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DO REMITTANCES IMPROVE MICRONUTRIENTS INTAKE AND CHILD NUTRITIONAL STATUS? EVIDENCE FROM KWARA STATE, NIGERIA

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ABSTRACT
This paper examines the impact of remittances on micronutrients intake and child nutritional status in Kwara State of Nigeria. A combination of instrumental variable and ordinary least square approaches were used to analyze the relationship between remittance income and micronutrients intake, especially iron and vitamin A, and child nutritional status of selected farming households in the region. The results show that while remittances contribute to larger income and assets of recipient households, it does not significantly affect micronutrients intake and child nutritional status in the sample. Nevertheless, household income net of remittances seems to have a positive and significant effect on these nutrition outcomes. Utilization of remittances for non-food purposes and underreporting of remittances were identified as among the possible reasons for the absence of significant effect. Reducing the cost of sending remittances and nutrition-related awareness enlightenment will make remittances to have a more favourable effect on household's nutrition outcomes in general.

KEYWORDS: Migration, Remittances, Micronutrients, Nutritional Status, Nigeria

INTRODUCTION

Rising food prices and the global economic recession have pushed up the number of undernourished people in the world to about 925 million in 2010 (FAO, 2010). Eighty-five percent of the undernourished people in the world are from developing countries. Apart from undernourishment, micronutrient deficiencies and child malnutrition are important public health problems in many developing countries of the world (Abdulai and Aubert, 2004). Against this background, migration and remittances have become a key component in the livelihood strategies of an increasing number of households across the developing world. Large numbers of people are seeking better earning opportunities in richer countries or in more developed areas within their own country (Zezza *et al*., 2011). Worldwide, about 200 million people representing 3% of the world's population are living outside their country of birth in 2005 (World Bank, 2008).

As a result of the upsurge in international migration, remittances to developing countries have expanded in the last decade (Guptal *et al*., 2009). It has increased by 16% annually on average since 2000. In 2006, total remittances flow to developing countries totaled US$ 221 billion – an amount that was twice the Official Development Assistance (ODA) to developing countries in that year (Guptal *et al*., 2009). The flow increased to about US$ 305 billion in 2008, but declined by 6% in 2009 during the period of economic recession. It is expected to have recovered in 2010 and continues to grow in subsequent years (Ratha *et al*., 2010). Remittances are believed to have huge impacts on the socioeconomic conditions of migrant families left behind in the country of origin. For this and other reasons, remittances have continued to receive increasing attention among development experts as an important factor in promoting economic development and poverty reduction (Zezza *et al*., 2011).

In the development economics literatures, very view studies have examined the linkage between migration and household nutrition. Fewer studies have researched into the impacts of remittances on micronutrients intake and child nutritional status in developing countries (Zezza *et al*., 2011). The absence of empirical evidences on the linkage between remittances and micronutrients intake, as well as child nutrition, is partly responsible for the dearth of concrete policy on migration, remittances and child nutrition in many developing countries. The main objective of this paper is to examine the impact of remittances on micronutrients intake and child nutritional status of the recipient households. The paper will try to answer the research question: do remittances improve intake of vitamin A and iron, and child nutritional status among the recipient households?

Few studies have shown that remittances in developing countries are basically spent on food, clothing and education of the recipient households. However, it is not very clear whether the amount spent on food is large enough to improve micronutrients intake and child nutritional status. Likewise, it remains uncertain whether the share of remittances allocated to food is actually spent on buying quality food and micronutrients. Although no well-documented empirical link has been established in this regard, it is hypothesized that remittances has a positive and significant effect on micronutrients intake and child nutritional status among the recipient households. This hypothesis is tested formally in this paper, using econometric analysis. This paper attempt to contribute to the limited empirical evidence on the linkage between migration cum remittances and household and child

nutrition, using a recent survey data collected from farming households in Kwara State of Nigeria. Results of this kind of study could be useful for the formulation of policies on effective utilization of remittances which could lead to increased intake of micronutrients and better child nutrition. The paper proceeds as follows. Section 2 reviews evidences of migration, food consumption and nutrition linkages. Section 3 discusses the data and methodology adopted, while section 4 presents and discusses the results. Section 5 concludes with policy implications.

REMITTANCES, FOOD CONSUMPTION AND NUTRITION: THE LINKAGE

Migration cum remittances may have direct and indirect effects on consumption and nutrition of the recipient households. It can have a positive direct income effect by increasing the total income of the recipient households, thereby increasing their ability to access important nutritional inputs like food, sanitation and health services. For instance, Quartey and Blankson (2004) found evidence of increased food consumption among remittances recipient households in Ghana. The study showed that remittances help to smoothen consumption in the face of economic shocks. Jimenez (2009), in Mexico found that food consumption expenditure were higher in remittances recipient households and Shaw (2007) in Lesotho found that remittances increased per capita food consumption by 35% on average among recipient households.

