteria with a Cragg-Donald Wald F statistic of 20.58 (larger than the threshold of 10), indicating its strength as an instrument. Our regression also controls for non-remittance household income, which may be endogenous with respect to both remittances and the health outcome variables. However, as income is not our main variable of interest, we include it in our analysis simply as a control variable. Table 2, column 2 regresses remittances on our control variables without income. The results are very similar to the regression with income, indicating that the use of income as a control variable does not bias our results. Lastly, we controlled for migrant household status because only 49% of migrant households receive a remittance.

We now estimate several forms of the following linear regression,

$$Health_i = \alpha + \beta_1 \log(Remittance_i) + \beta_2 \log(Income_i) + \beta_k X_{ki} + \varepsilon_i$$

where $Health_i$ represents the health outcome variables of household i, $Remittance_i$ represents remittance per capita received by the household, $Income_i$ is other income per capita of the household, and X_{ki} represents a vector of household and community characteristics. Both

[9] Our calculation of 84,3% (first six rows, excluding "previous personal experience") includes both family and friends abroad and those in Tajikistan. This is because we expect migrants to communicate with their families back in Tajikistan, and this will then have an effect on informational networks in the household communities in Tajikistan.

income and remittance variables are logged to form a more normal distribution and for ease of interpretation. Our main parameter of interest is $\beta_{1,}$ which identifies the impact of remittance on the six health outcomes. Results are shown in Table 3. We also ran an OLS regression without using an IV, which did not yield any significant results, but can be viewed in Appendix A-3.

In our analysis, remittances include both cash and the value of in-kind transfers. The vector of household characteristics controls for age and human capital variables of the head of household such as education, as these factors can constitute the demand for health, which in turn determines the investment level in health (Grossman, 1972). For education, we control for four levels of the highest education level that was completed: none, basic (grades 1-9), secondary (grades 10-12), and tertiary. Other head of household controls include gender of the head, ethnic background, and whether the head earns a regular wage. Since our analysis is at the household level, we also control for household size as well as the number of children (under 14 years) and the elderly (over 65 years) as these groups may require more health care.

Table 2. First-Stage OLS estimation, dependent variable: ln(Remittance p.c.)

	(1)	(2)
log(Income pc)	-0.0483***	
	(0.0178)	
Household size	-0.0691***	-0.0753***
	(0.0180)	(0.0181)
Migrant HH dummy	5.271***	5.290***
	(0.210)	(0.210)
Gender of HH head	-0.491***	-0.490***
	(0.101)	(0.101)
Wage earner	-0.118	-0.189**
	(0.0810)	(0.0793)
Rural dummy	0.0428	0.0267
	(0.157)	(0.157)
No. of children < 14 years	0.0161	0.0276
	(0.0267)	(0.0270)
No. of elderly > 65 years	-0.0165	-0.0597
	(0.0651)	(0.0639)
Migrant density	1.899***	1.932***
	(0.641)	(0.639)
Constant	-1.576***	-1.769***
	(0.363)	(0.354)
Observations	4304	4304
Adjusted R^2	0.528	0.527

Standard errors in parentheses and are clustered at the primary sampling unit level. Income pc excludes remittances and includes both cash and in-kind earnings from wages, self-employed work, as well as donations and government benefits; and excludes remittances. For further details, see section 3. We control for migrant household status because not all migrant households receive remittances. We also control for characteristics of the household head (education level and ethnicity), community infrastructure variables (access to sewage, clean water, medicine, telephone), health variables (general community health level, hospitals, doctors, drug stores), and region (dummies for each of the five regional *Oblasts*). * $p < .10$, ** $p < 0.05$, *** $p < 0.01$

Next, we control for quality of health infrastructure based on the level of urbanization and technology measured by responses to community questions of the LSMS survey: access to centralized sewage, water supply, basic medicine, and phones, and whether the quality of health services in a *hukumat* is rated as satisfactory or better. Additional health variables that we include are the number of hospitals, doctors, and drugstores at the *hukumat* level. Controlling for these community health variables is particularly important for our exclusion restriction as previously explained in the introduction.

We also include migrant status as a control variable, because if a migrant is abroad, it may decrease the income of the household, which may reduce the ability of the family to pay for or seek health services. Before including this variable, we tested whether it correlated with income and remittances, and found that there was no correlation, partly because there is significant variation in who receives a remittance. While 1,170 households have a migrant abroad, only 582 of those receive either a cash or in-kind remittance. We then control for geographic differences by including dummies for the five *oblasts* (administrative regions).

