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The Effect of Remittances on Children's Health Expenditures in Ecuador[1]

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Abstract

We evaluate the impact of remittances on family expenditures and anthropometric health indicators for Ecuadorean children 0-5 years old, using data for the 2005-2006 and 2013-2014 periods. We employ an instrumental variable approach and split the data across wealth, gender, and rural vs urban dimensions. We find positive and significant effects of remittances on overall expenditures, food consumption, and expenditures in health. We also find positive results for children in the top half of the wealth distribution and no effects on the poorer half. Across gender, males seem to benefit more than females, while children in rural areas see larger effects relative to those in urban areas.

Keywords: Remittances, Household expenditures, Children's Health, Ecuador

JEL classifications: F24 I1

1. Introduction

Ecuador has a long migration history, with remittances amounting to 2% of GDP and ranking as the second source of external financing after petroleum exports (BCE, 2015). Migration rapidly accelerated when the country suffered a severe economic crisis starting in 1998. Since then, migration has stabilized at around 7% of the country's population (Figure 1).

This paper examines the impact of remittances on family expenditures and health indicators for children under five years of age in Ecuador. We use data from Ecuador's Living Standard Measurement Survey (LSMS) collected in 2005-2006 and 2013-2014. Our main dependent variables are overall household expenditures, expenditures on food and health, and anthropometric health outcomes (weight-for-age (WAZ), height-for-age (HAZ), and weight-for-height (WHZ)).

Our primary explanatory variable - the monthly dollar amount of remittances received by the household – may suffer from an endogeneity problem. In order to address this concern, we

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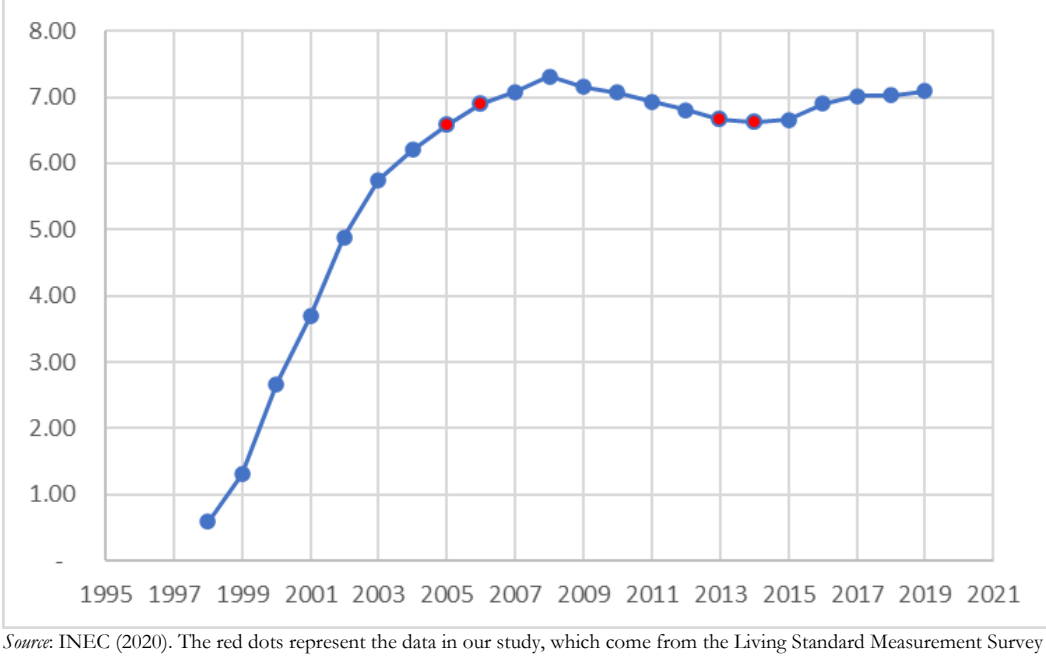
follow Ponce et al. (2011) and Bucheli, Bohara, and Fontenla (2018) and use an instrumental variable approach, where we exploit the fact that Ecuadorean remittances have two principal source countries, the United States and Spain. Conditions in the source country may determine the volume and frequency of international funds transferred, while at the same time, we do not expect these migration paths to directly affect health expenditures and outcomes.