Similarly, Ratha (2003), in a summary of several studies on migration and remittances, concludes that remittances not only raise the food consumption level of recipient households in developing countries, but it also has multiplier effects because they are mostly spent on acquiring locally produced goods. It should be noted however, that the overall direct impact of remittances on consumption-related expenditures may depend to a large extent, on who has control of remittances in the households (Zezza *et al*., 2011). Given that women are known to be more concerned about family nutrition, remittances tend to have larger impact when they are in the control of women in the households.

In addition to the direct income effect, remittances may also have an indirect income effect by helping to relax insurance and credit constraints for productive and human capital investment. For example Taylor *et al* (2003) found a positive relationship between remittances and saving and investment in China. In Kenya, Collier and Lal (1986) reported that remittances facilitate more productive asset ownership for recipient households. Likewise, Caldwell (1969) showed that, in Ghana, remittances enable households to increase spending on schooling, farm labour and small business investment. Subsequently, by relaxing credit constraints, remittances help to increase income from productive activities and indirectly facilitate additional and better quality food expenditures.

Remittances may also affect food consumption and nutrition through the promotion of human capital accumulation (Karamba *et al*., 2011). For instance, in El Salvador and Guatemala, evidences suggest that remittances have a positive impact on school retention and investment in education respectively (Cox and Ureta, 2003; Adams, 2006). A similar positive effect of remittances on education spending was reported by Yang (2004) in the Philippines and Adams (2005) in Guatemala. Since better education is often related to better nutrition outcomes, it follows that remittances can improve nutrition through the education channel.

In contrast to the positive effects discussed above, remittances may also have negative effects on household nutrition, especially after controlling for total household income. Migration means a reduction in household labour and if this last for a very long time, it could have negative effects on food production and income generation. This effect could be worsened by imperfections in the labour and credit markets, so that households are not able to hire labour to replace the migrant, or not able to access enough credit to hire labour if the migrant fails to remit money or find employment. As remittances may have positive or negative effect on food consumption and nutrition, it can also have positive or negative effects on micronutrients intake and child nutritional status, which are important nutrition outcomes. As mentioned earlier, there are very few studies that have looked into this relationship. The absence of evidence directly explaining the nature of the relationship between remittances, micronutrients intake and child nutritional status in Nigeria, provides further justification for the choice of this research topic.

METHODOLOGY

Migration and Malnutrition in Nigeria Context

During the period of the oil boom (1960 – 1970), Nigeria was a major international migration destination. The number of immigrants in the country was almost 2% of the population in 1965 (Shaw, 2007). The flow of migrants to Nigeria was dramatically reduced by the civil war of 1970s and the downturn in the economy caused by the fall in the prices of oil. In addition, the expulsion of many illegal migrants – mostly Ghanaians, in 1983 considerably reduced the migrant population in Nigeria. Migration in Nigeria after this era has been characterized by emigration, as well as, internal migration. SAMP (2006), reported that nearly 15,000 Nigerians migrated legally to Europe and North America every year from 1995 – 2001. Shaw (2007), suggest that some 11% of educated Nigerians live and work in OECD countries. Likewise, a recent survey of migrant population in Europe shows that there are some 45,000 Nigerians in United Kingdom, 17,000 in Italy and 15,000 in Germany. Significant migrations to the Middle East and Asian countries have also been reported (SAMP, 2006). The growing number of Nigerian migrants worldwide has led to increased international remittances to the country. For example, World Bank (2008), submitted that Nigeria was the highest receiver of remittances in Africa and the thirteenth in the World. With US$3.329 billion remittances in 2007, Nigeria alone accounted for about 31% of total remittances flows to Sub-Saharan Africa (World Bank, 2008). Majority of these remittances are from Europe and North America, where 40% of the Nigerian migrants reside. In terms of number, a recent survey of African migrant population in USA and Europe between 1995 – 2000 shows that Nigeria accounts for the largest share of African migrant population in these regions (SAMP, 2006).

Malnutrition is widespread in Nigeria, especially in the rural areas. This is partly due to inadequate food and nutrient supply. The 2003 Nigeria Demographic and Health Survey revealed that 38% of under-five children in Nigeria are stunted, 29% underweight and 9.2% wasted (Ajieroh, 2010). The 2004 Food Consumption and Nutrition Survey reported similar trends with 42% stunted, 25% underweight and 9% wasted (Ajieroh, 2010). These surveys indicated significant variation between the rural and urban areas with children from rural areas worse affected by malnutrition. Micronutrients deficiencies are also widespread in the country, as about 23% and 31% of the population suffers from iron and vitamin A deficiency respectively (NBS, 2006).

