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Effect of household socio-economic factors on child nutritional status In Ghana, Kenya and Zambia

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Abstract

Background: The nutritional status of the child plays an important role in the growth and development of the child and affects the child's economic outcomes in adulthood. However, despite efforts by most Sub-Sahara Africa (SSA) countries, child nutritional outcomes remain poor. The study examines the effect of household socio-economic factors on the child's nutritional outcomes in Ghana, Kenya and Zambia.
Methods: The study employs the ordinary least squares technique in the estimation, adjusting for sample weights in the dataset. The nutritional status of the child was measured using the Weight-for-Age Z-score (WAZ) analysis. The study used data from the 2014 Demographic and Health Survey of the countries. The results show that the nutritional status of the child is positively associated with the nutritional status of the woman during pregnancy, type of breastfeeding adopted, educational level of the woman, and the wealth index of the household. Also, the nutritional status of the child is negatively affected when decisions in the household are made by someone else other than the mother, size at birth, age, and birth order of the child.
Conclusion: The study recommends that women should be involved in household decision making, particularly in relation to nursing a child. Adequate dietary requirements among mothers is vital to improve nutritional status of the child during pregnancy and after childbirth. Health education particularly on nutrition and benefits of exclusive breast feeding among pregnant women should be encouraged.

Keywords: Child's nutrition, Nutritional status, Socio-economic status

Introduction

Food insecurity, under-nutrition and ill health continue to persist in many developing countries. These problems tend to be severe in the African region with its attendant inequality in resource allocation [1]. This creates a problem for human capital development and undermines productivity since good health is a component of human capital and a key factor in the creation of wealth [2]. The situation is devastating for children under age five, who depend on their parents/caregivers for nutritional needs. According to the World Health Organization (WHO) [3], poor nutrition in the first 1,000 days of a child's life can have irreversible consequences leading to stunting, which makes him/her more susceptible to sickness, often fall behind in education, and more prone to non-communicable diseases. Malnutrition in turn contributes to poverty and hunger. Proper feeding practices, proper nutrition and appropriate health care utilization are important channels to improve child health. Despite numerous efforts at improving child health in the Sub-Saharan Africa, under-nutrition continues to persist in most countries.

The health status of a child is important for proper development and participation in the economy as an adult. For instance, proper education and progression on the educational ladder are anchored on good health, whereas ability to participate in the labor force as an adult is hampered by poor health. These have implications for human capital development of any economy with such outcomes. Poor nutrition has been identified as a cause of under-five childhood morbidity and mortality, and accounts for about one third of under-five mortality in Africa [4]. Improving child health is, therefore, an important public health goal which can be achieved through proper nutrition and proper health care services utilization. According to WHO reports that the risk of a child dying before completing five years of age is still highest in the WHO African Region with a rate of 81 per 1000 live births, with under-nutrition accounting for 45% of such deaths [5]. Thus, a significant reduction in childhood mortality and morbidity can be achieved if appropriate nutrition is provided for the child before and after birth.

Under-nutrition is often caused by inadequate or improper food intake, poor child feeding practices, and repeated episodes of childhood diseases. This leaves the child vulnerable and increases his/her probability of poor livelihood. The Ghana Demographic and Health Survey reports that adequate nutrition is critical to children's growth and development [6]. Poorly nourished children cannot grow and develop properly, resist infections or learn to their full potential. Malnourished adults are less capable of performing work and are severely disadvantaged in terms of their social and economic security. Thus, good nutrition makes an essential contribution to the fight against poverty. The Millennium development goals sought to eradicate extreme poverty and hunger by reducing the prevalence of underweight children. The Sustainable Development Goals (SDGs) aim to end preventable deaths of newborns and children under 5 years of age by 2030. It also aims to end hunger, achieve food security and improved nutrition and promote sustainable agriculture. The key to achieving these goals lies in identifying the household socioeconomic factors that influence the nutritional status of the under-five year old child.

Socioeconomic status can significantly enhance or hinder a person's quality of life and nutritional status. Curie and Goodman for instance, argue that children of families with low socioeconomic status are likely to have lower health status at birth not

necessarily because of worse genetic endowment, but because of the circumstances surrounding gestation and birth. Similarly, low wealth/income can adversely affects child health through malnutrition, poor hygienic conditions and improper utilization of health care services [7]. Environmental/living conditions such as place of residence, access to health services and basic social amenities like water and sanitation can help improve the health of the child. Another important contributor of a child's development is educational status of the parent as it creates a reasonable knowledge on proper.

