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Parent Socioeconomic Status and Child Malnutrition in Nasarawa State, Nigeria

[1] Paul Joseph, [1] Aimua Ehigocho Peace, [2] Oji-Okoro Izuchukwu
[1] Department of Economics, Faculty of Social Science, Federal University of Lafia, P. M. B 146 Lafia, Nasarawa State, Nigeria
[2] Central Bank of Nigeria, Abuja, Nigeria

Abstract: The study analyzed the relationship between parent socioeconomic status and child malnutrition in Nasarawa State, Nigeria, with a particular emphasis on the pathway through which the socioeconomic factors of the parents determine child nutrition and wellbeing. To achieve this objective, a study was conducted in the Lafia metropolis with a random sample of 480 women who had children between the ages of 0 to 5. Data analyzed was collected by administering a structured questionnaire to women in the study area. Descriptive statistics, chi-square, and mediation analysis were employed to analyze the data. The findings from the results unveiled that the primary determinant of child nutrition in Nasarawa State is the mother's educational status.
Furthermore, the mediation analysis showed a perfect mediation between the mother's Education, toilet facility, and child malnutrition. The study recommended that the government should encourage sensitization on the importance of girl child education at all levels, especially among rural dwellers. Having quality education by the girl child will improve her socioeconomic status through an increase in Education and a rise in income level to better her role as a future mother.

Keywords: Malnutrition, Child, Education, Nasarawa State

1. Introduction

Malnutrition has been identified as one of the critical determinants of under-five mortality and morbidity in developing countries, especially Nigeria. For instance, the Food and Agriculture Organization of the United Nations (FAO) report shows that, as of 2020, about 811 million people worldwide suffered from various forms of malnutrition (FAO, 2021). Furthermore, the United Nations Children's Fund (UNICEF), World Health Organisation, and World Bank (WHO) (2021) joint report showed that in 2020, 149 million children under the age of five were stunted in growth, 41 million were overweight, and 45.4 million were wasting as a result of malnutrition (United Nations Children's Fund (UNICEF), 2021; World Health Organisation [WHO], 2021). Globally, UNICEF estimates that malnutrition affects more than one in five children under five years living in developing countries (UNICEF; WHO; World Bank, 2021). A report from Nigeria Demographic and Health Survey (2015) also shows that Nasarawa State is the third highest State in Nigeria with reported cases of child malnutrition.

Over the last two decades, child malnutrition has been the primary cause of increased child mortality and other diseases common among children (Salawu, Rufai, Salman & Oguniyi, 2020). For instance, among the 7.6 million world under-five children that died annually, about 35% were due to malnutrition-related cases. Concerning vulnerability to other ill health, UNICEF (2020) reported that while malnutrition due to deficiency of vitamin A causes blindness in a child, malnutrition due to iodine, folic acid, and iron can result in neural tube defects, nervous system disorder, and brain disorder. This adverse effect of malnutrition especially stunting, on a child's brain and nervous system development is huge. The reason because the cycle of development starts during pregnancy and is completed in the second year of a child's life. Also,

malnutrition that leads to poor early growth in under-five children and is later accompanied by acute weight gain can increase the risk of coronary heart disease, hypertension, and diabetes and reduce productivity in adulthood (Uauy, Kain & Camila, 2011).

Literature on child nutrition established that the consequences of child malnutrition across the globe point to stunting growth, obesity, underweight, risks of disease, death, low human capital development, low labor productivity in adulthood, and lower economic growth (Samto, Kerr, Hoddinott, Garigipati, Olmos & Young, 2019). According to Baker (2014), a child's socioeconomic status is a significant determinant of child nutrition based on family income, parent education, and parental occupation. This is affirmed in the empirical study by Aimua (2021), which revealed that children from educated and rich parents enjoy better health than their counterparts from lower socioeconomic families. The intuition is that rich and educated parents have knowledge of child health care prevention, possess the ability to afford quality medical care and live in a well-sanitized environment.

Identifying the relationship between parent socioeconomic status and child nutrition is critical for policy formulation. To formulate health policies, policymakers must first understand the determinants of child nutrition and identify the relationship between parents' socioeconomic status and child nutrition. Despite interventions and policies on child nutrition by the Nigerian government and other private organizations in Nigeria, child malnutrition is still on the rise; there needs to be a more vital link between government intervention and child nutrition outcomes in Nigeria. Hence, there is a need to examine the relationship between parents' socioeconomic status and child nutrition, as parents are children's primary caregivers, and their role in child welfare cannot be overlooked.

