Factors Explaining Acute Malnutrition Among Under-Five Children in Sub-Sahara Africa (SSA)

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Abstract: Child malnutrition poses serious challenge to economic development in many SSA countries. This study analyzed the factors predisposing children to wasting in selected SSA countries. Anthropometrics data for children in Gambia, Niger, Comoros, Central African Republic, Lesotho and Swaziland were analyzed using Z-score and Probit regression. Results show that wasting is highest in Niger (12.69 percent). Probit analysis shows that attainment of secondary education by the mothers, urbanization, presence of pipe water, vaccination, and mother's access to radio and television significantly reduce the probability of wasting, while infection with diarrhea, fever and age at first polio vaccine significantly increase it ($p<0.10$). Concerted efforts to reduce malnutrition must focus on provision of health facilities in the rural areas, promotion of women education, promotion of enlightenment programs on the need for child immunization and ensuring cleanliness in caring, among others.
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1. Introduction

The state of child malnutrition in many developing countries has significantly worsened over the past few decades (ACC/SCN, 2000). Because mothers were either ill or malnourished, about 24 million babies are annually born with small weight unable to sustain healthy living (de Onis *et al*, 1998, UNICEF, 1998). Out of under-five children in developing world, 206 million are stunted (low height for age), 50 million are wasted (low weight for height), and 167 million are underweight (low weight for age) due to lack of sufficient food and the presence of diseases (de Onis *et al*, 1997).

In Africa, several studies have shown that the goal of overcoming malnutrition among children, which has recurrently featured in several policy statements is yet to be achieved (WHO, 2000; UNICEF, 2000; World Bank, 2004; Silva, 2005). Despite several national and international awakening and assistance, child's health is still in a state of crisis in many SSA countries. Although some improvements had been recorded over the last fifty years, these have been slower than what was had in other regions of the world.

The incidence of wasting, which reflects the acuteness of malnutrition had been widely used to characterize the nutritional status of children (DCS, 2003; Wise, 2004; Silva, 2005). Wasting reflects a deficit in weight relative to height due to a deficit in tissue and fat mass (Fernandez *et al,* 2002). Epidemiological evidence suggests that the first response to a nutritional deficiency and/or disease infectious is weight loss (wasting), and this will be followed by retardation in linear growth (stunting). If the infection persists, children will cease to grow in height and will lose weight, thus augmenting the process and prevalence of wasting (Fernandez *et al,* 2002; Wise, 2004).

This study is important because in the United Nations MDGs, which was unanimously adopted in September 2000, and latter accepted as a policy guide and framework for economic planning in many developing countries, child matters on issues of nutrition, health and mortality are very prominent. The objective of the study is to analyze the factors predisposing under-five children in some SSA countries to wasting? This will provide the needed directions to African policy makers on the way of reducing the problem of wasting in order to reduce child mortality and work towards meeting the MDGs.

2. Theoretical Framework and Literature Review

UNICEF (1990; 1998) analyzed the determinants of wasting within a framework that incorporate some underlying causes like inadequate health services, unhealthy environment, inadequate household food security, and inadequate mother- and child-caring practices. It was noted that most of the underlying causes are directly linked to some basic (or structural) factors that are political, legal, and cultural in nature. In like manner, Chevassus-Agnès (1999) presented a framework for understanding the causes of malnutrition (fig. 1). This identified key factors as access to food, care practices, and health and sanitation as factors ultimately determining nutritional status.

