Influence of household remittance on childhood stunting in Nepal

Sanju Bhattarai

A thesis

submitted in partial fulfillment of the

requirements for the degree of

Master of Public Health

University of Washington

2016

Committee:

Annette L. Fitzpatrick, Chair

Jonathan L. Gorstein

Program Authorized to Offer Degree:

Epidemiology

University of Washington

Abstract

Influence of household remittance on childhood stunting in Nepal

Sanju Bhattarai

Chair of the Supervisory Committee:
Professor. Annette L. Fitzpatrick
Epidemiology

Introduction: Migration is a livelihood strategy for many poor households in Nepal where about 56% of the households receive remittances, money sent by migrants. The country also has high rates of undernutrition; 41% of children under five years of age are reported to be stunted. Although remittance payments are known to increase household income potentially contributing to improvements in the health and nutrition of children, no study has examined this within the context of Nepal. Understanding these associations may provide evidence to advocate for expansion of cash transfer programs to improve the nutritional status of children in Nepal.

Method: To investigate associations between the odds of stunting among children in households receiving remittances compared to those who did not, we utilized cross-sectional data of 2,498 children under 5 years of age from the Nepal Living Standard Survey 2010/11. Outcomes included low height for age (HAZ), wasting or low weight for height (WHZ), and underweight or low weight for age (WAZ). Multiple logistic regression was used to evaluate the odds of child stunting by remittances received by the families in the 12 months preceding the survey categorized into four groups: (1) not receiving remittance, (2) received less than or equal to Nrs. 15,000, (3) received Nrs. 15,001 to 60,000 and (4) received more than Nrs. 60,000. Guided by a conceptual framework, models were adjusted for variables representing child, maternal, household level characteristics and household cluster.

Results: Our investigation showed that the odds of a child being stunted decreased with increased levels remittances received by households 67% (adjusted OR: 0.33, 95% CI: 0.16, 0.67) lower for households receiving more than Nrs.60,000 remittance per year. However there

was no significant association between remittance and underweight and wasting. Similarly there was no difference in the risk of stunting by gender of the head of the household and income categories.

Conclusion: The study finding that increased household income could potentially reduce the burden of chronic undernutrition in poor families in Nepal paves a path for the expansion of the cash transfer programs. Further research is indicated to understand the threshold of remittance or cash transfer needed to have best impact on nutritional outcomes.

TABLES OF CONTENT

LIST OF FIGURES

LIST OF TABLES

Chapter 1. INTRODUCTION

Forty one percent of children under five years of age in Nepal are stunted or chronically undernourished. The stunting rate is much higher in lower wealth strata as nutrition status is strongly linked to poverty (GON, 2011). About 56% of the households in Nepal are reported to be receiving remittance from a family member defined as money sent by migrants to their family (GON, 2012). Remittance income has contributed to poverty reduction and improved food security in Nepal (GON, 2013). Several studies have found that increased income from remittance contributes to better nutrition and food security (Basu, Harcourt & Zarro, 2011 & Taylor, Rozzelle & De Brauw, 2003). To date, no study looked at the impact of remittance on household nutritional outcomes in Nepal. Understanding these associations may provide evidence to advocate for expansion of cash transfer programs to improve the nutritional status of children in Nepal.

In this study we investigated the risk of stunting among children in households receiving remittances compared to those that did not by conducting a quantitative analysis using data from the Nepal Living Standard Survey. We examined whether household economic status and gender of the head of the household modify the association, examining if the benefit of remittances are critical for poorer households and if women as recipients of remittances result in better nutritional outcomes for children. The mechanism by which remittances may have an impact on nutrition is most likely by increased household income that may allow households to buy good quality food and subsequently to improve their nutritional status. Availability of more diverse foods to families receiving remittances is also explored as a potential pathway through which stunting may be reduced.

The specific objectives of this study are:

1) To determine the association between household remittance and child undernutrition as measured by stunting defined as low height for age (HAZ).

2) To evaluate effect modification of the association between household remittance and child stunting by socioeconomic status and gender of the household head.

3) To compare the associations between household remittance and other child nutritional outcomes as measured by wasting or low weight for height (WHZ) and underweight or low weight for age (WAZ).

Chapter 2. BACKGROUND

2.1 BURDEN OF STUNTING

Stunting reflects chronic undernutrition among children and is considered an indicator of poverty and underdevelopment (Victora et al., 2011). In 2011, 26% (165 million) children under five years of age were stunted in the world (UNICEF, 2013). The global prevalence of stunting in children under 5 years declined from 40% in 1990 to 26% in 2011, however there are sharp regional variation with 36% of children under 5 stunted in south Asia alone (UNICEF, 2013). In Nepal the latest Demographic Health Survey estimated the prevalence of stunting to be 41% which is above the regional average (GON, 2012). Increasing income disparities, inadequate food production and poor feeding behaviors are associated with persistent high rates of stunting in Nepal.

Children from poor households are two times more likely to be stunted than children from wealthy households (UNICEF, 2013). While association between the sex of the child and stunting is not as compelling, boys are 1.4 times more likely to be stunted than girls (GON, 2012). Undernutrition in general causes deaths in one third of the children under the age of five, and the proportion of death attributed to stunting in this age group is 14 -17% (Black et al., 2008). Two thirds of the undernourished children who survive have impaired cognitive and physical development as well as reduced economic productivity (Black et al., 2008). Stunting before 2–3 years of age has moderate to large effects on children's cognitive and educational attainment compared to non-stunted children (Grantham-McGregor et al., 2007).

Stunting interacts with infectious diseases leading to higher rates of mortality among children with infections (Pelletier et al., 1995 & Caulfield et al., 2004). Stunted children with diseases such as diarrhea, pneumonia, and measles have 4.6 times higher risk of death compared to non-stunted children (Black et al., 2008). While exclusive breast feeding has been positively associated with both undernutrition and infections, infants not breastfed are 14 times more likely to die (all-cause mortality) than children exclusively breastfed (Black et al., 2008). Infections, largely due to poor water and sanitation, hinder nutrient absorption and also diminish appetite, resulting in stunting (Humphrey, 2009).

2.2 CHILD NUTRITION AND REMITTANCE

Childhood stunting is multidimensional, thus no single program has been found to produce a significant reduction. Cash transfer programs that boost household financial security are positively associated with food security and child nutrition (Gitter, Manley, & Slavchevska, 2012). While efforts to improve household financial security through cash transfer programs have been limited in developing countries, the increasing trend of economic migration has helped to boost household income (Amuedo-Doeantes & Pozo, 2006). Remittance, defined as money sent home by migrants to their families, is a source of private income that helps to relax household budget constraints. Remittance income has provided rural households in many low resource countries with an opportunity to secure daily food requirements and escape poverty (Yang, 2008).

A quarter of the Nepal's population live on less than one dollar (USD) a day. A lack of job opportunities at home forces many young people to migrate outside of the country to meet their day to day household expenses. Migration is an informal social protection measure taken by families to address their financial vulnerabilities (Sabates- Wheeler & Waite, 2003). In recent years, remittance income has increased significantly in developing countries, in some cases surpassing aid assistance flows to the country (Amuedo-Doeantes & Pozo, 2006). In 2013, Nepal received remittance payments of 5.6 billion dollars, about 29% of gross domestic product, while aid assistance was around 870.6 million dollars (WB, 2015). In Nepal remittances have played a crucial role in reducing poverty and food insecurity (Pyakuryal, Roy &Thapa, 2010). While this additional source of income has had a positive impacts on the short-term nutritional indicators such as weight for height and weight for age, it is believed that remittances have no impact on the long-term nutritional indicator of height for age (Anton, 2010). Similarly, other studies have also noted that short-term nutrition indicators are affected by remittances while long-term improvements occurred only in cases where mothers were highly educated and if households were receiving money for a longer period of time (Acosta, Fainzylber & Lopez, 2007).

2.3 CONCEPTUAL FRAMEWORK ON CHILD NUTRITION AND REMITTANCE

The United Nations Children's fund (UNICEF) has developed a conceptual framework for child nutrition. It provides an overview of the determinants and different pathways affecting child nutrition, and is used in this study to analyze the effect of remittances on child nutritional status.

This framework identifies child's nutritional intake and health status as the immediate determinants of their nutritional status which are influenced by the underlying determinants such as household food security and diet, healthy environment and care for a child and the mother. The combination and interactions of these immediate determinants define the child's nutritional status measured as height for age. The three main pathways for remittances to impact the underlying determinants of child nutrition are healthy environment, proper child care and improving household food security.

Healthy environment depends on the household's access to safe water and sanitation facilities measured by its ability to use toilets and safe drinking water. Child care is determined by the utilization of health services such as antenatal care, and immunization services. Increased income from remittances allows the household to make improvements to water supply and sanitation and enables families to access health services (De & Ratha, 2012. Evidences shows that children in remittance receiving households are more likely to be immunized (Acosta, Fainzylber & Lopez, 2007) and also spend more money on their health care (Valero-Gil, 2009). Childcare is determined by caregivers' education as well as their control over the resources. Caregivers are often the mother; when they receive remittances they are empowered to make decisions on its use and are more likely to use the additional income for the benefit of the child.

Household food security is defined by the availability of resources to consume sufficient food for all members in the household, either by food production, cash income or food received as gift (Smith & Haddad, 2002). Remittances directly increases the household's income making resources available to purchase good quality food. This improves household food availability as well as diet diversity and thus the child's nutritional intake. Remittance payments have been found to change food consumption patterns with improvement in the quality of food consumed (Basa, Harcourt & Zarro, 2011). However, in a comparative analysis between remittance receiving and non-receiving households in Mexico, it was found that the consumption patterns did not differ significantly, with food consumption expenditures being higher in remittance receiving families (Jimenez, 2009). Similarly, a study in Nigeria highlighted that while the nutrition of children in the remittance receiving households was better, the quality of diet was not significantly improved as it increased only in caloric intake (Babatunde & Martinetti, 2010). The

same study showed that the quality of dietary intake was positively related to the family size and the household's net income rather than to remittance income (Babatunde & Martinetti, 2010).

