Knowledge, Attitude and Practices of Guardians on Nutritional Status of Children with Visceral Leishmaniasis attending Kacheliba Sub-County Hospital, West Pokot County, Kenya

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Summary

INTRODUCTION

Visceral Leishmaniasis (VL) causes considerable morbidity and mortality in Kenya. However, data on the knowledge, attitude and practices of guardians on nutritional status of children aged 5-12 years with VL attending Kacheliba Sub County Hospital is nonexistent. This study sought to assess knowledge, attitude and practices of guardians on nutritional status of children with VL, in West Pokot County.

MATERIALS AND METHODS

A descriptive cross-sectional design was employed involving both quantitative and qualitative approaches of data collection. Two hundred and three children aged 5-12 years with VL were enrolled in the study. Semi-structured questionnaires were administered to the guardians of the children with VL. The respondents were requested to give information on the socio-demographics, cultural related characteristics, their knowledge, attitude and practices. A Systematic random sampling technique was used for this study. Data was analyzed using chi-square to test the association between the variables. Odds ratio regression was used to test the multivariate relationships between various independent and dependent variables.

RESULTS

The results of the study established that the independent variable; knowledge, attitude and practices of the guardians of the children influenced prevalence of malnutrition among the children.

CONCLUSION

The study concluded that Parents shape the development of children's eating behaviors, not only by the foods they make accessible to children, but also by their own eating styles, behavior at meal times, and child-feeding practices.

Keywords: *Leishmaniasis, Knowledge, Attitude, Practices, Africa, Kenya*

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Introduction

Visceral Leishmaniasis is the most devastating type among the group of Leishmaniasis. The term kala azar which means black (kala) fever (azar) in Hindi often is reserved for severe (advanced) cases of Visceral Leishmaniasis, although the terms kala azar and Visceral Leishmaniasis are sometimes used interchangeably. The general term Visceral Leishmaniasis encompasses a broad spectrum of severity and manifestations. The onset can be chronic, sub-acute, or acute.

Although the incubation period generally ranges from weeks to months, asymptomatic infection can become clinically manifest years to decades after the exposure in people who become immune compromised for other medical reasons such as HIV/AIDS.

Visceral Leishmaniasis is caused by systemic protozoan parasite called *Leishmania donovani* transmitted by phlebotomine sandflies which affects internal organs particularly, the spleen, liver, and bone marrow.). If untreated, severe cases of Visceral Leishmaniasis typically are fatal, either directly from the disease or from complications, such as secondary (myco) bacterial infection or hemorrhage (CDC, 2015).

Nutrition is a fundamental pillar of human life, health and development across the entire life-cycle. Proper and well balanced nutrition throughout the life-cycle is very important in maintaining a healthy status. Nutritional status of an individual can be assessed at all stages of the life-cycle from intrauterine growth to birth, through infancy, childhood, adolescence, and into adulthood and old age (Mushonga, Kujinga, Chagwena, Chituwu, & Nyabanga, 2014).

Visceral Leishmaniasis (VL) and malnutrition are considered important public health problems and together are responsible for millions of deaths each year (Malafaia, 2009). Malnutrition is one of the risk factors for the development of VL (Werneck, Hasselmann, & Gouvea, 2011; Malafaia, 2009).

The nutritional status of the individuals infected with *Leishmania spp*. is involved in the clinical course of the disease and is a major determinant of the progression, severity and increased mortality of VL.

Malnutrition may occur as a consequence of energy deficiency, such as protein-calorie malnutrition (PCM), or a micronutrient deficiency (Muller, & Krawinkel, 2005). The infectious process is usually followed by hyper catabolism, which is aggravated by anorexia, resulting in the loss and the consequent depletion of the body's nutrient reserves, thereby causing great changes in the metabolism of the host (Pereira, 2003).

Children are at great risk of developing VL when they are malnourished. The relationship between malnutrition and VL is poorly understood especially among children.

In Africa, Visceral Leishmaniasis (VL) is one of the most neglected infectious diseases. Reithinger, Brooker, and Kolaczinski (2007) note that East Africa is one of the world's main endemic areas for VL, which over the last 20 years has seen a dramatic increase in the number of VL cases, due to a complexity of factors.

It affects largely the poorest of the poor, mainly in developing countries including Ethiopia (WHO, 2010). As a result of inflation control and several protective measures for lower income families including better redistribution of income, a decrease in

malnutrition prevalence have occurred. In developing countries, young malnourished children are extremely susceptible to develop progressive infection.

Poverty, food insecurity, and illiteracy are the top three leading causes of malnutrition. A low level of parental education has been associated with poor feeding practices, leading to malnutrition. Educated parents/guardians are more likely to ensure that their children get adequate nutrition and treatment. Some studies have found a strong association between parental/guardian education and higher socioeconomic status. Furthermore, uneducated parents have been shown to have a higher probability of being undernourished.

Our study purported to assess the knowledge, attitude and practices of guardians on nutritional status of children aged 5-12 years with Visceral Leishmaniasis attending Kacheliba Sub- County Hospital, in West Pokot County.

Study site

This study was undertaken at Kacheliba Sub - County Hospital in West Pokot County, Kenya. This is one of the level 4 hospitals under the Ministry of Health and is located in Karon, Suam location, Kacheliba division in Kacheliba Constituency. It is an operational hospital with a capacity of 52 beds. Referrals are from 5 locations and 18 sub-locations serving about 193,625 people. Some of the health care services offered include Antiretroviral Therapy, Curative In-patient services, family planning, HIV testing and counseling, home-based care and immunization.

Study design

This current study adopted a descriptive cross - sectional study design employing both quantitative and qualitative approaches.