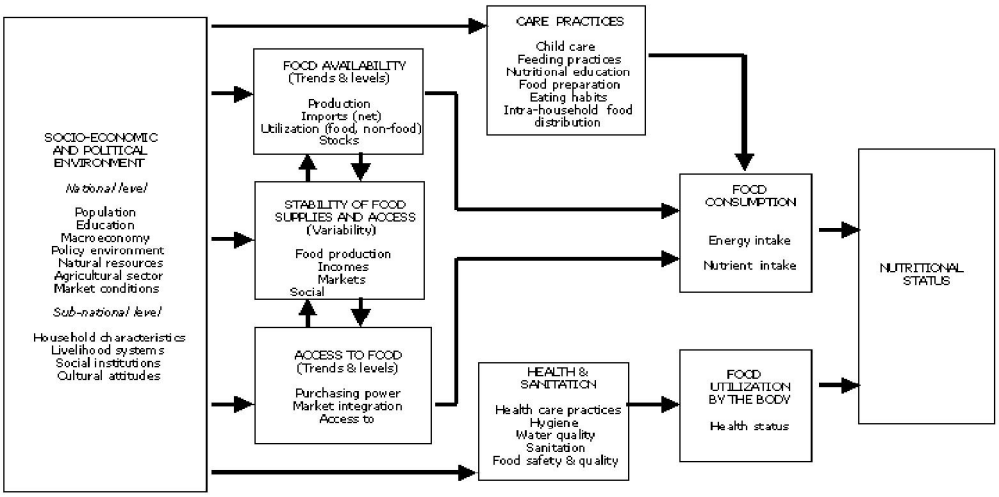

Figure 1: A conceptual framework for the determinants of child nutrition Source: Chevassus-Agnès, (1999).

Based on the framework presented above, many studies have analyzed the determinants of malnutrition. Specifically, Gunasekara (1999) used anthropometrics indices of weight-for-height to assess the nutritional status of children in Sri Lanka. It was found that employment status of mother, number of living children, the level of education of the mother and non-involvement of the mothers in the rural labour market significantly affected wasting problem in children.

ORC Macro (2001) found that in Africa, Malawi (2000 data), Tanzania (1999 data), Uganda (2000/2001 data) and Zimbabwe (1999 data) have prevalence of wasting being 5.5 percent, 5.4 percent, 4.0 percent, and 6.4 percent respectively. It is only in Malawi that wasting prevalence was higher among female children.

MINECOFIN (2002) also found that in Rwanda (using 2001 dataset), prevalence of wasting was 3.4 percent, but male children have a slightly higher prevalence. Wise (2004) further reported that using the same dataset, approximately 39 percent of Rwanda children between 12-17 months and 28 percent of children between 18–23 months were reported to have suffered from diarrhea two weeks prior to the survey. These two age groups also reported the highest prevalence of wasting (6.8 percent and 6.6 percent respectively). After the second year of life, the percentage of children reported to have suffered from diarrhea declines with age. However, urban children experience a higher
prevalence of wasting (4.1 percent) than children in rural areas (3.2 percent).

Fernandez *et al* (2002) found that l*ow* birth weight (LBW), measles incidence, and access to a safe water supply explained 64% of wasting variability in Asia. In Latin America, LBW and survey year explained 38% in Africa, LBW, survey year, and adult literacy explained 7%. Also, vitamin A had been identified as the growth-promoting factor "A." (Rivera *et* al, 2003).

Department of Census and Statistics (DCS) (2003) found that in Sri Lanka, the key factor explaining wasting in children were age of the child, sector of residence (urban or rural), work status of mother, access to media by the mother, mother's educational level and type of toilet. Also, wasting is influenced by number of living children in the family and whether the mother washes her hand after the child defecated, access to safe drinking water and sex of the child.

Ekanayake *et al* (2004) determined the factors influencing child malnutrition in Sri Lanka. Their findings revealed that while mother's nutritional awareness and total income are negatively related to child's malnutrition, mother's age and interest in media have positive significant relationship. Silva (2005) also analyzed the determinants of child malnutrition in Ethiopia. The study revealed that child's age, mother's height, household wealth, education of mothers and access to good water explain to a large extent the nutritional status of children.

3. Methodology

Source of data

The study used the data set available for some developing countries on child's anthropometrics information. The data were collected in 2000 End-Decade Multiple Indicator Cluster Survey with the financial support from the United Nations International Children Emergency Funds (UNICEF). The requested

information is robust in every respect comprising of child anthropometrics data, disease infection, mother's socio-economic characteristics, housing condition and participation in different forms of vaccination programs, among others. The samples in all the countries were selected in two stages. At the first stage, clusters were selected with probability proportional to size. After a household listing was obtained for the selected clusters, systematic samples were drawn. African countries for which data were analyzed in this study are Gambia, Niger, Central Africa Republic, Comoros, Lesotho, and Swaziland (see table 1 for the sample distribution). These countries were selected based on region and completeness of the needed variables.