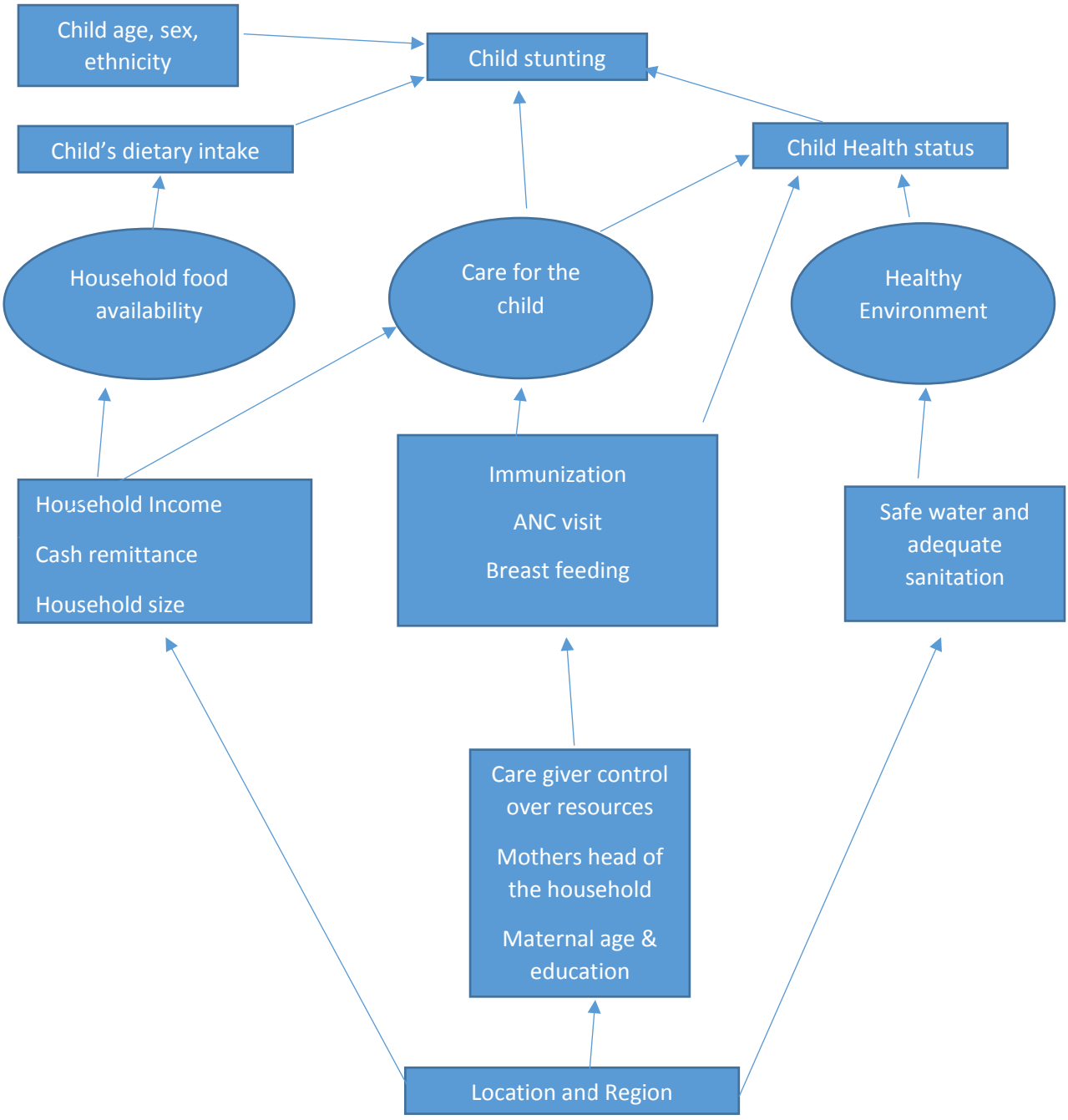

Figure 1: Conceptual framework

The above discussion shows how remittances ensure higher income often resulting in better nourishment for the family. But it is not clear what remittance threshold is needed to have a positive impact, how nutritional outcomes of households in different wealth categories are impacted by remittances, and how the benefit of remittances on child nutrition may vary depending on who in the family makes decisions to spend the remittance income. This study aims to explore these factors that help to understand the impact of remittance on children's nutrition and the potential role of remittance to ultimately break the cycle of poverty in Nepal. Results of this study are intended to provide justification for promoting cash transfer programs to improve the nutritional status of children in food insecure households.

Chapter 3. METHODS

3.1 STUDY DESIGN

We analyzed data from the Nepal Living Standard Survey 2010/11 (NLSS III). The NLSS III is the third in a series, the first was in 1995/96 and second in 2003/04. These are nationally representative surveys conducted by the Nepal Central Bureau of Statistics with the assistance from the World Bank. They collect information on poverty and living standard that are used to evaluate the impact of various government policies and programs including food security and nutrition. The NLSS III collected data from 7,020 households that included 5,988 households from the cross section sample and 1,032 households from panel sample also included in NLSS I and II. The data sets from different modules of the NLSS III were merged to prepare the data for analysis in this study.

3.2 STUDY SUBJECTS

The NLSS III collected anthropometric data from approximately 2,515 preschool children under 60 months of age. The final data set used here included 2,498 children with plausible height for age measurements. The 2,498 children came from 1,892 households which indicates that 606 children were repeated from the same households. Cluster command in Stata was used to avoid collinearity for including more than one children from the same household.

3.3 STUDY VARIABLES

Outcome variable

The main outcome variable selected for this study is stunting or low height for age (HAZ). For the third objective of this study two more outcomes: wasting or low weight for height (WHZ) and underweight or low weight for age (WAZ). Stunting is a measure of chronic undernutrition, wasting is measure of acute undernutrition and underweight is a combination of both. Children falling two standard deviations below the median height for age, weight for height and weight for height compared to World Health Organization (WHO) recommended reference population from 2006 are considered stunted, wasted and underweight respectively(WHO, 2006). The Stata zanthro program was used to calculate these variables. Those children with the z scores of more +6 and less than –6 were excluded because such values are considered implausible by the WHO standards (WHO, 2006).

Exposure Variables

The main exposure variable in these analysis is remittance: The NLSS III data has information on the exact amount of remittance received by the families in the 12 months preceding the survey. To understand what threshold of remittance is needed to have positive impact on stunting the remittance amount received by the families was categorized into four groups: (1) not receiving remittance, (2) received less than or equal to Nrs. 15,000[1], (3) received Nrs. 15,001 to 60,000 and (4) received more than Nrs. 60,000. To understand the source of the remittance, a categorical variable was created using the data from the survey. For those household receiving remittance the destination of the absentee member as reported in the survey was used and categorized into four groups (0) if household did not receive remittance, (1) if household received remittance and the absentee household member/s was within Nepal (domestic remittance only), (2) if household received remittance and the absentee household member/s was outside Nepal (foreign remittance only) and (3) if household received remittance and the absentee household members were in Nepal as well as abroad (domestic and foreign remittance).

Other variables:

Guided by the conceptual framework a set of variables representing child, maternal and household level characteristics were selected from the NLSS III to understand the effect of remittance on child nutrition.

Location: Variables related to the location (rural/urban) and the region (Mountains, Hill and Terai) of the residence were used because prior evidence suggests that geography is related to variability in child nutritional status in Nepal (GON, 2012). Regions were used as categorical variables.

Age of the child: Age of the child as reported by the respondent was recorded in months. For our analysis age was centered by adding the mean age of the child to each observation. Centered age and centered age squared were used in the model. Age squared was included because the effect of child age was found non - linear with remittance.

[1] Exchange Rate US$1= 107 Nrs. (Nepalese rupees) on 7/24/2016

Sex of the child: The sex variable was used as a dummy variable coding 1 for male and 0 for female.

Ethnicity: The caste and ethnicity of the family was asked during the survey. For the purpose of this study we categorized ethnicity into three groups and coded as (0) Upper Caste (Brahmin, Chettri and Madhesi higher caste), (1) Janajati (Janajati and Madheshi others) and (2) minority groups (Dalits and Muslims).

Birth order: The birth order of the child as reported by the respondent was used in the model.

Immunization: Information on the child's immunization status as recommended by the Nepali Ministry of Health was requested and recorded. Based on required immunization for age of the child an ordinal immunization variable was created and coded as (0) never immunized, (1) partially immunized, (2) fully immunized.

Antenatal visit: If the mother reported to have gone for any ante natal visit while pregnant with the child it was coded as 1 and if not 0.

Exclusive breast feeding: Mothers were asked to report if they breast fed their child and also when the child was given complementary food. If the mother reported the child was breast fed and also if she reported complementary feeding was done after six months the child was considered as exclusively breastfed and coded as 1 and 0 other wise.

Child Health: If the respondent reported that the child had suffered from any health problem (for example diarrhea, respiratory problems, fever etc) in the past 30 days preceding the survey it was coded as 1 and 0 otherwise.

Maternal age: Age of mother was recorded in years and used as a continuous variable. Older mothers have more knowledge about child care than younger ones (Borooah, 2005) so a positive association of maternal age with stunting is expected.

Maternal education: A categorical variable for mother's education variable was derived from three questions asked in the survey, the highest grade completed, grade currently attended, and if she can read. If the mother could not read or she had attended kindergarten or less she was categorized as illiterate and coded 0. If she was had attended or currently attending grade 1-5 it was coded as 1, grade 6 -10 coded as 2, school leaving certificate (high school graduate) coded 3, Intermediate (some college) coded as 4, Bachelor and above coded as 5. Maternal education is

expected to be positively associated with nutrition outcome as educated mothers tend to have better access to and are receptive to health information (GON, 2012).

Head of household: A binary variable was created to denote if mother of the child was head of the household. If she was the head of the household it was coded as 1 and if she was not it was coded as 0.