Study population

The population was 550 children aged 5-12 years who tested positive for VL by RK39. this number included the guardians. Guardians of the children with VL who were willing and able to provide informed consent were included in the study.

Sample size determination

This study used Cochran's formula to arrive at a sample size of 203. The sample for a large population is determined using the formula given as;

p= prevalence of VL from previous studies=30%

Cochran (1977) formula:

$n = z2pq/d2$

n = desired sample size when population is greater than 10,000

z= standard normal deviation at 95% confidence level (= 1.96)

$q = 1 - p = 1 - 0.3 = 0.7$

d= degree of accuracy desired set at 0.05

N= the target population = 550

$$= \frac{1.96^2 \times 0.3 \times 0.7}{0.05^2} = 322$$

Infinite correction was undertaken because the study population was less than 10000

$nf = n/(1 + ((n - 1)/N))$

$nf = 322/(1 + ((322 - 1)/550))$

$nf = 203$

Therefore, the number of participants in the study was 203.

Sampling method

Systematic random sampling technique was used for this study. Children aged 5-12years with VL participated in the study. The skip interval was 3. Children attending the hospital were tested using R-K39 to determine their VL status. Those who turned positive for VL were sampled to get the 550 target population.

Thus:

N=550

n= 203

N/n = 550/203 =2.7

A random number 2 was selected from 1 to 3 to act as the starting point. Sampling was started from number 2 and every 3rd child was selected.

Data collection method

Semi-structured questionnaires were administered to the guardians of the children with VL. The respondents were required to select answers from the choices given in the structured questions to determine the socio-demographic characteristics of the study participants, their cultural characteristics and their knowledge, attitude and practices.

The socio-demographic characteristics information obtained was on age, sex, marital status, length of the child's illness, highest level of education, religious affiliation and their relationship to the child. On cultural characteristics information that was obtained from the guardians of the children in the study was on staple foods, foods that were culturally not allowed for the child to eat, any other taboos regarding food and preferences in food sharing.

The KAPs information obtained from the guardians included no. of times the child was fed in a day, if quantities of food given to the child were sufficient, if guardians perceived that the diets they give their child had nutritional diversity, nutrients that made a greater proportion of the diet of the children, supplementary feeds in the child's diet, awareness on supplementary feeds available locally, knowledge on the typical food ration required for children, compulsory food demonstrations in the hospital, number of times in the preceding one year the guardian visited the hospital when child is sick, relying on traditional medicine men for VL treatment, number of times in the preceding one year that the guardian took the child to the hospital for checkup even when not sick, and time taken to reach the nearest VL clinic.

Instruments

Data was collected using an interview guide which was administered to the guardians accompanying their children to Kacheliba Su-County Hospital. The interview guide was designed comprising of three sections. The first section was designed to determine fundamental issues including the demographic characteristics of the respondents, the second and the third sections consisted of questions focusing on the independent variables.

Data management and analysis

Both quantitative and qualitative approaches were used for data analysis. Quantitative data from the questionnaire was coded and entered into Statistical Package for Social Sciences (SPSS version 20). It was used to run descriptive statistics such as frequency and percentages so as to present the quantitative data in form of tables and graphs based on the major research questions.

The qualitative data generated from open ended questions was categorized in themes in accordance with research objectives and reported in narrative form along with quantitative presentation. The qualitative data was used to reinforce the quantitative data.

Descriptive statistics was used to describe the clinical manifestations of VL and its correlation with anthropometric measures. Inferential statistics such as chi-square and odds ratio regression were used. While chi-square tested the association between the independent and dependent variables, odds ratio was used to test the multivariate relationships between various independent and dependent variables.

The significance of the chi square relationship was evaluated using the probability values (p values). The significance of the odds ratio relationship was evaluated using the probability values (p values), the sign (positive or negative) and magnitude/strength of the odds ratio.

Validity

The questionnaire was submitted to the study supervisor, the statistician and an independent expert to evaluate the content validity and construct validity and to check for conceptual and investigative bias.

Reliability

The reliability of the questionnaire was ensured by accurate and careful phrasing of each question to avoid ambiguity. A test-retest technique was used. The instrument was prepared and administered to the participants. After two weeks the instrument was administered to the same participants. The responses to the first administration were compared to the responses of the second administration. The reliability of the responses from the two administrations was assessed to determine their reliability.

Ethical consideration

Ethical clearance and permission was sought from all the relevant authorities including the KNH/UON-ERC and Kacheliba sub-County Hospital management. Informed consent was also obtained from guardians of the children.

Results

Socio-demographic characteristics

The study findings showed that a majority of the respondents, 60.6%, representing the children's guardians were male while 39.4% were females. A majority 95.6% were married.

The results showed that 45.8% of the guardians were aged 31-40 years, 25.1% were aged 41-50 years while 4.9%, 14.3% and 9.9% of the respondents were aged below 30years, 51-60 years and above 60 years, respectively.

A majority, 84.2% of the guardians indicated that their children had been sick for a period of less than a year.

Regarding educational attainment, a majority, 74.4% had never attended school while 16.7% and 8.9% had attained up to primary and secondary levels, respectively.

Forty percent of the guardians were Christian, 44.6% had no religious affiliation while 10.1% were traditionalists. Fifty six point one of the guardians were related to the children as fathers, 34.5% were mothers while 9.5% were grandparents.

Cultural related practices

The respondents/guardians were asked to state their staple foods. Milk and meat were stated as the staple food in the community. A majority, 64.5% of the respondents indicated that these staple foods were known to have nutritional diversity.

