Association between healthy dietary intake and food expenditure in Malawi: A cross-sectional study, based on Fourth Integrated Household Survey (LSMS) 2017

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Abstract:

Safe, nutritious dietary intake is crucial for developmental stage of life. Healthy dietary intake can alleviate the malnutrition problem and unhealthy dietary intake along with sedentary lifestyle can cause the rise of non-communicable diseases in low- and middle-income countries. Food expenditures impact the dietary intake of a household. This study investigated household information from 2508 households taken from Malawi Fourth Integrated Household Survey (IHS4), 2016-17 which is a part of the World Bank Living Standards Measurement Studies (LSMS). The aim of this study is to assess the association between food expenditure and the healthy dietary intake of Malawian households and the potentiality of attaining healthy diet within limited food expenditure. Food consumption score can be used as measurement of a healthy diet. In this study food consumption score was developed and calculated to understand the dietary intake of the households. After performing a general linear regression with controlling the covariates, significant association was found between healthy dietary intake and food expenditure ($p=0.000$). About 25 percent of the households were able to attain healthy dietary intake with limited food expenditure. Households with higher educationally qualified householder had healthier food consumption than households with householder with no education. Households from urban settings had healthier dietary intake than rural households. This study also produced the number of Malawian households with poor dietary intake which can be used to identify the target population. Factors enabling population to attain healthier diet within limited food expenditure should be investigated. Food price intervention, food security intervention, sustainable income generating activity, cost effective production of healthy food can be considered for this population.

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List of abbreviation

DRC	Democratic Republic of Congo
FCS	Food Consumption Score
GoM	Government of Malawi
GPS	Global Positioning System
HDDS	Household Dietary Diversity Score
IHS4	Fourth Integrated Household Survey
IPC	Integrated food security Phase Classification
JCE	Junior Certificate Examination
LSMS-ISA	Living Standard Measurement Study-Integrated Surveys on Agriculture
MK	Malawian Kwacha
MSCE	Malawi School certification Examination
PHC	Population and Health Census
PSLC	Primary School Leaving Certificate
WFP	World Food Program

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1. Background

The United Nations announced the resolution to end hunger and all types of malnutrition and admitted that accessibility to nutritionally adequate and safe food is the human right of everyone in the International Conference on Nutrition held at Rome, 1992 (1). In 2017, the 2030 Agenda for Sustainable Development and the UN Decade of Action on Nutrition 2016–2025 invite all countries and stakeholders to eliminate hunger and stop all forms of malnutrition by 2030 cooperatively (2). Malnutrition varies from hunger to micronutrient deficiencies and to obesity, and its posing as a crucial problem for both developing and developed countries (3). As of 2021, about 828 million people worldwide were suffering from hunger and the numbers are rising specially in Africa, Asia, and Latin America. Globally 113 million people from 32 countries were undergoing acute hunger in 2018 which resulted from food insecurity, conflict, weather shock, economic distress and disease outbreak (4). In 2000 about 900 million people were chronic malnourished which decreased in 2019 to 618 million but increased again to about 768 million in 2021 due to covid outbreak (2, 5). According to UNICEF, stunting rate decreased from 33.1 percent (2000) to 22 percent (2020), overweight increased from 5.4 percent (2000) to 5.7 percent (2020) and wasting rate was 6.7 percent (2020) among children under 5 (6). Globally minimum two types of malnutrition exists in 124 countries (anemia and overweight in 56 countries, anemia and stunting in 28 countries, and overweight and stunting in 3 countries) among them 37 African countries face all three forms in high degree (7).

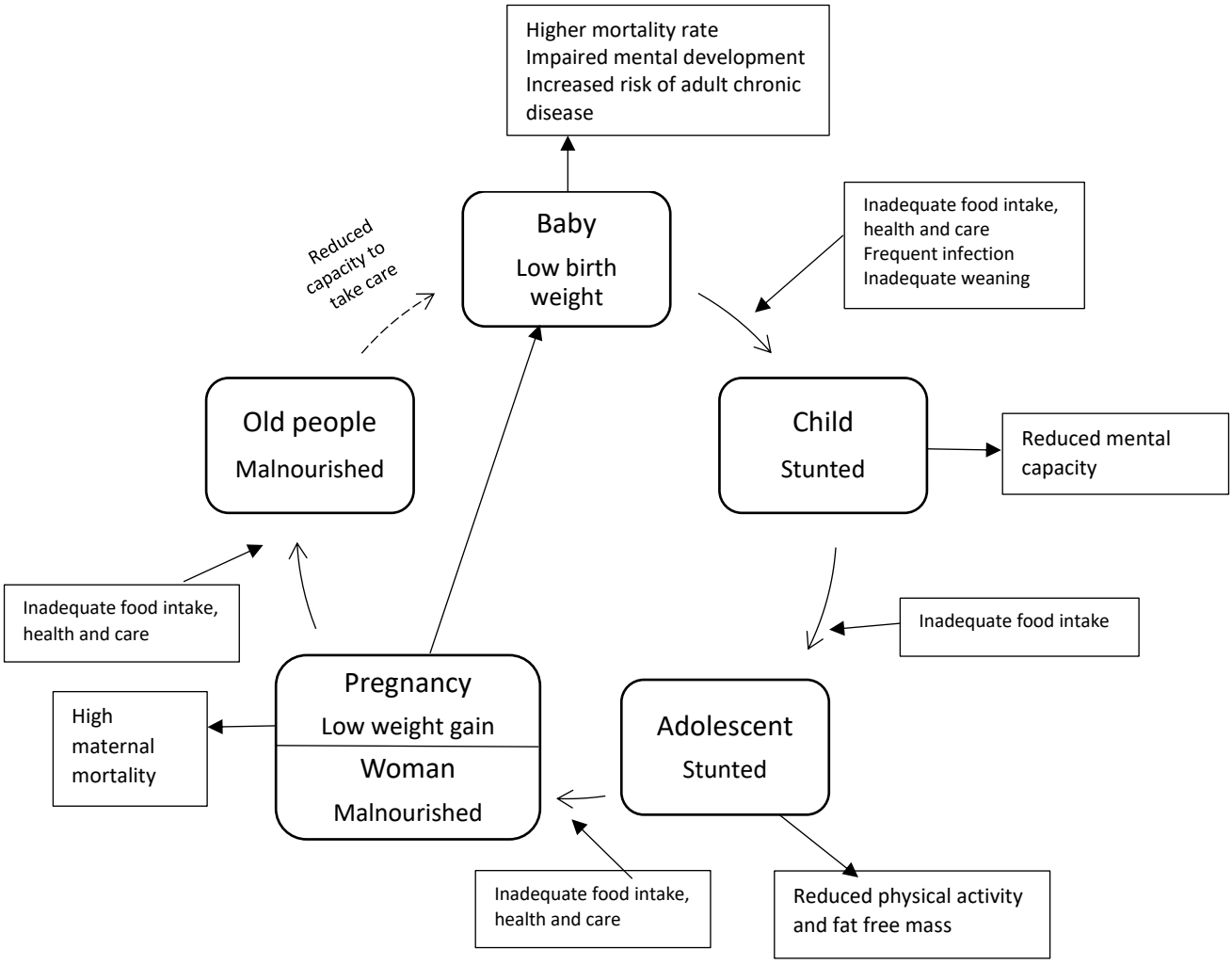
Safe, nutritious, and adequate food intake; proper dietary practices; healthy living conditions to avert diseases and encourage healthy eating practices are the fundamental precursors for the improvement of the nutrition and health status of both early and adult life (8). Low and middle income countries are on course of achieving the nutrition targets but in some regions the pace have been slow (9). Urbanization and economic development have been influencing dietary pattern including high consumption of fat and sugar products and physical activities in low and middle income countries (10). Inadequate dietary intake along with reoccurring diseases are one of the underlying causes of child malnutrition and changing dietary pattern in addition to physical

inactivity are leading causes of overnutrition, metabolic diseases, and non-communicable diseases (11, 12).

1.1 Impacts of dietary intake

Food is a pivotal part of health, economy, sustainability and livelihood (7). Dietary choices of an individual are mainly determined by availability of the foods which is affected by environmental, legislative, financial factors and management of foods such as cooking skills, time availability, accessibility to markets and acceptability of the foods which is affected by societal, personal and biological factors (13). Nutritionally adequate dietary intake is essential for every stage of life [figure 1] (14). Inadequate dietary intake causes growth faltering in children (15). Reduction in wasting, stunting and being underweight among children of 6 – 23 months of age is associated with diverse dietary intake (16). Nutritious food intake during pregnancy minimizes the likelihood of low birth weight in infants (17). Diversified diet decreases the possibility of metabolic diseases (18), risk of cardiovascular diseases (19) and improves health status (20).