Table 1: Distribution of Samples and Household Members in the Selected SSA Countries

Country	Gambia	Niger	Central Africa Republic	Comoros	Lesotho	Swaziland
Completed Samples	4190	4321	11452	3677	7471	4190
Household members	24213	26256	92466	25969	32744	34211
Total Women	5271	5664	14300	5242	6741	5271
Women included for analysis	4256	4331	12636	3687	4709	3730
Total Children	3509	5080	16964	4870	3737	3509
Children included for analysis	2474	4545	12094	3044	3083	3163

Analytical Models

Z-Score indices of prevalence of malnutrition

The z-score was used to carry out the analysis of child's malnutrition. This is represented as:

$$Z_i = \frac{X_i - \mu}{1}$$

Where i refers to individuals (children) and j = 1….3 with Z_i = weight-for-height nutrition index, and Z_i = z-score weight-for-age nutrition index, X_i = observed value for the ith child, μ = mean value of the reference population, and = standard deviation of the reference population. A z-score of -2 standard deviation is the most commonly adopted cut off for all nutrition indicators. Consequently, children with z-scores below (-2) (WHZ) are considered to be moderately or severely malnourished.

Probit Analytical Approach

The Probit regression was used to analyze the socio-economic determinants of the health outcomes using Limdep 7.0 software. The dependent variables (Y_{ij}) were binary variables with value of 1 if malnourished in respect of wasting (z-score less than –2) and 0 otherwise. Following Zere and McIntyre (2003), outliers were excluded based on the recommendation of WHO (1995). Therefore, weight-for-height z score less than –4 and greater than +5 were excluded. The estimated model is stated as:

$$Y_{ij} = \phi_j + \sum_{i=1}^{6} \beta_i M_i + \sum_{i=1}^{4} \varphi_i H_i + \sum_{i=1}^{4} \gamma_i D_i + 3$$

$$\sum_{i=1}^{5} \theta_i V_i + \sum_{i=1}^{4} \mu_i P_i + \sum_{i=1}^{8} \vartheta_i A_i + v_j$$

Where:

M_1 = sex (male 1, 0 otherwise)
M_2 = urbanization (urban centers = 1, 0 otherwise)
M_3 = age of child (months)
M_4 = hour of early learning (minutes)
M_5 = mother's secondary education (≥ secondary = 1, 0 otherwise)
M_6 = mother's primary education (≥ primary = 1, 0 otherwise)
H_1 = ever received vitamin A (yes =1, 0 otherwise)
H_2 = month since last dose of Vitamin A
H_3 = ever breastfed (yes =1, 0 otherwise)
H_4 = currently breast-feeding (yes =1, 0 otherwise)
D_1 = diarrhea in last 2 weeks (yes =1, 0 otherwise)
D_2 = cough in last 2 weeks (yes =1, 0 otherwise)
D_3 = fever in last 2 weeks (yes =1, 0 otherwise)
D_4 = sleep under bed net (yes =1, 0 otherwise)
V_1 = ever given BCG vaccines (yes =1, 0 otherwise)
V_2 = age at first polio vaccine
V_3 = number of polio vaccine
V_4 = number of DPT vaccine
V_5 = ever given measles vaccine (yes =1, 0 otherwise)
P_1 = mother alive (yes =1, 0 otherwise
P_2 = mother at home (yes =1, 0 otherwise)
P_3 = father alive (yes =1, 0 otherwise)
P_4 = father at home (yes =1, 0 otherwise)
A_1 = pipe water (yes =1, 0 otherwise)
A_2 = sanitary toilet (yes =1, 0 otherwise)
A_3 = non-iodized salt (yes =1, 0 otherwise)
A_4 = tile as floor material (yes =1, 0 otherwise)
A_5 = electricity (yes =1, 0 otherwise)
A_6 = radio (yes =1, 0 otherwise)
A_7 = television (yes =1, 0 otherwise)
A_8 = refrigerator (yes =1, 0 otherwise)
v_j = error term

The first hypothesis is that education of mothers does not significantly decrease wasting among children, while the second is that number of polio vaccine does not significantly reduce wasting.

