

DIETARY DIVERSITY
IN DANGARAYO AND DINSOR DISTRICTS, SOMALIA

FOOD SECURITY ASSESSMENT UNIT
THE FOOD AND AGRICULTURE ORGANIZATION
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EXECUTIVE SUMMARY

The main challenge within FSAU is to find tools that are precise enough to give the information needed on dietary diversity and simple enough to be used in large field assessments. The development of such tools requires systematic and repeated field surveys and rigorous pre-testing of the tools at field level. The challenge has even been bigger in Somalia where the adult literacy rate is less than 20% (UNDP 2001) and sharing food from the same bowl is common practice. A better understanding of dietary diversity will be useful in guiding the design of interventions that have an increased likelihood of success. This assessment provides baseline information on dietary diversity that can be used to assess differences over time.

The overall objective of the study aimed at bridging the knowledge gap on dietary diversity in Somalia by identifying dietary diversity issues of concern that are significant in triggering changes in levels of nutritional vulnerability/nutritional status and to create dietary diversity baseline for two of the dominant food economy groups (Agro pastorals group in Dinsor and pastoral group in Dangaroyo). The specific objectives of the study were:

- To list different food or food groups consumed by two of the food economy groups in Somalia (agro-pastoral and pastoral FEGs)
- To develop and pilot a simple dietary diversity tool
- To determine household level food/nutrient adequacy using caloric intake in the four dominant FEGs of Somalia
- To establish an association between dietary diversity scores and the nutrient adequacy of the household diets.
- To establish the association between dietary diversity and child nutritional status

A 24-hour recall questionnaire was designed to elicit food consumptions level at household in addition to other information elicited at review of available documentations as well as observations and key informant interviews. Households were randomly surveyed from purposively selected eight villages in each study location.

Some of the main findings of the study included:

- In the two samples (Dangorayo and Dinsor), there is a well measured, positive and significant association between dietary diversity and household per capita daily caloric availability- a good measure of household food access.
- In the two study groups, there is a positive, statistically significant association between number of meal occasions and household per capita caloric availability. As the number of meal occasions increase, the household per capita caloric availability also increases.
- In the samples, dietary diversity (number of food groups) is strongly and significantly associated with the nutritional status of under-fives within the households. This so despite the fact that only household consumption data was collected with no specific data for individual intake of food in those given households.
- Number of meal occasions is an important predictor of nutritional status of under-fives in sampled households for the two study groups.

This study reveals interesting findings of the relationship between the dietary diversity and energy provision as well as the nutrition status of the population. The difference in access to a diverse diet by the various food economy groups sheds more light in the food security and nutrition condition by those groups. A repeat of similar study in the various other food economies and in different seasons creates opportunity for increased understanding of the dietary habits in Somalia.

DEFINITIONS OF SELECTED INDICATORS

Dietary Diversity: The number of foods or **food groups** (in this study) consumed in the reference period.

Elasticity: the percentage change in the dependent variable given a one percent change in an independent variable.

Dietary Variety: a term often used in the literature and it is considered here as synonymous to dietary diversity.

Food Groups: A total of 12 food groups adopted from the FAO classifications as outlined: 1) Cereals, 2) Meat and meat products, 3) Roots and tubers, 4) Vegetables, 5) Fruits, 6) Beans and other pulses, 7) Dairy products, 8) Fats and oil, 9) Sugars and honey, 10) Fish and sea foods, 11) Eggs, 12) beverages, spices & other products was used in this specific study.

Food security: When all people at all times have both the physical and economic access to sufficient food to meet their dietary needs in order to lead productive and healthy life (USAID definition).

Food access: a measure of the household's ability to acquire food over a reference period

Food acquisition: The amount of food consumed by all members of household over a defined period of time (for instance, last 24 hours in this study).

Household caloric availability: the amount of calories accessed by the household; it's derived from data on food acquisition.

Household consumption: the nutrient value of food and non-food goods consumed by the household over a reference period (24 hours in this study).

Household per capita caloric availability: Household caloric availability divided by the number of consumers

Household per capita consumption: Household consumption divided by the number of household members

1.0 INTRODUCTION

1.1 Background: Rationale for the study

The Nutrition Surveillance Project within the Food Security Analysis Unit aims to develop an understanding of nutrition issues through enhancing information analysis and interpretation and endeavours to highlight all issues with possible implication of the nutritional welfare of both urban and rural population in Somalia. The household economy framework for analysis used in the unit provides valuable information on the availability of and access to food. The existing nutrition information from surveys, rapid assessments and the health facility-based surveillance also provides good picture of the nutritional status of different population groups in Somalia. However, less information is currently available on dietary diversity at individual and household levels and therefore little is known on its possible implication to the nutritional wellbeing of the population.

Although dietary diversity is universally recognised as a key component of healthy diets, there is still a lack of consensus on how to measure and operationalise it. Moreover, systematic dietary diversity studies are limited in most countries, particularly those that have ever experienced some level of crisis. In Somalia, the fragile security situation since the collapse of the government in the early 1990s has made it increasingly difficult to conduct such studies. Nutrition surveys and rapid assessments in Somalia have elicited minimal dietary issues with equally scanty documentation. However, studies elsewhere in both developed and developing countries reveal that dietary diversity assessments are fairly simple and have proven association with child growth, food security and adequacy in food consumption¹.

The Nutrition Surveillance Project at FSAU proposed this specific study in order to better understand the specific dietary diversity issues at household level. Due to high malnutrition rates in many parts of Somalia and particularly high cases of oedema in some localities even in times of relatively stable “food security”, it was necessary to understand dietary issues of specific population groups in Somalia. Further, FSAU planned to undertake a series of dietary diversity assessment as part of an effort to guide the design of intervention that could target specific problems in the population of Somalia. To begin with, FSAU intends to conduct dietary diversity studies in the four main food economy groups in Somalia; i.e, agro-pastoral, pastoral, urban and the riverine.

The Nutrition Surveillance Project’s interest on dietary diversity is guided by five main reasons: a) that a more varied diet is a valid outcome in its own right with profound influence on nutritional status b) that a more varied diet is associated with a number of improved outcomes in areas such as child growth, nutritional status etc. c) that a more varied diet has the potential to provide adequate dietary energy intake which is essential for body weight maintenance and work performance d) that questions on dietary diversity can be asked at the household or individual, making it possible to examine food security at household and even intra-household levels and e) that obtaining the dietary diversity data is relatively straightforward, simple and less time consuming. In particular, this study uses food groups for specific reasons. Food groups are chosen because they are likely to be more representative of a diverse diet than individual food items. It is acknowledged that increasing the number of food groups has a greater impact on nutrient adequacy than increasing the number of individual foods (which could at times only be a good source of one or two nutrients) in the diet.

