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NUTRITION STATUS OF CHILDREN IN KASESE DISTRICT AT THE UGANDA-CONGO BORDER

J.K. TUMWINE and W. BARUGAHARE

ABSTRACT

Objective: **To establish the magnitude and risk factors for malnutrition in Kasese district at the Uganda-Congo border.**
Design: **Cross sectional nutrition survey.**
Methods: **Thirty clusters were selected. The height, weight, and mid upper arm circumference of at least 31 children per cluster were measured. Data on food frequency, prevalence of cough, fever and diarrhoea was also collected.**
Results: **Half of the 932 children (49.8%) were stunted, and 21.9% were severely stunted. While 17.4% of the children were under weight, 1.29% were wasted and 3.7% had MUAC <12.5cm. Risk factors for stunting included not consuming milk, fathers' low formal education, having no immunisation card, and not breast feeding among 12-23 months old. Risk factors for underweight included fathers' and mothers' low education level, consumption of legumes, and fever or diarrhoea two weeks before the survey. For wasting the risk factors were consumption of vegetables, legumes or starchy foods. Those not consuming high-energy or animal foods including milk were likely to be severely wasted as were those not breast feeding in the 12-23 months age group. Fever or a diarrhoea episode two weeks preceding the survey and living in a female-headed household, were also risk factors for severe wasting.**
Conclusion: **Attention to education, poverty alleviation, appropriate feeding practices, prevention and treatment of infections might assist in combating malnutrition in this district.**

INTRODUCTION

This nutrition survey was carried out for Save the Children (U.K) in response to a need identified by the Kasese District Medical officer, the District Agricultural officer and by the Kasese District Technical Planning Committee(1). Since late 1996 the district had been affected by insecurity as a result of the Allied Democratic Forces (ADF) insurgency. An estimated 45,000 people of the total population of 393,078 were displaced. Almost 23,000 of the displaced were registered with the International Committee of the Red Cross (ICRC) and were receiving food aid (1/2 ration). With no end in sight for the conflict in the Democratic Republic of Congo (DRC), it appeared this insurgency was spiralling out of control. Staff at Kagando Church of Uganda Hospital, one of the three major hospitals in the district, had observed increasing numbers of admissions to the children's ward for malnutrition although we could not find reliable data to illustrate this. Save the Children had identified food security and malnutrition as priority areas in the Uganda Country Programme(2).

Kasese district was one of the four districts selected for the initial phase of the Ministry of Health action programme to assist districts in formulating nutrition intervention proposals to combat malnutrition at community level(3).

No substantive nutrition survey had been done in the district for five years. The last survey done in the south western region in which Kasese falls was the 1995 Demographic Health Survey which showed that 42.8% of the children under four years were stunted and 4.1% were wasted(4). Although the 1988 and 1995 Demographic Health Surveys gave general information on the nutrition status of children in the region (West/ South West Uganda) there is paucity of nutrition data on Kasese district.

Thus the magnitude, nature and severity of the nutrition problem in children in Kasese district remained largely unknown. In addition the relationship between nutrition and socio-economic factors in the district had not been explored. The situation had been confounded further by the ADF insurgency, which had displaced almost 11% of the district population, with women

and children bearing the brunt of displacement. Thus several stakeholders in Kasese district were keen to have a nutrition survey which would give a baseline for immediate and future nutrition activities in the district.

The general objective of the survey was to gain an insight into the magnitude and nature of acute and chronic malnutrition in Kasese district and to explore some processes linked to malnutrition. The specific objectives were to estimate the prevalence of acute (% equal or less than 2 standard deviations) weight for height, % > 12.5 cm MUAC) and chronic (% equal or less than 2 standard deviations height for age) malnutrition among children aged 6-59 months, and identify high-risk groups of malnutrition.

MATERIALS AND METHODS

Background to the survey area: Kasese district in western Uganda shares its borders with Kabarole in the east/ north east, Bundibugyo in the north, Bushenyi in the south and the Democratic Republic of Congo (DRC) in the west. It consists of three main topographical areas, the legendary Rwenzori mountains 'of the moon' with rugged mountain relief, undulating hills and the flat area in the southeast. The lake region, which consists of rift valley lakes (Edward and George among others), is an expanse of land, which undulates gently from the southern side of the district north of Lake Edward, running to the Hima and Kitswamba areas at the Kabarole border.

