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Original Research Article

Association of Children's Nutritional Status with Caregivers' Hygiene and Sanitation Conditions in Kiandutu Informal Settlements, Kiambu County, Kenya

Peris Mwangi[1], Dr. John Paul Oyore[2], Dr. Eunice Njogu[3]

[1]Research Scholar, [2]Senior Lecturer,
Department of Community Health & Epidemiology, Kenyatta University, Kenya, P.O BOX 43844-00100, Nairobi, Kenya,
[3]Lecturer, Department of Food, Nutrition and Dietetics, Kenyatta University, Kenya, P.O BOX 43844-00100, Nairobi, Kenya,

Corresponding Author: Peris Mwangi

ABSTRACT

Introduction: Childhood malnutrition increases the risk of infections, morbidity and mortality in association with decreased mental and cognitive development. Poor conditions of WASH lead to infectious disease, especially diarrhoea, causing nutrient malabsorption and poor appetite and consequently undernutrition.
Methods: the study was a cross sectional analytical study design with a sample size of 165 caregivers with their children aged 6-59 months. The caregivers were randomly within the Kiandutu Informal Settlement. Semi-structured questionnaire was used to gather hygiene and sanitation information from the caregivers. Children's height, weight and MUAC measurements were obtained. Data was analyzed using SPSS version 22.
Results: the nutritional status prevalence for the children was 33.3%, 15.1% and 8.8% for stunting, underweight and wasting respectively. The study results showed that the caregivers had low (88.1%) and moderate (11.9%) knowledge in WASH. Caregivers' WASH practices were also poor: only 23.9% got drinking water from piped water, 61.6% did not treat drinking water before consumption, 71.9% did not have access to a latrine and 55% of those who washed hands used water only.
Conclusion: the study established association between WASH knowledge and some practices among the caregivers with the child's nutritional status. In addition, the nutritional status prevalence was also high above the national rates, this indicated that undernutrition is a major public health problem in informal settlements.

***Key words*:** child, caregiver, undernutrition, hygiene, sanitation

INTRODUCTION

Children's nutritional status is essential since it determines their health status, development, physical growth, academic performance and general progress in life. [1] Childhood malnutrition increases the risk of infections, morbidity and mortality in conjunction with cognitive development. [2] It is approximated that globally, 50.5 million and 150.8 million children less than five years are wasted and stunted respectively. [3] Close to 4.5 percent of child deaths were attributed to undernutrition with 7.4 percent lives of children being at immediate risk due to severe wasting. [4]

Childhood undernutrition is caused directly by inadequate diet and diseases. Poor conditions of WASH lead to infectious disease, especially diarrhoea, causing nutrient malabsorption and poor appetite and consequently undernutrition. [5] Further, poor nutritional status increases infectious diseases susceptibility creating a vicious cycle of deteriorating nutritional status worsening illness. [6]

It is estimated that 40 to 60 percent of malnutrition in childhood is attributed to poor WASH conditions, predominantly through frequent diarrhoea episodes and nematode intestinal infections. [7] Some studies have shown that poor environmental conditions, poor sanitation and hygiene practices and unavailability of accessible, safe drinking water are the principle antecedents of diarrhoea among children under five years of age. [5] Improved water and sanitation conditions decrease stunting especially in a context of high open defecation per square meter and high population density. [4] Therefore, poor WASH contributes to undernutrition in three ways through introduction of soil transmitted helminthic infections, diarrhoea disease and environmental enteropathy. [6]

Children undernutrition and poor WASH conditions coexist in many developing countries with high rates of poverty. Informal settlements are associated with poverty, poor sanitation and inadequate clean water. Overtime, it has been recognized that poor urban areas may have the highest susceptibility of enteric infection because of the high population density combined with limited infrastructure such as overcrowding, impoverished housing conditions and lack of sanitation facilities and safe water for drinking. [8] In Kenya, the prevalence rate of under nutrition stands at 26, 4, and 11 percent for stunting, wasting, and underweight respectively in children below five years. [9] This shows that malnutrition is still a challenge among children under-five years. Kiambu County has a prevalence of 15.7, 2.3 and 5.1 percent for stunting, wasting and underweight respectively. [9]

This study sought to establish an association of the caregiver's hygiene and sanitation knowledge and practice with the child's nutritional status.