The main challenge within FSAU is to find tools that are precise enough to give the information needed and simple enough to be used in large field assessments. The development of such tools requires systematic and repeated field surveys and rigorous pre-testing of the tools at field level. The challenge has even been bigger in Somalia where the adult literacy rate is less than 20% (UNDP 2001) and sharing food from the same bowl is common practice. A better understanding of dietary diversity will be useful in guiding the design of interventions that have an increased likelihood of success. The assessment is also

¹ Ruel M. , IFPRI Discussion paper No.140, 2002

expected to provide baseline information on dietary diversity that can be used to assess differences over time.

1.2 The study objectives

Overall objective: The study aimed at bridging the knowledge gap on dietary diversity in Somalia by identifying dietary diversity issues of concern that are significant in triggering changes in levels of nutritional vulnerability or nutritional status and to create dietary diversity baseline for two of the dominant food economy groups (FEGs).

Specific objective of the study

- To list different food or food groups consumed by two of the main food economy groups in Somalia (agro-pastoral and pastoral FEGs)
- To develop and pilot a simple dietary diversity tool
- To determine household level food/nutrient adequacy using caloric intake in the two FEGs of Somalia
- To establish an association between dietary diversity scores and the nutrient adequacy of the household diets.
- To establish the association between dietary diversity and child nutritional status

2.0 METHODOLOGY

2.1 Study Design

As part of a series of seasonal dietary diversity assessments planned for Somalia, FSAU conducted a study in agro-pastoral areas of Dinsor District, Southern Somalia and pastoral areas of Dangorayo District in Northern Somalia in January 2004. This study was both descriptive and analytical in nature. Using a questionnaire (see appendix), quantitative data was collected.

2.2 The sampling procedure

Initially a sampling frame was constructed from which representative sample of villages were purposively drawn. The sample was drawn from a list of both pastoral (Dangorayo group) and agro-pastoral (Dinsor) villages. In each area (Dangorayo and Dinsor), **eight** villages (purposively chosen based on perceived representative ness) were selected. In each of the selected villages, a minimum of 30 randomly chosen households were assessed with all the children between the heights/length of 65 and 110cm and 6-59 months old, found in those households during the assessment, screened for Weight for Height. However, the field exercise provided additional challenges in accessing the number of households in the study areas. While accessing the required number of households in Dinsor it was simple and achievable while accessing households in pastoral set up was difficult. Some villages were visited only to find the population had moved the previous day or two to far off distances in pastoral villages of Dangorayo District. Consequently, only five of the selected villages could be accessed in the pastoral food economy. A total of 420 households (265 agro-pastoral and 155 pastoral group households) were surveyed during the first seasonal assessment on dietary diversity study.

2.3 Study population and sampling criteria

The study population consisted of people living in the pastoral and agro-pastoral villages of the two districts and comprised of all the households' members. For anthropometric assessment, all children aged 6-59 months or measuring 65-110 cm for height/length found in the visited households were assessed. On the visit to each village, the centre was identified and a pen was spun to determine the direction to follow in the selection of the households. The total number of the households from the centre to the end was established and given numbers to enable random selection of the first household. From the first household the same direction was followed to get the next household. On reaching the edge of the village the right-hand direction (clockwise direction) was followed until details of 30 households were collected from that village. If a village was exhausted of households before the required 30 households had been reached, a neighbouring area was randomly selected. All children measuring 65-110cm or aged 6-59 months found in the assessed households were measured and if a child or primary caregiver was absent, an appointment was booked for a later visit in the course of survey. If a child was in hospital, endeavour was made to take the measurement at the clinic or at the hospital. The survey of children was dependent whether the household selected for the survey had a child meeting the criteria, and thus unlike nutritional surveys where visiting a household is guided by the presence of an under-five child, the dietary assessment was targeted at all households irrespective of it having a child or not. Additional information on child illnesses one month prior to the study was also elicited.

2.4 Data collection

All randomly selected households within a village were surveyed irrespective of the presence of a child or not. A standard questionnaire detailing food groups consumed in the 24 hours prior to the study, specific amounts consumed by household and anthropometric details of children in the study households were collected.

2.4.1 Food consumption

Dietary issues were investigated through the 24-hour recall dietary intake interview and counts of food groups consumed in the previous 24 hours. Specific to eliciting information on dietary diversity, the study used:

- A simple count of food groups in the previous 24-hour period. For this study 12 food groups was used as recommended by FAO, namely: 1) Cereals, 2) Meat and meat products, 3) Roots and tubers, 4) Vegetables, 5) Fruits, 6) Beans and other pulses, 7) Dairy products, 8) Fats and oil, 9) Sugars and honey, 10) Fish and sea foods, 11) Eggs, 12) beverages, spices & other products
- Using food samples of known weight, taking of weights and volumetric measurement of food (using appropriately sensitive measuring equipment), the amount of food consumed by the entire household in the past 24 hours was established through the interview of the person involved in the food preparation and serving (mainly the mother in the household). Only the foods and drinks taken in the household by the members present were considered in the estimation of the caloric and nutrient provision at the household level. The amount served, consumed and any wastes that occurred were established for purposes of estimating the actual amount taken consumed. A food weighing scale/kitchen scale with a 50g calibration as well as equipment for volumetric measurements with calibration to nearest 50ml were used. Thus, the study recognises that there could have been an under-estimation of food consumption especially if men are mainly eating outside the household. However, the impact was expected to be minimal as for the agro-pastoralists, this was the peak of farm activities and they could hardly get time to socialise outside.

2.4.2 Anthropometric measurements

The anthropometric data were collected using the procedure stipulated by the WHO (1995) for taking anthropometric measurements. Adherence to this procedure was ensured. The protocol used was as follows:

Weight: Salter scale with calibrations of 100g-unit was used. This was adjusted to zero before weighing every child. The female children would be lightly dressed before having the weight taken while clothes for the male children were removed. Two readings were taken for each child and the average recorded on the questionnaire.