We find that one additional dollar in remittances increases consumption per capita by 0.4%, food consumption per capita by 0.3%, and expenditure in health for families with children under five years of age by 0.6%. In contrast, these increases in consumption and expenditures on food and health do not seem to translate into significant effects on actual health outcomes, as measured by WAZ, HAZ and WHZ.

We further inquire into the potential heterogeneous effects of remittances by partitioning our data into wealth groups, by gender, and across the rural-urban dimensions. We observe significant impacts on overall consumption, food consumption, and expenditures in healthcare for the wealthier groups, while we find no effects on the poorer half of the wealth distribution. Further, across the wealthier half, the positive effects are consistently larger and more significant for males relative to females. In addition, the impact of remittances on consumption seems stronger in rural areas, with larger effects for females within the rural setting.

Figure 1. Net Cumulative Flow of migrants as a percentage of the population



Source: INEC (2020). The red dots represent the data in our study, which come from the Living Standard Measurement Survey of Ecuador for the years 2005-2006, and 2013-2014.

2. Background

Ecuador is an upper-middle-income country with 16 million inhabitants as of 2017. Poverty and inequality are significant concerns. In 2015, 23.3% of the Ecuadorean population was

poor, as their consumption was below the national poverty line of 1005.48 USD per person per year (INEC 2015). Further, income distribution is highly unequal, with the wealthiest 20 percent enjoying about half of national consumption, while the bottom 40 percent of the population accounts for only 15 percent of national consumption (De Haan et al., 2012). Inequality, as measured by the Gini coefficient, is 0.465, where according to the United Nations, a Gini coefficient over 0.4 is alarming (INEC 2016).

The main destinations for Ecuadorean migrants are the United States, which began in the 1970s, and Spain, which started in the early 2000s. Figure 1 shows the cumulative net flow of Ecuadorean migrants as a percentage of the annual population (1998-2019). It depicts a significant increase for the 2000-2003 period as a consequence of the country's economic crisis that started in 1998. Migration peaked in 2008, slightly falling as a consequence of the great recession, and stabilizing at around 7%. During the study period, Ecuadorean migration to the United States was considered more expensive and dangerous than migrating to Spain.[4]

Remittances can promote economic development, increase income, reduce poverty, and provide funds families can spend on education and health (Coronado 2010). At the aggregate level, Arthur and Oaikhenan (2017) find no definitive empirical evidence on the effects of health expenditures on health outcomes. However, they find a complementary relationship between public and private health expenditures. Terrelonge (2014) uses a cross-country sample of 138 developing nations from the six major developing regions, with annual data from 1995 to 2009. The author finds that remittances improve child and infant mortality rates, reduce child malnutrition, and lower the depth of hunger.

At the household level, Sengupta (2015) studies India, and finds that educated households make better health expenditure decisions. That is, it may not be just the level of expenditures on health, but the way families choose health expenditures becomes relevant. For Mexico, Hildebrandt et al. (2005) find that families that receive remittances see a reduction in the likelihood of children dying in the first year of birth, higher birth weights, and an increase in the probability of births being delivered by a doctor. On the other hand, they find adverse effects in breastfeeding, vaccination, or visiting the doctor in the first year of life. For Guatemala and Nicaragua, Acosta and López (2008) evaluate the effect of remittances on children receiving complete vaccinations, professional presence in the delivery of children born, and anthropometric indicators. They find a positive effect in Nicaraguan children in weight- and height-for-age Z-scores, and the probability of doctor presence in deliveries.

Considering the Ecuadorian case, Antón (2010) finds a positive impact of remittances on weight-for-height (WHZ) and weight-for-age (WAZ) z-scores, which represent short-and middle-term indicators of infant nutritional status. In contrast, the author finds no effect of remittances on height-for-age z-scores (HAZ), which represents long-term nutritional status. The study uses an instrumental variable approach that includes the number of Western Union

[4] Typically, the route to the United States consists of traveling by plane to Mexico, and then attempting to illegally cross the border to the United States (Jokisch & Pribilsky, 2002). Stricter controls at the US border have increased the hiring of human smugglers (coyotes), which also substantially increased the cost of migrating. At the same time, increased border enforcement raises the probability of apprehension and deportation (Bertoli et al., 2011).Migration to Spain has been somewhat easier. Until 2003, Ecuadoreans travelling to Spain were not required to have visas for trips shorter than 90 days. Requirements instead included, upon arrival in Spain, showing proof of funds, a credit card, a confirmed return flight, and have a justification for the trip, such as tourism. Starting in 2003, visas became a requirement to fly to Europe, aditionally complicating migration. Still, overstaying tourist visas is the most common way of migrating, and is still less expensive and risky compared to illegally migrating to the United States (Jokisch & Pribilsky, 2002).

offices per 100,000 persons at the provincial level, and the proportion of families with a migrant member in the 2003 by province.