A majority of the guardians, 59.6%, indicated that there existed certain foods that were culturally not allowed for the child to eat while 40.4% indicated that none existed. The main foods pointed out were eggs and liver which were viewed as a preserve for men. Organ meats were perceived to be for dogs.

Many (70.0%) of the respondents indicated that there were other taboos regarding foods in their community. A majority of the respondents, 76.8%, agreed that household heads and income-earning members received preference in food sharing and that the youngest and weakest children were at a disadvantage in family food sharing.

Knowledge, attitude and practices

Regarding KAP, 16.3%, 10.3%, 42.9% and 30.5% of the respondents fed their child

once, twice, thrice and many times a child wanted, respectively, in a day.

More than half of the respondents, 69.5% indicated that they gave sufficient food quantities to their children. Those who did not give sufficient food were asked to point out some of the challenges they faced. Lack of food sometimes, child's sickness and vomiting were some of the challenges highlighted.

In addition, 62.2% of the respondents believed that the diets they gave to their children had nutritional diversity.

According to these findings, 41.4% and 29.6% of the respondents noted that proteins and carbohydrates made a greater proportion of the diet, respectively. Twenty nine point one percent of the guardians indicated that the diet contained all the above nutrients.

Several of the respondents (64.0%) acknowledged that they never added supplementary feeds to their children's diet.

A majority of respondents, 86.2% also indicated that they had no idea of any supplementary feed that was locally available.

The study also established that 84.2% of the respondents did not know the typical food ration required for their children while 60.6% indicated that there were no compulsory food demonstrations in the local healthcare centers.

Table 4.1 Social Demographic Characteristics of Guardians

Socio-demographic characteristics	Indicator	Frequency	Percentage (%)
Guardian sex	Male	123	60.6
	Female	80	39.4
Marital status	Married	194	95.6
	Unmarried	9	4.4
Age	Below 30 years	10	4.9
	31-40 years	93	45.8
	41-50	51	25.1
	51-60	29	14.3
	Above 60 years	20	9.9
Length of child's sickness	Less than 1 year	171	84.2
	2-3 years	7	3.4
	Over 3 years	25	12.3
Highest level of education	Never attended school	151	74.4
	Primary	34	16.7
	Secondary	18	8.9
	University/college	0	0
	Others	0	0
Religious affiliation	Christian	92	45.3
	Muslim	0	0
	Traditionalist	20	9.9
	No religion affiliation	91	44.8
Relation with child	Father	114	56.2
	Mother	70	34.5
	Grandparent	19	9.4

All the respondents strongly agreed that lack of or inadequate food, childhood sickness, refusing to eat and lack of time to feed a child caused malnutrition.

The respondents were asked to indicate how many times in the preceding year that they visited a health care facility when they fell sick. 42.4% indicated that they frequently visited the healthcare center, 44.3% did so infrequently while 13.3% never visited the healthcare center. In addition, a large number, 83.7% also indicated that their family relied on traditional medicine men.

When asked how many times in the preceding one year that they visited a health care facility for checkup even when not sick, good number, 58.1% they had not gone for checkups when not sick while 41.9% of the respondents did so infrequently. Thirty four percent of the respondents also indicated that it took them over 3 hours to reach the nearest VL clinic in their area, while 41.9% and 24.1% of the respondents indicated that it took 2-3 hours and less than an hour to reach the nearest clinic, respectively.

Cross tabulation and regression analysis

Only those factors (covariates) found to have a significant relationship with the dependent variable were included in the bivariate and multivariate logistic regression analysis. Logistic regression analysis was carried out to determine the effect of each independent variable on the outcome while controlling for other variables.

In the model:

a) The Wald statistic for a coefficient is the square of the result of dividing the coefficient by its standard error; this quantity is distributed as chi-square.
b) Exp(B) – is the estimated odds ratio

Correlation analysis was also conducted to ensure that covariates that were highly correlated were not included in the regression.

Table 4.2: Cultural Related Practices of Study Participants

Cultural related factors	Indicator	Frequency	Percentage
Staple foods with nutritional diversity	Yes	131	64.5
	No	72	35.5
Foods that are culturally not allowed for the child to eat?	Yes	121	59.6
	No	82	40.4
Any other taboos with regards to foods	Yes	142	70.0
	No	61	30.0
Preference in food sharing	Agree	156	76.8
	Disagree	47	23.2

Table 4.3: Knowledge, Attitude and Practices Related Characteristics of Guardians

Question	Indicator	Frequency	Percentage
No. of times child was fed a day	Once	33	16.3
	Twice	21	10.3
	Thrice	87	42.9
	Many times a child wants	62	30.5
If quantities of food given to the child are sufficient	Yes	141	69.5
	No	62	30.5
If guardians perceived that the diets they give Their child had nutritional diversity	Yes	127	62.6
	No	76	37.4
Nutrients that make a greater proportion of the diet of the children	Proteins	84	41.4
	Carbohydrates	60	29.6
	Minerals	0	0
	Vitamins	0	0
	All the above	59	29.1
Supplementary feeds in a child's diet?	Yes	73	36.0
	No	127	64.0
Awareness on supplementary feeds available locally	Fortified Blended Flours	28	13.8
	Use Supplementary Food	0	0
	None	175	86.2
Knowledge on the typical food ration required for children	Yes	32	15.8
	No	171	84.2
Compulsory food demonstrations in the hospital.	Yes	80	39.4
	No	123	60.6
Times in the past one year the guardian visited the hospital when child is sick.	None	27	13.3
	Infrequent	90	44.3
	Frequently	86	42.4
Relying on traditional medicine men for VL treatment.	Yes	170	83.7
	No	33	16.3
	None	118	58.1
	Infrequent	85	41.9
Times in the past one year the guardian has taken child to the hospital for checkup even when not sick.	Frequently	0	0
	Less than an hour	49	24.1
	2-3hours	85	41.9
Time taken to reach the nearest VL clinic	Over 3hours	69	34.0

Socio-demographic characteristics and nutritional status

The prevalence of malnutrition of the children was analysed individually and rated as either normal or malnourished, thereafter all the normal and malnutrition cases were added to give the total number of children with malnutrition and those without from each category. The findings of these analyses are presented in table 4.4

The study findings revealed that the percentage of malnourished children was 25.2% where their guardian was a male and 38.75% where the guardian was a female.