Height: For height, a vertical or horizontal measuring board reading a maximum of 175cm and capable of measuring to 0.1cm was used to take the height or length of a child. The child would stand on the measuring board barefooted; have hands hanging loosely with feet parallel to the body, and heels, buttocks, shoulders and back of the head touching the board. The head would be held comfortably erect with the lower border of the orbit of the eye being in the same horizontal plane as the external canal of the ear. The headpiece of the measuring board was then pushed gently, crushing the hair and making contact with the top of the head. Height/length was then read to the nearest 0.1cm. Two readings were recorded and the computed average used in the analysis.

Length: For children aged 6 to 24 months or between 65cm to 84.5cm length instead of height was taken. The child was made to lie flat on the length board. The sliding piece was placed at the edge of the bare feet as the head (with crushing of the hair) touched the other end of the measuring device. Then two readings were taken and the average computed.

2.4.3 Age determination of members of the household

Difficulties were encountered in determining the exact ages of household members. However, in the case of children, useful documents like growth monitoring/clinic attendance cards, or any other viable formal card were used when available. Calendars of events were also used as proxies to accurate age determination. Though not entirely accurate, ages were still regarded as important indicators for children though not used for anthropometric analysis and were approximate/average pointers. The nutrition indicator employed was weight for height as interest was in the wasting status (acute malnutrition). For

the rest of household members, ages were useful in determining the amount of food requirements for the households.

2.4.4 Oedema

This was defined as bilateral oedema on the lower limbs detected by gently pressing the feet to check if a depression is left after at least three seconds of pressing. It is notable that all severely malnourished children identified during the data collection process were referred to nearest health facilities.

2.4.5 Morbidity

Investigation of the common diseases among the children surveyed was done. The reference period was one month prior to the study. The definitions for the common diseases are as indicated below.

Diarrhoea: Diarrhoea was defined as presence of three or more loose or watery stools per day in a child.

Measles: A child with more than three signs of the following was considered having measles: fever and skin rash, runny nose or red eyes, and/or mouth infection or chest infection

Acute Respiratory Infection (ARI): Asked as *oof wareen or wareento*. The signs asked included cough, rapid breathing and fever.

Suspected malaria/acute febrile illness: The signs to be looked for are periodic chills, fever, sweating and sometimes a coma.

Table 1: A summary of the survey methodology, analysis and output

Objective	Method	Variables and derivative	Analysis	Expected output and use	Implementation
To list different foods and food groups consumed by the food economy groups in Somalia (agro-pastoral, and pastoral FEGs) in the previous 24-hours	Simple count of food groups consumed in the last 24 hours	Dietary diversity score. 12 food groups used with one point awarded for each food group consumed by household in last 24 hours	Mean 24-hour food group diversity Mean frequency of intake	A baseline information on dietary diversity in selected food economy groups in Somalia Dietary diversity scores based on food groups Dietary diversity scores used to formulate interventions	Data collection- by nutrition monitors in the area and 2 enumerators Coordinated by 2 senior nutrition staff; Analysis by the senior nutrition staff
To develop and pilot a simple dietary diversity assessment and monitoring tool	Design and use a questionnaire for data collection, Review of previous studies, Experience from assessment team	Draft and pilot the draft tool containing the key variables for assessment		Rapid assessment tool based on dietary diversity ready for use A tool for follow up data collection in each area and each season	2 senior nutrition staff
To determine household level food/nutrient adequacy using caloric intake in the FEGs of Somalia	-24-hour recall of food ingredient consumed -Estimated volumetric measurements of food ingredients consumed in the household	Amount consumed calculated in kilocalories Food group diversity score	Nutrient adequacy ratio (NAR) calculated as HH energy consumption as compared to RDA for the family	Documentation of household level of caloric intake in the sampled food economy groups Estimates of energy intake Nutrient adequacy used a measure of HH food security	Data collection- by nutrition monitors in the area and 2 enumerators Coordinated by 2 senior nutrition staff; Analysis by the senior nutrition staff
To establish an association between dietary diversity scores and the nutrient adequacy of the household diets	24-hour recall food group diversity 24-hour recall HH kilocalories consumption by household members	Food group diversity score; W/H indicator plus oedema Frequency of consumption	SPSS 1997 used. Correlation and regression analysis between food group diversity	Documentation of association between dietary diversity and nutrient value in Somalia context Documentation of dietary diversity as an indicator of food security at household	Data collection by enumerators and nutrition monitors Analysis by 2 senior nutrition staff

			and caloric adequacy	level	
To establish the association between household level dietary diversity and child nutritional status	24-hour recall food group diversity versus W/H indicator of child nutritional status	Food group diversity score ; W/H indicator plus oedema Frequency of consumption	Correlation and regression analysis between food group diversity and W/H index plus oedema	Documentation of the association between dietary diversity and child nutritional status	Data collection by enumerators nutrition monitors Analysis by senior nutritionists

2.4.6 Description of survey activities

Table 2: Chronology of activities for the dietary diversity study in Dangorayo and Dinsor Districts

Major Activity	Dates. 2003-2004
Preparation of tools, methodology & review of secondary data (Nairobi)	Nov-Dec -2003
Training of enumerators and pre-testing (Huddur and Garowe)	January 7-15 2004
Village Identification (Dinsor and Dangorayo)	January 11 and 15, 2004
Collection of data (Dinsor from 14 th -21 st and Dangorayo- 18 th -26 th)	January 14- 26, 2004
Entry of data and preliminary analysis	Feb. 2 – 13 2004
Presentation of preliminary results	Feb 26 th
Detailed analysis	Feb 16 th - 28 th
Report development	April 2004
Circulation of report	April 2004

In each district/area of study, there was one team consisting of two enumerators and two supervisors that conducted the assessment. The assessment team was able to handle at least one village a day. From the third day of assessment, the teams were able to assess two villages in each of the Districts. An elder from a particular village/cluster assisted the teams in identification of the centre of the village. Overall support, supervision and co-ordination was done by two Nairobi based FSAU nutritionists. The FSAU field team personnel assisted in the identification of the qualified enumerators who were selected on the basis of their experience with previous nutrition surveys and multi-indicator cluster surveys.

2.5 Quality control procedures

A comprehensive training of enumerators and supervisors was conducted covering interview techniques, sampling procedure, inclusion and exclusion criteria, sources of errors taking of measurements, standardising the questions in the questionnaire, levels of precision required in measurements, diagnosis of oedema, handling of equipment, interview techniques and the general courtesy during the survey.