In contrast to Antón (2010), Ponce, Olivié, and Onofa (2011) use different instruments, and do not find an effect of remittances on WHZ and WAZ. Their instruments are dummy variables for the main source countries of remittances, Spain and the U.S. They also find that remittances have an impact on preventive health activities and on health expenditures. In addition, they find significant effects of remittances on expenditures in medicine, and on health knowledge.

The previous empirical evidence shows no definitive conclusion and does not analyze the potential heterogeneous effects of remittances on children's health.

3. Data

Our data comes from Ecuador's Living Standard Measurement Survey (LSMS) of 2005-2006 and 2013-2014 (Encuesta de Condiciones de Vida 2005-2006, and 2013-2014). The survey is designed by the World Bank and has the same structure as other LSMS across the world. The 2005/2006 data comprises 13,581 households, and the 2013/2014 sample corresponds to 28,070 homes.[5] We further calculate Z-scores to analyze anthropometric data for children under five years of age, based on the WHO and UNICEF methodology (WHO-UNICEF 2019).

Table 1 presents descriptive statistics for our variables of interest and controls for both households receiving remittances and those that do not. Regarding our dependent variables, families receiving remittances have better health conditions and higher expenditures overall. The difference in the z-scores is statistically significant for weight-for-age (WAZ) and height-for-age (HAZ), but it is not significant for weight-for-height (WHZ), the short-term indicator. The WAZ shows that children in remittance-receiving families, on average, are less underweight. The HAZ indicates that children whose families receive remittances are less stunted. Finally, remittance-receiving households have higher levels of total consumption and expenditures on food and health relative to non-receiving families.

Regarding individual characteristics, Table 1 shows no statistical difference between the two populations with respect to sex. The average age of children in remittance recipient families is younger, by about one month. Considering household characteristics, remittance recipients appear to be better off than non-recipients. Therefore, we use these variables as controls in our empirical specifications. For example, mothers whose families receive remittances have, on average, about eight more months of education and have 0.14 more family members. In contrast, they have 0.21 fewer children younger than fourteen. Female heads of household are more prevalent for families receiving remittances, as expected, since migrants tend to be male. Heads of non-receiving households are younger than those in remittances-receiving households. Receiving households show a higher rate of white heads and a lower rate of indigenous heads relative to non-receiving households. This control is relevant because

[5] The survey is nationally representative, which includes four regions. Ecuador created two new provinces in 2007, so we adjust the 2005-2006 data to conform to the new political division. The data includes a complete list of all household members and a consumption module that contains questions on education, health, food, and housing. In addition, the module on migration makes it possible to identify households with migrants and whether they receive remittances. The survey also includes information on housing conditions, expenditures on housing, income of housing members, infrastructure variables, as well as family assets.

ethnicity and discrimination affect development outcomes in developing countries. Recipient households are 12% more likely to be homeowners.

Table 1. Descriptive Statistics for Remittance Recipients vs. Non-Remittance Recipients

	No Remittance recipients	Remittance recipients	Difference t-test
Health output and family expenses			
Weight-for-age z-score (WAZ)	-0.43	-0.33	-0.11***
Height-for-age z-scorev (HAZ)	-1.28	-1.15	-0.13***
Weight-for-height z-score (WHZ)	0.42	0.45	-0.03
Ln consumption per capita	3.37	4.21	-0.84***
Ln expenditures on food per capita	3.71	3.93	-0.22***
Ln expenditures on health per capita	0.87	1.40	-0.53***
Independent Variable of Interest			
Remittances per capita (per month, December 2014 USD)		30.10	
Individual characteristics			
Female =1 Dummy variable	0.48	0.48	-0.00
Age	2.07	1.99	0.09**
Household characteristics			
Years of schooling of the female head of household or female partner of the head of household	8.11	8.78	-0.68***
Number of members in the household	5.43	5.57	-0.14**
Number of children (age < 14) in household	2.59	2.38	0.21***
Female head of household	0.15	0.26	-0.12***
Age of head of household	37.99	41.92	-3.93***
White head of household = 1	0.03	0.06	-0.02***
Indigenous head of household = 1	0.17	0.09	0.08***
Owns home	0.36	0.48	-0.12***
Asset Index	0.34	0.47	-0.13***
Quality of housing index	0.35	0.48	-0.13***
Per capita income, net of remittances, monthly 2014 USD.	124.56	120.03	4.54
Household affected by a death, illness, or serious accident of a household member	0.07	0.12	-0.06***
Natural disasters (drought, storm, plague, flood)	0.04	0.03	0.01
Community controls			
rural area	0.51	0.36	0.15***
Regional poverty levels	0.34	0.27	0.08***
Survey year			
2006 number of individuals	3,552	700	
2014 number of individuals	10,678	783	
Total Number of observations	13937	1483	

