

# The Impact of Remittances on Infant Mortality in Mexico: A Research Design\*

Vidur Chopra<sup>†</sup>, Bodin Civilize<sup>‡</sup>, Sinaia Urrusti Frenk<sup>§</sup>

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## 1 Introduction

Amongst the many channels through which migration affects sending countries, remittances stand as the most prevalent potential source of development opportunities. Remittance flows are of critical importance for many developing countries' economies. Mexico is no exception: in 2007, remittances accounted for almost 3 percent of Mexico's GDP, surpassing inflows from foreign direct investment and tourism (Reyes, 2008). According to World Bank's estimates (Mohapatra *et al.*, 2008), Mexico is likely to have kept its position as the third largest recipient of remittance flows in 2008 among developing countries.

Remittances can enhance development through numerous mechanisms, some of which are parallel to the effect of any additional income source, such as government transfers. However, international remittances are in many ways different to other income sources. Most importantly, remittance transfers are likely to be less procyclical<sup>1</sup> to Mexico's economy. Moreover, their flows could be assigned to specific uses, such as long-term household investments, health, or education (Conway and Cohen, 1998; López-Cordova and Olmedo, 2007). For these reasons, the study of remittance income deserves attention as a topic in its own right within the development economics literature.

One important mechanism through which remittances can promote economic development is through their effect on health, the main topic of this paper.

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<sup>†</sup>vidur.chopra@yale.edu

<sup>‡</sup>bodin.civilize@yale.edu

<sup>§</sup>luzmaria.urrustifrenk@yale.edu

<sup>1</sup>The literature's findings on this topic are mixed. Some authors have found that remittances are countercyclical (Happe *et al.*, 2003; Ratha, 2003), others that they are acyclical (Kumar and Teele, 2009; Sayan, 2006).

Health improvements might come from many different channels which are difficult to disentangle. The most obvious of such channels is the direct effect of higher health expenditures and improved nutrition. Some other channels such as a reduction in female labor participation, household improvements, better sanitary infrastructure, or higher access to credit, are less direct. We have reasons to believe that remittances are very significant in terms of their impact on health in Mexico. Amuedo-Dorantes and Pozo (2004) find that almost half of remittance senders report health investments as the most important reason for sending remittances. If we include living expenses and food as indirect health-enhancing uses of remittance income, 76 percent of reported remittance-sending motives would be related to health improvements.

The positive effect of remittances could be reduced if households' available income is hurt as a result of high migration costs or a smaller labor force<sup>2</sup> (see, for instance, Airola, 2008). Dorantes and Pozo (2006) find that remittances might "defray migration related expenses" (Amuedo-Dorantes and Pozo, 2006: 222) and, at the same time, alter households' labor supply. Moreover, the household head's absence can have ripple effects on household dynamics (Acosta, Fajnzylber and López, 2007; Borraz, 2005; Calero *et al.*, 2008; Cox and Ureta, 2003; Hildebrandt and McKenzie, 2007; López, 2004). Migration could cause women to have less support in children's upbringing (see, for instance, Frank, 2005), and household head's migration could induce older children in the household to extend their labor services, leading to lower rates of school enrollment (Acosta *et al.*, 2007; Borraz, 2005; Calero *et al.*, 2008; López-Córdova, 2004).

Hildebrandt and McKenzie (2005), Kanaiupuni and Donato (1999), and López-Córdova (2004) have analyzed the impact of remittances and migration on infant mortality as an indicator of health outcomes in Mexican communities. Other studies, such as Acosta *et al.* (2007), attempt to use anthropometric measures of health for children such as height-for-age and weight-for-age. Regardless of the measure used, most studies have found better health outcomes for children from remittance-receiving households. For instance, Hildebrandt and McKenzie (2005) find that children in migrant households<sup>3</sup> have higher birth weights and are more likely to survive their first year of life<sup>4</sup>.

Kanaiupuni and Donato (1999) observed that the effect of migration on health, as on other development outcomes, might be time-dependent and varying at different stages of the migration process. Health might worsen in the

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<sup>2</sup>The labor surplus model (Lewis, 1956; Fei and Ranis, 1975) predicts that a smaller labor force will have no effect on household's income as a result of a smaller labor force because migrant-sending households adjust their work input to compensate for the loss of household workers, maintaining household income constant.

<sup>3</sup>We refer to migrant households as those that have had a member migrate to a foreign country.

<sup>4</sup>It should be noted, however, that Hildebrandt and McKenzie (2005) also find that migrant households are less likely to adopt preventive health care measures such as breastfeeding and vaccinations.

short-term as a result of migration, but subsequently increase as remittance flows become larger and more stable. In their analysis, they find that infant mortality increases during early stages of the migration process, but gradually decreases as the volume of remittances grows and migration becomes "institutionalized". Their finding of a non-linear relationship between migration and health outcomes highlights the potential impact that remittances have on migrant-sending households. In a macroeconomic-level analysis, Guillaumont, Korachais, and Subervie (2008) provide a similar insight: income (and, with it, remittance) growth has a different impact depending on whether it is stable or not.