Given the above background, it is imperative to investigate the socioeconomic determinants of child malnutrition and analyze the pathways through which parental socioeconomic status influences child malnutrition in Nasarawa state, Nigeria. Nasarawa state, one of the 36 states in Nigeria, is located in the north-central region of Nigeria, and the study area for this research is the third highest State in Nigeria with reported cases of child malnutrition (Nigeria Demographic and Health Survey, 2015). Very little empirical literature has analyzed the relationship between health and parents' socioeconomic status. Hence, this study will differ from other studies on this topic because it analysis the pathway and transmission through which parental socio-economic status affects child nutrition.

2. Literature Review

2.1 Theoretical Framework

The theoretical framework for this work is based on the theory of family as a producer of health by Jacobson (2000). The theory extended the theory of health capital by Grossman (1972), including the concept of the family as a producer of health. The theory emphasizes that a family member can produce their health and that of other family members using the family's available resources as input. Therefore, parents do not only derive satisfaction in producing their health but also in producing their children's health. In model formulation, Jacobson (2000) argued that while Grossman's theory emphasizes that efficiency in health production is determined by Education, on the contrary, efficiency in child health production is determined by parents. In addition, the needed resources in producing child health include family wealth, market goods consumed by the family, and other individual and socioeconomic characteristics. The family as producer model is specified below:

HC=f(It,Zt).....Equation 1

HC Indicates that child health is a function of gross investment in child health denoted by It and other commodities. It and Zt are vectors of variables indicating parents' investment in child

health levels; These variables include market goods, parent's Education, health care utilization, market goods, time spent in preventive care, and household wealth.

Lordan. Soto, Brown, and Correa-Valez (2012) simplified the model specified by the theory of family as a producer of health in equation 1 by specifying the below model:

HC=f (Y, X).....Equation 2

HC represents child health which is a function of Y, and X. Y represents parent socioeconomic status, and X represents other factors such as past investment in health-related physical assets, household composition variables, and location. This paper will adopt this model by modifying it to include intermediary determinants as specified by Solar and Irvin (2010). Solar and Irvin (2010), in their conceptual framework, explained that socioeconomic status affects health through intermediary determinants. These intermediary determinants include nutrition and other harmful consumption habits; psychosocial circumstances include stressful living conditions and relationships. While the health system constitutes the issue of access to child health quality care in invent of illness which is consequential to child survival and adult health.

The framework explained that parent's socioeconomic status influences their child's health through intermediary determinants as specified below:

MC=f(Y,X,R).....Equation3

R=f(Y).....Equation4

MC represents child malnutrition which is a component of child health; Y indicates the parent's socioeconomic status, X indicates control variables, including the parent's occupation, marital status, distance to the health facility, and individual parent's and child characteristics, and R represents intermediary determinants.

2.2 Empirical Review

Literature that studied the link between parents' socioeconomic status and child malnutrition is reviewed at the state, country level, and international to enable comparison. Literature that explains the relationship between intermediary determinants, essential control variables, and child malnutrition is also reviewed to have a wider view of the factors that influence child malnutrition.

2.2.1 Socioeconomic Status

Socioeconomic factors in this study include the parent's educational status, income level, and place of residence. For instance, Ogunrinade (2014) used qualitative analyses to study the incidence of malnutrition in children aged 0 – 5 in developing countries, including Nigeria. The study found the primary determining factor to be poverty resulting in low quality and quantity of food intake. A similar result was reported by Salawu (2019), with the addition of parents' Education as an important determinant. Salawu (2019) undertook a review study on misunderstanding nutritional-related problems and reported that malnutrition resulting from inadequate intake of proper diet is caused by parents' Education. On the other hand, malnutrition resulting from not eating the right portion size is caused by poverty.