Rigorous standardisation of measurement and pre-testing of the questionnaire and equipment was carried out in one of the villages (not selected for data collection). Standardisation involved taking repeated measurement of 10 children by all the teams and comparing with some reference. Pre-testing also involved familiarising survey teams with village entry; administering the questionnaire, sampling procedure, correct taking of measurements and documentation. After the field pre-testing exercise, views were exchanged to address the difficulties identified; appropriateness of the questions reviewed and necessary changes were made.

The standardization of food sample measurements and assessment data were ensured through (i) close monitoring of fieldwork by FSAU nutritionists, (ii) crosschecking of filled questionnaires on daily basis and (iii) daily review undertaken with the enumerators to address any difficulties encountered, (iv) progress evaluation was carried out according to the time schedule, (v) continuous data cleaning after entry for easier identification of any data anomaly, (vi) monitoring accuracy of equipment (weighing scales) by regularly measuring objects/food samples of known weights vii) used of food samples to

establish weights for food consumed and viii) ascertained errors on volumetric measurements like meniscus did not occur.

2.6 Data analysis

2.6.1 Entry, cleaning, processing and analysis

Data from the 24-hour recall of food consumption was entered in Excel spreadsheet and converted into SPSS package for ease of statistical analysis. However, anthropometric data was entered and analysed using EPIINFO computer based package. Running and tabulating all variable frequencies was carried out as part of data cleaning. The EPINUT programme was used to convert the measurements (weight and height) into nutritional indicators and comparison made with the National Centre for Health Statistics (NCHS) references as designed by WHO (1983).

2.6.2 General characteristics of study population

Frequencies and cross-tabulations were used to give percentages, means and standard deviations in the descriptive analysis and presentation of general household and child characteristics.

Construction of a measure of dietary diversity was based on simple counting the number of food groups consumed in the past 24 hours (12 groups used by FAO)

The total caloric intake of household members was estimated using the conversion tables and food composition tables available for East countries. Adequacy of such intake was determined through comparing the amount available to the household members and total caloric requirements of the household members in a day.

Correlation and regression analysis was conducted in SPSS to establish any association, the direction and strength of such an association between a food group dietary diversity score and caloric adequacy, nutritional status of children.

2.6.3 Creation of nutritional status indices

The anthropometric measurement of weight and weight were used to compute the W/H nutritional status indicators of the studied children. Weight For Height (W/H) expressed in Z-scores was used and it measures the acute malnutrition or wasting. Using EPINUT, Z-scores were generated and the anthropometric indicator, WFH, was used to classify children into categories of nutritional status as follows:

- < -3 Z-Scores or oedema = Severe acute malnutrition
- 3 Z-Scores ≤ WFH < -2 Z-Scores = Moderate acute malnutrition
- < -2 Z-score or oedema = Global acute malnutrition
- ≥ -2 Z-Scores = Normal

3.0 RESULTS

3.1 General characteristics of the study population

The data was collected from 8 agro-pastoral villages of Dinsor District in Southern Somalia and 5 pastoral villages of Dangorayo District in North eastern Somalia in January 2004.

3.1.1 Background of study population

In the pastoral areas (Dangorayo Group), the assessment was conducted during a drought period which was characterised by pasture shortage and mass out-migration of livestock to other areas. Consequently, there was an acute shortage of animal products like milk and meat in the assessment period. On the other hand, the agro-pastoralists (Dinsor Group) had just experienced late 2003 Deyr rains making the areas relatively wet. The assessment coincided with a time for increased energy requirements for the agro-pastoral households, as weeding and other cropping activities were at peak. To their advantage, the agro-pastoral villages had had relatively good harvests in the 2003 Gu season and most households still had stocks of cereals. The animals were also in good condition with good productivity. Consequently foods in the agro-pastoral population were readily available to most of the households during the season.

3.1.2 Demographics

A total of 420 households (265 agro-pastoral and 155 pure pastoral households) were surveyed during this first seasonal assessment on dietary diversity study. Due to inconsistencies and extreme responses for some variables, some cases were dropped at analysis level. Therefore, the number of households analysed for each variable of interest differs from one question to another.

Mean household size was about 7 with agro-pastoral households having slightly more members (7.6 against 6.5 for pastoral households). Pastoral households had significantly higher numbers of male-headed households than the agro-pastoralists, an observation attributed to the fact that male pastoralists had migrated with their livestock leaving female members behind. The survey was conducted during a dry season in pastoral areas where movements in search of pastures had been witnessed with some pastoralists migrating as far as Ethiopia.

A total of 412 (260 and 152 respectively from agro-pastoral and pastoral households) under-five children present in the surveyed households were assessed for anthropometry. Due to extreme measurements of some children and missing data, only 378 were valid for anthropometric analysis (156 agro-pastorals and 122 pastoral). The main issue on the anthropometry was that quite a number of children were included that were actually outside the inclusion criteria.

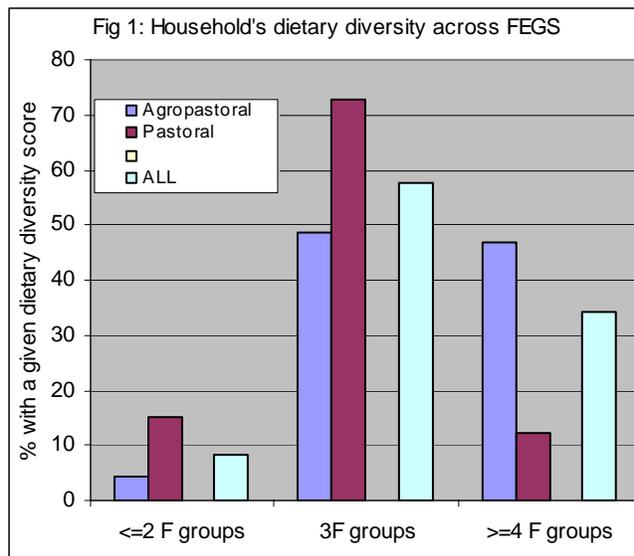
	Food economy Group	N	Mean	Std. Deviation	Std. Error Mean
Household size	Agro-pastoral	251	7.61	3.362	.212
	Pastoral	147	6.46	2.554	.211
Number of eating occasions	Agro-pastoral	250	3.01	.515	.033
	Pastoral	147	2.65	.849	.070
Dietary diversity	Agro-pastoral	251	4.14	1.061	.067
	Pastoral	147	3.45	.987	.081
Household Headship					
		Male	Female	Total	
	Agro-pastoral	198 (84.3%)	37 (15.7%)	235	
	Pastoral	91 (63.2%)	53 (36.8%)	144	
	Total	289 (76.3%)	90 (23.7%)	379	

