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Impact of Temporary External Migration & Remittances on Child Health Outcomes in Punjab, Pakistan

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Preface

The Centre for Research in Economics and Business (CREB) was established in 2007 to conduct policy-oriented research with a rigorous academic perspective on key development issues facing Pakistan. In addition, CREB (i) facilitates and coordinates research by faculty at the Lahore School of Economics, (ii) hosts visiting international scholars undertaking research on Pakistan, and (iii) administers the Lahore School's postgraduate program leading to the MPhil and PhD degrees.

An important goal of CREB is to promote public debate on policy issues through conferences, seminars, and publications. In this connection, CREB organizes the Lahore School's Annual Conference on the Management of the Pakistan Economy, the proceedings of which are published in a special issue of the Lahore Journal of Economics.

The CREB Working Paper Series was initiated in 2008 to bring to a wider audience the research being carried out at the Centre. It is hoped that these papers will promote discussion on the subject and contribute to a better understanding of economic and business processes and development issues in Pakistan. Comments and feedback on these papers are welcome.

Since the second half of 2018 we have had issues with our regular editing services, as a result of which there has been a growing backlog of working papers that had been approved by the editorial committee. To avoid further delays in dissemination of the ongoing research, we decided to publish approved but unedited working papers online. Working paper No 03-18, December 2018 was the first such paper.

Impact of Temporary External Migration & Remittances on Child Health Outcomes in Punjab, Pakistan

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ABSTRACT

Primary motive of temporary migration in developing countries like Pakistan is generally in response to the income constraint faced by the households. Therefore, to relax the resource constraint, migrants tend to remit back to their families in home countries. This study attempts to look at the impact of temporary external migration and remittances on child health outcomes as measured by height-for-age (HAZ) & weight-for-age z scores (WAZ) in Punjab, Pakistan. Further, we test for the presence of intra household resource allocation bias where boys get preferential treatment in term of health care as compared to girls. Using historic migration rates and number of banks in each district to instrument for external migration and remittances from overseas, respectively, we employ an Instrumental Variable Approach estimated through Two Stage Least Square and Treatment Effect Model. Our results suggest significant positive impact of external migration and remittances on both the indicators of child health outcomes. Further this study confirms the presence of increased bargaining power of women in households headed by females resulting in a greater share of resources being spent on girls relative to boys.

Keywords: External migration, Child Health, Health Outcomes, Resource Allocation Bias, Treatment Effect Model, Bargaining power

1.INTRODUCTION

The implications of migration on economies vary according to the prevailing socioeconomic conditions of host and destination countries. Generally, the income differentials that persist between developed and developing countries is a major reason for external migration. Pakistan is one of the populous countries in the world with rising labor force. Over the past several years, migration from Pakistan to other developing countries is aimed at seeking better economic opportunities and improving the lives of the families left behind.

From a microeconomic perspective, effects of migration on households and communities can be complex. Generally, individuals migrate because of economic constraints or lack of access to the credit markets in the home country. So, migrating individuals tend to maintain economic interactions with the families left behind (Stark & Bloom,1985). These interactions are in terms of remittances which help families ease their credit constraint and to enhance the level of investment in the human capital of children left behind. Human capital of children left behind is affected by migration in several different ways. Child's health and nutrition is one aspect of human capital which has gained a lot of attention. Lack of nutrition early in life during the developmental period can have severe consequences for the child in the long term. Several studies state that child's health can have implications for educational outcomes later in life for children in developing countries like Pakistan (Alderman et al.,2001).

Pakistan is a developing country where along with other social problems, child malnutrition and high infant mortality is widespread. Malnutrition among children has several health effects, which include increased risk of illness and lower levels of cognitive development. Pakistan's performance regarding the child nutritional status is not satisfactory and the measures of nutritional status of children less than five years of age, stunting¹ and wasting², have shown a deteriorating trend over the years (Arif et al.,2012). In Pakistan, about 35% of child deaths are linked to malnutrition (UNICEF,2011).

The state of child health conditions in Pakistan have been at the periphery of developmental landscape.³ The most significant social issue is the prevalence of child malnutrition. Child malnutrition is

¹ According to World Health Organization, stunting is characterized by impaired growth and development that children experience from under nutrition and repeated exposure to infections which then results in a lower height for age.

² Wasting is a symptom of acute malnutrition due to insufficient food intake and high incidence of infectious diseases resulting in a lower weight for age for a child (WHO, 2010).

³ It has the eighth highest newborn death rate in the world where from 2001-2007, one in every ten children born died before reaching the age of five years (Afzal & Yusuf, 2013). Pakistan's performance in achieving MDGs related to health conditions of

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a key factor that leads to illness and death among young children and it's considered to be an important factor causing half of the deaths of children globally (Cheah et al., 2010). According to the report issued by UNICEF, 1200 children under five years of age die every day in Pakistan and more than a third of these deaths are related to malnutrition. Around 43% of the children suffer from chronic malnutrition and more than 15% from acute malnutrition (UNICEF,2012). According to the National Nutrition survey held in 2011, indicators of malnutrition including stunting and wasting had worsened since 2001 survey.

Figure 1 (See Appendix) shows the prevalence of malnutrition in Pakistan for children less than 5 years of age issued by National Nutrition Survey (2011). The figure clearly demonstrates the prevalence of stunting and wasting for both the rural and urban areas of Pakistan where stunting is higher in rural areas as compared to urban areas. Stunting reflects long term nutritional status of children and its adverse effects are expected to continue throughout life. It shows that around 46% of stunted children are residing in rural areas as compare 37% in urban areas. These numbers clearly demonstrate that the children living in rural areas are more likely to be severely malnourished because of lack of availability of resources in those areas.

The purpose of this study is to unveil the impact of temporary external migration and remittances separately on two indicators of early child growth (weight for height z-score and height for age z-score) since very young children are vulnerable to shocks with substantial long term health consequences. There is a vast majority of evidence regarding the migrants remitting back to source country which helps ease the credit constraint of the households in the receiving country.⁴ This paper will confirm the fact that whether migration and remittances promote human capital development in terms of health care in Pakistan or the cash flows generated through migration facilitates consumption pattern of the receiving households. Further, based on the recent work done in context of intra-household resource allocation bias where substantial male preference exists, this study explores any extra benefits to girls in terms of health care in the migrant sending and remittance recipient households.

This paper is divided into five sections. After the introduction, the second section gives a brief review of the existing literature focusing on the impact of migration on indicators of child health outcomes. Third section discusses the theoretical framework of the study followed by the econometric model, methodology & specification issues, data sources and descriptive statistics in the fourth section. Section five discusses the first stage results- impact of historic migration rates on current external migration. Section six outlays

children is not satisfactory. In South Asia, Pakistan has highest mortality rate for children and women. According to the recent estimates, in under five category, 38 percent of children are underweight while 12 percent are severely underweight (Khan,2012)

⁴ Several studies confirm the fact that remittances received by the households are spent on consumption of goods and services along with human capital accumulation (Cox & Ureta,2003; Hanson & Woodruff,2003; Yang ,2004; McKenzie and Rapoport ,2005; Acosta,2006; Mansuri,2006; Arif & Chaudhry, 2011)

the main results of our study; impact of temporary external migration & remittances on child health outcomes. Further this section tests for the intrahousehold resource allocation bias. Lastly, Section 7 presents the conclusion of the study.

2.LITERATURE REVIEW

Several studies have looked at the impact of external migration and remittances on child health outcomes. Most of these studies confirmed the idea that generally remittances ease the financial constraint of the households in the origin country by providing them access to credit where remittances act as a mechanism to smooth consumption pattern of the households but on the other hand due to the process of migration, parental absence generally leaves children with access burden and the lack of monitoring makes children worse off. With the father's migrating, there is an excess burden on mothers within the household increasing workload for them leading to mother's unavailability.

Several studies have looked at the impact of remittances on child's health using anthropometrics measures. Acosta et.al (2007) examined the relationship between remittances and child's health using anthropometric measures i.e. weight for age and height for age z-scores in Latin America. By employing multivariate analysis on children less than five years of age, they concluded that children in remittance recipient households are far better than children in non-recipient households.

International remittances are considered as an important source of relaxing income constraint of the migrant households. De & Ratha (2012) in a study used household data from Sri Lankan Integrated survey to see whether remittances reduce income constraint of the recipient households. The study found that remittance income improved child's health outcomes i.e. weight, height and BMI but there is no such evidence that households use remittance income to buy durable assets.

In a research report on Albania and Macedonia, countries that are characterized by high emigration rate and remittance dependence, the authors examined the impact of migration on child health status in both countries. The results indicate that migration has positive effect on child health in Albania and it negatively affects child health in Macedonia.⁵

⁵ The difference in results could be due to the differences in destination countries to which they migrate (Albanian Centre for Socio-Economic Research, Impact of migration on child growth in Albania and Macedonia, 2013).

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Ponce, Olivie & Onofa (2011) evaluates the impact of remittances on health outcomes in Ecuador. An instrumental variable approach is applied by using two IV's⁶. The results of the study indicate that remittances do not have a significant impact on child health outcomes, but it does impact the health expenditures i.e. medical expenditures which people make when they are sick.

Mansuri (2006) in a study examined whether resource inflows due to migration allow households to provide better health care and nutrition to girls.⁷ Using Instrumental variable approach, the study concluded that migration has a substantial impact on child health outcomes (weight for age and height for age z-scores) for young girls.

Impact of migration both in terms of remittances and whether the family has a migrant member have an impact on child health outcomes. Hildebrandt et al. (2005) examined the impact of migration on two indicators of child health: infant mortality and birth weight. Using the instrumental variable approach, the study concludes that migration from Mexico to United States improves child health outcomes resulting in lower infant mortality and higher birth weight.⁸

Langworthy (2011) estimates the relationship between remittances and parental time on child health as measured by height for age and weight for age z-scores. The results indicate that both remittances and parental time have implications for child health. Parental absence has negative impact on child health which could only be compensated if migrants send significant amount of remittances back home.

Hamilton & Choi (2014) examined the relationship between migration and infant health in Mexico. They found that the impact of migration on health differs depending on the dimension of migration and measures of health being used.⁹

The impact of migration on child health could be due to the benefits that accrue to migrants or it could be the result of positive health selection of migrants. By using binational data from Mexico and US, Hamilton & Choi performed selection analysis and concluded that infants born to Mexican immigrants have

⁶ A vector of variables that include two dummies for the source country (Spain and United States) and availability of banks and money transfer institutions.

⁷ Intra- household resource allocation shows gender differences in the allocation of resources whenever household face income shocks

⁸ Historic migration networks and pattern of development of railroad system are used as an instrument for current level of migration

⁹ The community remittances and return migration are associated with lower risk of low birth weight but they are associated with higher risk of macrosomia. On the contrary, out migration is linked with lower risk of macrosomia but higher risk of low birth weight

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birth weight lower than the infants born to US born mothers and their birth weight is lower as compare to their counterparts born in Mexico. They further confirmed the selection hypothesis by stating that Mexican migrants originate from areas that are advantaged in terms of infant health.

In a study done by Frank & Hummer (2002), they analyzed the relationship between U.S. migration experience and the risk of low birth weight. By applying logistic regression analysis, their study concludes that having membership in migrant household reduces the risk of low birth weight.¹⁰ Narazani (2013) in a study examines the role of migration in reducing infant mortality in Albania. Using the Albanian Demographic and Health Survey (2008-09), the study looked at the impact of migration on fertility decisions and infant mortality. The results suggest that migration has no significant impact on fertility decisions, but migrant households have lower levels of infant mortality than non-migrant households.¹¹

Father's migration can have both positive and negative effects on child health. Schmeer (2009) in a study utilizes longitudinal data from Mexico to assess the impact of father's migration on child's illness in rural households. Both the state and individual level fixed effects support the findings that odds of children being ill are higher when parents are absent in the household.¹²

Adhikari et al. (2012) studies the impact of parental migration¹³ on the physical health of children left behind. Both bivariate and multivariate analysis indicates that having a single parent migrated is associated with higher likelihood of illness than with both or no parent migrating.¹⁴

Robson et al. (2008) investigated the impact of parental absence on nutritional status of children left behind who are younger than 7 years of age in some rural places in china. Results of the study suggest that the nutritional intake of children left behind is relatively low and they have poor nutritional status than children living with their parents.¹⁵

Brockerhoff (1994) in a study estimates the relationship between maternal rural urban migration and the survival chances of children under two years of age. The results indicate that children whose

¹⁰Their study incorporates low birth weight rather than infant mortality as a measure of health because of the lack of data on infant deaths

¹¹ UNICEF considers infant mortality as one of the indicators which determines the degree of socio-economic development within a country

¹² The sample chosen for the study includes children aged (0-5) years and the measures used for child illness includes any illness and diarrhea

¹³ Parental migration is often associated with mother, father or both migrating in search of better job opportunities leaving their children in care of others. Mostly this phenomenon of parental migration is seen in terms of parents remitting back to the country of origin, but little has been discussed in terms of its impact on children left behind.

¹⁴ The study uses data from 2007 survey of migration and health form Kanchanaburi, Thailand and a total of 11,241 children were included in the survey with one or both parents migrating

¹⁵ Several anthropometric measures including weight for age z-scores and height for age z-scores are used in the analysis.

mothers have migrated have higher levels of infant mortality than children of women who stayed back in the village.

We have incorporated two instrumental variables; historic migration rates and number of banks in each district to gauge the impact of migration and remittances on child health outcomes. Further, we have tried incorporating all the relevant control variables into our analysis for precise results.

3. THEORETICAL FRAMEWORK

Impact of migration on child wellbeing can be identified through many potential channels. The Grossman's Model of Health Production Function provides a framework for how age, education, health status and income influence the production of health through the demand for health capital. Grossman's model is based on the idea that how consumers allocate their resources to produce health. According to this model, health of a particular child i at a time t can be represented as:

$$H_i = F(M_i, K_i, T_i, B_i, \epsilon_i) \quad (1)$$

Where M_i represents the nutritional and medical inputs into the health of the child i , T_i shows time inputs of the parent, K_i is the parental health knowledge, B_i is the genetic endowment and ϵ_i is the random health shock. In Grossman's model, health is considered both as an investment and consumption good. The impact of migration on child health could be seen as changes in M , either by changing diets or access to health care or changes in K when migrating parents gain more knowledge when abroad (Stillman, 2009). The changes in M could only be brought if the income level changes for a household. The availability of financial resources could not be directly incorporated into the production function but can only be seen by changing either M or T . Changes in income will relax the financial constraint of the household and will help in purchasing better and more nutritious inputs (Hildebrandt & McKenzie, 2005).

4. ECONOMETRIC MODEL FOR ESTIMATING THE IMPACT OF MIGRATION & REMITTANCES ON CHILD HEALTH OUTCOMES

In order to assess the impact of migration and remittances on child health, Grossman's Model of Health Production Function provides a basic framework in order to gauge the impact of age, parental education, health status and income of the households that might influence the production of health through the demand for health capital. Following the Grossman's Model, we can derive an econometric model relating the child's health with the migration status of households. A simple version of equation (1) where the health of a particular child i at a time t can be represented as:

$$\mathbf{CH}_{it} = \mathbf{X}_{it}\boldsymbol{\beta}_t + \mu_t \quad (2)$$

Where \mathbf{CH}_{it} are the child health variables i.e. HAZ and WAZ. For measuring child health outcomes, several measures have been discussed in literature¹⁶

The vector \mathbf{X}_{it} includes all the control variables which might influence the health of the child. These control variables include individual characteristics of the child¹⁷, maternal characteristics¹⁸,

¹⁶ Robson et al.(1974), World Bank (2006), Albanian Centre for Socio-Economic Research, Tirana (2013), Acosta et al. (2007), De & Ratha (2012), Ponce & Olivie (2011) and several other studies have used these measures of child health while estimating the impact of migration and remittances on child health. So, we have incorporated these two measures of child health for our analysis.

¹⁷ Child's individual characteristics include the age and gender of the child. Both variables help in determine the health status of a child. Pakistan is a developing country where there is a presence of gender disparity among boys and girls, so the gender dummy has also been incorporated into the analysis in order to see which gender's health is being mostly compromised or benefited by migration of the household member

¹⁸ Maternal characteristics are an important indicator that impacts the health of the child. Educated mothers can have better knowledge of the child rearing practices which helps them in raising healthier children (Glewwe,1999). Along with the mother's education, information regarding mother's marital status has also been included into the analysis. Family disruptions like divorced mothers or households with solo female heads can have an impact on the child's health. (Hamilton & Choi, 2015).

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health inputs¹⁹, household characteristics²⁰, health environment, parental health knowledge²¹, household's asset composition²² and locational/geographical characteristics²³.

After incorporating all of the variables discussed above, following equations can be estimated:

$$CH_{ghi} = \beta_0 + \beta_1 C_{ghi} + \beta_2 M_{ghi} + \beta_3 HI_{ghi} + \beta_4 X_{hi} + \beta_5 V_{hi} + \beta_6 W_{hi} + \beta_7 U_{hi} + \beta_8 EM_{ghi} + \mu_{ghi} \quad (3)$$

$$CH_{ghi} = \beta_0 + \beta_1 C_{ghi} + \beta_2 M_{ghi} + \beta_3 HI_{ghi} + \beta_4 X_{hi} + \beta_5 V_{hi} + \beta_6 W_{hi} + \beta_7 U_{hi} + \beta_8 R_{ghi} + \mu_{ghi} \quad (4)$$

The two equations above incorporate all the factors that might influence the child health. Equation (3) looks at the impact on child health when we have an external migrant in the household. Equation (4) looks at the impact of remittances on indicators of child health. We repeat the analysis

¹⁹ Health inputs which are being provided to the child at the time of delivery or at an early age acts as important indicators for the health of the child later in life. Health inputs which include whether the child has been delivered by a doctor, whether he/she has been breastfed by the mother or has received all the vaccines have been incorporated into the model. The purpose of adding these health inputs into the analysis is to see the impact of these early life health inputs on child's health later in life (McKenzie, 2004).

²⁰ Majority of the literature has talked about child health being influenced by household characteristics which include the father's education, households total income, the total number of household members, the number of younger children in a household and the number of children dead in a particular household. As MICS doesn't provide any information regarding the father's education, so we have used household head's education as a proxy for father's education. The household income is likely to have an impact on child health status as it intuitively suggests that family's income is a proxy for household's available resources and higher income is likely to result in more expenditure devoted to health inputs and consequently improved health outcomes. Kuehnle (2014) finds a significant positive relationship between income and child health. Our dataset has no question that inquires directly regarding the total household income, so we have used the wealth score and household's asset composition as a proxy for household income. The wealth score is being constructed using Principal component analysis using information on consumer durables, dwelling characteristics and all other factors that might determine the household's wealth status (MICS, 2011). The number of children under five years of age and the total number of children surviving might acts as a constraint on the household's present resources so both variables have been included into the analysis.

²¹ In order to assess the knowledge of household members regarding health, we have incorporated few variables into our analysis that directly gives us idea about how conscious the individuals are regarding health-related issues. Our data suggests that only 31% of the households are aware of HIV/AIDS and very few people are aware of basic health necessities like treating water before making it available for drinking ((Chaudhry & Afzal, 2012).

²² Household income is an important indicator which helps to ease the credit constraint of the household members Our dataset does not provide any information regarding the income earned by the households, so we have added asset composition of the households as well as wealth scores that act as proxy for household income (Chaudhry & Afzal, 2012).

²³ We have added urban dummy into the analysis to see the impact on child health if the households are in urban areas. This locality factor is important because households located in urban area or city has more access to health facilities like hospitals or child health clinics where accessibility is not an issue in case of emergency. Moreover, urban areas are better equipped with basic health facilities as compared to rural areas.

for the two indicators of child health separately for boys and girls age (0-59) months. For this purpose, next we divide the dataset for boys and girls and then run the regression separately for two groups in order to see whether migration and remittances affect male child differently as compared to female child in a migrant household.

\mathbf{CH}_{ghi} looks at the health of child g in household h living in a district i . \mathbf{C}_{ghi} is a vector of child characteristics, \mathbf{M}_{ghi} is a vector of maternal characteristics, \mathbf{HI}_{ghi} is a vector of health inputs, \mathbf{X}_{hi} is a vector of household characteristics, \mathbf{V}_{hi} is a vector of health environment prevalent within a household, \mathbf{W}_{hi} is a vector of parental health knowledge, \mathbf{U}_{hi} is a vector of household's asset composition.