The empirical literature on factors that influence the nutritional status of the child have provided evidence on important factors. Factors such as maternal education [9, 10, 11, 12], maternal autonomy [1], household economic status [1, 9, 15, 16] have been reported to influence the nutritional status of the child. For instance, studies have argued that children born in educated and wealthy households get better care than their counterparts born in less educated and wealthy households. Other, child specific characteristics that have also been argued in the literature to affect child health are the age of the child, gender of the child, and birth order of the child [9, 10, 11, 12]. The studies have attempted to provide evidence on various aspects of child health outcomes in different parts of sub Saharan Africa. These studies have shown a similar pattern that maternal factors do influence health outcomes of the child. However, most of these do not include some important indicators like the health care use of the mother, the household power structure and the birth order of the child. These are factors that are also likely to influence the nutritional status of a child. This study therefore set out to investigate these effect of these factors on nutritional outcome of a child using a more recent demographic survey data and to incorporate these various aspects in a comparative approach to help us to understand the role these factors play in the three study countries. Evidence from the study will help in policy/decision making on improving child health outcomes in Africa. The study examines the effect of household socio-economic factors on the child's nutritional outcomes in Ghana, Kenya and Zambia.

Methods

The study is based on the Grossman model of health capital and the demand for health care [8]. Our model specification follows Rosenzweig and Schultz (1982) as outlined in Mwabu in which child health production is embedded in the utility maximizing behavior of the mother [18]. The model assumes that the mother derives utility from the health of the child and therefore engages in child health production using market and non-market or behavioral inputs. The mother serves as the point of reference here because the child at the age depends a lot on the mother for feeding and other essential things. The utility function of the mother is specified as equation (1);

$$U = U(X, Y, H) \quad (1)$$

In equation 1, *X* is a vector of health neutral goods which yields utility to the mother, but has no direct effect on her reproductive health status; *Y* is a vector of health-related goods that yields utility to the mother and also affects her reproductive health; *H* is a vector of child health outcomes, which is embedded in the mother's utility function. *H* is assumed to yield positive utility to the mother. The child's health outcomes (*H*) is also affected by a number of maternal and child-specific characteristics. The child health production function can be specified as equation (2);

$$H = H(S, Y, C, U) \quad (2)$$

In equation 2, *S* is a vector of the economic status of the mother/household captured while *C* is a vector of social factors of the mother/household. *U* is a vector of child

specific characteristics that can influence the child's health. The utility of the mother is maximized subject to the household budget constraint, which is specified in equation 3 as;

$$P_x X + P_y Y + P_c C = M \quad (3)$$

P_x, P_y and P_c are the prices of the health neutral good (X), health related good (Y), and price of child health (C), respectively. M is the total income of the family made up of initial wealth, and labor and non-labor income. The left-hand side represents total expenditure while the right-hand side represents the total income of the family. We derive the demand for health function of the child by substituting equation 2 into equation 1 and forming the Lagrangean function for optimization as specified in equation (4);

$$U = U\big(X, Y, H(S, C, U)\big) + \lambda\big(M - P_x X + P_y Y + P_c H\big) \quad (4)$$

Taking the first order conditions from equation 4 with respect to X, Y and H, and solving through results in the demand functions for each of the arguments in the utility function. The reduced form equations for these demand functions are as specified;

$$x = x\big(P_x, P_y, P_c, S, C, M\big) \quad (5)$$

$$y = y\big(P_x, P_y, P_c, S, C, M\big) \quad (6)$$

$$h = h\big(P_x, P_y, P_c, S, Y, C, M, U\big) \quad (7)$$

Equation 7 allows the estimation of the child's health production as a function of the socioeconomic status of the household. Unfortunately, in the DHS dataset, access to prices, particularly that of medical care are unavailable. Thus, we do not include prices in our estimations. We do not expect this to have a significant effect on the results since the economic status of the household was controlled for. For the purpose of estimation, equation (8) is specified and estimated using the ordinary least squares. β, π, δ are vector of parameters associated with Y, S and C, respectively.