3.2 Food Group Diversity at Household level

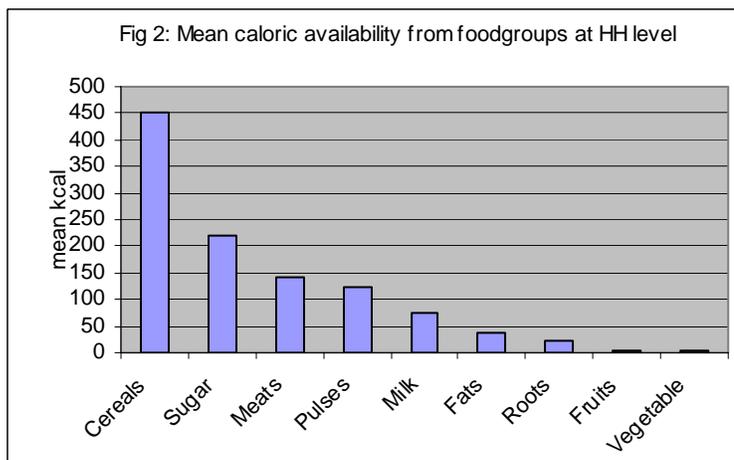
Table 4: Food groups consumed at household level the entire group

No. of food groups	Frequency	Valid Percent	Cumulative Percent
1	4	1.0	1.0
2	29	7.3	8.3
3	130	32.7	41.0
4	99	24.9	65.8
5	121	30.4	96.2
6	13	3.3	99.5
7	2	.5	100.0
	398	100.0	

The agro-pastoral households had more diversified diet than the pastoral households. While only about 4% of the agro-pastoral households consumed two or less food groups in the previous 24 hours, over 15% of pastoral households consumed only one or two food groups within the same period. Additionally, while about 50% of agro-pastoral households had four or more food groups within the previous 24 hours, only 12% of pastoral households consumed 4 or more food groups within the same period. Overall, majority of the studied households consumed at least three food groups in the previous 24 hours. From the findings, it appears that consuming less than three food groups pre-disposes the households to heightened food insecurity and nutritional risks while consumption of more than four food groups is associated with beneficial effects on both caloric adequacy and better nutritional status as will be demonstrated in the next sections of this study.



The main food groups consumed by both the Dinsor and Dangorayo groups were cereals, sugar, meats, pulses, milk and milk products and oil and fats. Cereals remained the commonest food group consumed in the two FEGs. While consumption of vegetables, fruits and roots were insignificant overall, their consumption were remarkably negligible among the pastoral households. Milk and meats were more consumed by the agro-pastoral households than their pastoral counter-parts. The leading food groups amongst the pastoralists were cereals, sugar oils/fats and pulses while for the agro-pastoral households, these were cereals, sugar milk meats and oil/fats in that order. The low consumption of animal products among pastoral households was explained by the poor body condition and productivity of livestock due to the on-going drought/dry weather condition, which had also led to out-migration of animals at time of assessment. With regard to caloric provision, cereals, sugar, meat and pulses still remain the important sources of calories in the two study groups. As expected the caloric provision of sugar amongst the study population was high as it is consumed almost in all the meals (Somalis normally add sugar to all types of food e.g pulses, rice etc in addition to sugar consumption in tea-a concentrated concoction).

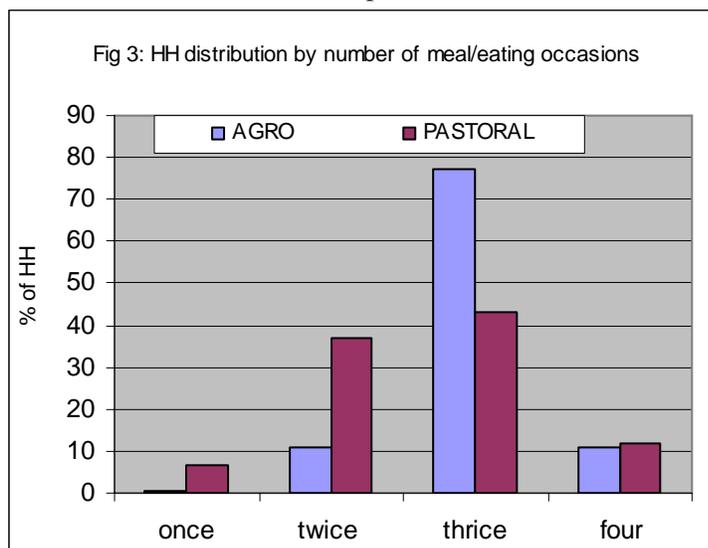


3.3 Number of meal/eating occasions

The mean number of meal occasions was 2.88. This varied with food economy groups. While the average meal occasions were about 3 amongst the agro-pastoralist, it was about 2.6 for the pastoral households.

	Number of meal occasions	Frequency	Valid Percent
Valid	1	11	2.8
	2	81	20.4
	3	256	64.5
	4	44	11.1
	5	5	1.3
	Total	397	100.0

While a significantly higher proportion (about 90%) of agro-pastoral households had three or more meals occasions in the 24 hours prior to the study, only about 55% of pastoral households had three or more eating occasions in the same period. This implies then that over 40% of pastoral households only had one or two eating occasions compared to only one-tenth of agro-pastoral households.



3.4 Household caloric availability/ food consumption

To establish the caloric adequacy, comparison has been made between the caloric requirement of adult equivalent and the computed average number of calories consumed per adult equivalent by each household in the sample. The results reported here are not strictly meant for comparison across the different food economy zones (Dangorayo and Dinsor).

The overall household per capita caloric availability (amount of calories available at household level divided by the number of consumers expressed as adult equivalent units) for the two food economy groups was about 2600 kcal. This was higher than their per capita caloric requirements² which averaged about 2100kcal. However there were significant differences in the amount of consumption for the two study groups. Whereas the agro-pastoral had a surplus intake (about 3100kcal against their requirement of about 2200kcal), the pastoralists in Dangorayo had a deficit in caloric intake (a per capita caloric consumption of about 1800kcal against a per capita requirement of about 2000kcal).