The Chi-square statistic, however, showed a significant relationship between the guardian sex and prevalence of malnutrition (χ^2=4.193 and p= 0.041) at 0.05 level of significance.

Marital status was cross tabulated against nutritional status; the percentage of children with malnutrition was higher where the guardian was unmarried as compared to when they were married (29.89% vs. 44.44%). However, there was no statistical significant association between marital status and prevalence of malnutrition (χ^2=0.858 and p= 0.354) at 0.05 level of significance.

Guardian age was cross tabulated against prevalence of malnutrition; the percentage of children with malnutrition was higher where the guardian was below 30 years at 100% followed by ages 51-60 years at 68.96% as compared to when they were aged between 41-50 years, 31-40 years and above 60 years respectively. The study found a statistically significant association between guardian age and prevalence of malnutrition (χ^2=56.433 and p= 0.000) at 0.05 level of significance.

Length of a child's sickness was cross tabulated against prevalence of malnutrition. A longer period of sickness (2-3years and >3 years vs. <1 year) was associated with higher prevalence of malnutrition as compared to shorter periods (100%, 64.00% vs. 22.81%).

The study found a statistically significant association between the length of child's sickness and prevalence of malnutrition (χ^2=33.934 and p= 0.000) at 0.05 level of significance. The guardian highest level of education was cross tabulated against prevalence of malnutrition. A lower level of education was associated with higher prevalence of malnutrition as compared to higher education levels (40.39% vs. 3.03%). The study found a statistically significant association between the level of education of the guardian and prevalence of malnutrition (χ^2=27.038 and p= 0.000) at 0.05 level of significance.

The religion affiliation of the guardian was cross tabulated against prevalence of malnutrition. The percentage of malnourished children was 32.61% where the guardian was a Christian, 55.00% when a traditionalist and 23.08% when the guardian had no religious affiliation.

The Chi-square statistic, however, showed no significant relationship between the guardian religious affiliation and prevalence of malnutrition (χ^2=8.215 and p= 0.016) at 0.05 level of significance.

Cultural characteristics and nutritional status

Whether their staple foods such as meat (source of proteins, vitamins and iron) and milk (source of protein, calcium and iron) had nutritional diversity i.e. all the micronutrients and macronutrients required for the child, was cross tabulated against the prevalence of malnutrition. The findings of these analyses are presented in table 4.6.

The percentage of children with malnutrition was higher where the staple foods had no nutritional diversity as compared to where they had nutritional diversity (44.44% vs. 22.90%). There was a statistically significance association between nutritional diversity in staple foods and prevalence of malnutrition (χ^2=10.166 and p= 0.001) at 0.05 level of significance. Certain foods like liver (provides iron to the body) and eggs (provides iron and proteins) that were culturally not allowed for the children to eat was cross tabulated against the prevalence of malnutrition.

The percentage of children with malnutrition was higher where certain foods were culturally not allowed for the children to eat compared to where none existed (39.67% vs. 17.07%).

There was a statistically significant association between existence of certain foods that were culturally not allowed for the children to eat and prevalence of malnutrition (χ^2=6.796 and p= 0.009) at 0.05 level of significance.

Table 4.4: Relationship between Social Demographic Characteristics and Nutritional Status of Children with VL

Nutritional Factors	Categories	Normal	Mal-nourished	Mal-nourished (%)	χ^2	p-value
Guardian sex	Male(n=123)	92	31	25.2		
	Female(n=80)	49	31	38.75	4.19	0.041
	Total (n=203)					
Marital status	Married(n=194)	136	58	29.89		
	Unmarried(n=9)	5	4	44.44	0.85	0.354
	Total (n=203)					
Guardian's age	Below 30years (n=10)	0	10	100.0		
	31-40years (n=93)	72	21	22.58		
	41-50years (n=51)	40	11	21.57		
	51-60years (n=29)	9	20	68.96	56.433	0.000
	Above 60years (n=20)	20	0	0.0		
	Total (n=203)					
Length of child's sickness	Less than a year (n=171)	132	39	22.81		
	2-3years (n=7)	0	7	100.0		
	Over 3years (n=25)	9	16	64.00	33.934	0.000
	Total (n=203)					
Level of education	Never attended school (n=151)	90	61	40.39		
	Primary (n=34)	33	1	3.03		
	Secondary (n=18)	18	0	0.0		
	University/college (n=0)				27.038	.000
	Total (n=203)					
Religion	Muslim (n=0)	62	30	32.61		
	Christian (n=92)	9	11	55.00		
	Traditionalist (n=20)	70	21	23.08		
	No religious affiliation (n=91)				8.215	0.016
	Total (n=203)					

Existence of any other taboos with regards to foods was cross tabulated against the prevalence of malnutrition. The percentage of children with malnutrition was lower where these taboos existed compared to where they were never existed (28.87% vs. 34.42%).