$$H = \beta Y + \pi S + \delta C + \varepsilon \quad (8)$$

The study uses data on children under age five from the 2014 Demographic and Health Survey (DHS) for Kenya, Ghana and Zambia. The dependent variable is the child's nutritional status measured by the Weight-for-Age Z-score (WAZ), which is computed as the difference between the value of an individual child and the mean value of the reference population for the same age or height, divided by the standard deviation of the reference population. The socioeconomic factors used include wealth, education, place of residence, employment, decision making structure of the household, and education of the partner. Specific characteristics of the child including age, gender and birth order were included as controls.

In our analysis, the wealth of the household was categorized into five quintiles from the poorest households to the wealthiest. We expect that wealth should have a positive effect on the nutritional status of the child. Education of the mother is also measured in categories with no education, primary education and secondary plus. We measure father's education by years of schooling. We expect education to have a significant effect on the nutritional status of the child. Also, we use the household decision making structure has four responses; the woman alone, the partner alone, woman and partner, and someone else. Residence is measured as rural or urban. We control for the age of the mother, the educational level of the partner, and the nutritional status of the mother using the Body Mass Index (BMI). Finally, we control for specific characteristics of the child that may also affect the child's nutritional status. These are the age of the child, gender of the child and the birth order of the child.

Results

Descriptive statistics

Table 1 shows that majority of the households are in the poorest wealth quintiles in the three countries. Majority of the mothers in Ghana had no education, with the exception of Zambia and Kenya, where we found that majority of the women had primary education. The majority of the women in our sample were also found in the informal sector with only a small fraction who reported to be in the professional fields from the three countries. With the decision making variable, majority of the decisions in the households are made by the woman and the partner with just a small percentage being made by someone else other than the woman or the partner.

Table 1: Descriptive result of some respondent's information across the three countries

Variables	Ghana %	Kenya %	Zambia %
Wealth of the household			
Poorest	33.38	34.58	24.02
Poorer	22.83	21.2	23.81
Middle	19.58	16.8	22.89
Richer	13.68	14.65	16.94
Richest	10.54	12.77	12.34
Occupation of the woman			
Not working	9.58	37.03	38.42
Professional	2.72	7.73	2.96
Self employed	74.19	41.28	56.11
Manual work	13.51	13.95	2.51
Source of getting water			
Pipe	27.81	30.83	23.42
Public tap	36.73	8.9	24.09
Well	22.72	53.92	51.49
Other	12.73	6.36	1.0
Education of woman			
No education	44.33	21.82	11.07
Primary	20.01	52.94	55.87
Secondary	33.74	19.02	29.56
Higher	1.93	6.21	3.5
Partner's education			
No education	36.2	18.56	6.63
Primary	11.02	48.81	43.43
Secondary	45.37	23.86	43.06
Higher	7.41	8.77	6.89
Decision making in the household			
Respondent alone	25.67	33.37	29.37
Respondent and husband	53.01	40.73	43.14
Husband/partner alone	20.88	25.6	27.02
Someone else	0.44	0.3	0.47
Marital status			
Not married	30.16	19.49	17.91
Married	69.84	80.51	82.09
Residence			
Urban	39.22	31.31	36.44
Rural	60.78	68.69	63.56
Antenatal care visits			
No visits	3.57	5.86	1.37
Between 1 and three visits	12.42	39.67	67.25
4 or more visits	84.01	54.47	31.38

Source: Authors compilation from the DHS, 2014 data.

Majority of the women in our sample also had a minimum of four antenatal care visits in Ghana and Kenya.

Table 2 shows summary of the mean and the standard deviation of descriptive characteristic of the survey respondents. The mean Z- score was -0.67 with maximum and minimum values of -5.28 and 3.44 in Ghana. In Kenya, the mean Z-score was -0.75 with maximum and minimum values of -5.39 and 4.45. This is slightly different for Zambia where the mean Z-score was recorded as -0.90 with maximum and minimum values of -5.59 and 4.13. The mean age of the child and the mother in Ghana were recorded to be 59 weeks and 30 years respectively. In Kenya and Zambia, the mean age of the child and the mother were recorded to be approximately 2 years and 29 years respectively. The descriptive statistics also reveals that the average Body Mass Index (BMI) of the women in Ghana, Kenya and Zambia were 23.69, 22.92 and 22.56 respectively, with the highest being recoded in Kenya as 58.40. The average child in the study was approximately the fourth child in the three countries, with the minimum being one and maximum values of 13 and 15 children recorded in Ghana, Kenya and Zambia, respectively.

