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Malnutrition among children in Southern Ethiopia: Levels and risk factors

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Abstact

Using data collected in the Community and Family Survey of the Southern Nations Nationalities and Peoples Region, this study estimates the level of child malnutrition and identifies the factors associated with chronic malnutrition among children in the five densely populated zones of the Region. A total of 850 children aged 3 - 36 months were included in the present study. Both bivariate and multivariate techniques were employed in order to identify risk factors of child malnutrition. The results indicate that about 45% of children are stunted, 42% underweight, and 12% wasted. The search for the factors affecting long-term nutritional status point to both socio-economic and demographic factors. Among the socio-economic factors, household economic status and women's education were important in explaining the variation in long-term nutritional status of children. From the demographic variables included in the analysis, age, preceding birth interval and number of under-five children were associated with stunting. Moreover, number of antenatal care visits the mother had during the pregnancy of the child and age at weaning are linked to chronic malnutrition. The study recommended the need for programs related to income-generating activities for poor households and family life education, including appropriate child care for women in reproductive age groups.

Introduction

Child malnutrition is among the most serious problems facing Ethiopia. Results of the 1992 National Rural Nutrition Survey indicated that about 64% of all children in rural Ethiopia aged 6-59 months were chronically malnourished (1). Such level of stunting is among the highest in the world (2). The level of acute malnutrition in under-5 children was 8% and 47% were under-weight. This prevalence of under-weight is likely to be the highest in Africa (along with that of Mozambique).

There is a general consensus today that a complex set of causes determines malnutrition. Inadequate and/or inappropriate dietary intake and infectious diseases are the immediate/direct causes while these in turn are related to a number of socio-economic, demographic, child care, and environmental factors.

Among the socio-economic variables, household income is one of the major factors to be considered very important in determining children's nutritional status (4). However, income does not always directly contribute to improving the nutritional well-being of children. Lack of knowledge regarding the nutritional needs of children may lead to the withholding of needed food, even when it is available. This entails the importance of parental education in determining children's nutritional status. Education, especially maternal education, is a powerful predicator of children's nutritional status.

Studies show that there is a strong relationship between a child's age, family size, birth interval and stunting (5,6). In communities that have little access to, and contact with, health care, children are more vulnerable to malnutrition as a consequence of inadequate treatment of common illnesses, low immunisation rates, and poor antenatal care. Poor environmental sanitation, including insufficient safe water supply, also puts children at risk of infection which increases susceptibility to malnutrition. Infant and child care, along with household food security, adequate health services and a healthy environment are a necessary preconditions for adequate nutrition (7).

However, the factors associated with the problems of malnutrition may differ among regions, zones, and communities, as well as over time. Identification of the major risk factors associated with malnutrition for each region is, therefore, essential if appropriate policies and programs are to be devised to rectify nutritional deficiencies and imbalances. This study, therefore, estimates the level of malnutrition and examines the influence of some of the socio-economic, demographic, child care, and environmental variables on one of the anthropometric nutritional indices (stunting) of children in the five densely populated zones of the Southern Nations, Nationalities and People's Region (SNNPR).

Methods

The data for this study were drawn from the Southern Nations, Nationalities and People's Region Community and Family Survey (SNNPR-CFS) conducted by the Demographic Training and Research Centre (DTRC) of the Addis Ababa University and the Population Studies and Training Centre (PSTC) of the Brown University (USA) in May and June 1997. The survey was an integrated multi-level, survey of communities, households, and women in their reproductive ages. The SNNPR-CFS included the five densely populated Zones of the Region, namely, Sidama, Semen Omo, Hadiya, K.A.T., and Guraghe.