MATERIALS AND METHODS

A cross-sectional analytical study design was adopted in this study. The study was conducted in Kiandutu Informal Settlements in Kiambu County, Kenya. The area has poor hygiene and sanitation conditions and an average of 250 cases of diarrhoea and 100 cases of malnutrition among children under five are reported monthly. [10]

Study participants

The study targeted caregivers with their children aged 6-59 months who had lived in Kiandutu Informal Settlement for the last six months.

Data collection tools

Hygiene and sanitation information was collected using a researcher administered questionnaire. Nutritional status was determined using anthropometric measures which included height, weight and MUAC.

Data Analysis

Data collected was analyzed with SPSS version 22. Anthropometric measures were analyzed using SMART ENA to get the nutrition status. Inferential and descriptive statistics were used to infer and describe the quantitative data. Chi-square was used to test the association between WASH and nutrition status. The level of significance was set at $p<0.05$.

Ethical Approval

Ethical approval to conduct the study was given by the Kenyatta University Ethical Committee. Research permit was obtained from the National Commission for Science, Technology and Innovation. Informed consent was sought from the study participants. The data collected was anonymous and confidentiality was maintained.

RESULTS

Demographic Characteristics of Caregivers

A total 159 questionnaires (96% response rate) were complete and hence used for analysis.

Table1:Caregivers'Demographic Characteristics

Characteristic	N=159	
	N	%
Sex		
Male	2	1.3
Female	157	98.7
Age		
≤ 19 years	14	8.8
20-29 years	96	60.4
30-39 years	44	27.7
40-49 years	3	1.9
≥ 50 years	2	1.2
Level of education		
None	2	1.3
primary incomplete	23	14.5
primary complete	35	22
secondary incomplete	44	27.7
secondary complete	37	23.2
tertiary education	18	11.3
Occupation		
Unemployed	87	54.7
Self-employed	47	29.6
Employed (salaried)	25	15.7
Total	159	100.0

As shown in Table 1, majority (98.7%) of the caregivers were female, more than half (60.4%) were aged 20-29 years with only 1.2% being above 50 years. Most (27.7%) had incomplete secondary school with only 11.3% having tertiary education. More than half (54.7%) were unemployed and most of the households (49.7%) had an average monthly income of between Kshs. 1000 and 5000.

Characteristics of the Children

Table 2: Age and sex of the children

	Boys		Girls		Total	
AGE (months)	**n**	**%**	**N**	**%**	**n**	**%**
6-17	43	52.4	39	47.6	82	51.6
18-29	19	48.7	20	51.3	39	24.5
30-41	8	38.1	13	61.9	21	13.2
42-53	7	53.8	6	46.2	13	8.2
54-59	1	25.0	3	75.0	4	2.5
Total	78	49.1	81	50.9	159	100.0

As shown in table 2, most (50.9%) of the children were girls and more than half (51.6%) of the children were aged 6-17 months. Most (53.8%) of the boys aged 12-53 months and most (61.9%) of the girls aged 30-41 months.

Nutrition status of the children

Table 3: Prevalence of wasting based on MUAC measurements

	All n = 159	Boys n = 78	Girls n = 81
Prevalence of global malnutrition	(14) 8.8 %	(9) 11.5 %	(5) 6.2 %
(< 125 mm and/or oedema)	(5.3 - 14.2 95% C.I.)	(6.2 - 20.5 95% C.I.)	(2.7 - 13.6 95% C.I.)
Prevalence of moderate malnutrition	(11) 6.9 %	(6) 7.7 %	(5) 6.2 %
(< 125 mm and >= 115 mm, no oedema)	(3.9 - 12.0 95% C.I.)	(3.6- 15.8 95% C.I.)	(2.7 - 13.6 95% C.I.)
Prevalence of severe malnutrition	(3) 1.9 %	(3) 3.8 %	(0) 0.0 %
(< 115 mm and/or oedema)	(0.6 - 5.4 95% C.I.)	(1.3 - 10.7 95% C.I.)	(0.0 - 4.5 95% C.I.)

