Why are our children wasting?: Predictors of wasting among under five's in Ghana

*Eugene Kofuor Maafo Darteh[1]

Corresponding author: eugenedarteh@gmail.com/edarteh@ucc.edu.gh

Evelyn Acquah[1]

Email: evelynacquah77@yahoo.com

[1]Department of Population and Health

University of Cape Coast

Cape Coast

Ghana

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Abstract

Wasting is one of the indicators of malnutrition known to contribute to the deaths occuring from childhood malnutrition. It is the measure of body mass in relation to body length to explain recent nutritional status. We examine the predictors of wasting among children in Ghana using data from the children recode file of the 2008 Demographic and Health Survey. A total of 2379 children under five years with valid anthropometric data were used. Data on the wasting were collected by measuring the weight and of all children under six years of age. Bi-variate and multi-variate statistics are used to examine the predictors of wasting. Children aged 6-8 months had the highest odd of wasting. Region and ethnicity were significantly related to wasting. Culturally appropriate interventions and policies should be put in place to minimise the effects of distal factors on wasting among under 5 children.

Key words: wasting; children; Ghana; predictors; under fives

Background

Childhood malnutrition is currently the single leading cause of the global burden of disease. Globally 6.3 million children under five die from preventable and treatable causes in a year and nearly half of all these deaths are attributed to malnutrition (World Health Organisation, 2014). This translates into loss of lives of about 3 million children a year from malnutrition.

Wasting is one of the indicators of malnutrition known to contribute to the deaths occuring from childhood malnutrition. It is the measure of weight in relation to height to explain recent nutritional status. Children whose weight-for-height measures are below minus two standard deviations (-2SD) from the median of the reference population, are too thin for their height and considered wasted. Failure to obtain or get access to sufficient nutrition or inadequate dietary intake in recent times and a current incident of illness could lead to loss of weight and the beginning of wasting (Ghana Statistical Service (GSS) et. al., 2009).

The commitment of the international community to reducing childhood malnutrition and mortality has been recently renewed through the Millennium Development Goals. This has steered the advancement of a more incorporated and universal strategies in a way as to ensure full benefits to the vulnerable groups. The key intervention has been that involving the establishment and promotion of exclusive breastfeeding and promotion of nutritionally adequate diets for children less than five years (UNICEF) [2011].

Despite the interventions by the international community wasting among children under five in Ghana increased from 7% in 2003 to 9% in 2008 (GSS et. al., 2004, GSS et. at., 2008). Despite the increase in the prevalence of

wasting, studies conducted on child malnutrition in Ghana have not given wasting much attention. A number of studies have identified factors which put children at risk of malnutrition in general (GSS et. al., 2009, Giroux, 2008, Wamani et. al., 2006) or stunting (Darteh et. al., 2014) with little attention for wasting. It is evident, therefore, that further studies on the determinants of wasting is needed to help in the formulation of strategies to reduce wasting. The study sought to assess the determinantsof wasting among children under five.

Conceptual framework

The conceptual hierarchical framework for analysing determinants of nutritional status by Hien and Hoa (2009) was adapted for the study. Figure 3 shows the conceptual framework for the study.

>>>>>>>> insert Figure 1 here>>>>>>>>>>>>>>>>>>>>>>>>>>>>

The advantages of this framework is due to the fact that it provides a way of understanding how the different factors affecting child malnutrition are linked. The model draws attention to how important it is to identify how the distal factors act through the intermediate and proximal factors to affect a child's nutritional status. It brings out larger concepts that interrelate to bring an outcome. Under each larger concept are specific variables that could be measured to achieve the purpose of the study

The framework was chosen again because, it was developed to explain child malnutrition in areas with high prevalence of child malnutrition especially in developing countries. Once a child lives in a society, changes in the society will affect the child's nutritional status directly or indirectly through

his or her socio demographic, environmental, maternal and individual factors. The variables used for the study were region, child's age, household size, source of drinking water, kind of latrine, ethnicity, mother's level of education, age, number of children, wealth status, child's health status and timing of breastfeeding.

Data and Methods

The paper uses data from the children recode file of the 2008 Demographic and Health Survey, a nationally representative cross sectional survey conducted in Ghana. The data for this study were requested online from the Demographic and Health Survey website. An approval was given to download the data. The Ghana Health Service Ethical Review Committee in Accra gave ethical approval for the study protocol. The STATA data file of the children recode file was downloaded for the study.

The survey was conducted with a sample of more than 12,000 households chosen nationally. A two-stage sample design was used with the first stage involving choosing sample points or clusters from a restructured master sampling frame created from the 2000 Ghana Population and Housing Census. In all 412 clusters were chosen from the master sampling frame.