4. Results and Discussions

Wasting Prevalence

Table 2 shows the indices of wasting computed for some countries in SSA. The mean of the weight-for height z-score (WHZ) is highest in Swaziland with 0.4953 and the percentage of wasting is lowest there with 1.13 percent. The wasting prevalence were also computed for rural children and urban children. Among all the countries, wasting prevalence is highest among all the children, rural children and urban children in Niger with 12.69 percent, 14.19 percent and 10.21 percent respectively. Whether for rural or urban children, Swaziland has the lowest wasting prevalence.

Table 2: Prevalence of Wasting Based on Child's Sex and Sector of the Economy

Malnutrition Variable/ Country	Gambia (n = 2474)	Niger (n = 4545)	Central African Republic (n = 12094)	Comoros (n = 3044)	Lesotho (n = 3083)	Swaziland (n = 3163)
Mean Z score (WHZ)	-0.4978	-0.8616	-0.1314	0.1811	0.3179	0.4953
Std deviation	1.1647	1.0605	1.3969	1.7692	1.4435	1.13
All children	8.60	12.69	8.19	10.22	4.96	1.20
Rural Sector	8.58	14.19	8.36	10.34	4.95	1.31
Urban Sector	8.75	10.21	7.91	9.97	5.08	0.69

Determinant of Wasting

The analysis of the socio-economic factors explaining wasting in under-five children is presented in tables 3a and 3b. The results show that male children in Niger and Central Africa Republic have significantly higher probability of wasting, while the opposite applies for Swaziland. This goes in line with the finding of ORC Macro (2001). In Comoros and Swaziland, children from urban centers have significantly lower probability of wasting than those in the rural areas. This difference had been traced to the presence of health facilities and income generating opportunities in the urban areas {United State Agency for International Development (USAID) (2000)}. This goes in line with the findings of Yimer (2000), but contradicts that of Wise (2004) for Rwanda. Also, as the children grow older, their probability of wasting significantly reduces in Niger and Comoros. Wise (2004) had similar finding and explained Table that it was due to high vulnerability of children to illness at the early stage of growth. Example is teething, which disturbs the growth processes if the child has diarrhea. The more the hours of early learning, the less the probability of wasting in Gambia and Central Africa Republic. This can also be linked to the fact that it is older children that are kept in most of these kindergarten classes.

3a: Probit Regression of the Determinants of Wasting (WHZ) Among Children in Sub-Saharan Africa