* p<0.05, ** p<0.01, *** p<0.001, diff. t test. all monetary values expresed in December 2014 USD.

We also construct two indices to capture the long-term household socioeconomic status. The first is the asset index, which categorizes ownership of cooking stove, television, refrigerator, car, sound system, video player, video games, washing machine, laptop, and desktop computer. The second one is the home's quality index, which considers floor, roof, and walls using principal component analysis. Monthly per capita income net of remittances shows that non-recipient households earn 4.54 dollars more than recipient households.

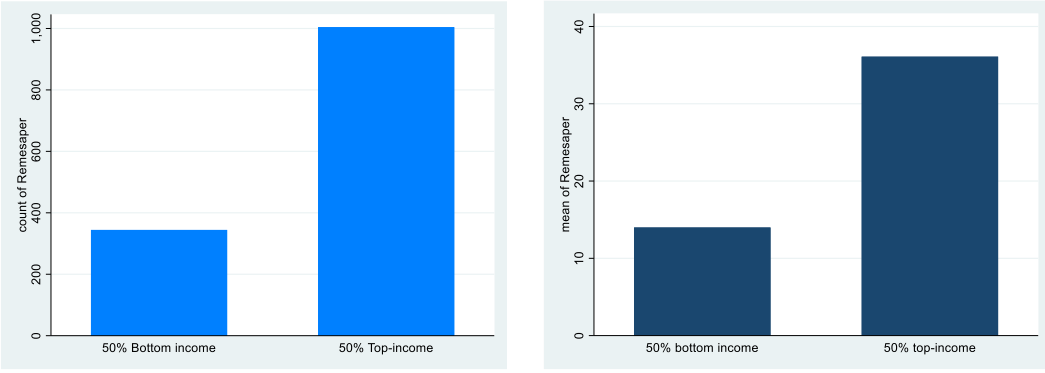
Two control variables capture external shocks affecting families. The first one identifies households affected by a death, illness, or severe accident. The second one considers natural disasters (drought, storm, plague, or flood), where the difference between recipients and non-recipients is not statistically significant. Concerning community variables, families receiving remittances are more likely to live in urban areas, and in places with lower poverty rates.

Figure 2 shows that wealthier households are more likely to receive remittances and that remittances are larger when they receive them. We consider the average per capita income

without remittances as the measurement for wealth. Panel (a) shows that the top income group has more children whose families receive remittances. Panel (b) shows that the 50% top income group receives, on average, approximately 35 dollars in remittances monthly, more than double the amount of the lower income half.

Figure 2. Number of children whose families receive remittances and the monthly average amount of remittances by income.

Panel (a) Panel (b)



Source: INEC 2006, 2014

There is a similar number of households receiving remittances from the U.S. and Spain. Additionally, U.S. remittance receivers, get an average of 38 dollars per month, 14 more dollars than those households receiving remittances from Spain.

4. Theoretical Framework and Empirical Specifications

The Grossman (1972) model of a health production function determines the output health status of the child at a particular time as the following equation:

> Health = f (Medical and nutritional inputs into child health i + Time inputs of the parent i + Parental health knowledge i + Biological endowments such as genetic characteristics of child i + Random shocks) (1)

The health decision is, at the same time, an investment and a consumption good. Theoretically, reverse causality between income and health is not present in the children's case because the parent does not expect an immediate return in revenue as a consequence of investing in their children's health (Hildebrandt & McKenzie, 2005), especially for children aged 0-5. One prominent channel is the income effect of remittances that may reduce budget constraints, as it allows the purchase of medical and nutritional inputs as healthcare becomes a normal good (Hildebrandt & McKenzie, 2005). For example, higher expenditures on education, health, and housing in the Ecuadorean case are the impacts of remittance receipts (Göbel, 2013). Nevertheless, there is no guarantee that additional remittances positively affect child health because income does not improve health directly. After all, better health depends on how families are using this extra income.