In estimating our initial and subsequent equations, we account for the possible correlation of individuals living in the same community. To address this issue, we use robust standard errors and cluster at the primary sampling unit (PSU) level. The Tajikistan LSMS sample design, based on the UNICEF Multiple Indicator Cluster Survey constructed 270 clusters with 18 households per cluster. Both clustering at the PSU level and only using robust standard errors yield significant results, indicating the stability of our model.

Table 3, column 1 shows that remittances have a significant and positive effect on health expenditure (Table 4 presents the corresponding regressions without control variables). A 1% increase in remittance per capita leads to a 0.97% increase in per capita health expenditure. The coefficient is an order of magnitude larger than the coefficient for income, where a 1% increase in income only leads to a 0.06% increase in health expenditure. For the average household, this means that a 1 USD increase in remittances leads to, on average, a 0.09 USD increase in health expenditure. Correspondingly, an increase in income by 1 USD leads to a 0.01 USD increase in health expenditure.[10] Other variables that have a positive effect on health expenditure include living in a community where most households have access to piped water and living in communities where the general quality of health is already 'good'[11].

[10] Calculations are based on mean income per capita, mean remittance per capita of remittance receiving families, and mean health expenditure per capita. We then converted TJS amounts to USD using the 2007 monthly average rate of 1 USD = 3.44 TJS (WB, 2014). The mean remittance per capita is 2084 TJS divided by 3.44 is 605 USD. The mean income per capita is 821 TJS, and divided by 3.44 is 238 USD. The mean health expenditure per capita is 197 TJS divided by 3.44 is 57.26 USD. Using these numbers, a 1% (6.05 USD) increase in remittances leads to, on average, a 0.97% (0.56 USD) increase in health expenditure. For income, an increase by 1% (2.38 USD) leads to a .06% (0.03 USD) increase in health expenditure. We then calculate the effect per one dollar, respectively, 0.09 USD and 0.01 USD.

[11] In the LSMS survey, respondents were asked to evaluate whether they believed the general quality of health of their community members were excellent, good, satisfactory, or bad. We use a dummy variable that labels the first three conditions as 'good', taking on the value 1, and 'bad' takes the value of zero.

Table 3. 2SLS regression with IV

	(1) log(healthexp pc)	(2) days_ill(a)	(3) days_ill(b)	(4) healthshare	(5) healthlast	(6) sicklast4
log(remittance pc)	0.977*	-1.376	-1.844**	0.00418	0.0269*	-0.247***
	(0.522)	(0.895)	(0.812)	(0.00679)	(0.0139)	(0.0930)
log(income pc)	0.0593*	-0.0268	-0.126**	-0.000878	0.000116	-0.0151**
	(0.0360)	(0.0663)	(0.0637)	(0.000601)	(0.00110)	(0.00707)
Household size	0.126***	0.275***	-0.0311	0.00330***	0.00657***	-0.00463
	(0.0430)	(0.0979)	(0.0823)	(0.000963)	(0.00172)	(0.00892)
Migrant HH	-5.067*	7.104	9.650**	-0.0191	-0.143*	1.309***
	(2.749)	(4.754)	(4.317)	(0.0367)	(0.0743)	(0.493)
Gender of head	0.291	-0.683	-0.976**	0.0141**	0.0286***	-0.139***
	(0.287)	(0.591)	(0.482)	(0.00609)	(0.0101)	(0.0531)
Wage earner	0.000507	-0.804**	-0.315	0.00636**	0.00677	-0.0245
	(0.123)	(0.334)	(0.243)	(0.00285)	(0.00521)	(0.0278)
Rural dummy	-0.0170	0.459	0.795*	0.000298	-0.00505	0.0896*
	(0.236)	(0.541)	(0.416)	(0.00478)	(0.00788)	(0.0461)
# children<14 yrs	-0.0749*	-0.437***	0.0500	0.00273***	0.00182	0.00205
	(0.0404)	(0.108)	(0.0890)	(0.000955)	(0.00184)	(0.00874)
# elderly>65 yrs	0.188*	1.399***	0.232	-0.0178***	-0.0236***	0.00929
	(0.0967)	(0.293)	(0.211)	(0.00418)	(0.00519)	(0.0208)
Constant	1.839**	0.462	-0.308	0.932***	0.926***	-0.0811
	(0.854)	(1.752)	(1.578)	(0.0179)	(0.0301)	(0.166)
Observations	4304	4304	4304	4304	4304	4304
Adjusted R^2	.	.	.	0.024	.	.

