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Rural-urban Migrants' Remittances and the Physical Health Status of the Left-behind Children in Rural Areas of Niger State, Nigeria

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Abstract
Rural-urban migrants in Nigeria often leave their children behind in the hands of parents or non-parent caregivers, when migrating. Although most of the migrants send remittances to enhance the lives of the family, little is known about the role of such remittances in enhancing the health status of the left-behind children. Using a sample of 401 left-behind children from the rural areas of Niger State, this study investigated the impacts of rural-urban migrants' remittances on the health status of the children. The Ordered Logit Model was used for the estimation. The result shows that a one Naira increase in remittance receipt by the left-behind family, increases the probability of the left-behind children being in the adequately nourished health category. Also, children under the care of mothers are more likely to be in the adequately nourished health category, and a year increase in the education of the caregivers increases the probability of the children being in the adequately nourished heath status. It is suggested that government should increase the breadth of the Microfinance Banks in the rural areas of the state, with a view to providing an efficient remittance transfer system to the rural left-behind households.
Keywords: Rural-urban migrants; Remittances; Left-behind children; Physical health; Ordered Logit model.

1. Introduction

The movement of people from rural to urban centers in Nigeria has created a group of children, whose one or both parents are away. According to the NDHS (2008)'s report, over 21% of the Nigerian children, who are non-orphans, lived with at least one of their biological parents away. Migrant parents might leave their children behind due to the cost and risk considerations of moving along with the family or due to their altruistic decision to send remittances that might be used to improve the well being of the left-behind family, including children (Amakon and Iheoma, 2014; Amuedo-Dorantes and Pozo, 2009; Anto´n, 2010; Carletto et al., 2011; López-Cevallos and Chi, 2012).

Rural-urban migrants' remittances constitute the major share of the remittance flow to rural areas in Nigeria, and it provides a poverty alleviation mechanism to the rural left-behind households (Chiwuzulum et al., 2010). In the absence of formal insurance, migrants' remittances also provide a substitute against agricultural and health risks, which is a common experience in the rural households of the country (Dillon et al., 2011; Gubert, 2002).

Although previous studies in Nigeria have investigated the impacts of remittances on health, most of the studies were aligned to the impacts of international remittances, and were mostly based on macro investigations (e.g Amakon & Iheoma, 2014). The few Microeconomic studies that determined the impacts of remittances on health in the country, were mainly focused on the impacts of the remittances on poverty alleviation and inequality reduction (e.g Chiwuzulum et al., 2010). Poverty reduction may be a distal measure of well-being of the family. In order to find out the role of remittances in enhancing the welfare of the left-behind children, a more proximal measure of well-being, such as the physical health of the children was suggested (Beverly, 2000). Therefore, this study investigates the impacts of rural-urban migrants' remittances on the physical health status of the left-behind children in the rural areas of Niger State, Nigeria. The article is, however, presented in six sections, which include the introduction, theoretical framework, methodology, results, discussions and conclusion.

2. Theoretical framework

The health production function is used as the underpinning theory of this study. According to the theory, individuals have natural stock of health, which degrades over time, but investment in it can be made through medical care and adequate nutrition (Grossman, 1972). The original model is shown in Equation (1) below:

$H_i = h(H_o, M_i, Z_i)$……(1)

Where $\mathbf{H_i}$ is the health of child **i**, $\mathbf{H_0}$, is the inherited stock of health (or health endowment) of child **i**, $\mathbf{M_i}$, is the

total consumption of medical services by child **i,** while, $\mathbf{Z_i}$, is the total consumption of commodities (or nutrition) by child **i.**

Hildebrandt et al. (2005) however, reformulated the original function as in Equation (2) below:

