

2026-01-20

Adequate fruit or vegetable consumption and associated factors among young children aged 2-5 years in Waja town, North East Ethiopia, 2025.

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COLLEGE OF MEDICINE AND HEALTH SCIENCES

SCHOOL OF PUBLIC HEALTH

DEPARTMENT OF NUTRITION AND DIETETICS

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among young children aged 2-5 years in Waja town, North East
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PRINCIPAL INVESTIGATOR: Alie Mengesha Haile (BSc)

A RESEARCH THESIS SUBMITTED TO DEPARTMENT OF NUTRITION
AND DIETETICS SCHOOL OF PUBLIC HEALTH, IN PARTIAL
FULFILLMENT OF THE REQUIREMENTS FOR DEGREE OF MASTERS
OF SCIENCE IN PUBLIC HEALTH NUTRITION.

JANUARY, 2026

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ADEQUATE FRUIT OR VEGETABLE CONSUMPTION AND
ASSOCIATED FACTORS AMONG YOUNG CHILDREN AGED
2-5 YEARS IN WAJA TOWN, NORTH EAST ETHIOPIA, 2025.

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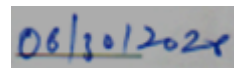
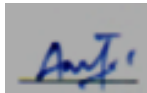
JANUARY, 2026

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DECLARATION

I hereby declare that this research thesis titled "Adequate fruit or vegetable consumption and associated factors among young children in Waja Town, Northeast Ethiopia", submitted in partial fulfillment of the requirements for the degree of Master of Science in Public Health Nutrition in the Department of Nutrition and Dietetics, Bahir Dar University, is my original work. This thesis has not been submitted to this or any other institution for any degree or certification. All source of information and support received during the course of this research have been duly acknowledged.

Alie Mengesha Haile



Name of the investigator

Signature

Date

APPROVAL SHEET

This is to certify that the thesis research titled “Adequate fruit or vegetable consumption and associated factors among young children in Waja Town, Northeast Ethiopia, 2025”, submitted by Alie Mengesha in partial fulfillment of the requirements for the degree of Master of Science in Public Health Nutrition at the Department of Nutrition and Dietetics, Bahir Dar University, has been reviewed and approved for oral defense.

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ACKNOWLEDGEMENT

First and foremost, I express my deepest gratitude to the Almighty God for granting me the strength, wisdom, and perseverance to undertake this research.

I am grateful to the Department of Nutrition and Dietetics, Bahir Dar University, for providing the necessary academic support. I extend my sincere appreciation to my advisors, Foziya Mohammed (MPH) and Genet Endalk (MPH), for their invaluable guidance, constructive feedback, and continuous support throughout the preparation of this thesis.

I would like to present my sincere appreciation to the data collectors, the administrative bodies of Waja Town, and the study participants for their cooperation and commitment during the data collection process. Finally, I am deeply indebted to my family, friends, and colleagues for their unwavering support, motivation, and encouragement throughout this academic journey.

LIST OF ABBREVIATIONS AND ACRONYMS

AOR-----	Adjusted odds ratio
CI-----	Confidence Interval
COR-----	Crude odds ratio
DALYs-----	Disability Adjusted Life Years
DHS-----	Demographic and Health Survey
EDHS-----	Ethiopian Demographic and Health Survey
FFQ-----	Food Frequency Questionnaire
G.C. -----	Gregorian calendar
HFIAS-----	Household Food Insecurity Access Scale
Km-----	Kilometer
MSc-----	Masters of Science
MPH-----	Masters of Public Health
NCDs-----	Non Communicable Diseases
NGOs-----	Non-Governmental Organizations
SPSS-----	Statistical Package for the Social Sciences
UK-----	United Kingdom
USA-----	United States of America
VIF-----	Variance Inflation Factor
WHO-----	World Health Organization
ZFV-----	Zero Fruit and Vegetable Consumption

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ABSTRACT

Background: Adequate fruit and vegetable consumption during early childhood plays a crucial role in preventing all forms of malnutrition, supporting optimal growth and development, and reducing the risk of NCDs later in life. Despite these benefits, children's intake often falls below recommended levels globally. In Ethiopia, no published study has specifically assessed adequate fruit or vegetable intake among young children aged 2-5 years, despite being a critical period to establish a healthy dietary habit. National data on zero fruit or vegetable consumption among children under two years indicate very low intake, suggesting that inadequate consumption may persist into the preschool years. However, evidence on the magnitude of adequate fruit or vegetable consumption and its associated factors among children aged 2-5 years remain limited.

Objective: The aim of this study was to assess adequate fruit or vegetable consumption and associated factors among young children in Waja Town, North east Ethiopia, 2025.

Methods: A community based cross sectional study was conducted from August 05 to September 01 2025 among mothers of young children aged 2-5 years living in Waja Town. A two stage cluster sampling technique was employed to select a total of 636 study participants and data on fruit and vegetable intake was collected using interviewer administered semi quantitative FFQ. Binary logistic regression was used; variables with $p < 0.25$ in bivariate analysis were included in multivariable analysis, and those with $p < 0.05$ were considered statistically significant. The direction and strength of association were interpreted using AOR at 95% confidence intervals.

Result: The prevalence of adequate fruit or vegetable consumption was 11.8 % (95% CI: 9.3-14.3%). Parental fruit and vegetable consumption [AOR =4.253, 95% CI (2.148, 8.423)], household food security status [AOR =0.257, 95% CI (0.105, 0.634)] and farm production diversification [AOR=2.566, 95% CI (1.266, 5.198)] were significantly associated with adequate fruit or vegetable consumption.

Conclusions and recommendations: The prevalence of adequate fruit or vegetable consumption among young children was very low. Therefore, responsible stakeholders should strengthen interventions that improve parental fruit and vegetable consumption, farm production diversification, and household food security.

Keywords: Adequate fruit or vegetable consumption, young children, Waja Town, Ethiopia

1. INTRODUCTION

1.1. BACK GROUND

Fruits and vegetables are the edible portions of plants including seed bearing structures, flowers, buds, leaves, stems, shoots, and roots that are consumed in their raw or minimally processed form, excluding starchy roots and tubers , mature dry legumes, and cereals unless harvested while immature (1). Fruit and vegetables are abundant sources of vitamins, minerals, fiber, and bioactive compounds vital for healthy growth and development, immune function (2) . In addition to providing essential nutrients, fruits and vegetables can influence dietary behaviors by displacing energy dense and nutrient poor foods, which are commonly associated with childhood overweight and obesity. Children who consume a higher proportion of fruits and vegetables are less likely to consume sugary snacks, fried foods, and processed products (3) (4) (5) (6) (7) .

Early childhood is a formative period for establishing food preferences and eating habits, and dietary behaviors adopted during this time often persist into later childhood, adolescence, and adulthood. Research has shown that children with higher fruit and vegetable consumption are more likely to maintain these dietary habits throughout their lives, which in turn reduces their risk of developing chronic diseases such as cardiovascular disease, type 2 diabetes, and certain cancers(8) (9) (10) . Despite the well-established benefits, evidence from multiple countries indicates that a high proportion of children fail to meet the recommended daily intake of fruits and vegetables. Globally, inadequate consumption is widespread, and this pattern contributes significantly to undernutrition ,hidden hunger and the rising prevalence of overweight and obesity among children(11) (12) .

Fruit and vegetable consumption in Ethiopia is very low (13) (14) (15) . Ethiopia's agricultural sector is predominantly cereal based, with fruits and vegetables contributing a smaller proportion to the overall production (16) . In Ethiopia, the per capita availability of fruits (30.1 g/day) and vegetables(32.1 g/day)(17) is extremely low compared with the Ethiopian FBDG recommendations (18) , insufficient to meet nutrient and fiber requirements. Different factors are associated with adequate fruit or vegetable consumption.

1.2. STATEMENT OF PROBLEM

Adequate fruit and vegetable consumption can help to prevent all forms of malnutrition including under nutrition, micro nutrient deficiency, overweight and obesity and reduce the risk of NCDs later in life (19) . However, despite these benefits, children's intake of fruits and vegetables often falls below the recommended levels globally (20) . Low fruit and vegetable intake is among the top ten selected risk factors for global mortality (21) . Approximately 16 million (1.0%) DALYs and 1.7 million (2.8%) of deaths worldwide are attributable to low fruit and vegetable consumption Moreover, micro nutrient deficiencies are responsible for approximately 3.9 million deaths (35% of total deaths) and 144 million DALYs (33% of total DALYs) in children under five(22) (23) .

