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Feeding Practices and Nutrition Status among Children Aged 6-23 Months after Discharge from Supplementary Feeding Program in Isiolo County, Kenya

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ABSTRACT

The children successfully treated for acute malnutrition continue to be at risk of illnesses, relapse and sometimes death in the subsequent year after treatment. This vulnerable population could adopt appropriate feeding practices to prevent relapse with improved linear growth within the critical age of up to 23 months. Insufficient scientific documentation of these children's state of nutrition since their discharge, from malnutrition treatment program, guided this study. Cross section analytical design was used among children exited from the supplementary feeding program who were cured and within the age group 6 to 23 months. Children continuing in the program were excluded from the study. Purposive sampling was used to sample Garbatulla sub-county in Isiolo and the children who fit the criteria from the program registers. Relationships between variables were determined using Chi-square, Pearson Correlation and Odds ratio at 0.05 level of significance. Wasting (14.7%), stunting (33.8%) and underweight (19.1%) indicated under-nutrition by Z-scores. Attaining minimum meal frequency and minimum acceptable diet was a challenge among the non-breastfed and older children. Individual dietary diversity ($r=0.47$; $p=0.045$), meal frequency ($r=0.53$; $p=0.038$) and attaining minimum acceptable diet ($\chi^2=45.71$; $p=<0.001$) exhibited significant relationships with wasting. Children still relapse after successful treatment of acute malnutrition after discharge. Feeding practices adopted after discharge were poor and below the World Health Organization guidelines as depicted by failure to attain the minimum acceptable diet. As a result, some children were wasted. This was attributed to overreliance on the food aid. The study recommends that follow-up schedules of the children below 2 years after nutrition program treatment be documented to enhance timely identification of possible relapse cases.

Keywords

Supplementary feeding program, Feeding practices, Nutrition status, Wasting, Children 6-23 months.

Introduction

Feeding practices that do not meet the needs of young children are documented to increase their risk of becoming undernourished, contracting infections and could lead to death in the end [1]. Vulnerable populations, such as those successfully treated for acute malnutrition, could use feeding to prevent relapse while improving linear growth rapidly and significantly [2]. The available dietary requirements for children may not take into account factors that may upset assimilation and utilization of nutrients after malnutrition treatment; thereby increasing the risk of over-estimating or under-estimating their needs [3]. Nevertheless, it is recommended that foods given to the children recovering from illness should be based on the available foods in their locality with an inclination towards a diverse diet that includes foods sourced from animals.

The 18-month interval between 6 and 23 months is reported to be especially of importance due to the introduction of solid and semisolid foods to complement the breast milk [1]. In the early life, under-nutrition is directly because of poor feeding practices (in both breastfeeding and complementary feeding) coupled with high disease occurrence [4]. Nutrition changes, beyond the second year of life, have little effect on recovery due to the lost potential outside the first 1000 days of life [5]. A study carried out in Nairobi, Kenya [6], revealed that cessation of breastfeeding before a child's second birthday increases the likelihood of being underweight by up to four times. Ethiopia show higher stunting levels in children

who are breastfed beyond one year than those below one year [5]. Studies in Bangladesh [7,8] reveal a significant relationship between dietary diversity and stunting levels amongst children [9]. Some studies in Ghana [10,11] associate dietary diversity with all the three anthropometric indicators of nutrition status [Weight for Age Z-score (WAZ), Length for Age Z-score (LAZ) and Weight for Length (WLZ)]. Likewise, a research study conducted in among children in Kenyan prisons [12] found no association between stunting and any of the complementary feeding indicators [Minimum Dietary Diversity (MDD), Minimum Meal Frequency (MMF) and Minimum Acceptable Diet (MAD)]. The revealed inconsistencies portray the need for more information regarding the association between complementary feeding and nutrition status.