$$PH_i = h(M_i, F_i, T_i, K_i, B_i) \quad \ldots\ldots(2)$$

Where $\mathbf{M_i}$, represents nutritional and medical input into the child **i**'s physical health. In this case, $\mathbf{M_i}$, is represented by remittances since most migrants' remittances are spent in nutrition and health care provision (Amuedo-Dorantes and Pozo, 2009). Non-remittance family income ($\mathbf{F_i}$) will also be added as a control for non-remittance income that may affect the health of the children. $\mathbf{T_i}$ is the time input of the parent. In this case, $\mathbf{T_i}$, is represented by the caregiver since the care giving time is provided by the caregivers. Caregivers also provide the emotional atmosphere for children's eating behavior (Benton, 2004). $\mathbf{K_i}$ is the health knowledge of the parents, but educational level of the caregivers will be used since educational level of the caregivers determine their ability to use resources (e.g remittances) in the production of child's health (Babalola & Fatusi, 2009). $\mathbf{B_i}$ is the physical health endowment of the child. Also, a variable $\mathbf{X_i}$ is added to represent the child's living condition. Children living in overcrowded houses are more likely to experience transmission of infectious diseases, accidents, injuries and lead poisoning, which may affect their physical health (Yoo et al., 2009). Age ($\mathbf{A_i}$) and gender ($\mathbf{G_i}$) are used as controls because age affects health, as health degrades with age (Grossman, 1972). Therefore, the physical health function of the left-behind child **i**, is presented in Equation (3) below:

$$PH_i = h(M_i, F_i, T_i, K_i, B_i, X_i, A_i, G_i) \quad \ldots\ldots(3)$$

2.1 Hypothesis

$\mathbf{H_a}$: Rural-urban migrants' remittances enhance the physical health status of the left-behind children in rural areas of Niger State

3. Methodology

3.1 Data and sample

The data for this study was collected from a sample of 401 left-behind children in rural areas of Niger State, Nigeria. Stratified sampling technique was first adopted to select three local governments from the three geopolitical zones[1] of the state. In each of the three selected local governments, a random sample of 45 left-behind households were selected, such that data on 405 left-behind children and their caregivers were obtained from the selected households. Four questionnaires had incomplete observations and were dropped, leaving a sample of 401 respondents. The sample consists of children within the age brackets of six to ten years, whose at least one parent has migrated for at least three months.

3.2 Dependent variable

The dependent variable of this study is the children's physical health status, which was obtained using weight-for-age Antropometric indicator. The weight-for-age of the children obtained using z-scores and was calculated using the Center for Diseases and Control's calculator. Based on the generated z-scores, -2 < Z-score < +2, represents adequate nutritional health status, -3 < Z-score < -2, represents moderately malnourished health status, while Z-score < -3, represents severely malnourished health status. Cut offs were ordered 1, 2 and 3 for the severely malnourished, moderately malnourished and adequately nourished health statuses respectively, thereby providing the ground for the application of the ordered Logit model.

3.3 Independent variables

The key independent variable of interest in this study is the migrants' remittances. Other variables included as controls were the education of the caregiver and caregiver status. Remittance was measured as a continuous variable, which is the amount of remittance received per month, by the left-behind household. The education of the caregiver was also measured as a continuous variable, while the values of 1, 2 and 3 were assigned to the mother, father and non-parent caregivers respectively. Other control variables include the child's physical health endowment, non-remittance family income, child's living condition, age and gender of the child. When a child has a history of poor physical health, e.g sickle cell anemia, before parents' migration, a value of 1 was assigned, while 0 otherwise. Non-remittance family income was measured as a continuous variable. The child's living condition was measured as the ratio of the total number of people living in the left-behind household to the total number of rooms in the households. Age was measured in years while gender was measured as 1 and 0 for male and female left-behind children respectively.

3.4 Method of data analysis and model specification

Both descriptive statistics and Ordered Logit regressions were conducted. The descriptive statistics provide some

[1] The three geopolitical zones are Zone A, Zone B and Zone C.

important information about the respondents and the variables of the study. The Odered Logit regression estimated the coefficients of the estimated parameters in the model. The ordered Logit model was employed due to the Ordered nature of the dependent variable (Cameron and Trivedi, 2005). The empirical model of the Ordered Logit model is specified in Equation (4) below:

$$Pr(PH_i) = \beta_0 + \beta_1 Rem_i + \beta_2 Cgvr_i + \beta_3 Ecgv_i + + \beta_4 Cphe_i + \beta_5 Clct_i + \beta_6 Ficm_i + \beta_7 Age_i + \beta_8 Gender_i + \mu_i \quad (4)$$

where: Rem, is remittance; cgvr, is the caregiver of the left-behind child; Ecgv, is the education of the caregiver; Cphe, is the child's physical health endowment and Clct, is the child's living condition. Age and gender refers to the age and gender of the left-behind child.