As shown in Table 3, the prevalence of Global Malnutrition (GAM) was 8.8% with boys having a prevalence of 11.5% and girls 6.2%. Girls did not have any case of severe wasting but 3.8% of the boys were severely malnourished.

Prevalence of stunting

Prevalence of stunting in children 6-59 months was 33.3% (CI 26.5- 41.0) with 35.9% (CI 26.1- 47.0) being male and 30.9% (CI 21.9- 41.6) being female. The prevalence of those stunted and severely stunted was 20.8% (CI 15.2- 27.7) and 12.6% (CI 8.3- 18.6). The study revealed that slightly above half (66.7%) of the children were normal. Severe stunting was highly (35%) experienced in the age-set of 30-41 months while moderate stunting was highest (36%) in the age-set 6-17 months.

Prevalence of underweight

The study revealed that the prevalence of underweight among study subjects was 15.1% (CI 10.4- 21.5) with 15.4% (CI 9.0- 25.0) being male and 14.8% (CI 8.7-24.1) being female. Majority (84.9%) of the children 6-59 months were normal. The prevalence of moderate underweight and severe underweight was 8.2% (CI 4.8- 13.5) and 6.9% (CI 3.9-12.0) respectively. Severe and moderate underweight were high (54.5% and 46% respectively) in the age-set 30- 41 months.

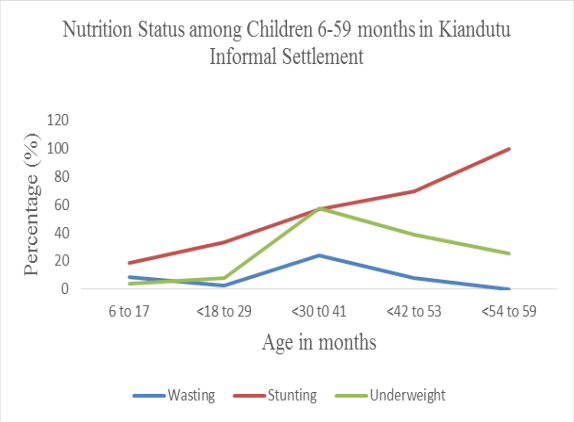

Figure 1: Nutritional status of the children versus age

Hygiene and sanitation conditions among caregivers

In general the study revealed that the caregivers had low (88.1%) and moderate (11.9%) knowledge in water, hygiene and sanitation (WASH). The cumulative score was obtained from answers in WASH questions relating to WASH related diseases signs and symptoms, transmission and prevention. The practices in WASH among the caregivers were also poor. For instance, only 23.9% got drinking water from piped water, 61.6% did not treat before drinking, 71.9% did not have access to a latrine and 55% of those who washed hands used water only. Further, 96% of the children had had diarrhoea two weeks prior to the survey.

Association of Caregivers' WASH conditions with children's nutritional status

The study used underweight (weight for age (W/A)) which shows undernutrition, and is a representative of both stunting and wasting, to cross-tabulate with the various aspects of caregivers' WASH.

WASH was cross-tabulated in terms of knowledge and practices. Table 4 show the Chi-Square results for the relationship between Caregiver's WASH knowledge with child's nutritional status:

Table 4: Knowledge Score Percent versus Underweight

Knowledge score percent				
Nutritional status (Weight for Age)	**low knowledge**	**moderate knowledge**	**N**	**Chi-square value**
Underweight	24	0	24	$\chi2$=3.836;
Normal	116	19	135	df=1
Total	140	19	159	P=0.036*

*: significant (P< 0.05); Fisher's Exact Test value was used for all 2by2 tables

Caregiver's WASH knowledge score had a significant association with the child's nutritional status. This meant that those caregivers who had low knowledge in WASH had their children being underweight.