Household size: The number of children present in the household is negatively associated with the nutritional outcome, as the mother is less likely to have time to take care of each child when the number of children increases in the household (Baez, 2008). Both the total household size as well as the number of children less than 5 years in the household were included in the model as continuous variable.

Household Income: The annual total household income was calculated adding income from sources other than remittances. Income from home production, livestock and farming, rent, jobs and social protection were included. Twenty eight households in our data had negative household income because the household investment in livestock, agriculture and nonagricultural enterprises was higher compared to the income from these sources. Income was categorized into four categories (0) less than Nrs.30,000, (1) Nrs.30,001 to 80,000, (2) Nrs.80,001 to 200,000 and (3) more than Nrs. 200,000 and used as dummy variables with lowest earning household as base.

Sanitation: Two variables related to household sanitation was identified: household's access to safe water and improved toilets. The household toilet facility was categorized into three groups and coded as no toilet (0), unimproved toilet (1) and improved or flush toilet (2). Similarly, household access to safe water was coded as 1 if piped, covered or tube well and 0 otherwise.

Dietary Intake: The household respondent in the survey was asked to report the number of food groups (out of 8) they consumed over a reference period of seven days before the survey. (NPC, 2013) Depending on the response, the dietary intake variable could have values from 0 to 8 (8 reflecting consumption of all 8 food groups and 0 as consumption from any of the 8 food groups).

Participation in nutrition programs: The NLSS III collected information on the household's participation in nutrition education and nutrition related cash transfer programs. A variable was

created to indicate the household's participation in any such program and coded as 1 if they had participated and 0 otherwise.

3.3 DATA ANALYSIS

All data analysis was done using Stata, version 12.0 (College Station, Texas). Descriptive and bivariate analysis were carried out and followed by simple and multivariate logistic regression analysis. There were missing values for birth order (n=49), maternal age (n=43) and education (n=141), any antenatal care (ANC) visit (n=687). For logistic regression models, the cluster command was used to account for more than one sample from the same household. Prior to conducting logistic regression, we performed diagnostics using residuals plots and reviewed goodness of fit parameters for the models. These tests showed that a multiple logistic regression model was able to predict 69% of the cases correctly and there was no discrepancy between the observed and fitted model. Models were adjusted hierarchically. First we performed logistic regression with stunting as an outcome and remittances (categorical) as a predictor without controlling for hypothesized confounders and effect modifiers. In the next stage, the second remittance source variable (foreign/ domestic/ both) was added into the model. In the third stage the remaining variables discussed above were added into the model. Next we explored interaction; an interaction term between household income and remittance was added into the model to see if household income modifies the association between remittance and stunting. Similarly, we then included an interaction term for mother as head of the household and remittance to see if there is differences in the risk of stunting with mother being the head of the household or not. To test interaction we performed both the Wald and Likelihood Ratio Test. The Wald test was done for the logistic regression models that adjusted for household (i.e. used cluster command) while the Likelihood Ratio Test was done for the models not using the cluster command. Multiple logistic regression was carried out with wasting and underweight as outcomes to compare the results with stunting using the same model and only replacing the outcome. Total N and percentages, mean and standard deviation (SD) are presented for descriptive analysis. Odds ratios and 95% confidence intervals are reported for logistic regression models.

Chapter 4. RESULTS

4.1 CHARACTERISTICS OF THE CHILDREN BY REMITTANCE CATEGORIES

Table 1 presents the characteristics of the children in the study by remittance categories. The mean age of the children in the study was 30 months and it did not significantly differ by remittance categories. Gender was evenly distributed with slightly more boys in all the categories except for those receiving highest remittance. More than 45% in all the remittance categories were from Janajati ethnic group. Households receiving the highest level of remittance had more children that were first or second in birth order. A majority children in the households were exclusively breast fed which did not significantly vary by remittance categories.

Table 1. Characteristics of children in study by remittance categories (N = 2498)

Characteristics	No Remittance (n=1134)	<=15,000 (n = 547)	15,001 – 60,000 (n = 344)	> 60,000 (n = 473)	
	n (%) / Mean (SD)	n (%) / Mean (SD)	n (%) / Mean (SD)	n (%) / Mean (SD)	P value
Age of child in months	30.3 (17.2)	30.6 (16.9)	29.8 (16.5)	30.6 (16.6)	0.389
Sex of the child					
Male	603 (53.2%)	275 (50.3%)	183 (53.2%)	232 (49.0%)	0.381
Female	531 (46.8%)	272(49.7%)	161 (46.8%)	241 (51.0%)	
Caste/ethnicity					
Upper caste	377 (33.2%)	158 (28.9%)	106 (30.8%)	148 (31.3%)	
Janajati	527 (46.5%)	259 (47.4%)	161 (46.8%)	226 (47.8%)	0.575
Minority groups	230 (20.3%)	130 (23.8%)	77 (22.4%)	99 (20.9%)	
Birth Order*	2.8 (1.8)	2.6 (1.7)	2.5 (1.8)	2.2 (1.4)	0.001
Exclusive Breastfeeding					
Yes	578 (51.0%)	265 (48.4%)	188 (54.6%)	250 (52.8%)	0.280
No	556 (49.0%)	282 (51.6%)	156 (45.4%)	223 (47.2%)	
Child unwell in past 30 days					
Yes	341 (30.1%)	209 (38.2%)	121 (35.2%)	177 (37.4%)	0.002
No	793 (69.9%)	338 (61.8%)	223 (64.8%)	296 (62.6%)	
Immunization status					
Never Immunized	49 (4.3%)	13 (2.4%)	10 (2.9%)	10 (2.1%)	0.157
Partially Immunized	759 (66.9%)	390 (71.3%)	241(70.1%)	331 (70.0%)	
Fully Immunized	326 (28.7%)	144 (26.3%)	93 (27.1%)	132 (27.9%)	
Any ANC visit while pregnant with child*					
Yes	580 (70.6%)	324 (80.0%)	205 (83.3%)	292 (86.4%)	0.001
No	242 (29.4%)	81 (20.0%)	41 (16.8%)	46 (13.6%)	

*Missing data

Children in households receiving remittance payment were significantly more likely to have been unwell in the month preceding the survey compared to those not receiving remittance, with highest proportion (38.2%) among those receiving remittance less than Nrs.15,000 per year. The immunization status of the children did not vary significantly by remittance categories, 68.9% and 3.3% of them were partially and never immunized respectively. More mothers belonging to the highest remittance group went for antenatal visit while they were pregnant than mother belonging to other remittance group.

Maternal and household level characteristics of the children by remittance categories are presented in Table 2. The average age of the mother was significantly different by remittance categories, mothers of the children in households not receiving remittance were older (28 years) compared to those in remittance receiving categories. Percentages of households headed by the child's mother increased significantly as the amount of remittance increased, households receiving Nrs.15,001 to 60,000 per year had the highest (31.6%). Maternal education varied significantly by remittance categories with the highest proportion in all the categories being illiterate except for those receiving the highest remittance. Significantly higher proportion of the remittance receiving households were rural (approximately 80%) with more than 50% in the Terai, while non-receiving households were mostly from hilly regions (60.2%). The largest household size, 7.1 individuals/household, was observed among those receiving less than Nrs.15000 remittance per year.

Access to both toilet and safe drinking water was significantly associated with remittance. Households' access to toilet facilities was not impressive with majority in all categories except in highest remittance receiving category had no toilets. Those receiving less than 15,000 remittance were worse off with highest proportions of no toilets and lowest improved toilets. Access to safe water was worse for those receiving no remittance, around 25% still consumed unsafe water compared to 11% of those receiving more than 60,000 remittance per year. Households with annual income more than Nrs.80,000 were more likely not to receive remittance or receive less than Nrs.15,000, while households with lowest income were more likely to receive in higher remittance more than Nrs.15,000. This suggests that remittance is a major source of household income for those receiving it.

Table 2. Maternal and household characteristics by remittance categories (N = 2498)

Characteristics	No Remittance (n=1134) n (%) / Mean (SD)	<=15,000 (n = 547) n (%) / Mean (SD)	15,001 – 60,000 (n = 344) n (%) / Mean (SD)	> 60,000 (n = 473) n (%) / Mean (SD)	P value
Mother's Age (years)*	28 (6.3)	27 (6.5)	27 (5.8)	26 (6.0)	0.002
Mother household head*					
Yes	70 (6.3%)	57(10.5%)	105 (31.6%)	135 (29.1%)	0.001
No	1046 (93.7%)	486 (89.5%)	227 (68.4%)	329 (70.9%)	
Mother's education *					
Illiterate	565 (52.9%)	277 (52.5%)	144 (46.7%)	164 (36.1%)	
Grade 1 to 5	168 (15.8%)	99 (18.7%)	64 (20.8%)	81(17.8%)	0.001
Grade 6 to 10	184 (17.2%)	92(17.4%)	55(17.9%)	142(31.3%)	
SLC	52 (4.9%)	37 (7.0%)	20 (6.5%)	33 (7.3%)	
Intermediate	49 (4.6%)	12 (2.3%)	13 (4.2%)	22 (4.8%)	
Bachelor and above	49 (4.6%)	11 (2.1%)	12 (3.9%)	12 (2.6%)	
Location					
Urban	319(28.1%)	108 (19.7%)	73(21.2%)	93 (19.7%)	0.001
Rural	815(71.9%)	439 (80.3%)	271(78.8%)	380 (80.3%)	
Regions					
Mountain	115 (10.1%)	45 (8.2%)	21 (6.1%)	14 (3.0%)	
Hill	683 (60.2%)	174 (31.8%)	151 (43.9%)	195 (41.2%)	0.001
Terai	336 (29.6%)	328 (60.0%)	172 (50.0%)	264 (55.8%)	
Average household size	6.4 (2.4)	7.1 (3.3)	6.3 (2.7)	6.7 (3.4)	0.001
Type of Toilet					
Improved	340 (30.0%)	133 (24.3%)	103 (29.9%)	188(39.7%)	
Unimproved	243 (21.4%)	92 (16.8%)	65 (18.9%)	74 (15.6%)	0.001
No toilet	551 (48.6%)	322 (58.9%)	176 (51.2%)	188 (39.7%)	
Source of Drinking water					
Safe	848 (74.8%)	459 (83.9%)	277 (80.5%)	423 (89.4%)	0.001
Unsafe	286 (25.2%)	88 (16.1%)	67 (19.5%)	50(10.6%)	
Annual household income					
Less than Nr. 30,000	131 (11.6%)	66 (12.1%)	103 (29.9%)	130 (27.5%)	
Nrs. 30,001 to 80,000	320 (28.2%)	148 (27.0%)	101 (29.4%)	153 (32.4%)	0.001
Nrs. 80,0001 to 200,000	412 (36.3%)	204 (37.3%)	91 (26.5%)	126 (26.6%)	
More than Nrs.200,000	271 (23.9%)	129 (23.6%)	49 (14.2%)	64 (13.5%)	

*Missing data

4.2 HOUSEHOLD DIET AND NUTRITION OUTCOME AMONG CHILDREN

Table 3 present's the results of bi variate analysis of household diet and nutrition outcomes with remittance categories. Even though significantly higher proportion of household's not receiving remittance had participated in nutrition programs (16% vs 9% or less), the diet diversity score

decreased as remittance amount decreased. Those receiving more than Nrs. 60,000 consumed the most diverse diet consisting of food from 7 or more food groups out of 8.