Although no published study has specifically assessed the magnitude of adequate fruit or vegetable consumption among young children in Ethiopia, evidence from national studies on zero fruit or vegetable consumption indicates that the proportion of fruit or vegetable consumption among children Ethiopia ranges from 14.1 % to 30.7%, reflecting very low intake (15) (24) . Vegetable non consumption among under five children was particularly high in Afar, Tigray, Amhara, and Addis Ababa, while relatively lower levels were observed in the Southern Nations, Nationalities, and Peoples' Region, Dire Dawa, and Oromia; similarly, fruit non consumption was highest in Tigray and Afar and lowest in Harari (25) .

Besides promoting fruit and vegetable consumption through the NNP and FBDG, Ethiopia has implemented Horti Life Project Phase I, II, and III in collaboration with different stakeholders to increase dietary diversity, rural income and job (26) . In developed countries, interventions to improve fruit and vegetable intake among under five children include subsidies for low income families, school food policies, public health campaigns, and regulations requiring health messages in food advertising (27) .

Despite the critical role of fruits and vegetables in child health and nutrition, research focusing specifically on fruit and vegetable consumption remains limited in Ethiopia. Most of the studies in Ethiopia have focused on dietary diversity as a general indicator of nutritional status, there remains a notable lack of research specifically examining the consumption of fruits and vegetables. Dietary diversity, although valuable, may not fully capture the specific factors

affecting the consumption of key food groups like fruits and vegetables, which are crucial for meeting children's micro nutrient needs.

Moreover, among the limited literature s published on fruit and vegetable consumption in Ethiopia most of them give more emphasis to fruit and vegetable consumption of adults. However, early childhood fruit and vegetable consumption pattern has a significant impact on the child's fruit and vegetable consumption later in life. Early childhood offers a cost effective window for nutrition intervention, as behaviors established during this period have long term impacts. Research in this age group is essential to identify barriers and guide preventive strategies before unhealthy dietary habits become firmly established. Early childhood is also a critical period of steady growth and development that requires adequate fruit and vegetable intake to provide essential vitamins and minerals, preventing growth faltering, infections, and cognitive delays. Additionally, most previous studies on fruit and vegetable consumption among children in Ethiopia rely on secondary data sources, particularly the DHS. Although these studies are useful for estimating the prevalence of fruit or vegetable consumption and identifying zero consumption, they provide limited detail on intake quantity and adequacy.

Besides, this research used semi quantitative FFQ, to not only capture frequency but also to provide data on portion sizes, offering a more comprehensive understanding of actual intake. Even though the study area is characterized by monotonous agricultural production, fruit and vegetable consumption has remained largely unexplored. Understanding the extent of the problem in such a vulnerable setting is crucial for designing targeted interventions. Given the vital role fruits and vegetables play in child health and development, this study helps to provide a snapshot of habitual consumption and identify factors associated with adequate fruit or vegetable consumption.

1.3. SIGNIFICANCE OF THE STUDY

This study provide useful information about the magnitude of the problem. Besides, by identifying associated factors it also provide useful information for the Amhara regional health bureau and NGOs working in Waja Town. In addition, the findings serve as baseline data for researchers conducting future studies on adequate fruit or vegetable consumption among young children.

2. LITERATURE REVIEW

2.1. GLOBAL LEVEL FRUIT AND VEGETABLE CONSUMPTION AMONG YOUNG CHILDREN

Studies conducted worldwide reveal considerable heterogeneity in fruit and vegetable consumption among young children, with intake patterns and their associated determinants varying across socio cultural and environmental contexts. For instance, a Malaysian study among children aged 1-6 years reported that only 11.7% of children met the recommended fruit intake, and 15.8% met vegetable recommendations (28) . Similarly, an Australian study of preschoolers aged 3-5 years found that the mean fruit and vegetable consumption was 14.8%, indicating low adherence to dietary guidelines (29) . In Tanzania, nearly half of children (48.34%) did not consume any fruits or vegetables, highlighting a high prevalence of zero intake (30) .

In contrast, a study in the Czech Republic reported that only 22% of children achieved a total daily intake of five or more servings of fruits and vegetables (31) , while a study among Polish preschool children observed a higher proportion, with 49.2% meeting the recommended intake (32). Furthermore, findings from Saudi Arabia showed that 59.3% of children met the vegetable recommendation and 35.7% met the fruit recommendation (33) , reflecting higher adherence compared to the studies from Malaysia, Czech Republic, and Poland . Likewise, data from the United States indicated that 68% of children aged 1-5 years consumed fruit daily, and 51% consumed vegetables daily (34) . Conversely, a study in Ireland among children aged 1-4 years reported exceptionally high consumption, with 98% of children consuming fruit and 90% consuming vegetables at least once (35) , highlighting substantial variation across countries.

In summary, the body of evidence from the above studies underscores a global concern regarding sub optimal fruit and vegetable consumption. Despite variations in study tools, and sample size and sample population, most of the findings showed that fruit and vegetable intake among under five children remained low worldwide.

2.2. ETHIOPIAN CONTEXT OF FRUIT AND VEGETABLE CONSUMPTION

Fruit and vegetable consumption remained sub optimal in Ethiopia. Some studies, both primary and secondary, consistently demonstrated a low intake of fruits and vegetables in the country. A secondary analysis of DHS data from East Africa found that the prevalence of ZFV consumption among children aged was 52.3%, with Ethiopia recording the highest rate at 85.9% (24) . Another nationwide community based study covering nine regions and two administrative cities found that 38.1% of children did not consume vegetable and 36.5% did not consume any fruit (25) . A secondary analysis of the 2016 EDHS found that among children aged 6-59 months, only 17.4% consumed vitamin A-rich fruits and vegetables, and just 13.9% consumed other fruits and vegetables, highlighting persistently low fruit and vegetable intake even at the national level (14) . A study in Merhawi, Amhara region, found that although 91.7% of children achieved good dietary diversity, only 29.8% and 34.8% consumed fruits and vegetables respectively (36) . This emphasizes that good dietary diversity does not necessarily equate to sufficient fruit and vegetable intake, possibly due to the heavy reliance on cereals and limited inclusion of fruits and vegetables in the daily diet. In conclusion, fruit and vegetable consumption in Ethiopia remains markedly low. Moreover, while some national assessments exist, the availability of studies specifically focused on adequate fruit or vegetable consumption among children is limited, underscoring the need for more targeted research to improve fruit and vegetable intake in this age group.

2.3. FACTORS ASSOCIATED WITH FRUIT AND VEGETABLE CONSUMPTION

2.3.1. Socio demographic and economic factors

According to the different studies reviewed ; sex of the household head, household wealth index, maternal education ,maternal employment, household size, household food security status were the socio demographic and economic factors associated with fruit and vegetable consumption (15) (24, 30) (37) (38) . Children from female headed households were more likely to not consume any fruit or vegetable than compared to their counterparts (24) (30) . In Tanzania, children whose mothers had only primary education were more likely to not consume any fruits or vegetables compared to those whose mothers had no formal education (30), while in East Africa, children whose mothers had primary, secondary, or higher education were less likely to not consume any fruit or vegetable compared to those whose mothers had no education (24) . Children from middle and high income households had higher odds of not consuming any fruit or vegetable compared with those from poor households (30) . In contrast, evidence from East Africa shows that not consuming any fruit or vegetable is more common among the poorest children, while fruit and vegetable consumption is higher among children from the richest households (24) . Children with employed mothers were less likely to not consume any fruit or vegetable (30) (37) . Not consuming any fruit or vegetable was 1.3 times more likely among children living in large households compared to children living in smaller households (24) . Studies in UK and USA reported that food insecure respondents consumed fruits and vegetables fewer times per day than food secure respondents (38) (39) .

2.3.2. Maternal and child related factors

Different studies on conducted on children fruit and vegetable consumption reported that birth interval, child's age ,media exposure, parental fruit and vegetable consumption were associated with fruit and vegetable intake (15) (24) (30) (37) (29) . Older children had lower odds of not consuming any fruit or vegetable compared with younger children (15) (30) (37) .Not consuming any fruit or vegetable was less likely among children with longer birth intervals compared with those with shorter birth intervals (24) . Children whose mothers had media exposure had lower odds of not consuming any fruit or vegetable than those from mothers with no media exposure

(30) (37). Children whose parents frequently consumed fruits and vegetables also had better fruit and vegetable intake than their counter parts (29) (40) .