Some community-level studies also found Education as a significant pathway to improved child malnutrition: Emmanuel, Nwachukwu, Adetunji, Hosea, and Kumzhi (2016) studied the associated factors that determine malnutrition among under-five children in Borgu Local Government Area of Niger State. Emmanuel et al. (2016), using chi-square analysis, found mother's Education influences child malnutrition negatively; Jude, Chukwunedum, and Egbuna (2019) took a cross-sectional study on under-five malnutrition in South-Eastern Nigeria

metropolitan cities using chi-square as a method of analysis. The study also reported the mother's educational level as a significant determinant of under-five malnutrition. Igbokwe, Adimorah, Ikefuna, Ibeziako, Ebesie, Ekeh, and Ilog (2017) investigated how socio-demographic factors affect malnutrition among children in primary schools in Enugu state using logistic regression on data collected in Enugu North local government. The study also revealed a negative relationship between increased mother's Education and children's malnutrition, including other vital determinants such as age and sex.

Previous studies have also reported a positive relationship between residing in rural areas and child malnutrition, using country- and community-level data. For instance, Adetola and Olufemi (2012) reported a higher prevalence of child malnutrition in rural Nigeria resulting from high poverty on multidimensional child poverty. The result also reported a higher prevalence of child malnutrition in the North-West than in other regions. Alabi, Ijadunola, Alabi, Onayade, and Aluko (2016) also reported a higher prevalence of malnutrition among those under five in some rural communities of Zafara State. The study assesses childhood nutritional status by collecting data from 397 under-five children from selected communities in Zamfara using anthropometric parameters for estimation. Senbanjo, Olayiwola, Afolabi, and Senbanjo (2013) also reported a similar result when examining maternal and child under-nutrition in rural and urban communities of Lagos State, using chi-square and logistic regression. A higher prevalence of malnutrition was found among rural children compared to children who reside in the urban areas of Lagos.

The review studies argued that parental socioeconomic status concerning the mother's Education, parent's income level, and place of residence form essential determinants of child malnutrition in Nigeria. This is possible because a higher level of mother's Education provided knowledge and a better understanding of child health care improvement through dieting and prevention against diseases. Higher Education also provides better job opportunities that enable the capacity to afford better diet and health care services. Income level also provides the opportunity to afford better housing conditions and provides high quality and proper food for the children, improving their nutritional condition. Residing in urban areas increases areas on dieting and provides the necessary facilities for better child nutrition.

2.2.2 Intermediary Determinants

Intermediary determinants are the mediating factors that establish the relationship between parents' socioeconomic factors and child malnutrition. These intermediary determinants include mode of breastfeeding, type of toilet facilities, access to health care facilities, source of drinking water, immunization, household characteristics, and mother's age at childbirth, among others. Ijarotimi et al. (2016) studied urban-rural disparities and determinants of the nutritional status of under-five children using chi-square to analyze data collected through a questionnaire in Ibadan. They reported a higher incidence of malnutrition among children not exclusively breastfed. This result agrees with the findings of Akorede and Abiola (2013) conducted in Akure South Local Government of Ondo State. The studies argued that infants who were not exclusively breastfed are liable to infection through contamination and, in turn, affect their eating habits and consequently lead to malnutrition. On the other hand, Emmanuel et al. (2016) reported an insignificant relationship between exclusive breastfeeding and child malnutrition because their data were collected mostly for infants who were not likely to be malnourished.

Previous findings have also reported family size influences child malnutrition. For example, Ejike (2016) examined different socioeconomic statuses and malnutrition in urban children of Umuahia and reported a positive relationship between large family sizes (four and above) and child malnutrition. This is because having a large family size with a corresponding increase in the level of income will positively affect the quality of dieting in the family, which might lead to malnutrition in children. On the contrary, Awoyemi et al. (2012) reported no relationship between family size and child malnutrition; this could be possible due to the nature of

community-level data, which may lack many disparities due to similar cultures of family size. Mother's age was reported by Ehwarieme et al. (2018) to relate positively to under-five malnutrition in the Evbuotubu community of Edo State. Babatunde, Olagunju, Fakayode, and Sola-Ojo (2011) found the type of toilet facility and source of drinking water as essential determinants of child malnutrition.

Regarding healthcare services, Hamel, Enne, Omer, Ayara, Yarima, Cockroft, and Anderson (2015) reported that mothers who attend antenatal and delivered in the hospital were found to have children less likely to be malnourish. Zereyesus, Amanor-Boadu, Ross & Shanoyan (2017). also agree that children born outside the hospital were more likely to be malnourish because their mothers had missed the opportunity to learn more about child nutrition.

