DEM Working Papers

N. 2017/12

Remittances and healthcare consumption: human capital investment or responses to shocks? Evidence from Peru

Gabriella Berloffa, Sara Giunti

UNIVERSITÀ DEGLI STUDI DI TRENTO

Dipartimento di Economia e Management

Università degli Studi di Trento

Department of Economics and Management, University of Trento, Italy.

Guidelines for authors

Papers may be written in Italian or in English. Faculty members of the Department must submit to one of the editors in pdf format. Management papers should be submitted to R. Gabriele. Economics Papers should be submitted to L. Andreozzi. External members should indicate an internal faculty member that acts as a referee of the paper.

Typesetting rules:

1. papers must contain a first page with title, authors with emails and affiliations, abstract, keywords and codes. Page numbering starts from the first page;
2. a template is available upon request from the managing editors.

Remittances and healthcare consumption: human capital investment or responses to shocks? Evidence from Peru.

Gabriella Berloffa* and Sara Giunti**

ABSTRACT *This paper estimates the effect of international remittances on healthcare consumption. We test whether consumption decisions of remittance-receiving households with respect to healthcare are driven by the occurrence of health shocks or reveal different preferences to invest in human capital. Using data from the "Peruvian National Survey of Households", we find that remittances have a positive impact on healthcare consumption shares and a negative one on consumption goods, net of the remittance-related income effect. This suggests a tendency to devote larger shares of income from remittances to human capital investment, compared to other sources of income. This propensity is independent of the occurrence of a health shock, confirming the role of migrant transfers for human capital accumulation.*

*Department of Economics and Management, University of Trento, Italy
** Insitute for Fiscal Studies, London, UK

1. Introduction

Remittance inflows[1] have surged during the last decades, becoming a fundamental source of external funds for developing countries. Their amount at a global level was three times larger than official development assistance in 2013, and their flows are more regular than both private debt and portfolio equity[2]. The economics of migration has devoted increasing efforts to the analysis of the effects of remittances on sending communities (Clemens et al., 2014). The potential additional income provided by remittances may relax household liquidity constraints, fostering poverty reduction, human and physical capital accumulation and ensuring against income volatility. These potential benefits may be counterbalanced by the direct costs of migration and the indirect costs in terms of reduced incentives to labour supply and rural productivity of members left behind, and skilled workers being lost (brain drain) (Acosta et al., 2007; Adams and Cuecuecha, 2013; Randazzo and Piracha, 2014; Taylor and Lopez-Feldman, 2010; de Haas, 2010).

Particular attention has been devoted to the impact of remittances on human capital accumulation. Several studies have confirmed that these income flows support resource-constrained households for the enrolment and maintenance of children in school and for improving the quality of their educational investment (Cox Edwards and Ureta, 2003; Salas, 2014). A more recent literature contradicting the "brain drain" hypothesis suggests that, since the returns of education are higher when migrating, the prospect of future migration raises the overall expected returns to education, stimulating higher domestic investment in schooling (Docquier and Rapoport, 2012). There is also evidence of some negative effects of migration due to parental absenteeism, such as school drop-outs and child labour employment (Hanson and Woodruff, 2003; Hildebrandt et al., 2005; McKenzie and Rapoport, 2011).

The impact of migration on the health status of family members left behind has received less attention. The main contributions investigate the influence of migration on child health outcomes (Kanaiaupuni and Donato, 1999; Frank and Hummer, 2002; Hildebrandt et al., 2005). Only a few studies analysed

[1] The term "remittances" indicates the money and goods that are transmitted to households by migrants working outside of their origin communities, either in urban areas or abroad (Adams Jr, 2011). Remittances can be sent through either formal or informal channels. Formal channels include money transfer services offered by banks, post office banks, non-bank financial institutions, foreign exchange bureaus, and money transfer operators (MTOs), e.g. Western Union and MoneyGram. Informal remittances are defined as money transfers that do not involve formal contracts and thus, are unlikely to be recorded in national accounts. Cash transfers occurring through personal relationships, or carried out by unofficial courier companies, friends or relatives are the most common forms of informal remittances (Freund and Spatafora, 2008).

[2] Aggregate data for Peru confirm the trends registered at the global level. The amount of remittance inflows from abroad reported in 2013 represents the 1.3% of GDP (Migration and Remittances Team, 2014)

the effects of migration and remittances on health inputs, i.e. expenditures for health services provision (preventive and curative), family planning activities, drugs, etc. Contrasting evidence has emerged by two studies investigating the effects of migration on consumption patterns of Mexican households. Amuedo-Dorantes and Pozo (2011) observe that the sensitivity of household healthcare expenditures to variations in the level of international remittances is almost three times greater than their sensitivity to changes in other sources of income. On the contrary, Mora and Taylor (2006) observe larger marginal health budget shares for rural households receiving domestic transfers, while no significant difference is noticed for families receiving international remittances. Such divergence is probably due to the characteristics of the migratory phenomena considered. Indeed, the migration flows analysed in the second study are mostly characterized by low-skilled temporary migrants from rural areas with different migration perspectives with respect to those migrating from urban areas. Although heterogeneous in magnitude, positive evidence of the impact of migrant transfers on health expenditure has been verified in other contexts too. Adams and Cuecuecha (2010, 2013) report an increase in health marginal budget shares both for internal and international remittance receiving households (RRHs) in Ghana and Guatemala.

This paper investigates the impact of international remittances on the consumption of healthcare services. It overcomes some methodological limitations of the previously mentioned studies related to the functional form adopted to model consumption behaviour. In addition, we aim to assess whether the observed healthcare consumption preferences reflect a choice of investing in human capital or a response to health shocks. A larger investment in human capital may be triggered by several interrelated factors linked to migration, which modify the household decision-making process and consequently the resource allocation outcomes: changes in income composition due to remittance inflows, migrants' influence on income allocation decisions, existence of a sort of commitment to address resources coming from remittances towards specific consumption items, transmission of knowledge and good practices by migrants to sending families. On the other hand, an increase in health spending can be caused by health shocks affecting members left behind (Ambrosius and Cuecuecha, 2013). In the occurrence of a negative shock, remittances may constitute an *ex-post* coping strategy to reduce the adverse consequences. Therefore, reverse causality problems may occur in the two-way relationship between the migrant decision to send transfers at home and the healthcare consumption choices of relatives left behind. In order to disentangle these two effects, we consider whether households report a recent health shock or not and we test if consumption preferences react to the shock differently according to household remittance status. Moreover, we conduct separate estimations for households experiencing a health shock and not.

In order to deal with the fragmentation of medical care provision by the health supply sector in Peru, we consider the total amount of health consumption instead of direct expenditures only, as it has been done in all the studies mentioned above. Indeed, households may have access to healthcare through other channels besides out-of-pocket outlays, and this element cannot be detected considering only direct expenditures. In this way, we also take notice of households getting access to medical care by expenditures covered by public or private insurance, donations, or other informal channels. Therefore, we are able to identify whether receiving income from migrants widens the overall level of medical care consumption.

The identification of the link between remittance income and health demand is obtained by comparing the consumption behaviour patterns of transnational and national households. In order to do that we estimate an Almost Ideal Demand System (AIDS) using data from the "Peruvian National Survey of Households" of 2011. We find that RRHs allocate more resources to healthcare consumption than no remittance receiving households (NRRHs) and this outcome is robust to a potential reverse causality bias due to the occurrence of a health shock. Therefore, our results confirm the positive role of international remittances in fostering human capital investment.

The next sections are organized as follows. Section 2 presents an overview of theoretical and empirical studies investigating the impact of migration on health status of sending households. The main empirical challenges faced in the estimation of the net effect of remittances on health consumption are outlined. Section 3 presents the Peruvian context, identifying how remittance may contribute to improve household healthcare access. Dataset characteristics and some descriptive statistics are introduced in Section 4. Section 5 describes the empirical strategy pursued in our estimation and, finally, Section 6 presents and comments the main findings.

2. Migration and health status of those staying behind

Several studies have tried to identify the net impact of migration on health outputs, considering both the direct income effects provided by remittances and the direct and indirect costs of migration. The mechanisms through which potential improved economic conditions due to migrant transfers may enhance health outcomes are various (Deaton and Paxson, 1998; Case et al., 2002; Fletcher and Wolfe, 2014). Individuals in better socio-economic conditions experience lower exposure to communicable diseases, risky behaviours and sedentary lifestyles. Heterogeneity in the access to healthcare, knowledge about good health practices, and intergenerational transmissions of healthy behaviours are other commonly used arguments to explain reported differences in health status across

income groups (Smith, 1999). Hildebrandt et al. (2005), Kanaiaupuni and Donato (1999), Frank and Hummer (2002) test the various effects of parental migration to US on child health in Mexico, measured in terms of infant mortality, birth weight, undernutrition and anthropometric outcomes. The receipt of remittances is significantly and negatively associated with the odds of low birth weight (Frank and Hummer, 2002). On the other side, the absenteeism of a family member worsens some of the outcomes observed for children left behind, as it weakens caregiver attention and disrupts the division of labour within the household. Such drawbacks tend to shrink over time as migrants accumulate experience and households adapt to their absence (Kanaiaupuni and Donato, 1999). A further channel through which migration to US affects health preferences of sending households is the transfer of health knowledge. The awareness about healthcare practices and lifestyle behaviours accumulated by migrants guides relatives' decisions in terms of both preventive and curative medical care consumption, and improves the effectiveness of the healthcare provided. Knowledge flows generate spillover effects also on non-migrant households, inducing an additional contribution in terms of "social remittances" (Hildebrandt et al., 2005; Lindstrom and Muñoz-Franco, 2005).