There was no statistically significant association between existence of those taboos and prevalence of malnutrition (χ^2=0.570 and p= 0.450) at 0.05 level of significance. Whether household heads and income-earning members received preference in food sharing that disadvantage the youngest and weakest children in family was cross tabulated against the prevalence of malnutrition.

The percentage of children with malnutrition was higher where that was the practice as compared to where that was not a practice (35.26% vs. 14.89%). There was a statistically significant association between food sharing practices and prevalence of malnutrition (χ^2=7.060 and p= 0.008) at 0.05 level of significance.

Knowledge, attitude and practices on nutritional status

The total number of cases of malnutrition and children that were normal was determined and entered into the model (Table 4.7).

The percentage of children with malnutrition ranged between 12.64% and 80.95% between the different number of feeding times and this formed 30.54% of the children with malnutrition compared to 69.46% who were normal.

Table 4.5: Cross Tabulation Analysis between Cultural related Characteristics of Guardians and Nutritional Status of children with VL

Nutritional status	Categories	Normal	Mal-nourished	Mal-nourished (%)	χ^2	p-value
nutritional diversity their staple foods have	Yes (n=131) No (n=72) Total n=203)	101 40	30 32	22.90 44.44	10.166	0.001
Foods that are culturally not allowed for the child to eat.	Yes (n=121) No (n=82) Total(n=203)	73 68	48 14	39.67 17.07	6.796	0.009
Any other taboos with regards to foods	Yes (n=142) No (n=61) Total (n=203)	101 40	41 21	28.87 34.42	0.570	0.450
Preference in food sharing	Agree (n=156) Disagree (n=47) Total (n=203)	101 40	55 7	35.26 14.89	7.060	0.008

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Table 4.6: Relationship between Knowledge, Attitude and Practices of Guardians on nutritional status of children with VL

Nutritional Factors		Normal	Mal-nourished	Mal-nourished (%)	χ^2	p-value
No. of times child is fed	Once (n=33) Twice (n=21) Thrice (n=87) Many times a child wants (n=62) Total (n=203)	7 4 76 54	26 17 11 8	78.79 80.95 12.64 12.90	83.596	0.00
Supplementary feeds in child's diet	Yes (n=141) No (n=62) Total (n=203)	137 4	4 58	2.83 93.55	4.829	0.028
Sufficient food quantities	Yes (n=141) No (n=62) Total (n=203)	137 4	4 58	2.84 93.55	167.04	0.000
Nutritional diversity in child diets	Yes (n=127) No (n=76) Total (n=203)	103 38	24 38	18.89 50.00	21.681	0.000
Nutrients making greater proportion of child's diet	Proteins (n=84) Carbohydrates (n=60) Minerals (n=0) Vitamins (n=0) All of the above (n=59) Total (n=203)	53 60 28	31 0 31	36.90 0 52.54	41.448	0.000

The Chi-square statistic showed a significant relationship between the number of times a child was fed and prevalence of malnutrition (χ^2=83.596 and p= 0.00) at 0.05 level of significance.

Households where a child was given sufficient food quantities were cross tabulated against prevalence of malnutrition.

The prevalence of malnutrition was lower in households where the child was given sufficient quantities of food and higher where the child was given inadequate food (2.84% vs. 93.55%). The Chi-square statistic showed a significant relationship between feeding the child with sufficient food and prevalence of malnutrition (χ^2= 167.04 and p= 0.00) at 0.05 level of significance.

Nutritional diversity in the child's diet was cross tabulated against prevalence of malnutrition. The prevalence of malnutrition was lower in households where the child's diet had nutritional diversity and higher where the child was given diets with no nutritional diversity (18.89% vs. 50.00%). The Chi-square statistic showed a significant relationship between feeding the child with diets that had nutritional diversity and prevalence of malnutrition (χ^2=21.681 and p= 0.00) at 0.05 level of significance.

Adding supplementary feeds in the child's diets was cross tabulated against prevalence of malnutrition.

Table 4.6: Relationship between Knowledge, Attitude and Practices of Guardians on nutritional status of children with VL Continued

Nutritional Factors		Normal	Mal-nourished	Mal-nourished (%)	χ^2	p-value
Awareness of Supplementary feeds availability	None (n=142) Fortified Blended Flours (n=61) Liquid Nutrition Supplements (n=0) Use Supplementary Food (n=0) Total (n=203)	80 61	62 0	43.66 0	38.345	0.000
Knowledge on required child's typical food ration	Yes (n=32) No (n=171) Total (n=203)	32 109	0 62	0 36.26	6.542	0.011
Greater proportion of the food ration	None (n=99) Cereals (n=104) Pulses (n=0) Oil (n=0) Sugar (n=0) Total (n=203)	59 82	40 22	40.40 21.15	6.706	0.010
Compulsory food demonstrations in hospitals	Yes (n=80) No (n=123) Total (n=203)	68 73	12 50	15.00 40.65	15.034	0.000
Times in the past one year the guardian took the child to the hospital when they felt sick.	None (n=29) Infrequently (n=85) Frequently (n=89) Total (n=203)	3 55 83	26 30 6	89.66 35.29 6.74	72.439	0.000
Relying on traditional medicine men for treatment of VL	Yes (n=170) No (n=33) Total (n=203)	118 23	52 10	30.58 30.30	0.001	0.974
Times in the past one year took the child to the hospital for checkup even when not sick.	None (n=118) Infrequently (n=85) Frequently (n=0) Total (n=203)	62 79	56 6	47.46 7.05	38.012	0.000
Time taken to reach the nearest VL clinic	Less than 1hour 2-3 hours Over 3 hours	53 56 32	2 27 33	3.636 32.53 50.77	7.097	0.029

The prevalence of malnutrition was lower in households where supplementary feeds were added to the child's diet and higher where the child diets were not added any supplementary feed (2.84% vs. 93.55%).