Country/Variables	Gambia		Niger		Central African Republic	
	Parameter	t-value	Parameter	t-value	Parameter	t-value
Constant	0.110953**	2.196	0.043876	0.742	0.053873**	2.471
Sex	0.001632	0.186	0.030855*	3.455	0.009379*	3.065
Urbanization	0.011081	0.823	-0.005992	-0.396	0.003397	0.906
Age of child	-0.000052	-0.118	-0.001065**	-2.344	0.000072	0.710
Hour of early learning	-0.00167***	-1.860	0.000993	0.723	-0.000212**	-2.538
Mother's primary education	-0.03366***	-1.778	0.016108	0.955	-0.010077*	-2.829
Mother's secondary education	-0.022526*	-2.815	-0.021965*	-2.706	-0.002836	-0.528
Vitamin A	0.003470	0.219	-0.000912	-0.220	-0.000708**	-2.162
Month since last dose of Vitamin A	-0.001585	-1.136	0.001855*	2.634	-0.000811	-1.495
Ever breast fed	-0.032786	-0.738	-0.000901	-0.030	-0.024876**	-2.548
Currently breast feeding	-0.007795	-0.536	0.062385*	3.941	-0.004880	-1.235
Diarrhea in last 2 weeks	0.01022**	1.981	0.038717*	3.895	0.010056*	2.770
Cough in last 2 weeks	0.01537***	1.828	0.012495**	2.129	0.001556**	2.458
Fever in last 2 weeks	0.001223**	2.094	0.037970*	3.786	0.001939	0.556
Sleep under bed net	-0.005832*	-2.657	-0.022007**	-1.961	0.001372	0.392
Ever given BCG vaccines	-0.003830**	-2.103	-0.005607**	-2.255	-0.000600**	-2.098
Age at first polio vaccine	0.018551*	2.677	0.042681*	2.753	0.007931*	2.577
Number of polio vaccine	-0.005158**	-2.561	0.003444	0.500	-0.00335***	-1.809
Number of DPT vaccine	0.008593	0.665	0.012900	1.602	0.001993	0.696
Ever given measles vaccine	-0.005476**	-2.290	-0.001716**	-2.249	-0.005989**	-2.055
Mother alive	-0.012249**	-2.326	0.024832	0.521	0.006872	0.432
Mother at home	0.003065	0.121	0.007674	0.307	-0.006903	-0.919
Father alive	0.028419	0.882	-0.025026	-0.621	0.01713***	1.947
Father at home	-0.021821**	-2.383	-0.014846	-0.842	-0.005721**	-2.358
Pipe water	-0.022683**	-2.318	0.000271	0.024	-0.003651**	-1.993
Sanitary toilet	-0.000071	-0.696	-0.048304***	-1.819	-0.014117*	-2.909
Non-iodized salt	0.027217*	2.906	0.018943**	2.109	-0.002487	-0.452
Tile as floor material	-0.004470**	-2.500	0.019914	1.349	-0.006444**	-2.579
Electricity	0.000556	0.041	0.032687***	1.893	0.013063*	1.689
Radio	0.004710	0.462	-0.006674	-0.691	0.00592***	1.795
Television	0.01494***	1.727	-0.021179*	-2.987	-0.01301***	-1.816
Refrigerator	-0.04402***	-1.727	0.026119	1.104	0.006201	0.446
F- value	9.03*		8.93*		8.62*	

* - statistically significant at 1 percent level, ** - statistically significant at 5 percent level
*** - statistically significant at 10 percent level

Table 3b: Probit Regression of the Determinants of Wasting (WHZ) Among Children in Sub-Saharan Africa

Country/Variables	Comoros		Lesotho		Swaziland	
	Parameter	t-value	Parameter	t-value	Parameter	t-value
Constant	0.009608	0.641	0.00456	0.2345	0.017245	1.444
Sex	-0.001553	-0.412	0.00522	1.077	-0.00274***	-1.671
Urbanization	-0.007247*	-2.577	-0.004611	-0.696	-0.006393**	-2.481
Age of child	-0.000090*	-2.587	0.000075	0.345	-0.001191	-1.020
Hour of early learning	0.000257	0.629	-0.00283	-0.811	-0.000135	-0.364
Mother's primary education	0.001640	0.145	-0.067364*	-2.693	-0.008806**	-2.472
Mother's secondary education	-0.003070*	-2.714	-0.011207**	-2.104	0.001057**	-2.320
Vitamin A	0.015701*	2.597	0.003655	0.463	-0.003920*	-2.586
Month since last dose of Vitamin A	-0.001279	-1.008	-0.000140	-0.148	0.000093	0.795
Ever breast fed	0.00656	0.122	-0.007955*	-2.642	0.005649	0.910
Currently breast feeding	-0.004585	-0.837	0.020951*	2.843	0.004895	1.481
Diarrhea in last 2 weeks	0.012840**	2.479	0.0068311	0.993	0.004049	0.990
Cough in last 2 weeks	-0.005946	-1.263	-0.010335*	2.623	-0.001137	-0.547
Fever in last 2 weeks	0.002226**	2.500	-0.000421	0.325	0.036777*	5.447
Sleep under bed net	-0.006149**	-2.467	-0.006984**	-2.365	-0.012109	-0.341
Ever given BCG vaccines	-0.006997*	-2.671	-0.005701**	-2.222	0.016558*	-2.644
Age at first polio vaccine	-0.002945	-0.413	0.014990**	2.290	-0.004365*	-2.972
Number of polio vaccine	-0.000822**	-2.249	0.000138	0.019	0.002824*	-2.579
Number of DPT vaccine	0.002628	0.606	-0.003016	-0.308	-0.00353***	-1.703
Ever given measles vaccine	0.011233	1.156	0.015261	0.875	-0.008720	-1.459
Mother alive	-0.01228***	-1.866	-0.056487*	-2.647	0.004250	0.440
Mother at home	0.006264	0.660	-0.007697*	-2.844	-0.00864***	-1.702
Father alive	0.015384	1.308	0.000813	0.087	0.000126	0.018
Father at home	-0.016840*	-2.897	-0.001610**	-2.268	-0.001572**	-2.461
Pipe water	0.00800***	1.954	0.002224	0.415	-0.010334*	-2.582
Sanitary toilet	0.002075	0.214	0.060926*	2.711	0.002306	0.332
Non-iodized salt	-0.008442	-1.477	0.0074744**	2.256	0.01137***	1.923
Tile as floor material	0.004906	1.193	0.0026052	0.181	0.004336	1.063
Electricity	0.007431	1.398	0.003340	0.221	-0.006778	-1.039
Radio	0.0026300	0.609	-0.004090	-0.744	-0.002744	-0.605
Television	-0.007934**	-2.255	-0.01551***	-1.739	-0.003072*	-2.638
Refrigerator	-0.002040	-0.312	0.000394	0.037	0.00623	0.118
F value	7.98*		8.06*		8.14*	