Rainfall is mainly conventional and averages 900 mm falling in two peaks during April, May and the other September to November. The pronounced dry seasons occur in June- to July and December to February. Temperatures range from 25-32°C. Administratively the district is divided into two counties of Bukonzo and Busongora, which are divided into 21 sub-counties with a total of 92 parishes.

The population density ranges from 0-49 per Km^2 in the lower reaches of Busongora County to more that 400 per Km^2 in Bwera and Karambi sub-counties at the DRC border. Kasese Town Council has the highest density of population (over 800 per Km^2) . The total population was projected at 393078 in 1998. Fifty percent of the population are children below 15 years(5). The infant mortality rate is 103 per 1000 live births and life expectancy at birth is 49.8 for males and 53.7 for females.

More than 85 % of the economically active population aged over 10 years, are engaged in subsistence agriculture for their livelihood although there has been an attempt to revive industry (cobalt processing in Kasese and cement production in Hima, copper mining in Kilembe). Cassava, beans, bananas, sweet potatoes and groundnuts are the main food crops while coffee is the main cash crop. There is potential for a vibrant tourism industry given the presence of the Queen Elizabeth National Park, the Rwenzori Mountain Park, the beautiful lakes and scenery. Unfortunately the Allied Democratic Forces (ADF) insurgency and the war in the neighbouring Democratic Republic of the Congo (DRC) have dampened activity in this area.

Inclusion criteria and exclusion criteria: All children aged 6-59 months, resident within Kasese district at the time of the study and whose parents/caretakers accepted to participate were included in the study. Children whose parents or caretakers could not ascertain the age were excluded from the study.

Sample size, sampling and household interviews: We used the formula by Keish(6) to calculate the sample size. Assuming the prevalence of stunting in Kasese to be 42.8 % which is the figure available for the western region(4) with an acceptable error of 0.032 and 95% confidence, the minimum sample size was calculated as 918. The 1991 Population and Housing census(5), was used to select 30 clusters (parishes) using the WHO two stage cluster sampling method(7). A list of all the 92 parishes with their population was compiled.

We made three columns on the list. The first column had the parish names, the second had the population of each parish and the third column showed the cumulative population. The total district population was divided by 30 to give the sampling interval. Using a list of random numbers, a number between one and the maximum number in the sampling interval was chosen. This number fell at a particular point in the cumulative population in the first parish to be selected. We then added the sampling interval to the first random number and this new number fell at another point within the cumulative population in the 2nd parish to be selected. The rest of the parishes were selected by repeating this process. This method allows us to select clusters proportional to population size.

Unfortunately parishes in the two sub-counties of Kyondo and Ihandiro with a combined projected 1998 population of 22197, were excluded from the sampling frame, because of the precarious security situation attaining there at the time of the study. Also excluded was Mahango sub-county because of the repeated impassability of the road. Mahango's 1998 projected population was 14032. Thus the three sub-counties, Kyondo, Ihandiro and Mahango with a combined population of 36229 or 9.2% of the district population were excluded from the study. The sub-county, parish and other local council (LC) leaders together with the chiefs were consulted and informed about the study and its objectives. At least 31 children were selected from each cluster. To decide which household would be studied in a parish, the teams would go to the geographical centre of the parish. A random direction from the centre of the parish was determined by throwing a pen into the air with the point, after landing, indicating the direction.

The first household was selected randomly from the houses in the chosen direction. The subsequent houses to be visited were chosen by proximity, always taking households on the right hand side. In each household, the mother was interviewed using a questionnaire. In the absence of the mother the closest person taking care of the child was interviewed. If the father was present, he was interviewed concerning some socio-economic indices like level of education, land size and animals owned. However both parents were free to give us information. All eligible children (aged 6-59 months) were included in the sample. Where caretakers were absent, they were followed up by a return visit to the household on the same day or following day. A sub-sample of children aged 6-35 months was selected for the food frequency questionnaire. Children aged 12-23 months formed the sub-sample for the measles vaccination coverage.

Training and Measurements: A two-day training course was held in which the field staff were appraised of the objectives and methodology of the study. We specifically emphasised the importance of identifying the correct respondent and eligible child, questionnaire administration and measuring the child's weight, height and mid upper arm circumference (MUAC). Measurements were carried out using international guidelines. Children were weighed to the nearest 100g using a hanging Salter spring scale, which was checked and adjusted daily. Children were weighed almost nude with only underpants retained for privacy. Height, for children aged 24 to 59 months, and length for those below two years, was measured using locally constructed adjustable wooden boards constructed according to UN specifications(8).