2.3.3. Environmental factors

Studies show that availability and accessibility of fruits and vegetables are key environmental factors influencing children's fruit and vegetable intake, with higher availability and accessibility linked to greater consumption (29) (41) .

2.3.4. Agricultural factor

Studies reported that farm production diversification was associated with fruit and vegetable intake (42) (43) .

2.4. CONCEPTUAL FRAME WORK OF ADEQUATE FRUIT OR VEGETABLE CONSUMPTION

This is the conceptual framework of adequate fruit or vegetable consumption which includes socio demographic and economic, maternal and child health characteristics, environmental, agricultural factors adopted after exploring different literatures published on fruit and vegetable consumption.

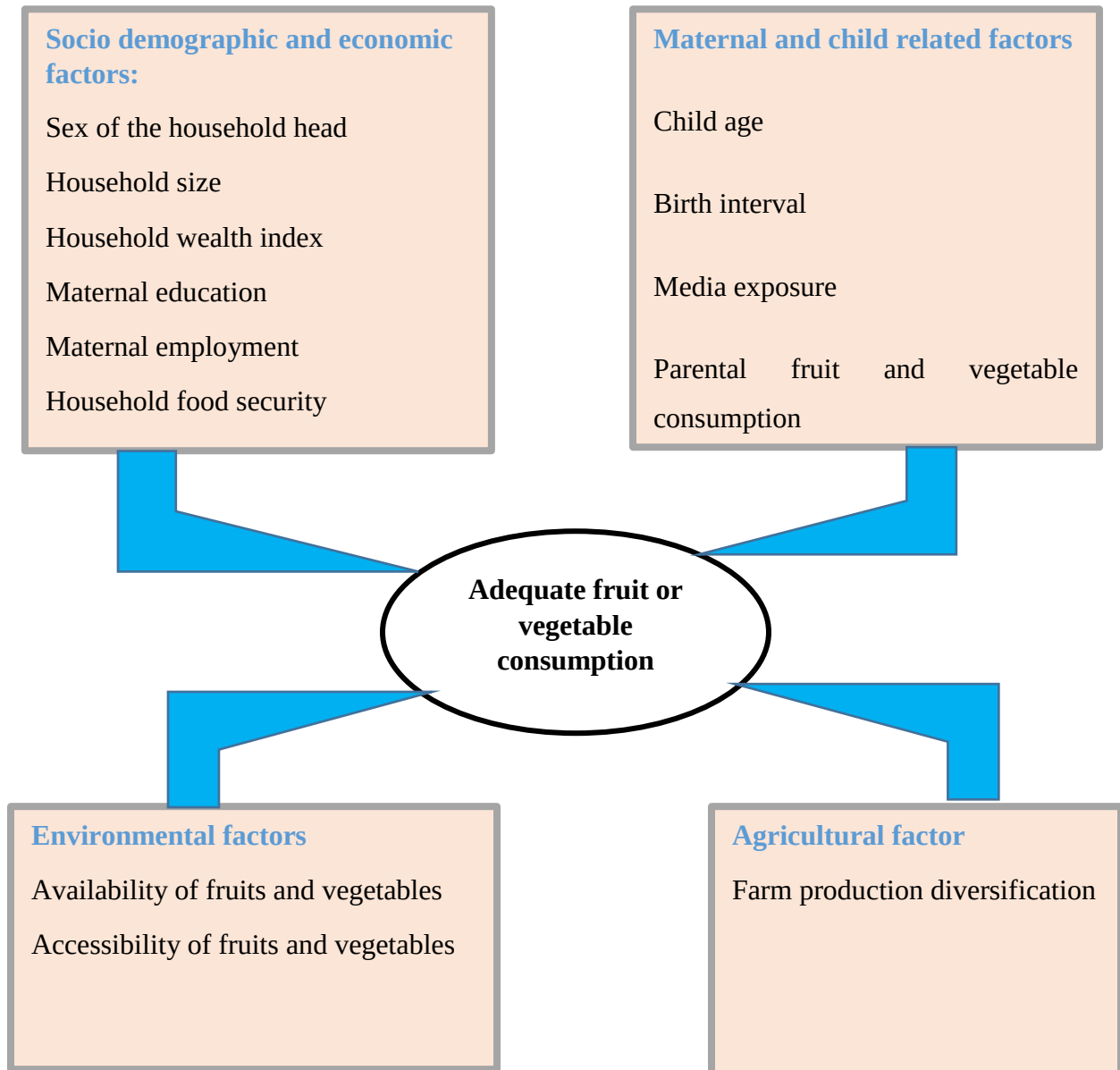


Figure 1: Conceptual framework of adequate fruit or vegetable consumption (15) (24) (29) (30) (37) (38) (39) (40) (41) (42, 43)

3. OBJECTIVES

3.1. GENERAL OBJECTIVE

- To assess adequate fruit or vegetable consumption and associated factors among young children in Waja Town, Northeast Ethiopia, 2025.

3.2. SPECIFIC OBJECTIVES

- To determine the prevalence of adequate fruit or vegetable consumption among young children in Waja Town, Northeast Ethiopia, 2025.
- To identify factors associated with adequate fruit or vegetable consumption among young children in Waja Town, Northeast Ethiopia, 2025.

4. METHODS AND MATERIALS

4.1. STUDY AREA AND PERIOD

Waja town is located in the Amhara region of Northeast Ethiopia, approximately 580 km from Addis Ababa. Waja is situated at an elevation of 1469 meters above sea level, with geographical coordinates of 12.28534° or 12° 17' 7" north and 39.6009° or 39° 36' 3" east (44) . The town has nine kebeles with a total number of 37,040 households and it is home to 12 private clinics and one government health center that provide health care services to the local population (45) . Waja's agricultural practices support the production of a variety of fruits and vegetables, including mango, banana, papaya, lemon, orange, bitter orange, avocado, guava, watermelon, kale, beetroot, carrot, and pumpkin. The study was conducted over a period of one month from August 05 to September 01, 2025.

4.2. STUDY DESIGN

A community based cross sectional study was conducted to assess adequate fruit or vegetable consumption and associated factors among young children in Waja Town, Northeast Ethiopia, 2025.

4.3. POPULATION

4.3.1. Source population

- The source population was all young children aged 2-5 years living in Waja Town.

4.3.2. Study population

- The study population was all young children aged 2-5 years living in the randomly selected kebeles of Waja Town.

4.4. ELIGIBILITY CRITERIA

4.4.1. Inclusion criteria

- Children aged 2-5 years who had resided in Waja Town for at least six months and whose mother or guardian was willing to participate in the study.

4.4.2. Exclusion criteria

- Children or caregiver with severe illness.

4.5. SAMPLE SIZE DETERMINATION

To determine the appropriate sample size for this study, the following considerations were taken into account: the prevalence of adequate fruit or vegetable consumption, the desired level of precision, design effect, margin of error. The sample size for single population was estimated using the standard formula:

$$n_o = (Z_{\alpha/2})^2 * p * (1-p) / d^2$$

Where; Z= 1.96 (for a 95% confidence level)

p = 50% (since there is no previous study)

$$n_o = (1.96)^2 * (0.5) * (0.5) / (0.05)^2 = 385$$

d = 5% (margin of error)

Considering the two stage cluster sampling design, a design effect of 1.5 was applied to adjust for clustering and, after accounting for a 10% nonresponse rate, the final sample size was set at 636 to ensure adequate representation.

4.6. SAMPLING TECHNIQUE

Multi stage sampling technique was employed to select the study participants. Waja Town has nine kebeles, of which three kebeles were randomly selected using a lottery method. Although the total number of households in each kebele was available from kebele administrative records, information on the presence of children aged 2-5 years within households was not available. Therefore, prior to the actual data collection, a household listing was conducted in the selected kebeles to identify households with at least one child aged 2-5 years. Based on this listing, a sampling frame of eligible households was prepared, and the total sample size was proportionally allocated to each kebele. Households were then selected using systematic random sampling. In households with more than one eligible child, one child was selected randomly.