Table 3. Nutritional outcomes in children by remittance categories (N = 2498)

Characteristics	No Remittance (n=1134)	<=15,000 (n = 547)	15,001 – 60,000 (n = 344)	> 60,000 (n = 473)	
	n (%) / Mean (SD)	n (%) / Mean (SD)	n (%) / Mean (SD)	n (%) / Mean (SD)	P value
Household Diet diversity score (range)	6.7 (0 to 8)	6.9 (3 to 8)	6.9 (3 to 8)	7.1 (4 to 8)	0.001
Household participation in nutrition program					
Yes	178 (15.7%)	49 (9.0%)	28 (8.1%)	22 (4.6%)	0.001
No	956 (84.3%)	498 (91.0%)	316 (91.9%)	451 (95.4%)	
Height for Age (HAZ)					
Average Z score	-1.6 (1.6)	-1.5 (1.6)	-1.5 (1.5)	-1.3 (1.5)	
Normal	661 (58.3%)	323 (59.1%)	207 (60.2%)	305 (64.5%)	0.013
Moderately Stunted	286 (25.2%)	151 (27.6%)	93 (27.0%)	124 (26.2%)	
Severely Stunted	187 (16.5%)	73 (13.4%)	44 (12.8%)	44 (9.3%)	
Weight for Height (WHZ) *					
Average Z score	-0.7 (1.2)	-0.9 (1.2)	-0.8 (1.1)	-0.7 (1.2)	
Normal	893 (86.7%)	421(82.2%)	278 (87.7%)	379 (86.5%)	0.292
Moderately Wasted	102 (9.9%)	69 (13.5%)	30 (9.5%)	45 (10.3%)	
Severely Wasted	35 (3.4%)	22(4.3%)	9(2.8%)	14 (3.2%)	
Weight for Age (WAZ)*					
Average Z score	-1.4 (1.3)	-1.4 (1.2)	-1.4 (1.1)	-1.2 (1.1)	
Normal	768 (67.8%)	381 (69.7%)	249 (72.4%)	362 (76.5%)	0.026
Moderately underweight	277(24.5%)	122(22.3%)	70 (20.4%)	88 (18.6%)	
Severely underweight	88 (7.8%)	44 (8.0%)	25 (7.3%)	23 (4.9%)	

*Missing data

Stunting and underweight among children under five were significantly associated with remittance categories, while wasting was not associated. The average Z score for HAZ was lowest for those not receiving remittance and highest for those receiving more than Nrs. 60,000 (-1.6 vs -1.3). The proportion of moderately stunted children was similar (25-27%) in all categories, however the proportion of severely stunted children was highest for not receiving remittance 16.7% and gradually decreased as remittance increased.

Surprisingly those not receiving as well as the receiving highest remittance had the same and the highest z score for WHZ (-0.7). The proportion of wasted (13.5%) and severely wasted (4.3%) was highest in households receiving less than Nrs.15,000 remittance. Coincidently this group also had

worst access to improved toilet and children in these households were more likely to be unwell and less likely to be exclusively breastfed. Similar to stunting, z score for WAZ (-1.2) and the proportion of children not underweight was highest for those receiving more than 60,000 remittance. While the proportion of moderately underweight and severely underweight was highest among those not receiving remittance (24.5%) and those receiving less than 15,000 remittance(8.0%) respectively.

4.3 CHARACTERISTIC OF THE CHILDREN BY STUNTING CATEGORIES

Relationships between the child level characteristics and stunting are presented in Table 4. Older children were more likely to be stunted than younger ones. There was no significant difference in sex distribution of children by stunting categories. Compared to normal children, a higher proportion of stunted children came from Janjati (48% vs 46%) and minority groups (24% vs 19%).

Table 4. Characteristic of the children by stunting categories (N = 2498) n (%) / Mean (SD)

Characteristics	Normal (n = 1496)	Stunted (n=1002)	P value
Age of the child in months	27 (17.6)	35 (14.6)	0.001
Sex of the child			
Male	796 (53.2%)	497 (49.6%)	0.077
Female	700 (46.8%)	505 (50.4%)	
Caste/ethnicity			
Upper caste	512 (34.2%)	277 (27.6%)	0.001
Janajati	690 (46.1%)	483 (48.2%)	
Minority groups	294 (19.7%)	242 (24.2%)	
Average Birth Order of child*	2.4 (1.6)	2.9 (1.8)	0.001
Exclusive Breastfeeding*			
Yes	763 (51.0%)	518 (51.7%)	0.731
No	733 (49.0%)	484 (48.3%)	
Child was unwell in past 30 days			
Yes	527 (35.2%)	321 (32.0%)	0.099
No	969 (64.8%)	681 (67.9%)	
Immunization Status			
Never Immunized	47 (3.1%)	35 (3.5%)	0.001
Partially Immunized	989 (66.1%)	732 (73.1%)	
Fully Immunized	460 (30.8%)	235 (23.5%)	
Any ANC while pregnant with child*			
Yes	908 (81.1%)	493 (71.2%)	0.001
No	211 (18.9%)	199 (28.8%)	

*Missing data

Stunted children were also likely to be of higher birth order. There was no significant difference in the breast feeding pattern and child health by stunting categories. Thirty four percent of the children had been unwell in the month preceding the survey. However there was a significant difference in preventive health service utilizations, compared to normal children stunted children were less likely to be fully immunized (30.8% vs 23.5%) and their mothers less likely to have gone for at least one ANC visit while pregnant with the child (81.1% vs 71.2%).

Maternal and household level characteristic by stunting categories are presented in Table 5. Mothers of the stunted children were significantly older and compared to mothers of normal children they were also more likely to be head of the households (14.1% vs 16.3%) and less likely to be literate (60.2% vs 41.1%). Stunted children were more likely to live in rural areas (84.7% vs 70.6%) and mountain regions (10.8% vs 5.8%) compared to normal children. Stunting was not related to household size.

Households' access to safe water and toilet differed significantly with stunting categories stunted children were less likely to have toilets (43.0% vs. 59.3%) and less likely to have access to safe drinking water (77.6% vs. 82.2%). Households with stunted children were more likely to participate in nutrition programs in the community (14.3% vs. 9.0%). Stunted children mostly belonged to poorer households with lower proportion in higher income range categories (15.9% vs. 23.6%) among those earning more than 200 thousand rupees per year.

Table 5. Maternal and household characteristic by stunting categories (N = 2498)

Characteristics	Normal (n = 1496) n (%) / Mean (SD)	Stunted (n=1002) n (%) / Mean (SD)	P value
Mother's Age (years)*	27 (6.0)	28 (6.5)	0.001
Mother household head*			
Yes	207 (14.1%)	160 (16.3%)	0.013
No	1265 (85.9%)	823 (83.7%)	
Mother's education *			
Illiterate	579 (41.1%)	571 (60.2%)	
Grade 1 to 5	246 (17.5%)	166 (17.5%)	
Grade 6 to 10	320 (22.7%)	153 (16.1%)	0.001
SLC	110 (7.8%)	32 (3.4%)	
Intermediate	79 (5.6%)	17 (1.8%)	
Bachelor and above	75 (5.3%)	9 (1.0%)	
Location			
Urban	440 (29.4%)	153 (15.3%)	0.001
Rural	1056 (70.6%)	849 (84.7%)	
Region			
Mountain	87 (5.8%)	108 (10.8%)	
Hill	725 (48.5%)	478 (47.7%)	0.001
Terai	684 (45.7%)	416 (42.5%)	
Average household size	6.5 (2.9)	6.7 (2.8)	0.210
Type of toilet			
Improved	587 (39.2%)	200 (20.0%)	0.001
Unimproved	266 (17.8%)	208 (20.8%)	
No toilet	643 (43.0%)	594 (59.3%)	
Source of Drinking water			
Safe	1229 (82.2%)	778 (77.6%)	0.005
Unsafe	267 (17.9%)	224 (22.4%)	
Household Diet diversity score (range)	7.0 (3 to 8)	6.7 (0 to 8)	0.001
Household participation in nutrition program			
Yes	134 (9.0%)	143 (14.3%)	0.001
No	1,362 (91.0%)	859 (85.7%)	
Annual household income			
Less than Nr. 30,000	242 (16.2%)	188 (18.8%)	0.001
Nrs. 30,001 to 80,000	387 (25.9%)	335 (33.4%)	
Nrs. 80,0001 to 200,000	523 (34.3%)	320 (31.9%)	
More than Nrs.200,000	354 (23.6%)	159 (15.9%)	

*Missing data

4.4 ASSOCIATION OF STUNTING AND REMITTANCE AMONG CHILDREN

Table 6 compares the unadjusted and adjusted odds ratios related to stunting. The odds of the child being stunted was significantly lower (23 %) for households receiving more than Nrs. 60,000 remittance in the unadjusted model. In the multivariate model the odds of child stunting decreased with increases in amount of remittance received by households, 46%, 60% and 67% lower for households receiving remittances less than Nrs.15,000, Nrs.15,000 to 60,000 and more than Nrs.60,000 remittance per year, respectively.

