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Household food security, child dietary diversity and copping strategies among rural households. The case of Kole District in Northern Uganda

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Abstract

Household food security, feeding practices, dietary diversity and copping strategies to household food insecurity are largely interconnected. Using a cross sectional study approach involving 162 mothers and care givers in Kole district of Northern Uganda, this study examined the scenarios of household food security status, child feeding practices, dietary diversity and copping strategies. The study revealed that majority of the households (55%) were food secure with an overall observation of low dietary diversity at the household level (72.8%), largely showing dominance of starch-based Cereals, roots and tubers (82%) and limited consumption of other food groups, notably fruits, vegetables, meats and dairy products (18% combined). In terms of feeding practices, majority of the children were fed breast milk for at least 24 months, with mandatory exclusive breastfeeding highly adhered to, but the introduction of complementary foods often delayed and not well planned. Results also showed that a wide range of coping strategies are employed however the major ones were, reliance on less preferred food (54.9%), limiting portions of meals (35.2%), reducing number of melas taken in a day (29%), and gathering wild fruits and harvesting immature crops (29.6%). Generally, it was observed that household food security is a strong determinant of dietary of child dietary diversity, may influence feeding practices and the range of coping strategies applicable to households when they experience food insecurity. It is apparent that nutritional

education, household size and livelihood diversity also play a significant role in as far as household food security status, child feeding, diversity and food insecurity copping are concerned within rural households.

Key Words: *Child dietary diversity, food security, feeding practices, livelihood, diversity*

INTRODUCTION

Persistent undernutrition in early childhood is associated with poor development and achievement during adulthood (Black et al., 2008). The burden of undernutrition is most prevalent in low income nations and it has been largely reported to affect children most (Owais et al., 2016)**.** Even within developing countries, the burden is not uniformly distributed, with the rural areas most hit by the challenge of undernutrition, largely due to the resource constraints experienced. Existing literature indicates that there is a strong linkage between household food security status and nutritional outcomes of household members, including children (Mutisya et al., 2015). Many existing studies on household food security have focused on the determinants and welfare outcomes, studied majorly in respect to income and economic outcomes (Clark, 2012; Harris-Fry et al., 2017; John & Moses, 2020)**.** However limited attention has been placed on investigating the linkage with child feeding practices and coping mechanisms, particularly for households in agrarian rural areas in Uganda. Uganda's child nutrition research indicates that the countries children suffer from high levels of under nutrition indicated by 29 % stunting, 4% wasting and a significant level of .nutrition related deaths, among children (MFPED, 2018; USAID-DHS, 2018). It is well understood that child feeding practices vary across communities and are largely influenced by different socioeconomic conditions prevailing within the communities (Owais et al., 2016). Moreover, the feeding practices are key determinants of children's nutritional status. For instance, exclusive breast feeding for six months is known to be associated with reduced mortality

and morbidity for children under five years (Pretorius et al., 2021). Furthermore, the risk of malnutrition for children under 2 years is well linked to the feeding practices, notably breast feeding and complementary feeding practices by mothers of care givers of children within that age bracket (Pretorius et al., 2021). Similarly, Mattson et al., (2014) reported that, the nutritional practices and food habits normally translate directly and indirectly into nutritional and health status of individuals. From a broader perspective, household food security status is a known direct consequence of several household characteristics. As such, it is expected to have a strong bearing on the child dietary diversity, overall child feeding practices as well as copping strategies employed by the care givers in different households. Though many studies on copping strategies exist, a scan through them reveals that most are focused on household level copping rather than copping in regards to child feeding (Pottier, 2015; Rukundo et al., 2016; Twongyirwe et al., 2019). It is therefore apparent that bridging the information gap on the influence of household food security and child feeding practices in a local context is necessary. This study therefore provides informative insights on interrelationships between household food security, child feeding and copying strategies.

METHODOLOGY

Study Area, study population and sampling.

This study was conducted in Kole district, located in northern Uganda. The study area is atypically agrarian rural setting, between latitudes 02^{o} 124'N and 2.400^{o} N; and longitudes 32^{o} 48'E and 32.800^{o}E in northern Uganda. The study targeted households with children under five and specifically, the mothers and or caregivers of children within the targeted age group were engaged in the study. A purposive sampling approach was used targeting mothers and caregivers of children

under 5. This was done through the village health team registers and a total of 162 mothers and caregivers were selected to participate in the study.