The Chi-square statistic showed a significant relationship between adding supplementary feeds to the child's diet and prevalence of malnutrition (χ^2=4.829 and p= 0.028) at 0.05 level of significance.

Awareness of locally available supplementary feeds was cross tabulated against the prevalence of malnutrition. 43.66% of the children were malnourished in households which were not aware of any supplementary feeds that were locally available and this was higher prevalence compared to where the household was aware of at least one. The Chi-square statistic showed a significant relationship between awareness of locally available supplementary feeds and prevalence of malnutrition (χ^2= 38.345and p= 0.000) at 0.05 level of significance.

Knowledge of the required child's typical food ration was cross tabulated against the prevalence of malnutrition. The prevalence of malnutrition was higher in households which did not have any knowledge on the ration and lower where it was known (36.26% vs. 0%).

The Chi-square statistic showed a significant relationship between knowledge of the child's typical food ration and prevalence of malnutrition (χ^2=6.542 and p= 0.011) at 0.05 level of significance.

The component making the greater proportion of the food ration was cross tabulated against the prevalence of malnutrition.

The prevalence of malnutrition was higher in households where none of the stated components made a greater proportion compared to when cereals made the greater proportion of the ration (40.40% vs. 21.15%).

The Chi-square statistic showed a significant relationship between the proportions of the components of the child's food ration and prevalence of malnutrition (χ^2=6.706and p= 0.010) at 0.05 level of significance.

Compulsory food demonstrations in health centres were cross tabulated against the prevalence of malnutrition.

The prevalence of malnutrition was higher in where these demonstrations were not conducted as compared to where it was done (40.65% vs.15.00%).

The Chi-square statistic showed a significant relationship between compulsory food demonstrations in health centres and prevalence of malnutrition (χ^2=15.034and p= 0.000) at 0.05 level of significance.

The number of times in the past one year one visited a health care facility when they felt sick was cross tabulated against prevalence of malnutrition; the percentage of children with malnutrition was higher where the guardian never or infrequently visited the health Centre when sick as compared to when they did so frequently (89.66%, 35.29% vs. 6.74%). There was a statistically significant association between of times in the past one year one visited a health care facility when they felt sick and prevalence of malnutrition (χ^2=72.439 and p= 0.000) at 0.05 level of significance.

Reliance on traditional medicine men was cross tabulated against prevalence of malnutrition.

There was no much difference between the percentage number of malnourished children where the family relied on traditional medicine men and where they never relied on them (30.58% vs. 30.30%). The study also found no statistically significant relationship between reliance on traditional medicine men and prevalence of malnutrition (χ^2=0.001 and p= 0.974) at 0.05 level of significance.

Table 4.7: Model Summary of Bivariate Logistic Regression Analysis between Social Demographic Characteristics and nutritional of children with VL

Model Summary	1
-2 Log likelihood	142.417a
Cox & Snell R Square	0.411
Nagelkerke R Square	0.580

The number of times in the past one year one visited a health care facility for checkup even when not sick was cross tabulated against prevalence of malnutrition. The percentage of children with malnutrition was higher where the guardian never or infrequently visited the health center for checkup when not sick as compared to when they did so frequently (47.46%, 7.05% vs. 0%).

The study found a statistically significant relationship between the number of times in the past one year one visited a health care facility for checkup even when not sick and prevalence of malnutrition (χ^2=38.012 and p= 0.000) at 0.05 level of significance.

Time taken to reach the nearest VL clinic was cross tabulated against prevalence of malnutrition. The prevalence of malnutrition was higher where more time was take to reach the clinic as compared to where less time was taken (50.77%, 32.53% vs. 3.636%).

The study found a statistically significant relationship between time taken to reach the nearest VL clinic and prevalence of malnutrition (χ^2=7.097 and p= 0.029) at 0.05 level of significance.

A correlation analysis was conducted to check which factors were highly correlated after which only one was included in the regression.

Logistic regression analysis was carried out to determine the effect of each independent variable on the outcome while controlling for other variables.

Regression analysis for social-demographic characteristics and nutritional status

The variables in this model explain 58.0 of the variation in dependent variable (Nagelkerke R Square=0.580). The first categories of each variable were used as reference point.

The odds of the child being malnourished were 24.778 times higher when the guardian age was 51-60years compared to when the guardian age was below 30years. The length of a child's sickness was found to have a positive and significant relationship with prevalence of malnutrition.

The odds of the child being malnourished was 7.971 times higher when the child was sick for over 3years compared to when they were sick for less than a year.

The study also found a negative and significant relationship between the highest level of education of the guardian and prevalence of malnutrition. Having education up to the primary level decreased the odds of a child being malnourished by 0.036 times compared to when the guardian had never attended school. All the categories of religion did not have any significant relationship with the prevalence of malnutrition. The results are presented in Table 4.7 and 4.8.