Few contributions have investigated the impact of migration on health inputs, analysing the link between the amount of remittance income received and healthcare expenditures, or comparing the spending behaviour of RRHs with similar NRRHs. Household decisions in terms of healthcare consumption may be directly affected by remittances: if the additional resources provided by transfers overcome the income reduction due to a lower number of wage earners, household liquidity constraints are relaxed. The increase in income may stimulate RRHs to allocate more resources to medical care expenditures, fostering the access to healthcare and increasing the quality of services accessed. Such effect has been verified in several contexts. Amuedo-Dorantes and Pozo (2011) test whether and to what extent remittances contribute to the purchase of healthcare services in Mexican households. Medical care outlays seem to rise with the amount of income transfers from abroad, and the responsiveness of healthcare expenditure to remittance income is greater than its responsiveness to other sources of income. (Amuedo-Dorantes et al., 2007; Amuedo-Dorantes and Pozo, 2011).

Other studies have identified a positive effect of migrant transfers on health expenditures, examining the differences in consumption patterns between RRHs and NRRHs using the Working-Leser model[3]. Adams and Cuecuecha (2010, 2013) identify a slight increase in health marginal budget share for both internal and international RRHs in Guatemala and Ghana. Castaldo and Reilly (2007) use a

[3] The Working-Leser (W-L) (1943, 1963) model relates budget shares linearly to the logarithm of total household expenditure. The estimation of the W-L model is carried out using Ordinary Least Squares (OLS), separately estimating each equation of the demand system. The OLS coefficients and the average budget shares are used to calculate the marginal budget shares and the expenditure elasticity of good i.

similar specification to describe consumption patterns of Albanian families. The findings show significant and positive effects of external remittances on household health expenditures, while no relevant differences emerge between households receiving domestic transfers and NRRHs. Tabuga (2007) investigates the general relationship between remittances and household consumption patterns in the Philippines underlying that the model does not perform well in explaining the decision-making process determining budget shares allocated to medical care[4].

However, these studies have some limitations. Firstly, those estimating a demand system use a specification which is linear in expenditure[5,] assuming constant marginal budget shares with respect to the level of prices and total expenditure (Pollak and Wales, 1995). An exception is the study by Mora and Taylor (2006) who adopt a locally flexible functional form[6] as the Almost Ideal Demand System (AIDS) by Deaton and Muellbauer (1980b) to estimate the impact of migration on the expenditure patterns of rural Mexican households. The linearity assumption has often been contradicted by empirical analyses as inconsistent with the predictions of the Engel law (Barnett and Serletis, 2008). Figure 1 and 2 in the Appendix confirm that the consumption shares addressed to health and food do not vary linearly along with total consumption in our sample either. Recognizing a non-linear relationship of total consumption with budget shares, we estimate a demand system using the AIDS specification. The AIDS belongs to a class of demand systems called price-independent generalized logarithmic (PIGLOG), which assumes budget shares being linear in the logarithm of total expenditure[7].

A second limitation of the early mentioned contributions is that they do not verify whether the re-allocation of resources from remittances to health expenditures reflects a shift in migrant household preferences towards human capital investment or it constitutes a response to health shocks, that create demand for alternative financial sources by liquidity-constrained households. This would be in line with the predictions of the New Economics of Labor Migration theory which identifies international migration as a household strategy to reduce vulnerability to negative shocks through income diversification. Ambrosius and Cuecuecha (2013) test this hypothesis comparing the impact of health-related shocks on debt levels between national and transnational households in Mexico. They report no effect of the shocks on the debt-burden of RRHs, while the average debt burden is doubled for

[4] The measures of goodness-of-fit reported, i.e. Pseudo R-squared and Adjusted R-squared, are very low.
[5] In addition to Working-Leser model, Rotterdam model and Linear Translog models belong to this category of systems.
[6] A demand system is composed by flexible functional form equations if it is capable to provide a second order approximation to the behaviour of any theoretically plausible demand system at a point in the price-expenditure space (Pollak and Wales, 1995).
[7] AIDS is a complex demand system with several desirable properties: it satisfies the aggregation restriction, and with simple parametric restrictions, homogeneity and symmetry.

NRRHs. In order to assess whether the health consumption behaviour observed corresponds to a variation of household preferences or a reaction to shocks, we conduct further estimation. In particular, we investigate if consumption choices react differently to health shocks according to household remittance status, confirming the idea of remittances as insurance against negatives episodes. Moreover, we run separate estimations for households recently experiencing a health shock and not, to see whether the positive effect of transfers persists even in absence of a shock, reflecting an increased investment in preventive healthcare.

3. Access to healthcare in Peru

In order to figure out how remittances may contribute to raise health consumption, facilitating the access to healthcare and improving the quality of the health services accessed, some features of the Peruvian healthcare system need to be pinpointed. Although some efforts to integrate the health sector supply side have been done since the early 2000s, it continues to be fragmented among various providers belonging to both public and private sector. Public health providers are the Ministry of Health, the regional governments, the social security health insurance institution under the Ministry of Labour (EsSalud) and the police, army, air force, and navy health funds. Each of this institution provides healthcare to specific population subgroups, through heterogeneous source of fundings. EsSalud guarantees health insurance to formal employees and their families and is financed by payroll contributions. The Ministry of Health and the regional governments co-manage the Comprehensive Health Insurance Scheme (Seguro Integral de Salud—SIS), which ensures access to health services for workers in the informal sector and the poor, and it is subsidised directly by the Minister. The private health sector includes private providers and insurance companies, nonprofit entities, private medical doctors and other health professionals, as well as suppliers of traditional or indigenous medicine. Users of private sector services can access to them throught out-of-pocket outlays, private insurance coverage, or even donations (Vermeersch et al, 2014).

The Universal Health Insurance Law of 2009 created a regulatory framework to achieve universal health coverage, promoting coordinated institutional efforts between previously mentioned actors. However, the affiliation to different health insurance programmes corresponds to heterogeneous ranges of available services and access costs. Moreover, actual availability of services at the local level, waiting time and low quality of public provision may induce patients to get access to healthcare through more than one channel contemporaneously, and overlapping different paying systems to cover healthcare costs (Maeda et al., 2014).

Therefore considering only direct expenditure, as most of the studies presented above do, could be misleading. Services supplied by the public sector are not covered by out-of-pocket outlays and the price charged to the households may vary according to the provider and the type of insurance policy. Thus, a consumption variable is built up considering in addition to out-of-pocket outlays (both direct expenditures and outlays for private insurance), all the expenditures covered by public insurance or any other public institutions, private institutions, members of other households, or other informal channels. These expenditure items are calculated asking the respondents to impute the value of services consumed at market prices. Analogously to what is done for the health item, the annual amount of total consumption is computed for each consumption category.

Remittances may help to get quicker and higher standard access to diagnostic and curative services, and support the direct and indirect costs of therapies in case of lack of insurance coverage. On the other hand, this source of money can be addressed to preventive healthcare, immunization or pregnancy care. Nevertheless, remittances may be used to pay health insurance premia, preventing for future health shock risk exposure. International migration out of Peru is essentially a labour migration phenomenon, prompted by the will to improve the standards of living of both migrants themselves and relatives left behind. The vast majority of Peruvian migrants send money home on a regular basis and long after having left the country pitching in to current expenditures, covering children education fees and investing in house construction (International Organization of Migration, 2012). The nature of the phenomena corresponds to the understanding of migration as a household level investment decision to improve well-being in the medium and long run. Therefore, investing in human capital through preventive healthcare consumption may constitute a priority for RRHs. Household members left behind could be incentivized to address resources sent by migrants to health investment by the commitment to an intra-household informal agreement on remittance use.

4. Data and descriptive statistics

The data used in this analysis are retrieved from the "Peruvian National Survey of Households" of 2011 (*ENAHO - Metodologia Actualizada - Condiciones de vida y pobreza*), conducted by the "Peruvian National Institute of Statistics and Informatics" (INEI). The ENAHO is a yearly survey, nationally representative, and it collects information on dwellings, household expenditures and income, and on demographic, education, health and employment status of each household member. The sample consists of about 24700 observations.

As regards migration and remittance status, the survey provides details on the frequency with which

households receive international remittances, the annual amount of transfers received, and the absence of any household member[8]. RRHs represent 2.10 per cent of the sample. The annual amount of remittances received is 5360 Nuevo Soles[9]. Table 1 summarizes descriptive statistics according to household remittance status. RRHs are non-poor (90%), mostly living on the Coast or in Lima (78%), and settled in urban areas (90.73%). About 55 per cent of the household heads have completed at least the secondary level of education, compared to less than 40 per cent for NRRs. Household head average age is higher in transnational families. Almost 70 per cent of them has more than 50 years, compared to 50 per cent in the other group. The percentage of female household heads is larger than among NRRHs. RRHs report a remarkably higher average total consumption. As regards self-reported health status, transnational families are more likely to have a member experiencing chronic discomfort and a member who have been recently affected by a health shock. As a proxy for the occurrence of a health shock we consider reporting an episode of hospitalization in the 12 months before the survey.

The average annual healthcare consumption varies from 1192 Nuevo Soles in Sierra regions to 2801 Nuevo Soles in the Metropolitan area of Lima. Families headed by a woman seem to demand for medical care less than families with a male household head. The level of healthcare consumption reported when the household head is highly educated is significantly higher. Summary descriptive statistics in Table 2 (panel A) show that RRHs tend to spend more for healthcare, both in terms of direct expenditures and regarding outlays covered by public or private institutions and by members of other households. In particular, we observe that out-of-pocket outlays and expenditures covered by public institutions are more than double for RRHs, while the amount of expenditures covered by private insurances or by members of other households are more than three times larger than that reported by NRRHs. Table 2 (panel B) presents the average consumption shares for the consumption categories included in the demand system by remittance status. Relevant divergences in consumption allocation emerge between the two groups: RRHs report higher consumption shares for health, education, housing and transports, while smaller budget shares are observed for food and clothes.