Figure 1: Impact of inadequate food intake throughout the life cycle

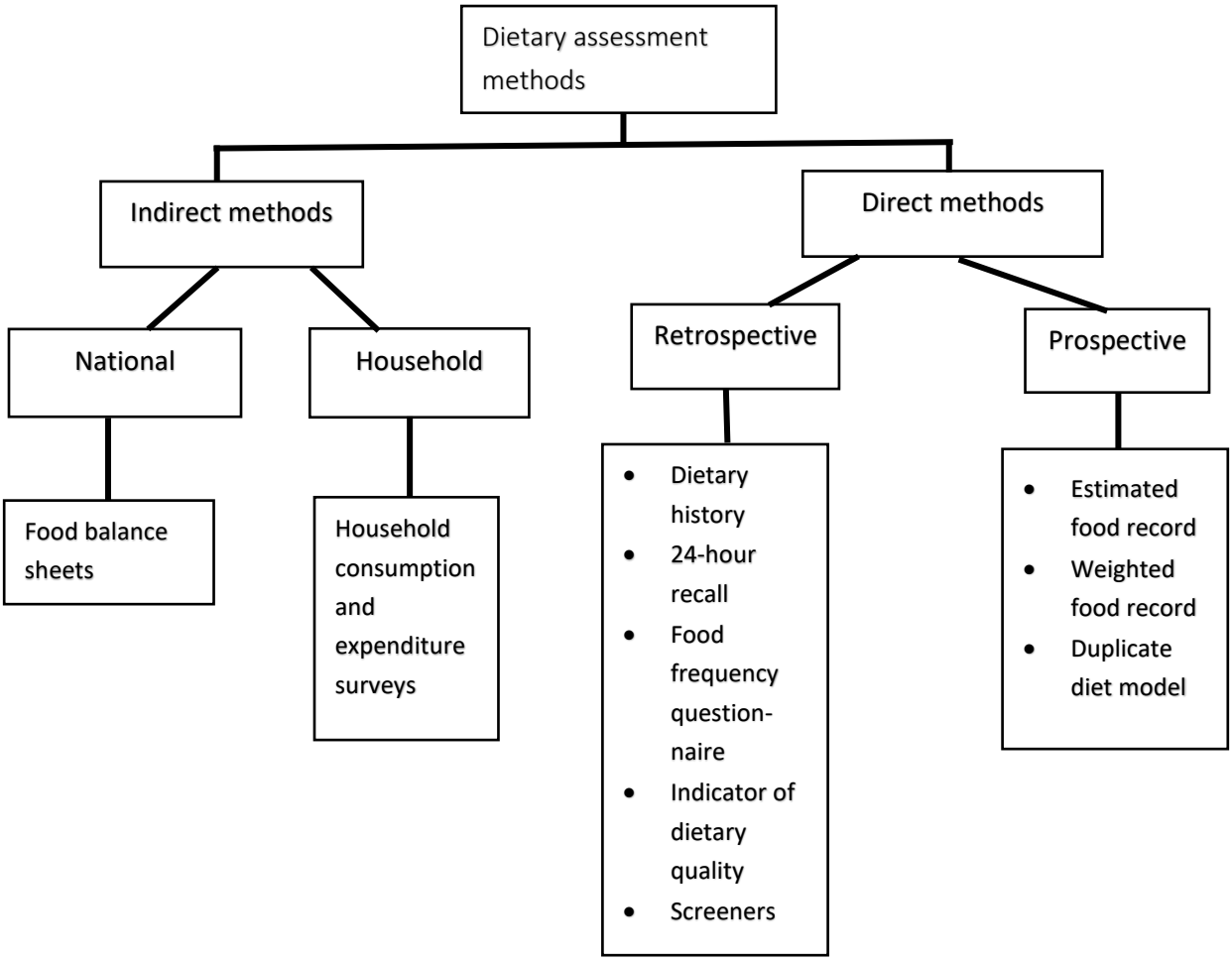


Source: The state of food insecurity in the world 2004, monitoring progress towards the World Food Summit and Millennium Development Goals. Food and Agriculture Organization. Rome, Italy: Food and Agriculture Organization of the United Nations; 2004.

1.2 Dietary Intake and dietary assessment

Dietary intake is defined as the consumption of food and beverages including water and supplements (when required) (21). Healthy diet supplies adequate nutrients to promote health and prevent diseases (22). Dietary intake assessment is the process of evaluating the food and nutrient intake and eating pattern of a person, household and population (23). Dietary intake assessment is one of the four methods of nutritional assessment of an individual (21). The remaining three methods are anthropometric measurements, biochemical tests and clinical tests (23). Dietary intake assessment can be categorized into two categories according to their nature [figure 2] (23). The indirect methods use secondary data such as food supply, household and agricultural statistics, food expenditure for evaluating dietary intake at national and household level. Indirect methods help to understand the food availability and food consumption trends of different countries and over time. The direct method utilizes primary information collected from individuals and this process can be prospective and retrospective. Direct methods assist to recognize the food and nutrient intake trends and dietary pattens and to assess the relationship between food consumption and diseases (23).

Figure 2: Summery of dietary assessment methods



Source: Dietary assessment: a resource guide to method selection and application in low resource settings. Food and Agriculture organization, Rome, Italy. 2018.

To assess the dietary intake at household level in indirect methods, household consumption and expenditure surveys are used. Household food consumption refers to the whole amount of food accessible by the household for consumption where away from home food consumption is excluded (23). Living Standard Measurement Survey (LSMS) is one of the ways of assessing household dietary intake (23). Other notable ways of assessing household food consumption are Household Budget Survey (HBS), Living Cost and Food Survey (LCFS), Household Income and Expenditure Survey (HIES), Household Expenditure Survey (HES) and Integrated Household Survey (IHS) (23). LSMS is a frontrunner household survey program developed by World Bank to

reinforce the survey system in low and middle income countries and to improve microdata quality for enhancement of the conceptualization of development policies (24). LSMS has been carried out since 1980s to assist countries in generating multidisciplinary household survey of high standard to determine welfare and other main socioeconomic measures (24). It also provides publicly accessible data and analyses which can be utilized for policy relevant studies (24).

Definition of food consumption score: Food consumption score is the total sum of the frequency of food groups taken over 7 days which are multiplied with their assigned weight based on their nutritional value [table 2] (25). it is an indicator of household diet, dietary diversity and food frequency (25, 26). FCS is also used to identify food insecure households as households with poor and borderline FCS delivers necessary knowledge about household's diet. It can also be utilized for finding the target group for food security assistance (27). It should be noted that FCS is an alternative retrospective assessment method of household dietary diversity (23).

1.3 Food expenditure

Food price and income can influence the diet quality (28). According to Engel's law the total share of income spent on food declines as the household conditions improves (25). The formula of food expenditure is $\frac{expenditure\ on\ food}{total\ expenditure} \times 100$ (25) and it also encompasses non-purchased items such as food from own production (29). Researchers have suggested that families spending 75 percent of their income on food is regarded as immensely at risk and suffering from food insecurity, whereas families spending less than 50 percent on food is food secured (25). Food expenditure is one of the main estimation to understand food insecurity (30) and its patterns (25). An association was observed between per capita expenditures and diverse dietary intake in a 10 country based study (31). Studies conducted in Asia (Taiwan and Bangladesh) had also found that food expenditure was associated with diet quality and diverse diet (32, 33).

1.4 Nutrition challenges in Africa

Africa is slowly progressing towards the fulfillment of global nutrition targets. The region is still suffering the malnutrition burden both among children and adults. As of 2020, the Stunting

prevalence among children under 5 years is 30.7 percent in Africa whereas it is 22 percent globally (34). Among African adults (18 year and above) about 21 percent women are obese whereas only nine percent men are obese (34). According to global report on food crisis 2020, 135 million people are undergoing food crisis and more than half of them are from Africa (4, 34, 35). Additionally in 2020, about 282 million people from the continent had suffered from hunger (36).

Study carried out in Sub Saharan Africa among 6-23 months children had showed that intake of iron rich food was related with children age, education status of parents and wealth status (37). Another study conducted in one province at South Africa showed that change in food intake was associated with noncommunicable diseases (38). Study conducted among low and middle income countries had observed that the dietary intake of African pregnant women was mostly plant based and the main staple food group was the primary source of energy, protein, iron and zinc of pregnant women from Ethiopia, Malawi, Kenya, Burkina Faso, the Seychelles and Egypt (39).

1.4.1 Nutritional challenges in Malawi

Approximately 23 percent of the world population suffering from the adverse level of acute food insecurity were from Southern Africa (4). This region is still recovering from the damaging 2014 – 16 El Nino according to WFP 2019. Flooding in Chikawa, Malawi caused crops damage and two cyclones hit led to death, devastation in Malawi, Zimbabwe, and Mozambique. These events resulted in communicable disease outbreak, primary precursor of malnutrition. Tanzania, Mozambique, Madagascar, DRC and Malawi have higher rate of chronically malnourished children compared to other countries in the region (4).

Malawi, a landlocked country surrounded by Mozambique, Zambia and Tanzania is one of the poorest countries of the world where economy depends on agriculture and prone to climate shock (40). According to the World Bank the national poverty decreased from 51.5 percent in 2016/17 to 50.7 percent in 2019/20 (40). Global nutrition report on Malawi shows that this country is on the way of achieving global nutrition target of wasting by decreasing from 4.7 percent in 2016 to 0.6 percent in 2020 and it has progressed in the direction of reaching the

target of low birth weight and stunting. However no improvement has been seen in decreasing anemia among women of reproductive age (41).

Study conducted on dietary intake of complementary food among rural mothers of children aged less than 12 months in Malawi has showed that the complementary food was mainly staple based and lacked animal source foods (42). Another study conducted on rural Malawian pregnant women has observed that the intake of milk and milk products food group was associated with birth weight of the infant positively (43). Improvement in the dietary intake of pregnant women by nutrition education and dietary counselling was found in a study done in rural Malawi (44).

2. Rationale

Study conducted on income and dietary intake observed that the increase in income influences the food intake (milk and fruit consumption, consumption from animal sources) (45, 46). Households with low income have significantly spent a large portion of their income on food (47). Study carried out among Canadian households indicated that household from low income setting budgeted more spending on milk and milk products yet the intake of these products was low (48). Study conducted on American population showed that the expenditure and intake of meat was high whereas it was low for fruits and vegetables (49). Another study conducted on American adults revealed that food expenditure apart from households is positively associated with poor diet quality (50). Findings from a study carried out among the households of Bolivia, Burkina Faso and Philippines showed that food secured households had high food expenditure (51).

Malawi Ranks 81st among 116 countries on global hunger index (52). Malawi being one of the poorest countries in the world located on southern Africa has stunting rate of 37.1 percent among children under 5 and 32.7 percent of women of reproductive age are anemic according to DHS 2015-16 (4). Apart from this condition about 3.3 million people are undergoing level 3 of Integrated food security Phase Classification (IPC) (or above) [see annexes (A)] (4). The motivation behind the investigation of the link between healthy dietary intake and food expenditure among Malawian households was that in a food insecure area an increase in food expenditure would increase the intake of healthy diet or other factors that should be considered. There are scopes

for further studies on healthy dietary intake and food expenditure among low- and middle-income countries. This present study will also provide proper knowledge about food insecure and poverty-stricken countries and knowledge about maintaining healthy diet within limited food expenditure so that policy makers and stakeholders can focus on the area and the economic aspects of nutrition ardently.

Sustainable development goals correspond unique chances to nutrition assurance (53). Improvement of undernourishment and assurance of accessibility to nutritious and sufficient food is mentioned in the SDG goal 2 (zero hunger) particularly in 2.1 and 2.2 subgoals (54). This study is indirectly connected to SDG goal 2 and 1 (no poverty) as it investigated about healthy dietary intake and food expenditure.

