

## **Does the Physical Health Status of the Left-behind Children Affects their Mental Healths? An Empirical Investigation on Children Left-behind by Rural-urban Migrants in Niger State, Nigeria.**

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**Abstract:-** Although empirical evidence has shown that physical health status of the children has a lot of bearing on their mental healths, little is known about the impact of physical health status of the left-behind children on their mental healths. This study uses a sample of 1135 left-behind children and their caregivers from rural areas of Niger State, Nigeria to investigate the effect of physical health status of the children on their mental health. The study uses a Logistic regression model. The physical health status was categorized as adequately nourished, moderately malnourished and severely malnourished. The finding of the study shows that left-behind children who are severely malnourished and those who are moderately malnourished are more likely to have poorer mental health than those who are adequately nourished. Left-behind children under the care of father and non-parent caregivers are more likely to have poorer mental health than those under the care of mothers, and the higher the number of siblings living with a left-behind child the lower the probability of the child having poor mental health. Left-behind boys are also more likely to have poor mental health than left-behind girls. Suggestions are therefore made for policy actions.

**Keyword:** *Left-behind children; Physical health; Mental health; Logistic Regression.*

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### **I. INTRODUCTION**

Children grown up in poor families are at higher risks of mental health problems [41]. Children's mental health refers to the healths of their minds [30]. It is the psychological well-being that enables children to utilize their potential, be productive, cope with the normal stress of life and make a meaningful contribution to their community [45]. It is, therefore, not necessarily the absence of mental disorder. Physical health, as measured by the nutritional status, is one of the major pathways through which poverty impacts on the mental health of the children, as poor households lack the ability to provide adequate nutrition for their children [24, 27].

Malnutrition affects mental health by affecting mental function and inhibiting mental development [20, 31]. Children who are malnourished are also less likely to have secure attachment [43]. Secure attachment refers to the ability to relate with others, which is normally learnt from interaction between the child and the primary caregiver. When the caregiver, child or both are malnourished, it affects such interaction and the child becomes at risk of not having a secure attachment [19]. Lack of secure attachment affects child's mental health [9]. Similarly, malnourished children have lower levels of temperament (quality of mind), which increases their risk of having poor mental health [34].

Children who have poor mental health are more likely to experience grade repetition, participate in special education and have lower academic performance [14]. Children with poor mental health also face long-term educational disadvantage such as lower grade point average (GPA), higher rate of suspension and lower completed years of schooling [16]. Children who have poor mental health are equally more likely to engage in criminal activities [17]. Moreover, poor mental health in the childhood is more likely to translate into low employment opportunities, lower earnings and a life of dependency in adulthood [18]. Therefore, understanding the determinants of children's mental health would assist government in making children's mental health policies.

In Nigeria, 60.9% of the populace live in absolute poverty [28]. Out of this poor population, 66.1% of them live in the rural areas of the country. Therefore, poverty in Nigeria is more in the villages than in the cities. One of the possible explanations for this variation in poverty levels is the socioeconomic inequities between the

rural and urban centers of the country [36]. Many rural dwellers are, therefore, motivated to migrate from rural to urban centers, either on temporary or permanent basis, in search of better economic opportunities [40]. In order to reduce the cost and risk of traveling with the family, rural-urban migrants often migrate and leave their children behind in the rural origin, either to the left-behind parent or relatives. According to the NPC (2009), in the North Central Zone of Nigeria, where Niger State belongs, 30% of the children live with at least one of their parents away. This percentage is above the national average of 19%.

Most rural-urban migrants leave their children behind with the altruistic decision of sending remittances to the left-behind family, which is mainly used for consumption and health care expenditures [4, 5, 6, 11, 33]. It is estimated that 36.1% of the Nigerian households receive internal remittances mostly from the rural-urban migrants and majority (45%) of the remittance receivers are poor households in the rural areas [38]. Migrants' remittances also provide a substitute against health risks [15, 23]. Rural-urban migration has therefore become a poverty alleviation strategy embarked upon by rural households in the country. Consequently, left-behind children have been reported by many studies to have improved physical health status due to remittance receipt [4, 6, 25], which may impact on their mental healths.