In line with what emerged in Table 1, these differences could simply reflect different geographical locations and overall economic status of the two household groups. Thus, in order to identify a specific tendency to address resources from transfers towards human capital investment, it is necessary to disentangle the overall income effect from the remittance effect. As Table 3 shows, divergences in the level of the health consumption shares are reported not only between RRHs and

[8] A member is considered "absent" if it is absent from the household for 30 days or more.
[9] Official exchange rate (Nuevo Soles per US dollars, yearly average 2011) is 2.75; International Monetary Fund, International Financial Statistics.

NRRHs, but also between the two groups in the same income quartile. Since the share of medical care outlays is larger for RRHs across all income quartiles, a specific contribution of migrant transfers to healthcare funding could be hypothesized.

Table 1 - Descriptive statistics by remittance-receiving status of households.

	Remittance-Receiving Households (RRHs)	**Other households (NRRHs)**
Household composition (%)		
Household size	4.00	3.98
Number of children	0.92	1.16
Number of elderly	0.58	0.34
Poverty status (%)		
Extremely Poor	0.19	7.21
Poor	4.83	19.85
No poor	94.98	72.94
Geographical area (%)		
Costa	38.42	27.44
Sierra	40.42	12.55
Selva	9.65	21.09
Lima	39.38	11.05
Urban	90.73	60.05
Education household head (%)		
No education	17.76	29.31
Primary education	25.87	30.47
Secondary education	35.14	25.53
High school or more	21,24	14,41
Gender household head (%)		
Female	38.80	23.44
Age of the household head (%)		
0-49	30.50	49.03
50-69	44.02	36.56
70 +	25.48	14.41
Total consumption (nuevo soles)	33,607	19,976
Rented House (%)	8.11	7.12
Member with chronic discomfort (%)	87.45	74.64
Member hospitalised in the last 12 months (%)	27.41	17.87

Source: Author's calculation on the 2011 Peruvian National Survey of Households (*ENAHO - Metodologia Actualizada - Condiciones de vida y pobreza)*

Table 2 – Healthcare consumption and average consumption shares by remittance-receiving status of households.

	RRHs	NRRHs	Test of means (*)
Panel A: Healthcare consumption (Nuevo Soles)			
Healthcare consumption (direct expenditure)	2017	927	-11.99***
Healthcare consumption (covered by public insurance or institutions)	1113	531	-6.77***
Healthcare consumption (covered by private institutions or members of other households)	730	203	-10.12***
Panel B: Average consumption shares			
Health	.098	.072	-6.85***
Food	.398	.508	16.52***
Education	.070	.053	-6.53***
Clothing	.043	.051	3.91***
Housing	.221	.180	-9.56***
Transports	.112	.082	-9.99***
Other	.058	.054	-2.09**
Total	1.000	1.000	

Notes: Test of means for remittance status, significant at 0.01 (***), 0.05 (**), 0.1 (*).
Source: Author's calculation on the 2011 Peruvian National Survey of Households (*ENAHO - Metodologia Actualizada - Condiciones de vida y pobreza)*

Table 3 - Household healthcare consumption shares by income quartile and remittance-receving status.

	1st quartile	2nd quartile	3rd quartile	4th quartile	Total
RRHs	0.08	0.08	0.10	0.10	0.10
NRRHs	0.05	0.06	0.07	0.09	0.07

Source: Author's calculation on the 2011 Peruvian National Survey of Households (*ENAHO - Metodologia Actualizada - Condiciones de vida y pobreza)*

5. Empirical strategy

5.1 Identification

As mentioned above, there are various sources of endogeneity in the relationship between remittance status and consumption decisions. Firstly, RRHs may differ from NRRHs for unobserved characteristics (e.g. skills, ability, motivation of migrant members, propensity to risk, previous migratory experiences), which may affect both the decision to send a migrant abroad and household preferences in terms of consumption allocation, giving rise to self-selection issues. Moreover, there exists a reverse causality concern in the two-way relationship between the decision of sending money back and the health conditions of members left behind. An individual may decide to migrate and send remittances because a household member suffers from bad health conditions, while at the same time remittances may foster health investment by loosening liquidity constraints.

Following previous contributions[10], we use an instrumental variable technique (IV) to overcome these potential sources of bias. The choice of the instruments is driven by the idea that migration networks, together with cultural, community or political factors of the area of origin influence the probability to migrate and remit, but not the consumption decisions of the households. The argument sustaining this criterion is that past migration facilitates present migration, as a larger network of migrants provides contacts, information and logistic support for new migrants. Moreover, international migration is more likely to be undertaken when people get in touch with successful experiences reported by neighbours or acquaintances. Since recent Peruvian migration history is mostly characterized by labour migration and remittance patterns seem to be very selective at the geographical level, historical migration and remittance flows at the local level may represent suitable instruments. Therefore, we include the historical migration rates at the departmental level (1995-2005)[11] and the remittance rate at the provincial level in 2007[12] in the first-stage regression. The choice of the time spells for the instruments is partly driven by data constraints but it also complies with the historical trends of Peruvian migration. Indeed, until the second half of the 1990s, international migration involved exclusively an élite of the urban population in Lima. The economic crisis caused by the escalation of the civil war acted as a push-factor for labour out-migration for all social groups, especially middle class young people (International Organization of Migration, 2012). Thus, a surge in the outflows occurred at the end of the 1990s, while they became flatter after 2006[13].

[10] Hanson and Woodruff (2003), Hildebrandt and McKenzie (2005), McKenzie and Rapoport (2011) all employ historical migration rates as instruments for current migration.
[11] See https://www.inei.gob.pe/estadisticas.
[12] The remittance rate at the province level is obtained from the 2007 wave of the ENAHO survey.
[13] See http://webinei.inei.gob.pe:8080/sirtod-series/.

As it is shown in the next section, the coefficients of the first-stage regressions are significant and have the expected signs, confirming the validity of the instruments selected.

To ensure the validity of the exclusion restriction, these historical rates should not affect household health consumption behaviour apart from their influence through current migration. A potential threat to this assumption is that previous migration may have boosted economic development, with positive consequences on health infrastructure development. Indeed, sizeable remittance inflows, return migration or transmission of knowledge from migrants to those left behind may have provided resources to potentiate the supply of health facilities and increased the demand for higher quality services. As such, the historical migration rate in a province could be positively correlated with the current level of health infrastructure in that same area. To deal with this possibility, we control for two proxies of geographical variation in health supply: the number of hospitals per 1000 population at the provincial level and a dummy for the presence of healthcare establishments in the district. The data on available healthcare supply at the local level are retrieved from *El Registro Nacional de Municipalidades* (2008)[14]. After adding these controls, historical remittance rates still remain strong instruments, while none of controls are individually significant. This provides further evidence for the validity of the instruments chosen.

5.2 The model

We model household consumption behaviour using an Almost Ideal Demand System. This model overcomes the linearity assumption between budget shares and total consumption fixed by the Working-Leser demand systems. The idea inspiring the class of models to which the AIDS belongs is to define a functional form which allows to perform a second-order approximation to any direct or indirect utility function or to a cost function. Correspondingly, the demand functions, expressed in terms of budget shares, become:

$$w_{ih} = \alpha_i + \sum_j \gamma_{ij} \log p_j + \beta_i \log\left(\frac{x_h}{P_h}\right), \tag{1}$$

where P is a price index defined by

$$\log P = \alpha_0 + \sum_k \alpha_k \log p_k + \frac{1}{2}\sum_j \sum_k \gamma_{kj} \log p_k \log p_j. \tag{2}$$

[14] For more details, see http://ineidw.inei.gob.pe/ineidw.

The adding up restriction requires that $\sum_{i=1}^{n}\alpha_i = 1$, $\sum_i \beta_i = 0$, $\sum_{i=1}^{n}\gamma_{ij} = 0$. Homogeneity condition is satisfied if and only if for all j, $\sum_j \gamma_{ij} = 0$, while the symmetry condition requires that $\gamma_{ij} = \gamma_{ji}$. However, since our analysis is based on cross-sectional data, we do not have information on the time variation of prices to separately identify price elasticities. Thus, a conventional normalization for cross-sectional data is applied setting $p_i = 1$ and $\log p_i = 0$. Consequently, the consumption shares can be written in the form:

$$w_{ih} = \alpha_i + \beta_i \log x_h - \beta_i \alpha_0. \tag{3}$$

Changes in real consumption operate through the β_i coefficients: these are positive for luxuries and negative for necessity goods (Deaton and Muellbauer, 1980a, 1980b). According to this empirical framework, different specifications are implemented, extending the model to include remittance status dummies and interactions of these dummies with total consumption. Separate models are estimated to distinguish between average and marginal effects of remittances on consumption allocation. The specific forms of the estimated equations are respectively:

$$w_{ih} = \alpha_i + \beta_{1j} \log Y_h + \beta_{2i} R_h + \beta_{3i} Z_h + u_{hi}, \tag{4}$$

$$w_{ih} = \alpha_i + \beta_{1j} \log Y_h + \beta_{2i} \log(Y_h) * R_h + \beta_{3i} Z_h + u_{hi}, \tag{5}$$

where w_{ih} corresponds to the consumption share of commodity i for household h, Y_h is total consumption for household h, R_h is the remittance status and Z_h is a vector of household characteristics including both household-level and province-level variables. Such specification permits remittance status to shift the propensity to allocate available income across the different consumption categories, and the functional form holds the attractive theoretical properties of the AIDS model.