Children in Kenya found to be moderately wasted, with no medical complications, are treated using supplemental feeds in an outpatient program [Supplementary Feeding Program (SFP)] until they achieve the target WLZ ≥ -2SD [13]. Once they attain the discharge criteria, the children are provided with ration that will last a fortnight. Follow-up studies on those discharged uncovered that the children's recovery from moderate acute malnutrition (MAM), through anthropometry, is not equivalent to physiologic and immunologic restoration [14-16]. The Arid Semi–Arid Lands (ASAL) are particularly of concern owing to their heightened risk of food scarcity and challenged socio-economic capabilities among its inhabitants [17,18]. Moreover, documentation of those children's state of nutrition after discharge from the nutrition treatment programs in Kenya is scanty. This study, therefore, set to generate information on feeding practices and nutrition status that could build towards interventions targeting this critical window of opportunity after previous treatment of acute malnutrition.

Materials and Methods

Study design

Cross sectional analytical design was used to determine associations between the feeding practices and nutrition status among the sampled children. The participating children were aged 6-23 months previously admitted through the SFP and discharged to home as "cured"; their primary caregivers accompanied them as respondents. The study excluded the children who had been discharged as "cured" but were later registered as readmissions.

Study area

Isiolo County receives developmental and emergency assistance through collaborative efforts of the County Government and Non-Governmental Organizations (NGO) [19]. By 2017, The entire Isiolo County was among the Counties targeted for the Blanket Supplementary Feeding Program (BSFP) after drought was declared a national disaster in Kenya [18]. Garbatulla Sub-County is one of 3 sub-counties of Isiolo that saw an increase in severe acute malnutrition despite the gradual decrease in the County's malnutrition levels. It is an ASAL locale, predominantly inhabited by the Borana community, whose majority depends on pastoralism for their livelihood. The sub-County has three wards namely: Garbatulla, Kinna and Sericho with 9,818.90 sq. km area and a population of 43,118 that were then served by a total 14 health facilities offering Integrated Management of Acute Malnutrition (IMAM) [13]. The GAM rate for the sub-County was 8.6% by May 2013 [19].

Sample size determination and sampling procedure

The Fischer's formula for populations below 10000 was used to arrive at the minimum sample size. A non-response rate of 10% was applied with reference to the multiple indicator cluster survey results in the Isiolo County regarding children below 5 years [13]. The study targeted a sample size of 216 of which data is reported for 204 children. Thirteen IMAM facilities were considered for the sample size distribution where the 14th was selected for pretesting of the tools. Probability proportionate to size was used to assign the sample per facility; individual children were selected purposively from the SFP registers at the facilities. As the study commenced, it was noted that there were slightly fewer children that had been admitted into the SFP and therefore, fewer children who fit the criteria in a few facilities. Deficits in the minimum sample per facility were filled in by sampling all children that fit the criteria in each of the 13 SFP registers, despite the initial minimum sample size per facility and period of time since they were exited. This sampling process to identify the children from the registers was conducted only once for each facility.

Data collection tools and procedure

A researcher-administered questionnaire was prepared using both closed ended and open-ended questions to elicit information on child's nutrition status and feeding practices. The anthropometry form included data on weight, length and presence of edema while the feeding practices were determined by 24 hour dietary recall. Pretest of the tools was conducted on 10% of the total sample at one of the facilities that was not included in the actual study. Thirteen research assistants who had completed high school studies and were knowledgeable in data collection for surveys were recruited from each facility area for the exercise. These were independent from the facility staff. The sampled children with their primary caregivers were mobilized to visit the facility from where the research assistants would collect the data in confidence. Those who were not available were asked for their convenient time and day for the interview.

Anthropometric measurements

Calibrated Salter scales were used to take the children's weight to the nearest 0.1kilogram. This was taken without shoes and any bulky clothing on the child. The standard calibrated height boards were used for length measurement to the nearest 0.1 centimeter. Length was taken when the child was lying down flat on the back with the head touching the board. This equipment was available at each of the sampled facilities. The primary caregivers were asked to carry with them the child's vaccination card to ascertain the age; those without the cards were asked to orally state the age. The measurements were taken two times and the average recorded as the final. The information on WLZ, HAZ and WAZ indices were referenced against the WHO growth reference charts to for interpretation. Presence of bilaterally pitting edema was

ascertained by applying moderate thumb pressure on the feet of the children.