\mathbf{EM}_{ghi} is introduced to incorporate the effect of external migration which is a dummy variable equals to 1 if we have an external migrant within the household and 0 otherwise. \mathbf{R}_{ghi} stands for remittances from overseas which is a continuous variable and captures the impact of monetary amount of remittances received by households. MICS (2011) does not provide any information regarding which family member has migrated and to which city or country. So, our analysis does not incorporate the effect of parental absence from the household and its consequences on child health.²⁴

Our analysis incorporates two measures of child health which are deviation of child's long term and current nutritional status from the household mean values as measured by standardized z-scores for height for age (HAZ) and weight for age (WAZ) for children 0 to 59 months of age. Height for Age is a measure of linear growth whereas the Weight for Age is a measure of acute and chronic malnutrition. As identified by our dataset, the height for age and weight for age variables are expressed in the form of z-scores and are recommended by World Health Organization (WHO) and National Center for Health Statistics (NCHS).

²⁴ Migration and remittances can positively or negatively influence the health of the children left behind. Two mechanisms work in opposite direction in households where we have migrants. Firstly, migration can increase the household income resulting in availability of more resources for the children of migrants left behind in the home country. The remittance amount helps in easing the income constraint on the households which enable them to make investments in terms of human capital. Secondly, when any member of the household migrates, that may generate a short term reduction in the current income linked to migration costs such as travel, resettlement and unearned income (Koechlin,2007) .Moreover migration generally disrupts family life putting emotional stress on the children left behind . With migration of either of the parent, children are left with less supervision and are forced to take up more household work (Ponce & Olivie , 2011) .

For the purpose of standardized analysis, these z-scores represent comparison of sampled children with the reference population of same age and gender (de Onis & Blossner, 2003).

4.1 METHODOLOGY & SPECIFICATION ISSUES

For the purpose of estimation, simple econometric modeling techniques like OLS²⁵ will be considered. While testing our main hypothesis relating migration to child health outcomes, an important question that tends to arise; differences occurring in child health outcomes between migrant and non-migrant families can entirely be attributed to the process of migration or there might be some external factors that are affecting both the child health outcomes and migration. ²⁶The use of OLS as a modeling choice will lead to biased results because of the following reasons:

4.1.1 Omitted Variable Bias:

Firstly, there appears the problem of omitted variable bias because of the presence of several child and household characteristics that are not observable. So, in order to reduce some of the bias caused by omitted variables, we have incorporated several child related, mother related, household related, demographic and socio-economic factors that are related to the health of the child.

4.1.2 Endogeneity of Migration variable:

Secondly, there is possibility of endogeneity where the observed variables are correlated with the error term and health outcomes of the child simultaneously. In order to deal with the problem of endogeneity, this study will make use of Instrumental Variable Approach. A strong instrument can deal with the problem of endogeneity, omitted variable bias and measurement error.²⁷

²⁵ OLS will be used to perform regression by considering child health outcomes as main variable of interest in the regression with migration status & remittances received from overseas as main independent variables.

²⁶ Several externalities like bad economic conditions, disease outbreaks or crop failure in the home country might trigger both the process of migration along with worsening the prevalent health conditions of the children (Hildebrandt et al., 2005).

²⁷ Different studies have employed several different instrumental variables to deal with the problem of endogeneity. Munshi (2003) used rainfall in Mexican villages as an instrument for migration. In a study on the impact of community level migration on birth weight in Mexico, Hamilton & Choi (2014) used state historic migration rates as an instrument for contemporary community migration. Langworthy (2011) used a dummy variable indicating whether the mother was originally from the community and the proportion of households surveyed within a community who received remittances as an instrument for remittances. Mansuri (2006b, c) & Acosta (2006) have used migration networks and migration history at the village or household level as instruments for migration. They proposed that that these variables have a positive impact on migration but no effect on income, schooling or nutrition of children back home. While measuring the impact of migration on child health, Mansuri (2006) used household

4.1.3 Household Income Differentials:

Thirdly, when migrant families are compared with the non-migrant families, the migrant households do not act as a random sample. This is due to the presence of distinct differences between the income levels of both the groups. In order to deal with this problem, wealth score and households asset composition are added into the analysis. The household's asset composition does not depend on the current income level and is independent of the process of migration (Chaudhry & Arif, 2010). We have incorporated both asset composition and wealth score into our analysis.

4.2 Treatment Effect Model

We have used another model to estimate the effect of migration on child health measures. The main reason for using treatment model is that our endogenous variable i.e. external migration (whether you have an external migrant in the household or not) is a dummy variable. With binary endogenous variable, IV approach might not give efficient estimates (Khandker et al., 2009). The standard IV 2SLS approach is applicable to situations with linear and continuous treatment and outcome but in case of binary endogenous variable, IV 2SLS estimates are obtained at a greater efficiency loss (Deb & Seck, 2009).²⁸

4.3 Model for Estimation:

For equations (3) & (4) , we have used two set of instruments for our endogenous variables: External Migration and Remittances. We derive the following two econometric equations:

composition as an instrument for current migration. Hildebrandt et al. (2005) while estimating the impact of migration on child health used historic state level migration networks as an instrumental variable for current migration.

Ponce, Olivie & Onofa (2011) used two instrumental variables for remittances. Firstly, they used a dummy variable equals to 1 if parish has any bank or money transfer institution. Secondly, they include two dummies for source country (Spain and United States). While examining the impact of remittances on income changes in Philippine households, Yang (2005) used rainfall shocks as an instrumental variable for remittances. Civilize & Frenk (2009) used the distance between each household locality and its closest western union as an instrument for remittances. Antón (2010) in a study on the impact of remittances on nutritional status of children in Ecuador used two set of instruments: the number of Western Union offices per 100,000 people at province level as an IV for remittances and proportion of households with migrants by province in 2003 as a proxy for migration networks abroad.

²⁸ Treatment regression estimates the effect of binary endogenous variable on the outcome of interest conditional on a set of exogenous variables (Bartram, 2014). The model estimates two regressions simultaneously where a probit-type treatment equation is estimated for the endogenous dummy and linear or probit regression is estimated for the outcome variable. Very few studies have used Heckman's Treatment effect model relating migration to happiness and several indicators of human development (Bartram 2014, Deb & Seck, 2009).

$$CH_{ghi} = \beta_1 \widehat{EM}_{ghi} + \beta_2 C_{ghi} + \beta_3 HI_{ghi} + \beta_4 X_{hi} + \beta_5 V_{hi} + \beta_6 W_{hi} + \beta_7 U_{hi} + \mu_{ghi} \quad (5)$$

$$CH_{ghi} = \beta_1 \widehat{R}_{ghi} + \beta_2 C_{ghi} + \beta_3 HI_{ghi} + \beta_4 X_{hi} + \beta_5 V_{hi} + \beta_6 W_{hi} + \beta_7 U_{hi} + \mu_{ghi} \quad (6)$$

CH_{ghi} represents the child health outcomes, \widehat{EM}_{ghi} and \widehat{R}_{ghi} represents fitted values of external migration and remittances from first stage regression, C_{ghi} is a vector of child characteristics, M_{ghi} is a vector of maternal characteristics, HI_{ghi} is a vector of health inputs, X_{hi} is a vector of household characteristics, V_{hi} is a vector of health environment prevalent within a household, W_{hi} is a vector of parental health knowledge, U_{hi} is a vector of household's asset composition.

4.4 Data

We have performed a cross sectional analysis using District based Multiple Indicator Cluster Survey (MICS) 2011. MICS is a household level dataset which covers all 36 districts of Punjab including 9 divisions and 150 tehsils comprising of 95,238 households covering both rural and urban areas. Further, in chosen households, all women aged 15-49 years and children under five years of age (0-59) months were selected.

4.4.1 Migration & Remittances:

For our analysis, the data on whether the household has an external migrant and amount of remittances received by households is all part of MICS (2011) questionnaire. Information related to all the control variables which includes child's characteristics, maternal characteristics, household's characteristics etc. are all part of MICS survey.

We have used two instrumental variables for our analysis i.e. historic migration rates and number of banks in each 36 districts of Punjab. For the purpose of calculating historic migration rates, we have taken the data from Bureau of Emigration and Overseas Employment in Pakistan (BEOE). Historic migration data covers a period of 31 years from 1981-2011 and are calculated by dividing the number of individuals migrated from a particular district by number of individuals in that particular district (Chaudhry & Arif,2011). And for our second Instrumental variable, we have acquired the data on number of banks in each district from State Bank of Pakistan. We have only accounted for those 25 banks which are registered

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under the State Bank's Pakistan Remittance Initiative (PRI)²⁹. The historic migration rates and number of banks in each district are interacted with number of adult male members in each household to obtain variation at the household level (Mansuri,2006).

4.4.2 Child Growth Measures:

We have used two child growth measures identified by our dataset as height for age(HAZ) and weight for age (WAZ) and are expressed in the form of z-scores and are recommended by World Health Organization (WHO) and National Center for Health Statistics (NCHS). The measures of child health (HAZ & WAZ) are already being generated by MICS (2011) according to NCHA and WHO standards.³⁰ We focus on children under 5 years of age (0-59) months. Height for Age is a measure of linear growth whereas the Weight for Age is a measure of acute and chronic malnutrition. The sample of children used for analysis is confined to those with z-scores in the range $-6 > \text{HAZ} > 6$ & $-6 > \text{WAZ} > 5$.³¹

4.4.3 Control Variables:

The control variables used in this study are the ones that are primarily supported by literature on migration and child health outcomes. Several studies have incorporated several socioeconomic characteristics that impact the child's health and nutritional outcomes.³²

Inclusion of different variables used for the purpose of analysis is also dependent on its availability in MICS (2011) dataset. Within the set of controls; the health environment vector includes all the initiatives

²⁹ Pakistan Remittance Initiative (PRI) is established in 2009 and it's a joint initiative taken by State Bank of Pakistan, Ministry of Overseas Pakistanis and Ministry of Finance. The purpose of such an initiative is to provide for an ownership structure in Pakistan for remittance facilitation. Its purpose is to facilitate faster, cheaper and efficient flow of remittances

³⁰ Z-score values for height-for-age and weight-for-age are used in the analysis. Children's height and weight are standardized according to the following formula: $Z = (x - \mu)/\sigma$, where x is the raw score and μ and σ are the mean and standard deviation, respectively (World Health Organization, 2010). If we take an example of WAZ of a child, it's actually the difference between the weight of the child and the median weight of the reference population of the same age and sex, divided by the standard deviation (SD) of the weight of same group of children: $\text{WAZ} = \frac{W_i - W_r}{\text{SD}}$ (Arif et al, 2012)

³¹ For more accurate results, we are following WHO z-scores technique where z-scores that fall within an improbable range of standard deviations are flagged and dropped from the analysis. The flagged ranges are $\text{HAZ} < -6$ and $\text{HAZ} > 6$, and $\text{WAZ} < -6$ and $\text{WAZ} > 5$ (World Health Organization, 2010)

³² A study done by Haddad & Hoddinott (1994) on the impact of women's income on the anthropometric status of children in Cote d'Ivoire found that child's age, income earned by females within a household, access to medical facilities, mother's age and education level have significant impact on child's height for age and weight for age. While studying the impact of family structure on child's health, Desai (1992) found that child's age, parental education, number of siblings and household's wealth composition has significant impact on the child's height for age. A study done by Handa (1999) relating maternal education and child height in Jamaica found child's age, mother's education and the household income as important variables in determining child's height for age

taken at the household level in terms of water availability for hand washing; water filter as well as water treatment. The equation also controls for locational factors. The set of household characteristics include number of individuals living in the household. For maternal characteristics, the paper includes mother's marital status and education of the mother within the household and number of surviving and dead children. There are multiple household level as well as community level characteristics that can have a substantial impact on the child health status through various channels. Most studies which estimate the health production function tend to include household and community level characteristics as potential controls in the health production function equation. Along with other factors, household income is likely to have an impact on child's health because it acts as a proxy for resources available at household level.

4.5 DESCRIPTIVE STATISTICS

Using MICS (2011) data for Punjab, Table 1 demonstrates the mean z-scores for two variables; Height for Age (HAZ) and Weight for Age (WAZ)³³. Height for Age is a measure of linear growth whereas the Weight for Age is a measure of acute and chronic malnutrition.

Table 1: Nutritional status of children in Punjab (0-59 months)

DEPENDENT VARIABLES	Obs	Mean	Std. Dev.	Moderate (-2 to -2.99 SD)	Severe (<-3 SD)
Height for Age z-score	61629	-1.45521	1.526028	34.70%	14.30%
Weight for Age z-score	61629	-1.48519	1.19759	31.20%	10.13%

Source: Based on author's calculation

These mean z-scores for Height-for-Age variable indicates that on average, a child less than 5 years of age in Punjab is 1.45 standard deviations below the median for a child of the same gender and age from the reference population. About 35% of children in our sample are moderately stunted whereas 14% of children are severely stunted i.e., below -3 SD of the reference population (WHO,2010). Stunting is an indication of chronic malnutrition due to lack of nutrition for a considerably long time and it also indicates the persistence of chronic illness. The mean score Weight-for-Age variable in the sample is 1.48 which means that on average a child is 1.48 standard deviations less than an average child of the same sex and age from the

³³ Z-score values for height-for-age and weight-for-age are used in the analysis. Children's height and weight are standardized according to the following formula: $Z = (x - \mu)/\sigma$, where x is the raw score and μ and σ are the mean and standard deviation, respectively (World Health Organization, 2010). If we take an example of WAZ of a child, it's actually the difference between the weight of the child and the median weight of the reference population of the same age and sex, divided by the standard deviation (SD) of the weight of same group of children: $WAZ = \frac{W_i - W_r}{SD}$ (Arif et al, 2012)

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reference population. Around 31% of children are moderately underweight and 10% are severely underweight which is less than HAZ estimates.³⁴

Table 2: SUMMARY STATISTICS OF ALL THE VARIABLES

DEPENDENT VARIABLES	Obs	Mean	Std. Dev.
Height for Age Z score	61629	-1.45521	1.526028
Weight for Age Z score	61629	-1.48519	1.19759
INDEPENDENT VARIABLES			
Migration	61624	0.152213	0.359231
External Migration	61629	0.06299	0.242947
Remittances	3194	477021.7	1606746
Child's Characteristics			
Age of Child in Months	61629	29.05751	17.11174
Childs Gender (female=0,male=1)	61629	0.510782	0.499888
Number of children in HH	61629	2.091029	1.074415
Maternal Characteristics			
Mother's Education_Primary	61629	0.190495	0.392695
Mother's Education_Middle	61629	0.100667	0.30089
Mother's Education_Secondary	61629	0.129225	0.335451
Mother's Marital Status	61629	0.977478	0.148375
Children Surviving	61301	3.413158	1.927253
Children Dead	61301	0.309342	0.74524
Health Inputs			
Child Delivered by Doctor	61629	0.277451	0.447744
Child Ever Breastfeed	61626	0.963327	0.187959
Child Receive BCG Vaccination	21246	0.8724	0.333652
Child Receive Polio Vaccination	21307	0.992397	0.086866
Child Receive Measles Vaccination	21010	0.644645	0.478632
Household's Characteristics			
Number of Household Members	61629	7.916435	3.728972
Household Head Sex(female=0,male=1)	61629	0.934836	0.246817
Household Head Education_Primary	61629	0.180808	0.384862
Household Head Education_Middle	61629	0.138506	0.345433
Household Head Education_Secondary	61629	0.188921	0.391449
Household Head Education_Higher	61629	0.105454	0.30714
Locational Factors:			
Districts	61629	16.65896	10.16479
Urban	61629	0.382093	0.485903

³⁴ For more accurate results, we are following WHO z-scores technique where z-scores that fall within an improbable range of standard deviations are flagged and dropped from the analysis. The flagged ranges are HAZ < -6 and HAZ > 6, and WAZ < -6 and WAZ > 5 (World Health Organization, 2010).

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Health Environment			
Water Availability for Handwashing	59767	0.971372	0.16676
Treat water before drinking	61602	0.05542	0.228801
Water Filter	61508	0.016258	0.126467
Parental Health Knowledge & Disease Environment			
Has Heard of AIDS	61041	0.306417	0.461009
Had Cough and Fever for last three weeks	61112	0.027507	0.163556
Diagnosed as having Tuberculosis	61104	0.001489	0.038563
Diagnosed as having Hepatitis	61101	0.002881	0.053593

INDEPENDENT VARIABLES	Obs	Mean	Std.Dev.
Household's Asset Composition			
Household owns Home	61629	0.862451	0.344429
HH Member Own land	61600	0.312013	0.463319
Household has Electricity	61627	0.950736	0.216421
Household has Gas	61592	0.317249	0.465409
Household owns Television	61595	0.63687	0.480906
Household owns Air Conditioner	61591	0.057947	0.233645
Household owns Washing Machine	61584	0.531502	0.499011
Household owns Motorcycle	61573	0.368116	0.482297
Household owns Car	61548	0.044144	0.205418
Household owns Bicycle	61527	0.351586	0.477469
Household owns Air Cooler	61615	0.93573	0.245235
Wealth Score	61629	-0.05227	0.992903
Wealth Index 1	61629	0.190511	0.392707
Wealth Index 2	61629	0.21021	0.407461
Wealth Index 3	61629	0.225787	0.418103
Wealth Index 4	61629	0.189635	0.392015

Source: Based on author's calculations

Table 2 presents the summary statistics of all the control variables.³⁵ Child's characteristics suggest that about 51% of the children in our dataset are males; the average age of a child in our dataset is around 29 months. The data suggests that on average each household has 2 children. Maternal characteristics include mother's education, marital status, and number of surviving and dead children. The summary statistics show that about 19% of the mothers are educated up to primary level, 10% are up to middle level

³⁵ Control variables includes child's characteristics, maternal characteristics, household's characteristics, health inputs, health environment within a household, parental knowledge and awareness about health conditions, household's asset composition and locational factors.

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and 12% of the mothers in our dataset are educated up to secondary level. Mother's education is an important variable that can affect child's health as education promotes awareness among individuals.³⁶ About 97% of the women in our dataset are married.

Under the health inputs, our data suggests that about 27% of the children are delivered by a doctor, 96% of children under the age of two are being breastfed, 87% receives BCG vaccination, 99% receives Polio vaccination and 64% of the children are given measles vaccination. Under parental health knowledge and disease environment, about 31% of the households have AIDS awareness, only 2% can recall to have cough and fever in the last three weeks, 0.1% are diagnosed as having tuberculosis and only 0.3% are diagnosed with hepatitis which indicates the presence of good environment within the households. The health environment being present in a household indicates the health measures taken by individuals. Our data suggests that about 97% of the households have water availability for hand washing, but very few households use water treatment measures to make water safer for drinking purposes. Only 0.2% of households have water filter facility.

The household characteristics indicate that on average, each household has 8 members. Moreover, 93% of the households have male household head. About 18% of household heads are educated up to primary and secondary level, 14% have education up to middle and around 11% of the household heads are educated up to higher level. On average about 38% of the households belong to the urban area.

Further we have included wealth index which is divided into five quintiles. About 19% of the households lie in the highest quintile of the wealth index, 19% lie in the lowest quintile, 21% lie in the second quintile and 23% of the households lie in the 3rd quintile of the wealth index. Our data suggests that 15% of the households have a migrant and only 6% have an external migrant. The average remittance amount received by the household is Rs 4,77021.

Table 3 includes the summary statistics of all the variables included where for the purpose of analysis, migrant and non-migrant households are compared. Similarly, remittance recipient households are compared with non-remittance recipient households.

TABLE 3: SUMMARY STATISTICS-COMPARING MIGRANT AND NON-MIGRANT HOUSEHOLDS

	Migrants	Remittance	External Migrant
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³⁶ Hamilton and Choi (2014) estimated the relationship between migration and infant health in Mexico and the along with other important variables they control for the maternal characteristics.