The demand system equations have been simultaneously estimated using an iterative three-stage least squares procedure (3SLS). In this way, the information contained in the cross-equation error correlations are exploited. To eliminate another potential source of endogeneity, total consumption has been instrumented by total household income and number of household members with high educational levels (Banks et al., 1997, Berloffa et al., 2006). To satisfy the adding-up restrictions required by the AIDS framework, a consumption category, that is other goods, is omitted and the estimation of those parameters is residually determined. The explanatory variables are identical for all the equations. They include variables describing household size and composition (total household

size, number of children and elderly members), in order to control for heterogeneous healthcare necessities across age groups. Characteristics of the household head, that are gender, age group and educational level, are encompassed to consider the role of education and informal knowledge in determining the demand for healthcare. The model includes also a set of 4 regional dummies (Costa, Sierra, Selva, Metropolitan area of Lima) and a rural/urban dummy to take into account heterogeneity across different areas of the country. A dummy indicating whether household dwelling is rented is considered to control for household assets.

In order to detect whether the observed health consumption behaviour corresponds to a choice of investing in preventive healthcare or a response to negative health conditions, some proxies of household members health status are included. In particular, we consider a dummy reporting the occurrence of a case of hospitalisation among family members during the 12 months before the survey, as a proxy of negative health shock, and a dummy for the presence of chronic discomforts, in order to control for permanent health conditions. A specification including the interaction between remittance status and the occurrence of the shock is performed to test if resource allocation decisions vary between the two household groups when the shock happens. As a supplementary test, we split the sample according to the hospitalization dummy and we estimate the model considering only households not reporting health shocks during the last year to verify whether the positive effect of transfers on health consumption shares is confirmed also in these circumstances.

6. Results

The second-stage equations (Equation (4)) for the demand system estimated with instrumental variables and reported in Table 4 are in line with standard consumption patterns. The food share increases with household size and for households living in rural areas but decreases with total consumption, educational level and age of the household head. For what concern the health dimension, we observe that, as expected, total consumption, number of children, number of elderly, age and education level of the household head, as well as presence of a member with chronic discomfort, all increase healthcare consumption shares. Geographical variation in health supply at the local level, instead, has no significant effect on household healthcare consumption decisions.

Focusing on the role of remittances, our results reveal significant differences in the consumption patterns of RRHs with respect to the others. Getting migrant transfers has a positive and significant average effect on the consumption shares of health and housing and a negative (and significant) effect on those of education, clothing and transports. The average effect of receiving transfers on healthcare

consumption shares is around 11 percentage points. This means that, for a level of annual total consumption of 30000 Nuevo Soles (corresponding to around 10900 $), RRHs address 1200 $ more than NRRHs to healthcare consumption. In order to assess if the size of the impact of remittances changes with the level of total consumption, the estimates of Equation (5) reported in Table A4 (Appendix) show that the marginal effect of receiving transfers is almost 1.1 percentage points. This results in an effect of remittances on healthcare consumption shares of 9.2 and 11.4 percentage points, respectively for a level of total consumption of 5000 and 35000 Nuevo Soles. Therefore, although the impact of remittances grows with the level of total consumption, the magnitude of this effect does not vary so much along the consumption distribution.

The consumption elasticities of demand for each consumption category confirm that the size of the consumption shares addressed to healthcare does not vary so much with the level of total consumption. The outcomes displayed in Table 5[15] give a measure of the propensity to redistribute additional resources towards healthcare for the two household groups as long as total consumption increases. Coherently with the elements emerged until now, the consumption elasticity of demand for healthcare is larger for RRHs with respect to NRRHs. However, the difference in the size of this elasticity is not very large: indeed, if total consumption increases by 10 per cent, healthcare consumption augments by 13.3 per cent for RRHs and by 11.8 per cent for NRRHs.

These findings present both similarities and divergences with the previously mentioned studies. The results are consistent with what observed by Adams and Cuecuecha (2010, 2013) for health and food, while they are hardly comparable with Castaldo and Reilly (2007), as the consumption categories adopted are different. Nonetheless, the evidence emerged in our estimation is conflicting with their findings showing that households receiving external remittances report higher food budget shares relative to those receiving no transfers. Undoubtedly, these divergences in the results are partly due to the fact that we consider consumption shares rather than direct expenditures only.

[15] According to the definition of elasticity and in line with the model estimated with the interaction variable, see Table 6 (Appendix A4), the consumption elasticity of good j for household i can be derived as $\eta_{ij} = (\alpha_{1j} + \bar{w}_j) * \frac{1}{\bar{w}_j} = \frac{\beta_{ij}}{\bar{w}_j} + 1$. In our case, the consumption elasticity for RRHs becomes $\eta_{ij}^R = \frac{\beta_{1j} + \beta_{2i}^R}{\bar{w}_j} + 1$. In this way we obtain the consumption elasticities of demand for RRHs and NRRHs at the same (average) level of consumption shares.

Table 4 - Almost Ideal Demand System Estimation with Instrumental Variables.

	(1) Health	(2) Food	(3) Education	(4) Clothing	(5) Housing	(6) Transports
Ln (total consumption)	0.01***	-0.13***	0.03***	0.01***	0.001	0.05***
	(0.003)	(0.004)	(0.002)	(0.001)	(0.003)	(0.002)
Receiving international remittances (dummy)	0.11***	-0.01	-0.08***	-0.07***	0.24***	-0.08***
	(0.04)	(0.06)	(0.02)	(0.02)	(0.04)	(0.03)
Household size	-0.01***	0.03***	0.002***	-0.001**	-0.02***	-0.004***
	(0.001)	(0.001)	(0.001)	(0.0004)	(0.001)	(0.001)
Number of children	0.005***	-0.01***	0.002***	0.01***	0.01***	-0.01***
	(0.001)	(0.001)	(0.001)	(0.0004)	(0.001)	(0.001)
Number of elderly	0.01***	-0.01***	-0.01***	-0.001*	0.01***	-0.004***
	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Educational level household head (Primary)	0.001	-0.01**	-0.003**	-0.001	0.01***	0.001
	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)
Educational level household head (Secondary)	-0.001	-0.02***	0.005***	-0.001	0.01***	0.01***
	(0.002)	(0.003)	(0.001)	(0.001)	(0.002)	(0.001)
Educational level household head (High School or more)	0.02***	-0.002*	0.027***	0.01***	0.03***	0.01***
	(0.002)	(0.004)	(0.002)	(0.001)	(0.003)	(0.002)
Age (group) household head 50-69	0.005***	-0.02***	-0.01***	-0.01***	0.02***	0.002**
	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)
Age (group) household head 70+	0.01***	-0.04***	-0.004**	-0.01***	0.04***	0.001
	(0.002)	(0.004)	(0.002)	(0.001)	(0.003)	(0.002)
Urban	-0.01***	-0.02***	-0.004***	-0.01***	0.05***	-0.005***
	(0.002)	(0.003)	(0.001)	(0.001)	(0.002)	(0.001)
Geographical area - Sierra	0.003*	-0.01***	0.01***	0.01***	-0.01***	0.002*
	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)
Geographical area - Selva	0.001	0.02***	-0.01***	-0.002**	-0.005***	-0.002
	(0.002)	(0.003)	(0.001)	(0.001)	(0.002)	(0.001)

Geographical area - Lima	-0.01**	0.01**	0.01***	-0.01***	0.01***	0.01***
	(0.003)	(0.004)	(0.002)	(0.002)	(0.003)	(0.002)
Absent member (dummy)	-0.01***	0.05***	-0.001	-0.01***	-0.014***	-0.01***
	(0.002)	(0.003)	(0.002)	(0.001)	(0.003)	(0.002)
Rent (dummy)	0.001	0.01***	0.001	0.004***	-0.01***	-0.001
	(0.002)	(0.003)	(0.001)	(0.001)	(0.002)	(0.002)
Chronic discomfort (dummy)	0.02***	-0.01***	-0.002**	-0.003***	-0.004***	-0.003***
	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Hospitalization (dummy)	0.07***	-0.03***	-0.01***	-0.002**	-0.01***	-0.01***
	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)
Gender household head	-0.003*	-0.02***	0.01***	0.005***	0.005***	0.001
	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Hospitals per 1000 population	-0.001	0.003	0.003**	-0.002**	0.002	-0.001
	(0.002)	(0.003)	(0.001)	(0.001)	(0.002)	(0.001)
Healthcare district (dummy)	-0.001	0.004	0.0003	-0.002***	0.002	-0.003***
	(0.002)	(0.003)	(0.001)	(0.001)	(0.002)	(0.001)
Constant	-0.08***	1.71***	-0.27***	-0.01	0.18***	-0.36***
	(0.02)	(0.03)	(0.01)	(0.01)	(0.02)	(0.02)
Observations	24,760	24,760	24,760	24,760	24,760	24,760
R-squared	0.15	0.33	0.16	0.04	0.15	0.18

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses. Reference category for education level of the household head: no education. Reference category for age group of the household head: no education:15-49. Reference category for geographical area: Costa.

As suggested by the first-stage regression in Table A2 (Appendix), the occurrence of a health shock among household members, proxied by a reported case of hospitalization during the previous 12 months, has a positive and statistically significant effect on the probability of receiving remittances. This may imply that the additional resources coming from migrant transfers and addressed to healthcare constitute a coping strategy against health shocks rather than a choice of human capital investment. In order to distinguish between these two interpretations, Table 6 reports the outcomes of the health demand equation estimation across different specifications (Columns 4 - 6).