Study design, data collection and analysis

Across sectional survey design was used to collect data from 162 households in the study area. Data on house hold food security status was collected using the HFIAS scale, with questions, consisting of 3 domains (categories) in the household questionnaire namely, anxiety and uncertainty about household food supply; food quality; and food quantity intake, related to food availability (Kabunga et al., 2014). Data on child feeding and dietary diversity was obtained using the modified WHO indicators as previously applied using indicators such as; exclusive breastfeeding (EBF) for the first 6 months; time of initiation of complementary feeding; minimum dietary diversity, minimum frequency of feeding and minimum acceptable diet (MacHaria et al., 2018). To assess response to food shocks by each household, the Coping Strategy Index (CSI) was used, as previously applied, including a weighted list of locally available coping strategies included in the household questionnaire (Maxwell et al., 2008, 2013). Descriptive data on the general characteristics of the study population was included as the first part of the data collection. Trained enumerators were deployed to conduct a pretest and later final data collection.

Data Analysis

Data was analyzed using SPSS v25 and STATA v14. Analysis involved both descriptive and inferential statistics. Data on house hold food security status from the HFIAS scale was used to categorize households as either food secure or food insecure. Data on child dietary diversity was used to categorized children as having either high diverse diet or low diverse diets. Descriptive analysis was conducted using frequencies and means. Regression analysis were performed to

assess the factors associated with household food security status, coping strategy and child dietary diversity. Since each of these variables were measured differently, an appropriate model was chosen in each case. In assessing factors associated with household food security status, a binary logistic regression model was fitted. This was because the dependent variable, household food security status was binary in nature with a household either falling in the food secure category (1) or the food insecure category (0). On the other hand, assessing the factors associated with household coping strategy, a multivariate least squares regression analysis was performed since the household coping strategy index, was a continuous variable. Finally, in assessing the factors associated with child dietary diversity, a binary logistic regression model was estimated, since, the variables child dietary diversity was binary in nature, with the child being classified either as having high dietary diversity (1) if child's 24-hour dietary diversity score was above four food groups or as having low dietary diversity (0) if the child's 24-hour dietary diversity was four or less food groups. The general specification for the binary logistic regression for assessing factors associated with household food security status and child dietary diversity score is specified in Equation (1).

$$log\left[\frac{p}{1-p}\right] = \alpha + XB^{'} + \mu \qquad (1)$$

Where: p is the probability that a given household is food secure in the case of assessing factors associated with household food security status, or the probability that a child has a diverse diet, in the case of assessing factors associated with child dietary diversity. $(1-p)$ = the probability of a household being food insecure or a child having low dietary diversity. α is the regression constant. $B^{'}$ is a vector parameters associated with each of the explanatory variables included in each of the models. X is a vector of explanatory variables that can potentially influences the dependent

variable. For each of the models, there are separated of explanatory variables. Table 1 presents a description and measurement of these explanatory variables. μ= stochastic error term. Prior to running each model, a pairwise correlation analysis was performed to help select the variables to be included in each model. Only variables that had a correlation coefficient of less than 0.45 were included in the model. After the analysis, in each case to post estimation goodness of fit test were performed and where the there was poor fit, the necessary adjustments were made. The final model showed good fit in both cases.

[Table 1 near here]

Since the logit model does not show direst changes in the dependent variable attributed to the changes in the independent variables, the marginal effects were estimated following logit regression in each case. Estimation of the marginal effects after logit followed equation (2).

$$\frac{\partial \Pr\left[y_i = 1 | x_{ij}\right]}{\partial x_{ij}} = \frac{\exp\left(x^{'}\delta\right)}{1 + \exp\left(x^{'}\delta\right)} \quad (2)$$

In order to assess the factors associated with household coping strategy, a multivariate least squares regression was estimated following equation (3)

$$CS = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_n X_n + \varepsilon \quad (3)$$

Where: CS is the household coping strategy index. β_0 is the regression constant. $\beta_1, \beta_2, \ldots, \beta_n$ are parameter associated with the respective explanatory variable, indicating the impact of each explanatory variable on the dependent variable. $X_1, X_2, \ldots, X_n$ are explanatory variables that can potentially influence coping strategy. Table 1 presents a description of these explanatory variables ε is the stochastic error term.