The second stage of the assortment involved the systematic sampling of 30 of the households scheduled in each cluster. Finally a sample of 12,323 households was selected for the survey. With the Household Questionnaire, each household selected for the GDHS was eligible for interview. Height and

weight measurements of children under the age of five years were taken in the households selected for the individual interview.

The number of occupied households successfully interviewed was 11,778, yielding a household response rate of 99 percent. In the households selected for individual interview in the survey, a total of 5,096 eligible women were identified; interviews were completed with 4,916 of these women, yielding a response rate of 97 percent. In the same households, a total of 4,769 eligible men were identified and interviews were completed with 4,568 of these men, yielding a response rate of 96 percent. There were 2,912 children under age five in the GDHS households of which 87% had their applicable height and weight measurement obtained.. Data on the nutritional status of children were collected by measuring the height and weight of all children under six years of age. A lightweight, electronic seca scales with a digital screen, designed and manufactured under the guidance of the United Nations Children's Fund (UNICEF) was used to collect the data on weight, while a measuring board produced by Shorr Productions was also used to obtain the height of the children (GSS et. al., 2009).

Children under 2 years of age were measured lying down on the board while those above 2 years were measured standing. Collected data were entered using CSPro, a programme specially developed for use in DHS surveys (GSS et. al., 2009). All data were entered twice for 100 percent verification. A total of 2379 children under five years who had valid anthropometric data were used for the study.

In the DHS data, a z-score is given for the child's weight relative to the height. It is defined as the number of standard deviation units from the median weight among children of that height in an international reference population. Children with z-score of -200 to -529 for weight-for-height were considered wasted and those with z-score of -199 to 458 were considered not wasted. The dependent variable for this study was wasting. Wasting was coded into 1 wasted and 0 not wasted. Region, place of residence, child's age, household size, source of drinking water, kind of latrine, ethnicity, and mother's level of education, wealth status, timing of breastfeeding and incidence of diarrhoea were the independent variables. STATA version 11 was used to recode the dependent and independent variables. The recoding was done based on the categorization of these variables in (GSS et. al., 2009). Age in months was group into less than 6 months, 6-8, 9-11, 12-17, 18-23, 24-35, 36-47 and 48-59. Educational level was put into four categories; no education, primary level, middle or Junior Secondary School level and Senior Secondary School or higher education. Region of residence was made up of the ten regions of Ghana including Ashanti, Western, Eastern, Volta, Northern, Brong Ahafo, Central, Greater Accra, Upper East and Upper West Regions. The place of residence was divided into urban and rural. Ethnicity was recoded into five ethnic groups namely Akan, Ga/Dangme, Ewe, Mole-Dagbani, and Others. Sex of child was divided in to male and female. Wealth status was divided into five categories namely poorest, poorer, middle, richer and richest. The household size of the children was recoded into 1–4, 5–8, 9 and above. The source of drinking water was recoded into four categories including pipe, well, spring or river or rainwater and tanker or bottle or sachet water. Type of toilet facility was also

recoded into water closet, pit latrine and bush or no facility. Timing of breastfeeding was grouped into less than an hour after birth, an hour after birth, 2^{nd} to 23^{th} hour after birth, less than six days after birth and 6^{th} to 14^{th} days after birth. Incidence of diarrhea was recoded into yes and no. The dataset was reorganised by dropping and keeping some of the variables to suit the objectives of the study. Descriptive statistics was used to describe the variables of the study. Binary logistic regression was used to examine the determinants of wasting. Binary logistic regression was used because the dependent variable is dichotomous. Three stepwise models were constructed for the study, based on the categorisation of the independent variables into distal, intermediate and proximal factors in the conceptual framework. Model one looked at the child's age, sex, region, ethnicity, mother's level of education and wealth status. The second model was fitted to assess how the variables in the first model would react when the intermediate variables including household size, number of children and mother's age are added. Model three was fitted to examine the effects of proximal factors such as timing of breastfeeding and incidence of diarrhoea on wasting among children. To ensure that variables were not co-linear, we run correlation analysis for variables for which we suspected some correlation such as region and ethnicity. The results showed weak and non-significant correlation (data not shown).