Study Area and Data Collection

This study was conducted in Kwara State, north central Nigeria. Kwara State was chosen for this study because undernourishment and poverty are prevalent in the State. For example, the nationwide living standard measurement survey conducted in 2004 indicated that about 83% of the households in the state are poor (NBS, 2006). Beside this, both local and international migrations are common phenomenon in the state, so that remittances are important component of household income. The State is one of the most heterogeneous in Nigeria because of its location: it is the gateway between the northern and southern regions, and it has a good mixture of the three major ethnic groups in Nigeria. The state has a total population of about 2.4 million people, 70% of which can be classified as smallholder farmers. The farming system is characterized by low quality land and predominantly cereal-based cropping patterns. Most farm households are net buyers of food, at least seasonally (KWSG, 2006).

A three-stage random sampling technique was employed in selecting the sample farm households. Eight out of the 16 local government areas in Kwara State were randomly selected in the first stage. Then, five villages were randomly chosen from each selected local government area, and finally, six households were sampled in each of the resulting 40 villages, using complete village household lists provided by the local authorities. Overall 240 farm households were selected. However, only 220 were used for the analysis due to missing values in 20 households. Personal interviews were carried out with the household head, usually in the presence of other family members. A standardized questionnaire was used that covered information on socioeconomic characteristics, income, migration and remittances, household food consumption, anthropometry data and various household and contextual variables.

Total income is measured as the sum of all income from the activities of the members of the household, both on and off-farm. On-farm income covers livestock and crop sales both valued at local market prices. Respondents were asked to specify in detail all inputs used, outputs obtained, and prices for the different crop and livestock activities over the 12-months period prior to the survey. Off-farm income includes agricultural wages, non-agricultural wages, self employed income, remittances, and other income such as capital earnings and pensions. These were recorded separately for all household members, also covering a 12-months period, in order to avoid a seasonality bias. Since the primary interest is to examine the micronutrients intake and child nutrition effects of remittance income, emphasis was more on the amount of remittances received by the household in the last 12 months before the survey. Remittances is defined here to include all cash money received by the household from migrant members living elsewhere in the country and outside the country.

Food consumption data were collected at the household level covering 105 food items. Quantities consumed include food from own production, market purchases, and out-of-home meals and snacks. While also here it would be desirable to have annual data that are free from seasonality effects, it is well known that the accuracy of food consumption data is negatively correlated with the length of the recall period (e.g., Bouis, 1994). Hence, a 7-day recall method was used in the survey. In terms of micronutrients, the study focused on iron and vitamin A, for which deficiencies are particularly widespread in Sub-Saharan Africa (Mason *et al*., 2005). From the food quantities consumed, total household's micronutrients intake were estimated using standard food composition tables. This total intake was divided by the number of Adult Equivalent (AE) in a household, in order to obtain the per capita micronutrients intake. This value was again divided by the 7-days recall period to obtain per capita daily micronutrients intake of each household.

As indicators of nutritional status, child anthropometric data were collected from children that under five years of age in the households. In the 220 sample households, weight and height data were collected from 127 children made up of 66 from remittances recipient and 61 from non-recipient households. Using a standard reference population as defined by the United States National Center for Health Statistics (NCHS), *Z*-scores for height-for-age, weight-for-age, and weight-for-height were calculated. For example, the height-for-age *Z*-score is calculated as $Z = X - \mu/\sigma$, where X is the child's height-for-age, μ is the median height-for-age of the reference population of children of the same age and sex group, and σ is the standard deviation of the reference population.

From the Z-scores, the nutritional status of the children was estimated. Three indices of malnutrition among all the sampled children were estimated. These are stunting, underweight and wasting. Stunting refers to a low height-for-age. It is a measure of chronic or long-term malnutrition in children and a good indicator of cumulative growth retardation. Children whose height-for-age *Z*-score is below minus 2 standard deviation from the median of the reference population are classified as stunted. Underweight denotes a low weight-for-age and it is a measure of combination of chronic and acute malnutrition. Children having weight-for-age *Z*-score less than minus 2 standard deviation from the median of the reference population are regarded as underweight. Wasting represents a low weight-for-height and it is a measure of acute malnutrition, an indicator of short-term fluctuation in nutritional status. It is commonly use in emergency situation to assess nutritional deficiency when the age of the child is not known and children with weight-for-height *Z*-score that are less than minus 2 standard deviation from the median of the reference population are classified as

wasted. The anthropometric analysis was carried out by using the NutriSurvey software for emergency nutrition assessment.