Prior to estimating the multivariate regression model, a pairwise correlation analysis was performed to select variables that should be included in the model. Only variable with correlation coefficient of less than 0.45 were included in the model. Post estimation Ramsey regression specification (RESET) test, showed that the least squares specification was appropriates, while, the variance inflation factor (VIF) analysis showed that all the variables had a VIF of less than 2.1 with an average VIF of 1.37. This implies that the model did not have any challenges of multi-collinearity. The present of heteroskedasticity was addressed using the robust option of STATA. The standard error presented are thus the robust standard errors.

RESULTS

Household Characteristics

Ninety four percent of the care givers were mothers of the children. Majority (85%) of the caregivers were married, while, more than half (64%) of the care givers had primary level of education. In this study, almost all the mothers attended antenatal clinics during their last pregnancy (98%), and post-natal clinics (97.5%). During antenatal and postnatal visits, majority of the mothers usually received nutrition trainings (Table 2). Results have also shown that there were three main sources of livelihood for the household under study with majority (94%) of the households earning a living from farming, while, another 39% earned their livelihood from businesses. Only nine percent were employed. Over 60% of the households had only source of livelihood.

[Table 2 near here]

The mean age of the caregivers was 27.5 years, with the youngest care giver being 13 years old, while, the oldest was 69 years old. The mean age of the child was 12.7 month, with the youngest child being 1 month and the oldest being 36-month-old. The households had on average five members with about three children. The largest household had 13 members with eight children, while the smallest household had two members with only one child. The mean ratio of number of children to household members was 0.5 (Table 3).

[Table 3 near here]

Child feeding practices

Table 4 presents summary statistics for child feeding practices investigated. It shows that 93% of children had ever been breast feed. Of these 73% were first breastfed within the first an hour of giving birth, while, 88% are still currently being breast fed. Nearly nine in ten of the children are fed other foods and drinks other than breast milk, with most of them being fed twice daily. Similarly, 80% of the children were being fed on solid foods other than liquids almost twice daily. Only 40% of the children were being fed using nipple bottles.

[Table 4 near here]

Nutritional indicators

Household Food Security Status

Using the household food insecurity access scale, this paper assessed the household food security level. Table 5 presents the frequency distribution of HFIAS questionnaire items. Overall, majority of the households ranked the responses as rarely and sometimes for most of the questions. There

are variations in food security status across households. The mean HFIAS level was 11.5 and a median of 13 shows borderline food security situation. HFIAS classification shows that over 54% of the household would be classified as food secure, while 46% would be classified as food insecure.

[Table 5 near here]

Coping Strategy

Using the coping strategy scale, this paper assessed the coping strategies with respect to food access for the household. Table 6 presents the frequency distribution of the different coping strategies adopted by households. Very few households responded to the strategies as occurring all the time. Majority however had responses of never, hardly at all and once in a while with respect to the different coping strategies. The mean coping strategy index of 55, and a median of 51.5 with a range of 0 – 167 implied that majority of the households had a relatively better food security situation. However, it doesn't mean they are totally food secure.

[Table 6 near here]

Child dietary diversity

Of the seven food items considered only other liquids excluding milk, and grains, roots and tubers were being fed to children in more than 75% of the households. The other food groups had less than 35% coverage, with eggs and fresh foods and products (15%) and egg products (14%) being the least fed to children (Table 7). The child dietary diversity classifications showed that only 27%

of the children were consuming highly diversified diets (more than 3 food groups), while the rest had less diversified food groups.