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DEPENDENT VARIABLES	With	Without	Recipient	Non Recipient	With	Without
Height for Age Zscore	-1.2729	-1.4879	-1.2728	-1.292545	-1.0808	-1.4879
Weight for Age Zscore	-1.2971	-1.5189	-1.2888	-1.361189	-1.0938	-1.51895
Child's Characteristics						
Age of Child in Months	28.2607	29.2007	28.2498	28.31711	28.6319	29.2007
Childs Gender (female=0,male=1)	0.50608	0.51162	0.50342	0.5139082	0.51236	0.51162
Number of children in HH	2.28422	2.05641	2.26988	2.354659	2.36064	2.05641
Maternal Characteristics						
Mother's Education_Primary	0.21279	0.18649	0.21807	0.1794159	0.19217	0.18649
Mother's Education_Middle	0.12196	0.09685	0.11909	0.1453408	0.15353	0.09685
Mother's Education_Secondary	0.17804	0.12045	0.18147	0.1529903	0.2442	0.12045
Mother's Marital Status	0.97793	0.97741	0.97912	0.9700974	0.97604	0.97741
Children Surviving	2.97191	3.49237	2.95788	3.044787	2.74773	3.49237
Children Dead	0.2172	0.32591	0.21358	0.2435269	0.14082	0.32591
Health Inputs						
Child Delivered by Doctor	0.32175	0.26949	0.32736	0.298331	0.3931	0.26949
Child Ever Breastfeed	0.95959	0.96399	0.96056	0.9568846	0.95672	0.96399
Child Receive BCG Vaccination	0.89378	0.86878	0.8984	0.8730512	0.91297	0.86878
Child Receive Polio Vaccination	0.99024	0.99276	0.98985	0.9933333	0.98869	0.99276
Child Receive Measles Vaccination	0.6792	0.63885	0.68225	0.6711409	0.72687	0.63885
Household's Characteristics						
Number of Household Members	8.83038	7.75247	8.70731	9.40751	9.32638	7.75247
Household Head Sex(female=0,male=1)	0.69648	0.97762	0.66632	0.8365786	0.71484	0.97762
Household Head Education_Primary	0.17974	0.18102	0.18533	0.1488178	0.16564	0.18102
Household Head Education_Middle	0.12644	0.14069	0.12811	0.1244784	0.13962	0.14069
Household Head Education_Secondary	0.18603	0.1894	0.18108	0.2023644	0.22849	0.1894
Household Head Education_Higher	0.09883	0.10665	0.09228	0.1258693	0.12674	0.10665
Locational Factors:						
Districts	17.9384	16.4297	18.1181	17.14047	17.1917	16.4297
Urban	0.27228	0.40175	0.26408	0.3087622	0.34441	0.40175
Health Environment						
Water Availability for Handwashing	0.97652	0.97044	0.97849	0.963467	0.99101	0.97044
Treat water before drinking	0.05941	0.05469	0.05583	0.0730181	0.09843	0.05469
Water Filter	0.02424	0.01483	0.02221	0.0326843	0.04436	0.01483
Parental Health Knowledge & Disease Environment						
Has Heard of AIDS	0.02424	0.29346	0.37853	0.3745608	0.51607	0.29346
Had Cough and Fever for last three weeks	0.37869	0.02818	0.02249	0.0315568	0.02026	0.02818
Diagnosed as having Tuberculosis	0.02376	0.00158	0.00091	0.0014015	0.0013	0.00158
Diagnosed as having Hepatitis	0.00097	0.0029	0.0026	0.0035014	0.00286	0.0029

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Household's Asset Composition						
Household owns Home	0.0028	0.85083	0.92989	0.9095967	0.95003	0.85083
HH Member Own land	0.43009	0.29082	0.42949	0.4254875	0.46483	0.29082
Household has Electricity	0.971	0.94709	0.97319	0.9554937	0.99227	0.94709
Household has Gas	0.27111	0.3255	0.26113	0.3247387	0.39985	0.3255
Household owns Television	0.72936	0.62023	0.73485	0.6945024	0.84356	0.62023
Household owns Air Conditioner	0.07815	0.05428	0.0754	0.0869263	0.15018	0.05428
Household owns Washing Machine	0.63654	0.5126	0.63498	0.6299652	0.83535	0.5126
Household owns Motorcycle	0.422	0.35842	0.41378	0.4554318	0.54152	0.35842
Household owns Car	0.06207	0.04089	0.06074	0.0737135	0.10052	0.04089
Household owns Bicycle	0.35842	0.35035	0.3563	0.3619247	0.33557	0.35035
Household owns Air Cooler	0.96119	0.93115	0.96339	0.9443672	0.98377	0.93115
Wealth Score	0.15077	-0.0888	0.14824	0.1322744	0.64133	-0.08888
Wealth Index 1	0.16802	0.19457	0.1709	0.1557719	0.06955	0.19457
Wealth Index 2	0.23486	0.2058	0.23637	0.2197497	0.17877	0.2058
Wealth Index3	0.26631	0.21853	0.26833	0.2600834	0.32638	0.21853
Wealth Index 4	0.2194	0.18421	0.21536	0.2294854	0.39258	0.18421

Source: Based on authors calculation's

The mean z-scores for Height-for-Age variable indicates that on average in a migrant household, a child less than 5 years of age in Punjab is 1.27 standard deviations below the median for a child of the same gender and age from the reference population. But in a non-migrant household, the mean HAZ is 1.49 standard deviations below the median from the reference population. These scores indicate that HAZ for children under 5 years of age in migrant households are better than non-migrant households. Whereas the mean z-score for Weight-for-Age variable in the migrant household is 1.3 which means that on average a child is 1.3 standard deviations less than an average child of the same sex and age from the reference population and as compared to non-migrant household where WAZ is 1.52. Almost similar statistics can be seen for remittance recipient and non-recipient households and households with and without external migrants.

The mean values for age of child in our sample for both the migrant and non-migrant households indicates that on average a child is 28 or 29 months old. The child's gender dummy is equal to 1 if the child is a male. In both migrant and non-migrant households, 51% of children are males. Similar analysis holds true for remittance recipient and non-recipient households and households with and without external migrants. On average there is no significant difference between the number of children a household has in all type of households.

On average, 21% of mother's in migrant-sending households are educated up to primary level as compared to 18% in non-migrant households. 21% mothers are educated in remittance recipient households

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compared to 17% in non-remittance recipient households. Around 12% of the mothers are educated up to middle in a migrant household as compared to 9% in a non-migrant household. Similarly, the mean values for mother's education up to secondary level shows that 17% of the women with a migrant are educated up to secondary level as compared to 12% in a non-migrant household.

Around 32% of the children in a migrant household are delivered by a doctor as compared to 27% of the children in a non-migrant household. 89% of children in the households with a migrant receive BCG vaccination and 67% receive measles vaccination as compared to 64% in a non-migrant household.

The descriptive statistics for household characteristics show that on average, 70% of the households are headed by males in a migrant household as compared to 98% in a non-migrant household. 27% of the households are from urban areas which have a migrant as compared to 40% of the households which do not have a migrant. The descriptive on the health environment shows no significant differences between migrant and non-migrant households. On average in both migrant and non-migrant households, the percentage of households who have water availability for hand washing, those who treat water before drinking and those who have availability of water filter is almost the same.

On average, the statistics shows that migrant households have a better asset composition as compared to the non-migrant households. Households with a migrant have higher percentage of durable goods such as television, air conditioner, washing machine, motorcycle etc. as compared to non-migrant households. This higher percentage of ownership of assets in migrant families shows an increased standard of living in households having a migrant.

As a proxy for income, wealth index has been added into the analysis. Wealth index have been divided into 4 quintiles. The statistics shows that about 16% of the migrant households belong to the lowest wealth quintile as compared to 19% of the non-migrant households. Around 23% and 26% of the migrant households belong to second and third quintile and 22% of the migrant households belong to the highest quintile as compared to 18% of the non-migrant households.

5. First Stage Results

Before estimating the relationship between external migration and remittances received from overseas on child health measures, these first stage results are estimated.

5.1 ESTIMATING IMPACT OF HISTORIC MIGRATION RATES ON EXTERNAL MIGRATION-FIRST STAGE RESULTS

For the purpose of estimation, we have incorporated all the variables that could possibly effect child's health. In the first stage regression, external migration is regressed on historic migration rates interacted

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with the number of adult males in a household. The current migration rates should be positively related to the historic migration networks since these networks strongly influence the decision of adults in those regions.

Table 4: OLS Regression: Historic Migration Rates on External Migration – FIRST STAGE RESULT

	OLS(1)	OLS (2)	OLS (3)
DEPENDENT VARIABLE			
External Migration=1 if there is an external migrant in the house			
Observations	61,629	61,629	61,629
R squared	0.139	0.126	0.125
INDEPENDENT VARIABLES			
Average Historic Migration Rates*No. of Adult males in HH	0.00143*** (6.21E-05)	0.00137*** (6.21E-05)	0.00140*** (6.21E-05)
Child Controls ³⁷	Yes	Yes	Yes
Mother Controls ³⁸	Yes	Yes	Yes
Household Controls ³⁹	Yes	No	No
Wealth Score ⁴⁰	No	Yes	No
Wealth Quantiles ⁴¹	No	No	Yes

Note: The sample comprises children 0-59 months of age with anthropometric data. Standard errors appear in parenthesis.

Asterisks denote the level of significance *** p<0.01, ** p<0.05, *p<0.1

Source: Based on author's calculations

Table 4 shows the results for the first stage regression.⁴² The external migrant is a binary dependent variable that equals to 1 if we have an external migrant in the household and historic migration rates interacted with the number of adult males in the household is the main explanatory variable in the above

³⁷ Child controls include number of children under 5 years of age in a household

³⁸ Mother controls include mother's education (primary, middle & secondary) and mother's marital status

³⁹ Household controls include number of household members, number of women in a household, household head's age and gender, household head's education (primary, middle, secondary & higher), locational factor i.e, whether the household is located in urban or rural area, availability of water filter within a household, household owns home, land, household has electricity, gas, television, air conditioner, washing machine, motor cycle, car, bicycle, air cooler, telephone, refrigerator, computer and cooking range

⁴⁰ The wealth score is created by MICS survey 2011 using the principal component analysis by using information on consumer durables, dwelling characteristics and all other factors that might determine the household's wealth status.

⁴¹ As a proxy for income, wealth index has been added into the analysis. Wealth index have been divided into 4 quintiles from the lowest (poorest) to the highest (richest)

⁴²The current migration rates should be positively related to historic migration networks on regional level, because the historic migration networks facilitate current migration. The regional historic migration networks facilitate the process of decision making of households in those regions because of the realization of gains from migration networks.

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specification. We have added all the relevant variables in the regression which might influence the decision to migrate.⁴³

The above table shows simple OLS results with three different types of specifications. In OLS(1), we have added the asset composition of the households along with all other control variables, OLS(2) shows the specification with wealth score whereas in OLS(3) we have added wealth indices which basically helps in identifying migrant and non-migrant households as non-random samples. The purpose of adding the asset composition or wealth indices is to incorporate the effect of social status and wealth into the analysis.

Our results show that historic migration rates are positively related to having a migrant in the household. All three specifications show the same result where our instrumental variable is significantly and positively related to the binary dependent variable. The results are significant at 10%, 5% and 1% levels of significance. The coefficients of the control variables are consistent with literature (See Appendix, Table 2).

5.2 ESTIMATING THE RELATIONSHIP BETWEEN NUMBER OF BANKS IN EACH DISTRICT & REMITTANCES FROM OVERSEAS -FIRST STAGE RESULTS

Table 5 shows the results for the first stage regression where number of banks in a particular district are regressed on the amount of remittances received from abroad. In order to estimate the relationship between the amount of remittances received from abroad and the child health, first stage results are estimated.

Table 5: OLS Regression: No. of Banks in each district on Remittances from Overseas–First Stage Result

	OLS (1)	OLS (2)	OLS (3)
DEPENDENT VARIABLE			
Remittances Received from abroad			
Observations	3,152	3,194	3,194
R squared	0.031	0.012	0.022
INDEPENDENT VARIABLES			

⁴³ These variables include number of household members, household head sex, education of the household head, mother's education etc.

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No. of Banks in each district**No. of Adult males in HH	12.11* (7.129)	14.81** (7.128)	14.09** (7.077)
Child Controls ⁴⁴	Yes	Yes	Yes
Mother Controls ⁴⁵	Yes	Yes	Yes
Household Controls ⁴⁶	Yes	No	No
Wealth Score ⁴⁷	No	Yes	No
Wealth Quantiles ⁴⁸	No	No	Yes

Note: The sample comprises children 0-59 months of age with anthropometric data. Standard errors appear in parenthesis.

Asterisks denote the level of significance *** p<0.01, ** p<0.05, *p<0.1

Source: Based on author's calculations

The amount of remittances received from abroad should be positively and significantly related to the number of banks present in each district because the presence of banks in a particular district facilitates the process of sending remittances. The number of banks present in each district acts an IV for remittances because if the households have accessibility to channels of transmission, it will facilitate the process of sending remittances from abroad. We have chosen only those 25 banks which are registered under the State Bank's Pakistan Remittance Initiative (PRI).⁴⁹ The above table shows simple OLS results with three different types of specifications.⁵⁰ The purpose of adding the asset composition or wealth indices is to incorporate the effect of social status and wealth into the analysis.

The results show that number of banks present in each district is positively related to the remittances received from abroad. All three specifications show the same result where the instrumental variable is significantly and positively related to the endogenous variable. The results are significant at 1% & 5%

⁴⁴ Child controls include number of children under 5 years of age in a household

⁴⁵ Mother controls include mother's education (primary, middle & secondary) and mother's marital status

⁴⁶ Household controls include number of household members, number of women in a household, household head's age and gender, household head's education (primary, middle, secondary & higher), locational factor i.e., whether the household is located in urban or rural area, availability of water filter within a household, household owns home, land, household has electricity, gas, television, air conditioner, washing machine, motor cycle, car, bicycle, air cooler, telephone, refrigerator, computer and cooking range

⁴⁷ The wealth score is created by MICS survey 2011 using the principal component analysis by using information on consumer durables, dwelling characteristics and all other factors that might determine the household's wealth status.

⁴⁸ As a proxy for income, wealth index has been added into the analysis. Wealth index have been divided into 4 quintiles from the lowest (poorest) to the highest (richest)

⁴⁹The total number of banks covers government, private, foreign and Islamic banks.

⁵⁰ In OLS(1), we have added the asset composition of the households along with all other control variables, OLS(2) shows the specification with wealth score whereas in OLS(3) we have added wealth indices which basically helps in identifying migrant and non-migrant households as non-random samples.

levels of significance. Where, the sign and significance of all the other controls in the regression is consistent with literature.

6.RESULTS

In this part of our analysis, we are going to estimate the second stage results where the external migration and remittances received from overseas is regressed on two measures of child health i.e., height for age z-scores and weight for age z-scores. We will be estimating the following two equations:

$$CH_{ghi} = \beta_1 \widehat{EM}_{ghi} + \beta_2 C_{ghi} + \beta_3 HI_{ghi} + \beta_4 X_{hi} + \beta_5 V_{hi} + \beta_6 W_{hi} + \beta_7 U_{hi} + \mu_{ghi}$$

$$CH_{ghi} = \beta_1 \widehat{R}_{ghi} + \beta_2 C_{ghi} + \beta_3 HI_{ghi} + \beta_4 X_{hi} + \beta_5 V_{hi} + \beta_6 W_{hi} + \beta_7 U_{hi} + \mu_{ghi}$$

CH_{ghi} represents the child health outcomes, \widehat{EM}_{ghi} and \widehat{R}_{ghi} represents fitted values of external migration and remittances from first stage regression, C_{ghi} is a vector of child characteristics, M_{ghi} is a vector of maternal characteristics, HI_{ghi} is a vector of health inputs, X_{hi} is a vector of household characteristics, V_{hi} is a vector of health environment prevalent within a household, W_{hi} is a vector of parental health knowledge, U_{hi} is a vector of household’s asset composition.

6.1 ESTIMATING THE IMPACT OF EXTERNAL MIGRATION ON CHILD HEALTH OUTCOMES

Table 6 shows the results for three methodologies used in the paper i.e. simple OLS, IV 2SLS & IV estimated through Treatment Effect Model. Ordinary Least Square estimation does not give us consistent results because of several issues already mentioned in methodology section of the paper.

Table 6: OLS, IV 2SLS & IV TEM: Height for Age (HFA) & Weight for Age (WFA)

DEPENDENT VARIABLES	Height for Age Zscore			Weight for Age Zscore		
	(1) OLS	(2) IV-2SLS	(3) IV-TEM	(1) OLS	(2) IV-2SLS	(3) IV-TEM
INDEPENDENT VARIABLES						
External Migration	0.0840292	0.0510796	0.9820404***	0.1190428***	1.18107**	0.7949048***
R2	0.1122	0.1131	2502.17	0.0981	0.1131	2152.84
F	62.02	–	16.28	53.38	–	23.36
N	19669	19669	19669	19669	19669	19669
Wald chi	–	–	2502.17	–	–	2152.84

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Child's Characteristics⁵¹	Yes	Yes	Yes	Yes	Yes	Yes
Maternal Characteristics⁵²	Yes	Yes	Yes	Yes	Yes	Yes
Health Inputs⁵³	Yes	Yes	Yes	Yes	Yes	Yes
Household's Characteristics⁵⁴	Yes	Yes	Yes	Yes	Yes	Yes
Health Environment⁵⁵	Yes	Yes	Yes	Yes	Yes	Yes
Parental Health Knowledge & Disease Environment⁵⁶	Yes	Yes	Yes	Yes	Yes	Yes
Household's Asset Composition⁵⁷	Yes	Yes	Yes	Yes	Yes	Yes
Locational Factors⁵⁸	Yes	Yes	Yes	Yes	Yes	Yes

Note: The sample comprises children 0-59 months of age with anthropometric data.

Asterisks denote the level of significance *** p<0.01, ** p<0.05, *p<0.1

Source: Based on author's calculations

The results for the IV model don't appear to be very efficient. Our main variable, external migration, is coming out to be insignificant for one variable i.e. Height for Age z-score. Whereas using the treatment effect model, our results appear to be more efficient with higher significance level. For all the methodologies discussed in the paper, we have used two different specifications i.e., all control variables with and without the asset composition.⁵⁹ (See Appendix)

Column (3) reports the results for treatment effect model. For testing the first hypothesis, two measures of child health are being used in the analysis i.e., Height for Age z-score and Weight for Age z-score. The results show that external migration has a positive and significant impact on both the measures of child health i.e. Height for Age z-score and Weight for Age z-score where having a migrant in the household increases the child's height and weight by 0.98 and 0.79 SD respectively as compared to non-migrant households. With a migrant in the household, the impact on the child's health can be observed through two mechanisms. Firstly, the migrant households experience an increase in household income which is translated into better health and living conditions for all the household members. Secondly, there

⁵¹ Child's characteristics include age and gender of the child and number of children under five years of age in a household.

⁵² Maternal characteristics include mother's education (primary, middle & secondary), mother's marital status, number of children dead and surviving born to a particular mother

⁵³ Health inputs include whether the child is being delivered by a doctor, whether the child is ever being breastfeed, whether the child receives BCG, polio and measles vaccination.

⁵⁴ Household characteristics include number of household members, gender of the household head and household head's education (primary, middle, secondary & higher)

⁵⁵ Health environment includes whether there is availability for hand washing, whether households treat water before drinking and whether the households have availability of water filter.

⁵⁶ Parental health knowledge and disease environment includes whether parents have ever heard of AIDS, whether the household members had cough and fever for the last three weeks and whether they are ever being diagnosed with tuberculosis and hepatitis.

⁵⁷ Household's asset composition includes whether the household owns home, land, television, air conditioner, washing machine, motorcycle, car, bicycle and air cooler and whether the household has electricity and gas facility.

⁵⁸ Locational factors include whether the household belongs to rural or urban area.

⁵⁹ The purpose of using two different specifications is to see whether any significant differences appear in the analysis. The results indicate almost similar results for all the specifications used in the analysis.

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is a spillover effect where the migrant members become aware of the new ideas and knowledge about improving child rearing practices.

The results indicate that child's HAZ and WAZ are decreasing with child's age and this might be due to the fact that at early age, the main source of nutrition for a child is breast milk and once weaning ends, malnutrition levels off and may even decline with the age of the child (Glewwe, 1999). This might be the reason for a declining HAZ and WAZ with child's age.