Standard errors in parentheses and are clustered at the primary sampling unit level. Income pc excludes remittances and includes both cash and in-kind earnings from wages, self-employed work, as well as donations and government benefits. For further details, see section 3. We control for migrant household status because not all migrant households receive remittances. We also control for characteristics of the household head (education level and ethnicity), community infrastructure variables (access to sewage, clean water, medicine, telephone), health variables (general community health level, hospitals, doctors, drug stores), and region (dummies for each of the five regional *Oblasts*). * $p < .10$, ** $p < 0.05$, *** $p < 0.01$

Table 4. 2SLS regression with IV - without control variables

	(1) log(healthexp)	(2) days_ill(a)	(3) days_ill(b)	(4) healthshare	(5) healthlast	(6) sicklast4
log(Remittance pc)	0.174*	-0.251	-0.377***	-0.0293*	-0.0225	-0.0314**
	(0.0926)	(0.160)	(0.139)	(0.0171)	(0.0164)	(0.0126)
Constant	1.900***	2.274***	1.304***	0.901***	0.891***	0.220***
	(0.116)	(0.207)	(0.180)	(0.0264)	(0.0254)	(0.0162)
Observations	4520	4520	4520	4520	4520	4304

Standard errors in parentheses
* $p < .10$, ** $p < 0.05$, *** $p < 0.01$

In terms of other health outcome proxies, remittances have a negative but insignificant effect on days that people are unable to work due to chronic illness (column 2).[12] This may be partially explained by the fact that chronic illnesses may develop over time and may not improve or worsen within a short time span such as one year. Therefore, the effect from a temporary influx of remittances may be limited. Sudden illness (column 3), on the other hand, is significantly and negatively influenced by remittances. The coefficient is large, where a 1%

[12] Chronic illness is defined as an illness or disability that has lasted more than three months. More than 90% of respondents had their chronic illness or disability diagnosed by a professional. The most commonly affected organs are heart/vascular system (17%), arms or legs (14%), and lungs/respiratory system (11%). As in cases of sudden illness, migrant and non-migrant households had a similar number of days they could not work due to chronic illness, 2.5 and 2.2 days, respectively.

increase in remittances decreases the days of work lost due to sudden illness by 0.2 days. Income, on the other hand, has no significant impact on this outcome variable.

For the fourth health proxy (column 4)—the percentage of household members who self-rank themselves as having a health condition of average or better—there is no effect of either remittances or income. This may be due to measurement issues from self-reporting, such as inconsistent recalls, or heterogeneity in subjectively weighting the response scale. Yet in terms of household members that are as healthy, or in better health than they were in the previous year (*healthlast*), our results indicate that on average, an increase in both remittances and income has a positive and significant impact on perceived health status relative to the previous year. Here, the impact of remittances is an order of magnitude larger than income (column 5). At the same time, the coefficient is so small that the effect of remittances is arguably negligible.

Our final health proxy, *sicklast4* (column 6), shows that remittances has a negative and significant impact on a family member being sick or injured. Possible reasons may include remittances supplementing the need for employment in hazardous work conditions, or remittances reducing highly labor intensive work that could damage health. As this is a dummy variable, we used maximum likelihood to estimate a probit model (see Appendix A-4). To allow for the endogenous nature of remittances in our model, we use an IV-probit estimation method. In the first stage, remittances are regressed on the instrument, migrant density, and the exogenous regressors. The fitted values are then included in the probit model estimated in the second stage. Results are consistent with our linear probability model where the sign is negative and significant at the 1% level.

As a robustness check, we ran an instrumental variable Tobit (IV-Tobit) model (see Appendix A-5). In this model, we estimate a likelihood function for receiving remittances in the first stage. Because a sizeable cluster of households do not receive remittances, our sample is truncated at zero. Additionally, we acknowledge the likely presence of a latent variable that determines both whether households receive remittances and the amount of remittances they receive. Using a Tobit model allows us to left-censor the households that do not receive remittances. We then use the predicted latent variable values from the Tobit estimate as an instrument for remittances in estimating the impact of remittances on our health proxies. To test for normality, we plotted a frequency histogram of the predicted values to visually confirm for normal distribution (see Appendix A-6), which gives us confidence in using these values in the second stage regression.