Table 2: Summary result of some characteristics of the respondents across the three countries

Variable	Observations	Mean	Std. Dev.	Minimum	Maximum
Weight for age z score					
Ghana	1080	-0.67	1.14	-5.28	3.44
Kenya	8899	-0.74	1.16	-5.39	4.45
Zambia	10869	-0.90	1.12	-5.59	4.13
Woman's BMI					
Ghana	1080	23.69	4.41	15.10	54.35
Kenya	8899	22.92	4.39	13.52	58.40
Zambia	10869	22.56	3.82	12.24	55.52
Age of child					
Ghana	1080	0.59	0.76	0.00	4.00
Kenya	10869	1.99	1.41	0.00	4.00
Zambia	8899	1.97	1.40	0.00	4.00
Age of woman					
Ghana	1080	29.59	6.94	15.00	49.00
Kenya	10869	28.85	6.98	15.00	49.00
Zambia	8899	28.87	6.55	15.00	49.00
Birth order of child					
Ghana	1080	3.50	2.19	1.00	13.00
Kenya	10869	3.78	2.45	1.00	15.00
Zambia	8899	3.50	2.32	1.00	15.00

Source: Authors compilation from the DHS, 2014 data.

Empirical findings

The results presented in Table 3 indicate that the nutritional status of the child is influenced by the decision-making structure in the household, the wealth of the household, education of the woman and household source of water. The results also indicate that the age of the child, the size of the child at birth, and the nutritional status of the mother are significant factors that influence child nutritional status. Wealth index is positively associated to the nutritional status of children in Ghana, Kenya and Zambia. The positive sign reveals that all the wealth categories are more likely to have a better nutritional status compared to the reference group, poorest. The effect of wealth is stronger in

Households in Kenya and Zambia than in Ghana. Also, the results indicated that women with at least secondary education in Kenya are more likely to have well-nourished children than those with no education. Nutritional status of the child was found to affect the nutritional status when households' decisions are made by someone else compared to households where decision is made by the woman. However, the nutritional status of the child improves with the nutritional status of the mother.

The results equally reveals that the size of the child at birth has a positive effect on the nutritional status of the child. We found that children with average and small size were more likely to have poor nutritional status compared to children with normal size at birth. Age of the child, gender of the child and the birth order of the child have a negative effect on the nutritional status of the child. Female child is more likely to be well-nourished than the male child. The results on birth order suggests that the household nutritional resource allocation is biased towards younger children. We also found that children who were exclusively breastfed, as recommended by WHO, are more likely to have a better nutritional status than children who received supplementary feeds and those who were breastfed beyond 24 months after birth.

Discussion

The wealth of the household is statistically significant at the one and ten percent levels of significance for all the wealth quintiles for Kenya and for the middle and richest wealth quintiles in Zambia. This suggests that the nutritional status of the child is highly related to the wealth of the household in Kenya and Zambia. Thus, compared to the households in the poorest wealth quintiles, all the households from the poorer to the richest wealth quintiles in Kenya and the households in the middle and richest wealth quintiles in Zambia are more likely to have well-nourished children. We also found that poorer households are also more likely to have well-nourished children compared to the poorest households in Ghana. These results indicate that compared to poorer households, richer households are more likely to have well-nourished children. This is not surprising as household wealth status determine nutritional intake of the mother during pregnancy and after birth. Wealth status also affects the ability to provide for the required nutritional needs of the child. This results are in concordance with earlier findings that suggested that the nutritional status of the child is affected by the wealth of the household [9, 13].