	Food economy Group	N	Mean Kcal	Std. Deviation	Std. Error Mean
Per capita caloric availability	Agro-pastoral	251	3120	1390	88
	Pastoral	146	1770	1260	104
Per capita caloric requirement	Agro-pastoral	251	2150	138	8
	Pastoral	146	2020.	530	44.
Per capita caloric availability	All	397	2624	1400	
Per capita caloric requirement	All	397	2104	348	

Overall, about 71% of the studied households had sufficient amounts of energy consumption, enough to meet their daily caloric requirements. However, there were significant variations across the food

²Caloric requirements depend on the composition of household size in a particular group, the ages of household members, sex of the members etc hence when computed, will normally differ from one group to another as reflected in this study

economy groups. Whereas only about 14% of the agro-pastoral households had insufficient caloric consumption at the time of study, more than a half of the pastoral households had inadequate caloric consumption within the same period. The differences in energy availability at household level across the food economy groups were statistically significant with pastoral households being more energy inadequate.

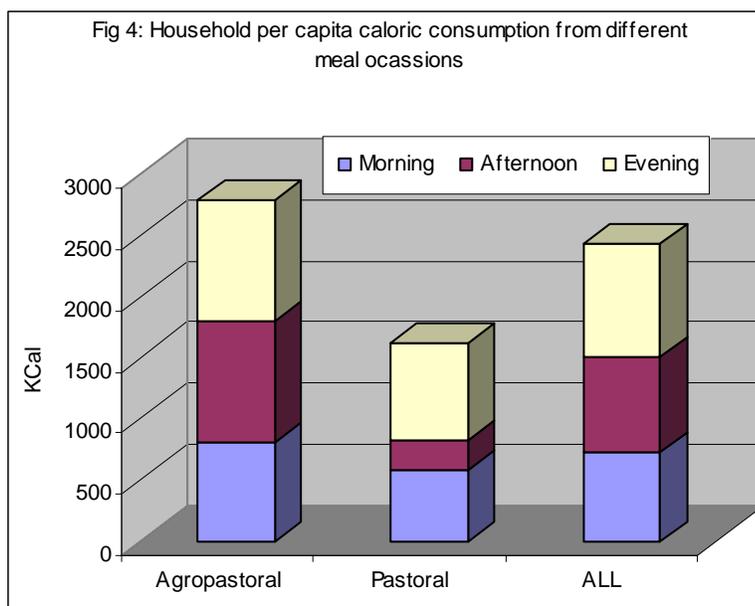
Table 7: Food economy group compared with caloric adequacy levels

FEG		% with Caloric inadequacy	% with Caloric adequacy	Total
Agro-pastoral	Count	34	216	250
	% within Food economy Group	13.6%	86.4%	100.0%
Pastoral	Count	79	58	137
	% within Food economy Group	57.7%	42.3%	100.0%
Total	Count	113	274	387
	% within Food economy Group	29.2%	70.8%	100.0%

P-value = 0.00

As described above households derive their energy from consumption of cereals (mainly rice and ‘anjero’ for the pastoralists and sorghum and maize for the agro-pastoral), sugars, pulses and oil.

Evening meals are important sources of energy provision to household members followed by lunches/afternoon meals. Whereas the agro-pastoral population values both lunches and evening meals in times of energy contribution, the intake of lunches/afternoon meals is relatively less significant compared to other meal times (morning, and evening) among the pastoral household. This is depicted in the adjacent figure.



3.5 Child nutritional status

3.5.1 Overall nutrition situation of the children

The global acute malnutrition was high at 11.9% (W/H <-2 Z-score or oedema) while the severe acute rate was 2.1% (W/H <-3 z-scores or oedema). There were no significant variations in the malnutrition levels across the food economy groups. Whereas children from agro-pastoral households experienced a global acute malnutrition of about 11.7% (W/H <-2 Z-score or oedema), children from pastoral households had malnutrition rate of about 12.3% (W/H <-2 Z-score or oedema).

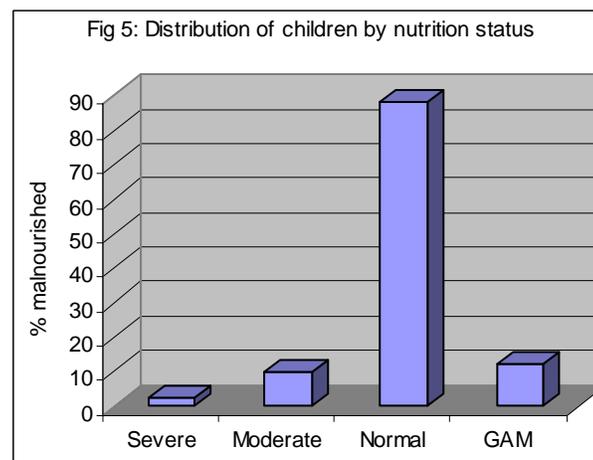


Table 8: Distribution of <5yr children from different food economy group by their nutritional status

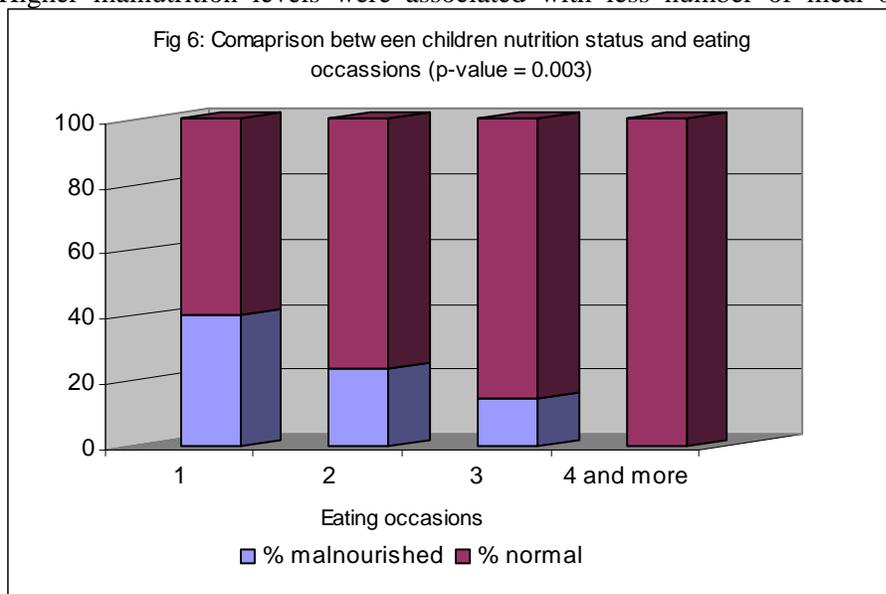
FEG		Severe	Moderate	Normal	Total
Agro-pastoral	Count	6	24	226	256
	% within FEG	2.3%	9.4%	88.3%	100.0%
Pastoral	Count	2	13	107	122
	% within FEG	1.6%	10.7%	87.7%	100.0%
Total	Count	8	37	333	378
	% within FEG	2.1%	9.8%	88.1%	100.0%
	% of Total	2.1%	9.8%	88.1%	100.0%