Height was taken to the nearest 0.1 centimetre. Mid upper arm circumference (MUAC) was measured to the nearest 0.1 centimetre using a standard tape acquired for this purpose. The age of the child was ascertained from the child health card, baptismal or birth certificates and, if none of these were available, age was assessed using a calendar of local events like the 1996 general election, the beginning of the ADF insurgency, and others. Data was processed using EPINUT and EPINFO version 6.0 computer statistical package(9).

RESULTS

Some of the characteristics including age, sex and county of residence were collected and are reported here. Of the 932 children 409 (43.9%) were males while 523 (56.1%) were females. The mean age was 30.76 months ± 1.19 (S D) while the range was 6 to 59 months.

Prevalence of acute and chronic malnutrition: Stunting was the most prevalent form of malnutrition. Of the 932 children aged 6-59 months, 464 or 49.8% were stunted (< -2 Z scores height for age), while 204 or 21.9% were severely stunted (<-3 Z score height for age). This means that 49.8% of the children were too short for age (when their heights were compared with the heights of normal healthy children of the same age), and 21.9% were, similarly, severely short.

Of the 932 children aged 6-59 months, only 12 or 1.29% were wasted (<-2 Z scores weight for height). Only 34 or 3.7 % of the 932 children had MUAC less than 12.5 cm. This is higher than the wasting rate obtained using weight for height. One hundred sixty two (17.4%) of the 932 children aged 6-59 months, were underweight (<-2 Z scores weight for age). Table 1 shows stunting increases rapidly in the first two years of life, levelling off in the third year and rising again in the fourth year to the fifth year. The influence of age on stunting is highly significant (p=0.00) while that on underweight, (p=0.12) and wasting (p=0.07) does not reach significant levels.

Gender was not significantly related to stunting. Of the 409 males, 210 (51.4%) were stunted while 48.6% of the 523 females were stunted amongst the 932 children aged 6-59 months. The difference was not statistically significant ($X^2 = 0.60$, $p = 0.43778$). Even when we controlled for the child's age, gender had no significant relationship to stunting. Similarly gender had no significant relationship with wasting and underweight.

Other factors influencing nutritional status of children: Stunting and wasting were most prevalent amongst children whose fathers had had up to the seventh grade of primary school. Nutrition benefit was realised for children whose fathers had had secondary school or higher education.

In the analysis, factors influencing stunting, wasting and underweight were assessed for each of the three categories. If a child presented with two forms of malnutrition (for example both stunted and wasted) s/he/she was placed in both categories for the purposes of this analysis.

The father's education level significantly influenced the nutrition status of the children, (p=0.004 for stunting and p=0.005 for underweight), except for wasting (p=0.516). Surprisingly the strong influence of the father's education level on stunting was not observed with the mother's education (p=0.299) (Table 2).

The consumption of milk was associated with less stunting (p=0.047) while curiously children consuming legumes were more likely to be underweight than those who were not (p=0.003). The influence of legumes consumption on stunting (p=0.133) and on wasting (p=0.496) was not statistically significant.

The prevalence of underweight and diarrhoea had a significant relationship. A bigger proportion of children (22.5%) who had had diarrhoea in the last ten weeks preceding the survey were underweight compared to only 16.0% among those who had not had diarrhoea. The difference statistically significant (p=0.028). Similarly having suffered from fever in the two weeks preceding the survey was an important risk factor for being underweight (p=0.001). The impact of diarrhoea on stunting was not statistically significant (p=0.063). Children who did not have an immunisation card were more likely to be stunted than those who had one, (p=0.010). Using logistic regression only diarrhoea, consumption of legumes and the father's education were significantly associated with underweight as shown in the Table 3.

In the logistic regression analysis, education level of the father, possession of a vaccination card and milk consumption were significant for underweight (Table 4).