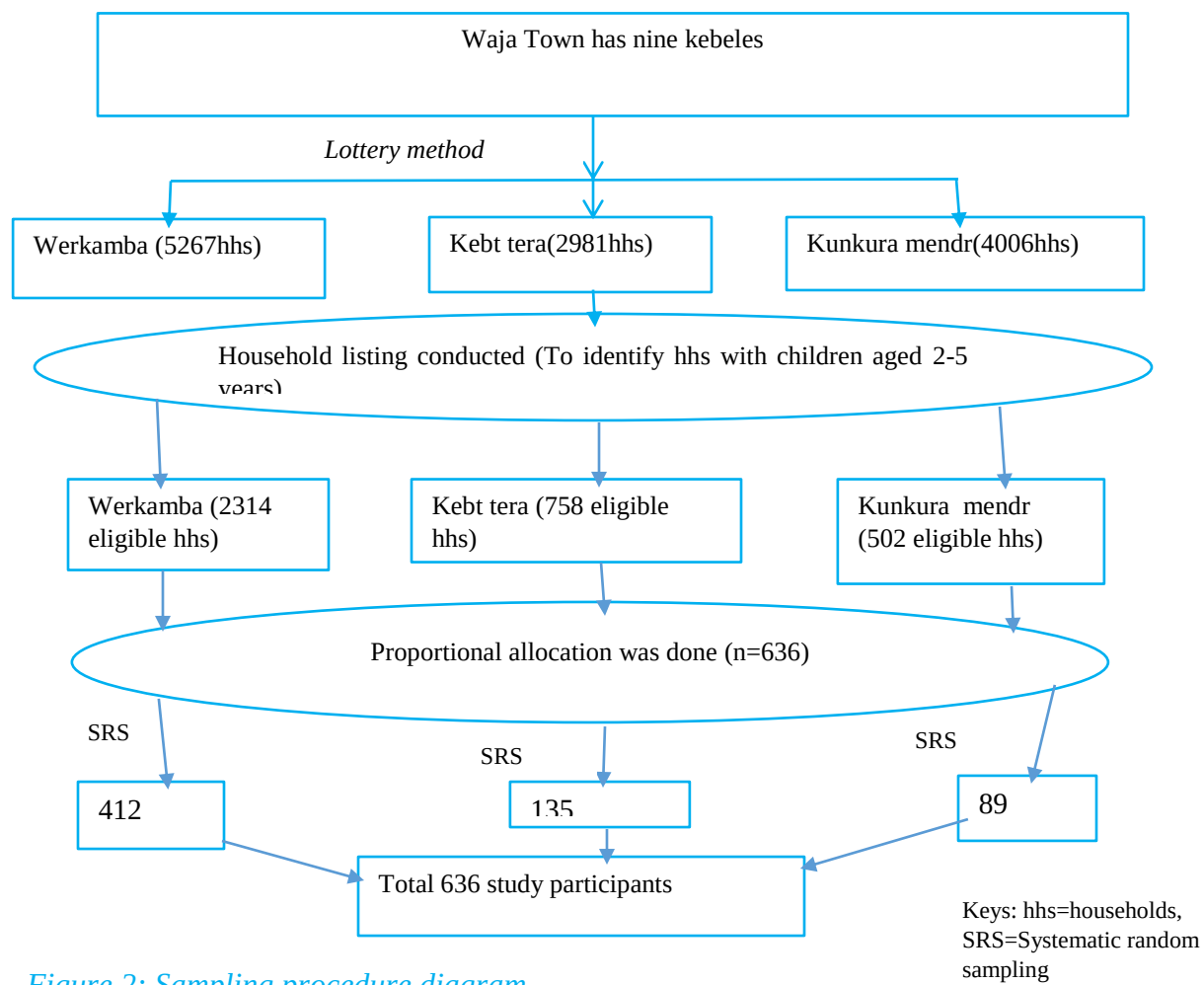


Figure 2: Sampling procedure diagram

4.7. VARIABLES

4.7.1. Dependent variable: Adequate fruit or vegetable consumption (Yes/No)

4.7.2. Independent variables:

Socio demographic and economic factors: Sex of the household head, household size, household wealth index, maternal education, maternal employment, household food security status.

Maternal and child related factors: Child age, birth interval, media exposure, parental fruit and vegetable consumption.

Environmental factors: Availability of fruit and vegetable, accessibility of fruit and vegetable.

Agricultural factor: Farm production diversification.

4.8. OPERATIONAL AND TERM DEFINITION

4.8.1. Term definition

Fruit: Refer to edible plant parts containing seeds and pulpy tissue, usually sweet or tart, consumed in raw or minimally processed form. In this study, fruits included are; banana, orange, avocado, papaya, watermelon, lemon, guava, mixed fruit juice. Processed or ultra-processed fruit products such as packaged juices, sweetened fruit drinks, jams, and canned fruits with added sugar were excluded (1) .

Vegetable: Refers to edible plant parts, including leaves, stems, roots, bulbs, flowers, and immature legumes or cereals, consumed fresh or minimally processed. In this study, vegetables include are: Kale, cabbage, beetroot, carrot, pumpkin, lettuce salad, mixed vegetable, immature corn. Starchy roots and tubers, dry legumes and pulses, cereals, nuts, oilseeds, spices used in small quantities, and processed or ultra-processed vegetable products with added ingredients were excluded (1) .

Lettuce salad: is defined as a dish consisting of tomato, onion, and lettuce, pepper.

Mixed vegetable: is defined as a dish consisting of cabbage, carrot, onion, and pepper

Young children: Refer to individuals within the early stages of childhood, typically aged from 2 to 5 years old (46).

4.8.2. Operational definition

Household wealth index: Calculated using principal component analysis and categorized into poor, middle, rich (24) .

Adequate fruit or vegetable consumption: Was calculated as the average of consumption over the preceding three days and subsequently classified as adequate or inadequate based on a daily intake of 100-150 grams of fruits or 75-100 grams of vegetables for young children (46).

Media exposure: Mother who listened to the radio, watched television, or read newspapers or magazines at least once a week; those who did not were considered to have no media exposure (30).

Parental fruit and vegetable consumption: Categorized as poor (0-3 days/week), good (4-7 days/week) (34).

Household food security status: Measured using the HFIAS and categorized into food secure, mildly, moderately, and severely food insecure (47).

Farm production diversification: Measured using a production diversity score, and categorized in to poor and good (48).

Household size: Categorized as small (1-4 members), medium (5-6 members), and large (7 or more members) (24) .

Accessibility of fruits and vegetables: Assessed using a composite score and categorized into poor , medium , and good (49).

Availability of fruits and vegetables: Assessed using a composite score and categorized in to poor and good (49).

4.9. DATA COLLECTION PROCEDURES AND TOOLS

Households with eligible young children was identified, and informed consent was obtained from mothers or caregivers before data collection begins. To ensure comprehensive data collection, two data collection tools were utilized. Fruit and vegetable consumption was assessed using a three day semi quantitative FFQ. The semi quantitative FFQ was translated into Amharic and included a list of commonly consumed fruits and vegetables in the study area. Mothers or caregivers were asked to report how often their child consumed each listed item over the last three days, along with the estimated portion size.

Portion sizes was estimated using locally relevant calibrated household measures such as bowls, plates, ladles, spoons, and glasses aided by photographs of the food items. Prior to household data collection, each portion of the listed fruits and vegetables was prepared and weighed using digital kitchen and spoon scales to establish gram equivalents for converting household estimates into grams.

In addition, Amharic version structured questionnaire was prepared to collect data on factors associated with adequate fruit or vegetable consumption .Data collection was conducted by six trained data collectors with nutrition background under the supervision of the investigator and one another senior nutritionist .Data was collected using Kobo Toolbox .Data collectors visited selected households in Waja Town and administered the questionnaires through face to face interviews.

4.10. DATA QUALITY CONTROL

The questionnaire was developed in English and then translated into Amharic, followed by a back translation into English to ensure consistency. A pretest was conducted with 5% of the sample size in Kobo town that has similar characteristics to the study area. The pretest revealed ambiguities in some dietary questions, challenges in portion size estimation, and identified fruits that were either not commonly consumed in the study area or unavailable during the data collection season; consequently, these items were excluded and the questionnaire was refined accordingly. Data collectors and supervisors underwent a training that covers the study's objectives, data collection procedures, ethical considerations, and the proper use of the electronic data collection tool. Supervisors conducted daily spot checks and monitor interviews to ensure the quality of the data. The electronic tool included built in validation checks to minimize missing data. To ensure accurate portion size estimation, all measuring devices including digital kitchen scale, digital spoon scale and commonly used household utensils were calibrated before data collection.