EMPIRICAL APPROACH

Empirical Model

The main objective of this paper is to find out whether remittances improve micronutrients intake (iron and vitamin A) and child nutritional status of farm households in Kwara State, Nigeria. Some of the available studies suggest a positive impact of remittances on total household income. However, it remains unclear whether this translates to better micronutrients intake and child nutrition for the recipient households. The hypothesis is that remittances increase micronutrients intake and child nutrition in the recipient households. To test this hypothesis empirically, a general model of household micronutrients intake and child nutritional status was specified as follows:

$$MC = \alpha_0 + \alpha_1 R + \alpha_2 Y + \alpha_3 X + \alpha_4 H + \varepsilon \quad (1)$$

Where MC is the micronutrients intake and child nutritional status indicator, R is remittances in naira per adult equivalent, Y is household income minus remittances, X is the vector of household head variables (gender, age, and education), H is the vector of other household variables and ε is the error term. In this model, the main parameter of interest is α_1 in terms of sign and significance. As dependent variable, we used micronutrients intake (iron and vitamin A) and child nutritional status, measured by the Z-scores.

Estimating equation (1) by ordinary least square (OLS) regression would imply that all the right hand side variables are truly exogenous. But, OLS estimates are likely to be biased when any of the variables is endogenous. This is particularly true for the net income and remittances variables. Moreover, one can argue that the relationship between nutrition and remittances is unlikely to be unidirectional (Guptal et. al., 2009). In order to tackle this endogeneity bias, the study employ an instrumental variable (IV) approach, using household assets, access to electricity, tapped water and tarred road as instruments to instrument remittances and net income. Another estimation problem is one that might occur due to the multi-stage random sampling approach, with household's observations clustered by villages. This introduces a potential intra-cluster correlation of the error term and produces an inconsistent variance-covariance matrix. As a remedy for this problem, the study uses a cluster correction procedure, so that the t-values are derived from robust standard errors (Deaton, 1997).

Explanatory Variables

Given the small sample size of the respondents in this study, only eight important covariates were included so as to maintain the degree of freedom (Deaton, 1997). Remittances, which is the main variable of interest, is included as one of the covariates. It is measured as total remittance income received by the household over the last one year expressed in naira per adult equivalent. In the development economics literatures, income has been identified as one of the important determinants of food consumption and nutrition (Abdulai and Aubert, 2004), therefore, household income specified as total income minus remittances was also included. The study excludes remittances from the measure of household income – and includes it as a separate covariate – so that it is able to properly disentangle the effect of remittances from those of other income sources (Edwards and Ureta, 2003). Household size was included because it is believed to be an important factor in micronutrients intake and child nutrition. Farm size – the total farm land cultivated by the household in the survey year – reflects the own-food production potential of households when other factors are kept constant. It is thus expected that households which cultivate larger farm size are more likely to produce more food and hence consume more food from where they can get micronutrients intake compared to those who cultivate smaller farm size.

Market access, measured by the distance in kilometer to the nearest urban market was included as a measure of the ease with which households sell their produce and buy other market-purchased foods and nutrients. This might affect – positively or negatively – household food intake and nutrition, especially the consumption of vegetables which are primary source of micronutrients. Gender dummy was included to account for the differential effects of gender on resource availability and food consumption. Though women are known to be more concerned about household nutrition, they are often disadvantaged in terms of social status and economic opportunities. Other variables used in the study are age and education of household head measured in years.

RESULTS

Sample Characteristics

Table 1 presents the definition and summary statistics of variables used in the analysis. The last row of the table indicates that 61% of the sample households received remittances, at least once, in the last one year. On the contrary, 39% of the households did not receive remittance income. Total income, including remittances, is approximately 30 thousand naira (US$250) per AE over all income sources. This is however lower than the national average of ₦45,250 in Nigeria, but is a representative figure for households located in rural areas of Nigeria (NBS, 2006). Annual Remittances – from both local and international sources is 1611 naira (US$13) per AE. The standard deviation of the remittances variable shows a wide range of variability in remittances across the sample. The average daily iron and vitamin A intake are respectively 27 mg and 289 µg RE per adult equivalent (AE). Children anthropometric data indicate that mean height-for-age, weight-for-age and weight-for-height Z-scores are 0.455, -0.586 and -0.991 respectively.

The average household size of five AE is consistent with the national average in Nigeria reported by NBS (2006). About 10% of the households are headed by women. The average age of respondent farmer in the sample is 59 years old and has seven years of schooling. The average wife has three years of schooling. The mean farm size of 1.9 ha is comparable to the national average of 2 ha. The value of household productive asset is approximately 74 thousand naira (US$617). Average age of children is 50 months and 52% of them are male. Fifty-seven percent of the households have toilet facilities in their houses. The

infrastructure variables indicate that many of the households do not have access to electricity, tapped water, or a tarred road. The mean distance to the nearest urban market place is 11.7 kilometers.