4. Results

4.1 Descriptive analysis

It is shown in Table 1 that, over 96.76% of the studied children, were within the adequately nourished health status, 2.49% were moderately malnourished while only 0.75% were severely malnourished.

Table 1: Socio-demographic Profile of the Left-behind children and their Caregivers

Variables	Frequency	Percentage	Mean	Min	Max
Child's Physical Health Status					
Adequately Nourished	388	96.76			
Moderately Malnourished	10	2.49			
Severely Malnourished	3	0.75			
Caregiver Status and Gender of the children					
Mother Caregivers	373	93.02			
Father Caregivers	5	1.25			
Non-parent Caregivers	23	5.74			
Child's P/Health Endowment					
History of Poor Physical Health Exists	4	1			
No History of Poor Physical Health	397	99			
Male	200	49.88			
Female	201	50.12			
Education of the Caregiver			12	1	17
Remittance			17987	7501	27501
Family Income			9772	2500	42501
Child's Age			8	6	10
Child's Living Condition			4	1	21

P/health, means physical health. Min, means minimum while max, means maximum

Concerning the characteristics of the caregivers, 93.02% of the caregivers were mothers of the left-behind children, 1.25% of them were fathers while 5.74% of them were non-parent caregivers. On whether the left-behind children had any history of poor physical health before the parents' migration, only 1% of the children were having history of poor physical health while 99% were not. The percentage of the male left-behind children among the respondent was 49.88%, while the female was 50.12%.

The average level of the education of the caregivers was 12 years with a minimum of 1year and maximum of 17years. The mean of the monthly remittances received by the left-behind households was ₦17, 987 ($50), with a minimum of ₦7,501($21) and a maximum of ₦27, 501($76)[1]. The average non-remittance monthly family income was ₦9,772 ($27), with a minimum of ₦ 2500 ($9) and a maximum of ₦ 42, 501($118). The mean age of the left-behind children was 8years with a minimum of 6years and a maximum of 10years.

4.2 Ordered Logit regression result

The ordered Logit coefficients in Table 2 shows that the coefficient of the remittances is positive and statistically significant at 10 percent, which means that a one Naira increase in the remittance receipt increases the probability that the left-behind child will be in the better (adequately nourished) health category. This confirms the hypothesis **H_2**, that rural-urban migrants' remittances enhances the physical health status of the left-behind children in Niger State. The coefficient of the father's caregiver was negative and statistically significant at one percent, thereby implying that compared to the left-behind children under the care of mothers (reference category), children under the care of fathers are less likely to be in the better (adequately nourished) health category.

[1] At the exchange rate of $1= ₦ 360

Table 2: Ordered Logit Regression Coefficients
Dependent Variable: Physical Health Status of the Left-behind children

Variables	Coefficients	Robust Standard Errors	P-values
Remittances	2.47387	1.407243	0.079*
Father C/giver	-12.20963	0.8170264	0.000***
Non-Parent C/giver	-1.533333	1.033515	0.138
Education of the C/giver	0.1705411	0.0850649	0.045*
Child's P/Health Edmnt	-4.720089	1.279827	0.000***
Child's Living Condition	-0.0665989	0.0898596	0.459
Family's Income	-1.021923	0.6625945	0.123
Child's Age	0.9203663	0.2446457	0.000***
Child's Gender	-1.30327	0.9695062	0.179
/cut1	16.72377	9.502699	
/cut2	18.66236	9.715337	

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. Where: C/giver, means caregiver; P/Health Edmnt, means physical health endowment.

The coefficient of the education of the caregivers in Table 2 was also positive and statistically significant at 10 percent, therefore indicating that, a one year increase in the education of the caregiver increases the probability that the left-behind child will be in the better (adequately nourished) health status. Moreover, the coefficient of age is positive and statistically significant one percent, therefore, a one year increase in the age of the left-behind child increases the probability that the child will be in the better (adequately nourished) health status.

However, the coefficient of the child's physical health endowment was negative, which means that, compared to the left-behind children who did not have a history of poor physical health (reference category), those who have a history of poor physical health are less likely to be in the better (adequately nourished) health status.