2.2.3 Control Covariates

Previous studies have reported some critical variables that influence child malnutrition; some of these studies are reviewed to understand better the control variables used in this study. Akombi et al. (2017) found a positive relationship between child age and malnutrition among Sub-Saharan children. Babatunde et al. (2011) also reported results from a study undertaken in Kwara State. These studies supported their findings by stating that more attention is given to children in their earlier life and nutritional status is maintained. On the other hand, Ezeh and Iyiani (2014) reported a high incidence of child malnutrition among male children compared to their female counterparts.

3. Research Methodology

This study employs a cross-sectional research design. The cross-sectional design is best employed in this study because of its appropriateness in measuring the variation between different people at a given point and time. Sample sizes are also selected with respect to existing variations among the study population. A total of 480 women with children between the ages of 0 and 5 were selected systematically through a multi-stage sampling technique. This selection was carried out across the existing three senatorial districts of Nasarawa State. Questionnaires were administered to gather information on parents' socioeconomic status, demographic factors, child characteristics, intermediary factors, the incidence of child malnutrition, and maternal healthcare use. The procedure for the multi-stage sample selection is explained below:

Stage 1: Out of the three senatorial districts of Nasarawa State, two local government areas (LGAs) were randomly selected, resulting in six LGAs being selected in total.

Stage 2: The study purposively selected the six LGAs headquarters selected to form the urban areas, while one community out of each LGAs was randomly selected to represent rural areas. This is done considering the level of social amenities in the LGAs, which must be present in most communities outside the LGA's headquarters.

Stage 3: One public and private hospital was purposively selected from each of the selected LGAs. The purpose was to capture categories of mothers with different socioeconomic statuses that access care in these types of hospitals. Primary healthcare facilities were also points used to collect information in rural communities.

Stage 4: The selected hospitals in stage 3 above were used as a point of data collection since mothers with under-five children visited either for immunization or antenatal. In contrast, others were randomly selected within the selected communities.

The respondents' consent was duly sought as they read through the consent form before administering the questionnaires, and they voluntarily responded to the questions. The response rate was high because the questionnaires were administered through a face-to-face interview.

Cochran formula by Cochran (1977) was used for sample size determination since it is appropriate where the population size is not accurately known. The National Bureau of Statistics (2017) revealed that the total number of registered births in Nasarawa State was 108,064, of which 57.58 percent were under-five children. There is the possibility that many children still need to be captured on the Nasarawa State registered, especially for households in rural areas. Therefore, this stated percentage of under-five children will be used to determine the sample size. Cochran (1977) stated that a minimum sample size can be calculated using n= (z^ (2) pq)/d^2, where the population under study is 10,000 and above.

Where n = minimum sample size; z = the standard statistics that define confidence level desired = 1.96; p = the proportion of people in the study, accounted for by the target population = 57.58/100 = 0.58

Note: The study's target population is under-five children in Nasarawa State, which is 57.58 percent of the total population of children in the State. Therefore, p is 0.58, which is the proportion of under-five children among the total number of children in Nasarawa State expressed in percentage.

q = 1 – p = 1 – 0.58 = 0.42

d = statistic degree of accuracy desired = 0.05

n = 1.962 x 0.58 x 0.42

= 3.8416 x 0.2436

= 0.93581376 = 374.3255

0.052

0.0025
0.0025
n = 374

10% of the calculated sample size is added to the sample size to take care of the likelihood of non-responses in data collection, making a sample size of 411. Because sample selection criteria (research budget and researcher convenience) allow for flexibility as long as the minimum acceptable size is accepted (Babbie, 1992), 480 sample size was proposed for convenient distribution across the three senatorial districts of Nasarawa State.

The variables for this study are selected from the literature and theory reviewed and subdivided into dependent and independent variables. Child nutrition, the dependent variable, is numbered one if a child is malnourished and 0 otherwise. The independent variables comprise structural and underlying factors. The essential structural factors are defined below:

Mother's level of income: this variable is coded 0 if a mother earns no income, one if a mother earns N25,000 or less, two if a mother earns N26,000 – N51,000, three if a mother earns N52,000 – N75,000, and four if a mother earns N76,000 and above.