TABLE 1. Summary statistics and definition of variables used in the analysis

Variable	Definition and unit	Mean	SD
Dependent variables			
IRON_IN	Household iron intake in mg/day/AE	26.57	8.58
VITA_IN	Household vitamin A intake in µg RE/day/AE	289.0	86.66
HFA_Z	Child height-for-age Z-scores	0.455	2.64
WFA_Z	Child weight-for-age Z-scores	-0.586	1.40
WFH_Z	Child weight-for-age Z-scores	-0.991	1.88
Independent variables			
HH_SIZE	Number of household members in adult equivalents	5.08	1.31
GENDER	Gender of household head, male = 1, female = 0	0.90	0.31
AGE_HHH	Age of household head in years	59.1	6.80
EDU_HHH	Education of household head in years of schooling	6.89	3.93
EDU_MOT	Mother education in years of schooling	3.27	2.71
FAM_SIZE	Area cultivated by the household in ha	1.90	0.58
ASSETS	Value of household productive assets in naira	73761	53154
A_CHILD	Age of child in months	49.7	8.64
G_CHILD	Gender of child, male = 1, female = 0	0.52	0.50
TOILET	Dummy for toilet in the household, yes = 1, no = 0	0.566	0.497
ELECT	Dummy for electricity in household, yes = 1, no = 0	0.83	0.38
T_WATER	Dummy for water tap in household, yes = 1, no = 0	0.65	0.48
T_ROAD	Dummy for tarred road in the village, yes =1, no = 0	0.74	0.44
D_MARKET	Distance to the nearest urban market place in km	11.71	12.89
NET_INC	Household income per year minus remittances in naira/AE	28634.4	23223.4
REM_INC	Remittances per year in naira/AE	1161.3	2471.8
TOT_INC	Total household income per year in naira/AE	30245.7	23416.3
AC_REM	Remittances recipient household, yes = 1, no = 0	0.61	0.48

Notes: Official exchange rate in 2006: 1 US dollar = 120 naira; SD is standard deviation. AE is adult equivalent. RE is retinol equivalent. The number of observations is N = 220.

Effect of Remittances: Preliminary Descriptive Evidence

Table 2 shows household assets, micronutrients intake and child nutritional status indicators, differentiating between remittances recipient and non-recipient households. The uppermost part of table 2 indicates that average income, value of productive assets, farm size and education of household head were larger in remittance recipient households. However, the t-test confirms that the differences between remittances recipient and non-recipient households were significant only for income and value of productive assets. The middle part of table 2 indicates that iron and vitamin A intake are higher among remittance recipient than non-recipient households, but the difference is statistically significant only for iron intake. Looking at child nutritional status in table 2, it can be seen that children in remittance recipient households have higher *Z*-scores and thus better nutritional status than children in non-recipient households. Accordingly, the prevalence of child stunting, underweight, and wasting is lower in remittance recipient households. Overall, these results suggest that remittance recipient households seem to have better access to food and nutrients. It thus supports the belief that a larger proportion of remittances in poor households are used for smoothing consumption.

Remittances and Micronutrients Intake

The second stage estimation results of micronutrients intake model are shown in table 3. The first stage regressions explaining remittances and net income are shown in Appendix table 5. The model statistics indicate that about 34% and 18% of the variations in iron and vitamin A intake respectively are explained by the variables included in the models. The Durbin-Wu-Hausman test statistics shown in the last row of table 3 confirm that remittances and net income are indeed endogenous thereby justifying the use of instrumental variable approach. Column (1) shows that household size has a negative and significant influence on iron intake. Likewise, age of household head impact negatively on iron intake in the sample: the older the household head the lower is the iron intake. Education of the head of household has a positive and significant effect on iron intake. This makes sense, since educated people are often more aware of the nutritional implications of consuming foods that are rich in micronutrients. For every extra year of schooling, daily iron intake increase by 0.02 mg per adult equivalent. In addition, household income net of remittances, improves iron intake in a significant way. Remittance income is insignificant in determining iron intake in the sample household.

TABLE 2. Assets, micronutrients intake and child nutritional status indicators by access to remittances

	All households (N = 220)	Remittances recipient households (N = 134)	Remittances non-recipient households (N = 86)	T-test (recipients vs. non-recipients)
Household assets				
Income (naira/AE)	30245.7	32518.1	26705.2	2.31
	(23416.3)	(25324.1)	(19709.4)	
Farm size (ha)	1.90	1.91	1.89	1.41
	(0.58)	(0.59)	(0.56)	
Assets (naira)	73761.8	79350.4	65054.0	1.67*
	(53154.0)	(60443.2)	(37907.9)	
Education (years)	6.89	7.42	6.04	0.72
	(3.93)	(3.60)	(4.28)	
Micronutrients intake				
Iron intake (mg/day/AE)	26.6	27.4	25.3	1.87**
	(8.58)	(8.47)	(8.65)	
Vitamin A intake	289.0	291.0	285.9	-1.20
(µg RE/day/AE)	(86.7)	(85.4)	(88.9)	
Child nutritional status [a]				
Height-for-age *Z*-score	0.456	0.992	-0.124	2.01**
	(2.64)	(2.59)	(2.59)	
Weight-for-age *Z*-score	-0.586	-0.415	-0.771	-0.09
	(1.41)	(1.31)	(1.49)	
Weight-for-height *Z*-score	-0.991	-1.15	-0.811	1.01
	(1.88)	(1.79)	(1.97)	
Prevalence of stunting (%)	23.6	14.3	28.1	-
Prevalence of underweight (%)	22.0	13.2	30.7	-
Prevalence of wasting (%)	14.2	7.9	19.3	-