Table 1

Distribution of malnutrition by age group amongst 932 children aged 6-59 months

Age (Months)	% Stunted	% Underweight	% Wasted	Total no. of Children
6-11	32.0	11.0	3.0	100
12-23	52.2	19.4	2.4	253
24-35	44.6	19.7	0.5	213
36-47	49.5	14.1	0.0	206
48-59	64.4	21.3	1.3	160
Total	49.8	17.7	1.3	932
P value	0.00	0.12(NS)	0.07(NS)	–

NS = not significant

Table 2

Factors associated with stunting, wasting and underweight among children

Risk	Stunted Freq (%)	OR (Cl)	Wasted Freq (%)	OR (Cl)	Underweight Freq (%)	OR (Cl)
Father's education						
≤ Primary	344(52.99)	1.52(1.15)	8(1.2)	1.00(0.99-1.02)	130(20.0)	1.61(1.14-2.28)
≥ Secondary	120(42.6)	P=0.004*	4(1.4)	P=0.516*f*	35(12.4)	P=0.005*
Mother's education						
≤ S Primary	411(50.4)	0.96(0.76-1.08)	10(1.2)*f*	0.72(0.16-3.24)	151(18.5)	1.54(0.93-2.58)
≥ Secondary	53(45.3)	P=0.299	2(1.7)	P-0.457*f*	14(12.0)	P=0.082
Milk in diet$_{ç}$						
Yes	47(37.9)	1.19(1.01-1.41)	0(0)	1.00(1.01-1.04)*f*	22(17.7)	1.02(0.67-1.57)
No	212(48.0)	P=0.047*	10(2.3)	P=0.08f	80(18.1)	P=0.927
Legumes in diet$_{ç}$						
Yes	176(48.1)	1.31(0.92-1.85)	6(1.6)	01.22(0.34-4.39)	79(21.6)	1.88(1.22-2.89)
No	83(41.5)	P=0.133	4(2.0)	P=0.496*f*	23(11.5)	P=0.003*
Fever lasting 2 weeks						
Yes	228(48.3)	1.06(0.93-1.21)	7(1.5)	1.34(0.43-4.21)	103(21.8)	1.60(1.20-2.13)
No	233(51.3)	P=0.359	5(1.1)	P=0.608*f*	62(13.7)	P=0.001*
Diarrhoea lasting 2 weeks						
Yes	99(44.6)	1.15(1.00-1.32)	5(2.3)	2.17(0.70-6.76)	50(22.5)	1.41(1.04-1.90)
No	349(51.8)	P=0.063	7(1.0)	P=0.172	108(16.0)	P=0.028*
Cough lasting 2 weeks						
Yes	286(50.4)	0.96(0.85-1.10)	8(1.4)	1.24(0.38-4.07)	111(19.6)	1.29(0.96-1.7774)
No	170(48.6)	P=0.582	4(1.1)	P=0.491*f*	53(15.1)	P=0.089
Vaccination cards						
Yes	22(36.1)	2.15(1.19-3.89)	1(1.6)	1.48(0.18-12.43)	10(16.4)	1.21(0.65-2.28)
No	113(54.9)	P=0.010*	5(2.4)	P=1.00*f*	41(19.9)	P=0.711

OR = Odds ratio
Cl = 95% confidence interval
Freq = Frequency
* = p-value significant
f = Fisher's exact test
Ç = applies to sub sample aged 6-35 months
ç = applies to sub sample aged 12-23 months

Table 3

Coefficients, odds ratio and confidence intervals in the regression analysis for stunting

	Coefficient	P-value	Odds ratio	95% CI
Fever	0.528	0.005*	1.70	1.18-2.44
Diarrhoea	0.238	0.238	1.27	0.86-1.88
Legumes	0.538	0.003*	1.71	1.20-2.44
Father's education	0.574	0.007*	1.78	1.17-2.69

CI =Confidence intervals, *=p-value significant

Table 4

Coefficients, odds ratio and confidence intervals in the regression analysis for under weight

	Coefficient	P-value	Odds ratio	95.0% C.I	
Fever	0.506	0.060	1.659	0.978	2.815
Father's education	-0.938	0.001*	0.392	0.221	0.694
Milk consumption	-0.663	0.035*	0.515	0.278	0.955
Legumes	-0.455	0.102	0.634	0.368	1.094
Vaccination card	-0.802	0.012*	0.448	0.239	0.840
Diarrhoea	0.088	0.749	1.092	0.636	1.877

CI = Confidence intervals, * = p-value significant

Table 5

Risk factors for malnutrition (stunted, underweight or wasting)