Column 4 shows the results of the model including an interaction term between the occurrence of a health shock and the remittance status. Similarly to what observed in the other specifications, RRHs address more resources to health in general. As expected, healthcare consumption increases for both household groups in case of shock. However, the interaction term between remittance status and the shock dummy is negative, indicating that in case of a health shock the two groups of households report the same level of healthcare consumption and the overall positive effect of remittances on healthcare consumption share is nullified. Coherently with what observed by Ambrosius and Cuecuecha (2013), the full results for this last specification (see Table A5 – Appendix) suggest that RRHs use migrant transfers to cope with the additional healthcare consumption related to the shock, while NRRHs resort to other sources to cover these outlays. Therefore, remittances provide an insurance instrument to cope with the indirect costs of a negative health shock, supporting liquidity-constrained families and preventing them from reducing the amount of resources addressed to other consumption categories.

As a robustness check, we estimate separate models for households experiencing a health shock or not. We observe that the positive effect of remittances on health consumption shares is confirmed also for the subsample of households not experiencing any shock, with even a larger average effect than the one estimated in the original specification (from 11 to 16.8 percentage points - see Table 6, Column 2 and 5). Thus, not controlling for the occurrence of a health shock gives rise to a downward bias in the estimation of the impact of remittances. These findings provide further support to the idea that the higher health consumption levels reported by RRHs are mostly driven by purchases of preventive medical care services rather than extraordinary outlays due to unexpected adverse health conditions.

Table 5 - Consumption Elasticities derived from the Almost Ideal Demand System estimation.

	(1) Health	(2) Food	(3) Education	(4) Clothes	(5) Housing	(6) Transports
Consumption Elasticity (receiving international remittance=1)	1.33	0.74	1.45	1.02	1.13	1.50
Consumption Elasticity (receiving international remittance=0)	1.18	0.75	1.60	1.16	0.10	1.59

Table 6 - Almost Ideal Demand System Estimation – Selected variables in Health Demand Equations for different specifications of the model and estimation methods.

	(1) Full sample	(2) Full sample	(3) Full sample	(4) Full sample	(5) Health shock=0	(6) Health shock=1
Remittance status	Exogenous	Endogenous (IV)	Endogenous (IV)	Endogenous (IV)	Endogenous (IV)	Endogenous (IV)
Ln (total consumption)	0.02***	0.01***	0.01***	0.01***	0.01***	0.02***
	(0.002)	(0.003)	(0.003)	(0.002)	(0.003)	(0.01)
Remittances	0.001	0.11***		0.17***	0.20***	-0.08
	(0.004)	(0.04)		(0.05)	(0.05)	(0.07)
Remittances*Ln(total consumption)			0.01***			
			(0.004)			
Health shock				0.08***		
				(0.002)		
Remittances*Health shock				-0.18***		
				(0.05)		
Observations	24,760	24,760	24,760	24,760	20,285	4,475
R-squared	0.18	0.15	0.15	0.13	0.11	-0.01

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses.

7. Conclusions

The paper provides some important insights into the impact of remittances on human capital investments of households left behind, with particular attention to healthcare consumption. The main aim of the paper is to examine whether households receiving transfers from migrants abroad devote more resources to healthcare. However, since experiencing a negative health shock might increase the likelihood of obtaining remittances and using them to cope with the shock, we need to test whether a higher healthcare consumption reflects a genuine choice of investing more in human capital or it simply responds to a negative health shock.

The study tests if the consumption behaviour of remittance receiving households (RRHs) differs from that of no remittance receiving households (NRRHs), utilizing data from the "Peruvian National Survey of Households" of 2011. In particular, we estimate an Almost Ideal Demand System (AIDS) for seven consumption categories: health, food, education, clothes, housing, transports and other goods. Three-stage least squares techniques have been implemented in order to overcome some common methodological issues presented by this kind of studies. Geographical variation in the historical migration and remittance rates has been exploited to instrument household remittance status and deal with the selectivity issues concerning the probability of receiving remittances.

Our findings reveal that receiving transfers from migrants abroad has a significant impact on household consumption decisions. Notably, transnational transfers seem to reshape household demand not only through an overall income effect, but by shifting household preferences in favour of higher human and real capital investments (healthcare and housing), with corresponding lower consumption of non-durable goods (food and clothing). However, as the New Economics of Labour Migration claims, this shift in household allocation decisions may be related to the adoption of international migration as a coping strategy to deal with negative health shocks. Our analysis, although confirming that households experiencing a shock are more likely to receive transfers from abroad, it also shows that the propensity to allocate additional resources to healthcare is not directly related to the occurrence of a negative health shock. In fact, we find a positive impact of remittances on healthcare consumption only for those households who do not experience a shock.

Such evidence confirms that the healthcare consumption behaviour of RRHs responds to a specific choice of investing in human capital through the acquisition of preventive medical care. This choice could be

driven by several aspects related to migration which we do not separately identify in our analysis, i.e. changes in income composition due to remittance inflows, role of migrants in determining income allocation decisions, intra-household informal agreements about the intended use of these resources. Anyway, our estimates highlight the important role of migrant transfers in enhancing health investments of members left behind, with positive implications for their long-term health status.

References

Acosta, P. A., P. Fajnzylber, and H. Lopez, (2007). *The impact of remittances on poverty and human capital: evidence from Latin American household surveys* (World Bank Policy Research Working Paper, no. 4247). Retrieved from SSRN: http://ssrn.com/abstract=992396.

Adams Jr, R. H. (2011). Evaluating the economic impact of international remittances on developing countries using household surveys: a literature review. *Journal of Development Studies*, 47, 809–828. doi: 10.1080/00220388.2011.563299.

Adams, R. H., and A. Cuecuecha (2010). Remittances, household expenditure and investment in Guatemala. *World Development*, 38, 1626–1641. doi:10.1016/j.worlddev.2010.03.003.

Adams, R. H., and A. Cuecuecha (2013). The impact of remittances on investment and poverty in Ghana. *World Development*, 50, 24–40. doi:10.1016/j.worlddev.2013.04.009.

Ambrosius, C., and A. Cuecuecha (2013). Are remittances a substitute for credit? Carrying the financial burden of health shocks in national and transnational households. *World Development*, 46, 143–152. doi:10.1016/j.worlddev.2013.01.032.

Amuedo-Dorantes, C., and S. Pozo (2011). New evidence on the role of remittances on healthcare expenditures by Mexican households. *Review of Economics of the Household*, 9, 69–98. doi:10.1007/s11150-009-9080-7.

Amuedo-Dorantes, C., T. Sainz, and S. Pozo (2007). *Remittances and healthcare expenditure patterns of populations in origin communities: evidence from Mexico* (Working Paper INTAL – ITD No. 25). Retrived from Inter-American Development Bank: https://publications.iadb.org/handle/11319/2620.

Banks, J., R. Blundell, and A. Lewbel (1997). Quadratic Engel curves and consumer demand. *Review of Economics and Statistics*, 79, 527–539. doi: 10.1162/003465397557015.

Barnett, W.A., and A. Serletis (2008). Consumer preferences and demand systems. *Journal of Econometrics*, 147, 210–224. doi:10.1016/j.jeconom.2008.09.009.

Berloffa, G., A. Brugiavini, and D. Rizzi (2006). *Health, welfare and inequality* (University Ca'Foscari of Venice, Dept. of Economics Research Paper Series no. 41/06). Available at SSRN: http://ssrn.com/abstract=948376.

Case, A., D. Lubotsky, and C. Paxson (2002). Economic status and health in childhood: the origins of the gradient. *American Economic Review*, 92, 1308–1334. doi:10.1257/000282802762024520.

Castaldo, A., and B. Reilly (2007). Do migrant remittances affect the consumption patterns of albanian households? *South-Eastern Europe Journal of Economics*, 1, 25–54. Retrieved from: https://ojs.lib.uom.gr/index.php/seeje/article/view/5570.

Clemens, M. A., Ç. Özden, and H. Rapoport (2014). Migration and development research is moving far beyond remittances. *World Development*, 64, 121–124. doi:10.1016/j.worlddev.2014.09.009.

Cox Edwards, A., and M. Ureta (2003). International migration, remittances, and schooling: evidence from El Salvador. *Journal of development economics*, 72, 429–461. doi: 10.1016/S0304-3878(03)00115-9.

Deaton, A. S., and C. Paxson (1998). Health, income, and inequality over the life cycle. In D. A. Wise (Ed.), *Frontiers in the Economics of Aging*, (pp. 431–462). Chicago, IL: University of Chicago Press.

Deaton, A., and J. Muellbauer (1980a). An almost ideal demand system. *The American economic review*, 70, 312-326. Retrieved from: http://www.jstor.org/stable/1805222.

Deaton, A., and J. Muellbauer (1980b). *Economics and consumer behavior*. Cambridge: Cambridge University Press.

de Haas, H., and F. Rodríguez (2010). Mobility and human development: introduction. *Journal of Human Development and Capabilities*, 11, 177-184. doi:10.1080/19452821003696798.

Docquier, F., and H. Rapoport (2012). Globalization, brain drain, and development. *Journal of Economic Literature*, 50, 681–730. doi**:** 10.1257/jel.50.3.681.

Fletcher, J., and B. Wolfe (2014). Increasing our understanding of the health-income gradient in children. *Health economics*, 23, 473–486. doi: 10.1002/hec.2969.

Frank, R., and R. A. Hummer (2002). The other side of the paradox: The risk of low birth weight among infants of migrant and nonmigrant households within Mexico. *International Migration Review*, 36(3):746–765. doi: 10.1111/j.1747-7379.2002.tb00103.x.