Mother's level of Education: this variable is coded 0 if a mother had no formal Education, one if a mother's highest qualification is a secondary certificate, two if a mother had an NCE certificate, and four if a mother had a degree or higher qualification.

Mother's occupation is categorized into non-worker, private and civil servant, marketer, and farmer.

On the other hand, some of the essential intermediary factors include:

Toilet facility: a household that uses a water system toilet facility is coded 1, while households that use a pit toilet or bush are coded o.

Source of drinking water: the variable household that uses a borehole as the source of drinking water is coded 1, and the household that drinks water from a well or stream is coded 0.

Exclusive breastfeeding: this variable is coded one if a child was exclusively breastfed and 0 otherwise.

Immunization: the variable immunization is coded one if a child is immunized and 0 otherwise
This study uses chi-square analysis and descriptive statistics to show the frequency distribution and percentages between the dependent and independent variables. Structural equation modeling using the Lavan package in R was used to analyze the direct, indirect, and total effect between child malnutrition and parents' socioeconomic status using intermediary determinants as mediating variables. The models are specified below:

$$CM=\beta_0+\beta_1\ 〖ud〗_i+\beta_2\ 〖PSF〗_i+\varepsilon yi \ldots\ldots\ldots\ 1$$

$$ud=\delta_0+\delta_1\ 〖PSF〗_i+\varepsilon m_i\ \ldots\ldots\ldots\ldots\ldots.2$$

CM represents child malnutrition, ud represents a vector of intermediary determinants (mediator variable), and PSF represents a vector of the parent's socioeconomic status (exposure variable). These models estimated the direct, indirect, and total effects while the residual variables εyi and εm_i are uncorrelated and were typically distributed having zero means. Equation 2 is inserted in Equation 1, and the structural equation model considers the reduced form of the equation as presented below.

$$CM=\beta_0+\beta_1\ (\delta_0+\delta_1\ 〖PSF〗_i+\varepsilon m_i)\ +\beta_2\ 〖PSF〗_i+\varepsilon yi\ldots\ldots\ldots\ldots\ldots\ldots.6$$

β_2 estimates the direct effect of a parent's socioeconomic status on child malnutrition, while β_1 δ_1 estimates the indirect effect of a parent's socioeconomic status on child malnutrition through intermediary determinants.

4. Data Analysis and Interpretation

4.1 Descriptive Statistics

Table 1: Child Malnutrition by Parent's Socioeconomic Variables

	Child Malnutritional Status	
Determining Factors	Malnourished	Not Malnourished
Mother's Education		
Degree and Above	9 (5)	91 (51)
NCE	24 (17)	76 (55)
Secondary	38 (70)	62(112)
Primary	48 (57)	52 (62)
No Education	67 (32)	33 (16)
Mothers occupation		
Civil Servants	15 (8)	85 (47)
Private Servant	30 (9)	70 (21)

Marketer	40 (76)	60(116)
Farmer	46 (24)	54 (28)
Not working	43 (64)	57 (84)
Mothers Income		
Rich	12 (5)	88 (36)
Middle	36 (28)	64 (50)
Poor	39 (85)	61(132)
Poorest	45 (63)	55 (78)
Father's Education		
Degree and above	21 (26)	79 (98)
NCE	38 (36)	62 (60)
Secondary	43 (69)	57 (90)
Primary	41 (17)	59 (24)
No Education	58 (33)	42 (24)
Fathers Occupation		
Civil Servants	28 (38)	72 (97)
Private Servant	33 (17)	67 (35)
Marketer	40 (45)	60 (67)
Farmer	47 (22)	53 (25)
Not working	38 (10)	62 (13)
Fathers Income		
Rich	33 (43)	67 (89)
Middle	37 (71)	63(121)
Poor	45 (59)	55(72)
Poorest	36 (8)	64 (14)
Place of Residence		
Lafia	28 (37)	28 (37)
Keffi	34 (10)	34 (10)
Akwanga	43 (15)	43 (15)
Nasarawa	39 (24)	39 (24)
Keana	29 (7)	29 (7)
Wamba	13 (3)	13 (3)
Gudi	56 (15)	56 (15)
Gunduma	59 (13)	59 (13)
Iwagu	56 (10)	56 (10)
Laminga	58 (23)	58 (23)
Nakere	35 (6)	35 (6)
Agyaragu	38 (18)	38 (18)