The IV-Tobit model allows us to do two things. First, using a Tobit model allows us to retain the rich data on NRRHs. Instead of omitting households that do not receive remittances, we are able to censor the remittances at zero, and keep the data on the households at this threshold. Second, we use the latent component of the Tobit model as an instrument for remittances, estimating the probability of being a RRH, which minimizes some of the unobserved heterogeneity. Results from the Tobit model support the effect of remittances on health expenditure from our previous results, but leaves us with inconclusive results for the remaining health outcomes variables. As such, some caution should be used in quantifying the robustness of the other variables.

4.2. Transmission channel analysis

The analysis above indicates that remittances have a positive impact on health outcomes. Income, on the other hand, does not always have a significant effect, and when it does, the coefficient is an order of magnitude smaller than remittances. Because out-of-pocket expenses (OPE)—the private financial cost to a household, such as direct payment to service providers are notoriously high—we wanted to examine the extent to which OPE inhibits access to medical care. Additionally, what is the impact of remittances in terms of access, and what is the transmission mechanism for how remittances improve health outcomes? In this section, we take a closer look at the group of people who were ill but did not seek care, which includes both households that voluntarily opted not to seek care, as well as those that simply could not afford care. By focusing on the impact of remittances on these two groups, we aim to confirm or negate two potential transmission channels.

First, among NRRHs and RRHs, there are a proportionately equivalent number of households that were ill in the past 12 months, but did not seek help, respectively, 38.1% and 39.5%[13]. However, within these groups, descriptive statistics shown in Table 5 indicate that a far greater percentage of NRRHs could not afford health care (38%), compared with RRHs (22%). We additionally see a greater proportion of RRHs opting out of seeking care because they believe they will get better or they self-medicate. Based on the descriptive data, our hypothesis is twofold. First, we expect remittances to have a negative effect on involuntarily opting out of seeking care, i.e. those who could not afford to pay. Because remittances increase health care expenditure, as shown in Section 4.2., it should improve a household's ability to pay for and seek care. Second, we expect remittances to have a positive effect on households that voluntarily opt out of seeking care. As shown in Table 5, the most common reason for voluntarily opting out is self-medicating (using traditional herbs or pharmaceuticals the household already had). We therefore expect that an increase in remittances increases expenditure on medication, and allows households to manage some basic illnesses without seeking medical care.

Table 5. Reasons for why ill household members delayed or did not seek medical care

	NRRH		RRH	
	Count	%	Count	%
Thought they would get better without doing anything	167	21%	21	21%
Thought they would get better using herbs/pharmaceuticals they already had	266	34%	46	47%
Could not afford to pay	298	38%	22	22%
It was too far away	38	5%	6	6%
Other	13	2%	3	3%
Total	782		98	

To test the two hypotheses, we first regress 'inability to pay' as the main reason for not seeking care on remittances and a set of control variables. Table 6 shows that remittances significantly decreases the likelihood of 'inability to pay' as the determinant for not seeking care. Column 1 shows the results from a simple OLS regression without any control variables, and column 2

[13] Out of a total of 2,050 NRRHs that had illnesses, 782 households did not seek care. For RRHs, out of 346 households that had an illness, 98 did not seek care.

includes all control variables. Columns 3-5 are 2SLS regressions that incorporate the migrant density instrument in the second stage, with varying control variables. Column 6 is an IV-Tobit regression, where remittances are again instrumented in the second stage. Lastly, columns 7-8 are IV-probit regressions to account for the fact that our dependent variable is binary. Across our regressions, with the exception of specification 5 (which is nearly significant), we find that remittances have a significant and negative impact on inability to pay as the main reason for not seeking care. The coefficients are also much larger than income. Similar findings across regressions reflect the stability of our model. This finding also complements our previous finding that remittances increase health expenditure, in that remittances also seem to increase the likelihood that households seek care.