[Table 7 near here]

Factors Associated with household food security status

Table 8 presents results of the binary logistic regressions results for factors predicting household food security status. It shows that sex of child ($p<0.001$), age of care giver ($p<0.001$), antenatal nutrition training ($p<0.001$), breast feeding within an hour of birth ($p<0.05$), household size ($p<0.001$), frequency of feeding child with other foods and liquids other than milk ($p<0.05$), frequency of feeding child with solid food foods non-liquid ($p<0.001$) and livelihood diversity ($p<0.001$). Specifically, household with male children were 36% less likely to be food secure as opposed to those with female children. Household with care takers aged between 20 – 29 years, 20 – 39 years and above 39 years were 51%, 58% and 67% less likely to be food secure, respectively, than households with caretakers below 20 years of age. Similarly, an increase in household size would increase the likelihood of being food insecure by 10%. Household with mothers who received nutritional training while attending antenatal clinic, were 48% more likely to be food secure. Results also showed that in households where the child was breastfed within an hour of birth, there was a 23% higher chance of being food secure. The daily frequency for feeding children other food was also important in that an increase in the number of times a child is fed other foods and liquids was more likely (15%) associated with being food insecure, while, an increase in the number of times a child is fed solid non liquid foods daily was more likely (23%) associated with being food secure. Results also showed that households with more than one source of livelihood had a 40% chance of being food secure.

[Table 8 near here]

Factors associated with household coping strategy

Table 9 presents regression results for predictors of coping strategy index (CSI). Post estimations command shows a non-significant Ramsey RESET test. The mean VIF is 1.37 with the highest of 2.08. The presence of heteroskedasticity was corrected by predicted robust standard errors. Results show that household size has a positive significant effect on coping strategy index, while, nipple feeding, livelihood diversity and HFIAS had a negative significant effect on CSI. Child caregivers' age, level of education, marital status, nutritional training, feeding child with other foods other than milk and length of time to first breastfeeding did not have any significant influence on CSI. An increase in household size increases CSI by 4.4 units ($p<0.05$). Households with children fed using nipple bottles had a 15 units lower CSI that who do not ($p<0.05$), while, households with more than one livelihood source also have a 15-unit lower CSI than those with only one livelihood source ($p<0.05$). As expected, food secure households had a 30-unit lower CSI as opposed to the food insecure households ($p<0.001$).

[Table 9 near here]

Factors associated with child dietary diversity

The binary logistic results for predictors of child dietary diversity are presented in Table 10. Results show that the child age, age of care giver, prenatal nutrition training, household size, Household food security status had a positive and significant effect on child dietary diversity,

while, the number of children in the household and coping strategy had a negative and significant effect on child dietary diversity. On the other hand, marital status, sex of child, child breast feeding status, nipple feeding and livelihood had no significant influence on child dietary diversity. Specifically, as expected, an increase in the age of the child is expected to increase the dietary diversity by 2% ($p<0.001$). Children with care givers between the age of 30 – 39 had a 11% higher dietary diversity than those with care givers aged below 20 years ($p<0.05$). The other age categories did not differ significantly in child dietary diversity. Similarly, where mothers had received nutritional training during prenatal visits, the child would have a 10% higher dietary diversity ($p<0.05$). An increase in household size would increase child dietary diversity by 7% (0.05) while food secure households had a 20% higher child dietary diversity than food insecure households ($p<0.01$). An increase in the number of children in the household would reduce the child dietary diversity by 3% ($p<0.05$), while, an increase in household CSI would reduce child dietary diversity by 0.3% ($p<0.001$)

[Table 10 near here]

DISCUSSIONS

We examined the factors associated with household food security status, child feeding practices, child dietary diversity and household food insecurity copping strategies in atypical agrarian setting. With the children in the household engaged in the study being between one and thirty-six months old, the study reveals that children in that category made up at least half of the household size. This observation indicates that the household feeding decisions would greatly influence the nutritional outcomes of the children. As previously reported, appropriate feeding practices are critical towards achieving good child health and nutrition outcomes (Pretorius et al., 2021). It is

apparent that the ability to provide this good nutritional care would be a consequence of the overall household food security status. As demonstrated in this study, the household food security status was a strong determinant of the feeding and child dietary diversity observed. The household food security status as measured in this study is largely based on the accessibility dimension (Hussein et al., 2018)**,** indicating that households with limited access to food would have lower levels of diversity. In fact, most of the highly nutritious food groups that are rather expensive and less affordable in local contexts were limitedly consumed among the households. As such children received less of such food items. Though it was not the subject of this study, it could be expected that the result is poor nutritional outcomes and deficiencies associated to less consumption of foods such as eggs, meat, poultry, and vitamin A rich fruits and vegetables.