Results

The background characteristics of children whose anthropometric data were taken during the survey are presented in Table 1. Twenty-one percent of the them were aged 48-59 months while 6 percent were aged 6-8 months. Fifty-

one per cent of the children were males with the rest been females. Forty-eight percent of the children were Akans while the Mandes constituted 1 percent. Thirty-five percent of the children had mothers with up to middle school education while 8 percent had mothers with secondary or higher education. Twenty-six percent of the children were from poorest household compared to 14 percent of children from the richest households. Fifty-three percent of the children were from households with 5-8 members while 3 percent were from households with 13-22 members. Children who had well water as their source of drinking water constituted 44 percent compared to 6 percent of children whose sources of drinking water were tankers, bottle or sachet water. Sixty-three percent of the children were from households that used pit latrine as their type of toilet facility while 1 percent were from households that used pan as their toilet facility.

Twenty-nine percent of the children had mothers age 25-29 while 3 percent had mothers age 45-49. Seventy-one percent of the children had mothers who have given birth to 1-4 children while 3 percent had mothers who have given birth to 9-14 children. Children who were breastfed less than an hour after birth were 53 percent compared to children who were breastfed 6-14 days after birth. Seventy-nine percent of the children had not suffered from diarrhoea in the two weeks preceding the survey while 21 percent had suffered from diarrhoea.

>>>>>>>>>>>>>>> insert Table 1 here >>>>>>>>>>>>>>>>>>>

Multivariate Regression

The logistic regression results of the determinants of wasting are presented in Table 2.

Age of child was a signficant predictor of wasting. For instance, children aged 6-8 months were more likely to be wasted comapred to those aged less than 6 months (OR=2.23 at $p<0.05$). The effects of age increased slightly to 2.25 among those aged 6-8 months of age and they were still more likely to be wasted than the reference group being children under six month (see Table 2).

Ethnicity was found to be significantly related to wasting among children. The results indicate that children of the Ga /Dangme ethnic group were significantly more likely to be wasted compared to Akans (OR= 2.87; $p<0.05$). The odds of wasting among children of some ethnic groups increased in model 2: from 2.87 to 3.11 for the the Ga/Dangme ethnic ($p<0.05$) (see Table 2). There was a significant relationship between region and wasting among children. For instance, children from the Upper West (OR=3.09; $p<.05$); Upper East (OR=2.62; $p<.05$) and the Northern Region (OR=2.76; $p<.05$) were more likely to experience wasting compared to those from the Western Region. With the addition of intermediate factors in model 2, the effects of these regions on wasting increased significantly (see Table 2). Also, with the addition of intermediate factors, children from the Central Region become more likely to experience wasting compared to those in the Western Region (OR=2.51; $p<.05$).

Discussions

The study sought to examine the predictors of wasting among under 5 children in Ghana using the conceptual hierarchical framework for analysing determinants of nutritional status developed by Hien & Hoa (2009). The findings of the study suggest that some distal factors are significantly associated with wasting among under 5 children in Ghana. We discuss the correlates of wasting according to the concepts used in the framework.

Age was significantly related to wasting among children under five. The high prevalence of wasting among children 6-8 months of age could be explained by the fact that complementary food is introduced from age 6 months, therefore the inappropriateness of the introduction of complementary feeding experienced from 6 months could be a contributing factor to why children aged 6-8 months were more likely to be wasted (WHO, 2003).

Ethnicity was found to have a significant relationship with wasting. It was observed that children belonging to the Ga/Dangmes ethnic group were more likely to experience wasting. The result is consistent with Awumbila (2003) who indicated that cultural practices of administration of water and other complementary foods too early among some ethnic groups hamper the benefits that can be realized from exclusive breastfeeding up to four or six months recommended by conventional medicine. The high likelihood of wasting among Ga/Dangme ethnic could be attributed to the link it has with the emergence of kwashiorkor in the world (Awumbila, 2003).

Region was significantly related to wasting among children under five. The study observed that wasting was common among the children of the three

Northern Regions - Upper West, Upper East and Northern. These regions have been consistently considered to be the poorest in the country for decades. Also, the Mole-Dagbanis who are the most predominant ethnic group (76%) in these regions have cultural practices which deny women eggs and other protein foods which are known to affect the nutritional value of the child (Darteh et. al., 2014; Gyimah, 2002).

This study is limited by its cross-sectional nature and hence causal inferences cannot be made. However, the study has some compelling strengths. These include the large sample size and the representativeness of the sample which gave sufficient power and enhances its generalisability to other settings respectively.

Conclusion

Wasting among children in Ghana is influenced by distal factors such as age, ethnicity, and region. To improve the nutritional status of children in Ghana, factors that are significantly correlated with wasting should be addressed. The effects of the distal factors like ethnicity and region of residence could be reduced by adoption of culturally appropriate interventions and policies to promote the consumption of nutritious foods which are not consumed by nursing mothers and their children. These interventions and policies should aim at changing peoples attitudes towards some of societal values, beliefs and culture., Programmes aimed at promoting proper child feeding practices should be strengthened to reduce the effect of complimenary feeding on stunting among children under 5. Further research should be conducted on ethnicity and region of residence to determine the factors that

influence these predictors of wasting. This research was mainly quantitative so further studies should focus on the reasons that contribute to the variations observed among these predictors.