4.11. DATA PROCESSING AND ANALYSIS

The data were coded, entered, cleaned, and analyzed using SPSS. Descriptive statistics, including proportions, frequencies, pie chart were used. Binary logistic regression was conducted to identify factors associated with adequate fruit or vegetable consumption. Variables with a p-value < 0.25 in the bivariable analysis were included in the multivariable logistic regression model to control for potential confounders. In the multivariable analysis, a p-value < 0.05 was considered statistically significant. The results were presented using COR and AOR with their corresponding 95% CI. Multicollinearity was assessed for all independent variables using VIF, and no multicollinearity issues were detected (all VIF < 5). The Hosmer and Lemeshow test indicated good model fit ($p = 0.448$).

4.12. ETHICAL CONSIDERATIONS

This research was conducted based on the ethical principles as outlined in the Declaration of Helsinki, ensuring that all aspects of the study meet standards for medical research involving human participants. Before commencing, ethical approval was obtained from the Ethical Review Board of Bahir Dar University, College of Medicine and Health Sciences .A formal letter of permission to conduct the study was also obtained from the administrative body of Waja Town. Informed consent was obtained from the parents or guardians. All information was treated with strict confidentiality, and data were anonymized and stored securely. Every effort was made to minimize any discomfort, or risk to the participants. The study involved noninvasive procedures, and participants were informed of their right to withdraw from the study at any time without facing any negative consequences. Additionally, all interactions with participants were conducted with respect and care throughout the study process.

5. RESULT

5.1. SOCIO DEMOGRAPHIC AND ECONOMIC CHARACTERISTICS

A total of 619 households participated in the study, with a response rate of 97.3%. Most households were male headed (90.3%), of medium wealth (47.5%), and small in size (57.2%). Regarding food security, 28.1% of households were food secure, while 71.9% experienced food insecurity. Among mothers, 61.2% had no formal education, only 0.6% had higher education, and the majority were housewives (79.0%), with very few government employed (0.5%).

Table 1: Socio demographic and economic characteristics of respondents in Waja Town, North east Ethiopia, 2025(n=619)

Variable	Category	Frequency	Percentage (%)
Sex of the household head	Male	559	90.3
	Female	60	9.7
Wealth index	Poor	182	29.4
	Medium	294	47.5
	Rich	143	23.1
Household size	Small	354	57.2
	Medium	245	39.6
	Large	20	3.2
Household food security status	Food secure	174	28.1
	Mildly food insecure	177	28.6
	Moderately food insecure	113	18.3
	Severely food insecure	155	25
Maternal education	No formal education	379	61.2
	Primary school	158	25.5
	Secondary school	78	12.6
	Higher	4	0.6
Maternal employment	Housewives	489	79.0
	Government employed	3	0.5
	Self employed	68	11
	Daily laborer	59	9.5

5.2. CHILD AND MATERNAL CHARACTERISTICS

Regarding the age of the children, the largest proportion were aged 5 years (40.2%), while a smaller proportion were aged 2 years (3.4%). Concerning birth interval, 67.2% of the children had a short birth interval, whereas 32.8% had a long birth interval. Regarding to maternal media exposure, half of the mothers (50.4%) had media exposure. In terms of parental fruit and vegetable consumption, the majority of parents (88.9%) had poor fruit and vegetable consumption, while only 11.1% had good consumption.

Table 2: Child and maternal characteristics of respondents in Waja Town, Northeast Ethiopia, 2025(n=619)

Variable	Category	Frequency	Percentage (%)
Age of the child	2	21	3.4
	3	108	17.4
	4	241	38.9
	5	249	40.2
Birth interval	Short	416	67.2
	Long	203	32.8
Media exposure	Yes	312	50.4
	No	307	49.6
Parental fruit and vegetable consumption	Poor	550	88.9
	Good	69	11.1

5.3. ENVIRONMENTAL FACTORS

The majority of households (59.8%) reported good availability of fruits and vegetables, whereas 40.2% experienced poor availability. In terms of accessibility, 37.5% of households had medium access, while 28.1% had good access.

Table 3: Environmental characteristics of the respondents in Waja Town Northeast Ethiopia, 2025(n=619)

Variable	Category	Frequency	Percentage (%)
Availability of fruits and vegetables	Poor	249	40.2
	Good	370	59.8
Accessibility of fruits and vegetables	Poor	213	34.4
	Medium	232	37.5

	Good	174	28.1
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5.4. AGRICULTURAL FACTOR

A majority of households (64.1%) exhibited a good farm production diversification, whereas 35.9% had low diversification.

Table 4: Agricultural characteristics of respondents in Waja Town, Northeast Ethiopia, 2025 (n=619)

Variable	Category	Frequency	Percentage (%)
Farm production diversification	Poor	222	35.9
	Good	397	64.1

5.5. PROPORTION OF ADEQUATE FRUIT OR VEGETABLE CONSUMPTION

A total of 619 mothers participated in the study. Among their children, the prevalence of adequate fruit or vegetable consumption was 11.8 % (95% CI: 9.3-14.3%).

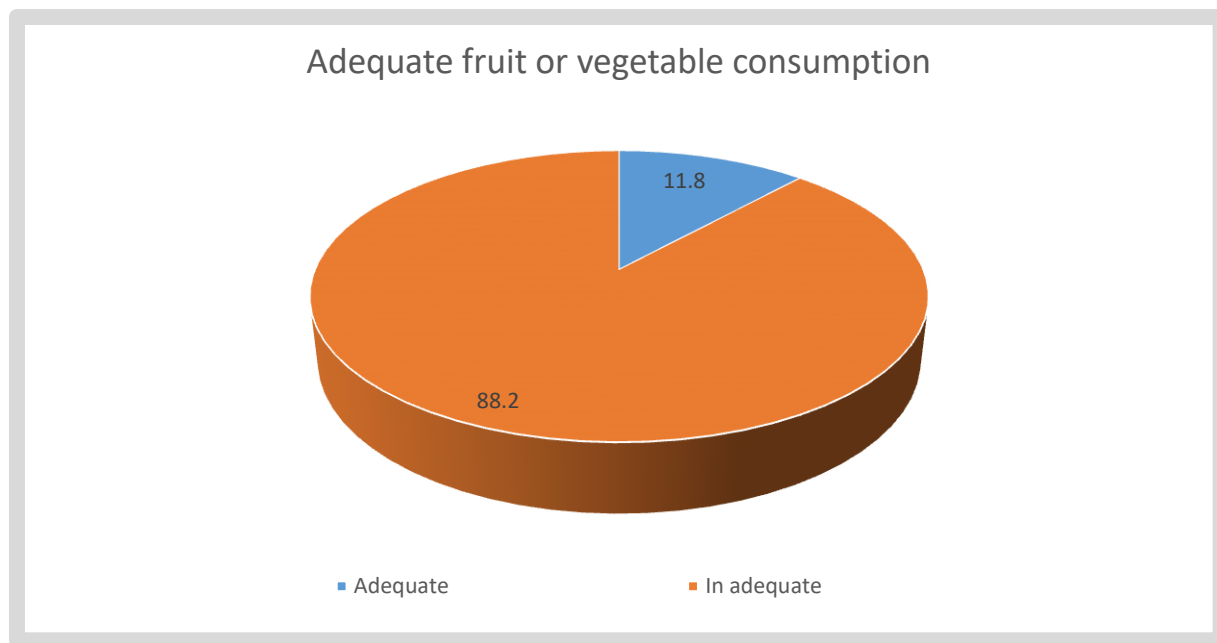


Figure 3: Prevalence of adequate fruit or vegetable consumption among young children in Waja Town, North east, Ethiopia, 2025

5.6. FACTORS ASSOCIATED WITH ADEQUATE FRUIT OR VEGETABLE CONSUMPTION

All variables in the bivariable logistic regression which had $p < 0.25$ were entered to the multivariable logistic regression analysis. Multivariable logistic regression analysis was conducted to control for potential confounders and determine the independent effect of each predictor on adequate fruit or vegetable consumption. In bivariable regression availability of fruits and vegetables, accessibility of fruits and vegetables, farm production diversification, household food security, wealth index, parental fruit and vegetable consumption were the factors associated with adequate fruit or vegetable consumption.