The sampling design combined both stratified sampling and simple random sampling proportionate to population size (8). From the sample of 2500 households (2000 rural and 500 urban) targeted by the survey, 2317 households (1819 urban and 498 urban) were actually covered and completed. In each Zone, weredas were stratified into low and high density. Then, one high and one low density wereds were randomly selected from each Zone. From each selected wereda two Peasant Associations (PAs) were randomly selected resulting a total of 20 PAs in the study. From each PA, one Enumeration Area (EA) was selected. Then, 50% of residential households were interviewed from each EA (8). The urban sample is representative of the surveyed Zones as a whole (8). Ten EAs were selected using a simple random sampling method from 224 EAs found in the five Zones. Then from each selected urban EA, one-third of the households were interviewed. The overall response rate was close to 100% (8).

The survey used four types of instruments to gather the information: community questionnaire, household questionnaire, individual women questionnaire, and anthropometric recording sheet (8). The community questionnaire collected information on community variables, such as access to social services, water situation, and community needs. The household questionnaire was used to list names and certain characteristics of household members, like household composition, age and sex structure, nuptiality, education, and perceived economic status of the household. The women's questionnaire was used to collect information about fertility, immunisation, child health and mortality, knowledge, attitude, and practice of family planning.

The anthropometric recording sheet collected information on: height and weight of young children aged 3 - 36 months, and mid upper left arm circumference of women of reproductive age.

Sampling of children for the anthropometric measurement was based on the recorded age in the household questionnaire. All children aged less than three years were recorded on the Anthropometric Eligibility Sheet and their exact ages were probed, and all children aged 3 - 36 months were measured (8). There was almost no refusal for measurement. The extensive effort to collect children's months and year of birth, and birth history ensure that heaping on multipliers of 12 months, which is often a problem in many surveys if only age is asked (10), is not observed in this study. Data collection was done by trained interviewers from the Region.

Since children's heights and weights change with age, the anthropometric measurements, taking age and sex into consideration, were converted into Z scores based on the growth standard of the National Centre for Health Statistics (NCHS). The Centre for Diseases Control (CDC) package, ANTHRO, was used to calculate the Height-for-Age, Weight-for-Height, and Weight-for-Age Z scores. For a given child, the Z score is the number of standard deviation (SD) units that the child's measurement deviates from the reference population median. Children who fall more than -2 SDs below the reference population median were considered to be undernourished, while those who fall more than -3SDs below the reference population median were considered to be severely undernourished. All the three anthropometric indicators are used to examine the prevalence of malnutrition in this study. However, in depth analysis was performed on stunting particularly focussing on the factors affecting chronic malnutrition.In analysing the collected, data univariate, bivariate, and multivariate analysis technique were employed. The univariate analysis was used to estimate the prevalence of malnutrition in the study area. In the bivariate analysis, the relationship between all suspected independent variables and the proportion of stunted children aged 3-36 months are considered. In this part, a chi-square test was employed to test the association between the different variables of interest. For the multivariate analysis, Logistic Regression was used. The logistic model considers the relationship between a binary dependant variable and a set of independent variables.

Results

1. Overall Levels of Malnutriton

A total of 850 children aged 3-36 months were included in the analysis of this study. As can be seen in Table 1 the level of malnutrition in the Region is very high. The prevalence of stunting in the Region was 44.8% of which 24.7% of children were severely stunted (that is, below -3SD from the reference median).

The level of wasting (the percentage of children classifed as being too thin), was 12.0%.

Moreover, about 42% of children aged 3-36 months were underweight for their age. Of which, 17.8% were severely underweight.

2. Socio-economic Variables and Stunting

There were noticeable and significant differences in the proportion of children suffering from malnutrition in rural Zones (Table 2). The highest prevalence of stunting was observed in rural K.A.T Zone (60.6 percent), followed by Semen Omo Zone (50.8 percent). Even in the Zone with relatively lessmalnutrition level (rural Guraghe), more than one-third of young children were stunted.

The prevalence of stunting ranged from 34.5 percent in households with high economic status to 47.3% in households with below average economic status (Table 2). In the bivariate analysis, stunting shows no statistical difference as far as both mother's and husband's education and religion are concerned. However, economic status of the household was found to be strongly associated with chronic malnutrition.