Common childhood diseases were more prevalent among children from agro-pastoral households (prevalence of 35% and above) for the common sicknesses amongst under-fives than among the children from pastoral households (only about 26%). When related to nutritional status level, children who had suffered any of the common childhood sicknesses were slightly more malnourished than the counterparts. The relationship was however not significant. The

commonest diseases included diarrhea, respiratory infections, malaria and skin infections. Respiratory and skin infections were particularly common among the pastoral households.

3.5.2: Child nutritional status according to meal frequency

Higher malnutrition levels were associated with less number of meal occasions at household level.



Households that had more than four meal occasions in a day did not experience any malnutrition amongst the under-fives in their households whereas households with only one eating occasion experienced malnutrition levels of almost 40%. Malnutrition levels decrease as the frequency of eating increases. Thus, pastoral households with less eating occasions had slightly higher malnutrition levels.

3.6 Correlations between different variables

Consideration is made to the association between dietary diversity (number of food groups) and caloric adequacy (hereby determined by at least 90% of per capita caloric requirement to be regarded as caloric adequate and obtaining less than 90% of per capita caloric requirement as caloric inadequate). This section also considers the association between dietary diversity and child nutritional status indicator (W/H) as well as the associations with other dietary indicators such as the frequency of meal consumption. In this study, the two study groups (Dangorayo and Dinsor) are treated as: (i) distinct and separate and (ii) also combined their two data sets for an overall picture). The focus will be on regression results expressed as $\log \text{household per capita caloric availability} = a + b$; that is, $\log \text{number of food groups} + \text{control variables}$. This approach is considered since the results of this can be readily interpreted to establish strengths and direction of association and that the coefficients also double as elasticities because of the “log-log” expression. The model as serves to control for confounding factors e.g. location (Dinsor

verses Dangorayo). The results are presented below: Other results like mean dietary diversity or mean per capita caloric availability are presented in the earlier sections.

3.6.1 Association between dietary diversity and household caloric adequacy

Table 9: Summary of households' dietary diversity categories compared to caloric adequacy levels

Food groups		Inadequate	Adequate	Total
<=2 food groups	Count	20	12	32
	% within Dietary diversity categories	62.5%	37.5%	100.0%
3 food groups	Count	74	145	219
	% within Dietary diversity categories	33.8%	66.2%	100.0%
>=4 food groups	Count	19	117	136
	% within Dietary diversity categories	14.0%	86.0%	100.0%
Total	Count	113	274	387
	% of Total	29.2%	70.8%	100.0%

P-value < 0.05

Energy adequacy levels increased with the consumption of more food groups in the previous 24 hours. Whereas almost two-thirds of the households consuming less than or equal to two food groups had inadequate household per capita caloric availability, only 14% of households consuming at least four food groups had inadequate caloric consumption.

Table 10: Summary of the model of determinants of HH per capita caloric availability

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	F Change	df2	Sig. F Change
Dietary diversity	.121	.015	.193	58.87628	53.525	219	.0498
Number of meal occasions	.497	.247	.240	57.11002	14.756	218	.000

The dietary diversity (as measured by the number of food groups) is a major predictor of household per capita caloric availability the same as the number of meal occasions that households had is a major predictor to caloric adequacy after controlling for food economy grouping/locations (Dangorayo and Dinsor) of a particular household. The strength of the relationship between number of meal occasions and caloric adequacy is significantly large. About a quarter of variability in caloric adequacy is explained within the model by number of meal occasions. The same analysis is confirmed by ANOVA analysis of variances. The food group dietary diversity has a positive partial relationship (about 0.1) meaning that as the diversity increases, caloric adequacy is also increased.

In the model, number of meal occasions or frequency which is a food diversity variable appears strongly as a predictor of dietary adequacy at household level.

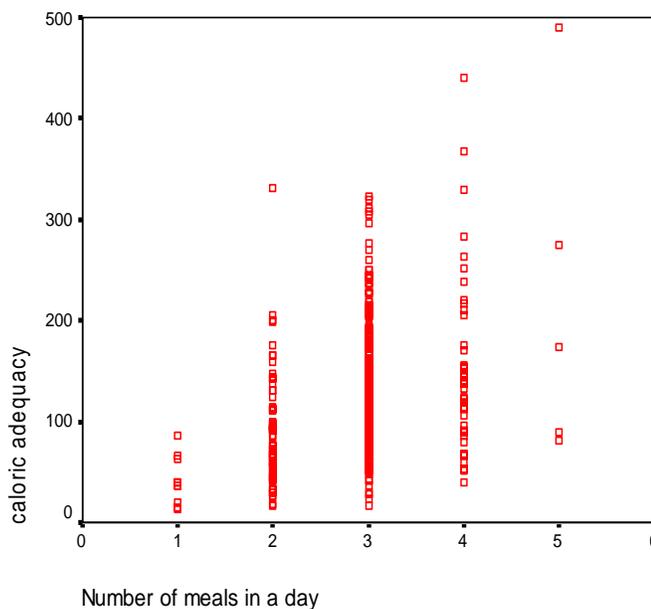


Table 11: Dietary diversity and number of meals

Number of meals		Dietary diversity			Total
		<=2 food groups	3 food groups	>=4 food groups	
1 or 2 meals	N	21	64	0	91
	Proportion	23%	77%	0	100.0%
3 meals	N	11	138	107	256
	Proportion	4.3%	53.9%	41.8%	100.0%
4 meals	N	1	23	20	44
	Proportion	2.3%	52.3%	45.5%	100.0%
5 meals	N	0	3	2	5
	Proportion	0	60.0%	40.0%	100.0%
TOTAL	N	33	228	135	396
	Proportion	8.3%	57.6%	34.1%	100.0%

