An Assessment of Malnutrition among Children in the New Juaben Municipality of Ghana: A Factor Analysis Approach

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Abstract:
Malnutrition has gained deep roots in the African society. According to UNICEF (2009), for every 10 children in the rural setup in Africa, four are likely to fall in the region of malnutrition. This paper therefore assesses malnutrition among children in the New Juaben Municipality of Ghana using factor analysis statistical tool. Purposive sampling technique was used to collect information from 150 mothers of whom 37 percent of the respondents had children who suffer from malnutrition. The results revealed that two major factors determine a child's nutritional status in the Municipality.

Key words: Malnutrition, Child health, Factor Analysis

1. Introduction

The provision of nourishment and administration of medication especially for children is vital to the development of a child's life. Under-nutrition and improper administration of medication has very serious consequences on a child's development. Children are economic assets to the world and their future health and development outcome is more likely to be influenced by their nutrition and health status (Birhan, 2010). In light of this fact, successive governments and numerous NGOs have over the years initiated various mitigating policies, programmes and other interventions but the results have always been on the low side. The World Food Programme (WFP) defines malnutrition as "a state in which the physical function of an individual is impaired to the point where he/she can no longer maintain adequate bodily performance process such as growth, pregnancy, location, physical work and resisting and recovering from the disease". Although the word "malnutrition" is associated with both under-nutrition and over-nutrition (Smith and Haddad 2000), it is meant to refer to under nutrition in this paper.

The prevalence of malnutrition is on the increase in mostly Sub-Saharan Africa which is as a result of insufficient intake of required vital body enhancing ingredients. According to the World Health Organization, the prevalence of malnutrition worldwide by 2015 will be 17.6 percent and a large number of malnourished populations will be from developing countries in Southern Asia and Sub-Saharan Africa (WHO 2012). Moreover, malnutrition is found to be the cause of illnesses and deaths affecting large populations of children worldwide (UNICEF 2005). According to Glewwe and Migue (2007), hundreds of millions of children in less developed countries suffer from poor health and nutrition. The WHO database on child growth and malnutrition (2008) further revealed that Ghana is among the developing countries with very high a prevalence rate of 26.80% in terms of child malnutrition.

Although there have been past studies and surveys on child malnutrition in the country (GDHS 2008), most of these studies have been on national basis with broad objectives, leaving out some critical rural and peri-urban areas where malnutrition among children is most likely to be found. Moreover, the analysis have been mainly descriptive in nature and limited to the study of nutrition and health-related variables. It is against this background that this research paper seeks to employ factor analysis, a comprehensive statistical tool in classifying and analyzing the variables that determine the health and nutritional status of a child so that appropriate interventions can be planned to achieve growth and development.

2. Methods

The study adopted a descriptive design employing only quantitative research techniques with the aim of summarizing and measuring large data using traditional statistical methods more comprehensively and conclusively. For the intends and purposes of this study, purposive sampling technique was used. This is because the research sought information from a targeted population (Mothers with children under 5 years) in the New Juaben Municipality. A total number of 150 mothers were sampled and interviewed for the study of which 56 of them had malnourished children. Primary source of data in the form of administered questionnaire which consisted of

only close ended questions was used in order to guide respondent towards the aims and objectives of the research and also avoid deviations for a more accurate computation and data analysis.

Data analysis was performed using Statistical Package and Social Solutions (SPSS version 17). The following assumptions underlying factor analysis according to Manly (2005) and Rencher (2002) were also verified and applied;

- The data should be within an interval range.
- The variables used in factor analysis should be linearly related to each other.

3. Results

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8.808	73.400	73.400	8.808	73.400	73.400	5.234	43.616	43.616
2	1.444	12.033	85.433	1.444	12.033	85.433	5.018	41.816	85.433
3	.800	6.666	92.098						
4	.355	2.962	95.060						
5	.179	1.492	96.553						
6	.146	1.216	97.768						
7	.096	.797	98.566						
8	.068	.565	99.131						
9	.053	.443	99.574						
10	.028	.232	99.806						
11	.023	.194	100.000						
12	3.553E-17	2.961E-16	100.000						
Extraction Method: Principal Component Analysis.									

Table 1:   Total Variance Explained

From the output above, it could be observed that only the first two (2) components have eigenvalues greater than one under the 'Total' columns of the table. This means that only two factors can be extracted from the variables. This is because if a factor's eigenvalues is less than one (1), it implies that its contribution to the explanation of the variances in the variables is very little and may be ignored or regarded as redundant hence the extraction of the first two factors out of 12 for the analysis. Moreover, the analysis from this table will be based the "Rotation Sum of Square Loadings" column since it minimizes the number of variables which have high loadings on each given factor so that the total amount of variance accounted for is redistributed over the two factors for easy interpretation.

Therefore, looking at the "% of Variance" from the "Rotation Sum of Square Loadings" column, it could be observed that 43.616% of the variation in the original variables is accounted for or explained by the first factor while 41.816% of the variation in the original variables is accounted for or explained by the second factor with a cumulative of 85.433%. Therefore, we can conclude to use two factors and that these two factors cumulatively could still explain over 85% of the information contained in the original variables. We can also conclude that the first factor is more significant than the second one since it explains more of the variation than the second factor.

	Component	
	1	**2**
Sex of Child	.421	.650
Sex of household head	.372	.740
Age of Child	.104	.648
Birth Order	.627	.668
Place of Residence	.565	.721
Mother's Education	.953	.319
Employment Status of Mother	.930	.104
Employment Status of Partner	.914	.286
Family income level	.935	.415
Education of Partner	.835	.293
Number of Household	.821	.372
Source of drinking water	.914	.329
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.		
a. Rotation converged in 3 iterations.		