Table 4.8: Bivariate Logistic Regression Analysis between Social Demographic Characteristics and nutritional status of children with VL

Variables in the Equation	B	S.E.	Wald	df	Sig.	Exp(B)
Guardian sex(1)	2.002	0.753	7.060	1	0.008	7.401
Age of guardian			18.847	4	0.001	
Age of guardian (1)	-0.345	0.679	0.259	1	0.611	0.708
Age of guardian (2)	1.485	0.907	2.679	1	0.102	4.413
Age of guardian (3)	3.210	0.955	11.301	1	0.001	24.778
Age of guardian (4)	0.073	0.937	0.006	1	0.938	1.076
Length of child's sickness			9.367	2	0.009	
Length of child's sickness(1)	22.158	14835.02	0.000	1	0.999	4.2E+09
Length of child's sickness(2)	2.076	0.678	9.367	1	0.002	7.971
Level of education			7.289	2	0.026	
Level of education(1)	-3.335	1.235	7.289	1	0.007	0.036
Level of education(2)	-21.747	8734.608	0.000	1	0.998	0.000
Religion			3.522	2	0.172	
Religion(1)	-0.013	0.849	0.000	1	0.988	0.988
Religion(2)	-0.908	0.621	2.14	1	0.143	0.403
Constant	-2.173	0.944	5.296	1	0.021	0.114

Table 4.8: Model Summary of Bivariate Logistic Regression Analysis between Cultural related Characteristics and Nutritional Status of Children with VL

Model Summary	1
-2 Log likelihood	222.659a
Cox & Snell R Square	0.125
Nagelkerke R Square	0.177

Table 4.9: Bivariate Logistic Regression Analysis between Cultural practices and Nutritional Status of Children with VL

Variables in the Equation	B	Wald	df	Sig.	Exp(B)
Nutritional diversity in staple foods(1)	-1.012	6.721	1	0.010	0.364
Foods culturally not allowed for child(1)	0.902	4.663	1	0.031	2.466
Food sharing practices(1)	1.275	5.432	1	0.020	3.579
Constant	-1.862	9.264	1	0.002	0.155

Regression analysis for cultural characteristics and nutritional status

The variables in this model explain 17.7% of the variation in dependent variable (Nagelkerke R Square=0.177). The first categories of each variable were used as reference point. The second category of nutritional diversity in staple foods was found to have a significant relationship with prevalence of malnutrition.

Table 4.10: Model Summary of Bivariate Logistic Regression Analysis between Knowledge, Attitude and Practices of Guardians and Nutritional Status Children with VL

Model Summary	1
-2 Log likelihood	59.281a
Cox & Snell R Square	0.609
Nagelkerke R Square	0.860

Regression analysis for knowledge, attitude and practices and nutritional status

The variables in this model explain 86.0% of the variation in dependent variable (Nagelkerke R Square=0.860). The first categories of each variable were used as reference point. Two of the categories of number of feeding times were found to have a significant relationship with prevalence of malnutrition.

Increasing the number of times a child is fed decreases the odds of a child with VL being malnourished. There was a significant and negative relationship between nutritional diversity in child's diets and prevalence of malnutrition.

The odds of a child being malnourished were 2.466 times higher where such foods existed as compared to where they never existed. The study also found a positive and significant relationship between food sharing practices that disadvantage the weak and youngest children in the family and prevalence of malnutrition. The odds of a child being malnourished were 3.579 times higher when such practices existed as compared to where that was not the case. The results are presented in Tables 4.11 and 4.12.

The odds of a child being malnourished were 0.364 times less when staple foods had nutritional diversity as compared to when they did not have nutritional diversity. The study found a positive and significant relationship between the existence of foods culturally not allowed for children to eat and prevalence of malnutrition.

The study found a negative and significant relationship between nutritional diversity in staple foods and prevalence of malnutrition.

The odds of a child being malnourished were 0.078 times less when given diets that had nutritional diversity than when the diets had no nutritional diversity.

There was also a negative and significant relationship between supplementary feeds in a child's diets and prevalence of malnutrition.

The odds of a child being malnourished was 0.141 times less when supplementary feeds were added in a child's diets than if none was added. The study found no significant relationship between knowledge of a child's ration and prevalence of malnutrition among children with VL.

There was a significant and negative relationship between compulsory food demonstrations in health centres and prevalence of malnutrition.

The odds of a child being malnourished were 0.081 times less when there were compulsory food demonstrations in health centres than when these demonstrations were not done. The study also found a negative and significant relationship between the number of times the guardian visited hospital when sick and prevalence of malnutrition.

Table 4.11: Bivariate Logistic Regression Analysis between Knowledge, Attitude and Practices of Guardians and Nutritional Status Children with VL

Variables in the Equation	B	S.E.	Wald	Df	Sig.	Exp(B)
Number of feeding times			12.327	3	0.006	
Number of feeding times (1)	1.957	1.416	1.909	1	0.167	7.075
Number of feeding times (2)	-2.942	1.188	6.128	1	0.013	0.053
Number of feeding times (3)	-3.024	1.305	5.371	1	0.020	0.049
Nutritional diversity(1)	-2.552	0.81	9.926	1	0.002	0.078
Supplementary feeds(1)	-1.961	1.031	3.615	1	0.050	0.141
Knowledge of food ration(1)	-19.068	5730.017	0.000	1	0.997	0.000
Compulsory food demonstrations(1)	-2.518	1.123	5.032	1	0.025	0.081
No. of times guardian visited hospital when sick			9.477	2	0.009	
No. of times guardian visited hospital when sick (1)	-4.093	1.386	8.727	1	0.003	0.017
No. of time guardian visited hospital when sick (2)	-4.243	1.48	8.223	1	0.004	0.014
No. of time guardian went for checkup when not sick(1)	-3.985	1.031	14.946	1	0.000	0.019
Time taken to reach VL clinic			12.599	2	0.002	
Time taken to reach VL clinic(1)	2.555	1.366	3.5	1	0.061	12.872
Time taken to reach VL clinic(2)	5.184	1.597	10.543	1	0.001	178.402
Constant	5.506	2.041	7.278	1	0.007	246.167

The odds of a child being malnourished were 0.017times and 0.014 times less when the guardian visited the hospital infrequently and frequently respectively.