Appropriate initiation and continuation of breast feeding at early childhood is critical for the good nutritional wellbeing of the child (Saha et al., 2008)**.** In this study we observed that majority of children obtained breast milk within one hour after birth and were maintained on breast milk for up to between 12 to 24 months, however, the timing of introducing other foods other than milk was rather unclear. Additionally, there was no strong consistency on the type of non-milk foods given to children. For typical agrarian community like the ones in this study, the foods were largely starch based. Moreover, reports indicate that complementary foods are often introduced too early or too late (Przyrembel, 2012). In the case of this study, even when they are introduced at the right age, they are most often nutritionally inadequate (largely starch based).

It is well emphasized that children should be fed both on balanced and nutritionally diverse diet (Miller et al., 2013; Penagini et al., 2013)**.** However, our study reveals that 70% of the children were receiving a diet of low diversity, largely dominated by grains, roots and tubers. These could

be attributed to the fact that the households here are predominantly peasants and largely obtain their food from their own production. This is an observation previously raised in related studies examining food access and child feeding dynamics in rural agrarian settings (Ahishakiye et al., 2019; Ko et al., 2018). This essentially implies that integrating nutrition in the household production planning would enhance child nutrition as well as dietary diversity. Though it was observed that about half of the households were food secure, the critical factors associated with household food security status were the age of care takers, nutritional training, household size and livelihood diversity. By way of inference, older care givers were less capable of providing diverse diets largely due to limited livelihood options, while larger households presented a greater burden towards the food needs of the households, hence affecting child feeding. Similarly, as previous scholars such as Ickes et al., (2017); Kulwa et al., (2014); Elolu & Ongeng, (2020) and Kajjura, Veldman, & Kassier, (2019) emphasized the need for nutritional education, we observe in this study that integration of nutritional training in antenatal care programs greatly influences the feeding practices, dietary diversity and has a strong positive association with household food security. It is therefore apparent that nutritional education should be an integral part of training for mothers and caregivers of infants and young children.

Generally, it was observed that household food security is a strong determinant of dietary of child dietary diversity, may influence feeding practices and the range of coping strategies applicable to households when they experience food insecurity. In terms of coping strategies essentially, the majority of households copping strategies were, reliance on less preferred food, limiting portions of meals, reducing number of meals taken in a day, and gathering wild fruits and harvesting immature crops. These strategies may have specific effect on the outcome of food insecurity towards different individual groups in the household namely children, adults, women, and elders

among others. For instance, elders and adults may be deprived of adequate food as children may end up being prioritized with the limited food available. Similarly, pregnant women may end up receiving less food than recommended as inadequacies both in terms of reduced portions available and shifting priorities. These observations were also previously reported in some cases where effect of food security on household food distribution was studied (Harris-Fry et al., 2017). The aforementioned strategies also lend credence to the role of other food sources and their potential contribution to household food and nutrition. Such sources include wild foods particularly fruits and vegetables, still quite abundant in rural communities such as in the study area in northern Uganda (Tuyizere et al., 2021). Although these strategies may vary from one community to another, it is apparent that there is no special strategy employed only to target maintaining good child feeding. By inference, this may imply that initiatives to improve child feeding practices should rather be broad and focus on improving the overall household food and nutrition security status.

CONCLUSIONS

Representing a typical rural agrarian community, this study indicted a broad level relationship between household food insecurity, dietary diversity, child feeding practices and associated copping strategies. It is still evident that most of the diets in this area are largely staple based, largely dominated by grains, roots and tubers, with evidence showing limited diversity of household diets. We found that variations in household food insecurity are significantly associated with infant feeding practices. Specifically, it is clear that nutritional training, household size and livelihood diversity are critical factors associated with household food security status and thus diversifying the livelihoods options, provision of nutritional education as an integral part of

livelihoods and social development initiatives would certainly contribute to better household food security.