Although empirical studies have confirmed the link between physical and mental health [1, 8], most of the studies on the mental health of the left-behind children were centered on the effect of parental absence on the mental health of the children [37]. The role of the physical health in determining the mental health of the left-behind children has often been bypassed by most of the previous studies. Therefore, this article investigates the impacts of physical health status on mental health of the left-behind children in Niger State Nigeria. The article is presented in five sections, which include the introduction, theoretical framework, methodology, results, discussions and conclusion.

## II. THEORETICAL FRAMEWORK

The health production function of Grossman (1972) has been widely used by economists to explain variation in health as an output due to some changes in certain health inputs. In a similar fashion, Knesper et al. (1987) explain changes in mental health output as a function of mental health inputs, shown by Equation (1) below:

$$MH_i = f(X_i, \varepsilon_i) \dots \dots \dots (1)$$

where the mental health of child  $i$  is denoted as  $MH_i$ . The series of factors that affect the child's mental health is represented by  $X_i$ , and  $\varepsilon_i$  is the error term. Since the left-behind children may benefit from enhanced feeding due to remittance receipt, their physical health status may affect their mental health [27]. Left-behind children's mental health may also be affected by their caregivers due to the differences in emotional impact between parent and non-parent caregivers [26]. The mental health of the left-behind children may also be affected by the stability of the care arrangement of the children [37]. Similarly, the mental health effect of parental absence may be reduced by the frequency of contacts between the migrant parents and the left-behind children [32, 35]. Moreover, the trauma of parental absence may be reduced when left-behind children live with their siblings [46]. The living condition of the children may also affect their mental health [3]. Also, the left-behind children's current mental health status may be affected by their previous mental health endowment [22]. Left-behind girls are normally more resilient in the absence of parents than the left-behind boys [10], therefore, gender of the left-behind children may affect their mental health. Older children are also more resilient in the absence of parents than younger ones, hence age may affect the mental health of the children [32]. The mental health production function of the left-behind child  $i$  can, therefore, be depicted as in Equation (2) below:

$$MH_i = f(CG_i, SCA_i, FC_i, NS_i, PH_i, CL_i, ME_i, AG_i, GD_i) \dots \dots \dots (2)$$

where  $MH_i$  is the mental health of child  $i$ ,  $CG_i$  is the caregiver of child  $i$ ,  $SCA_i$  is the stability of care arrangement of child  $i$ ,  $FC_i$  is the frequency of contacts with migrant parents of child  $i$ ,  $NS_i$  is the number of siblings living with child  $i$ ,  $PH_i$  is the physical health of child  $i$ ,  $CL_i$  is the child  $i$ 's living condition,  $ME_i$  is the mental health endowment of child  $i$ ,  $AG_i$  is the age of child  $i$  and  $GD_i$  is the gender of child  $i$ .

### 2.1 Hypothesis

**H<sub>1</sub>:** Left-behind children who have better physical health status are expected to have better mental health condition.

## III. METHODOLOGY

### 3.1 Data and sample

This study surveyed a sample of 1143 left-behind children and their caregivers in rural areas of Niger State, Nigeria. It uses a stratified sampling technique to first select three local governments from each of the three geopolitical zones<sup>1</sup> of the state. Then a random sample of 127 left-behind households were selected from

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<sup>1</sup> The three geopolitical zones are Zone A, Zone B and Zone C.

each of the nine selected local governments. Eight questionnaires had incomplete observations and were dropped, therefore, leaving a sample of 1135 respondents as the final sample of the study. Left-behind children who are within the age brackets of six to ten years, whose at least one parent has migrated for at least three months, as well as their caregivers constitute the respondents of the study.