6.2 ESTIMATING THE IMPACT OF REMITTANCES FROM OVERSEAS ON CHILD HEALTH OUTCOMES

Table 7 reports the results for the two methodologies used for analyzing the relationship between the monetary amount of remittances received from overseas and the child health. Due to the inconsistency of OLS estimates, we have used Instrumental variable estimation by using number of banks in a particular district as an IV for remittances from overseas. Banks are an important channel through which the transfer of funds is being facilitated.⁶⁰

Table 7: OLS, IV 2SLS: Height for Age (HFA) & Weight for Age (WFA)

DEPENDENT VARIABLES	Height for Age Zscore			Weight for Age Zscore		
	(1) OLS	(2) IV-2SLS	IV 2SLS with District FE	(1) OLS	(2) IV-2SLS	IV 2SLS with District FE
INDEPENDENT VARIABLES						
Remittances from Overseas	3.25E-08	0.00000125* *	2.41E-07	0.00000005 35**	0.00000081 4**	4.21E-07
R2	0.1215	-	-	0.1563	-	-
F	4.05	60.83	-	5.43	93.78	-
N	879	879	879	879	879	879
Wald chi	-	-	544.51	-	-	769.1
Child's Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Maternal Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Health Inputs	Yes	Yes	Yes	Yes	Yes	Yes
Household's Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Health Environment	Yes	Yes	Yes	Yes	Yes	Yes
Parental Health Knowledge & Disease Environment	Yes	Yes	Yes	Yes	Yes	Yes

⁶⁰ The number of banks present in each district acts as an IV for remittances because if the households have accessibility to channels of transmission, it will facilitate the process of sending remittances from abroad.

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Wealth Score	Yes	Yes	Yes	Yes	Yes	Yes
Locational Factors	Yes	Yes	Yes	Yes	Yes	Yes

Note: The sample comprises children 0-59 months of age with anthropometric data.

Asterisks denote the level of significance *** p<0.01, ** p<0.05, *p<0.1

Source: Based on author's calculations

Column (2) of Table 7 reports the result for IV regression where remittances from overseas (instrumented by number of banks in each district) is regressed on two measures of child health i.e. HAZ and WAZ. The results show that in remittance recipient households, both the child's height and weight are going to increase. Though the magnitude of increase in the z-scores for height and weight is very small, but the direction of increase is positive. The results suggest that sending 1 rupee (Pakistani currency) in remittances is going to increase HAZ and WAZ by 0.00000125 and 0.000000814 SD respectively. If the migrants send 1 lac rupees in remittances, it increases HAZ and WAZ by 0.12 and 0.08 SD respectively.

There is a limitation attached to remittances data that it often suffers from reporting error where households do not report actual amount of remittances received. The monetary amount of remittances received by households have a direct impact on the child's health where monetary income is translated into better health facilities provided to children.

The results suggest that age of child is negatively related to HAZ which means that as the age of child increases, HAZ is going to fall. One possible explanation for such a relationship might be the fact that a very early age, the main source of nutrition for the child is mother's milk and as weaning ends, malnutrition levels off and may even decline with the age of the child. This might be the reason for declining HAZ of the child.

Column (3) of Table 7 also reports the results for IV approach with district fixed effects. Our main variable of interest, remittances from overseas, doesn't come out to be significant for both HAZ and WAZ. Other control variables show almost the same results when district fixed effects are added into the regression. (See Appendix, Table 5B)

6.3 ESTIMATING THE PRESENCE OF INTRA HOUSEHOLD RESOURCE ALLOCATION BIAS -EXTERNAL MIGRATION

Table 8A and 8B shows the results for whether there is a presence of intra household resource allocation bias where boys in migrant households receive preferential treatment in terms of health care as compared to girls resulting in higher HAZ and WAZ. Our results show the absence of gender bias in households having an external migrant.

Table 8A: IV-Treatment Effect Model: Height for Age (HFA)

DEPENDENT VARIABLES	Height for Age Zscore- BOYS				Height for Age Zscore-GIRLS			
	IV-TEM With HH Asset Composition	Z	IV-TEM with Wealth Quantiles	z	IV-TEM With HH Asset Composition	z	IV-TEM with Wealth Quantiles	z
INDEPENDENT VARIABLES								
External Migration	0.0786304	0.19	0.01156	0.03	1.281885***	6.89	1.219137***	6.24
Wald chi	1205.86		1195.39		1324.1		1195.39	
N	9878		9878		9791		9878	
Child's Characteristics	Yes		Yes		Yes		Yes	
Maternal Characteristics	Yes		Yes		Yes		Yes	
Health Inputs	Yes		Yes		Yes		Yes	
Household's Characteristics	Yes		Yes		Yes		Yes	
Health Environment	Yes		Yes		Yes		Yes	
Parental Health Knowledge & Disease Environment	Yes		Yes		Yes		Yes	
Household's Asset Composition	Yes		Yes		Yes		Yes	
Wealth Indices	No		Yes		No		Yes	
Locational Factors	Yes		Yes		Yes		Yes	

Note: The sample comprises children 0-59 months of age with anthropometric data.

Asterisks denote the level of significance *** p<0.01, ** p<0.05, *p<0.1

Source: Based on author's calculation

Table8: IV-Treatment Effect Model: Weight for Age (WFA)

DEPENDENT VARIABLES	Weight for Age Zscore- BOYS				Weight for Age Zscore-GIRLS			
	IV-TEM With HH Asset Composition	z	IV-TEM with Wealth Quantiles	z	IV-TEM With HH Asset Composition	z	IV-TEM with Wealth Quantiles	z
INDEPENDENT VARIABLES								
External Migration	0.673549***	3.72	0.788006***	4.74	0.8884572***	5.8	0.9406021***	6.42
Wald chi	1103.47		1039.66		1080.36		1065.2	
N	9878		9878		9791		9791	
Child's Characteristics	Yes		Yes		Yes		Yes	
Maternal Characteristics	Yes		Yes		Yes		Yes	
Health Inputs	Yes		Yes		Yes		Yes	
Household's Characteristics	Yes		Yes		Yes		Yes	
Health Environment	Yes		Yes		Yes		Yes	
Parental Health Knowledge & Disease Environment	Yes		Yes		Yes		Yes	
Household's Asset Composition	Yes		Yes		Yes		Yes	
Wealth Indices	No		Yes		No		Yes	

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Locational Factors	Yes		Yes		Yes		Yes	
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Note: The sample comprises children 0-59 months of age with anthropometric data.

Asterisks denote the level of significance *** p<0.01, ** p<0.05, *p<0.1

Source: Based on author's calculations

The coefficient for HAZ for girls is positive and significant which confirms the fact that there is no more discrimination against girls within the households in Punjab.⁶¹ External migration increases the HAZ score of girls by 1.28 SD in comparison to 0.07 SD for boys. For both the girls and boys, the coefficient on WAZ is positive and highly significant but the magnitude of the coefficient for girls is higher which is suggestive of the fact that there is absence of gender bias in the migrant households. Similarly, external migration increases the WAZ score of girls by 0.88 SD in comparison to 0.67 SD for boys.

Another possible explanation of such results could be seen through the context of increased bargaining power⁶² of women in households headed by females or increased spousal control over the allocation of resources (Antman, 2016). In Pakistan, mostly the households are headed by male members but due to the process of external migration; the male household heads are away giving the female spouse a greater command over decision making process resulting in a greater share of resources being spent on girls relative to boys. (See Appendix, Table 7A & 7B)

6.4 ESTIMATING THE PRESENCE OF INTRA HOUSEHOLD RESOURCE ALLOCATION BIAS - REMITTANCES

Table 9A and 9B shows the results for intra household resource allocation bias. Our results show the absence of gender bias in remittance recipient households.

⁶¹ In fact, it is indicative of the fact that male children are undernourished, and this might be due to the fact that boys are allowed to go outside the house playing or being involved in other activities as compared to girls.

⁶² There are several studies that have looked at the impact of increased bargaining power of women in households where resources are spent on girl's resulting in improvement of health of girls as compared to boys (Duflo,2003)

Table 9A: IV-2SLS: Height for Age (HFA)

DEPENDENT VARIABLES	Height for Age Z-score-BOYS		Height for Age Z-score-GIRLS	Z
	IV 2SLS	z	IV 2SLS	
INDEPENDENT VARIABLES				
Remittances from Overseas	-1.29E-07	-0.6	0.000000591**	2.29
R2	0.1019		0.0659	
N	436		443	
Child's Characteristics	Yes		Yes	
Maternal Characteristics	Yes		Yes	
Health Inputs	Yes		Yes	
Household's Characteristics	Yes		Yes	
Health Environment	Yes		Yes	
Parental Health Knowledge & Disease Environment	Yes		Yes	
Wealth Score	Yes		Yes	
Locational Factors	Yes		Yes	

Note: The sample comprises children 0-59 months of age with anthropometric data.

Asterisks denote the level of significance *** p<0.01, ** p<0.05, *p<0.1

Source: Based on author's calculations

Table 9B: IV-2SLS: Weight for Age (HFA)

DEPENDENT VARIABLES	Weight for Age Z-score-BOYS		Weight for Age Z-score-GIRLS	Z
	IV 2SLS	z	IV 2SLS	
INDEPENDENT VARIABLES				
Remittances from Overseas	1.68E-07	1.05	0.000001***	3.66
R2	0.0952		0.0659	
N	436		443	
Child's Characteristics	Yes		Yes	
Maternal Characteristics	Yes		Yes	
Health Inputs	Yes		Yes	
Household's Characteristics	Yes		Yes	
Health Environment	Yes		Yes	
Parental Health Knowledge & Disease Environment	Yes		Yes	
Wealth Score	Yes		Yes	
Locational Factors	Yes		Yes	

Note: The sample comprises children 0-59 months of age with anthropometric data.

Asterisks denote the level of significance *** p<0.01, ** p<0.05, *p<0.1

Source: Based on author's calculations

The results are quite similar to those households having an external migrant. The coefficient for HAZ and WAZ for girls is coming out to be positive and highly significant which

confirms the fact that there is no more discrimination against girls within the households in Punjab. On the other hand, the coefficient on HAZ for boys is coming out to be negative and insignificant which confirms the fact the remittance income from abroad is not being spent on male children and resources are directed towards the health of the female children in the households due to the spousal control over resources in migrant households. (See Appendix, Table 8A & 8B)

7. Robustness Checks

We have conducted a series of robustness checks in order to verify our results. For this purpose, we estimated the IV treatment effect model using two different specifications without controlling for health inputs, health environment & parental health knowledge and disease environment prevalent in a household.⁶³ While analyzing the impact of external migration on child health outcomes, it's important to incorporate these vectors of control variables along with other controls.⁶⁴ All of the health, environmental and parental awareness related variables do positively impact the child health outcomes and the purpose of not including these vectors of control variables is just to separate out their effect from the impact of external migration on child health outcomes. Our results suggest that even if we do not incorporate these health, environmental and parental awareness related variables in our regression the results are still coming out to be positive and highly significant. The results show that having an external migrant in the household is going to increase the child's height and weight by 1.12 and 0.76 SD respectively. (See Appendix, Table 4E)

We have performed similar robustness checks for remittances from overseas and employed similar approach as done for external migration. Our results suggest that even if we do not incorporate these variables in our regression the results are coming out to be positive but not significant. One possible explanation of such insignificant results is that the households receiving remittances from abroad are not directly spending these remittances on the health of the children e.g. making food expenditures but they might be spending it indirectly on health inputs by making an expenditure on the vaccination given to children at early age or by providing the facility of water filter which reduces the chance of getting water borne diseases by children and resulting in falling HAZ and WAZ. By not incorporating these vectors of control variables, the resulting HAZ and WAZ are coming out to be insignificant. Our study does not take

⁶³ Health inputs include whether the child is being delivered by a doctor, whether the child is ever being breastfed, whether the child receives BCG, polio and measles vaccination. Health environment includes whether there is availability for hand washing, whether households treat water before drinking and whether the households have availability of water filter. Parental health knowledge and disease environment includes whether parents have ever heard of AIDS, whether the household members had cough and fever for the last three weeks and whether they are ever being diagnosed with tuberculosis and hepatitis.

⁶⁴ Other controls include child's characteristics, mother's characteristics, Household characteristics, household's asset composition and wealth indices.

into consideration any spending done by households on food expenditures. So, the only impact of remittance income on child's health is seen in terms of expenditures done on health inputs. (See Appendix, Table 5C)

8.CONCLUSION

In most of the underdeveloped countries, income constraints force households to leave their home country in search of better economic opportunities and to cope with the existing income risk. There is a huge strand of literature that confirms the evidence that migration and remittances are one way through which households increase the accumulation of assets or increase their consumption expenditures which ultimately leads to higher standards of living. This paper presents a detailed analysis of the impact of temporary external migration and remittances from overseas on child health outcomes in Punjab. The focus of the study is young children aged (0-59) months which are the most vulnerable group whenever the households face any income constraint. Further, we test for the presence of intra household resource allocation bias where boys get preferential treatment in term of health care as compared to girls.⁶⁵

Our results suggest that temporary external migration and remittances significantly impact both the anthropometric measures: HFA & WFA. In consonance with the existing literature, our results point towards strong effects of external migration and remittances on child health outcomes (HAZ & WAZ) by loosening the credit constraint. Since our analysis is restricted to children under 5 years of age which are not school going and spend most of their time back home, so household dynamics which includes the number of HH members, mother's education, household head's education, parental health knowledge & household's asset composition all are significantly going to impact child's health.

It is generally presumed that female children face more discrimination in HH in Asia. This study rejects this presumption; male children under five years of age have lower z-scores than female children. Further this study confirms the presence of increased bargaining power of women in households headed by females where there is an increased spousal control over the allocation of resources.⁶⁶

On the developmental side, our evidence is on the positive effects of remittance income calls for policies that ease remittance flow by reducing fees or by giving tax breaks. Pakistan remittance initiative

⁶⁵ Our basic purpose is to see whether the income flows generated through migration and remittances helped households to provide better nutrition and health care to girls or there is still the presence of female gender bias where mostly the resources are directed towards the male children.

⁶⁶ In Pakistan, mostly the households are headed by male members and their absence due to migration gives the female spouse a greater command over decision making process resulting in a greater share of resources being spent on girls relative to boys.

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(PRI)⁶⁷ which is a joint initiative taken by State Bank of Pakistan, Ministry of Overseas Pakistanis and Ministry of Finance is a step towards promoting efficient and cheaper flows of remittances to Pakistan. Further, migration also has a spillover effect where the migrant members become aware of the new ideas and knowledge about improving child rearing practices often referred to as social remittances where the ideas, behaviors, identities and social capital flow from country of destination to country of origin. Migrant members of the household bring back not only financial remittances but also new information and values that may have a positive effect on children.

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⁶⁷ Pakistan Remittance Initiative (PRI) is established in 2009 and it's a joint initiative taken by State Bank of Pakistan, Ministry of Overseas Pakistanis and Ministry of Finance. The purpose of such an initiative is to provide for an ownership structure in Pakistan for remittance facilitation. Its purpose is to facilitate faster, cheaper and efficient flow of remittances

Disclosure statement

No potential conflict of interest.

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APPENDICES

Table 1: QUANTIFICATION OF DEPENDENT, INDEPENDENT & CONTROL VARIABLES

In order to investigate the effect of external migration and remittances on child's health, similar quantification approaches will be adopted as suggested by literature.

DEPENDENT VARIABLES	QUANTIFICATION
Weight for Age	z-scores
Height for Age	z-scores
MAIN INDEPENDENT VARIABLES	
External Migration	Dummy equals to 1 if there is an external migrant in the household and zero otherwise
Remittances	Monetary value
CONTROL VARIABLES	
<i>Child's Characteristics</i>	
Age of Child	In months (0-59)
Childs Gender	(female=0,male=1)
Number of children under 5 in HH	Numerical value
<i>Maternal Characteristics</i>	
Mother's Education-Primary	Dummy equals to 1 if mother is educated up to primary level & zero otherwise
Mother's Education-Middle	Dummy equals to 1 if mother is educated up to middle level & zero otherwise
Mother's Education-Secondary	Dummy equals to 1 if mother is educated up to secondary level & zero otherwise
Mother's Marital Status	(married=1,divorced=0)
Children Surviving	Numerical value
Children Dead	Numerical value
<i>Health Inputs</i>	
Child Delivered by Doctor	Dummy equals to 1 if child is delivered by a doctor & zero otherwise

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Child Ever Breastfeed	Dummy equals to 1 if child is breastfeed & zero otherwise
Child Receive BCG Vaccination	Dummy equals to 1 if child receives BCG vaccination & zero otherwise
Child Receive Polio Vaccination	Dummy equals to 1 if child receives polio vaccination & zero otherwise
Child Receive Measles Vaccination	Dummy equals to 1 if child receive measles vaccination & zero otherwise
<i>Household's Characteristics</i>	
Number of Household Members	Numerical value
Household Head Sex	(female=0,male=1)
Household Head Education-Primary	Dummy equals to 1 if HH is educated up to primary level & zero otherwise
Household Head Education-Middle	Dummy equals to 1 if HH is educated up to middle level & zero otherwise
Household Head Education-Secondary	Dummy equals to 1 if HH is educated up to secondary level & zero otherwise
Household Head Education-Higher	Dummy equals to 1 if HH is educated up to higher level & zero otherwise
<i>Health Environment</i>	
Water Availability for Hand washing	Dummy equals to 1 if water is available for hand washing & zero otherwise
Treat water before drinking	Dummy equals to 1 if water is treated before drinking & zero otherwise
Water Filter	Dummy equals to 1 if there is availability of water filter & zero otherwise
<i>Parental Health Knowledge & Disease Environment</i>	
Has Heard of AIDS	Dummy equals to 1 if HH members have ever heard of AIDS & zero otherwise
Had Cough and Fever for last three weeks	Dummy equals to 1 if HH members have cough and fever for last three weeks & zero otherwise

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Diagnosed as having Tuberculosis	Dummy equals to 1 if HH is diagnosed as having tuberculosis & zero otherwise
Diagnosed as having Hepatitis	Dummy equals to 1 if HH is diagnosed as having hepatitis & zero otherwise
<i>Household's Asset Composition</i>	
Household owns Home	Dummy equals to 1 if HH owns home & zero otherwise
HH Member Own land	Dummy equals to 1 if HH owns land & zero otherwise
Household has Electricity	Dummy equals to 1 if HH has electricity & zero otherwise
Household has Gas	Dummy equals to 1 if HH has gas & zero otherwise
Household owns Television	Dummy equals to 1 if HH owns television & zero otherwise
Household owns Air Conditioner	Dummy equals to 1 if HH owns air conditioner & zero otherwise
Household owns Washing Machine	Dummy equals to 1 if HH owns washing machine & zero otherwise
Household owns Motorcycle	Dummy equals to 1 if HH owns motorcycle & zero otherwise
Household owns Car	Dummy equals to 1 if HH owns car & zero otherwise
Household owns Bicycle	Dummy equals to 1 if HH is diagnosed as having hepatitis & zero otherwise
Household owns Air cooler	Dummy equals to 1 if HH owns air cooler & zero otherwise
Wscore	Calculated by MICS(2011)
<i>Locational Factors</i>	
Urban	(rural=0,urban=1)

INSTRUMENTAL VARIABLES FOR MIGRATION

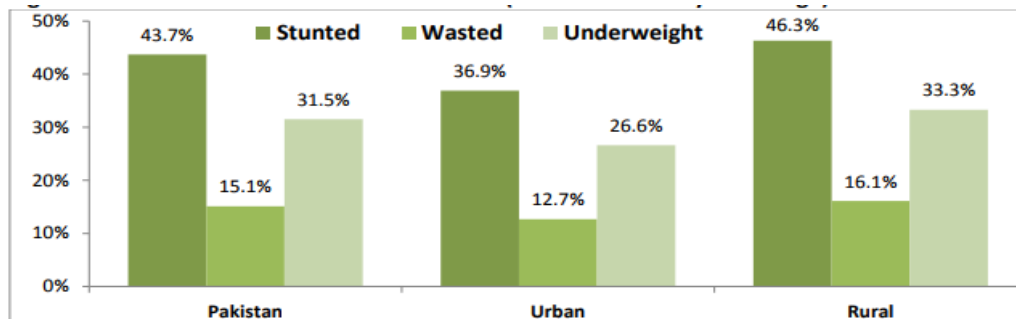
INSTRUMENTAL VARIABLES	REFERENCES
Historic Migration Rates	Hildebrandt et al.,2005 Chaudhry & Arif,2011
Household Composition	Mansuri (2006)
Migration networks & Migration history at the village or household level	Mansuri (2006b, c), Acosta (2006)
Rainfall in Mexican villages	Munshi (2003)
State Historic migration rates	Hamilton & Choi (2014)

INSTRUMENTAL VARIABLES FOR REMITTANCES

INSTRUMENTAL VARIABLES	REFERENCES
Dummy variable equals to 1 for the presence of bank or money transfer institution, Two dummies for source country	Ponce, Olivie & Onofa (2011)
Remittance Kinship or Baradri IV	Vyborny & Jamil (2013)
Rainfall shocks , Exploits the natural experiment of 1997 Asian financial crises	Yang (2005), Yang (2006)
Distance between each household locality and its closest western union	Civilize & Frenk (2009)
Number of Western Union offices per 100,000 people at province level,	Antón (2010)