3. Objectives of the study

General objective: To assess the association between healthy dietary Intake using food consumption score (FCS) and food expenditure in Malawi.

Specific objectives:

- To examine the possibility of maintaining healthy diet within limited food expenditure using FCS
- To measure the difference of food expenditure and FCS between rural and urban settings.
- To measure the difference between education qualification of the household head and its association with food consumption score.

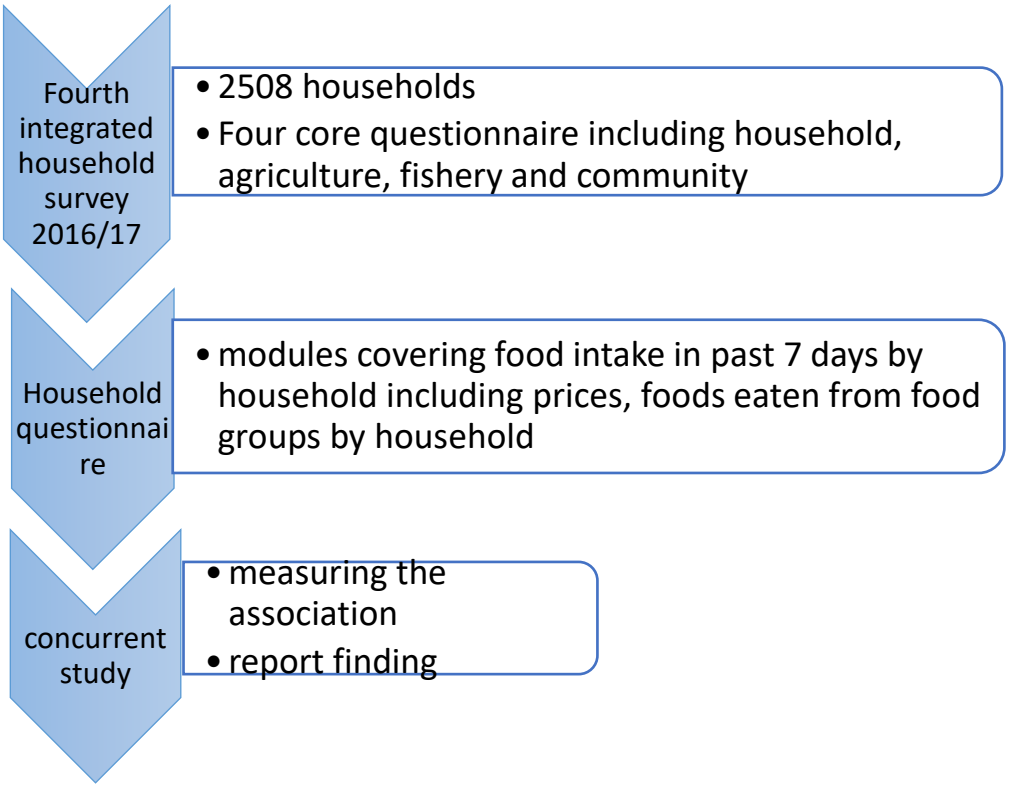
4. Methodology

4.1 Study design

An analytical cross-sectional method was applied to explore the relationship between the consumption of food groups on household level and food expenditure in Malawi. The data for this study was taken from the Fourth Integrated Household Survey (IHS4), 2016/17, a part of the World Bank Living Standards Measurement Studies (LSMS). The household data from all 2508 households from IHS4 were utilized for this study. It was a country representative sample.

The sampling frame of IHS4 was constructed upon information from Malawi Population and Housing Census (PHC) (2008). Three major area was stratified into rural and urban strata and island district Likoma was included in the sampling frame. Institutional population such as hospital inhabitants, prisoners, residents from military camps were excluded from the survey. A stratified two stage sample design was applied for IHS4 (55).

Figure 3: Diagram of the study process



4.2 Data sources

The national statistics office, Malawi has been carrying out household surveys from 1997 by the instruction from Government of Malawi to observe the conditions of households to check the poverty and vulnerability measures for policy making and meeting the MDG and currently SDG. The IHS4 was executed from April 2016 to April 2017. It was technically supported by World Bank LSMS-ISA (Living Standard Measurement Study-Integrated Surveys on Agriculture) initiative and financially assisted by Government of Malawi (GoM), the United States Agency for International Development (USAID) through the World Bank LSMS-ISA initiative, and the Millennium Challenge Corporation (MCC) (55).

The IHS4 consisted of four main questionnaires but only data from household questionnaire was used in this study. Information about housing, food consumption, income and assets, food security, health, education, social safety nets were collected by this questionnaire.

World Health Organization has classified foods into 14 food groups and subgroups because of food variety over the world (56). But in this study ten food groups were used in the questionnaire where eggs, meat and fish products are classified as one group, sugar, sugar products, fats and oils, and condiments were categorized as separated group and beverages group were excluded.

Table 1: overview of the food groups used in IHS4 Malawi in comparison with WHO given food groups

WHO conferred 14 food groups	**Ten food groups used in IHS4 Malawi**
1. Cereal and cereal products	1. Cereal, grains and cereal products
2. Roots, tuber, plantains and their products	2. Roots, tuber and plantains
3. Pulses, nuts, seeds and their products	3. Nuts and pulses
4. Milk and milk products	4. Milk and milk products
5. Eggs and their products	5. Meat, fish and animal products
6. Fish, shellfish and their products	
7. Meat and meat products	
8. Insects, grubs and their products	Excluded
9. Vegetables and their products	6. Vegetables
10. Fruits and their products	7. Fruits
11. Fats and oils	8. Fats and oils
12. Sweets and sugars	9. Sugar, sugar products and honey
13. Spices and condiments	10. Spices and condiments
14. Beverages	Excluded

4.3. Ethical approval

The IHS4 was conducted by national statistics office, Malawi and they have registered the data. No ethical approval was required for the present study. When the authority made the survey information publicly available, specific parts of the survey was not published to maintain the confidentiality. The survey had concealed the names of the respondents, their residing communities, their name of their children, the GPS of the location to sustain the anonymity.

4.4 Analytical methodology

The relationship between healthy dietary intake using food consumption score and food expenditure was assessed by general linear model (unianova). Unianova is a combination of regression and analysis of variance (anova) (57). Simple frequency test was run for the demographic characteristics. Anova test and independent t-test were carried out to test the differences among the different household characteristics across FCS. Welch test were reported in both of the tests as the levene test of variance were significant. Games Howell post hoc test was conducted to test the mean differences as the levene test of variance were significant. Pearson chi^2 test was conducted to test the differences in percentage of households divided by

demographic characteristics across categorical FCS. Pearson correlation was also used to examine the correlation between FCS and food expenditure. For data analysis SPSS version 26 was used.

The variable food expenditure was adopted from module G in IHS4, question G05 from the questionnaire, and Food consumption score was adopted from module G, question G08 (a-j) [see annexes (B)]. For formulating the Education qualification of the household head, question B04 from module B and question C09 from module C was used. Education qualification of household head then categorized into five groups as some of the sample from the categories were low. The education qualification of PSLC level is equivalent to eight years of schooling, JCE level is equivalent to ten years of schooling, and MSCE level is equivalent to 12 years of schooling (58). Primary economic activity of household head was formulated by using question E06_8 from module E and question B04 from module B [see annexes (B)]. Ganyu or short-term rural labor was one of the primary economic activities of household heads. Ganyu is defined as the off own farm casual work generally performed by rural people. The work is agricultural generally and done for neighbors, next to kins, farmhouses, properties sometimes in neighboring areas. The payment is done in cash or in kind (food) (59).

Calculation of food expenditure: The expenditure of food was collected separately for the specific food in this survey (module G, q G05) [see annexes (B)]. To calculate the food expenditure variable, the variable G05 was aggregated and summarized and then named food expenditure. The food expenditure was also categorized based on quantiles.

Calculation of food groups consumption over one week: Total food groups consumption over one week was calculated based on the intake of food groups over 7 days. Food items were divided into 10 food groups [table 1]. Household dietary diversity score is normally calculated by counting the intake of food groups in previous 24 hours (60) but this survey only collected data on the basis of 7 days. For this reason, the “how many days in one week household consumption of a specific food group” (module G, q G08 from a-j) [see annexes (B)] were coded into consumption of specific food groups over past 7 days based on 10 food groups. The variable was coded as yes when food groups were consumed over 1-7 days and no when the specific food groups was not

consumed over that specific period. Then it was compiled and coded as total food groups consumption over one week.

Formulation of food consumption score to assess dietary intake: The household food groups consumption was collected over one week in this survey. Generally household dietary diversity score (HDDS) is calculated by counting the food groups consumption in past 24 hours (60) so in case of this survey it was not possible to calculate HDDS. instead the food consumption score (FCS) (26) was calculated as an indicator for healthy dietary intake of the sample. In food consumption score 7-day recall method is used. The recorded frequencies of food groups consumption are multiplied by their own assigned weight. The food groups weights are calculated based on the nutrient density of the particular food groups (26) [Table 2]. Then the calculated values are summed to develop food consumption score. This score can be categorized into three categories by using standard thresholds.

Ten food groups were used in this survey and frequency of food groups consumption over one week was collected (module G, q 08 from a-j). So, the frequency of each food group consumption over one week was multiplied by the assigned weight of that particular food group. The calculated values of each food group were then summed to make food consumption score.

Consumption of roots and tuber group was treated as single group because the eating pattern was different from consumption of cereal and cereal products and to prevent data loss.

The sugar and oil consumption were high among the households. Normal category of FCS ranges from 21 to 35 where below 21 is poor, 21-35 is borderline and above 35 is acceptable. Since the household sugar and oil consumption were high, the range were increased by adding 7 to each threshold (21 and 35 to 28 and 42) following the standard procedure (26). However, for analysis continuous data of FCS was used and categorical data were used to understand the healthy dietary intake of the sample.