The results also indicate that the education of the woman has a positive and significant on child health at the 5 percent level of significance for Kenya suggesting that women with at least secondary education are more likely to have well-nourished babies than women with no education. The finding implies that partner's educational level is important in influencing the nutritional status of the child in Zambia. Our finding is suggestive that partners with higher levels of education are more likely to have well-nourished children than those with no education. We found the influence of education on child health to be absent in Ghana for the woman as well as the partner. The implication is that educated women and also partners who are educated may have better knowledge of childcare practices, which helps them in the child's upbringing and feeding. These findings are in conformity with similar findings [9, 10, 11, 12] that finds education correlates with child nutritional practice. Thus, to promote child health, it will be necessary to encourage women to pursue education, at least beyond the primary level as suggested by our findings. Indeed, as Kabubo-Mariaraa et al. posits, maternal education improves nutrition through

altering the household preference function and also through better child care practices, indicating the importance of human capital investments in improving children's nutritional status [16].

Our findings reveals that decision-making structure of the household and the nutritional status of the mother have a significant effect on the nutritional status of the child.

Table 3: Results from the empirical model across the three countries

VARIABLES	Ghana	Kenya	Zambia
Wealth of household			
Poorer	0.193*(0.101)	0.167***(0.058)	0.0749(0.048)
Middle	0.0664(0.125)	0.284***(0.066)	0.095*(0.050)
Richer	-0.123(0.189)	0.301***(0.072)	0.026(0.065)
Richest	0.214(0.210)	0.442***(0.088)	0.265***(0.084)
Education of the mother			
Primary	0.106(0.129)	0.099(0.067)	0.046(0.053)
Secondary	0.0662(0.123)	0.280***(0.084)	-0.006(0.063)
Higher	0.302(0.299)	0.412***(0.121)	0.067(0.169)
Partner's education			
Primary	-0.152(0.138)	-0.071(0.081)	0.045(0.070)
Secondary	-0.111(0.108)	-0.032(0.093)	0.100(0.073)
Higher	0.168(0.195)	-0.121(0.109)	0.267**(0.121)
Occupation			
Professional	-0.074(0.263)	0.068(0.093)	0.025(0.161)
Self-employed	0.048(0.124)	0.0144(0.053)	-0.036(0.036)
Manual work	0.002(0.173)	-0.020(0.067)	0.067(0.105)
Household source of water			
Public tap	-0.034(0.119)	-0.122(0.077)	-0.084(0.066)
Well	0.125(0.117)	0.0523(0.053)	-0.115*(0.061)
Other sources	0.263**(0.133)	0.103(0.083)	-0.376**(0.159)
Household decision making			
Woman and partner	0.0210(0.108)	-0.080*(0.044)	-0.023(0.039)
Partner alone	-0.113(0.123)	-0.015(0.047)	-0.014(0.044)
Someone else	-0.291*(0.175)	-0.749***(0.283)	-0.341*(0.197)
Marital status of woman			
Married	-0.117(0.104)	0.101(0.079)	-0.257*(0.139)
Place of residence			
Urban	-0.076(0.139)	-0.016(0.054)	0.221***(0.052)
Antenatal care use			
Less than 4 visits	-0.027(0.297)	0.018(0.105)	0.016(0.141)
4 or more visits	0.171(0.300)	0.082(0.105)	0.049(0.143)
Type of breastfeeding (Exclusive)			
Supplementary feeding	-0.372***(0.104)	-0.461***(0.065)	-0.492***(0.054)
More than 24 months	-0.547**(0.240)	-0.660***(0.089)	-0.560***(0.089)
Size of child at birth			
Average	-0.192*(0.113)	-0.224***(0.045)	-0.242***(0.036)
Small	-0.601***(0.136)	-0.640***(0.062)	-0.600***(0.065)
Female child	0.014(0.081)	0.100**(0.0408)	0.133***(0.033)
Birth order of child	0.015(0.024)	-0.0199*(0.0107)	-0.018*(0.010)
Log age of mother	-0.182(0.177)	0.085(0.086)	0.048(0.076)
Log age of child	-0.085(0.092)	-0.118***(0.018)	-0.101***(0.017)
BMI of mother	0.0312***(0.007)	0.029***(0.005)	0.044***(0.005)
Constant	0.046(1.180)	0.381(0.285)	-0.003(0.303)
Observations	910	5,169	5,833
R-squared	0.183	0.176	0.130

*Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1*

The nutritional status of the child is poorer in cases where someone else makes the decision in the household compared to when the woman makes such decisions. This is significant at 5 percent in Kenya, but at the 10 percent significance level for both Ghana and Zambia. The nutritional status of the child worsens when both partners make the decision in Kenya compared to when the woman makes the decision alone in the household. The results, therefore, suggests that as a means of improving the nutritional status of the child, it may be better to include the mother in such decisions. In SSA, it is a common norm for other family members to make decision on child's upbringing in the household. The mother, however, may have better information about the child and this may be necessary to allow her engage in the decision making process regarding the child in the household. In addition, the effect of the mother's BMI, a measure of the nutritional status of the mother, has a significant and positive effect on the nutritional status of the child in Ghana, Kenya and Zambia. Thus, well-nourished mothers are more likely to give birth to well-nourished babies given the importance of the woman's nutritional status during pregnancy and after birth. Thus, as a means to improving the nutritional status of the child, it may be necessary to also focus on improving that of the mother.

Our findings indicate that the age of the child is negatively associated with the child's nutritional status. Thus, the nutritional status of the child worsens as the child grows. This is significant at the 5% level for the Kenya and Zambia. The sign, even though negative in Ghana, is insignificant. Also, we find that the nutritional status worsens for higher order births. This is significant for Kenya and Zambia. This results suggests that the resource allocations in the household are biased towards earlier births, with less focus on later births. This result confirms the findings that older children have poor nutritional status. Indeed, as the child grows, his/her nutritional needs also increase, warranting the necessary supplements to ensure optimal growth. Thus, as a strategy to improve and ensure the optimal growth of the child, it is necessary that equal attention it paid to the older child as well as younger ones. Evidence has shown that health of children that grew up or exposes to dirt or other contaminated objects are affect negatively [19]. This notwithstanding, most children also become very active, coupled with the stress of school. Thus, it becomes important to give proper attention to the child as the child grows and his nutritional requirements increase.

Our results also reveals that the size of the child at birth is positively associated with the child's nutritional status. Small or average size at childbirth are more likely to have poor nutritional status than children with normal size at birth. This is significant at the one percent level for children in Kenya and Zambia for small and average sized babies. The positive and significant effect of the size of the child at birth on the nutritional status of the child has already been alluded to by a previous study [17]. This positive relation is explained by the fact that normal sized babies' might have a stronger immune system, which helps resist sickness and prevent anemia. Thus, "smaller-sized" and "average sized" babies need to be given the needed attention to ensure optimal growth like their "normal" counterparts.

Our findings also indicate that the type of breastfeeding has a significant effect on the nutritional status of the child. When compared to children who were exclusively breastfed, children who are given supplementary feeding and those who were breastfed beyond 24 months turn out

to be malnourished. This result is significant at the 5 percent level in Ghana, Kenya and Zambia. Thus, exclusively breastfeeding the child contributes to the significant improvement in the child's nutritional status, compared to supplementary feeding and feeding beyond 24 months. Indeed, as recommended by the WHO, exclusively breastfeeding (breastfeeding the child for six months without food supplements or water) helps children grow better and helps to also improve their immune system, which helps the children fight some diseases. It is therefore important that children are exclusively breastfed for six months before other food supplements are introduced to them. As suggested by Hong, the negative effect of breastfeeding the child over 24 months compared to exclusive breastfeeding may be due to reverse causality whereby mothers of malnourished children breastfed for longer or poorer mothers are more likely to continue breastfeeding as a substitute for appropriate complementary feeding [9]. Thus, it may be optimal for parents to wean off their babies at 2 years and introduce them to appropriate feeds as our results suggests that breastfeeding beyond 24 months worsens the child's nutritional status.

Conclusion

Certain socio-economics characteristics such as household wealth index, educational level of mother affect child's nutritional outcome. Policy could thus address the deficits in education in Kenya and perhaps other countries with similar challenges of poor child nutritional outcomes. Parents should also be educated on the importance of providing the appropriate nutritional and dietary requirement for all children irrespective of age and birth order. This is important to ensure that all children in the household maintain an appropriate nutritional status and grow as expected. This will help in the effort to improve child health. Such health education can be provided at the antenatal care points and through informal education using radio jingles and television announcements for behavioral change communication.

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