Table 6. Inability to pay as the main reason for not seeking care when ill

	(1) OLS	(2) OLS	(3) IV	(4) IV	(5) IV	(6) IV-Tobit	(7) IV-Probit	(8) IV-Probit
log(Remittance pc)	-0.0183***	-0.0182***	-0.131***	-0.134***	-0.142	-0.305*	-0.245***	-0.686*
	(0.00500)	(0.00486)	(0.0452)	(0.0468)	(0.0868)	(0.162)	(0.0825)	(0.389)
log(Income pc)		-0.00441		-0.0219	-0.0263	-0.0613		-0.107
		(0.0169)		(0.0165)	(0.0400)	(0.0461)		(0.198)
Household size		-0.0157*			-0.0215	-0.0002		-0.122
		(0.00846)			(0.0436)	(0.0179)		(0.182)
HH head-gender		-0.0295			-0.113	-0.242		-0.490
		(0.0471)			(0.140)	(0.151)		(0.708)
Wage earner		0.00657			0.109	-0.0728		0.458
		(0.0389)			(0.126)	(0.0811)		(0.740)
Rural dummy		-0.0516			-0.107	0.0379		-0.643
		(0.0594)			(0.222)	(0.115)		(1.572)
# children <14		0.0118			0.00983	0.0159		0.0599
		(0.0127)			(0.0514)	(0.0244)		(0.273)
# elderly > 65 yrs		-0.0315			0.135	-0.0548		0.597
		(0.0286)			(0.0968)	(0.0574)		(0.558)
Constant	0.345***	0.503***	1.011***	1.132***	0.952	-0.277	-0.666***	7.140
	(0.0163)	(0.145)	(0.255)	(0.302)	(1.588)	(0.458)	(0.121)	(319.9)
Observations	899	899	113	113	113	899	899	113
Adjusted R^2	0.011	0.043	.	.	.	.	.	.

Standard errors in parentheses and are clustered at the primary sampling unit level. Income pc excludes remittances and includes both cash and in-kind earnings from wages, self-employed work, as well as donations and government benefits. For further details, see section 3. We control for migrant household status because not all migrant households receive remittances. We also control for characteristics of the household head (education level and ethnicity), household income quintile, community infrastructure variables (access to sewage, clean water, medicine, telephone), health variables (general community health level, hospitals, doctors, drug stores), and region (dummies for each of the five regional *Oblasts*). * $p < .10$, ** $p < 0.05$, *** $p < 0.01$

Our second hypothesis is that remittances increase the likelihood that households voluntarily opt out of seeking care by self-medicating. It is possible that people seek less care because they are buying and taking more medicine. This follows on research by Schwarz, Wyss, Gulyamova, and Sharipov (2013) that finds that in Tajikistan, the median per capita expenditure on medicine has doubled from 2005 to 2011. Remittances thus might be spent on medicine. We regress a dummy for whether the reason for opting out was due to self-medicating on remittances and a set of household characteristics. The results do not show a stable and significant relationship between remittances and self-medicating (see Appendix A-7). There are several likely explanations for this result. For example, the reason for not seeking care may be related to the type of illness. For less acute illnesses, it may be easier to self-medicate. This

exercise shows us that while remittances increases health expenditure, it is not through increased spending on medicine amongst households that opted out of care. Instead, remittances increase the likelihood of being able to seek actual medical care.

5. Conclusion and policy implications

Our study finds a strong relationship between remittances and health outcomes, which are measured by six different proxies. Of the six proxies, all but two (the ratio of healthy household members and days unable to work due to chronic illness) are significantly influenced by remittances. These proxies are health expenditure, days unable to work due to illness, health compared with last year, and health in the past four weeks. For these outcome variables, remittances have a significant effect, and one that is an order of magnitude larger than for income. At the same time, the coefficients are relatively small, indicating that the effects, while stronger and more robust than income, are also small. The exception is health expenditure. Not only do remittances have a significant and positive effect, but the effect is substantially larger than the effect of income. A 1% increase in remittances leads to a 0.97% increase in health expenditure. These findings also add to the argument that remittances are indeed unique, and not fungible with other income sources.

Additionally, these results contribute to the growing body of evidence that remittances are invested for productive purposes, strengthening the argument of the optimists. It also reflects the continued importance of remittances in helping households obtain health care, especially when public funding is scarce. A better understanding of how remittances are embedded into household expenditure behavior may help policymakers better cater policies to the needs of the most vulnerable households. To contribute to this area of research, we investigated two transmission channels for how remittances improve health: being able to afford care and investing in medicine. We find that remittances decrease the likelihood of not being able to seek care due to financial constraints. We also found that remittances have no significant effect on the consumption of medicine for those who chose not to seek medical care. Thus, we find that one channel for remittances to ensure people seek appropriate care is through improving access to care services, not by encouraging the purchasing of medicine.