3. Demographic Factors and Stunting

Analysing the magnitude of chronic malnutrition at different ages reveals how nutritional status changes during a child's first three years of life. As can be seen in Table 3, the proportion classified as stunted is low among infants (30.4%) while about half of all children aged 12-36 months are classified as stunted.

Chronic malnutrition is significantly linked with shorter birth interval (Table 3). The proportion of stunted children among thosechildren with short preceding birth interval (less than 24 months) was 47.7%, while it was 45.2% and 32.5% for children with a birth interval of 24-48 and above 48 months, respectively.

4. Environmental Factors, Childcare Practice and Stunting

Optimal infant feeding practice includes the introduction of complementary foods at about six months of the child's age. Analysis was made to test whether the time of supplementation affects the child's long-term

nutritional status or not. As can be seen in Table 4, age of the child when supplementation started has a significant negative association with long-term nutritional status. The percentage of stunted children was higher for children who started supplementation after six months of age as compared to the other group.

The number of antenatal care visits a mother had during pregnancy is an indicator of some contact with health services and health seeking behaviour, when mothers would learn about child care, health, and nutrition. As can be seen in Table 4, the number of antenatal visits a mother had was inversely related with stunting: the prevalence of stunting among children of mothers who had five or more visits was low (32.9%) compared to children of mothers who had no visits (47.3).

Vaccination status of a child is the other indicator of contact with health services during infancy and childhood. Since it is expected that contact with health services would help correct incipient nutritional problems, vaccination status was expected to be positively associated with long term nutritional status. However, as can be seen in Table 4, fully vaccinated children were more likely to be stunted (47.1%) than children who had at least one vaccination (34.1%).

To identify the effect of each variable on long-term nutritional status of children, a logistic regression analysis was performed. As can be seen in Table 5, women's education, household economic status, and age of the child were found to be significant in the model. The likelihood of being stunted was found to be 2.3 times higher among children of illiterate women compared with children of women with post primary level education. In addition, children of women with some primary education were 2.1 times more likely to be stunted compared to children whose mothers had a post primary level education.

Household economic status was also inversely related to stunting. Children of poor households were 1.9 times more likely to be stunted compared to children of households with above average economic status. The findings also indicate that the risk of stunting for children in the age group 12-23 months was higher than those of children aged 24-36 months indicating that the second year of life was the most disastrous for nutritional status of children. In general infants were less likely to be stunted as compared to the other age groups.

Discussion

Overall, 44.8% of children aged 3-36 months in the five densely populated Zones of southern Ethiopia are chronically under-nourished. In addition the level of wasting and underweight were very high, with 12% of children aged 3-36 months being wasted and 42 percent being under-weight. This shows that child

*only variables which appeared to be significant are shown in the table

malnutrition is among the most serious health and welfare problems facing the population of Southern Ethiopia.

The findings of this study indicate that there was a significant variation in the prevalence of malnutrition in rural Zones. The prevalence of stunting ranges from a low of 36.7% in rural Guraghe to a high of 60.6% in rural K.A.T Zone. Since the administrative zones of the SNNPR are classified based on ethnic composition, the difference in the prevalence of stunting among zones may be due to the difference in cultural practices and access to health services. In their study in Southern Ethiopia, Melaku and Yohannes (9) also found a very high prevalence of stunting in K.A.T Zone.

Contrary to what was found in many studies (5, 10,11,12) there was no significant difference in the prevalence of chronic malnutrition between rural and urban children. A recent study done by CSA (14) confirmed that the average per capita daily calorie intake of the rural population of Ethiopia is higher (2,256) than that of the urban population (1,223). As one of the immediate causes of stunting is inadequate calorie intake, the observed higher prevalence of stunting in urban area seems plausible. On the other hand, though the calorie intake seems better in rural areas, other factors, such as health facilities, access to better source of drinking water, and latrine are relatively low and may offset the prevalence of stunting in the area.