Authors' contributions

EKMD conceived the study, conducted data analysis and interpretation as well as drafted the first version of the manuscript. EA conducted some aspects of the data analysis and interpretation. EKMD and EA revised the manuscript for important intellectual content and gave consent for the version to be published. All authors have read and approved the final manuscript.

Acknowledgement

The authors would like to thank IFC International for granting the permission to use the data. The authors would also like to express warm appreciation to all who have contributed in various ways towards the success of the Measure DHS data collection, particularly the U.S. Agency for International Development (USAID) which has been funding the Measure DHS project.

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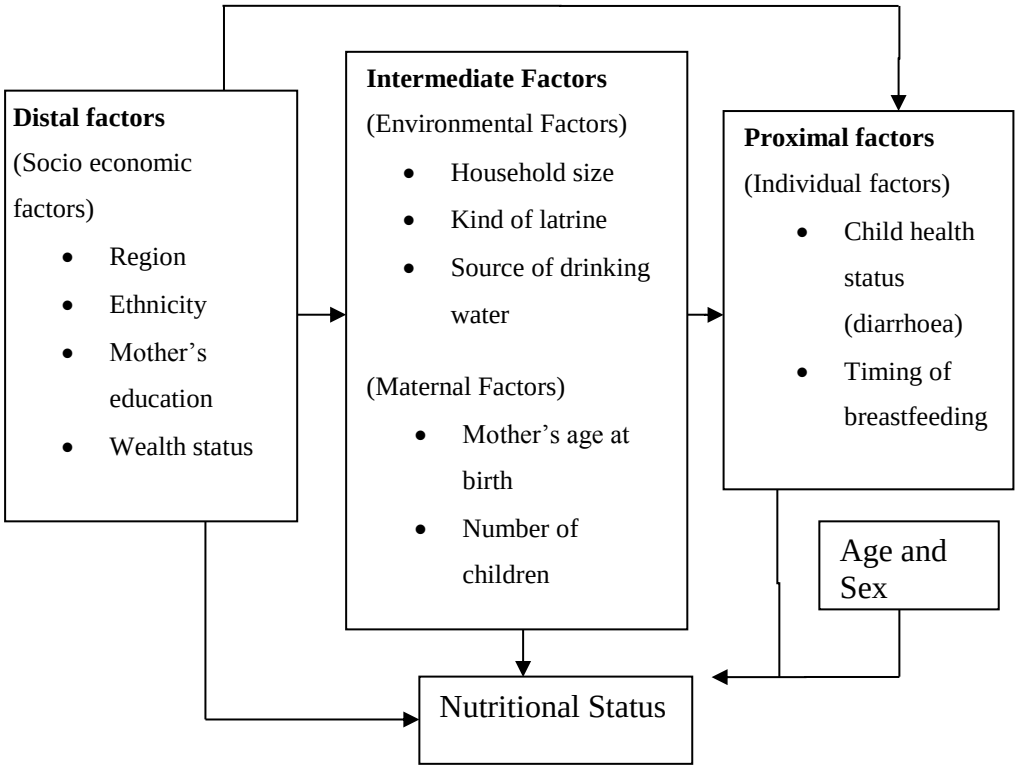

Figure 1: Conceptual framework

Source: Adapted from Hein and Hoa (2009)

Table 1: Background characteristics of children

Variable	Category	Percent
Age (N=2325)	<6months	
		8.8
	6-8months	5.5
	9-11months	6.0
	12-17months	11.8
	18-23months	9.3
	24-35months	19.3
	36-47months	18.8
	48-59months	20.5
Sex of child (N=2379)	Females	50.8
	Males	49.2
Region (N=2325)	Western	9.3
	Central	9.1
	Greater Accra	11.5
	Volta	9.1
	Eastern	8.2
	Ashanti	19.7
	Brong Ahafo	10.5
	Northern	15.2
	Upper East	4.8
	Upper West	2.6
Ethnicity (N=2230)	Akan	47.9
	Ga/Dangme	5.0
	Ewe	13.3
	Guan	3.1
	Mole-dagbani	21.4
	Grussi	3.0
	Gruma	5.4
	Mande	0.9