The results in Table 3 shows the average marginal effects of the Ordered Logit coefficients. The result shows that remittance was positive and statistically significant at the 10% under the column of adequately nourished health category, which means that a one Naira increase in the remittance receipt increases the probability that the left-behind child will be in the adequately nourished health category by 6%. The Father caregiver was negative and statistically significant at 1% under the column of adequately nourished health status, but was positive and statistically significant at 5% under the column of moderately malnourished health category. This means that, left-behind children under the care of fathers are 2.7% less likely to be in the adequately nourished health status and 2% more likely to be in the moderately malnourished heath status, as compared to their peers under the care of mothers (reference category).

Similarly, the education of the caregivers was positive and statistically significant at the 10% level under the column of adequately nourished health category, but negative and statistically significant at the 10% level under the column of moderately malnourished health status. This means that a one year increase in the education of the caregivers is associated with the probability that the left-behind child will be in the adequately nourished health category by 0.4% and reduces the probability that the left-behind child will be in the moderately malnourished health category by 0.3%.

Furthermore, the age of the left-behind child was positive and statistically significant at the 5% level under the column of adequately nourished, but was negative and statistically significant at the 5% level under the column of moderately malnourished health status. This implies that, a one year increase in the age of the left-behind child increases the probability that the left-behind child will be in the adequately nourished health category by 2% and reduces the probability that the child will be in the moderately malnourished health category by 1.5%.

However, the child's physical health endowment was negative and statistically significant at the 5% level under the column of adequately nourished, but was positive and statistically significant at the 5% level under the column of moderately malnourished health status. This therefore means that, compared to the left-behind children who did not have a history of poor physical health (reference category), those who have a history of poor physical health before parents' migration are 10.7% less likely to be in the adequately nourished health status and 8% more likely to be in the moderately malnourished health category.

Table 3:
Marginal Effects of the Ordered Logit Model for the Three Categories of Physical Health Status
Dependent Variable: Physical Health Status of the Left-behind children

Independent Variables	Adequately Nourished Health Status	Moderately Malnourished Health Status	Severely Malnourished Health Status
Remittance	0.0559824*	-0.0424115 (0.0299047)	-0.0135709
	(0.03222)		(0.0089752)
Father C/giver	-0.0270473***	0.0208393**	0.006208
	(0.0073176)	(0.0067081)	(0.003866)
Non-Parent C/giver	-0.0564033	0.0427458	0.0136575
	(0.0558685)	(0.0394449)	(0.0179633)
Edu. of C/giver	0.0038593*	-0.0029237* (0.0016858)	-0.0009355
	(0.0020279)		(0.0006071)
Child P/H Endmnt	-0.1068132**	0.0809203**	0.0258929
	(0.0350489)	(0.028361)	(0.0159908)
Child's Lving Cdtn	-0.0015071	0.0011418	0.0003653
	(0 .002065)	(0.0016256)	(0.0004806)
Family's Income	-0.0231256	0.0175196	0.0056059
	(0.0163759)	(0.0136165)	(0.0039715)
Child's Age	0.0208274**	-0.0157786**	-0.0050488
	(0.0075519)	(0.0058361)	0.0033335
Child's Gender	-0.0294923	0.022343	0.0071493
	(0.0224286)	0.0171794	0.0066273

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. Where: C/giver, means caregiver; Edu., means education; P/H Endmnt, means physical health endowment, while Lving Cdtn, means living condition.

4.3 Post estimation diagnostics

Table 4 in the appendix shows the various post estimation tests. The most important assumption of the ordered Logit model, the parallel line assumption, was tested using the Brant test. The joint P-values of all the variables were not statistically significant (0.133), therefore, there was no enough evidence that the parallel line assumption was violated. The Linktest was also used to test the model specification error. The P-value of the _hatsquare (0.125) was not statistically significant, thereby supporting the null hypothesis that the model is correctly specified. The Multicollinearity test was also conducted using VIF and Tolerance value. All the variables in the model had a VIF of less than 10 and tolerance values that are close to 1, which implies that Multicollinearity does not exist among the covariates in the model. The goodness-of-fit was tested using the BIC and AIC criterion. Two models were tested, the saved model and the current model. The saved model include two variables of interests, that is, the caregiver and education of the caregiver, while the current model does not. The AIC value of the saved model is smaller than that of the current model and the difference between the two models, as shown by the BIC is 7.02, which implies a strong evidence that the saved model fits the data better (Raftery, 1995).