Among the demographic variables used in the bivariate analysis, length of preceding birth interval, age of the child, and number of under-five children in the household were significantly associated with long-term nutritional status of children. Children born less than 24 months after the last sibling are more likely to be stunted than those born after 48 months. Similar results were observed in Zimbabwe (10) and in Mali (6). Children born in short birth intervals may create huge biological and childcare burdens in both pre- and post – natal periods that can result in reduced nutritional status. Similarly a number of studies have associated short preceding birth interval with low birth-weight and higher infant mortality (6, 12). Number of under five children in the household is significantly associated with long-term nutritional status of children--the greater the number of under-fives in the household, the higher the chance of being stunted. This is not surprising since, as the number of children under five years of age increases, so may the strains on intra-household availability of resources and childcare. Thus, effort should be made to improve family planning so that women may limit their children and space their births to two or more years apart, as a means to improve child nutrition.

Unexpected finding is that fully vaccinated children were highly likely to be malnourished compared to children who were partially vaccinated. Rutestin (16) and Tekele (17) found similar results. On the other hand, studies done by Macro International Inc. in Senegal (10) and Uganda (13) show negative association between chronic malnutrition and vaccination status of children. Since stunting appears at early ages in Ethiopian children (1) many of the children of this study may be stunted before they receive all the recommended vaccinations. Probably, children who were frequently brought to immunization sessions may be those children who were perceived by their mothers as too short or too thin for their ages, which should be investigated.

The number of antenatal care visits a woman had during the pregnancy of the child and age of the child when supplementation started had a significant effect on chronic malnutrition. Antenatal care can help prevent low birth- weight and birth complications while, at the same time, providing mothers with valuable information about childcare, health and nutrition. Thus, availability and accessibility of antenatal care services to pregnant women should be increased as a means to improve long term nutritional and survival status of children.

Results of multivariate analysis indicate that age of the child, women education and household economic status have significant effect on chronic malnutrition. Since stunting is a cumulative process that occurs over the course of many individual insults of nutritional deprivation and/or illness, the increase in the risk of stunting with age is not surprising. The dramatic rise of stunting with age up to the end of the second year of life reflects the cumulative effect of repeated illness and inadequate nutrient intake. This pattern highlights the first two years of life as the most nutritionally vulnerable for children in the study area, suggesting that the first two years of life are critical periods for public health intervention.

Although maternal educational level is highly correlated with household economic status, which also positively affects child nutritional status, this study also showed that even after controlling for household economic status, maternal education has a positive effect on long-term nutritional status. The importance of mother's education in relation to the health and nutrition of the child has been stressed by many studies (5,10,11,12,13). In general, women education affects the knowledge and attitude of parents which in turn affect their fertility behaviour, their use of health services, and their access to information. Hence, considering the importance of women education for the improvement of children's nutritional status as crucial, more deliberate effort by local government administrators and educational personnel is needed to improve educational opportunities for female children as a long term strategy.

Economic status of the household, which also directly indicates the level of household food security, is positively associated with long-term nutritional status of children. Household food availability/security is clearly a pre-requisite for adequate dietary intake for all household members. Household economic status can affect children's nutritional status through its association with adequate dietary intake, use of health services, improved water source and sanitation facilities. Similar results were reported in Latin America and Sub-Saharan African countries (4, 10-12, 16). This indicates the need of creating mechanisms to develop community-based development intervention particularly in food deficit areas for most deprived households.

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Tables

Table 1: **Percentage of children age 3-36 months who are classified as malnourished according to the three anthropometric indices of nutritional status, by density and residence, SNNPR-CFS, 1997.**

Density and Residence	Stunted		Wasted		Underweight	
	Severe[1]	Moderate & Severe[2]	Severe[1]	Moderate & Severe[2]	Severe[1]	Moderate & Severe[2]
Density (Rural)						
High	29.1	48.4	1.2	12,6	22.0	45.8
Low	22.0	43.4	1.2	10.4	17.3	42.9
Residence						
Rural	25.5	45.8	1.2	11.5	19.7	44.3
Urban	21.6	40.7	2.9	14.0	10.3	34.3
Total	24.7	44.8	1.5	12.0	17.8	42.3

1Below -3 standard deviations from the median of the NCHS/WHO reference pop.