Notes: AE is adult equivalent. RE is retinol equivalent. Figure in bracket are standard deviation.
* Differences between households with and without remittances are statistically significant at 10% level.
** Differences between households with and without remittances are statistically significant at 5% level.
[a] Child nutritional status refers to children below the age of five. The total children sample includes 127 children: 66 from remittances recipient and 61 from remittances non-recipient households.

TABLE 3. Household micronutrient intake models

	(1) Iron intake (IV model)	(2) Vitamin A intake (IV model)
Constant	22.71***	270.5***
	(3.51)	(3.70)
HH_SIZE	-0.068*	-7.52
	(-1.88)	(-0.96)
GENDER	4.19***	29.48*
	(2.62)	(1.93)
AGE_HHH	-0.149**	-1.47*
	(-2.12)	(-1.85)
EDU_HHH	0.019**	-3.13
	(2.29)	(-1.08)
FAM_SIZE	0.010	21.48*
	(0.01)	(1.72)
D_MARKET	0.029	0.464
	(0.44)	(0.61)
REM_INC [a]	0.0002	0.002
	(1.06)	(0.92)
NET_INC [a]	0.0002***	0.003**
	(2.64)	(2.57)
Adjusted R^2	0.341	0.177
Durbin-Wu-Hausman chi^2	12.61	6.39

Notes: The number of observations in all models is N = 220. Figures in parentheses are *t*-values.
*, **, *** indicate statistically significant at the 10%, 5%, and 1% level, respectively.
[a] These are instrumental variables, predicted by household assets, access to electricity, tapped water and tarred road

Household vitamin A intake is analyzed in column (2) of table 3. Household income net of remittances has a positive effect: for every 1000 naira additional income net of remittances, daily vitamin A intake increase by 3 µg. The effect of farm size is also positive, and for every additional hectare of farm land, vitamin A intake increases by 21 µg. Male-headed households tend to consume more vitamin A compared to female-headed one. Age of household head reduces vitamin A intake and every additional year decrease vitamin A intake by 1.5 µg. As is the case with iron intake, remittance income has no significant impact on vitamin A intake in our sample. These results tend to suggest that remittances have no clear micronutrients intake effects among poor farming households in the region.

Remittances and Child Nutritional Status

To analyze the effects of remittances on child nutritional status, anthropometric measurements of children were regressed against a set of socioeconomic variables, including remittance income. As mentioned before, the sample is confined to children under the age of five. As explanatory variables, selected household characteristics were used as before, but additionally include a few child specific variables such as sex, age and mother's education, plus a dummy for households with a private toilet, which proxies the sanitary conditions. These variables are important for child nutritional development and anthropometry (Smith et. al., 2005). As before, a cluster correction approach is used to obtain a consistent variance-covariance matrix. However, the exogenous hypothesis for remittance income and household net income could not be rejected, so that OLS estimators are used.

Columns (1), (2) and (3) in table 4 show the estimation results. The dependent variable is the individual child Z-scores for height-for-age, weight-for-age, and weight-for-height respectively. The results indicate that within the age range covered, older children have lower Z-scores for height-for-age and weight-for-height and thus a lower nutritional status than younger children. This is expected considering that many of the younger children are breastfed, so that more severe malnutrition sets in only after weaning. Mother's education has a positive and significant influence on child nutritional status in the sample. Every additional year of schooling by the mother improves the height-for-age, weight-for-age, and weight-for-height Z-scores by 0.04, 0.07 and 0.1 respectively. These results appear consistent with that of Garrett and Ruel (1999) in a different context.

TABLE 4. Child nutritional status model

Z-score	Height-for-age	Weight-for-age	Weight-for-height
Constant	7.37***	-1.10	-6.72***
	(2.88)	(-0.97)	(-3.62)
HH_SIZE	-0.047	0.099	0.092
	(-0.21)	(0.99)	(0.56)
G_CHILD	0.765	0.338	-0.191
	(1.57)	(1.55)	(-0.54)
A_CHILD	-0.137***	-0.063	-0.067***
	(-4.10)	(-1.56)	(-2.80)
EDU_HHH	0.169**	0.023	0.021
	(0.21)	(0.66)	(0.37)
EDU_MOT	0.043**	0.071*	0.139**
	(2.47)	(1.74)	(2.07)
FAM_SIZE	0.736*	0.342*	0.147
	(1.67)	(1.73)	(0.46)
D_MARKET	0.015	0.018	0.008
	(0.67)	(1.43)	(0.48)
TOILET	1.00*	1.39***	1.08***
	(1.95)	(6.09)	(2.91)
REM_INC	0.000	-0.001	0.0001
	(1.00)	(-1.01)	(1.12)
NET_INC	0.0001	0.0001**	0.000
	(0.74)	(2.00)	(1.55)
Adjusted R^2	0.138	0.362	0.278

Figures in parentheses are *t*-values. *, **, *** indicate statistically significant at the 10%, 5%, and 1% level, respectively.