Table: 2 Food groups with their assigned weight and justification

Food groups	Weight (a)	Explanation	Food items (example)	Days consumed past 7 days (b)	Score a×b
Main staples	2	Generally consumed in large quantities, energy dense, poor protein content and poorer protein efficiency ratio (PER)*, phytates bounded micro-nutrients.	Rice, maize, maize porridge, sorghum, pasta, bread and other cereals and cereal products	7	14
			Potatoes, sweet potatoes, cassava, tubers, plantains		
Pulses	3	High quantity of protein, lower quality PER, energy dense, low fat content, micronutrients bounded by phytates.	Nuts, beans, peas	7	21
Vegetables	1	Low in energy, protein, no fat, micronutrients.	Vegetables, leafy vegetables	7	7
Fruit	1	Low in energy, protein, no fat, micronutrients.	Different types of fruits	7	7
Meat, fish and meat products	4	Energy dense, high-quality protein, absorbable micronutrients, fat.	Beef, goat, pork, poultry, egg and fish	7	28
Milk	4	High quality of protein, energy, micronutrients, vitamin A.	Milk and milk products	7	28
Sugar	0.5	Empty calories.	Honey, sugar and sugar products	7	3.5
Oils	0.5	Energy dense, no micronutrients	Fats, oils and butter	7	3.5
Condiments	0	Consumed in small amounts by definition and have no significant effect on general diet.	Tea, coffee, spices and other condiments.	7	0
Maximum composite score					**112**

Source: Food compostion analysis technical guidance sheet: Food consumption analysis Calculation and use of the food consumption score in food security analysis. World Food Program

Food security cluster. Guidelines on food consumption score (FCS) calculation for Bangladesh. Food Security cluster 2014

* Protein efficiency ratio- a measurement for protein quality of proteins from foods.

5. Results

5.1 Demographic characteristics of households

This study explored the demographic characteristics of the households which is shown in table 3. Among 2508 households about 27 percent of the sample were from urban setting and rest were from rural setting. About 75 percent of the interviewed families were managed by male household head.

The education qualification of household head was not widely varied. Among 2508 households about 63.3 percent of household head did not acquire any education qualifications. However, the attendance of school by household head was 90.3 percent which suggest that many of them had attended school but never acquire any educational degree. About eleven percent of household head had acquired education qualification of PSLC level, ten percent of them had JCE level , and ten percent of them had MSCE level. Only about 5 percent of household head had gained higher education among total household heads.

Among 2508 households about half of the household head (48 percent) were engaged in unpaid agricultural household labor as their primary earning for economic activity, and about 22 percent of them were employed in wage employment activity exclusion of short-term rural labor also known as Ganyu. About 16 percent of the household head were employed in non-agricultural household business, 14 percent of them were engaged in Ganyu and less than one percent of them were employed in unpaid apprenticeship.

About 12 percent of the households were consisted of 2 household members or less, about 36 percent of the sample had 3 to 4 members and about 16 percent of the sample had household member of 5 person. Approximately 35 percent of households had 6 or more than 6 members. The size of the households varied from 1 to 21. Among 2508 households about 68 percent of them were proprietor of their own property. About 18 percent of them lived in a rented property, 10 percent were lived in an authorized and rent-free property. About two percent of the sample lived in a land provided by employer, about one percent of them lived in rent free and

unauthorized property and only 0.8 percent of the sample lived in a land which was on purchasing process.

About one third of the sample (32 percent) were traditional households made with thatched roof, rough beams, unfired clay brickwork, another third (33 percent) of them were permanent households constructed of cement, fired red bricks, iron sheets, tiles, concrete. The last third (35 percent) of the households were semi structured build with the combination of traditional housing materials and modern building materials.

Food expenditure: Among 2508 households the mean of the food expenditure was 9107.87±9598.59 SD MK (=8.8±9.4 USD[1]) per week. About 25 percent of the sample (N=2508) spent less than 3050.00 MK for food and about 25 percent of them spent more than 11602.00 MK on food.

[1] 1 USD =1026 MK

Table 3: Demographic characteristics of the households

Characteristics	N	Frequency	Percentage
Residence setting	2508		
Urban		667	26.6
Rural		1841	73.4
Gender of the household head	2508		
Male		1878	74.9
Female		630	25.1
Attendance of school by household head	2487*		
Yes		2247	90.3
No		240	9.7
Education qualification of household head	2487*		
None		1575	63.3
PSLC		268	10.8
JCE		258	10.4
MSCE		258	10.4
Non-university diploma, University diploma, Post grad degree		128	5.1
Economic activity of last 12 months of HH head (primary activity)	2379**		
Agricultural unpaid household labor		1143	48.0
Wage employment		516	21.7
Nonagricultural household business		379	15.9
Ganyu (short term rural labor)		334	14.0
Unpaid apprenticeship		7	.3
Ownership of the house	2508		
Own property		1708	68.1
Rented		452	18.0
Free, authorized		246	9.8
Provided by employer		50	2.0
Free, unauthorized		31	1.2
Being purchased		21	0.8
Housing condition	2508		
Traditional		806	32.1
Permanent		817	32.6
Semi-permanent		885	35.3
HH size (Number of household members)	2508		
HH size 0-2		307	12.2
HH size 3-4		914	36.4
HH size 5		399	15.9
HH size 6-highest		888	35.4
Food expenditure MK (Malawian Kwacha)	2506***		
0-3049 MK		621	24.8
3050-6049 MK		627	25.0
6050-11601 MK		632	25.2
11602-85450 MK		626	25.0

*Missing data =21, **missing data= 129, ***Missing data=2

5.2 Household food groups consumption

The most commonly consumed food groups over 7 days by households were cereals (99.4 percent), vegetables (99.8 percent) and spices and condiments (99.9 percent). Meats, fish and animal products (74.8 percent), roots, tubers and plantains (69.1 percent) and fruits (64.7 percent) were fairly eaten. The least consumed food group was milk and milk products (28.7 percent).

Based on days, cereals, and spices were taken 7 days a week, vegetables were taken 5 days a week, oils and sugar products 4 days a week on average. On the other hand, nuts and pulses; meat, fish and other animal products; roots, tuber and plantains were taken 2 days a week and milk and milk products were taken only 1 days a week on average.

This suggests that most of the households had taken cereals; vegetables; spices and condiments daily and fats and oil and sugar and sugar products 4 days a week. About 85-65 percent of household had nuts and pulses, animal products, roots and tubers, and fruits for only 2 days on average a week. However only 28 percent of the household had milk and milk products but for only 1 days a week.

Table 4: Food group consumption over one week and on average day basis

Food groups	**n**	**Frequency**	**Percentage of HH consumption in last 7 days**	**Mean ±SD (average day basis)**
Cereals, grains and cereal products	2508	2492	99.4	6.68±1.112
Vegetables	2508	2503	99.8	5.37±1.937
Spices and condiments	2508	2506	99.9	6.66±1.181
Nuts and pulses	2507*	2124	84.7	2.33±1.685
Fats and oils	2507*	2098	83.7	4.45±2.693
Sugar, sugar products, honey	2506**	1920	76.6	4.19±2.967
Meat, fish and animal products	2508	1876	74.8	2.47±2.098
Roots, tubers and plantains	2508	1734	69.1	2.13±2.039
Fruits	2508	1622	64.7	2.02±2.270
Milk and milk products	2507*	720	28.7	1.27±2.374

*Missing data = 1, **missing data = 2

5.3 Total food groups consumption over one week

The total food group consumption in one week is shown in table 4. Among 10 food groups the mean of food group consumption over one week was 7.81±1.75 SD which ranged from 3 to 10 food groups. About 88 percent of the households had consumed from ≥6 food groups indicating having high diversity in food consumption over one week, about ten percent of household had taken food from 4-5 food groups which indicated medium diversity and less than two percent of households had low diversity (≤3 food groups). consumption of less than 3 food groups was not reported.

Table 5: Total food groups consumption over one week

Number of food groups consumption over one week n = 2503*	**Frequency**	**Percentage of HH consumption of total food groups**
3 food groups	34	1.4
4 food groups	95	3.8
5 food groups	168	6.7
6 food groups	275	11.0
7 food groups	370	14.8
8 food groups	517	20.7
9 food groups	580	23.2
10 food groups	464	18.5

*Missing data=5

5.4 Food consumption score (FCS) of households

The range of FCS among the households is shown in table 5. The mean FCS among the household was 51.31± 21.60 SD and ranged from 6.50 to 126. About 13 percent of the samples had ≤28 FCS suggesting poor food consumption, about 27 percent had from 28.5-42 indicating borderline food intake and about 60 percent of them had acceptable (≥42) food intake.

Table 6: Food consumption score among the households(n=2503)*

Frequency	**Percentage**	**FCS**	**Profiles**
310	12.4	Poor	≤28
682	27.2	Borderline	28.5-42
1511	60.4	Acceptable	≥42

*Missing data=5

5.5 Differences in FCS among households

The differences in FCS among households are shown in table 7(a). Households with household heads who acquired higher education degree had significantly high FCS compared to the mean of FCS of other households. The lowest mean FCS was reported in households with household head with no education qualification.

The mean difference between households led by household head with and without any education qualification was also significant (table 7b).

Households who spent ≤3049 MK on food had significantly lower FCS compared to households who spent more than 3049 MK on food. Households with food expenditure of more than 11602 MK had highest FCS among all households.

The FCS was significantly higher among households which were led by wage-employed household heads [64.35 (SD 22.54)] and household heads engaged in nonagricultural household business [61.79 (SD 22.98)] than households led by household head engaged in unpaid agricultural labor and Ganyu. The FCS score was lowest among households with household head engaged in Ganyu.

After running the Games-Howell post hoc test in one-way Anova the mean FCS difference was significant between households which were led by wage employed household heads and households run by household head engaged in unpaid agricultural household labor. The mean FCS difference was also significant between households led by wage employed householders and households led by Ganyu employed household heads (table 7b) ($p < 0.05$).

In case of ownership, households which were rented had significantly high FCS compared to other households. On the other hand, own property houses had low FCS.

The mean FCS difference was significant between own houses and rented houses. ($p < 0.05$) (see table 7b)

Households in urban setting had significantly high FCS compared to FCS of households in rural settings and household which were led by male household head also had significantly high FCS.

However no significant difference was reported in case of households with different household member size.

Households from different resident settings (rural/urban) spent differently on food and had significantly different mean FCS [figure 4] which was found by running two way Anova among residence setting*food expenditure with FCS ($f=4.36$, $p=0.005$, $\alpha \leq 0.05$). However, the effect size was negligible in this test (not presented on the table).