Figures

Figure 1: Prevalence of Malnutrition of children (0-59) months in Pakistan



Source: National Nutrition Survey (2011)

FIRST STAGE RESULTS
ESTIMATING IMPACT OF HISTORIC MIGRATION RATES ON EXTERNAL MIGRATION

Table 2: Relationship between Historic Migration Rates & External Migration-First Stage Results

Dependent Variable External Migration=1 if there is an external migrant in the house	OLS(1)	OLS(2)	OLS(3)
Average Historic Migration Rates*No.of Adult males in HH	0.00143*** (6.21e-05)	0.00137*** (6.21e-05)	0.00140*** (6.21e-05)
Number of children under five years of age in HH	0.0120*** (0.00109)	0.0106*** (0.00109)	0.0104*** (0.00109)
Mother's education-Primary	0.00115 (0.00250)	-0.00854*** (0.00248)	-0.00373 (0.00253)
Mother's education-Middle	0.0198*** (0.00326)	0.0114*** (0.00324)	0.0137*** (0.00327)
Mother's education-Secondary	0.0307*** (0.00303)	0.0248*** (0.00303)	0.0250*** (0.00304)
Mother's Marital Status-currently married	0.0347*** (0.00620)	0.0359*** (0.00622)	0.0361*** (0.00622)
Number of HH Members	-0.00775*** (0.000512)	-0.00615*** (0.000505)	-0.00621*** (0.000505)
Number of Women in HH	0.0307*** (0.00135)	0.0310*** (0.00135)	0.0319*** (0.00135)
Household Head's Age	0.000958 (0.000648)	0.00101 (0.000650)	0.000908 (0.000650)
Household Head's Sex(Male=1)	-0.210*** (0.00383)	-0.212*** (0.00382)	-0.215*** (0.00382)
Education of HH Head-Primary	-0.000438 (0.00265)	-0.00325 (0.00266)	0.000271 (0.00266)
Education of HH Head-Middle	-0.00295 (0.00297)	-0.00472 (0.00298)	0.000210 (0.00298)
Education of HH Head-Secondary	-0.00661** (0.00279)	-0.00408 (0.00281)	0.000891 (0.00280)
Education of HH Head-Higher	-0.0332*** (0.00361)	-0.0206*** (0.00356)	-0.0143*** (0.00352)
Urban(Urban=1, Rural=0)	-0.0368*** (0.00247)	-0.0725*** (0.00232)	-0.0715*** (0.00232)
Availability of Water Filter	0.0295*** (0.00761)		
Household owns Home	0.0110*** (0.00274)		

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HH Members Own Land	0.0263*** (0.00222)		
Electricity	-0.00354 (0.00708)		
Gas	-0.00352 (0.00259)		
Television	0.00435* (0.00230)		
Air Conditioner	0.0103** (0.00514)		
Washing Machine	0.0315*** (0.00250)		
Motor Cycle	-0.00410* (0.00220)		
Car	-0.0198*** (0.00504)		
Bicycle	-0.00118 (0.00196)		
Air Cooler	0.00614 (0.00621)		
Telephone	0.0973*** (0.00455)		
Refrigerator	0.0440*** (0.00250)		
Computer	0.0292*** (0.00415)		
Cooking Range	0.0387*** (0.00496)		
Wscore		0.0545*** (0.00134)	
Wealth Index Second			0.00921*** (0.00306)
Wealth Index Middle			0.0391*** (0.00318)
Wealth Index Fourth			0.0878*** (0.00347)
Wealth Index Highest			0.143*** (0.00402)
Constant	0.131*** (0.00863)	0.209*** (0.00744)	0.147*** (0.00751)
Observations	60,984	61,629	61,629
R-squared	0.139	0.126	0.125

Note: The sample comprises children 0-59 months of age with anthropometric data. Standard errors appear in parenthesis. Asterisks denote the level of significance parentheses *** p<0.01, ** p<0.05, *p<0.1

Source: Based on author's calculations

ESTIMATING THE IMPACT OF NO. OF BANKS IN EACH DISTRICT ON REMITTANCE FROM OVERSEAS**Table 3: Relationship between Number of banks in each district & Remittances-First Stage Results**

Dependent Variable Remittances Received from Overseas	OLS(1)	OLS(2)	OLS(3)
No. of Banks in each district*No. of Adult Males	12.11* (7.129)	14.81** (7.128)	14.09** (7.077)
No. of children under 5 in HH	82,052** (31,945)	64,427** (31,283)	67,137** (31,300)
Mother's education-Primary	-86,138 (82,904)	-125,287 (81,286)	-132,702 (82,854)
Mother's education-Middle	-102,779 (89,014)	-99,482 (88,165)	-79,071 (88,662)
Mother's education-Secondary	2,263 (75,708)	-23,189 (74,956)	-12,411 (75,717)
Mother's Marital Status- currently married	252,842 (191,336)	292,240 (190,445)	261,826 (189,856)
No. of Household Members	-13,502 (13,654)	-5,748 (13,387)	-6,912 (13,358)
Number of Women in HH	26,885 (35,803)	39,748 (35,683)	39,470 (35,486)
Household Head's Age	23,158 (20,533)	24,728 (20,459)	21,527 (20,405)
Household Head's Gender	-31,915 (71,403)	23,060 (69,061)	21,893 (68,852)
Education of HH- Primary	178,588** (87,437)	192,664** (87,105)	204,595** (86,850)
Education of HH-Middle	51,982 (93,141)	37,640 (92,231)	47,010 (92,157)
Education of HH-Secondary	208,822** (83,568)	214,666*** (82,872)	208,371** (82,364)
Education of HH-Higher	157,411 (100,349)	170,102* (99,892)	176,114* (98,641)
Urban (Urban=1,Rural=0)	-236,367*** (77,989)	-175,009** (70,192)	-168,412** (70,477)
Availability of Water Filter	311,476** (146,270)		
Household owns Home	26,172 (135,235)		
Household Members Own Land	-19,017 (65,715)		
Electricity	-1.041e+06** (413,058)		
Gas	174,122**		

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	(73,394)		
Television	21,900		
	(90,681)		
Air Conditioner	-25,496		
	(98,071)		
Washing Machine	-117,426		
	(92,355)		
Motor Cycle	22,418		
	(65,854)		
Car	373,652***		
	(106,456)		
Bicycle	261,882***		
	(63,762)		
Air Cooler	-47,318		
	(279,278)		
Telephone	-118,508		
	(79,605)		
Refrigerator	202,771**		
	(92,756)		
Computer	-27,048		
	(81,798)		
Cooking Range	-6,108		
	(92,949)		
Wscore		22,133	
		(43,846)	
Wealth Index Second			-166,508
			(196,357)
Wealth Index Middle			277,615
			(180,584)
Wealth Index Fourth			-168,272
			(175,448)
Wealth Index Highest			28,199
			(180,329)
Constant	846,865**	-113,905	-56,351
	(415,932)	(213,487)	(260,683)
Observations	3,152	3,194	3,194
R-squared	0.031	0.012	0.022

Note: The sample comprises children 0-59 months of age with anthropometric data. Standard errors appear in parenthesis.

Asterisks denote the level of significance *** p<0.01, ** p<0.05, *p<0.1

Source: Based on author's calculations

MAIN RESULTS

ESTIMATING THE IMPACT OF EXTERNAL MIGRATION ON CHILD HEALTH OUTCOMES

Table 4A-Estimating the Effect of EXTERNAL MIGRATION on Child Health measures-Height

for Age z-score & Weight for Age z-score using OLS

DEPENDENT VARIABLE	Height for Age Zscore			Weight for Age Zscore				
	OLS(1)	t-value	OLS(2)	t-value	OLS(1)	t-value	OLS(2)	t-value
INDEPENDENT VARIABLES								
External Migration	0.204074***	3.89	0.0840292	1.59	0.228853***	5.62	0.1190428***	2.91
Child's Characteristics								
Age of Child in Months	(0.0399243)***	-27.99	(0.0402337)***	-28.28	(0.0081867)***	-7.39	(0.0085022)***	-7.72
Childs Gender (female=0,male=1)	(0.1000333)***	-4.42	(0.1043438)***	-4.63	(0.0611821)***	-3.49	(0.0640714)***	-3.67
Number of children in HH	(0.0846329)***	-6.44	(0.0735804)***	-5.6	(0.0780511)***	-7.65	(0.0709238)***	-6.97
Maternal Characteristics								
Mother's Education_Primary	0.0713884**	2.31	0.0286621	0.92	0.0537219**	2.24	0.0241203	1
Mother's Education_Middle	0.0667133	1.63	0.0027964	0.07	0.0659724**	2.07	0.0175988	0.55
Mother's Education_Secondary	0.1538116***	3.98	0.0882993**	2.27	0.1217632***	4.06	0.0704783**	2.34
Mother's Marital Status	0.0624281	0.66	0.0204315	0.22	0.0298566	0.41	-0.0068715	-0.09
Children Surviving	(0.0140973)**	-2.26	-0.0042752	-0.68	(0.025005)***	-5.15	(0.0154446)***	-3.18
Children Dead	(0.0769814)***	-4.92	(0.0629906)***	-4.03	(0.0580441)***	-4.78	(0.0465983)***	-3.85
Health Inputs								
Child Delivered by Doctor	0.1251921***	4.66	0.0634512**	2.35	0.1750803***	8.4	0.1223225***	5.84
Child Ever Breastfeed	0.0398714	0.64	0.0661329	1.06	-0.0208261	-0.43	0.002595	0.05
Child Receive BCG Vaccination	0.065334*	1.69	0.0494108	1.28	0.0697808**	2.33	0.0571972*	1.92
Child Receive Polio Vaccination	-0.1526487	-1.16	-0.1544766	-1.18	-0.0582385	-0.57	-0.0604517	-0.59
Child Receive Measles Vaccination	0.1817539***	5.85	0.1574958***	5.07	0.1673683***	6.94	0.1523534***	6.34
Household's Characteristics								
Number of Household Members	0.0202336***	5.31	0.00416	1.03	0.0197426***	6.68	0.0059438*	1.9
Household Head Sex(female=0,male=1)	(0.1301558)***	-2.7	(0.1255423)***	-2.6	(0.1339397)***	-3.58	(0.1308557)***	-3.5
Household Head Education_Primary	0.1166348***	3.55	0.083357**	2.54	0.0929977***	3.65	0.06351**	2.5
Household Head Education_Middle	0.2974098***	8.01	0.2334243***	6.26	0.2093429***	7.26	0.1547727***	5.36
Household Head Education_Secondary	0.3835281***	11.29	0.2770122***	8.01	0.3044953***	11.55	0.2067252***	7.72
Household Head Education_Higher	0.5858699***	13.61	0.3915495***	8.72	0.4563884***	13.66	0.2678248***	7.7
Health Environment								
Water Availability for Handwashing	0.1798388**	2.56	0.1044121	1.48	0.1097651**	2.01	0.0551949	1.01
Treat water before drinking	0.0878798	1.53	0.0127643	0.22	0.1196968***	2.68	0.0497211	1.11
Water Filter	0.125259	1.24	-0.0036835	-0.04	0.1967531**	2.51	0.0756995	0.95
Parental Health Knowledge & Disease Environment								
Has Heard of AIDS	0.2706637***	9.29	0.1716893***	5.78	0.2605624***	11.52	0.1737151***	7.55
Had Cough and Fever for last three weeks	(0.1590998)**	-2.38	(0.1360199)**	-2.05	-0.0457296	-0.88	-0.0305831	-0.59
Diagnosed as having Tuberculosis	-0.1157251	-0.36	-0.0936807	-0.3	-0.1674368	-0.68	-0.1468867	-0.6
Diagnosed as having Hepatitis	-0.1561393	-0.66	-0.1496394	-0.63	-0.1809118	-0.98	-0.1575016	-0.85
Household's Asset Composition								
Household owns Home			0.0222986	0.66			-0.011484	-0.44
HH Member Own land			0.1215568***	4.48			0.1484793***	7.06
Household has Electricity			0.1590683*	1.88			0.0588443	0.9
Household has Gas			0.1402524***	4.29			0.1192933***	4.71
Household owns Television			0.1464786***	5.27			0.0922426***	4.29
Household owns Air Conditioner			0.2662972***	4.6			0.2134849***	4.76
Household owns Washing Machine			0.2343***	7.74			0.1923808***	8.21
Household owns MotorCycle			0.0673847**	2.53			0.1148027***	5.56
Household owns Car			0.1214678*	1.94			0.1511403***	3.12
Household owns Bicycle			0.0271474	1.11			(0.0308927)*	-1.64
Household owns AirCooler			-0.0463383	-0.61			0.0329383	0.56
Locational Factors:								
Urban	0.1387639***	5.53	0.0152846	0.49	0.0369593*	1.9	(0.0483701)**	-2.02
R2	0.0998		0.1122		0.0804		0.0981	
F	75.57		62.02		59.57		53.38	
N	19787		19669		19787		19669	

Asterisks denote the level of significance *** p<0.01, ** p<0.05, *p<0.1

Source: Based on author's calculations

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Table 4B- Estimating the effect of EXTERNAL MIGRATION on Child Health measures-Height for Age z-score & Weight for Age z-score using IV 2SLS

DEPENDENT VARIABLE	Height for Age Zscore						Weight for Age Zscore					
	IV 2SLS(1)	z	IV 2SLS(2)	z	IV 2SLS with District FE	z	IV 2SLS(1)	z	IV 2SLS(2)	z	IV 2SLS with District FE	z
INDEPENDENT VARIABLES												
External Migration	0.7262626	1.22	0.0510796	0.08	4.072799	0.63	1.595376***	3.38	1.18107**	2.36	6.311995	0.97
Child's Characteristics												
Age of Child in Months	0.0400436**	-28	(0.0402289)***	-28	(0.0405257)***	-22	(0.008499)***	-7.44	(0.0086542)***	-7.72	(0.0093489)***	-4.98
Childs Gender (female=0,male=1)	0.0997309**	-4.4	(0.1043825)***	-4.6	(0.0943111)***	-3.7	(0.0603909)***	-3.35	(0.0628255)***	-3.54	(0.0575926)**	-2.26
Number of children in HH	0.0851412**	-6.5	(0.0735151)***	-5.6	(0.0813128)***	-3.6	(0.0793815)***	-7.56	(0.0730294)***	-7.03	(0.0817453)***	-3.55
Maternal Characteristics												
Mother's Education_Primary	0.0706768**	2.28	0.0285216	0.91	0.0230272	0.32	0.0518595**	2.1	0.0286474	1.16	0.0459646	0.63
Mother's Education_Middle	0.0556181	1.29	0.0032143	0.08	-0.0621361	-1.2	0.0369372	1.08	0.0041283	0.12	-0.0497578	-0.97
Mother's Education_Secondary	0.1383335***	3.26	0.0889334**	2.18	0.0142787	0.2	0.0812583**	2.4	0.0500402	1.56	-0.0207728	-0.28
Mother's Marital Status	0.0305737	0.3	0.0221744	0.22	-0.1615833	-0.5	-0.0535036	-0.66	-0.0630483	-0.8	-0.3189025	-0.91
Children Surviving	-0.0094886	-1.2	-0.0045139	-0.6	0.0312042	0.58	(0.0129444)**	-1.99	-0.0077484	-1.27	0.0338602	0.63
Children Dead	0.0732194**	-4.5	(0.0631635)***	-4	-0.0357786	-1.1	(0.0481993)***	-3.73	(0.041024)***	-3.27	-0.0148655	-0.46
Health Inputs												
Child Delivered by Doctor	0.1180436***	4.2	0.0635989**	2.34	0.0247416	0.61	0.1563734***	7	0.1175617***	5.49	0.0850867**	2.08
Child Ever Breastfeed	0.033984	0.54	0.0665553	1.1	-0.0235235	-0.1	-0.0362328	-0.72	-0.0110212	-0.22	-0.1262859	-0.73
Child Receive BCG Vaccination	0.0675825	1.74	0.0492144	1.27	0.0429676	0.77	0.0756649**	2.45	0.0635274**	2.09	0.0679228	1.21
Child Receive Polio Vaccination	-0.1322803	-1	-0.155824	-1.2	-0.0292382	-0.2	-0.004936	-0.05	-0.0170219	-0.16	0.1201074	0.61
Child Receive Measles Vaccination	0.1753424***	5.49	0.1577859***	5.01	0.0839214	1.64	0.15059***	5.92	0.1430038***	5.76	0.0816456	1.59
Household's Characteristics												
Number of Household Members	0.0163534***	2.81	0.0043335	0.83	-0.0130889	-0.4	0.0095883**	2.07	0.0003492	0.08	-0.0253797	-0.69
Household Head Sex(female=0,male=1)	-0.023667	-0.2	-0.1321056	-1	0.6430745	0.54	0.1447325	1.4	0.0806919	0.76	1.059042	0.89
Household Head Education_Primary	0.112462***	3.38	0.0834462**	2.54	0.0451561	1.18	0.0820778***	3.1	0.0606332**	2.35	0.0363801	0.95
Household Head Education_Middle	0.2899593***	7.6	0.2335808***	6.25	0.1712863***	3.51	0.1898457***	6.25	0.149728***	5.09	0.106571**	2.18
Household Head Education_Secondary	0.3786347***	11	0.2767489***	7.93	0.2587512***	4.09	0.2916897***	10.6	0.2152109***	7.83	0.2357549***	3.71
Household Head Education_Higher	0.5801235***	13.3	0.39088***	8.37	0.4379074***	3.59	0.4413506***	12.7	0.2894053***	7.87	0.4013521***	3.28

EXTERNAL MIGRATION, REMITTANCES & CHILD HEALTH

DEPENDENT VARIABLE	Height for Age Zscore						Weight for Age Zscore					
	IV 2SLS(1)	z	IV 2SLS(2)	z	IV 2SLS with District FE	z	IV 2SLS(1)	z	IV 2SLS(2)	z	IV 2SLS with District FE	z
INDEPENDENT VARIABLES												
Health Environment												
Water Availability for Handwashing	0.1707519**	2.4	0.1046132	1.48	0.0706306	0.72	0.0859855	1.52	0.0487141	0.88	-0.0108794	-0.11
Treat water before drinking	0.0804676	1.38	0.0128881	0.22	0.0503746	0.74	0.1002997**	2.16	0.0457301	1	0.0621531	0.91
Water Filter	0.0859284	0.78	-0.0020527	-0	-0.2116893	-0.5	0.0938283	1.07	0.0231374	0.27	-0.2432849	-0.58
Parental Health Knowledge & Disease Environment												
Has Heard of AIDS	0.252029***	7	0.1723541***	5.33	0.1275762	1.58	0.2117969***	7.39	0.1522858***	5.98	0.0906218	1.12
Had Cough and Fever for last three weeks	(0.155389)**	-2.3	(0.1361953)**	-2.1	-0.0513637	-0.6	-0.0360185	-0.67	-0.0249307	-0.48	0.0226167	0.26
Diagnosed as having Tuberculosis	-0.0987538	-0.3	-0.0944986	-0.3	0.0567308	0.14	-0.1230242	-0.48	-0.1205242	-0.48	0.0267885	0.07
Diagnosed as having Hepatitis	-0.1616732	-0.7	-0.1492109	-0.6	-0.0525227	-0.2	-0.1953936	-1.03	-0.171314	-0.91	-0.1350764	-0.5
Household's Asset Composition												
Household owns Home			0.0226395	0.66					-0.0224727	-0.83		
HH Member Own land			0.1224902***	3.77					0.118396***	4.62		
Household has Electricity			0.1591553***	1.88					0.0560428	0.84		
Household has Gas			0.1405533***	4.24					0.1095929***	4.19		
Household owns Television			0.1467408***	5.2					0.0837897***	3.77		
Household owns Air Conditioner			0.2681577***	3.94					0.153518***	2.87		
Household owns Washing Machine			0.2358141***	5.62					0.143577***	4.34		
Household owns MotorCycle			0.0675085***	2.52					0.1108114***	5.26		
Household owns Car			0.1221169*	1.91					0.1302172***	2.59		
Household owns Bicycle			0.0269586	1.1					-0.0248085	-1.28		
Household owns AirCooler			-0.0460545	-0.6					0.02379	0.4		
WealthIndexSecond					0.2113598***	3.04					0.1282117*	1.84
WealthIndexMiddle					0.2931296	1.41					0.1165731	0.56
WealthIndexFourth					0.3114104	0.66					0.0129381	0.03
WealthIndexHighest					0.4126641	0.55					-0.0329273	-0.04
Locational Factors:												
Urban	0.1527268	5.15	0.0141208	0.37	0.1402625	0.39	0.0734991***	3.11	-0.0108606	-0.36	0.2158599	0.59
R2	0.0959		0.1131		0.0372		0.0959		0.1131		0.0118	
N	19787		19669		19787		19787		19669		19787	