At infant and early childhood stages, it is apparent that exclusive breast feeding is largely practiced in such rural areas. However, the introduction of complementary feeds is often delayed among many mothers and child care givers. Finally, in terms of coping strategies, although reliance on less preferred food, limiting portions of meals and reducing number of meals taken in a day were the predominant coping mechanisms among the caregivers, it is apparent that no single strategy that can be sufficient in isolation. Therefore, building broad based resilience of households to food insecurity could be the most desirable approach to ensure and preserve food security.

Declarations

The article has been approved for submission by all the authors and there is no conflict of interest

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Tables

Table 1: Description of Variables used for regression analysis

Variable	Description/Measurement
Dependent Variables	
HFIAS Classification	Binary dependent variable classifying households into 1=food secure, 0=food insecure, basing on the HFIAS
Coping Strategy Index	Coping strategy index for the households
Child Dietary Diversity Score	Number of difference food groups fed to child over a 24-hour period
Independent Variables	
Sex of child	Sex of reference child, 1=male, 0=female
Age of child	Age of the reference child in months
Age of care giver	Age of the caregiver in complete years
Prenatal Nutrition training	Mother of reference child attended prenatal nutrition training (1=yes, 0=no)
Education	Level of education of mother/care giver
Married	Marital status of caregiver
BF_Less1Hr	Reference child was breast fed within one hour after birth (1=yes, 0=no)
Still_BF	Child is still breast feeding (1=yes, 0=no)
HH_size	Number of members in the household
Nipple_feed	Child was fed using a bottle with nipple in the last 24 hours (1=yes, 0=no)
Other_food	Child is given other foods (1=yes, 0=no)
PII_5	24-hour frequency of child's consumption of mashed or pureed food or solid or semi-solid food as a meal or a snack
PII_8	24-hour frequency of child's consumption of solid, semi-solid, or soft foods other than liquids
Multi_livelihood	Household has more than one livelihood sources (1=yes, 0=no)

Note: HFIAS was included in the coping strategy and dietary diversity models, while, coping strategy was also included in the dietary diversity model as independent variables.

Table 2: Descriptive statistics for household Characteristics

Variable	Category	Frequency	Percent (N=162)
Care giver is mother of child	Yes	152	93.8
	No	10	6.2
Marital status of care giver	Single	9	5.6
	Married	138	85.2
	Divorced	15	9.3
Education level of care giver	None	15	9.3
	Primary	103	63.6
	O' level	31	19.1
	A' level	3	1.9
	Tertiary	10	6.2
Mother attended antenatal clinics	Yes	159	98.1
	No	3	1.9
Mother received nutrition trainings during Antenatal visits	Yes	130	81.8
	No	29	18.2
Mother attends post-natal clinics	Yes	158	97.5
	No	4	2.5
Mother receives nutrition and feeding practices training during post-natal visits	Yes	125	79.1
	No	33	20.9
Farming is source of livelihood	Yes	152	93.8
	No	10	6.2
Business is source of livelihood	Yes	63	38.9
	No	99	61.1
Employment is source of livelihood	Yes	16	9.9
	No	146	90.1
Livelihood diversity	Yes	63	38.9
	No	99	61.1

Table 3: Age and household size

Variable	Mean	SD	Min	Max
Age of the care giver (years)	27.52	9.47	13	69
Age of the child (month)	12.71	7.24	1	36
Household size	5.46	2.26	2	13
Number of children in the household	2.87	1.89	1	8
Ratio of Number of children to household size	0.50	0.17	0.10	0.89

Table 4: Child feeding practices

Variable	Category	Frequency	Percent (N=162)
Child was ever breast fed	Yes	151	93.2
	No	11	6.8
Child Exclusively breast fed for 6 months			
Length of time from birth to first breast feeding	Less than an hour	110	72.9
	More than an hour	41	27.1
Child is still breast feeding	Yes	109	72.2
	No	42	27.8
Child eat other food and drink, other than breast milk	Yes	143	88.3
	No	19	11.7
Number of times child is fed mashed or pureed food or solid or semi soldi food	0	18	11.1
	1	19	11.7
	2	75	46.3
	3	39	24.1
	4	11	6.8
Child eats solids foods other than liquids	Yes	129	79.6
	No	33	20.4
Number of times child eats solid, Semi-solid or soft foods other than liquids	0	26	16.0
	1	34	21.0
	2	65	40.1
	3	35	21.6
	4	2	1.2
Child uses nipple bottle feeding	Yes	63	38.9
	No	99	61.1