### 3.2 Dependent variable

The left-behind children’s mental health is the dependent variable of this study. Mental health was measured using the Strength and Difficulties Questionnaire (SDQ) developed by Goodman (1997). The questionnaire, which consists of twenty items, is anchored on a 3-point Likert’s scale. Each question is scored 0-2. When a questionnaire has a total difficulty score of 0-13, the child is normal, 14-16, the child is borderline, and 17-40, the child is abnormal. However, following Assis and Ruiz-Marave (2013) the questionnaire was dichotomized. A child with a total difficulty score of 17 and above was assigned 1, to denote poor mental health, and 0, otherwise.

### 3.3 Independent variables

The physical health status of the left-behind children is the key independent variable of interest in this study. Weight-for-age Anthropometric indicator was used as the measure of the children’s health status because the parents may engage in temporary migration, hence the effect of remittances on their health status may only be measured by a short-term health indicator [44]. The z-scores were used to derive the weight-for-age, after collecting data on the weight and age of the children using a digital scale. The Anthro, which is a WHO’s Anthropometry dedicated software, was used to generate all the z-scores. The children were classified as adequately nourished ( $-2 < Z\text{-score} < +2$ ), and were assigned a value of 3; moderately malnourished ( $-3 < Z\text{-score} < -2$ ), and were assigned a value of 2; or severely malnourished ( $Z\text{-score} < -3$ ), and were assigned a value of 1. However, the caregiver status of the child, stability of care arrangement of the child, frequency of contacts between the child and the migrant parents, number of siblings living with the child, the child’s living condition, the child’s mental health endowment, gender and age were added as co-variants. The value of 1, 2 and 3 were assigned for mother, father and non-parent caregivers respectively. Similarly, a dummy value of 1 was assigned when the caregiver of the child was ever changed and 0, otherwise. The frequency of contact between the child and the migrant parents was assigned a value of 1, 2, 3, 4 and 5, for never, less often, at least once a week, more than three times a week and daily communications respectively. The number of siblings was measured as a continuous variable, while the ratio of the number of rooms to the number of people living in the house were a left-behind resides was used as a measure of the child’s living condition. Also, the value of 1 was assigned to a child that has a history of a poor mental condition, while 0 otherwise. Age was a continuous variable while 1 and 0 were assigned to male and female respectively.

### 3.4 Method of data analysis and model specification

The functional form in Equation (2) was used to estimate the effect of the physical health of the left-behind children on their mental healths. Since the dependent variable is dichotomous, Logistic regression model was used in the estimation [12], as shown by the Equation (3) below:

$$\ln\left(\frac{MH_i}{1-MH_i}\right) = \beta_0 + \beta_1PH_i + \beta_2Cgvr_i + \beta_3Scar_i + \beta_4Fcmp_i + \beta_5Nsbl_i + \beta_6Clct_i + \beta_7Cmhe_i + \beta_8Age_i + \beta_9Gder_i + \mu_i \dots\dots\dots(3)$$

where,  $MH_i$ , is the mental health of child  $i$ ,  $\beta_0$ , is the constant parameter of the equation,  $\beta_s$ , are the coefficient of the independent variables. The  $PH_i$ , is the physical health of child  $i$ ,  $Cgvr_i$ , is the caregiver of child  $i$ ,  $Scar_i$ , is the stability of care arrangement of child  $i$ ,  $Fcmp_i$ , is the frequency of contacts between the migrant parents and child  $i$ ,  $Nsbl_i$ , is the number of siblings living with child  $i$ ,  $Clct_i$ , child  $i$ ’s living condition,  $Cmhe_i$ , is the child  $i$ ’s mental health endowment,  $Age_i$ , is the age of child  $i$ ,  $Gder_i$ , is the gender of child  $i$ , while  $\mu_i$ , is the error term.