Educational level	No education	32.9
(N=2323)	Primary	24.3
	Middle/JHS	34.9
	Secondary+	7.9
Wealth Status (N=2325)	Poorest	25.6
	Poorer	22.9
	Middle	17.8
	Richer	19.5
	Richest	14.2
Household size (N=2325)	1-4	35.2
	5-8	53.1
	9-12	9.0
	13-22	2.7
Source of drinking water (N=2311)	Pipe	35.6
	Well	43.6
	Spring/river/rainwater	14.5
	Tanker/bottle/sachet	6.3
Type of toilet facility (N=2309)	Water closet	8.6
	Pit latrine	63.6
	Bush/no facility	27.8
Number of children (N=2329)	1-4	71.6
	5-8	25.0
	9-14	3.4
Mother's age (N=2345)	15-19	3.8
	20-24	18.3

	25-29	28.9
	30-34	20.2
	35-39	17.4
	40-44	8.1
	45-49	3.3
Timing of breastfeeding (N=2323)	<1 hour	53.4
	1 hour	11.7
	2^{nd} - 23^{rd} hour	18.2
	< 6 days	16.0
	6^{th} - 14^{th} day	0.7
Incidence of diarrhoea (N=2332)	Yes	20.9
	No	79.1

Source: Computed from 2008 GDHS dataset

Table 2: Logistic regression results of wasting

Variable	Model 1	Model 2	Model 3
Distal factors			
Age in months			
<6 (ref)	1.00	1.00	1.00
6-8	2.23 **	2.25**	2.26**
9-11	1.46	1.45	1.39
12-17	0.82	0.78	0.77
18-23	0.52	0.52**	0.56
24-35	0.28	0.28***	0.32**
36-47	0.25***	0.25***	32**
48-59	0.17***	0.18***	0.29***
Sex			
Male	1.00	1.00	1.00
Female	1.02	1.00	1.07
Educational level			
No education (ref)	1.00	1.00	1.00
Primary	0.96	0.96	1.00
Middle/JHS	0.97	0.99	1.07
Secondary+	0.45	0.47	0.65
Wealth Status			
Poorest (ref)	1.00	1.00	1.00
Poorer	0.94	0.93	0.91
Middle	1.09	1.12	1.00
Richer	0.68	0.73	0.80
Richest	0.72	0.92	0.99
Ethnicity			
Akan (ref)	1.00	1.00	1.00
Ga/Dangme	2.87 **	3.11**	3.71**
Ewe	1.55	1.48	1.67
Guan	0.78	0.75	0.88
Mole-dagbani	0.79	0.82	0.85
Grussi	0.83	0.82	0.87

Gruma	0.81	0.81	0.88
Mande	0.00	0.00	0.00
Region			
Western (ref)	1.00	1.00	1.00
Central	2.10	2.51**	1.84
Greater Accra	0.96	1.06	0.70
Volta	0.67	0.76	0.53
Eastern	0.75	0.83	0.57
Ashanti	1.63	1.65	1.67
Brong Ahafo	0.81	0.83	0.59
Northern	2.76 **	3.17**	2.12
Upper East	2.62**	3.18**	2.25
Upper West	3.09**	3.54**	2.47
Intermediate factors			
Household size			
1-4 (ref)		1.00	1.00
5-8	NA	0.97	0.99
9-12	NA	1.25	1.65
13-22	NA	0.46	0.59
Source of drinking water			
Pipe (ref)		1.00	1.00
Well	NA	1.52	1.47
Spring/river/rainwater	NA	1.52	1.47
Tanker/bottle/sachet	NA	1.72	2.20
Type of toilet facility			
Water closet (ref)		1.00	1.00
Pit latrine	NA	1.56	1.77
Bush/ no facility	NA	1.22	1.55
Mother's age			
15-19(ref)		1.00	1.00
20-24	NA	0.90	0.79
25-29	NA	0.80	0.64
30-34	NA	0.80	0.70

35-39	NA	0.76	0.64
40-44	NA	0.61	0.48
45-49	NA	0.53	0.22
Number of children			
1-4 (ref)		1.00	1.00
5-8	NA	1.14	1.28
9-14	NA	1.66	1.82
Proximal factors			
Timing of breastfeeding			
<1 hour (ref)	NA	NA	
1 hour	NA	NA	0.71
2^{nd} - 23^{rd} hour	NA	NA	0.76
< 6 days	NA	NA	0.75
6^{th} - 14^{th} day	NA	NA	3.14
Incidence of diarrhoea			
Yes (ref)			1.00
No	NA	NA	1.3

Source: Computed from 2008 GDHS dataset: ***p<0.001, **p<0.05

P-values in parenthesis; ref= reference