## 2 The Model

Several issues arise when investigating the impact of migration and remittances on development outcomes, including health. Firstly, opportunities in the use of remittance income are not randomly distributed across households (Yang, 2005), causing their effect to vary depending on elements that are difficult to observe. Similarly, exogenous income shocks such as crop failure may induce the decision to migrate which in turn might affect health outcomes (Calero *et al.*, 2008; Hilderbrandt and McKenzie, 2007). In addition to the endogeneity problem and a possible omitted variable bias, estimations could suffer from a reverse causality problem where lower levels of development might influence the motivation to remit (Calero *et al.*, 2008; Dorantes and Pozo, 2006; Hilderbrandt and McKenzie, 2007; López, 2004).

To address these issues, we must instrument for the volume of remittances received. Some studies have exploited historic migration rates and distance from the U.S.-Mexico border as potential instruments of migration and remittance flows, respectively (Acosta, 2006; Acosta *et al.*, 2007; Borraz, 2005; Hanson and Woodruff, 2002; Hilderbrandt and McKenzie, 2005; López-Córdova, 2004; Mansuri, 2006; McKenzie and Rapoport, 2006 (a) and 2006 (b)). Indeed, historical migration rates and distances from the U.S.-Mexico border are correlated with the strength of migrant and social networks, rendering them an arguably appropriate instrument for migration. Nevertheless, they are not an accurate proxy of the volume of remittances because, even if migration prevalence and intensity follow historical patterns, they are not necessarily correlated to the size of remittances.

Amuedo-Dorantes and Pozo (2006) construct an instrument based on an alternative measure - the per capita count of Western Union offices in the state during the previous year - interacted with household members' education levels. Along similar lines, Ponce, Olivie and Onofa (2008) attempt to analyze the

impact of remittances on human development in Ecuador. Their research finds that the probability of receiving remittances varies with the ease with which banks and/or money-transferring agencies can be accessed. Estimates suggest that the presence of an institution which enables the transfer of remittances in the local community, increases the amount of remittances received by U.S. \$ 8 per month. These two studies are important as they set a precedent for the instrument we propose for this study.

The goal of the study is to draw upon and complement previous studies on the impact of remittances on one of many potential development outcomes: infant survival. The model we propose is the following:

$$IM_i = \alpha_i + \beta R_i + X_i' \gamma + \varepsilon_i \quad (1)$$

where  $IM$  is a dummy of whether household  $i$  had an infant die during the specified year,  $R$  is the amount of external remittances received by household  $i$  in that year, and  $X'$  is a vector of household  $i$ 's characteristics that includes household size, floor material, head's educational level, and whether other children are living in the household.

As explained above, the problem with equation (1) is that remittances are not exogenous. In order to infer causality, we must use an instrumental variable approach. We hope to contribute to the literature by incorporating a new instrument for remittances: distance from the household's community to the closest Western Union franchise interacted with household income. The main idea behind this instrument is that the further away a household is to a Western Union franchise, the smaller its remittance inflows will be because the costs associated with the receipt of remittances are higher. Our proposed instrument must satisfy two requirements. First, it must have no partial effect on infant mortality, our dependent variable. Second, it must be correlated with remittance flows but not with the error term in equation (1). Below, we address some potential critiques of our instrument.

One possible criticism is that the community-level distance measure might be correlated with general infrastructure development which in turn is correlated with infant mortality. This omitted variable criticism can be addressed by including health and general infrastructure variables in the exogenous regressor set of the first and second stages. A second potential criticism concerns the identification condition. Given that the distance to the closest Western Union franchise is likely to represent a higher cost to poorer households, we can include the main effects of such distance and income level variables and use their interaction as the excluded instrument. By doing so, the distance to the closest Western Union franchise can be included in the first and second stages as a control variable. This will allow us to test the overidentifying restrictions since we

no longer have to assume that distance to the closest Western Union franchise is excludable.

### 3 Data and Variables

Our approach will be tested using Oportunidades' ENCEL 1998, 1999 and 2000 rural datasets. The sample is not representative at the national level - it pertains to rural households in marginalized communities eligible to receive benefits from the Oportunidades program in seven Mexican states (Guerrero, Hidalgo, Michoacán, Puebla, Querétaro, San Luís Potosí, and Veracruz). In ENCEL 2000 the survey asks whether an infant in the household has died in the last five years. We will use this information to reconstruct infant mortality for each year since 1995. Using ENCEL 1998 and 1999, we will do a cross-section analysis explaining infant mortality in 1999. Our analysis will focus on those households surveyed that have had a member migrate anytime between 1992 and 1999. We do this sample selection because we are interested in comparing migrant households that receive remittances with migrant households that do not.

We will also test our results using data from the latest National Demographic Dynamics Survey of 2006 (ENADID 2006) carried out by the National Institute of Statistics, Geography, and Informatics (INEGI), the National Population Council (CONAPO), the Ministry of Health, and the National Institute of Public Health. The ENADID 2006 is representative at the national level and includes rural and urban households from all Mexican states.

### 4 Hypothesis

The effect of remittances on infant mortality will depend on how households employ remittance income. Using the instrument for remittances presented in this research design, we expect our results to confirm previous findings in the literature: infant mortality will be less prevalent in remittance-receiving migrant households.

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