Table 6. Association of stunting and remittances among under five children in Nepal

	Unadjusted (N=2498)			**Adjusted* (N=1748)**		
Remittance categories	OR[a]	95% CI	P	OR [a]	95% CI	P
No remittance (referent)						
Nrs 1 to 15,000	0.97	0.78, 1.20	0.774	0.54	0.31, 0.97	0.038
Nrs 15,001 to 60,000	0.92	0.71, 1.20	0.552	0.40	0.20, 0.81	0.011
More than Nrs 60,000	0.77	0.61, 0.97	0.027	0.33	0.16, 0.67	0.002

[a]OR = Odds Ratio *regions and location, child age, gender, ethnicity, birth order, suffered illness and immunization, ANC visit during pregnancy, maternal age and education, household size, income, access to water and toilet facilities, diet diversity and participation in nutrition program and remittance source

Table 7 provides the result of the multiple logistic regression including all variables hypothesized to affect the association between stunting and remittance. Along with remittance, child's age, maternal education, household size, region and location where the child lived had significant associations with stunting. For example children in the Terai were 49% less likely to be stunted than children in the mountain regions. Children with mothers who had bachelor and above degree were 82% less likely to be stunted compared to illiterate mothers. And children in the rural areas were 56% more likely to be stunted than children in urban areas. On the other hand household income, toilet type, water source, birth order, diet diversity score and ANC visit by the mother while pregnant were not significantly associated with stunting in multivariate models although they were significantly related to both stunting and remittance in bivariate analyses.

Table 7. Association of covariates in the multiple logistic regression model with stunting (N = 1748)

Independent variables	OR	95% CI	P value
Remittance			
No Remittance (referent)	1.00		
Nrs. 1 to 15,000	0.54	0.31, 0.97	0.038*
Nrs. 15,001 to 60,000	0.40	0.20, 0.81	0.011*
More than Nrs.60,000	0.33	0.16, 0.67	0.002*
Child age	1.04	1.03, 1.05	0.001*
Child age square	1.00	1.00, 1.00	0.001*
Male	0.95	0.76, 1.18	0.629
Ethnicity	1.12	0.94, 1.34	0.199
Birth Order	1.09	0.98, 1.21	0.100
Child suffered illness	1.04	0.82, 1.32	0.724
Immunization	0.94	0.75, 1.18	0.580
Ante natal visit	1.17	0.87, 1.58	0.303
Mothers age	0.98	0.95, 1.00	0.118
Education			
Illiterate (referent)	1.00		
Grade 1 to 5	0.71	0.50, 0.99	0.044*
Grade 6 to 10	0.63	0.44, 0.90	0.012*
SLC	0.39	0.21, 0.73	0.003*
Intermediate	0.50	0.24, 1.10	0.077
Bachelor and above	0.18	0.07, 0.52	0.001*
Mother household head	1.07	0.75, 1.55	0.700
Regions			
Mountain (referent)	1.00		
Hill	0.85	0.51, 1.40	0.533
Terai	0.51	0.29, 0.89	0.017*
Rural	1.56	1.11, 2.17	0.011*
Diet diversity	0.95	0.85, 1.06	0.398
Household size	1.06	1.00, 1.11	0.046*
Household size < 5	0.85	0.73, 1.00	0.047*
Annual household income			
<Nrs.30,000 (referent)	1.00		
Nrs.30,001 to 80,000	1.00	0.71, 1.40	0.999
Nrs. 80,0001 to 200,000	0.73	0.51, 1.05	0.089
More than Nrs. 200,000	0.78	0.50, 1.21	0.266
Toilet type	0.86	0.72, 1.02	0.075
Safe water	1.22	0.89, 1.69	0.210
Nutrition program	1.16	0.79, 1.71	0.437
Remittance source			
No Remittance (referent)	1.00		
Domestic only	1.90	1.05, 3.43	0.034*

Foreign Only	1.83	0.92, 3.70	0.088
Both Domestic and Foreign	2.16	1.06, 4.42	0.035*
Constant	2.92	0.77, 11.10	0.116

* Significant

We further explored effect modification in the relationship of stunting and remittance by household's income and mother being the head of household using both the Wald and Likelihood Ratio Test. There was no significant difference in the risk of stunting by income categories (P values for Likelihood Ratio: 0.497 & Wald test: 0.526) and mother being the head of the household (P values for Likelihood Ratio 0.199 & Wald test: 0.207).

4.5 COMPARING ASSOCIATION OF WASTING AND UNDERWEIGHT WITH REMITTANCE

Table 8 shows that similar to association of stunting and remittance the odds of underweight is reduced for children in households receiving remittances although results are not significant. However the likelihood of child a being wasted increased with remittance. The odds of wasting was significantly higher (2%) for children in households receiving less than Nrs.15,000, this association though a similar in trend was not significant for children in higher remittance receiving households.

Table 8. Adjusted association for wasting and underweight with remittance among under five children in Nepal

	Wasting (N=1556)			Underweight (N=1747)		
Remittance categories	OR[a]	95% CI	P	OR[a]	95% CI	P
No remittance (referent)						
Nrs. 1 to 15,000	1.98	1.07, 3.68	0.031	0.78	0.40, 1.53	0.478
Nrs. 15,001 to 60,000	1.10	0.46, 2.64	0.817	0.55	0.25, 1.23	0.148
More than Nrs. 60,000	2.03	0.85, 4.83	0.109	0.53	0.24, 1.21	0.133

[a]OR = Odds Ratio. Adjusted for regions and location, child age, gender, ethnicity, birth order, suffered illness and immunization, ANC visit during pregnancy, maternal age and education, household size, income, access to water and toilet facilities, diet diversity and participation in nutrition program and remittance source.

Chapter 5. DISCUSSION

Based on our analysis of the data from a nationally representative household survey, we report that the household receipt of remittance payments had a positive effect on reducing childhood stunting in Nepal. Notably, households receiving remittance had 46–67% reduced odds of stunting among children aged 0–60 months when adjusted. We also found that educated mothers were less likely to have stunted child and rural children were more likely to be stunted. Previous studies have produced mixed findings, some concur with our results, reporting inverse association of household remittance with childhood stunting, (Acosta, Fajnzylber & Lopez 2007) while others have reported no association (Anton, 2010 & Davis, 2015). However, almost all studies have shown positive association between mother's education and stunting (Van de Poel et al., 2008 & Semba et al., 2008). In our study stunting was significantly related with household diet diversity, annual income, access to toilet and safe drinking water, birth order, child immunization and prenatal care in bivariate analyses, however in contrast to previous studies (Monteiro et al., 2010, Arimond & Ruel, 2004, Fenske, Burns & Rehfuess, 2013 & Rah et al., 2015) we did not find these variables to be predictors of stunting in multivariate analysis. There could be several reasons for the lack of significance in our study. For example, it is possible that the proxy measures used to measure some of these variables were not accurate or that there was a difference in the distribution of variables in the population (Pearce, 2011). Another difference in our findings compared to previous studies, (Anton, 2010) is that children in remittance receiving households were more likely to be wasted. Wasting, an indicator of acute undernutrition can result from a single episode of poor health (Black et al., 2008). In our study a higher proportion of the wasted children were unwell (47% vs 32%). It is possible that the remittance was sent to provide health care services for unwell children rather than healthy food to children. Lack of information on the exact timing of remittance over the period of one year precludes us to test this proposition.

A child's nutritional status is determined as early as or before conception (Black et al., 2008). Therefore the exact duration of time the households received remittance is critical for it to have positive impact on child nutrition (Davis & Brazil, 2016). In Nepal, when the migrants leave the country they are often young, average age 25 years, (GON, 2014). This provides them an

opportunity to pay the loans taken for migration before starting a family. Once the loans are paid the remittance money is predominantly used for food consumption (Ratha, 2013) hence better child health and nutrition result. Child care practices are an important predictor of child nutrition (Jayatissa & Wickramage, 2016). In Nepal providing care for the child is traditionally a women's domain and the migrants are predominantly male (GON, 2014) allowing for the children to benefit from remittance payments without forgoing their mother's care. Therefore the positive association of remittance on childhood stunting was found.

5.1 GENDER OF HOUSEHOLD HEAD AND STUNTING

Female headed households possess less resources making them more vulnerable to food insecurity (Babatunde et al., 2008). Past studies have shown that children in female headed households are more likely to be stunted (Babatunde et al., 2008). Others have reported that the gender difference in providing child care was influential in overcoming the constraint placed by limited resources for child nutrition in female headed household (Horton & Miller, 1989). However, in our study we did not find a difference in the relationship of remittance and stunting by gender of the household head. There could be several explanations. First, in our study, the proportion of stunted children was significantly higher in households headed by the mother. It is possible that the remittance income was not enough to compensate the baseline stunting in mother-headed households. Second the respondent was asked if household received remittance, this assumes that remittance received by all the members in the household is known and reported by the respondent. It is also assumed that the head of the household has control over remittance use. But in reality the respondent may not be aware of all the members receiving remittance. It is also possible that the gender of the individual who receives the remittances, rather than the gender of the household head, is more important to understand the impact of remittances on the household (Posel, 1999). Third, even in male headed households, women's bargaining power within the household may have more say on the allocation of remittance income (De and Ratha, 2005).

5.2 PROS AND CONS OF REMITTANCE

In developing countries like Nepal remittance is considered a "powerful antipoverty force" because of its capacity to increase households' income (Ratha, 2013). With increased income

from remittance, households are more likely to invest in health care and infrastructures for water and sanitation (De & Ratha, 2012) which are critical for child nutrition (Humphrey, 2009). Our study finding reinforces that remittances or personal cash transfers can greatly decrease stunting among children, signifying socio economic development.