Tajikistan has made a concerted effort to encourage the inflow of remittances by reducing taxes on remittances, and making it easier and safer to remit money. For example, in 2001, the government abolished the 30% tax on remittances that were physically brought into the country (Olimova & Bosc, 2003). In 2004, Tajikistan signed an agreement with Russia to facilitate easy border crossings by simplifying document requirements, increasing social protection of Tajik migrants in Russia, and to lengthen visas for Tajik migrants in Russia from one to three years (Kalaj, 2013; Kireyev, 2006). In recent years, migrants can also transfer funds through 14 banks without an account. However, while policy makers have helped reduce some of the transaction barriers for people to send and receive remittances, there are still opportunities to leverage the use of remittances. An example might include offering incentives to participate in a commitment health savings scheme[14] for RRHs, or to place

[14] A commitment health savings scheme would, for example, require that a certain percentage or amount of remittance received be put into an account set aside for health care expenditure. For an overview of commitment savings schemes in developing countries, see Ashraf, Karlan, Gons, and Yin, (2003).

remittance withdrawal offices directly at health facilities to encourage senders and receivers to invest in health. In addition to strengthening the remittance-channel to finance health expenditure, it may be important to understand whether there may be a crowding-out effect of remittances, a relevant topic for further research. For example, as more households receive remittances and can afford medical expenses, do medical service providers assign preferential treatment to those households with remittances? Policy makers may perhaps best target the most disadvantaged groups by ensuring that the NRRHs in the lowest income quintiles have access to adequate health services.

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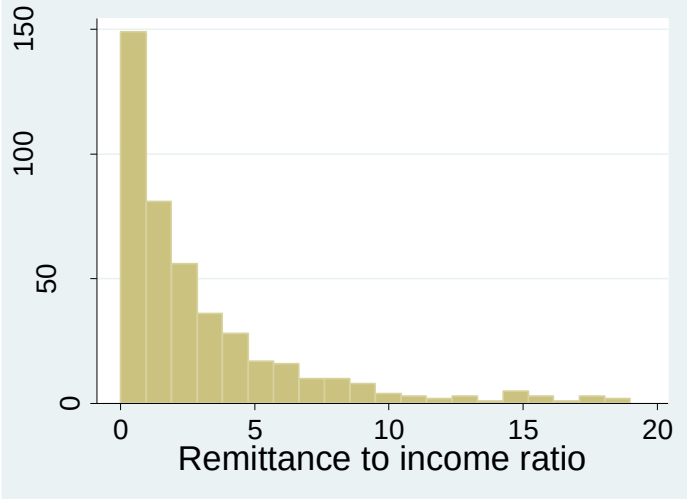
Appendix

Appendix A-1. Remittance to income ratio by frequency



Appendix A-2. Who provided information on where to go and/or how to find work?

	Freq.	Percent
Family/relatives in Tajikistan	100	16.72
Family/relatives abroad	147	24.58
Friends in Tajikistan	95	15.89
Friends abroad	132	22.07
Previous personal experience	55	9.2
Neighbors	30	5.02
TV, radio, newspaper, or book	9	1.51
Internet	5	0.84
Other	25	4.18
Total	**598**	**100**

Appendix A-3. OLS regression

	(1) healthexp	(2) days_ill(a)	(3) days_ill(b)	(4) healthshare	(5) healthlast	(6) sicklast4
log(Remittance pc)	0.0043	0.076	-0.0282	-0.000156	-0.00011	-0.00053
	(0.016)	(0.051)	(0.0402)	(0.000424)	(0.00083)	(0.0029)
log(Income pc)	0.011	0.0457	-0.0354	-0.00110**	-0.0012	-0.0028
	(0.016)	(0.0405)	(0.0374)	(0.000490)	(0.00076)	(0.0028)
Household size	0.059***	0.376***	0.0943*	0.00300***	0.0047***	0.0124***
	(0.02)	(0.0709)	(0.0502)	(0.000854)	(0.0013)	(0.00402)
Migrant HH dummy	0.14	-0.670*	-0.0704	0.00410	0.0015	-0.0099
	(0.11)	(0.402)	(0.352)	(0.00353)	(0.0063)	(0.024)
Gender of HH head	-0.193*	0.0396	-0.0722	0.0119**	0.015**	-0.017
	(0.099)	(0.344)	(0.192)	(0.00516)	(0.007)	(0.018)
Wage earner	-0.116	-0.631**	-0.0985	0.00584**	0.0036	0.0048
	(0.074)	(0.293)	(0.185)	(0.00271)	(0.0043)	(0.016)
Rural dummy	0.132	0.236	0.516	0.000961	-0.00091	0.0518**
	(0.177)	(0.458)	(0.317)	(0.00454)	(0.0063)	(0.026)
No. of children < 14 years	-0.06**	-0.460***	0.0217	0.00280***	0.0022	-0.0018
	(0.028)	(0.100)	(0.0746)	(0.000955)	(0.0017)	(0.0056)
No. of elderly > 65 years	0.184***	1.404***	0.239	-0.0178***	-0.024***	0.0101
	(0.068)	(0.276)	(0.170)	(0.00418)	(0.0049)	(0.0134)
Constant	0.556	2.376*	2.085**	0.926***	0.890***	0.244***
	(0.398)	(1.215)	(0.925)	(0.0156)	(0.0203)	(0.0634)
Observations	4304	4304	4304	4304	4304	4304
Adjusted R^2	0.033	0.025	0.010	0.035	0.036	0.013