2.Below -2 standard deviations from the median of the NCHS/WHO reference population

Table 2: **Number and percent of children aged 3-36 months who are stunted, by selected socio-economic characteristics, SNNPR-CFS, 1997.**

Socio-economic Characteristics	Percent stunted	Number of children	p-value
Zone (rural)			
K.A.T	60.6	109	
S. Omo	50.8	122	
Hadiya	43.9	139	
Sidama	40.6	234	
Gurghe	36.7	79	P<0.003
Mother's education			
No education	45.2	383	
Primary	45.7	267	
Post primary	37.2	94	NS
Religion			

Orthodox	48.6	185	
Protestant	44.8	384	
Muslim	37.9	124	
Others	45.8	153	NS
Eco. Status of the household			
Above average	34.5	142	
Average	45.6	309	
Below average	47.3	394	P<0.03
Husband's Occupation			
Agricultural	46.5	608	
Sales/services	43.1	58	
[1]Professional	36.8	95	
Not working	42.2	64	NS
Husband's education			
No education	45.2	465	
Primary	49.4	164	
Post primary	10.5	185	NS

Note: Levels of significance determined using chi-square test

NS= Not significant [1] Teachers/others civil servants

Table 3: **Number and percentage of children aged 3-36 months who are stunted, by demographic characteristics, SNNPR-CFS, 1997.**

Demographic characteristics	Percent student	Number of Children	P-value
Sex			
Male	46.7	456	
Female	42.6	394	NS
Age of the child (months)			
3-11	30.4	184	
12-23	46.1	393	
24-36	52.7	273	P<0.00001
Preceding birth interval			
<24 months	47.7	109	

24-48	45.2	290	
>48 months	32.5	83	P<0.05
Mother's age at the birth of the child			
<20	52.5	61	
20-34	43.9	608	NS
>35	42.6	136	
No of other under five children in HH			
None	42.0	373	P<0.05
1+	48.8	414	

Note: Levels of significance determined using chi-square test NS= Not significant

Table 4: **Nmber and percentage of children aged 3-36 months who are stunted, by selected childcare and environmental variables, SNNPR-CFS, 1997.**

Age when supplementation started and Selected health status indicators	**Percent stunted**	**No of children**	**P-value**
Age when supplementation started Exclusively breast fed	41.1	150	
0-4	36.7	91	
4-6	41.8	347	P<0.05
7+	49.6	112	
No of antenatal Care Visits			
None	47.3	467	
1-4	44.9	225	P<0.05
5+	32.9	121	
Vaccination status of the child			
No vaccination	46.7	430	
1-3 vaccinated[1]	34.1	139	P<0.03
Fully vaccinated[2]	47.1	261	
Drinking water source			
Piped	43.7	186	
Pumped/protected well	48.3	116	NS
Unprotected/Surface	45.7	547	
Type of toilet			
None	45.0	640	NS

Pit latrine	44.4	207	

Note: Levels of significance determined using chi-square test NS= Not significant

1. If the child received 1-3 vaccine from the following vaccination: BCG, 3 doses of DPT and Polio, Measles

2. If the child received all of the above vaccination

Table 5: **Logistic regression estimates of the effect of the explanatory variables on stunting, SNNPR- CFS, 1997.***

Explanatory Variables	ß	(Exp ß)
HH economic status above average	Ref	
Average	0.4784	1.6136
Low	0.6237*	1.8658
Women education post primary	Ref	
Primary	0.7313*	2.0777
No education	0.8229**	2.2772
Age of the child 3-11	Ref	
12-23	1.5416***	4.6720
24-36	1.5177***	4.5619
constant N=850	-0.5181***	
-2logliklihodd	691.816***	
Model chi-square	79.232***	

Reference categories are in parenthesis

* P<0.05 ** P<0.01 *** P<0.0001

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