Assessment of feeding practices

Feeding practices were based on recall by the primary caregivers of the food items fed to the children in the preceding 24 hours of the study. These were then interpreted against 3 indicators; MMF, MDD and MAD. To attain MMF, breastfed infants in age group 6 -8 months were to have received at least two meals whereas those breastfed 9-23 months three or more meals in the previous 24 hours. All non-breastfed infants, regardless of their age, were to have received at least 4 meals within 24 hours [20]. Foods consumed were grouped into 7: grains, roots and tubers, legumes and nuts, dairy products, flesh foods, eggs, vitamin-A rich fruits and vegetables; other fruits and vegetables [20]. Children who consumed at ≥ 4 groups regardless of their breastfeeding status were considered to have attained the MDD. Further, breastfed children were regarded to have achieved MAD after having consumed at least the minimum number of food groups, as well as in the minimum number of meals for their age category. Non-breastfed infants must have consumed a combination of minimum meal frequency, minimum dietary diversity and milk feeds to have achieved MAD [20].

Data quality assurance

The authors reviewed all the data collection tools before their finalization. A pretest exercise was carried out within the same sub-county on respondents similar to those in the study. During recruitment of the research assistants, emphasis was put on education level and prior experience in carrying out surveys in the area. They were then trained for one complete day on the data collection tools with a demonstration session for practice. The lead investigator ensured close monitoring of the data collection process including collection of the anthropometry measurements twice for an average figure.

Data analysis

The coded data from the questionnaire was cleaned before analysis. ENA for SMART 2011 computer package was used to analyze the anthropometric measurements that were interpreted using the WHO (2006) cut off points. Indices (WAZ, LAZ and WLZ) that fell below -2SD up to -3SD Z score signified moderate underweight, stunting and wasting prevalence respectively while the severe under nutrition status were below -3SD Z score. SPSS version 17.0 was used to aid further cross analysis of the study variables. Chi-square test was executed to determine relationships between categorical variables (breastfeeding status and attainment of minimum acceptable diet) and nutrition status (wasting as a measure of acute malnutrition) among the children.

The Pearson product moment correlation was used to determine the relationship between non-categorical variables (number of food groups and meals consumed (dietary diversity and meal frequency) in addition to nutrition status among the children. Statistical significance was established by use of a P-value of < 0.05. Odds ratio was used to determine the strength of the relationship.

Results

Feeding practices among children

More than half (58.8%) of the study children were still being breastfed at the time of the study, 95.0% of whom were within the 6-11 months age group. The number of the breastfed children reduced, as they grew older whereas the fewest children being breastfed being in the age group 18-23 months (Figure 1).

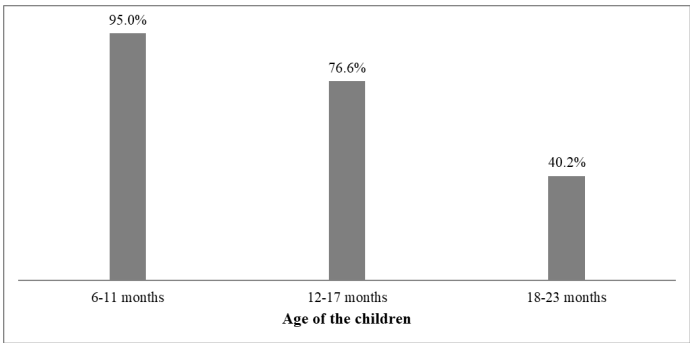

Figure 1: Breastfeeding status by the age of the study children.

A majority of children (74.0%) were fed on solid, semi-solid or soft foods 3 times in 24 hours before the study. The mean number of meals was 2.94 ± 0.54 (Table 1). The number of children who had received their recommended age group minimum meal frequency declined steadily with their age. The mean dietary diversity score among the study children was 4.73 ± 0.84, where nearly all (99.0%) of the children were in the medium and high terciles.

		n	%
Distribution of meals fed to the study children in the preceding 24 hours (n=204)	1	1	0.5
	2	32	15.7
	3	151	74.0
	4	19	9.3
	5	1	0.5
	Mean = 2.94 ± 0.54		
Children who met minimum meal frequency by age and breastfeeding status	Breastfed children 6-8 months (n=6)	6	100
	Breastfed children aged 9-23 months (n=114)	108	94.7
	Non-breastfed aged 6-23 months (n=84)	8	9.5
DDS of the study children	Lower ≤ 3	2	1.0
	Medium 4-5	161	78.9
	High ≥ 6	41	20.1
	Mean= 4.73 ± 0.84		

Table 1: Dietary practices among children.