Note: Number of observations = 477; statistics are presented in percentages and frequencies in parenthesis. ***Source: Filed survey, 2019***

Table 4.1 above presents the frequencies and percentages distribution of child malnutrition and parents' socioeconomic status. For example, 91 percent of children in the sample giving birth to mothers with degree certificates were not malnourish, 76 percent of children who had mothers with NCE certificates were not malnourish while, only 33 percent of children giving birth to mothers who had no formal education were not malnourish. This indicates that a higher number of malnourish children had mothers with a lower level of Education. 15, 30, and 40 percent of mothers who worked as civil servants, private employees, and marketers had children who were malnourish compared to 46 and 43 percent of malnourish children with mothers who were farmers and those who were not employed, respectively.

The variation concerning income among mothers in Nasarawa State indicated that among the children of the poorest households, 45 percent of them were malnourish compared to 12 percent of malnourish children among children from the wealthiest households. Only 21 percent of children whose fathers had degrees were malnourish compared to 58 percent of children from fathers with no formal education were malnourish. The sample distribution with respect to place of residence shows that the highest percentage of malnourish children reside in Gunduma (59 percent) and Laminga (58 percent). On the other hand, Wamba had the lowest proportion of malnourish children, about 13 percent.

4.3 Mediation Analysis

Table 2: Testing for Mediation between Child Malnutrition and Intermediary Determinants

	Model 5 (Malnutrition)		
Model Fit			
Chi-square		0.001	0.001
CFI		0.919	0.914
TLI		0.903	0.897
RMSEA		0.070	0.073
SRMR		0.108	0.108
Indicators	Path		
Hospital Del (hsp)~			
Mothers Edu(mdl)	(d)	-0.039	(0.069)
Chd Malnutri(muc). ~			
Hospital. del (hsp)	(e)	0.586***	(0.0168)
Mother Edu(mdl) ~	(c)	0.044	(0.067)
Toilet Fac(ws1) ~			
Mother Edu(mdl)	(f)	-0.318***	(0.055)
Chd Malnut(muc) ~			
Toilet Fac(ws1)	(g)	-0.570***	(0.106)
Ex-Brestfeed(exb) ~			
Mother Edu(mdl)	(h)	-0.081	(0.052)
Chd Malnutrit~			
Ex-breastfeed	(i)	-0.417 ***	(0.106)
INDIRECT EFFECT			
	de	-0.023	(0.039)
	fg	0.181***	(0.045)
	hi	0.034	(0.023)
	total	0.237**	(0.076)

N 477 Standard errors in parenthesis p<0.05=" p<0.01="** p<0.001="*** Source: Field Survey 2019*

Table 4.6 present the mediation analysis and pathways in which a mother's level of Education affects child malnutrition in Nasarawa State. The output of model 5 shows that the model has a good fit given the values of CFI 0.91, TLI 0.90, RMSEA 0.07, and SRMR 0.10. The coefficient of 0.44 percentage points on the mother's education path C is insignificant, implying no direct relationship between the mother's educational status and child malnutrition. This signifies the case of perfect mediation since the mother's Education only affects child malnutrition indirectly. Path c in Figure 4.1 is represented by mdl – muc (child malnutrition).

On the other hand, the coefficient of 0.18 percentage points on path fg is significant, showing the indirect relationship between the mother's educational status and child malnutrition through a type of toilet facility. They are represented by Figure 4.1 as mdl – ws1 – much by the direction of the arrows. This means that an increase in mothers' Education from one level to another increases the use of modern toilet facilities and, in return, reduces the probability of child malnutrition in Nasarawa State. The total effect of 0.23 percentage points is significant at the five percent level. It shows the combined coefficients of a mother's Education's direct and indirect effects on child malnutrition. The inter-relationship between the variables estimated in model 5 shows that: children born in the hospital were found to be 0.58 percentage points less likely to be malnourish compared to children born outside the hospital; using modern toilet facilities reduces child malnutrition by 0.57 percentage points, and also, children who were exclusively breastfed were found to be 0.41 percentage point less likely to be malnourish. These coefficients were significant at the one percent level, which signifies the strong relationship between the variables.