Risk	Freq	Malnourished OR (CI)	P-value
Father's education			
≤ Primary	130(20.0)	1.76(1.18-2.64)	0.017*
≥ Secondary	35(12.4)		
Mother's education			
≤ Primary	151(18.5)	1.67(0.93-3.01)	0.082
≥ Secondary	14(12.0)		
Milk in diet$_{ç}$			
Yes	48(94.1)		
No	240(92.7)	1.27(0.361-4.45)	0.712
Legumes in diet$_{ç}$			
Yes	196(92.5)	0.799(0.303-2.11)	0.650
No	92(93.9)		
Fever lasting 2 weeks			
Yes	103(21.8)	1.77(1.25-2.49)	0.001
No	62(13.7)		
Diarrhoea lasting 2 weeks			
Yes	50(22.5)	1.52(1.05-2.22)	0.028*
No	108(16.0)		
Cough lasting 2 weeks			
Yes	111(19.6)	1.36(0.95-1.95)	0.089
No	53(15.1)		
Vaccination card			
Yes	111(92.5)	0.925(0.879-0.973)	0.195
No	21(100)		

OR = Odds ratio
CI = 95% confidence intervals
Freq = Frequency
* = p value significant
f = Fisher's exact test
ç = applies to sub sample aged 6-35 months
Ç = applies to sub sample aged 12-23 months

Frequency of food consumption amongst children aged 6-36 months: Most children (75.8%) consumed three meals a day (Table 6). This is higher than the frequency found by Kikafunda and colleagues(10) and Rutishauser(11).

Table 6

Meal frequency amongst children in Uganda: results from different studies including the current study

Sample size	% Children having 1 meal	% Children having 2 meals	% Children having 3 meals	Author and Year
273	12.3	69.6	17.9	Rutishauser 1974
261	13.8	41.4	44.8	Kikafunda 1998
517	2.3	21.5	76.2	Tumwine 2001

Snacks: Of the 459 children 76% had had no snack of any type during the 24 hours preceding the survey (Figure 1).

Figure 1

Frequency of snack consumption amongst children aged 6-35 months

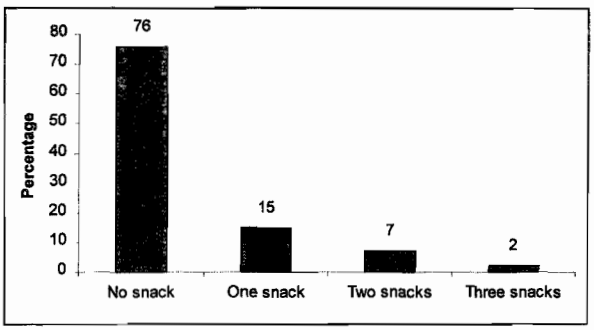
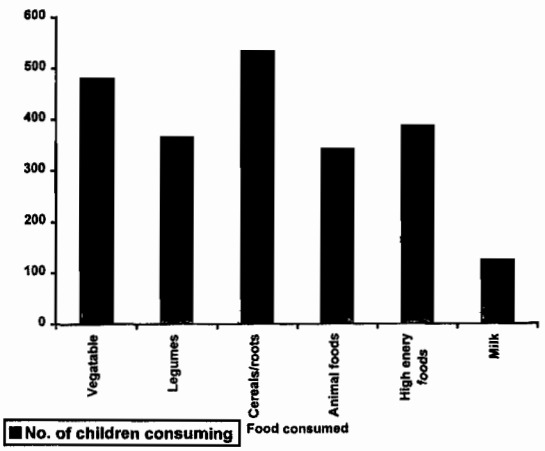


Figure 2

Distribution of the types of food consumed by children aged 6-35 months



The food consumed consists mainly of a cereal/ roots/tubers complimented by beans and sometimes fish. More than 75 % of the children had no milk in their diet. (Figure 2 and Table 7).

Table 7

Distribution of foods consumed by different age groups (between 6 and 35 months)

Type of food Consumed	Age in Months 6-11 (n =100) %	12-23 (n = 253) %	24-35 (n = 213) %
Vegetables	86.7	89.0	93.0
Legumes	62.2	71.4	67.3
Cereals	99.0	99.0	99.0
Animal food	53.3	82.4	64.8
High energy food	64.4	74.3	74.4
Milk	12.2	25.3	25.6

DISCUSSION

In this nutrition survey we attempted to establish the magnitude and nature of acute and chronic malnutrition in Kasese district in western Uganda. We also explored some of the processes and factors linked to malnutrition. To carry out meaningful interventions for the control of malnutrition it is important to understand the key factors influencing the evolution of this complex problem.