* - statistically significant at 1 percent level, ** - statistically significant at 5 percent level
*** - statistically significant at 10 percent level

Possession of at least a primary education significantly reduces the probability of wasting incidence in Gambia, Central Africa Republic, Lesotho and Swaziland. Also, possession of at least a secondary education significantly reduces the probability of wasting in all the countries except Central Africa Republic. Education is expected to broaden the knowledge of the mothers on the best way to take care of children. Similar findings had been reported (Yimer, 2000; C). Hypothesis 1 is to be rejected for those countries with statistical significance.

Fortification of food with vitamin A significantly reduces the probability of wasting in Central Africa Republic, Comoros and Swaziland. However, the longer the time that children last took vitamin A, the higher the probability of wasting in Niger. This finding supports the finding of Rivera *et al* (2003) because vitamin A had been identified as a growth-promoting factor in children.

Children who ever breastfed have significantly lower probability of wasting in Central Africa Republic and Lesotho. However, those children who were currently breast-feeding have significantly higher probability of wasting in Niger and Lesotho. Many factors like inability to fully breast-feed children, diseases and poor nutrition of the mothers may be responsible (Fernandez, 2002).

Infection with diarrhea significantly increases the probability of wasting in all the countries except Lesotho and Swaziland. Frogillo *et* al (1997) had a similar result. This is because of low food consumption and body dehydration associated with diarrhea. Also, infection with cough significantly increases wasting in all the countries with the exception of Comoros and Swaziland. Fever infection significantly increases wasting in all the countries except Central Africa Republic and Lesotho. Children that were sleeping under bed nets have significantly lower probability of wasting in all the countries except Central Africa Republic and Swaziland. This possibly results from prevention of malaria that may result from mosquito bites.

Children who ever took BCG vaccination have significantly lower probability of wasting in all the countries. The older the children are at the first

time of taking polio vaccination, the higher the probability of wasting in all the countries except Comoros. The higher the number of polio vaccines that children took, the lower the probability of wasting in all the countries with exceptions in Niger and Lesotho. Therefore, hypothesis 2 is to be rejected for those countries with statistical significance. Also, it is only in Swaziland that increasing the number of DPT vaccines taken by the children results in significant reduction in the probability of wasting. This is because these vaccines reduce incidence of diphtheria, polio and tuberculosis in children. Children who ever took vaccination against measles have significantly lower probability of wasting in Gambia, Niger and Central Africa Republic. Frogillo *et al* (1997) observed a negative correlation between immunization rate and prevalence of wasting in Asia.