4.4 Discussion of Results

This study analyzed the relationship between child malnutrition and parent socioeconomic status. Based on the literature reviewed in this study, it is evident that previous studies had analyzed the relationship between child malnutrition and parent socioeconomic status. Yet, little is known about the pathways through which parents' socioeconomic status affects child malnutrition. This study explains the relationship between child malnutrition and parents' socioeconomic status and the pathways through which this socioeconomic status influences child malnutrition.

The descriptive statistics show that parental socioeconomic status influences child malnutrition negatively, especially that of the mother's mothers. The result of the mediation analysis in Table 4.2 presented the mother's Education as an exposed variable. It selected intermediary determinants as mediators in analyzing the direct and indirect relationship between the mother's education and child malnutrition in Nasarawa State. The result shows that the mechanism through which a mother's Education influences child malnutrition in Nasarawa State was the type of toilet facility used by households. This study confirms the finding of Fadare et al. (2019), who reported a negative relationship between a mother's level of education and child malnutrition. A similar finding was also reported by Babatunde et al. (2011), that found the use of pit toilets as a significant determinant of child malnutrition.

Notwithstanding, this study further provided more information about how these variables (mother's Education and toilet facility) were linked to influence child malnutrition in Nasarawa State. The output of the mediation analysis in Table 4.2 shows a perfect mediation. Implying that accounting for toilet facility as a mechanism through which a mother's Education influences child malnutrition, the direct effect of the mother's Education became insignificant. It can also be explained that increasing the level of mothers' Education in Nasarawa State beyond primary and secondary school increases their chances of using improved toilet facilities, and that reduces the rate of malnutrition in their children. Even though the mediation analysis of this study found a strong association between exclusive breastfeeding and child malnutrition, it is not a pathway through which a mother's Education influences child malnutrition. It, therefore, shows that this result contradicts the assumption that a mother's Education affects child malnutrition through exclusive breastfeeding, as was stated in the work of Alderman and Heady (2017). One explanation for this is that there is more awareness about exclusive breastfeeding, and it could have been gradually adhered to by even the less educated women, thereby closing the gap between the higher and less educated women. Our finding also agrees with the assertion by Santoso et al. (2020) that improving sanitation through the provision of modern toilet facilities reduces the risk of childhood diseases, even though the result did not prove that statistically. Therefore, The research result provided statistical proof to confirm the statement. The total effect of the mother's Education and intermediary determinants used in the study predicted significantly the rate of child malnutrition in Nasarawa State. This means that most studies that do not account for the mediation between a mother's education and child malnutrition end up reporting the joint effect of Education and intermediary determinants. The direct effect of the intermediary determinants on child malnutrition revealed that: exclusive breastfeeding, hospital delivery, and toilet facility were strong predictors of malnutrition in Nasarawa State.

5. Conclusion and Recommendations

This study, therefore, concludes that a mother's level of Education is the primary determinant of child malnutrition in Nasarawa State. Mother's Education, therefore, improves child malnutrition and protects against early child ill health. It is evident that no matter the educational level or income of fathers' children, malnutrition will continue to worsen in Nasarawa State, except for the mother's educational levels to be improved. This thesis also concludes that the pathways through which a mother's educational level influences child malnutrition in Nasarawa State include the type of toilet facility used by households. This is possible because

better-educated mothers have the opportunity for better jobs resulting in higher income. This means they can make informed decisions about child health, environment, quality feeding, and access to quality health care and afford a better home for a child's healthy development. Given the finding of this research, the following recommendations were suggested: sensitization on the importance of girl child education should be encouraged by the government at all levels, especially among rural dwellers; Having quality education by the girl child will improve her socioeconomic status through an increase in Education and rise in income level to better her role as a future mother. Better Education to disadvantage mothers will help correct unhealthy cultural practices concerning breastfeeding and nutritional, complementary diet. Nasarawa State government should make more effort to establish additional public health facilities in the rural areas and provide opportunities for rural dwellers to enroll in the National Health Insurance Scheme (NHIS). Awareness about the health benefit of using modern toilet facilities should be encouraged.

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