Having a toilet in the household has a positive effect on child anthropometry in all the three models, which is not surprising, as better sanitary conditions entail a lower risk of infectious diseases. The effect of household net income on child nutritional status is positive, albeit significant only for the weight-for-age Z-scores. Farm size shows significant positive influence on height-for-age and weight-for-age Z-scores only. No significant relationship is found between remittances and child nutritional status. Though the child nutritional status estimates appear not very robust, it seems that remittance income is not spent on meeting child nutrition requirements beyond the provision of calorie for the household in general. Nonetheless, it is possible that with more comprehensive data, including further child specific details – such as birth weight and birth order – as well as health related variables, significant effects of remittances could be shown.

TABLE 5. First stage regression explaining remittances and household net income

	Remittance income (naira/AE)	Net income (naira/AE)
Constant	5125.9***	23115.940*
	(2.77)	(1.81)
HH_SIZE	372.1***	-5911.196***
	(2.76)	(-6.35)
GENDER	506.4	-2000.667
	(0.89)	(-0.51)
AGE_HHH	-19.5	148.640
	(-0.80)	(0.87)
EDU_HHH	53.6	1265.180***
	(0.85)	(2.89)
FAM_SIZE	-53.0	6535.976***
	(-0.17)	(3.11)
D_MARKET	25.7*	-354.732***
	(1.66)	(-3.31)
ASSETS	-5655.0	86.439***
	(-1.57)	(3.48)
ELECT	-220.9	7218.709**
	(-0.47)	(2.24)
T_WATER	-156.1**	1559.110
	(-2.31)	(0.47)
T_ROAD	-524.9*	-241.973
	(-1.86)	(-0.08)
Adjusted R^2	0.211	0.497

Notes: The number of observations in all models is N = 220. Figures in parentheses are *t*-values.
, * statistically significant at the 10%, 5%, and 1% level, respectively.

CONCLUSIONS

Migration – whether local or international is widespread in Nigeria. Likewise, micronutrients deficiencies and child malnutrition are prevalent in the country. The increased remittances flow has tend to increase the income of migrant households, raising the possibility that remittances will enhance micronutrient intake and child nutrition. This paper examined the impacts of remittances on micronutrients intake and child nutritional status among a sample of farming households in Kwara State of Nigeria. The paper used a combination of instrumental variable and ordinary least square techniques to analyze whether remittances improve micronutrients intake and child nutritional status.

The results show that while remittances contribute to larger income and assets of recipient households, it does not significantly affect micronutrients intake and child nutritional status in the sample. Nevertheless, household income net of remittances seems to have a positive and significant effect on these nutrition outcomes. The question now is why is remittances not impacting on micronutrients intake and child nutrition? The first reason could be that recipient households are not using remittances to buy quality food and micronutrients that could improve micronutrients intake and child nutritional status. While it is often assumed that larger share of remittances to developing countries are spent on food, they may not be spent on quality food and nutrients beyond that which is use to buy starchy staple food needed to provide the minimum dietary energy requirement. Related to this is also the possibility that remittances may be in the control of men rather women, and may not be readily available for household nutrition, but rather spent on non-food items such as clothing, shelter and leisure.

The second reason could be that remittances are under reported during data collection. Given that remittances flow is irregular and comes through informal channels, the amount captured in the data may not be sufficient enough to have any significant impact. The third reason could be problems of data and methodological limitations. For instance, the small size of the sample and the limited range of data used could affect the robustness of the results. Using a nationally representative data consisting of several food, health and anthropometric indicators may bring out more significant results. Similarly, finding appropriate instruments for remittances and net income in the instrumental variable model could also improve the results.

For the reasons given above, it is difficult to conclude that there is no link between remittances and micronutrients intake and child nutritional status. Removing the limitations of this study could make the link become more visible. For instance, reducing the cost of remitting money and improving the financial sector in developing countries, are policies that would likely increase remittances flow and boost its potential nutrition effects. In the same vein, remittance-recipient households could be enlightened on effective utilization of remittances for nutritional purposes. For instance, they can be trained on the importance of consuming a balanced diets and food rich in micronutrients. Clearly, before proposing any concrete policy, a stronger link between remittances and micronutrients intake and child nutritional status should be established. This would require additional empirical research in different situation, using a wide range of data.