In the multivariable analysis parental fruit and vegetable consumption, household food security and farm production diversification were associated with adequate fruit or vegetable consumption among young children. Children whose parents had good fruit and vegetable consumption had 4.25 times higher odds of consuming adequate fruit or vegetable compared with children whose parents had poor fruit and vegetable consumption (AOR(95 % CI) = 4.253 (2.148,8.423)).

Similarly, children from households with good farm production diversification had 2.57 times higher odds of adequate fruit or vegetable consumption than those from households with poor farm production diversification AOR (95 % CI) = 2.566(1.266, 5.198). Regarding household food security, children from severely food insecure households had 74.3% lower odds of consuming adequate fruit or vegetable compared with children from food secure households AOR(95% CI =(0.105,0.634).

Table 5: Bivariable and multivariable logistic regression analysis of factors associated with adequate fruit or vegetable consumption among young children in Waja Town, Northeast, Ethiopia, 2025 (n=619)

Variables	Categories	Adequate	Inadequate	COR (95% CI)	AOR (95% CI)
Wealth index	Poor	13	169	1	1
	Medium	41	253	2.107(1.096,4.050)*	1.783(0.833,3.815)
	Rich	19	124	1.992(0.948,4.186)*	1.757(0.743,4.152)
Food security status	Food secure	31	143	1	1
	Mild food insecure	22	155	0.655(0.362,1.183)*	0.850(0.422,1.711)
	Moderate food insecure	13	100	0.600(0.299,1.203)*	0.664(0.310,1.423)
	Severely food insecure	7	148	0.218(0.093,0.511)*	0.257(0.105,0.634)**
Parental fruit	Poor	53	497	1	1

and vegetable consumption	Good	20	49	3.827(2.117,6.920)*	4.253(2.148,8.423)**
Accessibility of fruits and vegetables	Poor	27	186	1	1
	Medium	32	200	1.102(0.636,1.910)	1.213(0.64,2.299)
	Good	14	160	0.603(0.306,1.189)*	0.583(0.259,1.311)
Availability of fruits and vegetables	Poor	21	228	1	1
	Good	52	318	1.775(1.040,3.030)*	1.282(0.718,2.290)
Farm production diversification	Poor	14	208	1	1
	Good	59	338	2.593(1.412,4.762)*	2.566(1.266,5.198)**

Note: * Included in multivariable model based on bivariate $p < 0.25$. ** Significant at $p < 0.05$.
1= reference Group, COR= crude odds ratio, AOR= adjusted odds ratio, CI= confidence interval.

6. DISCUSSION

The present study revealed a very low prevalence of adequate fruit or vegetable consumption among young children in Waja Town, indicating a substantial gap between the Ethiopian FBDG recommendations and actual child feeding practices. If this nutritional gap persists, the children may be at risk for several nutritional problems such as, linear growth faltering (50) , micronutrient deficiencies, childhood obesity, and NCDs later in life (51) .

The observed low prevalence of adequate fruit or vegetable consumption among young children in Waja Town is attributed to parental fruit and vegetable consumption, household food insecurity, and farm production diversification. Parental fruit and vegetable consumption was strongly associated with children's adequate fruit or vegetable intake; however, the majority of parents (88.9%) had poor fruit and vegetable consumption, likely limiting both household availability and positive dietary role modeling. In addition, the high burden of household food insecurity in the study area, with 71.9% of households experiencing some level of food insecurity, may explain the low adequate fruit or vegetable intake, as limited resources often lead

households to prioritize inexpensive, energy dense staple foods over nutrient dense foods like fruits and vegetables. Farm production diversification was another important factor influencing children's adequate fruit or vegetable intake. In the present study, approximately 40% of households had poor farm production diversification, indicating limited farm variety. Households with limited farm diversity tend to rely heavily on markets for fruits and vegetables, where prices may fluctuate seasonally and availability may be inconsistent. In contrast, diversified farm production can enhance year round access to a variety of foods, reduce dependence on markets, and increase the likelihood that fruits and vegetables are incorporated into household diets. Collectively, these factors create a constrained environment that plausibly explains the very low level of adequate fruit or vegetable consumption observed in Waja Town.

In contrast to this study finding, several other countries have reported substantially higher prevalence of adequate fruit or vegetable intake. For instance, Saudi Arabia documented adequate fruit or vegetable intake of 95% (33), which is markedly higher than the prevalence observed in Waja Town. Similarly, Poland reported an adequate fruit or vegetable intake prevalence of 49.2%, nearly four times higher than the current study (32) . However, the difference is less pronounced when compared with countries reported low prevalence like Malaysia (17.5%) (28) . The discrepancies may be due to socioeconomic factors, cultural dietary preferences, caregiver nutrition knowledge.

The negative association observed in this study, where children from severely food insecure households had lower odds to consume adequate fruit or vegetable than children from food secure households, is parallel with evidence from other settings. In the USA, studies among children have shown that those living in severe food insecure households consume significantly fewer fruits and vegetables than their food secure counterparts (39) . Similarly, evidence from the UK showed that an increment in food security score is associated with lower likelihood of consuming fruits and vegetables regularly (38) . The positive association showed in this study, where children whose parents have good fruit and vegetable consumption were over four times more likely to consume adequate fruit or vegetable is consistent with existing published literatures. Australian research among preschool children reported that good parental fruit and vegetable consumption was positively associated with adequate fruit and vegetable intake (29). In addition, a study from Poland reported that good parental fruit and vegetable consumption was

associated with increased intake of fruits and vegetables among their children (32), showing the influence of parental dietary habits on children's dietary behaviors. The association reported in this study between farm production diversification and adequate fruit or vegetable consumption among children is consistent with evidence from other settings. Research from Zimbabwe demonstrated that households with good farm production diversification reported higher frequency of fruit intake (42). Similarly, a study in Nepal found a significant association between agricultural diversity and child dietary diversity, particularly for fruits and vegetables (52).

7. LIMITATION OF THE STUDY

As a data collection tool semi quantitative FFQ has several limitations. Reported consumption may be affected by social desirability bias, and measurement errors could have occurred during the calibration of utensils and weighing of food items. Additionally, intake may vary due to seasonal changes in fruit and vegetable availability. The cross sectional design of the study also limits the ability to establish causal relationships. Furthermore, conducting the study in a single town may reduce its external validity and limit the generalizability of the findings to other settings.

8. CONCLUSION

The study revealed that overall adequate fruit or vegetable consumption was very low. The vast majority of young children in the area didn't meet the recommendations of the Ethiopian Food Based dietary Guideline (2022), which represents a significant public health concern. The factors significantly associated with adequate fruit or vegetable consumption were household food security status, parental fruit and vegetable consumption, farm production diversification. This study findings highlights the need for targeted interventions to improve fruit and vegetable intake among young children in the study setting.

9. RECOMMENDATIONS

Based on the findings of the study on adequate fruit or vegetable consumption among young children in Waja Town, Northeast Ethiopia, the following recommendations are suggested:

For parents and caregivers

- Parents and caregivers should be educated on the importance of modeling healthy eating behaviors, as children often adopt the eating habits of their caregivers. This education should be provided during visits to Waja health center or community based nutrition education programs should be organized and implemented by the Waja Town Health Office.

For agricultural and extension services

- Facilitate the construction of a large communal water reservoir during the rainy season to store water for use during the dry season, thereby enhancing household food security and farm production diversification.

For local health authorities and nutrition programs

- Integrate fruit and vegetable promotion into existing maternal and child health services to reinforce healthy eating from early childhood.

For researchers

- Conduct longitudinal or interventional studies to explore causal relationships and evaluate strategies to improve fruit and vegetable consumption.