Children whose mothers are alive have significantly lower probability of wasting only in Gambia, Comoros and Lesotho. However, probability of children becoming wasting significantly decreases when mothers are at home in Lesotho and Swaziland. The parameter of the variable, father alive does not have the expected sign for many of the countries and it is statistically significant only in Central Africa Republic. However, children whose fathers were at home have significantly lower probability of wasting in all the countries except Niger. Presence of father is expected to guarantee food provision and this may make children non-vulnerable to acute growth disturbances.

UNICEF (1990) noted that economic status of households could be assessed by access to basic health facilities, safe water and sanitation facilities. Children from homes where there is safe (pipe) water have significantly lower probability of wasting in all the countries except Niger and Lesotho. The presence of sanitary toilet also significantly reduces the probability of wasting in Niger and Central Africa Republic. Contrary to expectation, the parameter for Lesotho has positive sign and it is statistically significant ($p < 0.05$). Consumption of non-iodized salt leads to significant increase in the probability of child wasting in all the countries except Central Africa Republic and Comoros. Children from households where floors are covered with tiles have significantly lower probability of wasting only in Gambia and Central Africa Republic. The parameters of presence of electricity for Niger and Central Africa Republic have positive sign and statistically significant ($p < 0.10$) showing that children from houses where there is electricity have significantly higher probability of wasting. Similar contrary observation was recorded for radio parameter, which has positive and statistically significant variable ($p < 0.10$) for Central Africa Republic. However, households with television have significantly lower probability of wasting in all the countries except Gambia. Children whose households have refrigerator have lower probability of wasting in Gambia. This might result from increase in the ability to preserve food.

5. Recommendations and Conclusion

Wasting is one of the major indicators of malnutrition in SSA. The MDGs cannot be fully achieved if this issue is not tactically addresses given its direct linkage with child mortality. To therefore work towards ensuring increased welfare for SSA children, the following policy statement can be derived from this study: Wasting worst affects rural areas and infection with diseases like diarrhea and fever increases the incidence of wasting. Immunization with BCG, polio, DPT and measles vaccines significantly reduce probability of wasting. These underscore the need for provision of basic health facilities in the rural areas and strengthening the existing ones in urban areas with necessary facilities. Health services should also include educating women on the need for child immunization, causes of major child illnesses and the way of preventing them. These will help reduce child wasting.

Wasting is more pronounced among younger children and those currently breast-feeding. The need to ensure that mothers have the know-how of discharging cares to children at early age is underscored. This involves understanding the recommendations for exclusive breast feeding and nutritional requirements of mothers during breast-feeding.

Results for some countries revealed that children whose parents were alive and at home are nutritionally better that those who might have lost their parents or staying with guardians. This finding presupposes that setting up appropriate institutions to address issues like HIV/AIDS, malaria, tuberculosis, accidents etc. that often lead to untimely death of parents is a way of addressing malnutrition among children in SSA. Access to potable water reduces wasting in under-five children. There is therefore need to resuscitate water management schemes and their institutions to be able to cope with the water needs of the rural and urban people. These will lead to drastic reduction in the incidence of such diseases as cholera and diarrhea among children.

This study captures sanitary environment with inclusion of sanitary toilet and floor type variables, which significantly reduce probability of wasting in some SSA countries. Rural and urban sanitary officers should be strengthened to ensure that every household has a sanitary toilet for appropriate disposal of children and adult stools.

Finally, improved living condition with access to electricity, radio and television was found to significantly reduce probability of wasting in some SSA countries. This vividly underscores the important role media plays in improving the nutrition conditions of children in SSA. Therefore, radio and television programs on childcare and nutrition requirements of children should be sponsored and promoted.