Our primary explanatory variable – the monthly amount of remittances – may suffer from an endogeneity problem.[6] In order to address this endogeneity concern, we use an instrumental variables approach. We follow Ponce et al. (2011) and Bucheli, Bohara, and Fontenla (2018), exploiting the fact that Ecuadorean remittances have two principal source countries, the United States and Spain. We generate two dichotomous variables that denote the source country of remittances: one for the United States, and one for Spain. The source country may determine the volume and frequency of international funds transferred, as average incomes may differ across countries, and there may be exogenous variation in the transaction costs of money transfers. The descriptive statistics show that the average monthly amount of remittance differs between the U.S. and Spain. At the same time, we do not expect these paths of migration to directly affect health outcomes. Whether remittances come from Spain or the United States should not directly determine children's health conditions.[7]

Thus, we use the empirical model of IV with Two-Stage Least Squares, as follows:

$$Health\ outcomes_{it} = \gamma_0 + \gamma_1 \widehat{remittances}_{it} + \gamma_2 X_{it} + \gamma_3 D \quad + e_{it} \tag{2}$$

$$\widehat{remittances}_{it} = \delta_0 + \delta_1 X_{it} + \delta_2 \mathrm{Z}_{it} + \delta_3 \mathrm{D} + u_{it} \tag{3}$$

Where equation (2) is the empirical counterpart of equation (1). The health outcomes correspond to the expenditure of households in the families with children aged < 5 years old and anthropometric indicators (WAZ, HAZ, WHZ) for children aged < 5. X_{it} is the vector of control variables, and D represents time fixed effects. The index i refers to individuals in a series of two independent cross-sections.

Equation (3) denotes the first stage, which predicts the endogenous variable, remittances, using the vector of control variables and the instruments. Z_{it} refers to the instrumental dummy variables, which correspond to the country source of remittances, the United States and Spain. Errors are clustered at the parish/city level and fixed effects at the canton level.

5. Results

Table A1 in the Appendix reports the 2SLS first-stage results for the instruments' effect on per capita remittances and reports relevance and overidentification tests for our instrumental variables. Across all specifications, instrument coefficients are positive and significant. We can further reject the null hypothesis of a weak instrument based on the Cragg-Donald Wald F and Kleibergen-Paap rk Wald F statistics. Also, the table shows the under-identification test and overidentification test for all instruments, which provide support for the model being identified. The Hansen J statistic supports the validity of the instruments, as it does not reject the null hypothesis of our instruments being jointly uncorrelated with the error term.

Table 2 reports the estimates for our consumption and expenditure dependent variables, for both OLS and 2SLS specifications. The table rows show the effects of per-capita remittances in the different expenditures (overall consumption, food consumption, and expenditures in

[6] That is, it is possible that family health needs may be the cause of migration, they may affect the frequency and amount of remittances, or that additional variables may influence both health outcomes and remittances. Further, migration may not be a random process, as migrants may have unobserved characteristics that make them different from those that do not migrate.

[7] Tests for relevance and exclusion conditions reported in the results section further support our choice of instruments. In addition, we use an array of household and community controls to reduce potential biases, as there may be systematic differences between the households that receive remittances and those that do not.

health per capita) in families with children younger than five years old. The first column reports OLS estimates not corrected for endogeneity and without controls, which are potentially biased. The second and third specifications report the 2SLS model and include clustered standard errors at the city and parish level.

Table 2. Marginal effect of remittances on household expenditures - children < 5 years old

2SLS second stage	(1) OLS (no controls)	(2) A = 2SLS household & economic status controls	(3) B = A + local controls & FE
log consumption per capita	0.008***	0.010***	0.004***
	(0.0013)	(0.0013)	(0.0010)
log food consumption	0.002***	0.005***	0.003***
	(0.0004)	(0.0010)	(0.0010)
log expenditure in health per capita	0.006***	0.014***	0.006**
	(0.0010)	(0.0031)	(0.0031)

Clustered standard errors in parentheses. FE to canton (county) level / all monetary values expressed in December 2014 USD.
* p < 0.1, ** p < 0.05, *** p < 0.01

The preferred specification of table 2 is specification (3), which includes control variables for household, economic status, and community, plus fixed effects at the canton level, the equivalent of a county. According to our results, the overall impact of one additional dollar in remittances increases consumption per capita by approximately 0.4%, 0.3% for food consumption per capita, and 0.6% in the average expenditure in per capita health for families with children younger than five. Our results are consistent with the work of Amuedo-Dorantes and Pozo (2011) for the Mexican case and Göbel (2013) for the Ecuadorean case, who find that international remittances have a positive effect on health care expenditures.