Freund, C., and N. Spatafora (2008). Remittances, transaction costs, and informality. *Journal of Development Economics*, 86, 356–366. doi:10.1016/j.jdeveco.2007.09.002.

Hanson, G. H., and C. Woodruff (2003). Emigration and educational attainment in Mexico. Mimeo., *University of California at San Diego*. Retrieved from Child Migration: http://www.childmigration.net/files/Hanson_2003.pdf.

Hildebrandt, N., D. J. McKenzie, G. Esquivel, and E. Schargrodsky (2005). The effects of migration on child health in Mexico [with comments]. *Economia*, 6, 257-289. Retrieved from http://www.jstor.org/stable/20065490.

Kanaiaupuni, S. M., and K. M. Donato (1999). Migradollars and mortality: The effects of migration on infant survival in Mexico. *Demography*, 36, 339–353. doi: 10.2307/2648057.

Lindstrom, D. P., and E. Muñoz-Franco (2005). Migration and the diffusion of modern contraceptive knowledge and use in rural Guatemala. *Studies in family planning*, 36, 277- 288. doi: 10.1111/j.1728-4465.2005.00070.x.

Maeda, A., E. Araujo, C. Cashin, J. Harris, N. Ikegami, and M.R. Reich (2014). Universal health coverage for inclusive and sustainable development: a synthesis of 11 country case studies. Washington, DC: World Bank Group.

McKenzie, D., and H. Rapoport (2011). Can migration reduce educational attainment? Evidence from Mexico. Journal of Population Economics, 24, 1331–1358. doi:10.1007/s00148-010-0316-x.

Migration and Remittances Team, D. P. G. (2014). Migration and Remittances: Recent Developments and Outlook (World Bank Migration and development brief No.23). Retrieved from World Bank: http://www.worldbank.org/en/topic/migrationremittancesdiasporaissues/brief/migration-and-remittances-publications.

Mora, J., and J.E. Taylor (2006). *Does migration reshape expenditures in rural households? Evidence from Mexico* (World Bank Policy Research Working Paper No. 3842). Retrieved from SSRN:

http://ssrn.com/abstract=922968.

Organización Internacional para las Migraciones - OIM (2012). Perfil Migratorio del Perú 2012. Disponible en: http://publications.iom.int/books/perfil-migratorio-del-peru-2012.

Pollak, R. A., T. J. Wales, and C.K. Ranney (1995). Demand system specification and estimation. *Journal of Consumer Affairs*, 29, 283-285. Retrived from: http://www.jstor.org/stable/23859260.

Randazzo, T., and M. Piracha (2014). *Remittances and household expenditure behaviour in Senegal* (IZA Discussion Paper No. 8106). Retrived from SSRN: http://ssrn.com/abstract=2426860.

Salas, V. B. (2014). International Remittances and Human Capital Formation. *World Development,* 59, 224–237. doi: 10.1016/j.worlddev.2014.01.035.

Smith, J. P. (1999). Healthy bodies and thick wallets: the dual relation between health and economic status. *The Journal of Economic Perspectives: a journal of the American Economic Association*, 13(2), 144-166. doi: 10.1257/jep.13.2.145.

Tabuga, A. D. (2007). *International remittances and household expenditures: The Philippine case*. (Philippine Institute for Development Studies Discussion Paper Series No. 2007-18). Retrived from SABER: http://saber.eaber.org/sites/default/files/documents/PIDS_Tabuga_2007.pdf.

Taylor, J. E., and A. López-Feldman (2010). Does migration make rural households more productive? Evidence from Mexico. *The Journal of Development Studies*, 46, 68–90. doi: 10.1080/00220380903198463.

Vermeersch, C., A.C. Medici, and R. Narvaez (2014). Peru - Universal health coverage for inclusive and sustainable development : country summary report. Washington, DC: World Bank Group. Retrived from: http://documents.worldbank.org/curated/en/437741468076132999/Peru-Universal-health-coverage-for-inclusive-and-sustainable-development-country-summary-report.

Appendix

Table A1 - Household consumption categories in the 2011 Peruvian National Survey of Households (*ENAHO - Metodologia Actualizada - Condiciones de vida y pobreza)***.**

Category	Description
Health	Medical care expenditures. Doctor fees, medicines, examinations fees, hospitalization, prenatal check-ups, contraceptives.
Food	Purchased and non-purchased food, both consumed at home or outdoor.
Education	Uniforms, transport, registration fees, school supplies, accommodations. Amusement and cultural consumption.
Clothing	Clothing and footwear consumption.
Housing	Expenditures for rent, fuel, electricity, house maintenance. Payments for furniture and equipment.
Transports and communications	Payments for private and public transportations, travel expenditures, telephone, internet, mail expenditures.
Other	Extraordinary housing and services expenditures, family celebrations, and other type of sporadic expenditure.

Table A2 - First-stage regression estimates (Equation 4).

Dep. var.: Receiving international remittances (dummy)	Coef.
Household size	0.0002
Number of children	0.002
Number of elderly	0.009***
Absent member (dummy)	0.002
Education level household head (No education: reference category)	
Primary	0.006**
Secondary	0.01***
High school or more	0.01***
Gender of the household head (female)	0.02***
Age group household head (0 - 49: reference category)	
50 - 69	0.01***
70+	0.02***
*Geographical Area (*Reference Category: Costa)	
Sierra	0.0003
Selva	0.002
Lima	0.001
Urban	0.001
Rent (dummy)	-0.002
Chronic discomfort (dummy)	0.002
Hospitalization (dummy)	0.01***
Hospitals per 1000 population	-0.0012
Healthcare district	0.001
Total income	2.73e-07***
Number of high education members	-0.001
Remittance rate 2007 (province level)	0.58***
Historical migration rate (department level)	8.65e-09
Constant	-0.45***
R-squared	0.04
Number observations	24760

Notes: *** p<0.01, ** p<0.05, * p<0.1.

Table A3 – Almost Ideal Demand System: remittance status as exogenous variable.

	(1) Health	(2) Food	(3) Education	(4) Clothing	(5) Housing	(6) Transports
Ln (total consumption)	0.02***	-0.13***	0.03***	0.01***	0.01***	0.05***
	(0.002)	(0.004)	(0.002)	(0.001)	(0.002)	(0.002)
Receiving international remittances (dummy)	0.01	-0.01**	0.003	0.002	0.004	0.001
	(0.004)	(0.01)	(0.002)	(0.002)	(0.004)	(0.003)
Household size	-0.01***	0.03***	0.003***	-0.0004	-0.02***	-0.003***
	(0.001)	(0.001)	(0.0004)	(0.0004)	(0.001)	(0.001)
Number of children	0.01***	-0.01***	0.001**	0.005***	0.01***	-0.01***
	(0.001)	(0.001)	(0.001)	(0.0004)	(0.001)	(0.001)
Number of elderly	0.02***	-0.01***	-0.01***	-0.002***	0.01***	-0.005***
	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Educational level household head (Primary)	0.001	-0.01**	-0.003***	-0.001	0.01***	0.001
	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)
Educational level household head (Secondary)	-0.0004	-0.02***	0.004***	-0.001	0.01***	0.01***
	(0.002)	(0.003)	(0.001)	(0.001)	(0.002)	(0.001)
Educational level household head (High School or more)	0.0001	-0.05***	0.02***	-0.002	0.03***	0.01***
	(0.002)	(0.004)	(0.002)	(0.001)	(0.003)	(0.002)
Age (group) household head 50-69	0.01***	-0.02***	-0.01***	-0.01***	0.03***	0.001
	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Age (group) household head 70+	0.01***	-0.04***	-0.01***	-0.01***	0.04***	-0.001
	(0.002)	(0.004)	(0.002)	(0.001)	(0.003)	(0.002)
Urban	-0.01***	-0.02***	-0.003***	-0.01***	0.04***	-0.005***
	(0.002)	(0.003)	(0.001)	(0.001)	(0.002)	(0.001)
Geographical area – Sierra	0.002	-0.01***	0.01***	0.01***	-0.01***	0.003***
	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)
Geographical area – Selva	-0.001	0.02***	-0.01***	-0.001	-0.01***	-0.001
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)

Geographical area – Lima	-0.002	0.01**	0.005***	-0.02***	0.02***	0.003
	(0.00)	(0.00)	(0.002)	(0.001)	(0.003)	(0.002)
Absent member (dummy)	-0.01***	0.05***	-0.001	-0.01***	-0.01***	-0.01***
	(0.002)	(0.003)	(0.001)	(0.001)	(0.002)	(0.002)
Rent (dummy)	0.001	0.01***	0.002	0.004***	-0.01***	-0.001
	(0.002)	(0.003)	(0.001)	(0.001)	(0.002)	(0.002)
Chronic discomfort (dummy)	0.02***	-0.01***	-0.002**	-0.003***	-0.004***	-0.003***
	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Hospitalization (dummy)	0.07***	-0.03***	-0.01***	-0.002**	-0.01***	-0.01***
	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)
Gender household head	-0.001	-0.02***	0.01***	0.003***	0.01***	-0.0003
	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Hospitals per 1000 population	-1.21	2.92	3.11***	-1.81**	0.29	-0.14
	(1.61)	(2.56)	(1.09)	(0.91)	(1.76)	(1.22)
Healthcare district (dummy)	-0.001	0.004	0.001	-0.002**	0.001	-0.003***
	(0.001)	(0.003)	(0.001)	(0.001)	(0.002)	(0.001)
Constant	-0.11***	1.70***	-0.25***	0.01	0.12***	-0.34***
	(0.02)	(0.03)	(0.01)	(0.01)	(0.02)	(0.01)
Observations	24,760	24,760	24,760	24,760	24,760	24,760
R-squared	0.18	0.34	0.21	0.09	0.26	0.21

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses. Reference category for education level of the household head: no education. Reference category for age group of the household head: no education:15-49. Reference category for geographical area: Costa.