REFERENCES

Abdulai, A. and Aubert, D. (2004) Nonparametric and Parametric Analysis of Calorie Consumption in Tanzania. *Food Policy,* 29, 113–129.

Adams, R. (2005) Remittances, Household Expenditure and Investment in Guatemala. Policy Research Working Paper 3532, World Bank, Washington, DC.

Adams, R. (2006) International Remittances and the Household: Analysis and Review of Global Evidence. *Journal of African Economies,* 15 (AERC Supplement 2) 396–425.

Ajieroh, V. (2010) A Quantitative Analysis of Determinants of Child and Maternal Malnutrition in Nigeria. IFPRI Nigeria Strategy Support Program Brief No. 11, 2010.

Bouis, H.E. (1994) The Effect of Income on Demand for Food in Poor Countries: Are Our Food Consumption Databases Giving us Reliable Estimates? *Journal of Development Economics,* 44, 199–226.

Caldwell, J.C. (1969) African Rural–Urban Migration: The Movement to Ghana's Towns. Australian National University Press, Canberra.

Collier, P. and Lal, D. (1986) Labour and Poverty in Kenya, 1900–1980. Clarendon Press, Oxford.

Cox, E.A. and Ureta, M. (2003) International Migration, Remittances, and Schooling: Evidence from El Salvador. *Journal of Development Economics* 72, 429–461.

Deaton, A. (1997) *The Analysis of household surveys.* Johns Hopkins University Press, Baltimore, MD.

Edwards, A.C. and Ureta, M. (2003) Internattional Migration, Remittances and Schooling: Evidence from El Salvador. *Journal of Development Economics,* 72 (2003), 429–461.

FAO (2010) The State of Food Insecurity in the World. Addressing Food Insecurity in Protracted Crises. Food and Agriculture Organization of the United Nations, Rome.

Garrett, J.L. and Ruel, M.T. (1999) Are Determinants of Rural and Urban Food Security and Nutritional Status Different? Some Insights from Mozambique. *World Development*, 27(11): 1955–1975.

Gupta, S., Pattillo, C.A. and Wagh, S. (2009) Effect of Remittances on Poverty and Financial Development in Sub-Saharan Africa. *World Development,* 37(1): 104–115.

Jimenez, M.A.C. (2009) Household Development in Tlapanana: A Comparative Study Between Households Receiving Remittances and Households not Receiving Remittances. *Journal of Poverty,* 13(3): 331–349.

Karamba, W.R., Quinones, E.J. and Winters, P. (2011) Migration and Food Consumption Patterns in Ghana. *Food Policy,* 36(3): 41-53.

KWSG (2006) Kwara State Government of Nigeria, Planning Studies in Kwara State. Ministry of Land and Regional Planning, Ilorin.

Mason, J., Rivers, J. and Helwig, C. (2005) Recent Trends in Malnutrition in Developing Regions: Vitamin A Deficiency, Anemia, Iodine Deficiency, and Child Underweight. *Food and Nutrition Bulletin*, 26(1), 57–162.

NBS (2006) National Bureau of Statistics, Abuja, Socio-economic Survey of Nigeria.

Quartey, P. and Blankson, T. (2004) Do Migrant Remittances Minimize the Impact of Macro-Volatility on the Poor in Ghana? Global Development Network, 2004.

Ratha, D. (2003) Worker's Remittances: An Important and Stable Source of External Development Finance. Washington, DC: Global Development Finance.

Ratha, D., Mohapatra, S. and Silwal, A. (2010) Outlook for Remittance Flows 2010–11. Migration and Development Brief No. 12, July. World Bank, Washington, DC.

SAMP (2006) Migration and Development in Africa: An Overview. South African Migration Project, 2006, Cape Town, South Africa.

Shaw, W. (2007) Migration in Africa: A Review of the Economic Literature on International Migration in 10 countries. Development Prospects Group, World Bank, Washington DC 20433.

Smith, L.C., Ruel, M.T. and Ndiaye, A. (2005) Why is Child Malnutrition Lower in Urban than in Rural Areas? Evidence from 36 Developing Countries. *World Development,* 33(8): 1285–1305.

Taylor, J. E., Rozelle, S. and 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.

World Bank (2008) Migration and Remittances Fact Book 2008. Washington D.C: The World Bank.

Yang, D. (2004) International Migration, Human Capital and Entrepreneurship: Evidence from Philippine Migrants' Exchange Rate Shocks. University of Michigan, Ann Arbor, MI, USA.

Zezza, A., Carletto, C., Davis, B. and Winters, P. (2011) Assessing the Impact of Migration on Food and Nutrition Security. *Food Policy,* 36(3): 1-6.