Table 5: Household Food Insecurity Status

HFIAS Question		Frequency (percentage)			
		Never	**Rarely**	**Sometimes**	**Often**
Did you worry that your household would not have enough food?		10 (6.2)	48 (29.6)	68 (42.0)	36 (22.2)
Were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?		16 (9.9)	43 (26.5)	86 (53.1)	17 (10.5)
Did you or any household member eat just a few kinds of food day after day because of a lack of resources?		15 (9.3)	40 (24.7)	85 (52.5)	22 (13.6)
Did you or any household member eat food that you did not want to eat because a lack of resources to obtain other types of food?		27 (16.7)	44 (27.2)	77 (47.5)	14 (8.6)
Did you or any household member eat a smaller meal than you felt you needed because there was not enough food?		30 (18.5)	30 (18.5)	77 (47.5)	25 (15.4)
Did you or any other household member eat fewer meals in a day because there was not enough food?		32 (19.8)	36 (22.2)	82 (60.6)	12 (7.4)
Was there ever no food at all in your household because there were no resources to get more?		75 (46.3)	51 (31.5)	33 (20.4)	3 (1.9)
Did you or any household member go to sleep at night hungry because there was not enough food?		84 (51.9)	55 (34.0)	19 (11.7)	4 (2.5)
Did you or any household member go a whole day without eating anything because there was not enough food?		117 (72.2)	33 (20.4)	11 (6.8)	1 (0.6)
	Mean	**Median**	**SD**	**Min**	**Max**
HFIAS	11.47	13.0	5.631	0	24
HFIAS classification	**Frequency/Proportion**				
Food Insecure	74 (45.7)				
Food Secure	88 (54.3)				

SD = Standard Deviation

Table 6: Coping Strategies

Coping Strategy	Frequency (percentage)				
	Never	**Hardly at all**	**Once in a while**	**Pretty often**	**All the time**
Rely on less preferred and less expensive foods	6 (3.7)	21 (13.0)	39 (24.1)	89 (54.9)	7 (4.3)
Borrow food, or rely on help from a friend or relative	64 (39.5)	51 (31.5)	40 (24.7)	7 (4.3)	0 (0.0)
Purchase food on credit	67 (41.4)	51 (31.5)	31 (19.1)	12 (7.4)	1 (0.6)
Gather wild food, hunt, or harvest immature crops	28 (17.3)	35 (21.6)	49 (30.2)	48 (29.6)	2 (1.2)
Consume seed stock held for next season	63 (38.9)	38 (23.5)	45 (27.8)	14 (8.6)	2 (1.2)
Send household members to eat elsewhere	94 (58.0)	44 (27.2)	23 (14.2)	1 (0.6)	0 (0.0)
Send household members to beg	102 (63.0)	38 (23.5)	21 (13.0)	1 (0.6)	0 (0.0)
Limit portion size at mealtimes	38 (23.5)	21 (13.0)	43 (26.5)	57 (35.2)	3 (1.9)
Restrict consumption of adults in order for small children to eat	74 (45.7)	45 (27.8)	30 (18.5)	11 (6.8)	2 (1.2)
Feed working members of HH at the expense of non-working members	116 (71.6)	31 (19.1)	13 (8.0)	1 (0.6)	1 (0.6)
Reduce number of meals eaten in a day	56 (34.6)	26 (16.0)	27 (16.7)	47 (29.0)	6 (3.7)
Skip entire days without eating	128 (79.0)	24 (14.8)	7 (4.3)	2 (1.2)	1 (0.6)
	Mean	**Median**	**SD**	**Min**	**Max**
Coping Strategy Index	54.75	51.50	41.68	0.00	167.00

Table 7: Child dietary diversity

Child Food group	Proportion of children (n=162)	
	Frequency	%
Other liquids other than milk	121	74.7
Grains, roots and tubers	130	80.2
Dairy products (milk, yoghurt, cheese)	53	32.7
Fresh food (meat, fish, poultry and liver/organ meats)	25	15.4
Eggs or any food made with eggs	22	13.6
Vitamin A-rich fruits and vegetables	39	24.1
Other fruits and vegetables	56	34.6
Classification of child dietary diversity		
Low Diversity	118	72.8
High Diversity	44	27.2