Table A4 – Almost Ideal Demand System: model specification with interaction between remittance status and total consumption (remittance status as endogenous variable).

	(1) Health	(2) Food	(3) Education	(4) Clothing	(5) Housing	(6) Transports
Ln (total consumption)	0.01***	-0.13***	0.03***	0.01***	-0.0003	0.05***
	(0.003)	(0.004)	(0.002)	(0.001)	(0.003)	(0.002)
Receiving international remittances (dummy) * Ln (total consumption)	0.01***	-0.001	-0.01***	-0.01***	0.02***	-0.01***
	(0.004)	(0.01)	(0.002)	(0.002)	(0.004)	(0.003)
Household size	-0.01***	0.03***	0.00***	-0.00**	-0.02***	-0.00***
	(0.001)	(0.001)	(0.001)	(0.0004)	(0.001)	(0.001)
Number of children	0.005***	-0.01***	0.002***	0.01***	0.01***	-0.01***
	(0.001)	(0.001)	(0.001)	(0.0004)	(0.001)	(0.001)
Number of elderly	0.01***	-0.01***	-0.01***	-0.001	0.01***	-0.004***
	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Educational level household head (Primary)	0.001	-0.01**	-0.003**	-0.001	0.01***	0.001
	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)
Educational level household head (Secondary)	-0.001	-0.02***	0.005***	-0.001	0.01***	0.01***
	(0.002)	(0.003)	(0.001)	(0.001)	(0.002)	(0.001)
Educational level household head (High School or more)	0.001	-0.05***	0.02***	-0.002*	0.03***	0.01***
	(0.002)	(0.004)	(0.002)	(0.001)	(0.003)	(0.002)
Age (group) household head 50-69	0.005***	-0.02***	-0.01***	-0.01***	0.02***	0.002**
	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)
Age (group) household head 70+	0.01***	-0.04***	-0.004**	-0.01***	0.04***	0.001
	(0.002)	(0.004)	(0.002)	(0.001)	(0.003)	(0.002)
Urban	-0.01***	-0.02***	-0.004***	-0.01***	0.05***	-0.01***
	(0.002)	(0.003)	(0.001)	(0.001)	(0.002)	(0.001)
Geographical area - Sierra	0.003	-0.01***	0.01***	0.01***	-0.01***	0.002*
	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)

Geographical area - Selva	0.001	0.02***	-0.01***	-0.002**	-0.005***	-0.002
	(0.002)	(0.003)	(0.001)	(0.001)	(0.002)	(0.001)
Geographical area - Lima	-0.01**	0.01**	0.01***	-0.01***	0.01***	0.01***
	(0.00)3	(0.005)	(0.002)	(0.002)	(0.003)	(0.002)
Absent member (dummy)	-0.01***	0.05***	-0.001	-0.01***	-0.01***	-0.01***
	(0.002)	(0.003)	(0.002)	(0.001)	(0.003)	(0.002)
Chronic discomfort (dummy)	0.02***	-0.01***	-0.002**	-0.003***	-0.004**	-0.003***
	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Hospitalization (dummy)	0.07***	-0.03***	-0.01***	-0.002**	-0.01***	-0.01***
	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)
Rent (dummy)	0.001	0.01***	0.001	0.004***	-0.01***	-0.001
	(0.002)	(0.003)	(0.001)	(0.001)	(0.002)	(0.002)
Gender household head	-0.003*	-0.02***	0.01***	0.005***	0.004***	0.001
	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)
Hospitals per 1000 population	-0.001	0.003	0.003**	-0.002**	0.002	-0.001
	(0.001)	(0.003)	(0.001)	(0.001)	(0.002)	(0.001)
Healthcare district (dummy)	-0.001	0.004	0.0003	-0.002***	0.002	-0.003***
	(0.002)	(0.003)	(0.001)	(0.001)	(0.002)	(0.001)
Constant	-0.07***	1.71***	-0.27***	-0.02	0.19***	-0.36***
	(0.02)	(0.03)	(0.02)	(0.01)	(0.03)	(0.02)
Observations	24,760	24,760	24,760	24,760	24,760	24,760
R-squared	0.15	0.33	0.16	0.04	0.15	0.17

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses. Reference category for education level of the household head: no education. Reference category for age group of the household head: no education:15-49. Reference category for geographical area: Costa.

Table A5 - Almost Ideal Demand System: model specification with interaction between remittance status and occurrence of a health shock (remittance status as endogenous variable).

	(1) Health	(2) Food	(3) Education	(4) Clothing	(5) Housing	(6) Transports
Ln (total consumption)	0.01***	-0.13***	0.03***	0.01***	0.002	0.05***
	(0.002)	(0.004)	(0.002)	(0.001)	(0.003)	(0.002)
Receiving international remittances (dummy)	0.17***	0.06	-0.16***	-0.10***	0.32***	-0.14***
	(0.05)	(0.07)	(0.03)	(0.03)	(0.06)	(0.04)
Hospitalization (dummy)	0.08***	-0.03***	-0.02***	-0.004***	-0.01***	-0.01***
	(0.002)	(0.003)	(0.001)	(0.001)	(0.002)	(0.004)
Hospitalization (dummy)* Receiving international remittances (dummy)	-0.18***	-0.05	0.17***	0.10***	-0.32***	0.14***
	(0.05)	(0.07)	(0.03)	(0.03)	(0.05)	(0.04)
Household size	-0.01***	0.03***	0.002***	-0.001**	-0.02***	-0.004***
	(0.001)	(0.001)	(0.001)	(0.0004)	(0.001)	(0.001)
Number of children	0.005***	-0.01***	0.00*2**	0.01***	0.01***	-0.01***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Number of elderly	0.01***	-0.01***	-0.01***	-0.001	0.01***	-0.004***
	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Educational level household head (Primary)	0.001	-0.01**	-0.00**	-0.001	0.004**	0.002
	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)
Educational level household head (Secondary)	-0.002	-0.02***	0.01***	0.00001	0.01***	0.01***
	(0.002)	(0.003)	(0.001)	(0.001)	(0.002)	(0.002)
Educational level household head (High School or more)	-0.00001	-0.05***	0.02***	-0.002	0.02***	0.01***
	(0.002)	(0.004)	(0.002)	(0.001)	(0.003)	(0.002)
Age (group) household head 50-69	0.005***	-0.02***	-0.01***	-0.01***	0.02***	0.003**
	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)
Age (group) household head 70+	0.01***	-0.04***	-0.003**	-0.01***	0.04***	0.002
	(0.002)	(0.004)	(0.002)	(0.001)	(0.003)	(0.002)
Urban	-0.01***	-0.02***	-0.003***	-0.01***	0.04***	-0.005***
	(0.002)	(0.003)	(0.001)	(0.001)	(0.002)	(0.001)

Geographical area - Sierra	0.003*	-0.01***	0.01***	0.01***	-0.01***	0.002
	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)
Geographical area - Selva	0.001	0.02***	-0.01***	-0.002*	-0.01***	-0.002
	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)
Geographical area - Lima	-0.01**	0.01*	0.01***	-0.01***	0.01***	0.01***
	(0.003)	(0.004)	(0.002)	(0.002)	(0.003)	(0.002)
Absent member (dummy)	-0.01***	0.05***	-0.001	-0.01***	-0.01***	-0.01***
	(0.002)	(0.003)	(0.002)	(0.001)	(0.003)	(0.002)
Chronic discomfort (dummy)	0.02***	-0.01***	-0.002*	-0.003***	-0.004***	-0.003***
	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)
Gender household head	-0.003*	-0.02***	0.01***	0.005***	0.005***	0.001
	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)
Hospitals per 1000 population	-0.001	0.003	0.003**	-0.002**	0.001	-0.0003
	(0.002)	(0.003)	(0.001)	(0.001)	(0.002)	(0.001)
Healthcare district (dummy)	-0.001	0.004	0.0001	-0.002***	0.002	-0.004***
	(0.002)	(0.003)	(0.001)	(0.001)	(0.002)	(0.001)
Constant	-0.08***	1.72***	-0.27***	-0.01	0.16***	-0.36***
	(0.02)	(0.03)	(0.01)	(0.01)	(0.02)	(0.02)
Observations	24,760	24,760	24,760	24,760	24,760	24,760
R-squared	0.13	0.33	0.10	0.02	0.12	0.14

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses. Reference category for education level of the household head: no education. Reference category for age group of the household head: no education:15-49. Reference category for geographical area: Costa.

Table A6 – Almost Ideal Demand System: model estimation on subsample of households that experienced a health shock (remittance status as endogenous variable).