The most popular foods consumed by all of the children came from grains, roots and tubers 96.1%, dairy products (80.4%) and other fruits and vegetables (73.5%), which were not red or yellow nor dark-green, respectively (Figure 2).

Children who were fed using foods that were rich in iron or iron fortified were only 48.6%. The ability to achieve MAD decreased with the children's age whereas more breastfed children met their MAD (62.5%) than their non-breastfed counterparts did meet

(28.6%) (Table 2).

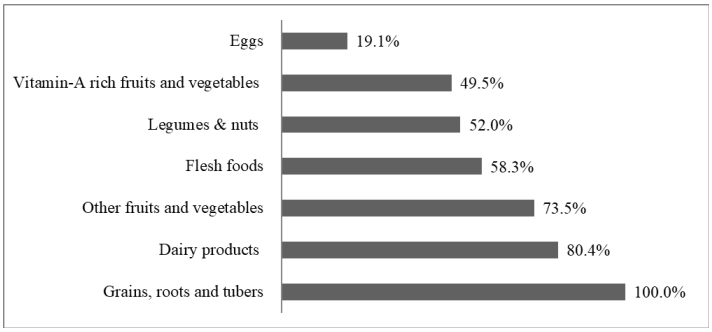

Figure 2: Food groups consumed by the study children in the preceding 24 hours.

Age group (n=204)	Frequency	% age group who met criteria
6-11 months (20)	17	85.0
12-17 months (77)	51	66.2
18-23 months (107)	31	29.0
Total 6-23 months (204)	99	48.5
Total 6-23 months Breastfed (120)	75	62.5
Total 6-23 months Non-breastfed (84)	24	28.6

Table 2: Distribution of children of met their minimum acceptable diet by age and breastfeeding status.

Nutrition status

The mean (SD) of the z-scores for wasting, stunting and underweight were -0.82 ± 1.55, -1.55 ± 1.89 and -0.08 ± 2.23 respectively. The prevalence of wasting, stunting and underweight were 14.7%, 33.8% and 19.1% in that order. At the time of the study, no bilaterally pitting edema cases were found among the assessed children. Most of the wasted children were in the age group 12-17 months (18.2%) with a decline as the children got into the 18-23 months (12.1%) category. More than half (66.2%) of all the children in the study had a normal length in relation to their age while stunting was highest in the age group 12-17 months. About 20.0% of all the children in the study had a low weight for their age with only 15.0% originating from the 6-11 months age group (Table 3).

Nutrition status by age	Age in months							
	6-11 (n=20)		12-17 (n=77)		18-23 (n=107)		Total (n=204)	
	n	%	n	%	n	%	n	%
Severely wasted (SAM) < -3SD WLZ	0	0	2	2.6	4	3.7	6	2.9
Moderately wasted (MAM) ≥-3SD to <-2SD WLZ	3	15.0	12	15.6	9	8.4	24	11.8
Total wasted (GAM) <-2SD	3	15.0	14	18.2	13	12.1	30	14.7
Severely stunted < -3SD LAZ	3	15.0	19	24.7	11	3	33	16.2
Moderately stunted ≥ -3SD to < -2SD LAZ	4	20.0	17	22.1	15	4	36	17.6
Total stunted < -2SD	7	35.0	36	46.8	26	7	69	33.8
Severely underweight < -3SD WAZ	0	0	1	1.3	7	6.5	8	3.9
Moderately underweight ≥ -3SD to < -2SD WAZ	3	15.0	16	20.8	12	11.2	31	15.2
Total underweight < -2SD	3	15.0	17	22.1	19	17.8	39	19.1

Table 3: Nutrition status of the children by age group.

Associations between feeding practices and nutrition status

Meal frequency (number of meals), dietary diversity (number of food groups) and attainment of minimum acceptable diet were the significant feeding practices, in relation to nutrition status (wasting). The higher the number of meals a child was given, the higher the Z scores (r=0.53; p=0.038) (Table 4).