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11. APPENDICES

APPENDIX I: ENGLISH VERSION CONSENT FORM

Dear Respondent,

Good morning or afternoon! My name is **Alie Mengesha**, and I am a student at **Bahir Dar University**, School of Public Health, Department of Nutrition and Dietetic. I am conducting research in fulfillment of the requirements for my **MSc degree**, titled **"Adequate fruit or Vegetable Consumption and Associated Factors among Young Children in Waja Town, Northeast Ethiopia**. "Fruit and vegetable consumption is essential for the overall health and wellbeing of children. You have been randomly selected to participate in this study, and your involvement is highly valuable. If you agree to participate, you will be one of the 636 **participants**, and the data collection process will take approximately 20-30 minutes. Your participation is entirely voluntary, and you may withdraw at any time without any consequences. No personally identifiable information, such as your name, will be recorded, and all responses will be treated with strict confidentiality. The data collected will be used solely for research purposes, and your insights will contribute significantly to improving child health and nutrition. If you have any questions or require further clarification before deciding to participate, please feel free to ask. Your contribution is essential to the success of this study, and your participation will be greatly appreciated.

Would you be willing to participate? Yes_____

No_____

The data collectors' Name_____

Signature_____

Date_____

APPENDIX II ENGLISH VERSION QUESTIONNAIRE

1. Household socio demographic and economic Factors

Questions	Response
Q1. What is the sex of the head of the household?	1.Female 2.Male
Q2.what is your current employment type?	1.Housewives 2. Government employed 3.Self employed 4. Daily laborer 5.Other
Q3.What is your education level?	1.Noformal education 2.Primary School 3.Secondary School

	4. Higher
Q4.How many people usually live in your household that is, people who have lived here for at least the past 6 months and share meals and living arrangements (exclude visitors or temporary guests)?	Number[----- ---]

Household wealth Index questionnaire

Housed hold assets and housing condition			Skip
301.	Who is the owner of the house you live?	1.private 2.rent 3. Other_____	
302	What is the main construction materials used in exterior walls?	1.cement 2.wood with mud 3.other(specify)_____	
303	What is the main construction material used for the roof?	1.cement/concrete 2. Corrugated iron/metal 3.other(specify)	
304	What is the main construction material used for the floor of	1.Mud 2.sand 2.Cement 5.Ceramic	

	your house?		
305	Did you have a separating room for sleep?	1. Yes 2. No.	
306	Did you have a separating room for kitchen?	1. Yes 2. No	
307	Did you have a separate room for Shower and toilet?	1. Yes 2. No	
30	Please tell me if your household has any of the following	2. Clock/watch 1. Yes 2. No 3. Radio 1. Yes 2. No 4. Television 1. Yes 2. No 5. Mobile phone 1. Yes 2. No 6. Home phone 1. Yes 2. No 7. Refrigerator 1. Yes 2. No 8. Chair 1. Yes 2. No 9. Sofa 1. Yes 2. No 10. Table 1. Yes 2. No 11. Bed with cotton, sponge mattress 1. Yes 2. No 12. Electric Mitad/stove 1. Yes 2. No 14. Stove 1. Yes 2. No 15. Bicycle 1. Yes 2. No 16. Motor cycle 1. Yes 2. No 17. Animal drawn cart 1. Yes 2. No 18. Car/truck 1. Yes 2. No	
309	What type of fuel does your household mainly use for cooking? (multiple answer is possible)	1. Electricity 2. Natural gas 3. Wood 4. Charcol 5. Animal dung 6 Others_____	
310	Does the household own any livestock, herds, other farm animals or poultry?	1. Yes 2. No	

311	If Yes for Q 310 how many of the following animals do you have?	1.Milk cows _____ 2.oxen or bulls _____ 3.Chicken _____ 4. Goats _____ 5. Sheep _____ 6.Donkey or mule _____	
312	Did you have a separate room for animals?	1. Yes 2. No	
313	What is the main source of drinking water?	1.Surface water (river, pond) 2.Unprotected well/spring 3.Protected well/spring 4.Public tap/standpipe 5.Piped into dwelling	

Household Food Insecurity Access Scale Measurement Scale (HFIAS)

No.	Question	Response Options
201.	In the past four weeks, did you worry that your household would not have enough food?	0=No (skip to Q2) 1=Yes
201.a	How often did this happen?	1= Rarely (once or twice in the past four weeks) 2.= Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks)

202.	In the past four weeks, were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?	0=No (skip to Q3) 1=Yes
202.a	How often did this happen?	1= Rarely (once or twice in the past four weeks) 2= Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks)
203.	In the past four weeks, did you or any household member have to eat a limited variety of foods due to a lack of resources?	0=No (skip to Q4) 1=Yes
203.a	How often did this happen?	1= Rarely (once or twice in the past four weeks) 2= Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks)
204.	In the past four weeks, did you or any household member have to eat some foods that you really did not want to eat because of a lack of resources to obtain other types of food?	0 = No (skip to Q5) 1 = Yes
204.a	How often did this happen?	1= Rarely (once or twice in the past four weeks) 2= Sometimes (three to ten times in the past four weeks) 3=Often(more than ten times in the past four weeks)

205.	In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?	0 = No (skip to Q6) 1=Yes
205.a	How often did this happen?	1= Rarely (once or twice in the past four weeks) 2= Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks)
206.	In the past four weeks, did you or any other household member have to eat fewer meals in a day because there was not enough food?	0 = No (skip to Q7) 1=Yes
206.a	How often did this happen?	1= Rarely (once or twice in the past four weeks) 2= Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks)
207.	In the past four weeks, was there ever no food to eat of any kind in your household because of lack of resources to get food?	0 = No (skip to Q8) 1=Yes
207.a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2=Sometimes(three to ten times in the past four weeks) 3=Often (more than ten times in the past four weeks)

208.	In the past four weeks, did you or any household member go to sleep at night hungry because there was not enough food?	0 = No (skip to Q9) 1=Yes
208.a	How often did this happen?	1= Rarely (once or twice in the past four weeks) 2= Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks)
209.	In the past four weeks, did you or any household member go a whole day and night without eating anything because there was not enough food?	0 = No 1=Yes
209.a	How often did this happen?	1= Rarely (once or twice in the past four weeks) 2= Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks)

2. Maternal and child related factors questionnaire

Questions	Response	Skip
Q1. What is the age of your child?	No[----- -----]	
Q2. Have you given birth to more than one child (including this child)?	1.No 2.Yes	→ (If "No", skip the next question)

What is the age difference between this child and the previous child born before him/her?	Year [----- -----]	
Q3.Do you have media exposure through any of the following activities (Radio, Television, Newspapers/Magazines)?	1.No(If you do not engage in any of these activities at least once a week) 2. Yes (If you engage in at least one of these activities once a week or more)	
Q4. During the past 7 days , did you consume any fruits or vegetables		
Day1	1.NO 2.Yes	
Day2	1.NO 2.Yes	
Day3	1.NO 2.Yes	
Day4	1.NO 2.Yes	
Day5	1.NO 2.Yes	
Day6	1.NO 2.Yes	
Day7	1.NO 2.Yes	

Environmental and agricultural factors Questionnaire

Availability questions	Response	Skip
Q1. During the past 7 days, how often did you have fruits and vegetables available in your home?	1.Never 2.Rarely (1–2 days) 3.Sometimes (3–4 days) 4.Often (5–6 days) 5.Always (7 days)	
Q2. How would you describe the availability of fruits and vegetables in the markets or stores in your community?	1.Very poor (few or no fresh fruits available) 2.Poor (limited selection) 3.Fair (moderate selection) 4.Good (wide selection) 5.Very good (excellent selection)	
Accessibility questions		
Q1. How far is the nearest market where you can buy fresh fruits and vegetables?	1.More than 3 km 2.1 to 3 km 3.Less than 1 km	
Q2. How long does it usually take you to get to the nearest market where fresh fruits and vegetables are sold?	1.More than 30 minute 2.15 to 30 minutes 3.Less than 15 minutes	
Q3. What mode of transportation do you usually use to reach the market?	2.Bicycle 2.Motorcycle 2.Baja 3.Walking Other:	

Q4. Is transportation to the market affordable for your household?	1.No 2.Yes	
Q5. Are the prices of fruits and vegetables at the market affordable for your household?	1. Never affordable 2. Rarely affordable 3. Sometimes affordable 4. Always affordable	
Farm production diversification questions		
Q1. In the past 12 months, has your household grown or raised any of the following crops or animals, either for food or for selling?"		
Cereals	1.No 2.Yes	
Roots and tubers	1.No 2.Yes	
Legumes	1.No 2.Yes	
Oilseeds	1.No 2.Yes	
Fruits	1.No 2.Yes	
Vegetables	1.No 2.Yes	
Spices or herbs	1.No 2.Yes	
Cattle	1.No 2.Yes	
Sheep or goats	1.No 2.Yes	
Chickens	1.No 2.Yes	
Donkeys, horses, Camel	1.No 2.Yes	
Other live stocks	1.No 2.Yes	