Table 7 (a): Differences in FCS (continuous) among households separated by different demographic characteristics

Variables	n	Frequency	**FCS** Mean (SD)	p value	Anova F value/ independent t test
Education qualification of household head[a]	2482*				
None		1571	44.93 (17.78)	0.000	130.33**
PSLC		267	54.44 (21.16)		
JCE		258	58.49 (21.65)		
MSCE		258	65.70 (21.27)		
Non-university diploma, University diploma, Post-grad degree		128	79.33(23.22)		
Food expenditure (MK)[a]	2501*				
0-3049 MK		619	34.87 (11.61)	0.000	611.17**
3050-6049 MK		624	43.27 (13.85)		
6050-11601 MK		632	53.30 (16.51)		
11602-85450 MK		626	73.67 (20.70)		
Primary economic activity of last 12 months of HH head[a]	2374*				
Wage employment		515	64.35 (22.54)	0.000	117.79**
Nonagricultural Household business		379	61.79 (22.98)		
Agricultural unpaid household labor		1140	43.96 (16.91)		
Ganyu (short term rural labor)		333	43.59 (17.36)		
Ownership of the house[a]	2503*				
Own property		1704	47.28 (19.90)	0.000	65.84**
Free, authorized		246	49.46 (19.98)		
Rented		451	66.65 (21.63)		
Residence setting[b]	2503*				
Urban		666	67.13 (22.13)	0.000	22.50**
Rural		1837	45.56 (18.30)		
Gender of the HH head[b]	2503*				
Male HH head		1874	52.91 (21.72)	0.000	6.63**
Female HH head		629	46.54 (20.53)		
HH size (categorized)	2503*				
HH size ≤5		1617	50.89 (21.55)	0.389	-1.30
HH size ≥6		886	52.07 (21.69)		

*Missing (Education qualification of HH head = 26, food exp=7, primary economic activity=134, ownership, residence setting, gender of HH head, HH size =5)

**p< 0.05,

[a] Welch test is reported because the levene test for homogeneity of variances assumption was not met for this variable. (one way anova)

[b] Welch test is reported because the levene test for homogeneity of variance assumption was not met for this variable. (independent t test)

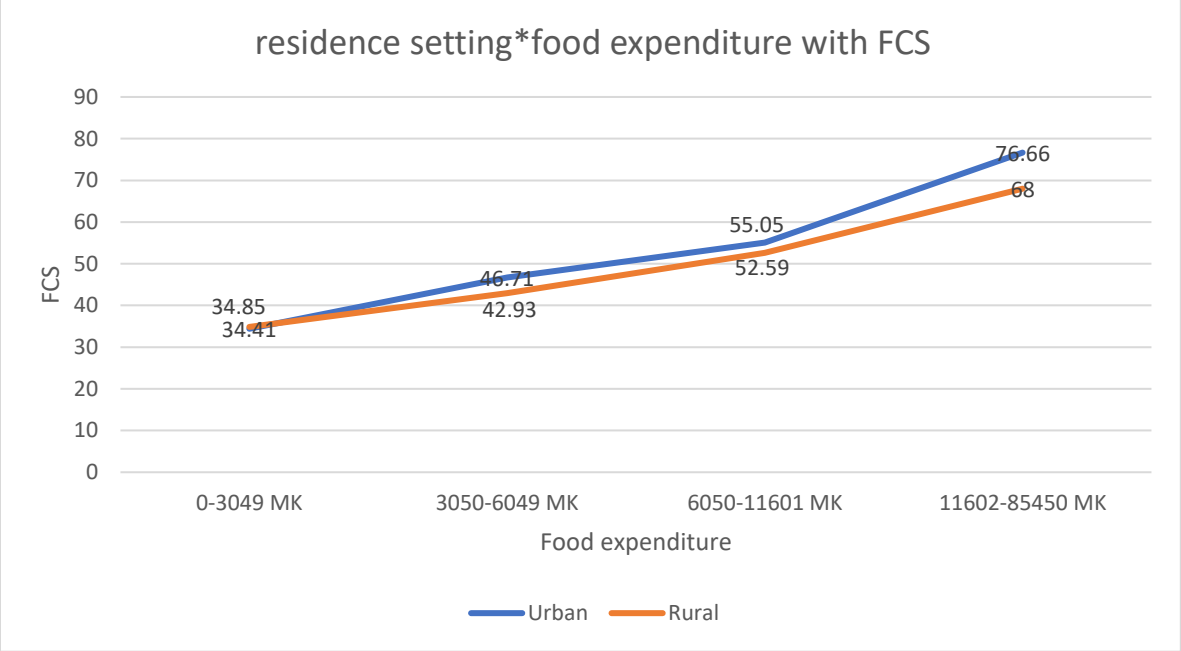
Unpaid apprenticeship from economic activity was not presented because of too few cases. Purchased property, employer provided property, and unauthorized free property from ownership of house were not presented because of too few cases.

Table 7(b): Mean FCS differences across households divided by demographic characteristics

FCS			
Variables		Mean difference	Sig (p value)
Education qualification of household head			
None	PSLC	-9.51*	0.000
	JCE	-13.57*	0.000
	MSCE	-20.78*	0.000
	Non-university diploma, University diploma, Post-grad degree	-34.40*	0.000
Primary economic activity of last 12 months of HH head			
Wage Employment	Nonagricultural Household business	2.56	0.460
	Agricultural unpaid household labor	20.39*	0.000
	Ganyu (short term rural labor)	20.76*	0.000
Ownership of the house			
Own property	Free, authorized	-2.18	0.597
	Rented	-19.37*	0.000

*p< 0.05

Figure 4: Differences of the FCS from different residence setting with different food expenditure



5.6 Categorical FCS of households divided by demographic characteristics

Percentage of households and their corresponding categorical FCS is shown in table 8. In case of food expenditure, increase in food expenditure had improved FCS of the households significantly. About 24 percent of households had acceptable FCS which had spent less than 3049 MK on the other hand, about 94 percent of households had acceptable FCS which had spent more than 11602 MK on food.

Households with higher level of education qualification of household head had significantly improved FCS. About 50 percent of Households which were led by household head with no education qualification had acceptable FCS whereas 93 percent households which were led by household head with higher education degree had acceptable FCS.

In case of residence setting, household from urban setting had significantly improved FCS. About 86 percent of household from urban setting had acceptable FCS whereas about 51 percent of households from rural setting had acceptable FCS. Male led households also had significantly acceptable FCS.

Table 8: Percentage of households divided by different demographic characteristics, separated by categorical FCS

Characteristics		Categorical FCS					
		Poor	Borderline	Acceptable		p value	Chi^2 value
	n	% of households	% of households	% of households	Total %		
Food expenditure						0.000	744.96*
0-3049 MK	619	30.7	44.9	24.4	100		
3050-6049 MK	624	13.8	35.7	50.5	100		
6050-11601 MK	632	4	23.4	72.6	100		
11602-85450 MK	626	1.1	5.3	93.6	100		
Education qualifications						0.000	246.81*
None	1571	17.1	33.1	49.8	100		
PSLC	267	6.7	28.1	65.2	100		
JCE	258	5.4	18.2	76.4	100		
MSCE	258	1.9	11.2	86.8	100		
Non University diploma, university diploma, post grad degree	128	1.6	5.5	93.0	100		
Residence setting						0.000	254.65*
Urban	666	2.3	11.7	86.0	100		
Rural	1837	16.1	32.9	51.1	100		
Gender of household head						0.000	46.19*
Male	1874	10.9	24.9	64.2	100		
Female	629	16.7	34.3	49.0	100		

* $p < 0.05$

5.7 Correlation between FCS and food expenditure

Pearson correlation was conducted between the continuous measure of FCS and food expenditure, and they were strongly correlated ($p=0.000$, $\alpha=0.01$). The pearson correlation coefficient was 0.67.

5.8 Association between FCS and food expenditure

After conducting Unianova between continuous measure of FCS and food expenditure and controlling the confounding variables (education qualification of household head, gender of household head, and residence setting) the FCS was significantly associated with food expenditure ($f=320.160$, $p=0.000$, $\alpha \leq 0.05$). The effect size was 0.280.

6. Discussion

6.1 Association between healthy dietary intake and food expenditure

It has been observed from a study conducted among 164 countries that increase in income, has increased food consumption (45). Evidence from a study based on 10 countries has shown that diverse dietary intake is associated with per capita expenditure (31).It also has been found that diet quality and diverse dietary intake is associated with food expenditure (32, 33, 61). Similarly, our study has found that among Malawian households the healthy dietary intake is strongly associated with food expenditure ($f=320.160$, $p=0.000$, $\eta^2=0.280$). Healthy dietary intake is also corelated with food expenditure (Pearson correlation coefficient 0.67, $p=0.000$, $\alpha=0.01$).

6.2 Possibility of attaining healthy dietary intake within limited food expenditure

It has been observed from this study that the households were able to attain acceptable FCS within spending limited amount of money on food. About 25 percent of the households were able to attain the acceptable FCS even though they spend less than 3050 MK on food (table 8). It could suggest that it is possible to maintain a healthy dietary intake within the limited food expenditure. These finding from the present study can be to some extent supported by studies conducted among American population where it is found that children from low income group had healthier food consumption (green vegetables, legumes, vegetables) than children from high income group (62) and healthy diets were economical (63). The factors influencing healthy

dietary intake within limited spending on food should be investigated. However, The latest FAO report on cost and affordability of healthy diet showed that globally about 3 billion people cannot afford healthy diet and most of these population are from Africa and Asia (28). It is found from the present study that with increase in food expenditure more households were able to attain the healthy dietary intake (acceptable FCS). The mean FCS of households spending ≤3050 MK was 34.87 (11.61 SD) (table 7a) which was borderline FCS according to FCS threshold. On the other hand, household spent more than 3050 MK the mean FCS was within acceptable threshold. This finding can also be supported by studies conducted in Brazil, Ethiopia, Ghana, Malayasia, Mexico, which showed that the healthy diet cost more than poor diet (64-68). This could suggest that in general healthy diets are costly, but it is possible to afford a healthy diet and factors enabling the affordability should be explored.