However there are some who believe remittance payments foster a culture of dependency in source communities, and undermine motivation to work that are counterproductive to the goal of poverty alleviation (Kamuleta, 2014). Also the most vulnerable people do not benefit from remittance because they do not have the social or the financial capital needed to migrate (Stark, Taylor & Yitzhaki, 1988). In fact this selective migration may increase inequality, as increased income in remittance receiving households is likely to increase the price of goods, making access to food and health care more difficult to non-recipients (Adams, 2011). Others (Adelman, Taylor & Vogel, 1988 & Taylor, 1996) argue that having money in the community has a multiplier effect on the local economy with positive impacts on non-recipients as well remittance recipients. Whatever the stances remittance is foremost a household level strategy to overcome economic hardships that can help communities to prosper but they cannot be expected to solve the existing structural inequalities (De Soto, 2000).

5.3 CASH TRANSFER PROGRAMS FOR NUTRITION IN NEPAL

Like remittance, cash transfer programs are a form of social protection measures for poor households to ease their financial burdens. However unlike remittances these are public programs or state interventions. Governments around the world implement cash transfer programs. Type of program and amount of transfer vary widely but it is estimated that around one billion people in low and middle income countries (LMICs) receive cash transfers (Barrientos, 2013). Similar to remittance, studies on associations between cash transfer and childhood nutritional status show mixed results; while some show no association (Gitter, Manley & Slavchevska, 2012) others have shown positive association especially for children in poorer households, younger and those in household receiving remittance for longer duration (Leroy, Ruel & Verhofstadt, 2009 & Behrman & Hoddinott, 2005).

The government of Nepal's political commitment to social protection measures is reflected in the enactment of the Social Welfare Act (1992) and Child Welfare Act (1992) (Holmes & Uphadya,

2009). The social protection programs directly relevant to child health are the annual block grant (GON, 2012) child protection grant (2009/10) and safe delivery incentive program (SDIP) (2005) (Holmes & Uphadya, 2009). The annual block grant prescribes the village development committees to use 35% of its budget for the empowerment of children (GON, 2012). The SDIP provides mothers who deliver babies in health facilities a monetary incentive. The child protection grant provides $2 per child per month for up to two children under the age of five to reduce household income insecurity and address children's nutrition. While the cash transfer through the SDIP is universal the child grant is limited to some districts in Karnali zone and to children from Dalit families across the country. Cash transfer programs have had limited impact on poverty reduction due to low coverage, low levels of benefit and implementation constraints (Holmes & Uphadya, 2009). After the 2015 earthquake in Nepal, the child grant program was extended to include all children under five in the most severely affected districts (UNICEF, 2015). Since then there has been renewed commitment to expand the child grant program with revisions on the benefit amount, linking the grant to birth registration, with strong monitoring and electronic payments for effective program delivery (UNICEF, 2015).

5.4 RECOMMENDATION

Childhood stunting is caused by several factors interplaying at different levels offering nutrition programmers and policy makers ample pathways to intervene. For decades the focus has been on the nutrition-specific interventions directly related to health and food security. They have substantial impact on childhood stunting but for the child to survive, grow and thrive well-targeted nutrition-sensitive interventions are also needed. Several of these have been outlined in the Multi-Sectoral Nutrition Plan, Nepal (GON, 2012). This study reinforced the growing body of evidence on the role of increased household income on child growth.

1. Remittances, while important, have uncertain benefits and often fail to provide aid to the most vulnerable. As shown in our study, just receiving remittance is not enough for improving health and nutrition; as families receiving lowest remittance had poorer access to health, water and sanitation services. Therefore we should have more robust dose-response studies to examine what threshold of remittance is required to have positive impact on child growth and development. To ensure proper nutrition of all children, the

existing targeted cash transfer programs for nutrition should be expanded to include the children in poorest families in Nepal. Ongoing effectiveness studies of these programs should be carried out to identify best implementation and scale up strategy.

2. To improve migration opportunities for poor households, governments should try to explore ways to minimize the cost of migration to make this option affordable to all levels of income strata especially to the poorest. In additional, provision of low interest loans to offset the cost of migration for poor households would also help the most vulnerable families.
3. To ensure access to information on migration opportunities at the community level, local governments should organize information sessions targeting youth in poor communities.
4. Migrants' quality of life determines their productivity, as well as their likelihood of remitting. Therefore, the Nepal government should improve diplomatic ties with destination countries to ensure the health and safety of the migrants in destination. Proactive roles must be taken to ensure the human rights of the migrants in the destination countries.
5. Along with health and safety of the migrants, there is a need for continued nutrition education to families left behind to discourage the consumption of junk food as it may increase with money received from remittance.

Chapter 6. STRENGTH AND LIMITATIONS

An inherent limitation of cross-sectional data is its inability to establish a temporal relationship between household remittance and stunting. Stunting is a result of chronic undernutrition, and nutrition during pregnancy and early childhood are important predictors of stunting. Proxies used to capture these and other factors related to stunting may not provide an accurate estimate of the underlying concept of interest. Other drawbacks may be that we had no information on duration and timing of remittances which makes it impossible to determine if the family received remittance during the critical times in the child's development. There is a potential for selection bias here as there is no way to measure the family members' motivation to migrate and send remittance. Another source of bias is recall during the interview process. Both remittance and income could be under or over reported creating measurement error as it relied on the self-reported data for over a period of one year. Despite these limitations, the data came from a nationally representative survey that used standardized sampling procedures making the findings generalizable to the whole population of Nepal. The fairly large sample size provided enough power to detect the effect of remittance on stunting, and also to control for potential confounders. However, it is possible that the sample was not big enough to provide a significant result on effect modification due to the head of the household's gender or household income.

Chapter 7. CONCLUSIONS

The aim of this study was to assess the impact of household remittance on childhood stunting in Nepal, where migration is an important livelihood strategy for many rural families. Using logistic regression analyses we found that money sent by the migrants has a positive effect on reducing childhood stunting which reflects long term nutritional status. We did not find difference in the risk of stunting by income categories and gender of the household head. Also no statistically significant effect of remittance was found on wasting and underweight considered short and medium term measures of child nutritional status. These findings suggest that additional household income from remittance payments sent by the migrants could help to reduce stunting among children in Nepal. By the same token, additional income from cash transfer programs would relieve financial burden for poor households and contribute to reducing child under nutrition. The Nepal government should investigate the expansion of existing cash transfer programs for child nutrition to reach children in poor families. Further research is indicated to better understand the monetary threshold, critical times in child development and duration for providing or receiving remittance or cash transfer to have the best impact on nutritional outcomes. Effectiveness studies to develop the best implementation strategies and to identify target groups are needed to optimize program implementation and use of scare resources.

REFERENCES

Acosta, P. A., Fajnzylber, P., & Lopez, H. (2007). The impact of remittances on poverty and human capital: evidence from Latin American household surveys. World Bank Policy Research Working Paper, (4247).

Adams Jr, R. H. (2011). Evaluating the economic impact of international remittances on developing countries using household surveys: A literature review. Journal of Development Studies, 47(6), 809-828.

Adelman, I., Taylor, J. E., & Vogel, S. (1988). Life in a Mexican village: a SAM perspective. The Journal of Development Studies, 25(1), 5-24.

Amuedo-Dorantes, C., & Pozo, S. (2006). Migration, remittances, and male and female employment patterns. The American economic review, 96(2), 222-226.

Antón, J. I. (2010). The Impact of Remittances on Nutritional Status of Children in Ecuador1. International migration review, 44(2), 269-299.

Arimond, M., & Ruel, M. T. (2004). Dietary diversity is associated with child nutritional status: evidence from 11 demographic and health surveys. The Journal of nutrition, 134(10), 2579-2585.

Babatunde, R. O., & Martinetti, E. C. (2010). Impact of remittances on food security and nutrition in rural Nigeria. Unpublished manuscript, Center for International Cooperation and Development, University of Pavia, Italy.

Babatunde, R. O., Omotesho, O. A., Olorunsanya, E. O., & Owotoki, G. M. (2008). Determinants of vulnerability to food insecurity: A gender-based analysis of farming households in Nigeria. *Indian Journal of Agricultural Economics*, *63*(1), 116.

Baez, J. (2008). Does more mean better? Sibling sex composition and the link between family size and children's quality. Available at SSRN 1136273.

Barrientos, A. (2013). *Social assistance in developing countries*. Cambridge University Press.

Basa, C., Harcourt, W., & Zarro, A. (2011). Remittances and transnational families in Italy and the Philippines: breaking the global care chain. Gender & Development, 19(1), 11-22.

Behrman, J. R., & Hoddinott, J. (2005). Programme evaluation with unobserved heterogeneity and selective implementation: The Mexican PROGRESA impact on child nutrition. *Oxford bulletin of economics and statistics*, *67*(4), 547-569.

Black, R. E., Allen, L. H., Bhutta, Z. A., Caulfield, L. E., De Onis, M., Ezzati, M., ... & Maternal and Child Undernutrition Study Group. (2008). Maternal and child undernutrition: global and regional exposures and health consequences. The lancet, 371(9608), 243-260.

Borooah, V. K. (2005). The height-for-age of Indian children. Economics & Human Biology, 3(1), 45-65.

Caulfield, L. E., de Onis, M., Blössner, M., & Black, R. E. (2004). Undernutrition as an underlying cause of child deaths associated with diarrhea, pneumonia, malaria, and measles. The American journal of clinical nutrition, 80(1), 193-198.

Central Bureau of Statistics (CBS), Government of Nepal. (2011). Nepal Living Standard Survey Volumn 1 and 2.

Davis, J. (2015). Contrasting migration effects with remittance effect on child growth outcomes in Nicaragua. Population Association of America 2015 meeting, San Diego, CA.