The study also found a negative and significant relationship between the number of times guardian went for checkup when not sick and prevalence of malnutrition. The odds of child being malnourished were 0.019times less when guardian infrequently went for checkup compared to when they never went for any checkup. The study further found a positive and significant relationship between the time taken to reach VL clinic and prevalence of malnutrition. The odds of child being malnourished were 178.402times more when the time taken to reach the nearest VL clinic was more than 3hours compared to when it took less than an hour to reach there. The results are presented in Tables 4.15 and 4.16.

Discussion

Social demographic characteristics and cultural practices were examined. Cross tabulation results showed that guardian age, their sex, their monthly income, the length of child sickness, the number of children in the household and the level of education were the only social demographic characteristics that had a significant relationship with the nutrition status of the vl children. The guardians' marital status and religious affiliation had no significant

relationship. The number of times one visited a health care facility when they felt sick and time taken to reach the nearest VL clinic was also found to have a significant relationship. Reliance on traditional medicine men and going for checkups when not sick did not have a significant association with prevalence of malnutrition.

Nutritional diversity in staple foods, existence of taboos on some foods and foods that were not allowed for the child to eat and food sharing practices that disadvantage the youngest and weakest children in the family were also found to have a significant relationship with prevalence of malnutrition among these children. However, the results of bivariate logistic analysis of each factor revealed that the length of child's sickness, the level of education, the number of times one visited a health Centre when they fell sick, monthly income and the number of children (dependents) in the household, nutritional diversity in staple foods, existence of taboos on some foods and foods that were not allowed for the child to eat and food sharing practices that disadvantage the youngest and weakest children in the family had significant relationship with prevalence of malnutrition among these children.

The study also established that knowledge, attitude and practices of these guardians also influenced prevalence of malnutrition among the children. Cross tabulations of the various independent variables against the dependent variable were examined for association. All the selected guardian characteristics namely the number of times a child was fed, child's appetite, sufficient food quantities, diversity in the child's diets, compulsory food demonstrations and so on were found to have a significant association with the prevalence of malnutrition among children with VL attending this health center.

However, there was a high correlation between some of these characteristics such as the number of times a child was fed and whether the child was given sufficient food quantities.

The results of Bivariate logistic regression showed that only the number of times a child was fed, availability of supplementary feeds in the child's diet and nutritional diversity in a child's diet had a significant relationship with prevalence of malnutrition among these children.

Conclusions

Based on the study findings, the study concluded that critical nutritional practices such as the number of feeding times, nutritional diversity and supplementary feed played a crucial role in determining the nutritional status of these children.

Most of the children who were malnourished were only fed less times and this meant that they had insufficient food intakes which could increase the severity of the malnutrition.

Even though most of the respondents believed that they gave balanced diets to their children, this was not the case since only one of the nutrition was available in the meal. This ignorance meant that the children would be malnourished even if they were fed all the time. Lack of supplementary foods in the diet of these children could be associated with lack of awareness of any feeds within the locality as well as lack of basic education on nutrition. Supplementary feeds are very efficient in managing the condition especially for the children with acute malnutrition.

The study concluded that even though compulsory food demonstration in health facility as well as knowledge on food ration for the children would reduce the cases of malnutrition, such initiatives would not yield any fruits if the

guardians of these children could not afford the foods as well as if changing their perception was not achieved.

The study also concluded that the length of child's sickness was a very critical factor that led to loss of child's appetite. Vomiting during a child's illness was a hindrance to feeding the children.

Long periods of sickness would also imply that the child was constantly deprived of crucial nutrients that were normally used up in fighting the disease and thus reduced their immunity. Sicknesses would also hinder the metabolism and absorption of food which could lead to malnutrition.

The study also concluded that a minimum of education up to the primary school level would go a long way in reducing malnutrition in this area. This implies that some basic information on the interplay between VL and malnutrition is crucial.

The study also concluded that taking a child to the hospital when the child was sick could help in the management of the disease since they were more likely to get treatment and basic information on how to manage the condition.

The study also concluded that increased number of children meant greater needs which could not be met with the little income.

The study concluded that some cultural practices such as food sharing practices, taboos on some foods and the belief that the known staple foods were culturally good for children was a contributing factor in denying children some of the key nutrients.

Recommendations

The study also established that the majority of the respondents were illiterate and that majority had their staple food as meat and milk which does not represent a balanced diet. He study recommends that the Ministry of Education should improve the accessibility to education in this area and basic education can also be undertaken more vigorously within centers and forums where residents are actively engaged so that the preventive measures that are easily undertaken without the need of specialists are encouraged. Health education on food diversities can also be taught in these forums.

The study established that most of the respondents were pastoralists and this activity could not be enough for them to be able to afford food to be eaten at the households, the study therefore recommends that these communities could be encouraged to venture into alternative livelihoods that can ensure food security so that they have diversity in their foods.

The study recommends that there should be improved health infrastructure within these areas so that the residents are able to access treatment within a shorter period. An investment in mobile clinics could be embraced since a majority of these families are always on the move and therefore could forgo treatment even when sick.

Access to health care especially to those children with VL should also be made free or less costly to ensure that these children do not experience long periods of illness.

The study findings showed that majority of the households had many children which was acceptable culturally to them which in turn led to children not having enough to eat due to the many mouths to feed because household providers could not afford enough food. The study therefore recommends that family planning and embracing leaner families should be highly encouraged in this area. This calls for a change in tactics and persistent in an area where having a large family is a cultural practice. There is need for encouraging NGOs

which have been more efficient in undertaking such programs to participle within this area.

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