Standard errors in parentheses and are clustered at the primary sampling unit level. Income pc excludes remittances and includes both cash and in-kind earnings from wages, self-employed work, as well as donations and government benefits. For further details, see section 3. We control for migrant household status because not all migrant households receive remittances. We also control for characteristics of the household head (education level and ethnicity), community infrastructure variables (access to sewage, clean water, medicine, telephone), health variables (general community health level, hospitals, doctors, drug stores), and region (dummies for each of the five regional *Oblasts*). * $p < .10$, ** $p < 0.05$, *** $p < 0.01$

Appendix A-4. IV-probit estimate, dep: sick the last four weeks

	(1)	(2)
log(Remittance pc)	-0.100***	-0.808***
	(0.0277)	(0.219)
log(Income pc)		-0.0490***
		(0.0182)
Household size		-0.0180
		(0.0242)
Migrant HH dummy		4.283***
		(1.175)
Gender of HH head		-0.454***
		(0.145)
Wage earner		-0.0785
		(0.0846)
Rural dummy		0.290**
		(0.133)
No. of children < 14 years		0.00782
		(0.0297)
No. of elderly > 65 years		0.0286
		(0.0679)
Constant	-0.772***	-1.756***
	(0.0363)	(0.419)
Observations	4304	4304

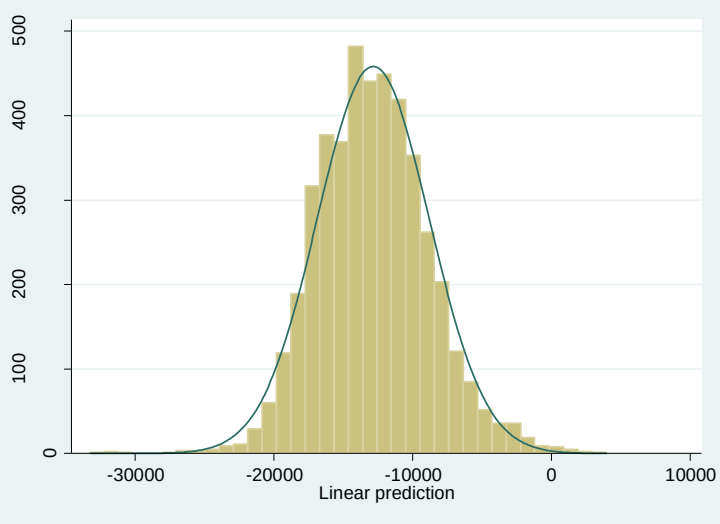
Standard errors in parentheses and are clustered at the primary sampling unit level. Income pc excludes remittances and includes both cash and in-kind earnings from wages, self-employed work, as well as donations and government benefits. For further details, see section 3. We control for migrant household status because not all migrant households receive remittances. We also control for characteristics of the household head (education level and ethnicity), community infrastructure variables (access to sewage, clean water, medicine, telephone), health variables (general community health level, hospitals, doctors, drug stores), and region (dummies for each of the five regional *Oblasts*). * $p < .10$, ** $p < 0.05$, *** $p < 0.01$.