Asterisks denote the level of significance *** p<0.01, ** p<0.05, *p<0.1

Source: Based on author's calculations

EXTERNAL MIGRATION, REMITTANCES & CHILD HEALTH

Table 4C- Estimating the effect of EXTERNAL MIGRATION on Child Health measures-Height for Age z-score & Weight for Age z-score using Treatment Effects Model

DEPENDENT VARIABLE	Height for Age Zscore				Weight for Age Zscore			
	TEM(1)	z	TEM(2)	z	TEM(1)	z	TEM(2)	z
INDEPENDENT VARIABLES								
External Migration	1.581821***	15.35	0.9820404***	5.6	1.28308***	16.9	0.7949048***	6.88
Child's Characteristics								
Age of Child in Months	(0.0396899)***	-27.77	(0.0401674)***	-28.24	(0.0080577)***	-7.3	(0.0085017)***	-7.72
Childs Gender (female=0,male=1)	(0.1019812)***	-4.51	(0.1035436)***	-4.6	(0.0602452)***	-3.4	(0.0631099)***	-3.62
Number of children in HH	(0.0838837)***	-6.26	(0.0752505)***	-5.69	(0.0773791)***	-7.4	(0.0721955)***	-7.05
Maternal Characteristics								
Mother's Education_Primary	0.0702449**	2.23	0.032432	1.03	0.0552869**	2.26	0.0269342	1.11
Mother's Education_Middle	0.0355428	0.85	-0.0100807	-0.24	0.0429014	1.32	0.0079063	0.24
Mother's Education_Secondary	0.1116225***	2.83	0.0684473*	1.74	0.0930344***	3.04	0.055518	1.82
Mother's Marital Status	-0.0229409	-0.24	-0.0279215	-0.29	-0.0280458	-0.4	-0.0433905	-0.59
Children Surviving	-0.0022062	-0.34	0.0022076	0.34	(0.0157279)***	-3.2	(0.0105507)***	-2.13
Children Dead	(0.0658364)***	-4.12	(0.0579515)***	-3.68	(0.0496714)***	-4	(0.042768)***	-3.51
Health Inputs								
Child Delivered by Doctor	0.1049017***	3.91	0.0593793**	2.2	0.1622119***	7.79	0.1195552***	5.72
Child Ever Breastfeed	0.0561722	0.9	0.0708944	1.14	4.61E-06	0.21	0.0080067	0.17
Child Receive BCG Vaccination	0.0569314	1.47	0.0455673	1.18	0.0623308**	2.07	0.0549565*	1.84
Child Receive Polio Vaccination	-0.1574873	-1.2	-0.1519558	-1.16	-0.0554836	-0.5	-0.0571198	-0.56
Child Receive Measles Vaccination	0.1735973***	5.58	0.1541317***	4.97	0.1635813***	6.78	0.1503789***	6.26
Household's Characteristics								
Number of Household Members	0.0093605***	2.38	-0.0005492	-0.13	0.0114748***	3.76	0.0023984	0.75
Household Head Sex(female=0,male=1)	0.1517108***	2.89	0.0537286	0.91	0.0837752***	2.07	0.0040632	0.09
Household Head Education_Primary	0.1048033***	3.13	0.08035**	2.44	0.0824591***	3.18	0.0612287**	2.4
Household Head Education_Middle	0.2766126***	7.3	0.228462***	6.09	0.1952436***	6.64	0.1510212***	5.2
Household Head Education_Secondary	0.3709921***	10.71	0.2827308***	8.12	0.2951079***	11	0.2110186***	7.83
Household Head Education_Higher	0.5645917***	12.87	0.4069916***	8.99	0.4402095***	12.9	0.2794538***	7.98
Health Environment								
Water Availability for Handwashing	0.1771435**	2.48	0.1102279	1.56	0.1133789**	2.05	0.0586058	1.07
Treat water before drinking	0.0746143	1.31	0.014466	0.25	0.11078**	2.5	0.0511938	1.15
Water Filter	0.019252	0.19	-0.0528527	-0.51	0.1161715	1.45	0.0385396	0.48
Parental Health Knowledge & Disease Environment								
Has Heard of AIDS	0.2318916***	7.97	0.1639653***	5.53	0.2283339***	10.1	0.1676446***	7.3
Had Cough and Fever for last three weeks	(0.1461938)**	-2.18	(0.133601)**	-2.01	-0.0362994	-0.7	-0.0288734	-0.56
Diagnosed as having Tuberculosis	-0.131796	-0.41	-0.1056065	-0.33	-0.1732936	-0.7	-0.1533994	-0.62
Diagnosed as having Hepatitis	-0.1372098	-0.57	-0.1403652	-0.59	-0.1383164	-0.7	-0.1498726	-0.81
Household's Asset Composition								
Household owns Home			0.0129256	0.38			-0.0185662	-0.7
HH Member Own land			0.0961081***	3.46			0.1293458***	6.05
Household has Electricity			0.1569686*	1.84			0.0571764	0.87
Household has Gas			0.1312558***	3.98			0.1125121***	4.41
Household owns Television			0.1385669***	4.95			0.0863039***	3.99
Household owns Air Conditioner			0.2136329***	3.62			0.173806***	3.82
Household owns Washing Machine			0.1915547***	6.08			0.1601864***	6.64
Household owns MotorCycle			0.0635299**	2.37			0.1119073***	5.39
Household owns Car			0.1028141	1.63			0.1371053***	2.81
Household owns Bicycle			0.0323235	1.32			-0.0270018	-1.42
Household owns AirCooler			-0.0542438	-0.71			0.0270021	0.46
Locational Factors:								
Urban	0.1733927***	6.76	0.046245	1.46	0.0638804***	3.21	-0.0250307	-1.03
Wald chi	2387.5		2502.17		1944.41		2152.84	
N	19669		19669		19669		19669	
chi square	111.28		16.28		136.24		23.36	

Asterisks denote the level of significance *** p<0.01, ** p<0.05, *p<0.1

Source: Based on author's calculations

EXTERNAL MIGRATION, REMITTANCES & CHILD HEALTH

Table 4D: Effect of EXTERNAL MIGRATION on Child Health measures - Height for Age z-score & Weight for Age z-score using IV Treatment Effect Model with Wealth Indices

DEPENDENT VARIABLE	Height for Age Zscore		Weight for Age Zscore	
	IV-TEM WITH WEALTH INDICES	z	IV-TEM WITH WEALTH INDICES	z
INDEPENDENT VARIABLES				
External Migration	0.9295877***	5.01	0.8804221***	8.15
Child's Characteristics				
Age of Child in Months	(0.0399426)***	-28.12	(0.0082038)***	-7.44
Childs Gender (female=0,male=1)	(0.1015652)***	-4.52	(0.0606136)***	-3.47
Number of children in HH	(0.0743114)***	-5.64	(0.0703005)***	-6.86
Maternal Characteristics				
Mother's Education_Primary	-0.0001128	0	0.0059631	0.24
Mother's Education_Middle	-0.0453156	-1.08	-0.0186678	-0.57
Mother's Education_Secondary	0.0408971	1.04	0.0356913	1.17
Mother's Marital Status	-0.0071594	-0.07	-0.0229231	-0.31
Children Surviving	0.0010799	0.17	(0.0123353)**	-2.5
Children Dead	(0.052057)***	-3.31	(0.0384148)***	-3.14
Health Inputs				
Child Delivered by Doctor	0.0513527*	1.9	0.1178357***	5.61
Child Ever Breastfeed	0.079983	1.29	0.015702	0.33
Child Receive BCG Vaccination	0.0363027	0.94	0.0453079	1.52
Child Receive Polio Vaccination	-0.1170739	-0.89	-0.0280288	-0.28
Child Receive Measles Vaccination	0.1429928***	4.61	0.1397198***	5.81
Household's Characteristics				
Number of Household Members	0.0042948	1.07	0.0068085**	2.23
Household Head Sex(female=0,male=1)	0.0719596	1.2	0.0422607	1
Household Head Education_Primary	0.0620523*	1.88	0.0502669**	1.96
Household Head Education_Middle	0.2133672***	5.69	0.1470717***	5.04
Household Head Education_Secondary	0.2650143***	7.61	0.213256***	7.87
Household Head Education_Higher	0.4083678***	9.13	0.3155199***	9.08
Health Environment				
Water Availability for Handwashing	0.1020098	1.44	0.0596516	1.09
Treat water before drinking	0.019144	0.33	0.0622362	1.39
Water Filter	0.0108443	0.11	0.0960672	1.21
Parental Health Knowledge & Disease Environment				
Has Heard of AIDS	0.1626217***	5.49	0.1711265***	7.45
Had Cough and Fever for last three weeks	(0.1153875)*	-1.74	-0.0122374	-0.24
Diagnosed as having Tuberculosis	-0.1360471	-0.43	-0.1790544	-0.73
Diagnosed as having Hepatitis	-0.1286813	-0.54	-0.1323191	-0.72
WealthIndexSecond	0.289243***	7.93	0.1941178***	6.85
WealthIndexMiddle	0.4331427***	10.95	0.3002906***	9.84
WealthIndexFourth	0.5570167***	11.94	0.418133***	11.85
WealthIndexHighest	0.7754989***	13.25	0.5980354***	13.71
Locational Factors:				
Urban	-0.0509223	-1.61	(0.110949)***	-4.66
Wald chi	2523.18		2084.11	
N	19669		19669	
chi square	13.39		32.01	

Asterisks denote the level of significance *** p<0.01, ** p<0.05, *p<0.1

Source: Based on author's calculations

EXTERNAL MIGRATION, REMITTANCES & CHILD HEALTH

Table 4E: Estimating the effect of EXTERNAL MIGRATION on Child Health measures-Height for Age z-score & Weight for Age z-score using IV Treatment Effect Model WITHOUT HEALTH INPUTS

DEPENDENT VARIABLES	Height for Age Zscore				Weight for Age Zscore			
	TEM With HH Asset Composition	z	TEM with Wealth Quantiles	z	TEM With HH Asset Composition	z	TEM with Wealth Quantiles	z
INDEPENDENT VARIABLES								
External Migration	1.123082***	15.23	1.072232***	13.45	0.7610097***	13.53	0.7696615***	13.41
Child's Characteristics								
Age of Child in Months	(0.0129363)***	-36.52	(0.0128981)***	-36.43	(0.0012916)***	-4.64	(0.0012509)***	-4.48
Childs Gender (female=0,male=1)	(0.0249323)**	-2.11	(0.0244719)**	-2.07	-0.0127822	-1.37	-0.0120579	-1.29
Number of children in HH	(0.0247062)***	-3.57	(0.0248826)***	-3.62	(0.0414959)***	-7.66	(0.0404368)***	-7.48
Maternal Characteristics								
Mother's Education_Primary	0.0179882	1.1	-0.0114465	-0.69	0.0162563	1.26	-0.0114721	-0.88
Mother's Education_Middle	0.0270565	1.26	-0.0078778	-0.37	0.0181233	1.08	-0.0178587	-1.06
Mother's Education_Secondary	0.1066983***	5.32	0.0784901***	3.91	0.0996445***	6.35	0.0719159***	4.57
Mother's Marital Status	-0.0552278	-1.18	-0.0444909	-0.95	-0.0053734	-0.15	0.0036052	0.1
Children Surviving	-0.0031196	-0.9	-0.0045919	-1.33	(0.0140852)***	-5.17	(0.0156505)***	-5.77
Children Dead	(0.0619417)***	-7.43	(0.05731)***	-6.88	(0.0528026)***	-8.08	(0.0491694)***	-7.51
Household's Characteristics								
Number of Household Members	(0.0076175)***	-3.44	-0.0018909	-0.89	-0.0013876	-0.8	0.0033908**	2.04
Household Head Sex(female=0,male=1)	0.0951044***	3.14	0.1138278***	3.69	0.0124295	0.53	0.0373365	1.59
Household Head Education_Primary	0.0700656***	4.03	0.0598271***	3.44	0.0417806***	3.06	0.0346627***	2.53
Household Head Education_Middle	0.1741747***	8.96	0.163225***	8.38	0.120599***	7.92	0.1149566***	7.51
Household Head Education_Secondary	0.2541698***	13.92	0.2452562***	13.4	0.18046***	12.61	0.1797332***	12.5
Household Head Education_Higher	0.4295148***	18.44	0.4434644***	19.24	0.3125005***	17.13	0.3444628***	19.02
Household's Asset Composition								
Household owns Home	0.0011074	0.06			-0.0052058	-0.37		
HH Member Own land	0.0899036***	6.13			0.1031717***	8.99		
Household has Electricity	0.2111517***	4.54			0.1361412***	3.74		
Household has Gas	0.0930962***	5.53			0.0951595***	7.21		
Household owns Television	0.1237722***	8.3			0.1024817***	8.78		
Household owns Air Conditioner	0.2258638***	7.53			0.2681658***	11.41		
Household owns Washing Machine	0.1735911***	10.77			0.16723***	13.27		
Household owns MotorCycle	0.097137***	6.88			0.1039163***	9.4		
Household owns Car	0.1619771***	5.02			0.1625893***	6.43		
Household owns Bicycle	0.0143197	1.11			(0.027572)***	-2.73		
Household owns AirCooler	(0.1000689)**	-2.45			-0.0481807	-1.51		
WealthIndexSecond			0.2356085***	11.77			0.1715847***	10.91
WealthIndexMiddle			0.3689373***	17.51			0.3173602***	19.21
WealthIndexFourth			0.4891099***	20.52			0.4336783***	23.34
WealthIndexHighest			0.7363008***	25.45			0.6744592***	30.09
Locational Factors:								
Urban	0.0678451***	4.14	(0.0346945)**	-2.14	0.0018139	0.14	(0.0930878)***	-7.38
Wald chi	5855.11		5816.38		5305.34		5090.18	
N	60843		60843		60843		60843	
chi square	96.31		71.64		85.39		81.8	

Asterisks denote the level of significance *** p<0.01, ** p<0.05, *p<0.1

Source: Based on author's calculations

ESTIMATING THE IMPACT OF REMITTANCES FROM OVERSEAS ON CHILD HEALTH OUTCOMES

Table 5A-Estimating the Effect of Remittances from Overseas on Child Health measures-Height for Age z-score & Weight for Age z-score using OLS

DEPENDENT VARIABLE	Height for Age Zscore				Weight for Age Zscore			
	OLS(1)	t	OLS(2)	t	OLS(1)	t	OLS(2)	t
INDEPENDENT VARIABLES								
Remittances from Overseas	1.91E-08	0.55	3.25E-08	0.95	0.000000042*	1.65	(0.0000000535)**	2.09
Child's Characteristics								
Age of Child in Months	(0.0290598)***	-4.12	(-0.0301149)***	-4.31	(0.008751)*	-1.65	(0.0096078)*	-1.83
Childs Gender (female=0,male=1)	(0.2025239)**	-1.97	(0.1938151)*	-1.9	-0.0684506	-0.88	-0.0613787	-0.8
Number of children in HH	(0.1047493)**	-1.96	(0.1005275)*	-1.9	-0.0227106	-0.56	-0.0192823	-0.48
Maternal Characteristics								
Mother's Education_Primary	(0.2633756)*	-1.76	(0.3021814)**	-2.04	-0.0394993	-0.35	-0.0710112	-0.64
Mother's Education_Middle	0.110064	0.67	0.0433933	0.27	-0.0079913	-0.06	-0.0621308	-0.51
Mother's Education_Secondary	0.1312852	0.96	0.0867501	0.64	0.2198156**	2.14	0.1836512*	1.81
Mother's Marital Status	0.2642716	0.48	0.2574214	0.48	0.4831141	1.18	0.4775514	1.18
Children Surviving	0.06026*	1.66	0.0704631*	1.95	-0.0181777	-0.67	-0.0098924	-0.37
Children Dead	0.0406708	0.31	0.092765	0.71	-0.0168158	-0.17	0.0254869	0.26
Health Inputs								
Child Delivered by Doctor	0.1535378	1.32	0.0593773	0.51	0.2218265**	2.53	0.1453642*	1.65
Child Ever Breastfeed	-0.3994762	-1.35	-0.3671496	-1.25	0.0768402	0.35	0.1030908	0.47
Child Receive BCG Vaccination	0.1346203	0.64	0.0391004	0.19	0.3778318**	2.38	0.3002657	1.9
Child Receive Polio Vaccination	(1.221497)**	-2.46	(1.123105)**	-2.28	(0.7382937)**	-1.98	(0.6583949)*	-1.79
Child Receive Measles Vaccination	0.2307791	1.44	0.2141922	1.35	0.3302296***	2.75	0.3167603***	2.66
Household's Characteristics								
Number of Household Members	0.026123	1.59	0.0206161	1.26	0.0117972	0.95	0.0073253	0.6
Household Head Sex(female=0,male=1)	0.1217109	0.95	0.0898793	0.71	0.0608311	0.63	0.0349826	0.37
Household Head Education_Primary	0.1220337	0.77	0.0914036	0.58	0.0304388	0.26	0.0055659	0.05
Household Head Education_Middle	0.5116359***	3.04	0.4499643***	2.69	0.5196605***	4.11	0.4695805***	3.75
Household Head Education_Secondary	0.2199004	1.45	0.1673626	1.11	0.0471607	0.41	0.0044978	0.04
Household Head Education_Higher	0.1314089	0.75	0.0139346	0.08	0.1449452	1.09	0.0495511	0.37
Health Environment								
Water Availability for Handwashing	0.6833048	1.09	0.4379937	0.71	0.0906769	0.19	-0.108526	-0.23
Treat water before drinking	0.0855256	0.42	-0.0346941	-0.17	0.0724703	0.48	-0.0251532	-0.17
Water Filter	0.1761973	0.64	0.0146039	0.05	0.3120454	1.5	0.1808248	0.87
Parental Health Knowledge & Disease Environment								
Has Heard of AIDS	0.312889***	2.75	0.1675477	1.42	0.316599***	3.7	0.1985758**	2.25
Had Cough and Fever for last three weeks	-0.2098603	-0.59	-0.108343	-0.31	-0.3404097	-1.28	-0.2579734	-0.98
Diagnosed as having Hepatitis	-0.2664304	-0.17	-0.1404615	-0.09	-0.5914403	-0.51	-0.4891483	-0.43
Wealth score			0.3703183***	4.28			0.300714	4.63
Locational Factors:								
Urban	0.0339211	0.3	(0.2362891)*	-1.84	0.0217328	0.26	(0.1976892)**	-2.05
R2	0.1026		0.1215		0.135		0.1563	
F	3.47		4.05		4.74		5.43	
N	879		871		879		879	

Asterisks denote the level of significance *** p<0.01, ** p<0.05, *p<0.1

Source: Based on author's calculations

EXTERNAL MIGRATION, REMITTANCES & CHILD HEALTH

Table 5B-Estimating the Effect of Remittances from Overseas on Child Health measures-Height for Age z-score & Weight for Age z-score using IV 2SLS