Table 2: Rotated Component Matrix[a]

The table above displays the set of variables that make up a factor based on the correlation coefficient of each individual variable. It could be observed that, the last five variables under component 1 have correlation coefficients within the region of 0.8 or higher making them fit into the first factor while the first five variables under component 2 fit into the second factor since their individual correlation coefficient is within the region of 0.6 or higher. The themes for these factors with their respective variables have been summarized in Fig 1 below.
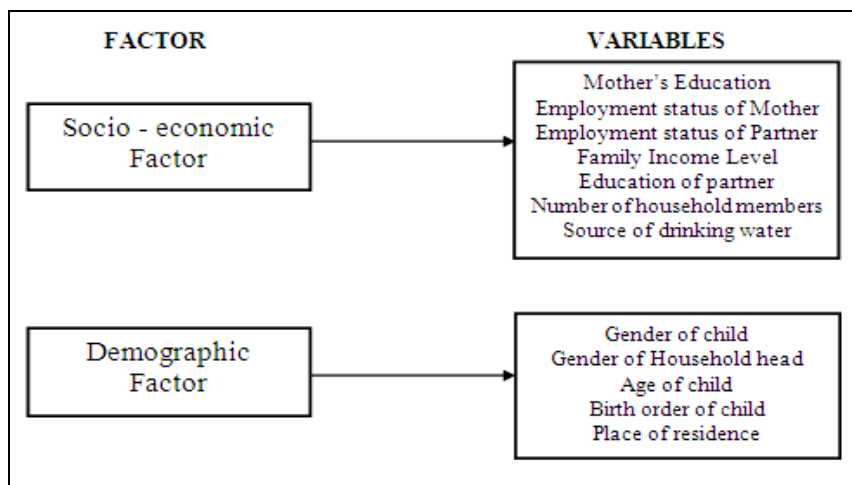

Figure 1: Summary of the factors and variables that determines
A child's nutritional status in the New Juaben Municipality of Ghana

4. Discussion
Results from the study show that two main factors determine a child's health/nutritional status in the New Juaben Municipality namely; demographic and socio-economic factors. Many studies conducted in developing countries (GDHS 2008, Pelletier 1991 and Liao 2010) report that demographic characteristics such as age, gender, birth order and place of residence are important determinants of a child's health/nutritional status. According to Liao (2010), demographic change matter for growth. He asserted in his findings that more than one-third of the growth in Taiwan during 1970-2004 could be explained by demographic change.
For instance, some studies have established a strong correlation between age of a child and his health status (Birhan 2010 and UN 1985). According to the United Nations reports 1985, children up to 24 months have better nutritional status than other age group.

This could be due to the exclusive breastfeeding in the early stages of the child growth and mothers' increased attention for them which is likely to decline the care and attention the older ones receive. On the issue of gender, the study found that boys are more vulnerable to malnutrition than girls making gender a significant demographic variable in determining a child's nutritional/health status. This finding is however consistent with other studies (Sentayehu 1994; Alemu et al., 2005a; Alemu et al., 2005b). Some of the reasons the researchers assigned to this finding, arguably, were the genetic differences between males and females and the fact that girls have greater access to food than boys through their gender ascribed role in contributing to food preparation. When vital nutrients of mothers are biological depleted due to continuous breastfeeding as a result of high birth order, some of children become malnourished at their early stage which becomes difficult to correct when they grow a bit older.

The study further found that the socio-economic status of the household where a child lives is very significant or plays an important role in the nutritional status of the child. Some studies have shown that children from poor households are found to be, on the average, at a higher risk of malnutrition than children from rich households (Smith et al., 2005; SCUK 2002; Woldemariam & Timotewoo 2002). This could be due to the fact that better-off households have better access to food and higher cash incomes than poor households, allowing them to eat quality diet and also get better access to medical care. Thomas et al.(2005a) using data from the 1986 Brazilian Demographic and Health Survey found the total income of a household to have a positive and significant effect on the child's nutritional status in both urban and rural sectors and the effect is much is much larger in magnitude in the rural sector. Alemu et al. (2005a) also found that the risk of malnutrition and health problems is significantly less on the average for children whose mothers educated than children from uneducated mothers. According to (Oyekale and Oyekale,2000; Smith and Haddad, 2000), education improves mothers' ability to implement simple health knowledge and facilitates their capacity to manipulate their environment, interact more efficiently with health professional on their child's health and comply with treatment recommendations. This implies that educated women have greater control over health choices for their children making children of educated mother less likely at risk of malnutrition.

5. Conclusion and Recommendations

The study revealed that demographic and socio-economic factors account to malnutrition or have significant effect on the nutritional status of a child in the New Juaben Municipality of Ghana. It was further found that the socio-economic factor is more significant in the determination of the child's nutritional status than the demographic factor. This implies that the socio-economic status of a household in which a child resides plays a major and important role in determining his/her nutritional status in the municipality. In light of these findings, the following recommendations are proposed;

Based on the findings that children from uneducated mothers are more vulnerable to malnutrition and health related problems, it is imperative that the municipal assembly and public health officers educate women on basic health principles, balanced diets and exclusive breastfeeding through various media within the Municipality. On the issue that children living in rural parts of the country are at higher risk of malnutrition due to poor source of drinking water and food insecurity, it is recommended that government strengthen healthcare and food security programs in the rural sectors to address this problem.

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