Appendix A-5. IV-Tobit regression results

	(1)	(2)	(3)	(4)	(5)	(6)
	healthexp	days_ill(a)	days_ill(b)	healthshare	healthlast	sicklast4
log(Remittance pc)	0.0305**	-0.0491	-0.0413	0.000610	0.000165	-0.00237
	(0.0155)	(0.0584)	(0.0390)	(0.000610)	(0.000796)	(0.00323)
log(Income pc)	0.0122	0.0395	-0.0360	-0.00106**	-0.00122	-0.00285
	(0.0156)	(0.0406)	(0.0360)	(0.000498)	(0.000765)	(0.00281)
Household size	0.0609***	0.367***	0.0934*	0.00305***	0.00472***	0.0123***
	(0.0194)	(0.0697)	(0.0493)	(0.000839)	(0.00126)	(0.00396)
Gender of HH head	-0.180*	-0.0226	-0.0788	0.0123**	0.0153**	-0.0175
	(0.0990)	(0.349)	(0.196)	(0.00512)	(0.00696)	(0.0180)
Wage earner	-0.113	-0.646**	-0.100	0.00593**	0.00359	0.00459
	(0.0735)	(0.292)	(0.183)	(0.00268)	(0.00432)	(0.0155)
Rural dummy	0.128	0.256	0.518*	0.000844	-0.000947	0.0521**
	(0.176)	(0.459)	(0.315)	(0.00453)	(0.00632)	(0.0255)
No. of children < 14 years	-0.0601**	-0.458***	0.0219	0.00279***	0.00224	-0.00176
	(0.0280)	(0.0997)	(0.0741)	(0.000948)	(0.00171)	(0.00555)
No. of elderly > 65 years	0.184***	1.404***	0.239	-0.0178***	-0.0237***	0.0101
	(0.0678)	(0.275)	(0.169)	(0.00416)	(0.00488)	(0.0134)
Constant	0.590	2.212*	2.068**	0.927***	0.890***	0.241***
	(0.393)	(1.220)	(0.931)	(0.0156)	(0.0203)	(0.0631)
Observations	4304	4304	4304	4304	4304	4304
Adjusted R^2	0.032	0.024	0.010	0.035	0.036	0.014

Standard errors in parentheses and are clustered at the primary sampling unit level. Income pc excludes remittances and includes both cash and in-kind earnings from wages, self-employed work, as well as donations and government benefits. For further details, see section 3. We control for migrant household status because not all migrant households receive remittances. We also control for characteristics of the household head (education level and ethnicity), community infrastructure variables (access to sewage, clean water, medicine, telephone), health variables (general community health level, hospitals, doctors, drug stores), and region (dummies for each of the five regional *Oblasts*). * $p < .10$, ** $p < 0.05$, *** $p < 0.01$.

Appendix A-6. Distribution of Tobit predictors



Appendix A-7. Dependent variable: Using herbs or medicine households already have

	(1) OLS	(2) IV	(3) IV	(4) IV	(5) IV-Tobit	(6) IV-Probit	(7) IV-Probit
log(Remittance pc)	0.0140	-0.0103	-0.00890	0.0450**	0.00937	-0.0300	0.224
	(0.00713)	(0.0595)	(0.0588)	(0.0176)	(0.00661)	(0.0735)	(0.172)
log(Income pc)			0.00708	0.00949	0.00502		0.0290
			(0.00472)	(0.00761)	(0.00944)		(0.0231)
Household size				0.0121***	0.0139***		0.0492*
				(0.00395)	(0.00495)		(0.0255)
Gender of HH head				0.0586	0.0342		0.156
				(0.0821)	(0.0708)		(0.138)
Wage earner				-0.00568	-0.0144		-0.0144
				(0.0223)	(0.0184)		(0.111)
Rural dummy				-0.0381	-0.0190		-0.0349
				(0.0430)	(0.0501)		(0.175)
# children<14 yrs				-0.0265***	-0.0266***		-0.0771**
				(0.00911)	(0.00904)		(0.0381)
# elderly>65 yrs				0.0156	0.0119		0.0318
				(0.0544)	(0.0508)		(0.0842)
Migrant HH dummy							-0.887
							(0.779)
Constant	0.373***	0.341***	0.303***	0.417***	0.329***	-0.414***	-0.0996
	(0.0478)	(0.116)	(0.111)	(0.0787)	(0.0782)	(0.107)	(0.513)
Observations	899	899	899	899	899	899	899
Adjusted R^2	0.006	.	.	0.011	0.038		

Standard errors in parentheses and are clustered at the primary sampling unit level. Income pc excludes remittances and includes both cash and in-kind earnings from wages, self-employed work, as well as donations and government benefits. For further details, see section 3. We control for migrant household status because not all migrant households receive remittances. We also control for characteristics of the household head (education level and ethnicity), community infrastructure variables (access to sewage, clean water, medicine, telephone), health variables (general community health level, hospitals, doctors, drug stores), and region (dummies for each of the five regional *Oblasts*). * $p < .10$, ** $p < 0.05$, *** $p < 0.01$.