Davis, J., & Brazil, N. (2016). Migration, Remittances and Nutrition Outcomes of Left-Behind Children: A National-Level Quantitative Assessment of Guatemala. PloS one, 11(3), e0152089.

De, P., & Ratha, D. (2005). Remittance income and household welfare: Evidence from Sri Lanka integrated household survey. *Development Research Group*.

De, P. K., & Ratha, D. (2012). Impact of remittances on household income, asset and human capital: evidence from Sri Lanka. Migration and Development, 1(1), 163-179.

De Soto, H. (2000). The mystery of capital: Why capitalism triumphs in the West and fails everywhere else. Basic books.

Fenske, N., Burns, J., Hothorn, T., & Rehfuess, E. A. (2013). Understanding child stunting in India: a comprehensive analysis of socio-economic, nutritional and environmental determinants using additive quantile regression. PloS one, 8(11), e78692.

Gitter, S. R., Manley, J., & Slavchevska, V. (2012). How Effective are Cash Transfer Programs at Improving Nutritional Status? (No. 2010-18).

Government of Nepal (GON). (2013). Thematic Report on Food Security and Nutrition 2013. National Planning Commission, Kathmandu Nepal.

Government of Nepal (GON). (2011) Nepal Demographic and Health Survey 2011. Ministry of Health and Population, New Era, and ICF International Inc.

Government of Nepal (GON). (2012). Ministry of Finance, Budget Speech 2012/2013. Kathmandu Nepal.

Government of Nepal (GON). (2012). Multi-Sector Nutrition Plan: For Accelerating the Reduction of Maternal and Child Under-Nutrition in Nepal, 2013-2017 (2023).

Government of Nepal (GON). (2014). Labour Migration for Employment: A status report for Nepal: 2013/2014.

Grantham-McGregor, S., Cheung, Y. B., Cueto, S., Glewwe, P., Richter, L., Strupp, B., & International Child Development Steering Group. (2007). Developmental potential in the first 5 years for children in developing countries. The lancet, 369(9555), 60-70.

Holmes, R., & Uphadya, S. (2009). The role of cash transfers in post-conflict Nepal. ODI Report. London: ODI.

Horton, S., & Miller, B. D. (1989, September). The effect of gender of household head on food expenditure: Evidence from low-income households in Jamaica. In *Conference on Family Gender Difference and Development, Economic Growth Center, Yale University, September* (pp. 4-6).

Humphrey, J. H. (2009). Child undernutrition, tropical enteropathy, toilets, and handwashing. The Lancet, 374(9694), 1032-1035.

Jayatissa, R., & Wickramage, K. (2016). What effect does international migration have on the nutritional status and child care practices of children left behind?. International journal of environmental research and public health, 13(2), 218.

Jimenez, M. A. C. (2009). Household Development in Tlapanalá: A Comparative Study Between Households Receiving Remittances and Households Not Receiving Remittances. Journal of Poverty, 13(3), 331-349.
Kamuleta, K. (2014). The impact of remittances on developing countries. European Parliament committee on Development.
Leroy, J. L., Ruel, M., & Verhofstadt, E. (2009). The impact of conditional cash transfer programmes on child nutrition: a review of evidence using a programme theory framework. *Journal of Development Effectiveness*, *1*(2), 103-129.
Monteiro, C. A., Benicio, M. H. D. A., Conde, W. L., Konno, S., Lovadino, A. L., Barros, A. J., & Victora, C. G. (2010). Narrowing socioeconomic inequality in child stunting: the Brazilian experience, 1974-2007. Bulletin of the World Health Organization, 88(4), 305-311.
Pearce, N. (2011). Epidemiology in a changing world: variation, causation and ubiquitous risk factors. International journal of epidemiology, dyq257.
Pelletier, D. L., Frongillo Jr, E. A., Schroeder, D. G., & Habicht, J. P. (1995). The effects of malnutrition on child mortality in developing countries. Bulletin of the World Health Organization, 73(4), 443.
Posel, D. R. (1999). Intra-family transfers and the household division of labor: a case study of migration and remittance behavior in South Africa.
Pyakuryal, B., Roy, D., & Thapa, Y. B. (2010). Trade liberalization and food security in Nepal. Food Policy, 35(1), 20-31.
Rah, J. H., Cronin, A. A., Badgaiyan, B., Aguayo, V. M., Coates, S., & Ahmed, S. (2015). Household sanitation and personal hygiene practices are associated with child stunting in rural India: a cross-sectional analysis of surveys. BMJ open, 5(2), e005180.
Ratha, D. (2013). The impact of remittances on economic growth and poverty reduction. Policy Brief, 8, 1-13.
Sabates-Wheeler, R., & Waite, M. (2003). Migration and Social Protection: A concept paper. Institute of Development Studies, Sussex, December, 1645, 1980-2000.
Semba, R. D., de Pee, S., Sun, K., Sari, M., Akhter, N., & Bloem, M. W. (2008). Effect of parental formal education on risk of child stunting in Indonesia and Bangladesh: a cross-sectional study. The Lancet, 371(9609), 322-328.
Smith, L. C., & Haddad, L. (2002). How potent is economic growth in reducing undernutrition? What are the pathways of impact? New cross-country evidence. Economic Development and Cultural Change, 51(1), 55-76.
Stark, O., Taylor, J. E., & Yitzhaki, S. (1988). Migration, remittances and inequality: A sensitivity analysis using the extended Gini index. Journal of Development Economics, 28(3), 309-322.
Taylor, J. E. (1996). International migration and economic development: a micro economy-wide analysis. Development strategy, employment and migration: insights from models., 87-104.
Taylor, J. E., Rozelle, S., & De Brauw, A. (2003). Migration and incomes in source communities: A new economics of migration perspective from China. Economic Development and Cultural Change, 52(1), 75-101.

United Nations Children;s fund (UNICEF). (2013). Improving Child Nutrition: The Achievable imperative for global progress.
United Nations Children's fund (UNICEF). (2015). UNICEF country office annual report 2015 for Nepal.
Valero-Gil, J. N. (2009). Remittances and the household's expenditures on health. Journal of Business Strategies, 26(1), 119.
Van de Poel, E., Hosseinpoor, A. R., Speybroeck, N., Van Ourti, T., & Vega, J. (2008). Socioeconomic inequality in malnutrition in developing countries. Bulletin of the World Health Organization, 86(4), 282-291.
Victora, C. G., de Onis, M., Hallal, P. C., Blössner, M., & Shrimpton, R. (2010). Worldwide timing of growth faltering: revisiting implications for interventions. Pediatrics, peds-2009.
World Bank (WB). (2015). Nepal Data Profile
World Health Organization (WHO). (2006). Child Growth Standards, Length／Height-for-Age, Weight-for-Age, Weight-for-Length and Body Mass Index-for-Age: Methods and Development. Geneva: WHO.
Yang, D. (2008). International migration, remittances and household investment: Evidence from Philippine migrants' exchange rate shocks. The Economic Journal, 118(528), 591-630.

ANNEX

Additional tables related to wasting and underweight are presented here:

Table 9. Characteristic of the children by wasting categories (N =2297)

Characteristics	Normal (n =1971)	wasted (n=326)	
	n (%) / Mean (SD)	n (%) / Mean (SD)	P value
Age of the child in months	34 (15.2)	24 (15.6)	0.001
Sex of the child			
Male	1,014 (51.5%)	178 (54.6%)	0.291
Female	957 (48.5%)	148 (45.4%)	
Caste/ethnicity			
Upper caste	640 (32.5%)	88 (27.0%)	0.011
Janajati	939 (47.6%)	151 (46.3%)	
Minority groups	392 (19.9%)	87 (26.7%)	
Average Birth Order of child*	2.6 (1.8)	2.7 (1.7)	0.711
Exclusive Breastfeeding*			
Yes	932 (47.3%)	194 (59.5%)	0.001
No	1,039 (52.7%)	132 (40.5%)	
Child was unwell in past 30 days			
Yes	633 (32.1%)	154 (47.2%)	0.001
No	1,338 (67.9%)	172 (52.8%)	
Immunization Status			
Never Immunized	42 (2.1%)	6 (1.8%)	0.751
Partially Immunized	1,433 (72.7%)	232 (71.2%)	
Fully Immunized	496 (25.2%)	88 (27.0%)	
Any ANC while pregnant with child*			
Yes	1,026 (76.0%)	216 (81.5%)	0.052
No	324 (24.0%)	49 (18.5%)	
Mother's Age (years)*	28 (6.3)	27 (6.1)	0.016
Mother household head*			
Yes	307 (15.9%)	34 (10.5%)	0.012
No	1,624 (84.1%)	290 (89.5%)	
Mother's education *			
Illiterate	870 (47.0%)	181 (58.2%)	
Grade 1 to 5	332 (18.0%)	41 (13.2%)	
Grade 6 to 10	379 (20.5%)	58 (18.6%)	0.009
SLC	115 (6.2%)	16 (5.1%)	
Intermediate	81 (4.4%)	8 (2.6%)	
Bachelor and above	73 (3.9%)	7 (2.3%)	
Location			
Urban	497 (25.2%)	65 (19.9%)	0.040
Rural	1,474 (74.8%)	261 (80.1%)	
Region			
Mountain	162 (8.2%)	16 (4.9%)	
Hill	1,017 (51.6%)	89 (27.3%)	0.001

Terai	792 (40.2%)	221 (67.8%)	
Average household size	6.5 (2.9)	6.9 (2.9)	0.0216
Type of toilet			
Improved	659 (33.4%)	73 (22.4%)	0.001
Unimproved	383 (19.4%)	63 (19.3%)	
No toilet	929 (47.1%)	190 (58.3%)	
Source of Drinking water			
Safe	1,572 (79.8%)	279 (85.6%)	0.014
Unsafe	399 (20.2%)	47 (14.4%)	
Household Diet diversity score (range)	6.9 (0 to 8)	6.9 (3 to 8)	0.530
Household participation in nutrition program			
Yes	217 (11.0%)	31 (9.5%)	0.419
No	1,754 (88.9%)	295 (90.5%)	
Annual household income			
Less than Nr. 30,000	338 (17.1%)	56 (17.2%)	0.001
Nrs. 30,001 to 80,000	570 (28.9%)	84 (25.8%)	
Nrs. 80,0001 to 200,000	644 (32.8%)	120 (36.8%)	
More than Nrs.200,000	419 (21.3%)	66 (20.2%)	

*Missing data

Table 10. Association of wasting and remittances among under five children in Nepal

	Unadjusted (=2297)			Adjusted (N=1556)		
Remittance categories	OR[a]	95% CI	P	OR [a]	95% CI	P
No remittance (referent)						
Nrs 1 to 15,000	1.41	1.05, 1.89	0.023	1.98	1.07, 3.68	0.031
Nrs 15,001 to 60,000	0.91	0.62, 1.36	0.657	1.11	0.46, 2.64	0.817
More than Nrs 60,000	1.01	0.73, 1.41	0.931	2.03	0.85, 4.84	0.109

[a]OR = Odds Ratio.