With regard to caregiver's WASH practices, the study revealed the association as illustrated in table 5:

Table 5: Nutritional Status (Underweight) versus WASH practices

Nutrition status vs:	**Underweight**	**Normal**	**Chi-square values**
Water treatment			
Yes	6	41	$\chi2$=0.282, df=1
No	18	94	P= 0.395
Source of drinking water		43	
piped municipal water	9	30	$\chi2$ =24.033, df=2,
private water vendors	6	57	P= 0.026*
borehole/ unprotected shallow well	9		
Access to a latrine			$\chi2$=0.032, df=1,
yes	7	37	P= 0.517
no	17	98	
Disposal of child's stool			
in the napkin/diaper	6	36	$\chi2$ =1.197, df=2,
on the ground	18	95	P= 0.550
in the latrine	0	6	
Caregiver handwashing practice			
yes	13	7	$\chi2$=44.459, df=1,
no	11	128	P= <0.001*
Child's handwashing practice			$\chi2$=0.553, df=1,
yes	5	38	P= 0.319
no	19	97	

*: significant (P< 0.05); Fisher's Exact Test value was used for all 2by2 tables

Water treatment practice did not have a significant association with the children nutritional status (χ^2=0.282; P=0.395; df =1). In addition, the source of drinking water for the household had a significant association with the child's nutrition status (χ^2=24.033; P=0.026; df=2). This meant that most of the caregivers who did not get drinking water from an improved source that is the piped water had children who had undernutrition. Access to a latrine by the caregiver did not have a significant association with the child's nutritional status (χ^2=0.032; P=0.517; df=1). The method of child's excreta disposal did not show a significant association with their nutritional status (χ^2=1.197; P=0.550; df=2). Key to note is that handwashing practice among the caregivers had a strong significant association with the child's nutrition status (χ^2=44.459; P=<0.001; df=1). This meant that most of the caregivers who did not practice handwash had children who had undernutrition. Majority of the caregivers used water only to wash hands without any bactericidal.

DISCUSSION

Overall the magnitude of undernutrition was high among children 6-59 months of age based on all the three indices with increasing age: stunting, wasting and underweight. The prevalence was higher than that of the national figure 26, 11 and 4 percent for stunting, underweight and wasting respectively. [9] The results agree with the rates identified in a study conducted in Korogocho slums determining feeding practices and high prevalence of malnutrition in urban slums child care centres. [11] However, the prevalence disagrees with that revealed by a similar study in the informal settlement among children living with HIV/AIDS. [12]

In this study, more boys were undernourished than girls in all the studied nutrition indicators, that is stunting, wasting and underweight, and this is in agreement with a study done in Kwale County. [13]

Source of drinking water had a significant relationship with the child's nutritional status, this agrees with a study that established that two year old children were 1.0 centimetre shorter in areas with worst conditions of water source, storage and sanitation compared to those with best conditions. [7] This study also found a very strong relationship between caregiver's handwashing practice with the child's nutritional status, the results agree with the findings of a study conducted in Tanzania which found an association between caregiver's handwashing practice with soap before a meal and after defecation with stunting. [14] This can be related to the fact that hands are carriers of various pathogens which cause diarrhoea which in turn affects nutrients absorption in the body.

Key to note is that of these diseases the most reported was diarrhoea. More than quarter of the malnourished children had diarrhoea two weeks prior to the data collection which agrees with a study done in Ethiopia. [7] The high prevalence of undernutrition could be attributed to the high morbidity especially in diarrhoea a WASH related disease and the poor WASH conditions in the area.

This can also be emphasized by the environmental enteric dysfunction, in children living in poor WASH conditions, which leads to poor nutrient absorption in their bodies. A study conducted in Tanzania concluded that unsanitary and unhygienic conditions led to undernutrition which agrees with this study. [15]

CONCLUSION

The study established that there is an association between caregiver's WASH knowledge and practices with the child's nutritional status. Therefore, the national and county governments and any other relevant authority should integrate WASH components in all nutrition programs to help fight undernutrition in children. Caregivers should also be educated on the linkage between WASH and poor nutrition status.

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