6.3 Education qualification of the household head and healthy dietary intake

The education status of household head can influence food security (69). It has also been observed from several studies that higher parental education status is associated with healthier food intake in children (6-59 months) (70-72). Family education status is also associated with diverse dietary intake (73). The present study has found that the education qualification of the household head was significantly associated with FCS (p=0.000). About 93 percent households run by household head with higher education qualification had acceptable FCS whereas about 50 percent households led by household head without any education qualification had acceptable FCS (table 8). The mean FCS of household with household head with no education qualification was 44.93 (17.78 SD) whereas the mean FCS of household run by household head with higher education qualification was 79.33(23.22SD) (table 7a). Although both mean FCS were within acceptable threshold, the mean differences among households with and without higher education qualification were significant (table 7b). These findings suggest that education level of household head is associated with healthy dietary intake, and it is coherent with previous studies (62, 74-77). This could suggest that households with higher education qualification household head can make good decision on choosing healthy dietary intake. Education level can possibly

influence the dietary intake as higher education increases the chance of higher income and growth in income increases healthy diet intake (45, 78).

6.4 Healthy dietary intake in urban rural settings

In this study it is observed that households from different residence setting with different categories of food expenditure had different FCS. Households from rural and urban settings spent ≤3050 MK had similar mean FCS (urban 34.4, rural 34.9) which was borderline, but as the expenditure increased the mean FCS also increased. Households from both setting with food expenditure more than 11602 MK had higher but different acceptable mean FCS (urban 76.7, rural 68.0) (figure 4). This could suggest that regardless of the food expenditure household from urban setting have higher chance of attaining healthy diet because of food availability within the region. The mean FCS of households from urban and rural settings were in acceptable threshold (table 7a) however only 51 percent of the households from rural settings had healthy dietary intake whereas 86 percent of the urban households had healthy dietary intake (table 8). These findings are supported by other studies done in Ethiopia (79), Nigeria (80), Cambodia (71) where poor dietary intake was observed among rural households.

In a previous study diverse dietary intake was found to be associated with dwelling area, cultivable land ownership, and gender of household head (33). This study also addressed other socio-economic factors such as primary economic activity of household head, household ownership, and gender of household head had influenced healthy dietary intake. Households with members engaged in different primary economic activity had mean FCS (table 7a) in acceptable threshold, but the difference between mean FCS was significant between households run by wage employed householder and households run by nonpaid agricultural household labored householder. The mean FCS difference was also significant between households led by wage employed householder and households run by householders engaged in short term rural labor (table 7b). This finding can be supported by a pervious study where households led by householders with professional job were food secured (69). This could suggest that households with economic solvency can attain healthy dietary intake well. The mean FCS differences between rented households and own property houses were significant (table 7b) and rented

households had healthier dietary intake compared to other households (Table 7a). Women empowerment is positively associated with healthy dietary intake (81). Studies have shown that female headed households are susceptible to food insecurity (69, 82). The present study has found that About 64 percent male led households had healthy dietary intake whereas only 49 percent female led households had healthy dietary intake (table 8). This finding is consistent with previous studies conducted in Tanzania (83) and Ghana (75) where it was found that male headed households has healthier dietary intake. This could also suggest that male led households made good decision of choosing healthy diet among this sample. Women empowerment could be a possible influencing factor as it is linked with food production, access and food intake (84). Study conducted among Mexican children had observed that household size can influence the dietary intake (85). However no significant dietary intake difference was found in different household size in present study.

6.5 Dietary pattern of Malawian households

Staple food and vegetables are most consumed food groups among Malawian population according to a report on nutrition and agriculture situation in Malawi by FAO. Consumption of animal products, pulses, and fats and oils were low among all the areas (86). Similar consumption pattern was found by the present study except for pulses, sugars, oils and fats. Present study found that about 85 percent of the households consumed pulses, about 84 percent of the sample consumed oils, 77 percent of them consumed sugar and sugar products over one week. Least consumed group was fruits and milk among the sample. Another study conducted on complementary feeding on Malawian children found similar household food consumption over one week (87). Study conducted on South African population also showed high consumption of sugar products, oils (38).

Present study addressed the food consumption score of Malawian households thus healthy dietary intake pattern. In the national food security and vulnerability analysis and nutrition assessment study in Malawi by World Food Program in 2011, the poor FCS was four percent, borderline was 22 percent and acceptable was 74 percent (88). The poor and borderline FCS of the present study sample was higher (13 percent- poor, 27 percent -borderline) and acceptable

food consumption was lower (60 percent) (table 6) than the previous national study. This could be due to the low consumption of fruits, milk and animal product and high consumption of staple food among the population. This score (60 percent) was also lower than other African countries (88).

6.6 Methods

Methodologically the present study used food consumption score to understand the dietary intake of the population and this method is also utilized by previous academic studies (79, 89). FCS is adopted and used by WFP to recognize and categorize household level food insecurity (27). It has also been used in the WFP comprehensive food security and vulnerability analysis (90). This method was used in the present study because the food consumption was collected over 7 days and results might have been different and would have reflected dietary intake potently if there was a possibility to collect on 24 hours recall method. But some studies have used 24 hours recall method to understand the diet and similar relationship have also been observed (32, 71, 77).

After meticulous searching for studies for comparison with present study few numbers of studies were found which observed food consumption score with food expenditure directly. There is still knowledge gap about these matters and LSMS provides free microdata of different low- and middle-income countries so this opportunity should be considered to investigate such matters.

6.7 Limitation of the study

Although this study tried to discover the association, this study could not investigate the association simultaneously as this study only used the 2016-17 survey information. As this study was a cross-sectional study it was unable to show causal inference strongly and did not produce the aetiology of having poor dietary intake. Another possible limitation was that the food intake was recorded over past 7 days, so this increased the likelihood of the biasness. Few studies had worked with food consumption score, so lack of comparable studies was another limitation.

7. Conclusion and recommendations

Access to nutritionally adequate food can be impeded by affordability and food prices (28). Impoverished households would have to spend a large proportion of their income to access to nutritious food (28). This study observed Malawi, one of the poorest countries and suffering from malnutrition and found that there was a strong association between healthy dietary intake and food expenditure, however it was possible to maintain healthy diet within limited food expenditure of the households. Food price intervention, sustainable income generating activities intervention can be considered for this population. Farm production diversity can also be helpful as farm production diversity is positively associated with household diet (89). It is sometimes not possible to increase the food expenditure because of low income as they are related (47) however reasons behind attaining healthy dietary intake within low food expenditure should be observed. These observed factors might be helpful for other households struggling with poor diet in Malawi and other countries from low- and middle-income settings. This study also produced the percentage of target households with poor dietary intake in Malawi so food security intervention can be carried out among these households.

This study also found that educational qualification and residence settings also influenced healthy dietary choices of the households. This study also produced the proportion of households having poor dietary intake which can be used for focusing the target population. Affordability of the households consuming poor diet should be increased by examining the households which were accessing the healthy diet with limited economic affordability. It was postulated that rural residences might have healthier diet due to low food price in the rural areas compared to urban ones (91), but the contrary situation was observed. It was observed in a previous study conducted in Nigeria that the rural residences had negative attitude towards buying fruits and vegetables as these items are accessible from their farmland (80). This might also be true for Malawi and in that case approaches should be taken to improve the fruits consumption. Malawian dietary guidelines mentioned the identification and consumption of locally available foods (92) and the guidelines should be familiarized by the populations. Identification of affordable nutritious food, popularization of nutritious food with low production cost can also be helpful. Accessibility to

healthy dietary intake and food expenditure of households should be checked before following nutrition education and behavior change approaches. Lowering prices of fertilizers, controlling production cost might not be the answer as long as the factors influencing the food costs are controlled. Economic stability of food system, economics of nutrition should also be emphasized and discussed in the nutrition policy.

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9. Annexes

A. Description of Integrated Food Security Phase Classification

Phase	Description
1. None/ minimal	Households can access to essential food and non food items without following unsustainable ways to access.
2. Stressed	Households with minimal adequate food intake and not capable of affording necessary non-food expenditures unless adapting approaches to cope with stress.
3. Crisis	• Households having high food intake gaps and indicated by high level of acute malnutrition • Households are only capable of meeting borderline food intake by diminishing livelihood resources or by adapting crisis-coping approaches.
4. Emergency	• Households having high food intake gaps and indicated by high level of acute malnutrition and mortality • Utilization of emergency approaches to alleviate high level of food intake gaps
5. Catastrophe/famine	Households with an extreme scarcity of food and/ or other basic needs despite adapting coping approaches. Hunger, mortality, poverty, extreme acute malnutrition are apparent.

Source: Food Security Information Network. GLOBAL REPORT ON FOOD CRISES 2020

B. Selected questions from IHS4 household questionnaire

Malawi Fourth Integrated Household Survey - Household Questionnaire - Page 1

MARK BOX WITH AN 'X' AND NUMBER FORMS BELOW IF YOU USE MORE THAN THIS SINGLE FORM TO COLLECT INFORMATION FROM THIS HOUSEHOLD. IF SO, BE SURE TO MARK IN THE SAME WAY THE OTHER FORMS USED FOR THIS HOUSEHOLD.

FORM _____ OF _____ FORMS IN TOTAL

Malawi Government
National Statistical Office

AUTHORIZED FOR PUBLIC DISCLOSURE

Questionnaire Number

FOURTH INTEGRATED HOUSEHOLD SURVEY, 2016/17

THIS SURVEY IS BEING CONDUCTED BY THE NATIONAL STATISTICAL OFFICE UNDER THE AUTHORITY OF THE 2013 STATISTICS ACT.
THIS INFORMATION IS STRICTLY CONFIDENTIAL AND IS TO BE USED FOR STATISTICAL PURPOSES ONLY.

HOUSEHOLD QUESTIONNAIRE

MODULE A-1: HOUSEHOLD IDENTIFICATION

WRITE CODES FOR TA, STA, OR TOWN; EA; AND HH ID. WRITE NAME OF DISTRICT; TA; VILLAGE; AND HOUSEHOLD HEAD.

CODE NAME

A01. DISTRICT: .....

A02. TA, STA, or TOWN: .....

A03. ENUMERATION AREA:

A04. PLACE / VILLAGE NAME: .....