Table 3 shows the estimates for the OLS and 2SLS specifications on children's health. The rows on the table show the dependent variables (HAZ, WAZ, WHZ), and the coefficient estimates report the effects of per-capita remittances. The Table's structure is similar to table 2: the first column is the OLS estimate without controls and not corrected for endogeneity, and these results are biased. The second and third specifications include city and parish level clustered standard errors. The preferred specification is the third one, which includes household and economic status, local controls, and fixed effects. According to our results, the overall impact of one additional dollar in remittances is close to zero and not significant across all health outcomes.

Table 3. Marginal effect of remittances on anthropometric indicators (HAZ, WAZ, WHZ) - children < 5 years old.

2SLS second stage	(1) OLS (no controls)	(2) A = 2SLS household & economic status controls	(3) B = A + local controls & FE
Height-for-age z-score (HAZ)	0.001*	-0.000	-0.002
	(0.0005)	(0.0024)	(0.0024)
Weight-for-age z-score (WAZ)	0.001*	0.003	-0.001
	(0.0005)	(0.0021)	(0.0024)
Weight-for-height z-score (WHZ)	0.000	0.003	-0.001
	(0.0005)	(0.0024)	(0.0027)

cluster standard errors in parentheses / FE to canton (like a county) level
* p < 0.1, ** p < 0.05, *** p < 0.01

We find no improvement in children's health for the 2006-2014 data. These insignificant effects, across all indicators, contrast with the findings of Antón (2010), who finds positive and significant effects of remittance reception on the same anthropometric indicators. Antón uses data for 2006, and a different instrument to deal with endogeneity. We repeat our analysis for the 2006 data only, and still find no significant effects. Table A2 in the appendix presents 2006 and 2014 results separately, with similar effects on consumption, expenditures, and children's health. In contrast, our results are similar to the work of Ponce et al. (2011), who use 2006 data with our same instruments, and find no significant effects with either 2006 or 2014 data. This implies that the additional income from remittances may not be enough to improve children's health, or that the quality of the expenditures is inadequate.

Table A3 in the appendix analyzes additional health outcomes available in the LSMS data and further finds no effect on the likelihood of vaccinations, deworming, diarrhea, respiratory infections, treatment by a health professional, access to health services while sick, or whether the child was seen in a private vs. a public hospital.

5.1. Income and Gender Differences

To further inquire into potential heterogeneous effects of remittances, Table A4 in the appendix divides our data into two groups according to household income, where we define as poor those in the 50% lower income group, and rich as those households in the top 50% of per capita income. For the lowest-income families, remittances show no statistically significant impacts for either male or female children.

In contrast, we observe significant impacts on consumption, food consumption, and expenditures in healthcare for the wealthy group. Further, these effects are consistently larger and more significant for males than females.

Our results could be related to the profile of Ecuadorean migration detailed in Figure 2 and the background and data sections. That is, most Ecuadorean migrants belong to the top half of the income distribution, in part due to the high costs of migration to Spain and the United States. Not only is the share of migrants in the lower-income half much smaller than in the top income half, but the amount of remittances received is also much smaller when they do receive them. Thus, lower amounts of remittances may not translate into noticeable increases in consumption and expenditures on health.

Table A5 in the appendix also splits the data by income and gender for the anthropometric health indicators. These results are overall consistent with the general finding of no effect of remittances on health outcomes.

5.2. Urban vs. Rural

Table A6 in the appendix presents results when we partition the data across urban and rural dimensions. Overall, the effects of remittances on consumption seem stronger in rural areas, with larger effects for females within the rural setting. With respect to health expenditures, table A6 displays a limited impact of remittances. Table A7 in the appendix shows that remittances have almost no effect on health outcomes. The one exception seems to be short-

and middle-term anthropometrics indicators (WHZ, WAZ), where remittances negatively impact male health in rural areas.