5. Discussion

Rural-urban migration is the most common form of internal migration in Nigeria. When parents migrate, their children are mostly left-behind in the rural areas, particularly due to the temporary migratory nature of some migrants, as well as the risks and costs consideration of moving along with the family. The academic community world over, has raised concern over the potential impacts of this form of migration on the health of the left-behind children, considering the fact that the migration may yield benefit in form of remittances to the left-behind children, it may also incur the children a cost of living without one or both of their parents, all of which may have implications on their health status.

The results of this study, first, show that a one Naira increase in remittance receipt was found to be associated with increasing the probability that the left-behind child will be in a better health category. This might be because remittances increase the ability of the left-behind households to providing nutrition and medication for their children (Amuedo-Dorantes and Pozo, 2009; López-Cevallos, 2012).

Secondly, left-behind children under the care of mothers are more likely to be adequately nourished than those under the care of fathers or non-parent caregivers. This result contradicts the previous finding that the health of the left-behind children under the care of non-parent caregivers does not suffer (Mazzucato and Schans, 2011).This might be because mothers are more altruistic to the welfare of their children than fathers and non-parent caregivers (Alger and Cox, 2013).

Thirdly, a one year increase in the education of the caregivers increases the probability that the left-behind

children will be in a in higher health category (adequately nourished) and reduces the probability that they will be in lower health status (moderately malnourished). This implies that, whereas being under the care of mother increases the probability of being in a better health category, only the education of the caregiver reduces the risk of being in a lower health status. This might be due to the importance of education in the utilization of health and nutritional information, providing environmental sanitation and seeking the relevant medical care supports in case of need, as reported by the previous finding (Babalola and Fatusi, 2009).

Fourthly, a one year increase in the age of the left-behind child was also associated with the probability of making the left-behind child to be in a better health category and reduces the probability of the child being in a lower health status.

Finally, children who have a history of poor physical health before parents' migration were found to be less likely to fall in the better health category and more likely to be in a lower health status than their peers who did not have a history of poor physical health before the parents' migration.

6. Conclusion

This study corroborates the previous findings in other contexts that migrants' remittances enhance the health of the left-behind children. However, contrary to the previous findings in the West-African context that the health of the left-behind children under the care of non-parent caregivers might be as good as that of the children under the care of their mothers, this study found that left-behind children under the care of their mothers are more likely to have better physical health than their peers under the care of non-parent or father caregivers. However, education of the caregivers not only increases the probability of the left-behind children having better physical health, but also reduces their probability of being in the lower physical health category.

Based on the findings of this study, it is therefore recommended that government should increase the breadth of the Microfinance Banks in the rural areas of the state, with a view to providing an efficient remittance transfer system to the rural left-behind households. It is also recommended that fathers should migrate and mothers wait and provide proper care for the children. Government should also provide health and nutritional knowledge to the caregivers of the left-behind children, as a means of improving the health of children under their custody.

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Appendix:

Table 4: Post Estimation Tests for the Ordered Logit Regression

Tests	**Measures**
Brant Test	**P-value**
All	0.133
Caregiver	0.247
Education of the Caregiver	0.460
Remittance	0.129
Child's P/health Edowment	0.192
Child's Living Condition	0.376
Family Income	0.172
Age	0.753
Gender	0.511
Linktest	
_hat	0.210
_hatsq	0.125
Multicollinearity Test	**Tolerance**
Caregiver	0.9922
Education of the Caregiver	0.5266
Remittance	0.4431
Child's P/health Endowment	0.9886
Child's Living Condition	0.9800
Family Income	0.5639
Age	0.9781
Gender	0.9822
Variance Inflation Factor (VIF)	
Caregiver	1.00
Education of the Caregiver	1.38
Remittance	1.50
Child's P'health Endowment	1.01
Child's Living Condition	1.01
Family Income	1.33
Age	1.01
Gender	1.01
Test for Goodness-of-fit	
Models	**AIC** **BIC**
Current Model	106.142 138.054
Saved Model	105.226 145.115
Difference	0.916 -7.062