Table 11. Association of covariates in the Multiple logistic regression with Wasting (N = 1556)

Independent variables	**OR[a]**	**95% CI**	**P**
Remittance (Nrs) (No Remittance referent)			
1 to 15,000	1.98	1.07, 3.68	0.031
15,001 to 60,000	1.11	0.46, 2.64	0.817
More than 60,000	2.03	0.85, 4.84	0.109
Child age	0.95	0.94, 0.96	0001
Child age square	1.00	1.00, 1.00	0.039
Gender	1.00	0.74, 1.34	0.984

Ethnicity	0.98	0.76, 1.25	0.849
Birth Order	1.00	0.88, 1.14	0.974
Child suffered illness	1.64	1.20, 2.24	0.002
Immunization	0.77	0.56, 1.07	0.121
Ante natal visit	1.26	0.84, 1.88	0.269
Mothers age	0.99	0.96, 1.03	0.754
Education (Illiterate referent)			
Grade 1 to 5	0.71	0.45, 1.12	0.140
Grade 6 to 10	0.92	0.57, 1.51	0.754
SLC	0.84	0.37, 1.88	0.664
Intermediate	0.42	0.16, 1.11	0.081
Bachelor and above	0.48	0.16, 1.48	0.201
Mother household head	0.75	0.43, 1.31	0.311
Regions (Mountain referent)			
Hill	1.03	0.52, 2.03	0.935
Terai	3.12	1.55, 6.27	0.001
Location (Rural/Urban)	1.20	0.78, 1.84	0.410
Diet diversity	0.92	0.80, 1.05	0.219
Household size	0.99	0.92, 1.06	0.728
Household size < 5	0.99	0.80, 1.24	0.954
Annual household income (<Nrs. 30,000 referent)			
Nrs. 30,001 to 80,000	0.66	0.42, 1.04	0.072
Nrs. 80,0001 to 200,000	0.78	0.49, 1.22	0.273
More than Nrs. 200,000	0.83	0.47, 1.46	0.513
Toilet type	0.93	0.74, 1.16	0.502
Safe water	0.83	0.52, 1.34	0.447
Nutrition program	1.20	0.70, 1.34	0.501
Remittance source (No Remittance referent)			

Domestic only	0.48	0.25, 0.91	0.025
Foreign Only	0.29	0.12, 0.68	0.004
Both Domestic and Foreign	0.43	0.18, 1.02	0.055
Constant	0.26	0.05, 1.38	0.113

[a]OR = Odds Ratio.

Table 12. Characteristic of the children by underweight categories (N =2,497)

Characteristics	Normal (n =1,760)	underweight (n=737)	
	n (%) / Mean (SD)	n (%) / Mean (SD)	P value
Age of the child in months	28 (17.2)	34 (15.6)	0.001
Sex of the child			
Male	924 (52.5%)	368 (49.9%)	0.242
Female	836 (47.5%)	369 (50.1%)	
Caste/ethnicity			
Upper caste	584 (33.2%)	204 (27.7%)	0.001
Janajati	831 (47.2%)	342 (46.4%)	
Minority groups	345 (19.6%)	191 (25.9%)	
Average Birth Order of child*	2.5 (1.7)	2.9 (1.8)	0.001
Exclusive Breastfeeding*			
Yes	865 (49.2%)	415(56.3%)	0.001
No	895 (50.8%)	322 (43.7%)	
Child was unwell in past 30 days			
Yes	601 (34.1%)	246 (33.4%)	0.711
No	1,159 (65.9%)	491 (66.6%)	
Immunization Status			
Never Immunized	58 (3.3%)	24 (3.2%)	0.001
Partially Immunized	1,169 (66.4%)	552 (74.9%)	
Fully Immunized	533 (30.3%)	161 (21.9%)	
Any ANC while pregnant with child*			
Yes	1,033 (79.3%)	367 (72.2%)	0.001
No	269 (20.7%)	141 (27.8%)	
Mother's Age (years)*	27 (6.1)	28 (6.5)	0.001
Mother household head*			
Yes	265 (15.3%)	102(14.1%)	0.436
No	1,465 (84.7%)	622 (85.9%)	
Mother's education *			
Illiterate	689 (41.6%)	460 (65.6%)	
Grade 1 to 5	305 (18.4%)	107 (15.3%)	
Grade 6 to 10	373 (22.5%)	100 (14.3%)	0.001
SLC	123 (7.4%)	19 (2.7%)	
Intermediate	86 (5.2%)	10 (1.4%)	
Bachelor and above	79 (4.8%)	5 (0.7%)	
Location			

Urban	485 (27.6%)	108 (14.7%)	0.001
Rural	1,275 (72.4%)	629 (85.3%)	
Region			
Mountain	127 (7.2%)	67 (9.1%)	
Hill	913 (51.8%)	290 (39.3%)	0.001
Terai	720 (40.9%)	380 (51.6%)	
Average household size	6.5 (2.9)	6.9 (2.9)	0.001
Type of toilet			
Improved	652 (37.0%)	135 (18.3%)	0.001
Unimproved	332 (18.9%)	141 (19.1%)	
No toilet	776 (44.1)	461 (62.6%)	
Source of Drinking water			
Safe	1,417 (80.5%)	590 (80.1%)	0.793
Unsafe	343 (19.5%)	147 (19.9%)	
Household Diet diversity score (range)	6.9 (0 to 8)	6.7 (2 to 8)	0.001
Household participation in nutrition program			
Yes	171 (9.7%)	105 (14.3%)	0.001
No	1,589 (90.3%)	632 (85.7%)	
Annual household income			
Less than Nr. 30,000	289 (16.4%)	141 (19.1%)	0.003
Nrs. 30,001 to 80,000	493 (28.0%)	229 (31.1%)	
Nrs. 80,0001 to 200,000	585 (33.2%)	248 (33.7%)	
More than Nrs.200,000	393 (22.3%)	119 (16.1%)	

*Missing data

Table 13. Association of underweight and remittances among under five children in Nepal

	Unadjusted (N=2,497)			Adjusted (N=1,747)		
Remittance categories	OR[a]	95% CI	P	OR [a]	95% CI	P
No remittance (referent)						
Nrs 1 to 15,000	0.92	0.72, 1.16	0.470	0.78	0.40, 1.53	0.478
Nrs 15,001 to 60,000	0.80	0.60, 1.07	0.129	0.55	0.25, 1.23	0.148
More than Nrs 60,000	0.65	0.49, 0.84	0.001	0.54	0.24, 1.21	0.133

[a]OR = Odds Ratio.

Table 14. Association of covariates in the Multiple logistic regression with Underweight (N = 1,747)

Independent variables	**OR[a]**	**95% CI [b]**	**P[c]**
Remittance (No Remittance referent)			
Nrs. 1 to 15,000	0.78	0.40, 1.53	0.478
Nrs. 15,001 to 60,000	0.55	0.25, 1.23	0.148
More than Nrs. 60,000	0.54	0.24, 1.21	0.133

Child age	1.02	1.02, 1.03	0.001
Child age square	1.00	1.00, 1.00	0.001
Gender	0.89	0.71, 1.12	0.321
Ethnicity	0.93	0.77, 1.13	0.467
Birth Order	1.06	0.95, 1.17	0.312
Child suffered illness	1.35	1.06, 1.71	0.015
Immunization	0.89	0.70, 1.11	0.3
Ante natal visit	1.17	0.86, 1.60	0.304
Mothers age	0.99	0.96, 1.02	0.527
Education (Illiterate referent)			
Grade 1 to 5	0.64	0.45, 0.89	0.009
Grade 6 to 10	0.58	0.40, 0.85	0.005
SLC	0.37	0.18, 0.76	0.007
Intermediate	0.39	0.17, 0.89	0.025
Bachelor and above	0.16	0.04, 0.54	0.003
Mother HH head	0.80	0.53, 1.20	0.279
Regions (Mountain referent)			
Hill	1.05	0.66, 1.66	0.846
Terai	1.54	0.93, 2.56	0.094
Location (Rural/Urban)	1.23	0.86, 1.76	0.253
Diet diversity	0.93	0.83, 1.03	0.18
Household size	1.04	0.98, 1.10	0.197
Household size < 5	0.90	0.75, 1.08	0.238
Annual Household income (<Nrs. 30,000 referent)			
Nrs. 30,001 to 80,000	0.81	0.57, 1.16	0.25
Nrs. 80,0001 to 200,000	0.75	0.52, 1.09	0.134
More than Nrs. 200,000	0.77	0.48, 1.25	0.291
Toilet type	0.92	0.77, 1.10	0.373

Safe water	1.05	0.75, 1.46	0.788
Nutrition program	1.48	0.99, 2.21	0.057
Remittance source (No Remittance referent)			
Domestic only	0.84	0.42, 1.67	0.611
Foreign Only	1.11	0.52, 2.40	0.786
Both Domestic and Foreign	1.21	0.55, 2.65	0.638
Constant	1.34	0.35, 5.14	0.669

[a]OR = Odds Ratio.