## IV. RESULTS

### 4.1 Descriptive analysis

The descriptive statistic is shown in Table 1. It could be seen from the table, 51.32% of the children have a good mental health while 48.68% of them have a poor mental health. So almost half of the population of the sampled children has a poor mental health. With regards to their nutritional status, 95% of them are adequately nourished, while only 3.16% and 1.84% are moderately and severely malnourished respectively. Therefore, the majority of the children is adequately nourished. Concerning the caregivers, the majority (73.16%) of the children is under the care of their mothers while only 1.49% and 25.35% are under the care of their fathers and non-parent caregivers respectively. On the frequency of contacts between the children and their migrant parents, 0.44% never communicated, 3.25% communicated, but less often, 67.81% communicated at least ones a week, 25.24% communicated more than three times a week while, 3.25% of them communicated daily. Therefore, the majority of the children communicate with their migrant parents at least ones in a week.

Similarly, the majority (99.65%) of the children had no history of mental health disorder before parents' migration, while only 0.35% of them had history of mental disorder before the parents' migration. With regards to the gender of the children, male constitutes the 52% of the sample, while female constitute the 47.46%. So, the population of male and female left-behind children in the sample are almost equal. On average, a left-behind child lives with four numbers of siblings, with a minimum being not living with any sibling and maximum being 23 siblings. Also, the average ratio of child to a room (child living condition) is about one room per child, with a minimum being around a room per child and a maximum being three children per room. The average age of the children is seven years, nine months, with minimum age of six years and a maximum age of ten years.

Variables	Frequency	Percent	Mean	Min	Max
<b>Mental Health Status</b>					
Poor Mental Health	555	48.68			
Good Mental Health	585	51.32			
<b>Physical Health Status</b>					
Adequately Nourished	1,083	95.00			
Moderately Malnourished	36	3.16			
Severely Malnourished	21	1.84			
<b>Caregivers</b>					
Mother Caregiver	834	73.16			
Father Caregiver	17	1.49			
Non-parent Caregiver	289	25.35			
<b>Care Arrangement</b>					
The Care arrangement is Stable	1,111	97.46			
The care arrangement is Unstable	29	2.54			
<b>Frequency of Contacts with Migrant Parents</b>					
Never	5	0.44			
Less often	37	3.25			
At Least Ones a Week	771	67.81			
More than Three Times A week	287	25.24			
Daily	37	3.25			
<b>Child's Mental Health Endowment</b>					
History of Poor Mental Health does not Exist	1,135	99.65			
History of Poor Mental Health Exists	4	0.35			
<b>Gender of the Child</b>					
Male	599	52.54			
Female	541	47.46			
<b>Number of Siblings</b>			4	0	23
<b>Child's Living Condition</b>			1.22	1.20	3.04
<b>Age</b>			7.90	6	10

#### 4.2 Logit regression result

In Table 2, the Logistic regression result was presented. The model (1) in the result is the full model. In the model, the variables on children's nutritional status, the proxies for physical health, were all positive and statistically significant. Severely malnourished was positive and statistically significant at the five percent. Also, moderately malnourished was positive and statistically significant at 10%. This means that physical health has statistically significant impacts on mental health of the children. Therefore, hypothesis  $H_1$ , is supported. The coefficients for the father and non-parent caregivers were each positive and statistically significant at the one percent. The coefficients for the number of siblings was negative and statistically significant at the one percent, while that of gender was positive and statistically significant at the one percent. This also means that, caregivers, number of siblings and gender have statistically significant impact on the mental health of the left-behind children in this context.

In model (2), the physical health variables, that is, severely malnourished and moderately malnourished were dropped. All the remaining variables maintain their significance at the same statistical level with what they were in the full model. But when the caregiver variables, that is, father and non-parent caregivers, were dropped in model (3), the statistical significance level of severely malnourished and moderately malnourished improved from five percent and 10% to one percent each, respectively. This shows that the effect of physical health on mental health is more in the absence of a caregiver. In other words, the caregiver also matters a lot on the mental health of the children.