	(1) Health	(2) Food	(3) Education	(4) Clothing	(5) Housing	(6) Transports
Ln (total consumption)	0.02***	-0.12***	0.03***	0.004	0.005	0.04***
	(0.01)	(0.01)	(0.004)	(0.003)	(0.01)	(0.004)
Receiving international remittances (dummy)	-0.08	-0.03	0.08**	-0.03	0.09*	0.002
	(0.07)	(0.08)	(0.04)	(0.03)	(0.05)	(0.04)
Household size	-0.01***	0.03***	0.002***	-0.0001	-0.01***	0.0001
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Number of children	0.01***	-0.01***	0.001	0.004***	0.01***	-0.01***
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Number of elderly	0.02***	-0.01***	-0.01***	-0.003**	0.01***	-0.01***
	(0.004)	(0.004)	(0.002)	(0.001)	(0.003)	(0.002)
Educational level household head (Primary)	-0.01*	-0.004	0.0003	0.001	0.01	0.003
	(0.005)	(0.01)	(0.002)	(0.002)	(0.003)	(0.003)
Educational level household head (Secondary)	-0.01**	-0.02***	0.01**	0.001	0.01***	0.01**
	(0.01)	(0.01)	(0.003)	(0.002)	(0.004)	(0.003)
Educational level household head (High School or more)	-0.01**	-0.05***	0.02***	0.002	0.03***	0.01***
	(0.01)	(0.01)	(0.004)	(0.003)	(0.005)	(0.004)
Age (group) household head 50-69	0.02***	-0.02***	-0.01***	-0.01***	0.01***	-0.001
	(0.004)	(0.004)	(0.002)	(0.002)	(0.003)	(0.002)
Age (group) household head 70+	0.05***	-0.04***	-0.01**	-0.01***	0.03***	-0.003
	(0.01)	(0.01)	(0.004)	(0.003)	(0.01)	(0.004)
Urban	-0.02***	-0.02***	0.0001	-0.00***	0.04***	0.001
	(0.005)	(0.01)	(0.003)	(0.002)	(0.004)	(0.003)
Geographical area - Sierra	-0.003	-0.01	0.01***	0.002	-0.004	0.01***
	(0.005)	(0.01)	(0.002)	(0.002)	(0.003)	(0.002)
Geographical area - Selva	-0.01***	0.02***	-0.004	-0.003*	-0.002	-0.001
	(0.005)	(0.01)	(0.002)	(0.002)	(0.003)	(0.003)

Geographical area - Lima	-0.003	0.01	-0.003	-0.02***	0.02***	0.01*
	(0.01)	(0.01)	(0.004)	(0.003)	(0.01)	(0.004)
Rent (dummy)	0.01*	0.001	-0.004	0.01**	-0.01**	-0.002
	(0.01)	(0.01)	(0.003)	(0.002)	(0.004)	(0.003)
Absent member (dummy)	-0.02**	0.04***	-0.001	-0.004*	-0.01**	-0.01**
	(0.01)	(0.01)	(0.003)	(0.002)	(0.004)	(0.003)
Chronic discomfort (dummy)	0.03***	-0.01***	-0.001	-0.004**	-0.004	0.0004
	(0.004)	(0.005)	(0.002)	(0.002)	(0.004)	(0.002)
Gender household head	0.001	-0.01**	-0.002	0.003**	0.005	-0.001
	(0.005)	(0.005)	(0.002)	(0.002)	(0.003)	(0.002)
Hospitals per 1000 population	-0.01	0.01	0.01**	-0.003*	0.002	-0.003
	(0.01)	(0.01)	(0.003)	(0.002)	(0.04)	(0.003)
Healthcare district (dummy)	-0.01**	0.01	0.002	-0.002	-0.0004	0.004
	(0.01)	(0.01)	(0.003)	(0.002)	(0.004)	(0.003)
Constant	-0.04	1.60***	-0.21***	0.02	0.11**	-0.33***
	(0.07)	(0.07)	(0.03)	(0.02)	(0.05)	(0.03)
Observations	4,475	4,475	4,475	4,475	4,475	4,475
R-squared	0.11	0.33	0.14	0.11	0.21	0.19

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses. Reference category for education level of the household head: no education. Reference category for age group of the household head: no education:15-49. Reference category for geographical area: Costa.

Table A7 – Almost Ideal Demand System: model estimation on subsample of households that did not experience a health shock (remittance status as endogenous variable).

	(1) Health	(2) Food	(3) Education	(4) Clothing	(5) Housing	(6) Transports
Ln (total consumption)	0.01***	-0.13***	0.03***	0.01***	0.0001	0.05***
	(0.003)	(0.004)	(0.002)	(0.001)	(0.003)	(0.001)
Receiving international remittances (dummy)	0.16***	0.05	-0.17***	-0.08***	0.30***	-0.13***
	(0.04)	(0.07)	(0.03)	(0.03)	(0.05)	(0.03)
Household size	-0.003***	0.03***	0.002***	-0.001**	-0.02***	-0.005***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Number of children	0.004***	-0.02***	0.002***	0.01***	0.01***	-0.01***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Number of elderly	0.01***	-0.01***	-0.01***	-0.001	0.01***	-0.003***
	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)
Educational level household head (Primary)	0.002	-0.005*	-0.003**	-0.001	0.01**	0.002
	(0.002)	(0.003)	(0.001)	(0.001)	(0.002)	(0.001)
Educational level household head (Secondary)	-0.0001	-0.02***	0.01***	-0.001	0.01***	0.01***
	(0.002)	(0.003)	(0.002)	(0.001)	(0.003)	(0.002)
Educational level household head (High School or more)	0.002	-0.05***	0.02***	-0.003*	0.03***	0.01***
	(0.003)	(0.004)	(0.002)	(0.002)	(0.003)	(0.002)
Age (group) household head 50-69	0.003**	-0.02***	-0.01***	-0.005***	0.02***	0.00**
	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)
Age (group) household head 70+	0.01***	-0.04***	-0.002	-0.01***	0.04***	0.002
	(0.002)	(0.004)	(0.002)	(0.002)	(0.003)	(0.002)
Urban	-0.005***	-0.02***	-0.004***	-0.01***	0.05***	-0.01***
	(0.002)	(0.003)	(0.001)	(0.001)	(0.002)	(0.001)
Geographical area - Sierra	0.004***	-0.01***	0.01***	0.01***	-0.01***	0.001
	(0.002)	(0.003)	(0.001)	(0.001)	(0.002)	(0.001)
Geographical area - Selva	0.003**	0.02***	-0.01***	-0.002	-0.01***	-0.002
	(0.002)	(0.003)	(0.001)	(0.001)	(0.002)	(0.001)

Geographical area - Lima	-0.01**	0.01	0.01***	-0.01***	0.01***	0.01**
	(0.003)	(0.005)	(0.002)	(0.002)	(0.004)	(0.003)
Absent member (dummy)	-0.01**	0.05***	-0.002	-0.01***	-0.01***	-0.01***
	(0.002)	(0.004)	(0.002)	(0.001)	(0.003)	(0.002)
Rent (dummy)	-0.0003	0.01***	0.002	0.004***	-0.01***	-0.001
	(0.002)	(0.004)	(0.002)	(0.001)	(0.003)	(0.02)
Chronic discomfort (dummy)	0.02***	-0.01***	-0.002**	-0.003***	-0.004**	-0.003***
	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)
Gender household head	-0.002	-0.02***	0.01***	0.005***	0.004**	0.001
	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)
Hospitals per 1000 population	0.0001	0.002	0.002*	-0.002	0.001	0.0003
	(0.002)	(0.003)	(0.001)	(0.001)	(0.002)	(0.001)
Healthcare district (dummy)	0.002	0.003	-0.0002	-0.002**	0.002	-0.005***
	(0.002)	(0.003)	(0.001)	(0.001)	(0.002)	(0.001)
Constant	-0.08***	1.74***	-0.29***	-0.02	0.19***	-0.38***
	(0.02)	(0.04)	(0.02)	(0.01)	(0.03)	(0.02)
Observations	20,285	20,285	20,285	20,285	20,285	20,285
R-squared	-0.01	0.31	0.07	0.03	0.12	0.14

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses. Reference category for education level of the household head: no education. Reference category for age group of the household head: no education:15-49. Reference category for geographical area: Costa.

Figure 1 - Health consumption shares across total consumption deciles

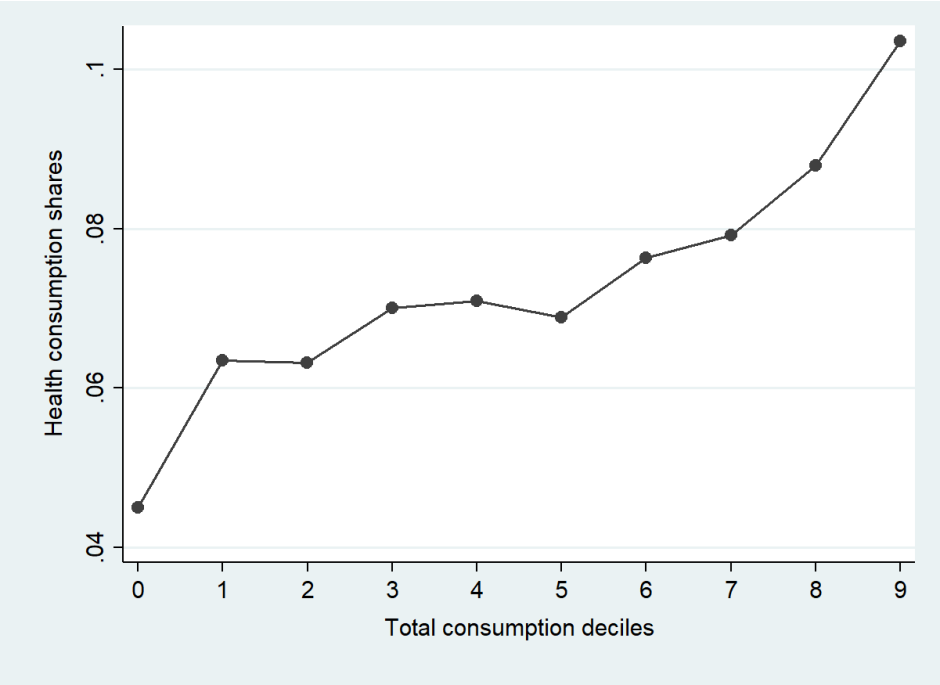

Figure 1 - Food consumption shares across total consumption deciles