DEPENDENT VARIABLE	Height for Age z-score				Weight for Age z-score							
	IV 2SLS(1)	z	IV 2SLS(2)	z	IV 2SLS with District FE	z	IV 2SLS(1)	z	IV 2SLS(2)	z	IV 2SLS with District FE	z
INDEPENDENT VARIABLES												
Remittances from Overseas	0.00000147**	2.04	0.00000125**	2.24	2.41E-07	0.39	0.000000965**	1.98	0.000000814**	2.16	4.21E-07	0.84
Child's Characteristics												
Age of Child in Months	-0.0192457	-1.46	(0.0227324)**	-1.99	(0.0303122)***	-3.94	-0.0025595	-0.29	-0.0050102	-0.65	-0.006897	-1.1
Childs Gender (female=0,male=1)	-0.2476893	-1.39	-0.2248445	-1.43	(0.2103327)**	-1.97	-0.0969918	-0.81	-0.0804967	-0.75	-0.0714088	-0.82
Number of children in HH	(0.2170238)**	-2.01	(0.1904772)**	-2.08	-0.0848911	-1.14	-0.0940937	-1.29	-0.075571	-1.21	-0.0166177	-0.27
Maternal Characteristics												
Mother's Education_Primary	(0.4440113)*	-1.66	(0.4825294)**	-2.03	(0.3576205)**	-2.29	-0.153285	-0.85	-0.1822142	-1.13	-0.1344358	-1.05
Mother's Education_Middle	-0.0226867	-0.08	-0.1172432	-0.45	0.0171093	0.09	-0.092629	-0.47	-0.1620585	-0.91	-0.1630672	-1.02
Mother's Education_Secondary	0.1968126	0.83	0.1072639	0.51	0.0839365	0.58	0.261459	1.62	0.1970563	1.38	0.1628034	1.38
Mother's Marital Status	-0.2448667	-0.25	-0.1767257	-0.21	-0.8967547	-1.38	0.1659587	0.25	0.2193713	0.38	0	
Children Surviving	0.0104236	0.15	0.0368902	0.63	0.0652368*	1.68	-0.0498983	-1.09	-0.0309142	-0.78	-0.0139101	-0.44
Children Dead	0.1108185	0.48	0.1907308	0.92	0.2164248	1.43	0.0275869	0.18	0.0862741	0.62	0.0710719	0.57
Health Inputs												
Child Delivered by Doctor	0.4244734*	1.79	0.2138801	1.1	-0.0127679	-0.09	0.3926807**	2.45	0.2412283*	1.83	0.1432839	1.19
Child Ever Breastfeed	-0.0435334	-0.08	-0.0421032	-0.09	-0.2546597	-0.79	0.2973138	0.84	0.3012836	0.95	0.1946926	0.74
Child Receive BCG Vaccination	-0.4497693	-1.05	-0.5223884	-1.38	-0.1668778	-0.58	0.0106987	0.04	-0.0453517	-0.18	0.0458443	0.19
Child Receive Measles Vaccination	0.267648	0.96	0.2314223	0.94	0.182017	1.08	0.3545383*	1.88	0.3282753**	1.96	0.2502685*	1.82
Household's Characteristics												
Number of Household Members	0.020532	0.72	0.0117752	0.46	0.0072708	0.41	0.008263	0.43	0.0018342	0.11	0.0017738	0.12
Household Head Sex(female=0,male=1)	-0.1081077	-0.44	-0.1252523	-0.57	0.0771694	0.48	-0.0849625	-0.51	-0.0994587	-0.67	-0.014995	-0.11
Household Head Education_Primary	0.0132963	0.05	-0.0223234	-0.09	0.0754445	0.46	-0.0384695	-0.2	-0.0648883	-0.38	-0.0344847	-0.26
Household Head Education_Middle	0.632658**	2.11	0.5026359*	1.92	0.4200793**	2.17	0.5975448***	2.95	0.5042423***	2.84	0.4825847***	3.06
Household Head Education_Secondary	-0.0650258	-0.22	-0.109891	-0.42	0.1153645	0.67	-0.1329549	-0.67	-0.1677256	-0.94	-0.0652809	-0.46
Household Head Education_Higher	-0.394855	-1.03	-0.5142018	-1.49	-0.1396337	-0.5	-0.1872099	-0.72	-0.2774305	-1.19	-0.1044422	-0.46
Health Environment												
Water Availability for Handwashing	0.2068768	0.19	-0.1507868	-0.16	0.0363863	0.04	-0.2062098	-0.28	-0.4512236	-0.69	-0.5123299	-0.75
Treat water before drinking	0.4011461	1.07	0.1378246	0.43	0.0584253	0.21	0.2709473	1.07	0.0809487	0.37	0.0770251	0.34
Water Filter	0.1029183	0.21	-0.1706674	-0.4	0.0963117	0.26	0.2671925	0.83	0.0688935	0.24	0.0985259	0.33
Parental Health Knowledge & Disease Environment												
Has Heard of AIDS	0.1973445	0.96	-0.0387909	-0.19	0.21396	1.52	0.2432045*	1.75	0.0700036	0.5	0.157906	1.37
Had Cough and Fever for last three weeks	-0.6802923	-1.08	-0.4277068	-0.78	0.0136105	0.04	-0.6326095	-1.49	-0.4514988	-1.21	-0.203569	-0.67
Diagnosed as having Hepatitis	-0.5675155	-0.22	-0.3735649	-0.16	0.0014154	0.05	-0.6933803	-0.39	-0.559044	-0.35	-0.3858005	-0.3
Wealth Score			0.6516351***	3.67	0.4732654**	2.15			0.4754989***	3.95	0.3561262**	1.98
Locational Factors:												
Urban	0.1249676	0.61	(0.3666118)*	-1.82	(0.3067082)*	-1.88	0.0802375	0.58	(0.2772394)**	-2.02	-0.214092	-1.61
R2	0.0352		0.0435		0.0941		0.0352		0.0435		0.0737	
N	879		879		879		879		879		879	

Asterisks denote the level of significance *** p<0.01, ** p<0.05, *p<0.1
Source: Based on author's calculations

Table 5C: Estimating the effect of REMITTANCES FROM OVERSEAS on Child Health measures-Height for Age z-score & Weight for Age z-score using IV-2SLS WITHOUT HEALTH INPUTS

DEPENDENT VARIABLES	Height for Age Zscore		Weight for Age Zscore	
	IV 2SLS	z	IV 2SLS	z
INDEPENDENT VARIABLES				
Remittances from Overseas	1.57E-07	0.39	4.16E-07	1.11
Child's Characteristics				
Age of Child in Months	(0.0125056)***	-7.99	(0.0035717)**	-2.47
Childs Gender (female=0,male=1)	-0.0573609	-1.19	-0.0212612	-0.48
Number of children in HH	-0.0304341	-0.88	-0.0328326	-1.03
Maternal Characteristics				
Mother's Education_Primary	-0.0909988	-1.07	-0.0012547	-0.02
Mother's Education_Middle	0.1224265	1.46	0.0205505	0.27
Mother's Education_Secondary	0.0910937	1.42	0.0559316	0.94
Mother's Marital Status	-0.148421	-0.6	-0.1348022	-0.6
Children Surviving	-0.0083355	-0.44	-0.0162935	-0.94
Children Dead	0.0944519	1.58	-0.0104707	-0.19
Household's Characteristics				
Number of Household Members	-0.0044349	-0.53	-0.0138414	-1.8
Household Head Sex(female=0,male=1)	0.0707336	1.2	0.1117545**	2.05
Household Head Education_Primary	0.0949595	0.87	0.0192297	0.19
Household Head Education_Middle	0.1746141**	2.17	0.0916678	1.24
Household Head Education_Secondary	0.1102228	0.96	-0.070835	-0.67
Household Head Education_Higher	0.1150053	1.02	0.0034103	0.03
Wealth Score	0.4146664***	10.48	0.3703181***	10.15
Locational Factors:				
Urban	-0.1236292	-1.34	-0.0766101	-0.9
Wald chi	324.22		228.6	
N	3162		3162	

Asterisks denote the level of significance *** p<0.01, ** p<0.05, *p<0.1

Source: Based on author's calculations

EXTERNAL MIGRATION, REMITTANCES & CHILD HEALTH

Table 6A: Comparing OLS, IV 2SLS & IV Treatment effect Model External Migration & Height for Age z-score

DEPENDENT VARIABLE	OLS	t-value	IV 2SLS	z	IV-TEM	z
Height for Age Zscore						
INDEPENDENT VARIABLES						
External Migration	0.0840292	1.59	0.0510796	0.08	0.9820404***	5.6
Child's Characteristics						
Age of Child in Months	(0.0402337)***	-28.28	(0.0402289)***	-28.24	(0.0401674)***	-28.24
Childs Gender (female=0,male=1)	(0.1043438)***	-4.63	(0.1043825)***	-4.63	(0.1035436)***	-4.6
Number of children in HH	(0.0735804)***	-5.6	(0.0735151)***	-5.57	(0.0752505)***	-5.69
Maternal Characteristics						
Mother's Education_Primary	0.0286621	0.92	0.0285216	0.91	0.032432	1.03
Mother's Education_Middle	0.0027964	0.07	0.0032143	0.08	-0.0100807	-0.24
Mother's Education_Secondary	0.0882993**	2.27	0.0889334**	2.18	0.0684473*	1.74
Mother's Marital Status	0.0204315	0.22	0.0221744	0.22	-0.0279215	-0.29
Children Surviving	-0.0042752	-0.68	-0.0045139	-0.58	0.0022076	0.34
Children Dead	(0.0629906)***	-4.03	(0.0631635)***	-3.96	(0.0579515)***	-3.68
Health Inputs						
Child Delivered by Doctor	0.0634512**	2.35	0.0635989**	2.34	0.0593793**	2.2
Child Ever Breastfeed	0.0661329	1.06	0.0665553	1.06	0.0708944	1.14
Child Receive BCG Vaccination	0.0494108	1.28	0.0492144	1.27	0.0455673	1.18
Child Receive Polio Vaccination	-0.1544766	-1.18	-0.155824	-1.16	-0.1519558	-1.16
Child Receive Measles Vaccination	0.1574958***	5.07	0.1577859***	5.01	0.1541317***	4.97
Household's Characteristics						
Number of Household Members	0.00416	1.03	0.0043335	0.83	-0.0005492	-0.13
Household Head Sex(female=0,male=1)	(0.1255423)***	-2.6	-0.1321056	-0.98	0.0537286	0.91
Household Head Education_Primary	0.083357**	2.54	0.0834462**	2.54	0.08035**	2.44
Household Head Education_Middle	0.2334243***	6.26	0.2335808***	6.25	0.228462***	6.09
Household Head Education_Secondary	0.2770122***	8.01	0.2767489***	7.93	0.2827308***	8.12
Household Head Education_Higher	0.3915495***	8.72	0.39088***	8.37	0.4069916***	8.99
Health Environment						
Water Availability for Handwashing	0.1044121	1.48	0.1046132	1.48	0.1102279	1.56
Treat water before drinking	0.0127643	0.22	0.0128881	0.22	0.0144466	0.25
Water Filter	-0.0036835	-0.04	-0.0020527	-0.02	-0.0528527	-0.51
Parental Health Knowledge & Disease Environment						
Has Heard of AIDS	0.1716893***	5.78	0.1723541***	5.33	0.1639653***	5.53
Had Cough and Fever for last three weeks	(0.1360199)**	-2.05	(0.1361953)**	-2.05	(0.133601)**	-2.01
Diagnosed as having Tuberculosis	-0.0936807	-0.3	-0.0944986	-0.3	-0.1056065	-0.33
Diagnosed as having Hepatitis	-0.1496394	-0.63	-0.1492109	-0.62	-0.1403652	-0.59
Household's Asset Composition						
Household owns Home	0.0222986	0.66	0.0226395	0.66	0.0129256	0.38
HH Member Own land	0.1215568***	4.48	0.1224902***	3.77	0.0961081***	3.46
Household has Electricity	0.1590683*	1.88	0.1591553***	1.88	0.1569686*	1.84
Household has Gas	0.1402524***	4.29	0.1405533***	4.24	0.1312558***	3.98
Household owns Television	0.1464786***	5.27	0.1467408***	5.2	0.1385669***	4.95
Household owns Air Conditioner	0.2662972***	4.6	0.2681577***	3.94	0.2136329***	3.62
Household owns Washing Machine	0.2343***	7.74	0.2358141***	5.62	0.1915547***	6.08
Household owns MotorCycle	0.0673847**	2.53	0.0675085***	2.52	0.0635299**	2.37
Household owns Car	0.1214678*	1.94	0.1221169*	1.91	0.1028141	1.63
Household owns Bicycle	0.0271474	1.11	0.0269586	1.1	0.0323235	1.32
Household owns AirCooler	-0.0463383	-0.61	-0.0460545	-0.61	-0.0542438	-0.71
Locational Factors:						
Urban	0.0152846	0.49	0.0141208	0.37	0.046245	1.46
R2	0.1122		0.1131			
F	62.02					
N	19669		19669		19669	
Wald chi					2502.17	
chi square					16.28	

Asterisks denote the level of significance *** p<0.01, ** p<0.05, *p<0.1
 Source: Based on author's calculations

EXTERNAL MIGRATION, REMITTANCES & CHILD HEALTH

Table 6B: Comparing OLS, IV 2SLS & IV Treatment Effect Model-External Migration & Weight for Age z-score

DEPENDENT VARIABLE	OLS	t-statistics	IV 2SLS	z	IV-TEM	z
Weight for Age Zscore						
INDEPENDENT VARIABLES						
External Migration	0.1190428***	2.91	1.18107**	2.36	0.7949048***	6.88
Child's Characteristics						
Age of Child in Months	(0.0085022)***	-7.72	(0.0086542)***	-7.72	(0.0085017)***	-7.72
Childs Gender (female=0,male=1)	(0.0640714)***	-3.67	(0.0628255)***	-3.54	(0.0631099)***	-3.62
Number of children in HH	(0.0709238)***	-6.97	(0.0730294)***	-7.03	(0.0721955)***	-7.05
Maternal Characteristics						
Mother's Education_Primary	0.0241203	1	0.0286474	1.16	0.0269342	1.11
Mother's Education_Middle	0.0175988	0.55	0.0041283	0.12	0.0079063	0.24
Mother's Education_Secondary	0.0704783**	2.34	0.0500402	1.56	0.055518	1.82
Mother's Marital Status	-0.0068715	-0.09	-0.0630483	-0.8	-0.0433905	-0.59
Children Surviving	(0.0154446)***	-3.18	-0.0077484	-1.27	(0.0105507)***	-2.13
Children Dead	(0.0465983)***	-3.85	(0.041024)***	-3.27	(0.042768)***	-3.51
Health Inputs						
Child Delivered by Doctor	0.1223225***	5.84	0.1175617***	5.49	0.1195552***	5.72
Child Ever Breastfeed	0.002595	0.05	-0.0110212	-0.22	0.0080067	0.17
Child Receive BCG Vaccination	0.0571972*	1.92	0.0635274**	2.09	0.0549565*	1.84
Child Receive Polio Vaccination	-0.0604517	-0.59	-0.0170219	-0.16	-0.0571198	-0.56
Child Receive Measles Vaccination	0.1523534***	6.34	0.1430038***	5.76	0.1503789***	6.26
Household's Characteristics						
Number of Household Members	0.0059438*	1.9	0.0003492	0.08	0.0023984	0.75
Household Head Sex(female=0,male=1)	(0.1308557)***	-3.5	0.0806919	0.76	0.0040632	0.09
Household Head Education_Primary	0.06351**	2.5	0.0606332**	2.35	0.0612287**	2.4
Household Head Education_Middle	0.1547727***	5.36	0.149728***	5.09	0.1510212***	5.2
Household Head Education_Secondary	0.2067252***	7.72	0.2152109***	7.83	0.2110186***	7.83
Household Head Education_Higher	0.2678248***	7.7	0.2894053***	7.87	0.2794538***	7.98
Health Environment						
Water Availability for Handwashing	0.0551949	1.01	0.0487141	0.88	0.0586058	1.07
Treat water before drinking	0.0497211	1.11	0.0457301	1	0.0511938	1.15
Water Filter	0.0756995	0.95	0.0231374	0.27	0.0385396	0.48
Parental Health Knowledge & Disease Environment						
Has Heard of AIDS	0.1737151***	7.55	0.1522858***	5.98	0.1676446***	7.3
Had Cough and Fever for last three weeks	-0.0305831	-0.59	-0.0249307	-0.48	-0.0288734	-0.56
Diagnosed as having Tuberculosis	-0.1468867	-0.6	-0.1205242	-0.48	-0.1533994	-0.62
Diagnosed as having Hepatitis	-0.1575016	-0.85	-0.171314	-0.91	-0.1498726	-0.81
Household's Asset Composition						
Household owns Home	-0.011484	-0.44	-0.0224727	-0.83	-0.0185662	-0.7
HH Member Own land	0.1484793***	7.06	0.118396***	4.62	0.1293458***	6.05
Household has Electricity	0.0588443	0.9	0.0560428	0.84	0.0571764	0.87
Household has Gas	0.1192933***	4.71	0.1095929***	4.19	0.1125121***	4.41
Household owns Television	0.0922426***	4.29	0.0837897***	3.77	0.0863039***	3.99
Household owns Air Conditioner	0.2134849***	4.76	0.153518***	2.87	0.173806***	3.82
Household owns Washing Machine	0.1923808***	8.21	0.143577***	4.34	0.1601864***	6.64
Household owns MotorCycle	0.1148027***	5.56	0.1108114***	5.26	0.1119073***	5.39
Household owns Car	0.1511403***	3.12	0.1302172***	2.59	0.1371053***	2.81
Household owns Bicycle	(0.0308927)*	-1.64	-0.0248085	-1.28	-0.0270018	-1.42
Household owns AirCooler	0.0329383	0.56	0.02379	0.4	0.0270021	0.46
Locational Factors:						
Urban	(0.0483701)**	-2.02	-0.0108606	-0.36	-0.0250307	-1.03
R2	0.0981					
F	53.38		0.1131			
N	19669		19669		19669	
Wald chi					2152.84	
chi square					23.36	

Asterisks denote the level of significance *** p<0.01, ** p<0.05, *p<0.1
 Source: Based on author's calculations

Table 6C: Comparing OLS & IV 2SLS-Remittances from Overseas & Height for Age z-score

DEPENDENT VARIABLE	OLS	t-statistics	IV 2SLS	z
Height for Age Zscore				
INDEPENDENT VARIABLES				
Remittances from Overseas	3.25E-08	0.95	0.00000125**	2.36
Child's Characteristics				
Age of Child in Months	(0.0301149)***	-4.31	(0.0227309)**	-1.99
Childs Gender (female=0,male=1)	(0.1938151)*	-1.9	-0.2248483	-1.43
Number of children in HH	(0.1005275)*	-1.9	(0.1905002)**	-2.1
Maternal Characteristics				
Mother's Education_Primary	(0.3021814)**	-2.04	(0.4825927)**	-2.05
Mother's Education_Middle	0.0433933	0.27	-0.1172957	-0.45
Mother's Education_Secondary	0.0867501	0.64	0.1072438	0.51
Mother's Marital Status	0.2574214	0.48	-0.177549	-0.21
Children Surviving	0.0704631*	1.95	0.0368759	0.64
Children Dead	0.092765	0.71	0.1907597	0.93
Health Inputs				
Child Delivered by Doctor	0.0593773	0.51	0.2139088	1.11
Child Ever Breastfeed	-0.3671496	-1.25	-0.0420819	-0.09
Child Receive BCG Vaccination	0.0391004	0.19	-0.5226071	-1.43
Child Receive Polio Vaccination	(1.123105)**	-2.28		
Child Receive Measles Vaccination	0.2141922	1.35	0.2314429	0.94
Household's Characteristics				
Number of Household Members	0.0206161	1.26	0.011773	0.46
Household Head Sex(female=0,male=1)	0.0898793	0.71	-0.1253102	-0.58
Household Head Education_Primary	0.0914036	0.58	-0.0223891	-0.09
Household Head Education_Middle	0.4499643**	2.69	0.5026166*	1.92
Household Head Education_Secondary	0.1673626	1.11	-0.1099725	-0.42
Household Head Education_Higher	0.0139346	0.08	-0.5143779	-1.54
Health Environment				
Water Availability for Handwashing	0.4379937	0.71	-0.1520422	-0.16
Treat water before drinking	-0.0346941	-0.17	0.1378738	0.43
Water Filter	0.0146039	0.05	-0.1707842	-0.4
Parental Health Knowledge & Disease Environment				
Has Heard of AIDS	0.1675477	1.42	-0.4278501	-0.78
Had Cough and Fever for last three weeks	-0.108343	-0.31	-0.3745304	-0.16
Diagnosed as having Hepatitis	-0.1404615	-0.09		
Wealth Score	0.3703183***	4.28	0.6517218***	3.79
Locational Factors:				
Urban	(0.2362891)*	-1.84	(0.3666738)*	-1.83
R2	0.1215			
F	4.05			
N	879		879	
Wald chi			997.32	

Asterisks denote the level of significance *** p<0.01, ** p<0.05, *p<0.1

Source: Based on author's calculations

Table 6D: Comparing OLS & IV 2SLS-Remittances from Overseas & Weight for Age z-score