A05. PANEL OR CROSS-SECTIONAL: CROSS-SECTION.....1; PANEL A .....2>>A09; PANEL B .....3>>A09

A06. HOUSEHOLD ID (FROM LIST):

A07. NAME OF HOUSEHOLD HEAD: .....

A08. DWELLING STRUCTURE NO. (FROM LIST): CODE (THEN>>A15)

A09: IHPS Y2-HHID FROM TRACKING FORM: -

A10. NAME OF HOUSEHOLD HEAD FROM IHPS: _____

A11. LOCATION OF HOUSEHOLD: SAME DWELLING UNIT.....1 ▶ A13; DIFFERENT DWELLING UNIT WITHIN SAME VILLAGE/URBAN LOCATION....2; DIFFERENT VILLAGE/URBAN LOCATION, WITHIN SAME DISTRICT.....3; DIFFERENT VILLAGE/URBAN LOCATION, WITH DIFFERENT DISTRICT.....4

A12. IHPS ROSTER ID & NAME OF TRACKING TARGET: .....

A13. CURRENT NAME OF HOUSEHOLD HEAD: _____

A14. LOWEST IHPS ROSTER ID NUMBER FROM SECTION B, QUESTION 06_1: REFER TO COMPLETED T0 AND CONFIRM IN MODULE B HOUSEHOLD ROSTER

VISIT 1

A15. DESCRIPTION OF LOCATION OF HOUSEHOLD:

.....

A16. WHAT ARE THE GPS COORDINATES OF THE DWELLING?

LATITUDE (S): D .

LONGITUDE (E): D .

A17. WEATHER CONDITION AT MEASUREMENT:
Clear/ Sunny.....1; Mostly Clear / Mostly Sunny....2; Partly Cloudy / Partly Sunny....3; Mostly Cloudy / Considerable Cloudiness..4; Completely Cloudy .....5; Rainy.....6

A18. PHONE NUMBER FOR HOUSEHOLD HEAD:

A. NAME: _____ B. PHONE: _____

VISIT 2 (ONLY APPLICABLE FOR PANEL HOUSEHOLDS)

A31. IS THIS HOUSEHOLD IN THE SAME DWELLING AS IN VISIT 1? YES...1 ▶ A33; NO 2

A32. DESCRIPTION OF NEW LOCATION OF HOUSEHOLD:

.....

A33. WHAT ARE THE GPS COORDINATES OF THE DWELLING? (RETAKE - DO NOT COPY)

LATITUDE (S): D .

LONGITUDE (E): D .

A34. WEATHER CONDITION AT MEASUREMENT:
Clear/ Sunny.....1; Mostly Clear / Mostly Sunny....2; Partly Cloudy / Partly Sunny....3; Mostly Cloudy / Considerable Cloudiness..4; Completely Cloudy .....5; Rainy.....6

A35. PHONE NUMBER FOR HOUSEHOLD HEAD: (RETAKE - DO NOT COPY)

A. NAME: _____ B. PHONE: _____

A19. CONTACT INFORMATION - **REFERENCE PERSON 1:**	A20. CONTACT INFORMATION - **REFERENCE PERSON 2:**	A21: CONTACT INFORMATION - **REFERENCE PERSON 3:**
A. NAME: _____	A. NAME: _____	A. NAME: _____
B. RELATIONSHIP TO HEAD: _____	B. RELATIONSHIP TO HEAD: _____	B. RELATIONSHIP TO HEAD: _____
C. PHONE: _____	C. PHONE: _____	C. PHONE: _____
D. DISTRICT: _____	D. DISTRICT: _____	D. DISTRICT: _____
E. TA, STA, or TOWN: _____	E. TA, STA, or TOWN: _____	E. TA, STA, or TOWN: _____
F. PLACE / VILLAGE: _____	F. PLACE / VILLAGE: _____	F. PLACE / VILLAGE: _____

MODULE B: HOUSEHOLD ROSTER

ENUMERATOR: RECORD START DATE & TIME FOR MODULE B: DAYS | MONTHS | HOURS | MINUTES

IN ORDER TO MAKE A COMPREHENSIVE LIST OF INDIVIDUALS CONNECTED TO THE HOUSEHOLD, USE THE FOLLOWING PROBE QUESTIONS:

First, give me the names of all the members of your immediate family who normally live and eat their meals together here.

WRITE DOWN NAMES, SEX, AND RELATIONSHIP TO HH HEAD (B02 to B04). LIST HOUSEHOLD HEAD ON LINE 1.

Then, give me the names of any other persons related to you or other household members who normally live and eat their meals together here.
FILL IN B02 to B04.

Are there any other persons not here now who normally live and eat their meals here? For example, household members studying elsewhere or traveling.
FILL IN B02 to B04.

Then, give me the names of any other persons not related to you or other household members, but who normally live and eat their meals together here, such as servants, lodgers, or other who are not relatives.
FILL IN B02 to B04.

DO NOT LIST SERVANTS WHO HAVE A HOUSEHOLD ELSEWHERE, AND GUESTS WHO ARE VISITING TEMPORARILY AND HAVE A HOUSEHOLD ELSEWHERE.

IF MORE THAN 15 INDIVIDUALS, USE SECOND QUESTIONNAIRE. MAKE SURE TO MARK BOX ON FIRST PAGE OF BOTH QUESTIONNAIRES.

B01 LINE CODE	B02 NAME MAKE A COMPLETE LIST OF ALL INDIVIDUALS WHO NORMALLY LIVE AND EAT THEIR MEALS TOGETHER IN THIS HOUSEHOLD, STARTING WITH THE HEAD OF HOUSEHOLD. (CONFIRM THAT HOUSEHOLD HEAD HERE IS SAME AS HOUSEHOLD HEAD LISTED ON COVER.) FILL IN B02 TO B04 BEFORE COMPLETING QUESTIONS B04_1 AND FOLLOWING.	B03 SEX MALE....1 FEMALE..2	B04 RELATIONSHIP TO HEAD: HEAD. . . . . .1 WIFE/HUSBAND. . . . .2 CHILD/ADOPTED CHILD . .3 GRANDCHILD. . . . . .4 NIECE/NEPHEW. . . . .5 FATHER/MOTHER . . . .6 SISTER/BROTHER. . . . .7 SON/DAUGHTER-IN-LAW . .8 BROTHER/SISTER-IN-LAW .9 GRANDFATHER/MOTHER. . 10 FATHER/MOTHER-IN-LAW. 11 OTHER RELATIVE. . . . 12 SERVANT OR SERVANT'S RELATIVE . . . . . 13 LODGER/LODGER'S RELATIVE . . . . . 14 OTHER NON-RELATIVE. . 15 OTHER (SPECIFY) . . . 16	B04a Does [NAME] have a working cell phone? YES..1 NO...2>>B05	B04_1 PHONE NUMBER:	B05 *(ALL HOUSEHOLDS. PANEL HOUSEHOLDS FILL IN VISIT 1)* How old is [NAME]? IF 6 YEARS AND OVER, GIVE YEARS ONLY. IF LESS THAN 6 YEARS IN AGE, GIVE YEARS AND MONTHS. YEARS	MONTHS	B05_1 **ENUMERATOR:** IS THIS PERSON [NAME] AGED 12 YEARS OR OLDER? YES..1>>B06 NO...2	B05_2 Does [NAME] have a birth certificate and/or immunization card? YES..1 NO...2	B06 When was [NAME] born? MONTH	YEAR (4-DIGIT)	B06_1 *(PANEL HOUSEHOLDS ONLY - VISIT 1)* **IF THIS MEMBER WAS PRESENT AT LAST SURVEY, ENTER IHPS ROSTER ID NUMBER FROM TRACKING FORM** **ELSE, ENTER 99** IHPS ROSTER ID	B06_2 *(PANEL HOUSEHOLDS ONLY - FILL IN VISIT 2)* Is [NAME] still a member of your household? STAYED.....1 NEW.....2 LEFT PERMANENTLY..3 DIED...4>>NEXT ROW	B06_3 *(PANEL HOUSEHOLDS ONLY - FILL IN VISIT 2)* How old is [NAME]? IF 6 YEARS AND OVER, GIVE YEARS ONLY. IF LESS THAN 6 YEARS IN AGE, GIVE YEARS AND MONTHS. YEARS	MONTHS
1																		
2																		
3																		
4																		
5																		
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11																		
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15																		

MODULE C: EDUCATION

CROSS-SECTIONAL HOUSEHOLDS: ASK OF ALL PERSONS AGED 5 YEARS AND OLDER.

PANEL HOUSEHOLDS: ASK OF ALL PERSONS AGED 5 YEARS AND OLDER THAT ARE NOT AMONG THE SELECTED RESPONDENTS FOR THE INDIVIDUAL-LEVEL QUESTIONNAIRE

C01	C02	C03	C04	C05		C06	C07		C08	C09	C10	C11
ID CODE	PUT AN 'X' FOR ALL INDI-VIDUALS WHO ARE AGED BELOW 5 YEARS. DO NOT ADMIN-ISTER THIS MODULE TO THESE INDI-VIDUALS.	IS THE INFORMATION SELF-REPORTED OR IS IT BEING PROVIDED BY ANOTHER HOUSEHOLD MEMBER? SELF-REPORTED..1>>C05 ANOTHER HH MEMBER....2	WHO IS REPORTING THE INFORM-ATION FOR THE INDI-VIDUAL? LIST FROM HOUSEHOLD ROSTER HH ROSTER ID CODE	Are you able to read and write in the following languages? YES..1 NO...2		Have you ever attended school? YES..1>>C08 NO...2	What was the reason you never attended school? LIST UP TO 2 REASONS. STILL TOO YOUNG TO ATTEND SCHOOL. . . . . .1 NO MONEY FOR FEES, UNIFORM .2 POOR QUALITY OF SCHOOLS. . .3 ILLNESS OR DISABILITY. . . .4 NOT INTERESTED, LAZY . . . .5 PARENTS DID NOT LET ME . . .6 HAD TO WORK OR HELP AT HOME.7 SCHOOL TOO FAR FROM HOME . .8 SCHOOL CONFLICT WITH BELIEFS . . . . . .9 OTHER (SPECIFY). . . . . 10 (THEN >NEXT MODULE)		What class are you in or what was the highest class level you ever attended? NURSERY/ PRE-SCHOOL-0 PRIMARY STND. 1 - 1 STND. 2 - 2 STND. 3 - 3 STND. 4 - 4 STND. 5 - 5 STND. 6 - 6 STND. 7 - 7 STND. 8 - 8 SECONDARY FORM 1 - 9 FORM 2 - 10 FORM 3 - 11 FORM 4 - 12 FORM 5 - 13 FORM 6 - 14 UNIVERSITY UNIV. 1 - 15 UNIV. 2 - 16 UNIV. 3 - 17 UNIV. 4 - 18 UNIV. 5 & ABOVE - 19 TRAINING COLLEGE TC YR. 1 - 20 TC YR. 2 - 21 TC YR. 3 - 22 TC YR. 4 - 23 ADULT INFORMAL EDUCATION - 24	What is the highest educational qualification you have acquired? NONE. . . 1 PSLC. . . 2 JCE . . . 3 MSCE. . . 4 NON-UNIV. DIPLOMA. 5 UNIVER. DIPLOMA, DEGREE . 6 POST-GRAD. DEGREE . 7	How old were you when you started school? YEARS	Did you attend school in the last completed academic year? YES..1 NO...2>>C13
				Chichewa	English		1st reason	2nd reason				
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												