References

1. *ACC/SCN*. Nutrition Throughout the Life Cycle, 4th Report on the World Nutrition Situation, Geneva. 2000.
2. Chevassus-Agnès, S. Anthropometric, health and demographic indicators in assessing nutritional status and food consumption Special: Population, poverty and environment FAO Food and Nutrition Division with the collaboration of Alain Marcoux, FAO Population Programme Service. 1999.
3. de Onis M, Blössner M. *WHO global database on child growth and malnutrition*. Geneva: World Health Organization; 1997. Unpublished document WHO/NUT/97.4
4. de Onis M, Blössner M, Villar J. Levels and patterns of intrauterine growth retardation in developing countries. *European Journal of Clinical Nutrition* 1998;52(Suppl 1):S5-15.
5. Department of Census and Statistics. Nutritional Status of Pre-School Children in Sri Lanka. Concluding Workshop. RETA 6007: Enahancing Social and gender Statistics. 24-27 June 2003, Bangkok, Thailand. http://www.unescap.org/stat/meet/esgs2/esgs2srilanka.pdf, download
6. Ekanayake, S, Weerahama J, Ariyawardana A. Role of Mother in Alleviating Child Malnutrition: Evidence from Sri Lanka. Research Report presented at the 3rd Poverty and Economic Policy (PEP). 16-20th June 2004.
7. Fernandez,Isabel D. John H. Himes Mercedes, de Onis. Prevalence of nutritional wasting in populations: building explanatory models using secondary data Bull World Health Organ vol.80 no.4 Genebra 2002
8. Frogillo EA. de Onis M. and Hauson K.M.P. Socio-Economic and Demographic Factors Are Associated With Worldwide Patterns of stunting and Wasting of Children. The Journal of Nutrition 1997;127. (12): 2302-2309.
9. Gunasekara HR. Nutrition Status of Children in Sri Lanka. *Sri Lankan Journal of Population Studies*. 1999; 1(12):57-73.
10. MINECOFIN. A Profile of Poverty in Rwanda, An Analysis Based on the Results of the Household Living Condition Survey. Kigali. Ministry of Finance and Economic Planning, National Poverty Reduction Programme and Statistics Department, February. Kigali, Rwanda. 2002.
11. ORC Macro. Measure DHS+STAT compiler. 2001.Available at: www.measuredhs.com
12. Rivera, JA, Hotz C, González-Cossío T, Neufeld L and García-Guerra A. The Effect of Micronutrient Deficiencies on Child Growth: A Review of Results from *Community-Based Supplementation Trials* J. Nutr. 133:4010S-4020S, November 2003.
13. UNICEF. *Strategy for Improved Nutrition of Children and Women in Developing Countries*. New York. 1990.
14. UNICEF. *The State of the World's Children 1998*. New York. 1998.
15. UNICEF. *Poverty Reduction Begins with Children* UNICEF New York March 2000.
16. United State Agency for International Development (USAID). Nutrition of young children and mothers in Burkina Faso Findings from the 1998-99 Burkina Faso DHS Survey, Macro International Inc. 11785 Beltsville Drive Calverton, Maryland, U.S.A. May 2000
16. Wise V. Nutritional Situation of Young Children in Rwanda: An Analysis of Anthropometric data collected by the Household Living Conditions Survey 1999 – 2001. Research Report, Food Security Research Project (FSRP) and Division of Agricultural Statistics (DSA) Ministry of Agriculture, Livestock, and Forestry, MINAGRI. 2004
17. World Bank. World Development Indicator Database www.worldbank.org). (2004).
18. World Health Organization (WHO) (1995). *Physical status: the use and interpretation of anthropometry. Report of a WHO Expert Committee.* Geneva, World Health Organization, 1995 (WHO Technical Report Series, No. 854).
19. World Health Organization (WHO). Nutrition for Health and Development (NHD) *A global agenda for combating malnutrition* World Health Organization, Sustainable Development and Healthy Environments (SDE) Nutrition for Health and Development (NHD), 2000.
20. Yimer G. Malnutrition among children in southern Ethiopia: Levels and risk factors. *Ethiopian* Journal of Health Development 2000; 14(3):283-292.
21. Zere E and McIntyre D. Inequities in Under-Five Child malnutrition in South Africa. *International Journal for Equity in Health* (2003). 2:7 www.equityhealthj.com/content/2/1/7

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