Model (4) is the average marginal effect based on the full model. It shows that, compared to the left-behind children who are adequately nourished (reference category), left-behind children who are severely malnourished are 27.4% more likely to have poor mental health. Also, compared to left-behind children who are adequately nourished (reference category), left-behind children who are moderately malnourished are 18% more

likely to have poor mental health. Concerning the caregivers, compared to the left-behind children under the care of their mothers (reference category), left-behind children under the care of their fathers are 36.1% more likely to have poor mental health. Similarly, compared to the left-behind children under the care of their mothers (reference category), left-behind children under the care of non-parents are 43.6% more likely to have poor mental health. Moreover, when the number of siblings living with a left-behind child, the child becomes less likely to have a poor mental health by 2.8%. Also, compared to the left-behind girls (reference category), left-behind boys are more likely to have poor mental health in the absence of parents by 6.1%. Other variables, that is, the stability of the care arrangement, frequency of contacts with migrant parents, child's living condition, mental health endowment and age, were not shown to have a statistically significant impact on the mental health of the left-behind children in this context.

Table 2:  
Logistic Regression Results and the Average Marginal effects for the Effect of Physical Health on Mental Health of the Left-behind Children

Variables	Logit Coefficients.			Marg. Effects (4)
	(1) Full Mode	(2) W/O P/H	(3) W/O Cgivr	
Severely Malnourished	1.360** (0.688)		1.841*** (0.638)	0.274** (0.138)
Moderately Malnourished	0.893* (0.492)		1.306*** (0.445)	0.180* (0.0984)
Father Caregiver	1.633*** (0.577)	1.603*** (0.584)		0.361*** (0.102)
Non-parent Caregiver	2.117*** (0.181)	2.170*** (0.181)		0.436*** (0.0278)
Stability of Care Arrangement	0.0561 (0.440)	0.0492 (0.434)	0.297 (0.415)	0.0113 (0.0887)
F/Contacts with Migrant Parents	-0.0577 (0.120)	-0.0576 (0.120)	-0.0490 (0.103)	-0.0116 (0.0243)
Number of Siblings	-0.137*** (0.0315)	-0.137*** (0.0313)	-0.130*** (0.0288)	-0.0277*** (0.00611)
Child's Living Condition	-0.0501 (0.175)	-0.0374 (0.175)	0.137 (0.163)	-0.0101 (0.0354)
Child's Mental Health Endowment	0.392 (1.228)	0.591 (1.075)	-0.161 (1.301)	0.0792 (0.248)
Age of the Child	-0.0247 (0.0529)	-0.0573 (0.0516)	0.00481 (0.0486)	-0.00499 (0.0107)
Gender of the Child	0.303** (0.133)	0.314** (0.132)	0.269** (0.122)	0.0612** (0.0266)

Robust standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. F/Contacts, means frequency of contacts; W/O P/H, means without physical Health; W/O cgivr, means without caregiver; Merg effect, means Marginal Effect.

#### 4.3 Post estimation diagnostics

In the appendix, Table 3 shows the different post estimation tests. To test for the model specification error, Linktest was used. The p-value of the hatsquare was 0.514, which shows that it is not statistically significant, thereby supporting the null hypothesis that the model is correctly specified. The percentage of correct prediction was used to test for the goodness-of-fit, and the area under the Receiver Operator Characteristics (ROC) curve was 0.7404. Therefore, the model has high discriminating ability since the area under the ROC curve is 74.04%. The values of the dependent variables are, therefore, correctly predicted. Moreover, VIF and Tolerance value were used to test for Multicollinearity. All the variables in the model had VIF values of less than 10, and Tolerance values that are greater than 0.1. This therefore implies that Multicollinearity does not exist among the covariates in the model [41].