Stunting was by far the most important form of malnutrition with 464 or 49.8% of the 932 children stunted. Worse still every fifth child (21.9%) in the survey was severely stunted. Stunting seems to increase rapidly in the first two years of life levelling off in the third year and rising again in the fourth year to the fifth year. This rapid increase might indicate that stunting is cumulative over the years. Jitta, Migadde and Mudusu(12) made a similar observation in 1992, amongst Ugandan children. Stunting reflects long term insults to the child including recurrent poor health, inadequate food, and inappropriate childcare, The consequences of stunting are serious: increased risk of other diseases (respiratory infections, anaemia, diarrhoea) and mortality. While stunted children do not reach their intellectual potential(13), they face other disadvantages like poor pregnancy outcome(14), poor physical work capacity and social stigma(15).

Factors influencing prevalence of malnutrition: There is a widely held misconception in Uganda and elsewhere that malnutrition is a problem of ignorance since "people have food but do not know how to use it for their children!".

In this study we have demonstrated that the key determinants of malnutrition are age of the child, father's education level less than eight years, having

no immunisation card, not consuming milk and having suffered from fever and diarrhoea. The gender of the child, however, had no significant effect on stunting, underweight or wasting. Even when we controlled for age, gender still had no significant relation with malnutrition. These findings are in contrast to the 1988 Uganda Demographic Health Survey, which showed that gender had a significant association with stunting(12). However this finding is similar to findings of a similar study in central Uganda where gender had no relation with stunting(10).

Parental formal education: Stunting and underweight were most prevalent among children whose fathers had had less than eight years of formal education. Nutrition benefit was realised for children whose fathers had had secondary school or higher education. Increasing levels of stunting and underweight were associated with decreasing levels of paternal education up to the seventh grade, when the level of education did not seem to be related to the nutrition level. Our findings are similar to those of Vella *et al.* who found that parental education was one of the determinants of anthropometric parameters of malnutrition(16).

Surprisingly the strong influence of the father's education on stunting was not observed with the mother's education. One would have expected maternal education to have a strong influence on nutrition status of children. The impact of education on nutrition is through improvement of economic status, health facility utilisation, and greater involvement of mothers in decisions regarding health care(17,18). Other workers(19-21) have found no association between the education status of mothers and nutrition status of their children.

This finding is also reinforced by a detailed analysis of the 1988 Uganda Demographic and Health Survey results, by Jitta *et al.*(12) who found that the education level of the mother did not influence the nutrition status of children in western Uganda, although it had influence in other parts of the country. On the other hand they found that the father's education level significantly influenced stunting in the western region, where Kasese is found. It is possible that the father's education influences economic status of the family, and food security.

Malnutrition and childhood illnesses: In this study we have found that diarrhoea and fever had a significant influence on the prevalence of underweight, and on severe wasting as defined by MUAC less than 12.5 cm. A bigger proportion of children (22.5%) who had had diarrhoea in the two weeks preceding the survey were underweight compared to only 16.5% among those who had not had diarrhoea. Similarly having suffered from fever in the two weeks preceding the survey was an important risk factor for being underweight, and for having MUAC below 12.5% (severe wasting). Our findings are similar to those of other workers(10,12,16) and are not surprising given the fact that when children are ill they lose appetite, occasionally vomit and use up body reserves for energy.

Health utilisation and prevalence of malnutrition: In the current study the possession of an immunisation card (p=0.015) or having received measles vaccine (p=0.028) had a significant relationship with stunting. Children who had an immunisation card were more likely to be stunted than those who had none. This influence might be related to health facility utilisation(15) or the health of the child(14,20).

In conclusion, from this survey of children aged 6-59 months, in Kasese district in western Uganda, we found a high prevalence of stunting (49.8%) and underweight (17.4%). The children were generally unhealthy having suffered from cough (61.8%), fever (51%) and diarrhoea (24.5%) in the two weeks preceding the survey.

Risk factors for malnutrition included lack of milk in the diet, fathers with less than eight years of education, poor immunisation status and ill health. This demonstrates the need for a multi-sectoral approach if we are going to tackle the problem of malnutrition.

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