Table 8: Factors associated with household food security status

Explanatory Variables (Dependent =HFIAS Classification	Logit regression			Marginal effects		
	Coef.	Robust Std. Err.	P>z	dy/dx	Std. Err.	P>z
Sex_child (Male)	-1.574	0.534	**0.003**	-0.368	0.112	0.001
Age_of_child	-0.040	0.033	0.218	-0.010	0.008	0.219
Below 20=Base						
age_20to29	-2.307	0.684	**0.001**	-0.509	0.122	0.000
age_30to39	-2.774	0.816	**0.001**	-0.581	0.116	0.000
age_above39	-5.191	1.078	**0.000**	-0.671	0.056	0.000
Nutr_training	2.1 c64	0.610	**0.000**	0.481	0.103	0.000
BF_Less1Hr	0.945	0.460	**0.040**	0.232	0.109	0.033
HH_size	-0.430	0.134	**0.001**	-0.105	0.033	0.002
Nipple_feed	0.678	0.477	0.155	0.163	0.111	0.143
PII_5	-0.642	0.317	**0.043**	-0.157	0.078	0.043
PII_8	0.932	0.339	**0.006**	0.228	0.083	0.006
Multi_livelihood	1.791	0.547	**0.001**	0.400	0.104	0.000
Constant	2.572	1.084	0.018			
N	162					
Wald chi2(12)	50.79		0.000			
Pseudo R2	0.393					
Log likelihood	-67.736					
GOF Pearson chi2(148)	139.84		0.672			

Table 9: Factors Associated with coping strategy index

Variable	Coef.	Robust Std. Err.	P>t
Age_caregiver	-0.170	0.374	0.649
Post_pri	1.861	6.103	0.761
Married	-9.579	7.968	0.231
Nutr_training	1.293	7.658	0.866
Other_food	9.530	8.786	0.280
BF_Less1Hr	-3.004	6.177	0.627
HH_size	4.429	1.958	0.025
Nipple_feed	-14.883	5.850	0.012
Multi_livelihood	-15.277	5.978	0.012
HFIAS_CAT	-30.286	7.090	0.000
Constant	63.838	17.820	0.000
Number of observations	162		
F (10, 151)	11.84		
Prob > F	0.000		
R-squared	0.396		
Ramsey RESET test	F (3, 148)	Prob > F	
	1.86	0.1387	
Mean VIF = 1.37, Max VIF 2.08			

Table 10: Factors associated with child dietary diversity

Variable	Logistic regression			Marginal Effects		
	Coef.	**Std. Err.**	**P>z**	**dy/dx**	**Std. Err.**	**P>z**
Age_of_child	0.171	0.045	**0.000**	0.016	0.005	0.000
Age of Caregiver (below 20 = base)						
age_20to29	1.129	0.789	0.152	0.108	0.072	0.136
age_30to39	1.967	0.989	**0.047**	0.280	0.174	0.106
age_above39	0.921	1.432	0.520	0.117	0.228	0.607
Married	1.202	0.928	0.195	0.084	0.045	0.065
Sex_child	0.609	0.502	0.224	0.059	0.052	0.262
Nutr_training	1.469	0.750	**0.050**	0.102	0.042	0.015
Child_number	-0.739	0.337	**0.028**	-0.071	0.030	0.017
HH_size	0.680	0.281	**0.016**	0.065	0.023	0.004
Still_BF	0.907	0.809	0.262	0.077	0.062	0.209
Nipple_feed	0.622	0.488	0.203	0.063	0.054	0.244
Multi_livelihood	-0.100	0.548	0.855	-0.009	0.052	0.854
HFIAS_CAT	2.064	0.730	**0.005**	0.197	0.088	0.025
CS	-0.030	0.011	**0.006**	-0.003	0.001	0.002
Constant	-9.743	2.770	0.000			
N	162					
Wald chi2(12)	51.06		0.000			
Pseudo R2	0.418					
Log likelihood	-55.192					
GOF Pearson chi2(148)	121.81		0.936			