DEPENDENT VARIABLE	OLS	t-statistics	IV 2SLS	z
Weight for Age Zscore				
INDEPENDENT VARIABLES				
Remittances from Overseas	0.1604181**	2.5	0.000000765**	2.2
Child's Characteristics				
Age of Child in Months	(0.0057597)**	-1.97	-0.0052888	-0.71
Childs Gender (female=0,male=1)	-0.0407046	-0.9	-0.0795372	-0.77
Number of children in HH	(0.0474573)**	-2.01	-0.0718999	-1.21
Maternal Characteristics				
Mother's Education_Primary	-0.0151348	-0.24	-0.1765895	-1.14
Mother's Education_Middle	-0.0398441	-0.51	-0.1561321	-0.91
Mother's Education_Secondary	0.0539914	0.78	0.1956039	1.42
Mother's Marital Status	0.2716973	1.49	0.2223575	0.41
Children Surviving	(0.0286826)**	-2.09	-0.0295367	-0.78
Children Dead	-0.0558709	-1.49	0.0828175	0.61
Health Inputs				
Child Delivered by Doctor	0.1131502**	2.14	0.2357639*	1.86
Child Ever Breastfeed	0.1518182	1.23	0.2933702	0.96
Child Receive BCG Vaccination	0.0376348	0.46	-0.0284827	-0.12
Child Receive Polio Vaccination	-0.0563584	-0.24	0	0
Child Receive Measles Vaccination	0.1962075***	3.03	0.3268275**	2.02
Household's Characteristics				
Number of Household Members	0.0051586	0.7	0.0021521	0.13
Household Head Sex(female=0,male=1)	0.0197418	0.35	-0.0908723	-0.64
Household Head Education_Primary	0.0663665	1	-0.0610247	-0.37
Household Head Education_Middle	0.2672431***	3.38	0.5002936***	2.91
Household Head Education_Secondary	0.1125762	1.6	-0.1577459	-0.93
Household Head Education_Higher	0.1470057*	1.64	-0.2595672	-1.18
Health Environment				
Water Availability for Handwashing	-0.0440268	-0.28	-0.4550388	-0.74
Treat water before drinking	0.070482	0.61	0.075841	0.36
Water Filter	0.1695267	0.98	0.0722238	0.26
Parental Health Knowledge & Disease Environment				
Has Heard of AIDS	0.1582754***	2.82	0.0778391	0.59
Had Cough and Fever for last three week	-0.0299357	-0.2	-0.4450951	-1.24
Diagnosed as having Tuberculosis	0.6912682	0.58	0	0
Diagnosed as having Hepatitis	0.3307854	0.78	-0.6293286	-0.41
Wealth Score	0.2774797***	6.86	0.4653381***	4.12
Locational Factors:				
Urban	(0.2002887)***	-3.27	(0.2740293)**	-2.08
R2	0.1273			
F	13.51			
N	871		879	
Wald chi			3329.28	

Asterisks denote the level of significance *** p<0.01, ** p<0.05, *p<0.1

Source: Based on author's calculations

EXTERNAL MIGRATION, REMITTANCES & CHILD HEALTH

Table 7A: Estimating the impact of Intra household resource allocation bias where boys in migrant households get preferential treatment in terms of health care (HAZ) as compared to girls

DEPENDENT VARIABLES	Height for Age Zscore- BOYS				Height for Age Zscore-GIRLS			
	TEM With HH Asset Composition	z	TEM with Wealth Quantiles	z	TEM With HH Asset Composition	z	TEM with Wealth Quantiles	z
INDEPENDENT VARIABLES								
External Migration	0.0786304	0.19	0.01156	0.03	1.281885***	6.89	1.219137***	6.24
Child's Characteristics								
Age of Child in Months	(0.0393634)***	-19.34	(0.0388731)***	-19.12	(0.0409027)***	-20.55	(0.0408488)***	-20.57
Number of children in HH	(0.057894)***	-3.08	(0.0587872)***	-3.13	(0.0906925)***	-4.88	(0.0885527)***	-4.8
Maternal Characteristics								
Mother's Education_Primary	0.0335585	0.76	0.0106253	0.24	0.0301519	0.68	-0.0108078	-0.24
Mother's Education_Middle	-0.019246	-0.32	-0.0469379	-0.79	0.0031973	0.05	-0.0414236	-0.71
Mother's Education_Secondary	0.0269097	0.48	0.0055206	0.1	0.1404113***	2.52	0.1067354*	1.92
Mother's Marital Status	-0.020052	-0.14	0.0215714	0.15	0.0234986	0.18	0.0381937	0.29
Children Surviving	-0.0081606	-0.87	-0.0107221	-1.15	0.008953	0.99	0.0085051	0.95
Children Dead	(0.062621)***	-2.79	(0.0575006)***	-2.56	(0.0565553)***	-2.57	(0.0483415)**	-2.2
Health Inputs								
Child Delivered by Doctor	0.089959**	2.34	0.078466**	2.04	0.0273528	0.72	0.0199421	0.52
Child Ever Breastfeed	-0.0853707	-0.97	-0.0803748	-0.92	0.2297479***	2.6	0.2372848***	2.69
Child Receive BCG Vaccination	0.025547	0.46	0.0123819	0.22	0.0682484	1.28	0.0623772	1.17
Child Receive Polio Vaccination	-0.0995189	-0.48	-0.0530577	-0.26	-0.2071965	-1.23	-0.1726353	-1.02
Child Receive Measles Vaccination	0.1677108***	3.8	0.1582171***	3.59	0.1406712***	3.23	0.1266412***	2.91
Household's Characteristics								
Number of Household Members	0.0028005	0.46	0.0096419	1.62	-0.0007379	-0.13	0.0026314	0.48
Household Head Sex(female=0,male=1)	-0.1405981	-1.35	-0.1272818	-1.25	0.132349*	1.73	0.1527912**	1.98
Household Head Education_Primary	0.0668917	1.44	0.0463391	0.99	0.0988931	2.12	0.0790028*	1.69
Household Head Education_Middle	0.2362223***	4.47	0.2256147***	4.27	0.2268994***	4.26	0.2060383***	3.87
Household Head Education_Secondary	0.2763216***	5.64	0.260691***	5.3	0.2895122***	5.87	0.2658963***	5.39
Household Head Education_Higher	0.408654***	6.32	0.4174047***	6.54	0.3938875***	6.19	0.3816073***	6.08
Health Environment								
Water Availability for Handwashing	0.0638278	0.64	0.0466026	0.47	0.1562032	1.56	0.1463525	1.46
Treat water before drinking	0.0053298	0.07	0.0086536	0.11	0.0182031	0.22	0.0246443	0.3
Water Filter	-0.1000242	-0.68	-0.0418957	-0.29	0.0556153	0.38	0.126138	0.87
Parental Health Knowledge & Disease Environment								
Has Heard of AIDS	0.164679***	3.87	0.1680301***	3.96	0.1645853***	3.97	0.1607641***	3.88
Had Cough and Fever for last three week	-0.1421963	-1.49	-0.12038	-1.26	-0.1261887	-1.36	-0.1051081	-1.14
Diagnosed as having Tuberculosis	0.0834031	0.2	0.0452059	0.11	-0.394084	-0.79	-0.421916	-0.85
Diagnosed as having Hepatitis	-0.079536	-0.28	-0.0540475	-0.19	-0.329023	-0.76	-0.3446107	-0.8
Household's Asset Composition								
Household owns Home	-0.0211886	-0.44			0.0542384	1.13		
HH Member Own land	0.1305205***	3.27			0.0764646*	1.95		
Household has Electricity	0.0946291	0.82			0.2231703*	1.76		
Household has Gas	0.1526533***	3.29			0.1125211**	2.41		
Household owns Television	0.2161485***	5.44			0.0640035	1.63		
Household owns Air Conditioner	0.2600426***	3.05			0.1936937**	2.33		
Household owns Washing Machine	0.1971485***	4.18			0.2154176***	4.93		
Household owns MotorCycle	0.0786432**	2.09			0.0526127	1.37		
Household owns Car	0.1377704	1.58			0.0593536	0.65		
Household owns Bicycle	0.0427017	1.23			0.0189064	0.55		
Household owns AirCooler	-0.0066264	-0.06			-0.098372	-0.85		
WealthIndexSecond			0.2970469***	5.74			0.2909011***	5.65
WealthIndexMiddle			0.4884306***	8.48			0.4081159***	7.39
WealthIndexFourth			0.5602522***	7.83			0.6101091***	9.61
WealthIndexHighest			0.8991694***	10.03			0.7225608***	9.07
Locational Factors:								
Urban	0.0221617	0.48	(0.0860072)*	-1.76	0.0537491	1.22	-0.0506773	-1.18
Wald chi	1205.86		1195.39		1324.1		1195.39	
N	9878		9878		9791		9878	
chi square	0		0.01		21.76		18.39	

Asterisks denote the level of significance *** p<0.01, ** p<0.05, *p<0.1

Source: Based on author's calculations

EXTERNAL MIGRATION, REMITTANCES & CHILD HEALTH

Table 7B: Estimating the impact of Intra household resource allocation bias where boys in Migrant Households get preferential treatment in terms of health care (WAZ) as compared to girls

DEPENDENT VARIABLES	Weight for Age Zscore- BOYS				Weight for Age Zscore-GIRLS			
	TEM With HH Asset Composition	z	TEM with Wealth Quantiles	z	TEM With HH Asset Composition	z	TEM with Wealth Quantiles	z
INDEPENDENT VARIABLES								
External Migration	0.673549***	3.72	0.788006***	4.74	0.8884572***	5.8	0.9406021***	6.42
Child's Characteristics								
Age of Child in Months	(0.0068721)***	-4.42	(0.0063894)***	-4.1	(0.0103088)***	-6.61	(0.0101459)***	-6.5
Number of children in HH	(0.0595299)***	-4.12	(0.059197)***	-4.09	(0.0842153)***	-5.8	(0.0810492)***	-5.59
Maternal Characteristics								
Mother's Education_Primary	0.0214148	0.63	0.0079254	0.23	0.0327851	0.94	0.0047714	0.14
Mother's Education_Middle	-0.047048	-1.03	-0.0702968	-1.53	0.0627853	1.37	0.0319747	0.7
Mother's Education_Secondary	0.0025597	0.06	-0.0154122	-0.36	0.1146477	2.63	0.0918688	2.1
Mother's Marital Status	-0.0852873	-0.79	-0.0559309	-0.51	0.0013513	0.01	0.0126962	0.12
Children Surviving	(0.0177945)***	-2.57	(0.020509)***	-2.96	-0.0023807	-0.34	-0.0034745	-0.49
Children Dead	(0.0476932)***	-2.77	(0.0443508)***	-2.56	(0.0400851)**	-2.33	(0.0343401)**	-1.99
Health Inputs								
Child Delivered by Doctor	0.1188243***	4.06	0.115289***	3.91	0.1199657***	4.02	0.1197744***	4
Child Ever Breastfeed	-0.090403	-1.35	-0.085501	-1.27	0.1106924	1.6	0.1192241*	1.72
Child Receive BCG Vaccination	0.0339625	0.8	0.0231564	0.54	0.0778296*	1.86	0.0689011*	1.65
Child Receive Polio Vaccination	0.1767921	1.12	0.2034958	1.28	(0.2271641)*	-1.71	-0.1959841	-1.48
Child Receive Measles Vaccination	0.1453763***	4.31	0.1352666***	4	0.1549119***	4.53	0.143249***	4.18
Household's Characteristics								
Number of Household Members	0.0039107	0.87	0.0095321**	2.21	0.0004745	0.1	0.0037128	0.85
Household Head Sex(female=0,male=1)	-0.0655911	-1.05	-0.0265422	-0.43	0.0682891	1.12	0.1051141*	1.76
Household Head Education_Primary	0.0637775*	1.79	0.0514107	1.43	0.0609119*	1.67	0.0507161	1.38
Household Head Education_Middle	0.1780884***	4.4	0.1768092***	4.34	0.125553***	3.01	0.1180601***	2.82
Household Head Education_Secondary	0.2351148***	6.25	0.2409792***	6.36	0.1866043***	4.84	0.1840101***	4.75
Household Head Education_Higher	0.2877502***	5.83	0.333007***	6.8	0.2704117***	5.44	0.2962308***	6.01
Health Environment								
Water Availability for Handwashing	-0.0014083	-0.02	-0.0073009	-0.1	0.1186164	1.51	0.1200899	1.53
Treat water before drinking	0.0777683	1.26	0.094251	1.52	0.0208623	0.32	0.0271108	0.42
Water Filter	-0.0003271	0	0.0520548	0.47	0.0905219	0.78	0.1531512	1.34
Parental Health Knowledge & Disease Environment								
Has Heard of AIDS	0.1757242***	5.44	0.1821671***	5.63	0.1558252***	4.78	0.1568711***	4.81
Had Cough and Fever for last three weeks	0.005969	0.08	0.023517	0.32	-0.0607465	-0.84	-0.0441441	-0.61
Diagnosed as having Tuberculosis	-0.0660827	-0.21	-0.1024504	-0.32	-0.31729	-0.81	-0.3279462	-0.84
Diagnosed as having Hepatitis	-0.0299939	-0.14	-0.0017337	-0.01	-0.436617	-1.28	-0.4500999	-1.32
Household's Asset Composition								
Household owns Home	-0.0374949	-1.01			0.0019457	0.05		
HH Member Own land	0.14938***	5.01			0.1071574***	3.5		
Household has Electricity	0.0283825	0.32			0.0841871	0.85		
Household has Gas	0.1190688***	3.35			0.1058774***	2.89		
Household owns Television	0.1409762***	4.63			0.0300917	0.98		
Household owns Air Conditioner	0.1824161***	2.85			0.1632125***	2.51		
Household owns Washing Machine	0.1521636***	4.46			0.1698037***	4.96		
Household owns MotorCycle	0.1090837***	3.78			0.1159026***	3.87		
Household owns Car	0.1558236**	2.33			0.1211749*	1.7		
Household owns Bicycle	-0.010188	-0.38			-0.0432442	-1.6		
Household owns AirCooler	0.0179929	0.23			0.0366444	0.41		
WealthIndexSecond			0.1879886***	4.73			0.2033602***	5.03
WealthIndexMiddle			0.2983574***	6.93			0.3063803***	7.07
WealthIndexFourth			0.41452***	8.25			0.4278668***	8.6
WealthIndexHighest			0.6045135***	9.85			0.5978739***	9.6
Locational Factors:								
Urban	-0.0337468	-0.98	(0.1177771)***	-3.47	-0.0136847	-0.4	(0.103515)***	-3.09
Wald chi	1103.47		1039.66		1080.36		1065.2	
N	9878		9878		9791		9791	
chi square	7.14		11.1		15.36		19.11	

Asterisks denote the level of significance *** p<0.01, ** p<0.05, *p<0.1

Source: Based on author's calculations

Table 8A: Estimating the impact of Intra household resource allocation bias where boys in remittance recipient households get preferential treatment in terms of health care (HAZ) as compared to girls

DEPENDENT VARIABLE	Height for Age Zscore-BOYS		Height for Age Zscore-GIRLS	
	IV 2SLS	z	IV 2SLS	z
INDEPENDENT VARIABLES				
Remittances from Overseas	-1.29E-07	-0.6	0.000000591**	2.29
Child's Characteristics				
Age of Child in Months	(0.0301611)***	-2.95	(0.0224263)**	-2.06
Number of children in HH	-0.0652378	-0.84	(0.1870976)**	-2.28
Maternal Characteristics				
Mother's Education_Primary	-0.3214268	-1.53	-0.3440814	-1.57
Mother's Education_Middle	0.2034555	0.83	-0.1190427	-0.5
Mother's Education_Secondary	-0.2699717	-1.41	0.380431*	1.83
Mother's Marital Status	-1.00341	-0.87	0.3322211	0.51
Children Surviving	0.0957434*	1.91	-0.0066764	-0.11
Children Dead	0.0415155	0.26	-0.0155887	-0.06
Health Inputs				
Child Delivered by Doctor	-0.0724219	-0.42	0.1586823	0.91
Child Ever Breastfeed	-0.3843973	-0.94	0.0266231	0.05
Child Receive BCG Vaccination	0.0583204	0.19	0	
Child Receive Polio Vaccination	0		(1.916871)***	-3.23
Child Receive Measles Vaccination	0.1030261	0.45	0.3589045*	1.74
Household's Characteristics				
Number of Household Members	0.0122739	0.53	0.0189852	0.75
Household Head Sex(female=0,male=1)	0.2467188	1.34	-0.0636688	-0.32
Household Head Education_Primary	0.0420635	0.19	0.1399698	0.58
Household Head Education_Middle	0.4089233*	1.77	0.4596799*	1.77
Household Head Education_Secondary	0.4576407**	2.13	-0.2109133	-0.89
Household Head Education_Higher	0.2583435	0.92	-0.3238032	-1.28
Health Environment				
Water Availability for Handwashing	1.175463	1.34	-0.2838115	-0.31
Treat water before drinking	-0.1390945	-0.47	-0.0452981	-0.15
Water Filter	-0.058214	-0.14	-0.0651697	-0.17
Parental Health Knowledge & Disease Environment				
Has Heard of AIDS	0.2980724*	1.73	-0.026771	-0.15
Had Cough and Fever for last three weeks	-0.1084239	-0.2	0.0373105	0.07
Diagnosed as having Hepatitis	-0.3094663	-0.2	0	
Wealth Score	0.1891394	1.42	0.6150548***	5.11
Locational Factors:				
Urban	0.0315531	0.16	(0.3453191)*	-1.68
Wald chi	57.14		71.81	
N	436		443	

Asterisks denote the level of significance *** p<0.01, ** p<0.05, *p<0.1

Source: Based on author's calculations

Table 8B: Estimating the impact of intra household resource allocation bias where boys in Remittance recipient households get preferential treatment in terms of health care (WAZ) as compared to girls

DEPENDENT VARIABLE	Weight for Age Zscore-BOYS		Weight for Age Zscore-GIRLS	
	IV 2SLS	z	IV 2SLS	z
INDEPENDENT VARIABLES				
Remittances from Overseas	1.68E-07	1.05	0.000001***	3.66
Child's Characteristics				
Age of Child in Months	-0.0070512	-0.92	-0.0012006	-0.1
Number of children in HH	-0.0258248	-0.44	-0.1166587	-1.34
Maternal Characteristics				
Mother's Education_Primary	0.0277282	0.18	-0.3053608	-1.31
Mother's Education_Middle	-0.0064768	-0.04	-0.1535913	-0.61
Mother's Education_Secondary	0.0288593	0.2	0.3412843	1.54
Mother's Marital Status	0.1805931	0.21	0.2578443	0.37
Children Surviving	-0.0064607	-0.17	-0.0732495	-1.18
Children Dead	-0.0033648	-0.03	0.032529	0.12
Health Inputs				
Child Delivered by Doctor	0.0925073	0.71	0.25291	1.36
Child Ever Breastfeed	0.1672143	0.54	0.5714403	1.09
Child Receive BCG Vaccination	0.1754176	0.76	0	
Child Receive Polio Vaccination	0		-0.9800507	-1.55
Child Receive Measles Vaccination	0.2929361*	1.69	0.5009054**	2.29
Household's Characteristics				
Number of Household Members	0.0124618	0.71	-0.0174734	-0.65
Household Head Sex(female=0,male=1)	0.0497456	0.36	-0.1121466	-0.52
Household Head Education_Primary	-0.1419903	-0.84	0.1072333	0.42
Household Head Education_Middle	0.4455752***	2.56	0.4317355	1.56
Household Head Education_Secondary	0.0987309	0.61	-0.3674533	-1.46
Household Head Education_Higher	-0.0437423	-0.21	-0.2370755	-0.88
Health Environment				
Water Availability for Handwashing	0.0172336	0.03	-0.2129239	-0.22
Treat water before drinking	-0.0294213	-0.13	0.0598191	0.18
Water Filter	-0.1182517	-0.38	0.2890853	0.69
Parental Health Knowledge & Disease Environment				
Has Heard of AIDS	0.2079844	1.6	0.0295696	0.15
Had Cough and Fever for last three weeks	-0.4196963	-1.05	-0.0538558	-0.1
Diagnosed as having Hepatitis	-0.6654245	-0.58	0	
Wealth Score	0.3159045***	3.16	0.4819312***	3.77
Locational Factors:				
Urban	-0.2051364	-1.4	-0.0970252	-0.44
Wald chi	67.98		61.6	
N	436		443	

Asterisks denote the level of significance *** p<0.01, ** p<0.05, *p<0.1

Source: Based on author's calculations

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