## V. DISCUSSION

Statistics has it that one in every five children in Nigeria will have a mental health problem and 50% of all mental health problems begin from childhood [13]. Since mental health of the children has implication on their future prospect and that of the economy at large [18], then mental health requires serious attention. Left-behind children are considered as one of the vulnerable groups whose mental health may suffer, perhaps due to parental absence. However, whereas previous empirical evidence has shown that physical health affects the mental health of the children, most of the investigations on the left-behind children were geared towards the effect of parental absence. This study fills this gap by investigating the effect of physical health on the mental health of the left-behind children. The study found that, poor physical health, as measured by the nutritional status, has a negative effect on the mental health of the left-behind children. Left-behind children who are

severely malnourished were found to be at higher risk of having poor mental health than those who are moderately malnourished or adequately nourished. The finding is consistent with the large body of literature that confirmed the link between physical health and mental health of the children [1, 8, 20, 31, 34, 43]. However, whether the effect takes place through secure attachment [43], temperament [34], or mental development [20, 31], is beyond the purview of this study.

The study has also shown that caregivers matter a lot on the mental health of the left-behind children. In fact the effect of caregiver on the mental health of the children is more than that of the physical health, and the mother's caregivers were shown to have been the best at providing good mental health to the left-behind children. This might be because mothers are more capable of handling the emotional attachment of their children than other caregivers [26], or because of their high level of altruism to the welfare of their children [2]). This finding therefore contradicts that of Mazzucato et al. (2015), who reported no statistically significant difference between the mental health of children under the care of mothers and those under the care of non-parent caregivers in the same context. This might be because, Mazzucato et al. (2015) used a sample of older children (11-21 years) than the one used in this study (6-10 years).

The negative and statistically significant impact of the number of siblings on the poor mental health status corroborated the previous findings, that companionship reduces poor mental health in left-behind children [46]. Also, gender, which was positive and statistically significant, is in line with previous findings that girls are more resilient in the absence of parents than boys [10]. The other variables, that is, the stability of the care arrangement, frequency of contacts with migrant parents, child's living condition, mental health endowment and age might not have been statistically significant because from the descriptive statistics, most of the children (73.16%), are under the care of their mothers, and mother's caregiver has shown to have had greater impact on the mental health of the children.

## VI. CONCLUSION

This study has investigated the impacts of physical health on the mental health of the left-behind children in Niger State, Nigeria. The study has found that left-behind children who have better physical health status also have good mental health. Also, left-behind children under the care of their mother have better mental health than those under the care of their fathers or non-parent caregivers. The higher the number of siblings living with a left-behind child the less likely would the child be to suffer from poor mental health, and left behind girls have better mental health than left-behind boys, perhaps due to their higher resilience to parental absence. Consequently, this study suggested that government should encourage rural-urban migrants' remitting behavior by providing easy remitting channels such as the Microfinance banks, with a view to enhancing quick access to remittances by the left-behind households in order to provide health and nutritional demands of their children. The study also suggests that fathers should migrate while mothers wait and provide adequate care for their children.

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<b>Appendix:</b>	
<b>Table 3: Model Specification Test, Goodness-of-fit Test and Multicollinearity Test</b>	
<b>Tests</b>	<b>Measure</b>
<b>Model Specification Test</b>	
<i>Linktest</i>	<i>P-value</i>
_hat	0.000
_hatsq	0.514
<b>Test for Goodness-of-fit</b>	
<i>Percentage of Corrected Prediction</i>	<i>Area under ROC curve</i> = 0.7404
<b>Multicollinearity Test</b>	
<i>Variables</i>	<i>Tolerance</i>
pyhealth1	0.9484
pyhealth2	0.9509
Cgiver	0.9557
Scar	0.9814
Fcmp	0.9729
Nslings	0.9709
Lclction	0.954
Mhelthe	0.9844
Age	0.9405
Gender	0.9953
<i>Variables</i>	<i>Variance Inflation Factor (VIF)</i>
pyhealth1	1.05
pyhealth2	1.05
Cgiver	1.05
Scar	1.02
Fcmp	1.03
Nslings	1.03
Lclction	1.05
Mhelthe	1.02
Age	1.06
Gender	1.00