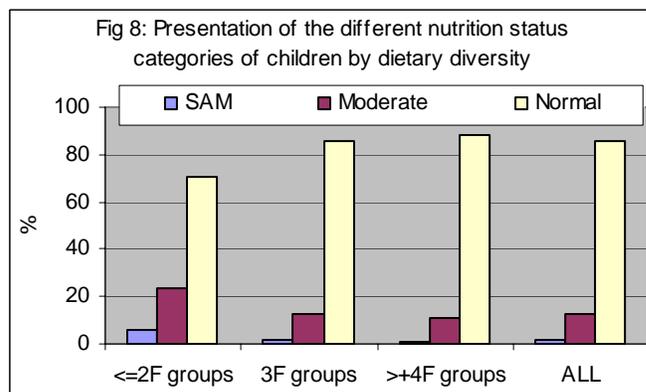
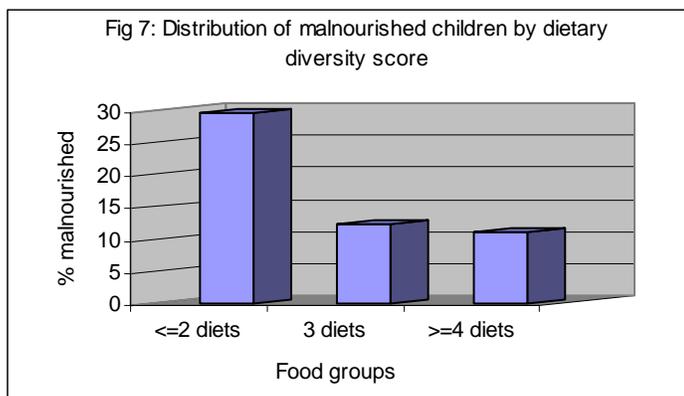
The more meals or eating occasions within a day, the likelihood of more diversified diets.

3.6.2 Association between dietary diversity and child nutritional status

Table 12: Illustration of number of meal occasion as a predictor of W/H z-score measurement of under-five children

	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
Model					R Square Change	F Change	df1	df2	Sig. F Change
No. of meals	.173	.030	.026	1.7221	.030	6.941	1	224	.009

In this model, frequency of meals in the household (number of meal occasion) is the single most major predictor of the nutritional being of under-five year old children. It is notable that the amount of residual (portion of variability in nutritional status not explained in the model is quite large) meaning that malnutrition is explained by a number of other variables not in the equation. Incidences of child illnesses in the one-month prior to the study also appear as a significant predictor with relatively high partial correlation (about 0.12) although the relationship is insignificant.



Overall, dietary diversity at household level was associated with the nutritional status of under-five year old children. As shown on the graph (fig 7 and 8), almost 30% of children from households consuming two or less food groups were malnourished compared to 10% global acute malnutrition amongst children from households consuming four or more food groups within the 24 hours prior to the assessment. The proportion of the normal children increase as the number of food groups increases. Children from households consuming two or less food groups were at least 1.4 times more likely to be malnourished than children from households consuming four or more food groups.

4.0 CONCLUSION AND RECOMMENDATIONS

4.1 Conclusion

This initial dietary diversity study in the post war Somalia elicits interesting findings pointing at existence of a relationship between the dietary diversity and energy provision and hence nutrition wellbeing of the population.

The study objectives were adequately addressed by the data collected using the simple tool, attached. The tool was adequate and can be used in future studies. Cereals, sugar, meat, pulses and milk are the five main sources of energy identified in the study groups. Other key results fulfilling the objectives include:

- Significant difference in caloric intake and adequacy was realized in the two study groups. The differences in energy availability at household level across the food economy groups were statistically significant with pastoral households being more energy inadequate than the agro-pastoral
- In the two study groups, there is a positive and statistically significant association between the number of meal occasions and household per capita caloric availability. As the number of meal occasions increase, the household per capita caloric availability also increases. About two thirds of households consuming one or two food groups had inadequate caloric availability while only 14% of the households consuming at least four food groups had inadequate caloric consumption.
- In the two samples (Dangorayo and Dinsor), there is a well measured, positive and significant association between dietary diversity and household per capita daily caloric availability which is a good measure of household food access.
- In the samples, dietary diversity (number of food groups) is strongly and significantly associated with the nutritional status of under-fives within the households. This is so despite the fact that only household consumption data was collected with no specific data for individual intake of food in those given households.
- The number of meal occasions is an important predictor of nutritional status of under-fives in sampled households for the two study groups.

Inclusion of dietary diversity component in the future nutritional surveys would add value to the study and enhance understanding of the situation and offer other intervention strategies of averting malnutrition.

4.2 Recommendations

- The study to be conducted seasonally in order to give an indication of the seasonal variations in food intake and how that may change the associations observed above
- The study needs to cover as many food economy zones/groups as possible in order to establish the picture for the relationships in Somalia.
- The study needs to be conducted at the same time across the different food economy zones/groups and when these groups, more or less face the same climatic changes, so as to allow for comparisons across the groups.
- The study requires to be conducted in urban set ups also to allow for comparison between urban and rural environments.
- If possible, attempts should be made to establish individual food intake in order to allow for direct relationships especially with child nutritional status (this may prove difficult as establishment of individual food consumption is normally an uphill task requiring a lot of expertise and time). It is even more difficult where the sharing of food from the same dish is common.
- Data on dietary diversity should be collected in nutritional surveys to enhance understanding on consumption patterns and food diversity.

meal										
Meal between morning and midday/Lunch										
Mid-day meal/Lunch										
Between midday and evening meal										
Evening meal/dinner										

Meal after dinner										

3): Anthropometry: Weight and Height for <5 children (6-59 months or measuring 65-110cm)

Sno	Name	Sex (M/F)	Age	Oedema(Y/N)	Weight	Height	Illness in past 30 days
1							
2							
3							
4							

Household food consumption (to be administered to 450 household from each food economy group)

Enumerator: _____ **Date of interview -----** **Village/town name:** _____ **District:** _____ **Respondent's sex: 1: Male 2: Female** **Sex of household head** 1: M 2: F **Age of household head:** __ **Total people in household (ALL)** __ __ **Total <5 years by sex: Male** __ **Female:** __

<5yrs	F5-10Yr	M5-10Y	F11-24yr	M11-24yr	F25-60Yr	M25-60yr	F>60yr	M>60yr
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DEMOGRAPHICS

NAME OF MEMBER	SEX	AGE	presence at morning meal y/n	presence at morning meal y/n	presence at morning meal y/n