6. Conclusions

We use the Standard of Living Measurement Survey of Ecuador of 2005-2006 and 2013-2014 to evaluate the causal effect of remittances on expenditures and health. While this topic has been previously analyzed for 2005-2006 data, additional and more recent data allows us to partition our study across wealth, gender, and the rural-urban dimension.

Our data shows a positive effect of remittances on general consumption, food consumption, and health expenditures. When we split the data, we find statistically significant effects for the top 50% income bracket, with larger effects in males for this group. Further, the impact of remittances on consumption seems stronger in rural areas, with larger effects for females.

Our results suggest that remittances reduce income constraints and increase families' expenditures on food and health. While expenditures increase, an effect on health outcomes is not guaranteed because it depends on the amount and quality of the spending. This is consistent with previous studies on remittances and health, which show mixed or very limited effects on health outcomes. Potential explanations for the lack of health effects on children is that households may increase health expenditures on other family members, such as older adults. Also, additional income from remittances may simply be insufficient for the income channel to improve health outcomes. Further, increases in consumption or expenditures may not have a measurable effect on family's health behavior that materializes as health outcomes.

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Appendix:

Table A1. First-Stage Estimates of Remittances

	(2)	(3)
Coefficients	2SLS household & economic status controls	(2) + local controls & FE
U.S.	23.421 ***	21.997***
	(3.312)	(2.791)
Spain	18.050***	18.259***
	(2.476)	(2.549)
U.S. F - Stat	50.93***	49.52***
Spain F-Stat	55.30***	53.20***
All instruments F- Stat	43.29***	45.19***
Underidentification test - Kleibergen-Paap rk LM statistic		39.69***
Weak identification test - Cragg-Donald Wald F statistic		749.124
Kleibergen-Paap rk Wald F statistic		45.192
Hansen J statistic - overidentification test of all instruments		0.114
χ^2 p-value		0.7352

Values expressed as coefficient/clustered standard errors in parentheses/ Fixed Effects at the canton level. * p < 0.1, ** p < 0.05, *** p < 0.01

Table A2. Marginal effects of remittances on families expenditures and anthropometric indicators (WAZ, HAZ, WHZ) for children aged < 5 by rural/urban area and sex split by 2005-2006 vs 2013-2014

	(1)	(2)
2SLS second stage	2005-2006	2013-2014
ln consumption per capita	0.003**	0.004**
	(0.0012)	(0.0014)
ln food consumption	0.001	0.004**
	(0.0012)	(0.0014)
ln expenditure in health per capita	0.011***	-0.004
	(0.0036)	(0.0051)
Weight-for-age z-score	0.000	-0.003
	(0.0035)	(0.0035)
Height-for-age z-score	-0.003	-0.002
	(0.0035)	(0.0033)
Weight-for-height z-score	0.001	-0.002
	(0.0037)	(0.0047)

cluster standard errors in parentheses
* p < 0.1, ** p < 0.05, *** p < 0.01

Table A3. marginal effect of remittances on health outcomes

	(1)	(2)	(3)
2SLS second stage	OLS	A = 2SLS household & economic status controls	B = A + local controls & FE
vaccination (1 meningitis and hepatitis)	-0.000*	0.001*	0.001
	(0.0002)	(0.0006)	(0.0007)
child dewormed in the 12 months	-0.000	-0.000	-0.001
	(0.0002)	(0.0011)	(0.0011)
Presence of ADD (acute diarrheal disease)	0.000	-0.001	-0.001
	(0.0002)	(0.0009)	(0.0009)
Presence of ARI (acute respiratory infection)	-0.000*	0.001	0.002
	(0.0003)	(0.0013)	(0.0015)
Adequate attention in case of ADD	0.001***	0.002	0.002
	(0.0003)	(0.0021)	(0.0028)
Adequate attention in case of ARI	0.000	0.001	0.002
	(0.0003)	(0.0013)	(0.0015)
Attention in private hospital in case of ADD	0.001***	-0.001	-0.002
	(0.0004)	(0.0023)	(0.0024)
Attention in private hospital in case of ARI	0.001*	0.003**	0.002
	(0.0007)	(0.0016)	(0.0018)
Attention in private hospital in case of ADD or ARI	0.001**	0.002	0.001
	(0.0005)	(0.0015)	(0.0016)

Values expressed as coefficient/clustered standard errors in parentheses/ FE to canton level
* p < 0.1, ** p < 0.05, *** p < 0.01