N=204		Wasting		Underweight		Stunting	
Meal frequency (No. of meals) (n)		f	%	f	%	f	%
<3	33	7	21.2	9	27.2	13	39.4
3	151	19	12.6	26	15.9	49	32.5
>3	20	3	15.0	4	20.0	7	35.0
Total	204	30	14.7	39	19.1	69	33.8
Individual dietary diversity (No. of food-groups) (n)		f	%	f	%	f	%
≤4	102	15	14.7	23	22.5	42	41.2
5	65	10	15.4	9	13.8	15	23.1
≥6	37	5	13.5	7	18.9	12	32.4
Total	204	30	14.7	39	19.1	69	33.8

Table 4: Nutrition status of the children by meal frequency and individual dietary diversity.

The children who received more meals or more food groups had higher Z scores; therefore, less malnutrition levels. This association was significant with the wasting index (r=0.47; p=0.045) (Table 5).

Feeding practice	Test		p- value
Meal frequency (No. of meals) and Z- scores for wasting	Pearson test (r)	0.53	0.038*
Individual dietary diversity (No. of food groups) and Z- scores for wasting	Pearson test (r)	0.47	0.045*
Minimum acceptable diet (met did not meet) and nutrition status (presence or absence of wasting)	χ^2	45.71	< 0.001*

Table 5: Relationship between number of meals, number of food groups consumed, minimum acceptable diet and the children's nutrition status (wasting).

*p is < 0.05; therefore, significant relationship.

Consequently, most of the children who satisfied the minimum acceptable diet were not wasted (acute malnutrition) (χ^2; p=<0.001). The children who met their recommended MAD were 1.32 times less likely to be wasted than those who did not meet the indicator (OR=1.32; p=0.035).

Discussion

The achievement of MDD in this study was much higher than that established in studies carried out in the Kenyan slum [21] and other ASAL areas [22]. This could be attributed to the area receiving government and NGO related aid consequently, probably, increasing the diversity [13]. Dairy products (mainly

milk) consumption was 2nd in popularity that could be explained by the area being of a pastoralist community with livestock. Even so, only a few children had been fed on flesh foods in the previous 24 hours also found in Kitui. Besides, Vitamin-A rich fruits and vegetables was among the least consumed as found in other studies [22-24]. This could have been due to fruits seasonality and the reported insecurity by the Isiolo-Meru border at the time of this study, which strained transport of produce.

The average number of meals in this study (3) was lower than that of a study carried out in Kitui, another ASAL region (4). This could have been attributed to this study area being in the former "northern frontier district" that is generally arid unlike Kitui, which is a semi-arid area with probably more favorable arable land [24]. The ability to meet the MMF standard dwindled with age with less than half of those 18-23 months achieving it, which could be linked to the skipping meals and reducing amount of food prepared per day. The age group is also likely to have been fully incorporated to the family pot for their meals hence they would likely feed as the rest of the family had their meals. Children who meet their optimal feeding standards are more likely to achieve adequately their nutrition needs [25].

Conclusion

Based on the findings of this study, the nutrition status of children 6-23 months post SFP discharge was of apprehension where the prevalence of the indicators (wasting, stunting and underweight) were higher than the WHO acceptable values. Infant and child feeding practices were still below the WHO standard guidelines whereby older children were less able to adopt the practices. In the face of good individual dietary diversity, the reported meal frequency was average and likened to the infrequent food availability in the area. This puts emphasis on the importance of food security in maintenance of child nutritional status. Overall, attainment of minimum acceptable diet is important for better nutrition status. The study recommends that follow-up schedules of the children below 2 years after nutrition program treatment be documented to enhance timely identification of possible relapse cases.

Acknowledgment

The authors appreciate the efforts of the Isiolo County authorities, the study participants and the research assistants. Their contribution towards this paper is invaluable.

Ethical Statement

The study was approved by the Kenyatta University graduate school while the Ethical clearance was received from Kenyatta University Ethical Review Committee (PKU/354/I328). The National Council for Science and Technology, Innovation (NACOSTI) was approached for the research permit. Further authorization was given at the Isiolo County level offices of: The Commissioner, Education and Public Health. Support was sought from facility in-charges and nutritionists of respective sampled areas. Individual caregivers gave consent to their participation and assented to their children's involvement in the study.

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