MODULE E: TIME USE & LABOUR (CONTINUE **MODULE E: TIME USE & LABOUR (CONTINUED)**

E01 CODE ID	E06_8 In what type of economic activity did you spend most of your time in the last 12 months: WAGE EMPLOYMENT EXCLUDING GANYU.....1 HOUSEHOLD BUSINESS (NON-AG).....2 UNPAID HOUSEHOLD LABOR (AGRIC).....3 UNPAID APPRENTICESHIP.....4 GANYU.....5		E07a How many hours in the last seven days did you spend on household farming activities whether for sale or for household food?	E07_1 List up to 5 crops that you worked on during the last 7 days, listed in accordance with importance (importance defined as value addition in terms of non-market (consumption) or market (commercial sales) terms). REFER TO CROP CODES AT THE END OF THE AGRICULTURE QUESTIONNAIRE. LIST ALL CROPS IN ORDER OF IMPORTANCE, STARTING WITH THE MOST IMPORTANT CROP. IMPORTANCE DEFINED AS VALUE ADDITION IN TERMS OF NON-MARKET (CONSUMPTION) OR MARKET (COMMERCIAL SALES) TERMS.					E07_1a In regards to the first crop listed in E07_1, are the products you worked on... READ RESPONSES: ALL INTENDED FOR SALE.....1>>E07_2a SOME ARE INTENDED TO BE SOLD AND SOME KEPT FOR USE OR CONSUMPTION BY YOUR FAMILY.....2 ALL ARE INTENDED TO BE KEPT FOR USE OR CONSUMPTION BY YOUR FAMILY....3>>E07_2a	E07_1b In regards to the first crop listed in E07_1, is it intended to sell... READ RESPONSES: LESS THAN 1/4.....1 1/4.....2 1/2.....3 3/4.....4 MORE THAN 3/4.....5	E07_1c In regards to the first crop listed in E07_1, In general, in the past have these products been mainly sold or mainly kept for family use or consumption? READ RESPONSES: MAINLY SOLD.....1 MAINLY KEPT FOR FAMILY USE OR CONSUMPTION.....2	E07_2a In regards to the second crop listed in E07_1, are the products you worked on... READ RESPONSES: ALL INTENDED FOR SALE.....1>>E07_3a SOME ARE INTENDED TO BE SOLD AND SOME KEPT FOR USE OR CONSUMPTION BY YOUR FAMILY.....2 ALL ARE INTENDED TO BE KEPT FOR USE OR CONSUMPTION BY YOUR FAMILY....3>>E07_3a	E07_2b In regards to the second crop listed in E07_1, is it intended to sell... READ RESPONSES: LESS THAN 1/4.....1 1/4.....2 1/2.....3 3/4.....4 MORE THAN 3/4.....5	E07_2c In regards to the second crop listed in E07_1, In general, in the past have these products been mainly sold or mainly kept for family use or consumption? READ RESPONSES: MAINLY SOLD.....1 MAINLY KEPT FOR FAMILY USE OR CONSUMPTION.....2
	MAIN	SECONDARY	HOURS	1ST	2ND	3RD	4TH	5TH						
1														
2														
3														
4														
5														
6														
7														
8														
9														
10														
11														
12														
13														
14														
15														

MODULE G: FOOD CONSUMPTION OVER PAST ONE WEEK

ENUMERATOR: RECORD START DATE & TIME FOR MODULE G: DAYS | MONTHS | HOURS | MINUTES

G00_1. Who in the household is most knowledgeable about food consumed in the household. LIST MEMBER ID. [ ]

G00_2. Who in the household is reporting information on food consumption in this module. LIST MEMBER ID. [ ]

DE LINE NUMBER	Over the past one week (7 days), did you or others in your household consume any [. . .]? INCLUDE FOOD BOTH EATEN COMMUNALLY IN THE HOUSEHOLD AND THAT EATEN SEPARATELY BY INDIVIDUAL HOUSEHOLD MEMBERS.	G01 YES..1 NO...2>> NEXT ITEM	G02 ITEM CODE	G03 How much in total did your household consume in the past week? QUANTITY	G03 UNIT	G04 How much came from purchases? QUANTITY	G04 UNIT	G05 How much did you spend? MK	G06 How much came from own-production? QUANTITY	G06 UNIT	G07 How much came from gifts and other sources? QUANTITY	G07 UNIT	DE LINE NUMBER
1	**Cereals, Grains and Cereal Products**												1
2	Maize *ufa mgaiwa* (normal flour) *		101										2
3	Maize *ufa* refined (fine flour) *		102										3
4	Maize *ufa madeya* (bran flour) *		103										4
5	Maize grain (not as *ufa*) *		104										5
6	Green maize *		105										6
7	Rice		106										7
8	Finger millet (*mawere*)		107										8
9	Sorghum (*mapira*)		108										9
10	Pearl millet (*mchewere*)		109										10
11	Wheat flour		110										11
12	Bread		111										12
13	Buns, scones		112										13
14	Biscuits		113										14
15	Spaghetti, macaroni, pasta		114										15
16	Breakfast cereal		115										16
17	Infant feeding cereals		116										17
18	Other (specify)		117										18

* ENUMERATOR: PLEASE SPECIFY SUB-UNIT CODE FOR ITEM. REFER TO PHOTO AID

CODES FOR UNIT:

KILOGRAMME 1
50 KG. BAG 2
PAIL (SMALL) . . .4
PAIL (LARGE) . . .5
No. 10 PLATE . . .6
No. 12 PLATE . . .7
BUNCH. 8
PIECE. 9
HEAP 10
BALE 11
OX-CART (UNSHELLED) . . 14
LITRE. 15
GRAM 18
MILLILITRE . . . 19
TEASPOON. 20
SATCHET/TUBE. . .22
OTHER (SPECIFY). 23

MODULE G: FOOD CONSUMPTION OVER PAST ONE WEEK (CONTINUED)

		G08. Over the past one week (7 days), how many days did you or others in your household consume any [...]? IF NOT CONSUMED, RECORD ZERO.
		NUMBER OF DAYS
A	**Cereals, Grains and Cereal Products** (Previous Page: 100s) (Maize Grain/Flour; Green Maize; Rice; Finger Millet ; Pearl Millet; Sorghum; Wheat Flour; Bread; Pasta; Other Cereal)	
B	**Roots, Tubers, and Plantains** *[Previous Page: 200]* (Cassava Tuber/Flour; Sweet Potato; Irish Potato; Other Tuber/Plantain)	
C	**Nuts and Pulses** *[Previous Page: 300s]* (Bean; Pigeon Pea; Macademia Nut; Groundnut; Ground Bean; Cow Pea; Other Nut/Pulse)	
D	**Vegetables** *[Previous Page: 400s]* (Onion; Cabbage; Tanaposi; Nkhwani; Wild Green Leaves; Tomato; Cucumber; Other Vegetables/Leaves)	
E	**Meat, Fish and Animal Products** *[Previous Page: 500s]* Egg;Dried/Fresh/Smoked Fish (Excluding Fish Sauce/Powder); Beef; Goat Meat; Pork; Poultry; Other Meat)	
F	**Fruits** *[Previous Page: 600s]* (Mango; Banana; Citrus; Pineapple; Papaya; Guava; Avocado; Apple; Other Fruit)	
G	**Milk/Milk Products** *[Previous Page: 700s]* (Fresh/Powdered/Soured Milk; Yogurt; Cheese; Other Milk Product - Excluding Margarine/Butter or Small Amounts of Milk for Tea/Coffee)	
H	**Fats/Oil** *[Previous Page: 703, 704, 803, 804 (if app.)]* (Cooking Oil; Butter; Margarine; Other Fat/Oil)	
I	**Sugar/Sugar Products/Honey** *[Previous Page: 801, 802, 804 (if app.), 815, 816, 817, 817 (if app.)]* (Sugar; Sugar Cane; Honey; Jam; Jelly; Sweets/Candy/Chocolate; Other Sugar Product)	
J	**Spices/Condiments** *[Previous Page: 900s, 810-814, 817 (if app.)]* (Tea; Coffee/Cocoa/Millop; Salt; Spices; Yeast/Baking Powder; Tomato/Hot Sauce;Fish Powder/Sauce; Other Condiment - Including Small Amounts of Milk for Tea/Coffee)	

G09. Over the past one week (7 days), did any people that you did not list as household members [READ LIST FROM HH ROSTER] eat any meals in your household?

YES..1
NO...2>> **NEXT MODULE** ☐

		For G10-G11: IF NOT SHARED, RECORD ZERO.	G10 What was the total number of days in which any meal was shared with people [...]? NUMBER OF DAYS	G11 What was the total number of meals that were shared over past 7 days with [...]? NUMBER OF MEALS
A	Children 0-5 years			
B	Children 6-15 years			
C	Adults 16-65 years			
D	People over 65 years old			

ENUMERATOR: RECORD PRIMARY RESPONDENT ID FOR MODULE G: ☐ ID

ENUMERATOR: RECORD END TIME FOR MODULE G: ☐☐ HOURS ☐☐ MINUTES