Table A4

Effect of remittances on household consumption, food consumption, and expenditures in healthcare by income and sex

		(1)	(2)
	2SLS second stage	50% Bottom income	50% Top-income
log consumption per capita	Pooled data	0.002	0.005***
		(0.0050)	(0.0009)
	Males	-0.006	0.005***
		(0.0060)	(0.0013)
	Females	0.009	0.005*
		(0.0070)	(0.0013)
log food consumption	Pooled data	0.001	0.002**
		(0.0032)	(0.0009)
	Males	-0.005	0.004***
		(0.0034)	(0.0012)
	Females	0.006	0.001
		(0.0048)	(0.0013)
log expenditure in health per capita	Pooled data	0.013	0.005
		(0.0161)	(0.0031)
	Males	0.004	0.007***
		(0.0213)	(0.0039)
	Females	0.023	0.003
		(0.0261)	(0.0052)

cluster standard errors in parentheses / FE to canton (like a county) level / all monetary values expressed in December 2014 UDS
* p < 0.1, ** p < 0.05, *** p < 0.01

Table A5. marginal effect of remittances on anthropometric indicators (WAZ, HAZ, WHZ) for children aged < 5 by income and sex.

		(1)	(2)
	2SLS second stage	50% Bottom income	50% Top-income
Height-for-age z-score (HAZ)	Pooled data	-0.014	-0.000
		(0.0110)	(0.0023)
	Males	-0.025**	0.001
		(0.0128)	(0.0036)
	Females	0.004	-0.002
		(0.0200)	(0.0029)
Weight-for-age z-score (WAZ)	Pooled data	-0.001	-0.001
		(0.0119)	(0.0024)
	Males	-0.012	-0.005
		(0.0126)	(0.0032)
	Females	0.020	0.003
		(0.0230)	(0.0036)
Weight-for-height z-score (WHZ)	Pooled data	0.005	-0.002
		(0.0144)	(0.0026)
	Males	0.001	-0.006*
		(0.0174)	(0.0032)
	Females	0.016	0.004
		(0.0247)	(0.0048)

cluster standard errors in parentheses/ FE to canton level
* p < 0.1, ** p < 0.05, *** p < 0.01

Table A6

The effect of remittances on household expenditures per capita with children younger than five years old by urban or rural area and sex.

		(1)	(2)
	2SLS second stage	Urban	Rural
log consumption per capita	Pooled data	0.003***	0.006***
		(0.0010)	(0.0019)
	Males	0.004***	0.005**
		(0.0013)	(0.0023)
	Females	0.003*	0.009***
		(0.0016)	(0.0025)
log food consumption	Pooled data	0.002	0.005**
		(0.0010)	(0.0020)
	Males	0.003**	0.004
		(0.0012)	(0.0029)
	Females	0.001	0.006**
		(0.0019)	(0.0023)
log expenditure in health per capita	Pooled data	0.006*	0.005
		(0.0035)	(0.0069)
	Males	0.006	0.005
		(0.0040)	(0.0048)
	Females	0.005	0.007
		(0.0068)	(0.0070)

cluster standard errors in parentheses / FE to canton (like a county) level / all monetary values expressed in December 2014 UDS
* p < 0.1, ** p < 0.05, *** p < 0.01

Table A7. Marginal effects of remittances on anthropometric indicators (WAZ, HAZ, WHZ) for children aged < 5 by rural/urban area and sex.

		(1)	(2)
	2SLS second stage	Urban	Rural
Height-for-age z-score (HAZ)	Pooled data	0.000	-0.005
		(0.0030)	(0.0041)
	Males	0.001	-0.013**
		(0.0030)	(0.0061)
	Females	-0.003	0.005
		(0.0051)	(0.0060)
Weight-for-age z-score (WAZ)	Pooled data	0.002	-0.005
		(0.0029)	(0.0039)
	Males	-0.002	-0.010*
		(0.0040)	(0.0051)
	Females	0.007	-0.000
		(0.0045)	(0.0055)
Weight-for- height z-score (WHZ)	Pooled data	0.002	-0.005
		(0.0033)	(0.0045)
	Males	-0.005	-0.005
		(0.0048)	(0.0058)
	Females	0.011*	-0.006
		(0.0063)	(0.0062)

cluster standard errors in parentheses / FE to canton level
* p < 0.1, ** p < 0.05, *** p < 0.01