Fruit and vegetable intake questionnaire

Question	Response		Skip
Q1.Did your child eaten any fruit or vegetable in the past three days	1.No 2.Yes		If “ yes” continue which type of fruit or vegetable it was

Q2.What type of fruit or vegetable did your child consume	Banana Orange Papaya Watermelon Lemon Avocado Mango Guava Mixed fruit juice Carrot Immature corn Pumpkin Beet root Kale Lettuce salad Cabbage Mixed vegetable dish		
Banana	How many times did your child eat banana?	What type of utensil was used to serve the banana?	How much banana did your child eat each time
When did your child consume the banana? ☐ One day ago ☐ Two days ago ☐ Three days ago	☐ Once ☐ twice ☐ Three times	☐ Spoon Eaten by hand	☐ One ☐ Two ☐ Three ☐ More than three(no _____) ☐ Half of peeled banana No[-----] ☐ Whole peeled banana No [-----]

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Orange	How many times did your child eat orange	What type of utensil was used to serve the orange	How much orange did your child eat each time
When did your child consume the orange? ☐ One day ago ☐ Two days ago ☐ Three days ago	☐ Once ☐ Twice ☐ Three times	☐ Spoon	☐ One ☐ Two ☐ Three ☐ More than three(no _____)
		☐ Eaten by hand	☐ Half of peeled orange(number _____) ☐ whole peeled orange(number _____)
Avocado	How many times did your child eat avocado?	What type of utensil was used to serve the avocado?	How much avocado did your child eat each time?
When did your child consume the avocado? ☐ One day ago ☐ Two days ago ☐ Three days ago	☐ Once ☐ Twice ☐ Three times	☐ Spoon	☐ One ☐ Two ☐ Three ☐ More than three(no _____)
		☐ Eaten by hand	☐ Half of peeled avocado(number _____) ☐ whole peeled avocado(number _____)

Lemon	How many times did your child eat lemon?	What type of utensil was used to serve the lemon?	How much lemon did your child eat each time?
When did your child consume the lemon? ☐ One day ago ☐ Two days ago ☐ Three days ago	☐ Once ☐ Twice ☐ Three times	☐ Spoon	☐ One ☐ Two ☐ Three ☐ More than three(no _____)
		Eaten by hand	☐ Half of peeled lemon(number _____) ☐ whole peeled lemon(number _____)

Papaya	How many times did your child eat papaya?	What type of utensil was used to serve the papaya?	How much papaya did your child eat each time?
When did your child consume the papaya? ☐ One	☐ Once ☐ Twice ☐ Three times	☐ Spoon	☐ One ☐ Two ☐ Three ☐ More than three(no _____)

day ago ☐ Two days ago ☐ Three days ago		☐ Eaten by hand	☐ Slice(number_____)
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Watermelon	How many times did your child eat watermelon?	What type of utensil was used to serve the watermelon?	How much watermelon did your child eat each time?
When did your child consume the watermelon ☐ One day ago ☐ Two days ago ☐ Three days ago	☐ Once ☐ Twice ☐ Three times	☐ Spoon	☐ One ☐ Two ☐ Three ☐ More than three(no_____)
		☐ Eaten by hand	☐ Slice(in number_____)

Guava	How many times did your child eat guava?	What type of utensil was used to serve the guava?	How much guava did your child eat each time?
When did your child consume the guava? ☐ One day ago ☐ Two days ago ☐ Three days ago	☐ Once ☐ Twice ☐ Three times	☐ Spoon	☐ One ☐ Two ☐ Three

		☐ Eaten by hand	☐ Half of peeled guava (number_____) ☐ whole guava(number_____) peeled
Fruit Juice	How many times did your child drink fruit juice?	What type of utensil was used to serve the fruit juice?	How much fruit juice did your child drink each time?
When did your child consume the fruit juice? ☐ One day ago ☐ Two days ago ☐ Three days ago	☐ Once ☐ Twice ☐ Three times	☐ Glass	☐ A quarter ☐ A half ☐ One ☐ More than one(no_____)

Immature corn	How many times did your child eat immature corn	What type of utensil was used to serve the immature corn	How much immature corn did your child eat each time?
When did your child consume the immature	☐ Once ☐ Twice ☐ Three times	☐ Plate ☐ Bowl	☐ A quarter immature corn ☐ A half immature corn ☐ One full immature corn

corn? ☐ One day ago ☐ Two days ago ☐ Three days ago		☐ Eaten by hand	☐ Half immature corn (number _____) ☐ Whole immature corn (number _____)
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Cooked kale	How many times did your child eat cooked kale?	What type of utensil was used to serve the cooked kale?	How much cooked kale did your child eat each time?
When did your child consume the cooked kale? ☐ One day ago ☐ Two days ago ☐ Three days ago	☐ Once ☐ Twice ☐ Three times	☐ Spoon ☐ Ladle	☐ One ☐ Two ☐ Three ☐ More than three(no ____)

Cabbage	How many times did your child eat cooked cabbage?	What type of utensil was used to serve the cooked cabbage?	How much cooked cabbage did your child eat each time?
When did your child consume the cooked	☐ Once ☐ Twice ☐ Three times	☐ Spoon ☐ Ladle	☐ One ☐ Two

cabbage? ☐ One day ago ☐ Two days ago ☐ Three days ago			☐ Three ☐ More than three(no___)
Beetroot	How many times did your child eat cooked beetroot?	What type of utensil was used to serve the cooked beetroot?	How much cooked beetroot did your child eat each time?
When did your child consume the cooked beet root? ☐ One day ago ☐ Two days ago ☐ Three days ago	☐ Once ☐ Twice ☐ Three times	☐ Spoon ☐ Ladle	☐ One ☐ Two ☐ Three ☐ More than three(no___)

Carrot	How many times did your child eat carrot?	What type of utensil was used to serve the carrot?	How much carrot did your child eat each time?
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When did your child consume the carrot? ☐ One day ago ☐ Two days ago ☐ Three days ago	☐ Once ☐ Twice ☐ Three times	☐ Spoon ☐ Ladle	☐ One ☐ Two ☐ Three ☐ More than three(no __)
		☐ Hand	☐ Half of raw carrot(number __) ☐ whole raw carrot(number __)

Pumpkin	How many times did your child eat pumpkin?	What type of utensil was used to serve the cooked pumpkin?	How much cooked pumpkin did your child eat each time?
When did your child consume the cooked pumpkin? ☐ One day ago ☐ Two days ago ☐ Three days ago	☐ Once ☐ Twice ☐ Three times	☐ Spoon ☐ Ladle	☐ One ☐ Two ☐ Three ☐ More than three(no __)
Salad(Lettuce,Onion,Tomatoa)	How many times did your child eat salad?	What type of utensil was used to serve the salad?	How much salad did your child eat each time?
When did your child consume the salad? ☐ One day ago ☐ Two days ago ☐ Three days ago	☐ Once ☐ Twice ☐ Three times	☐ Spoon ☐ Ladle	☐ One ☐ Two ☐ Three ☐ More than three(no __)

Mixed vegetable(onion,carrot,pepper,cabbage)	How many times did your child eat?	What type of utensil was used to serve?	How much did your child eat each time?
When did your child consume the mixed vegetable? ☐One day ago ☐Two days ago ☐Three days ago	☐Once ☐Twice ☐Three times	☐Spoon ☐Ladle	☐One ☐Two ☐Three ☐More than three(no___)

APPENDIX III: AMHARIC VERSION CONSENT FORM (አባሪ III: የተሳታፊ የፈቃድ ቅጽ)

ውድተሳታፊ፣እንደምን አደሩ / እንደምን ዋሉ ! ስሜ አ መንገሻ ነው፣ በባህር ዳር ዩኒቨርሲቲ፣ የህዝብ ጤና ት/ቤት፣ ምግብና ዳይቲቲክስ ዲፓርትመንት የሁለተኛ ዲግሪ ተማሪ ነኝ። የ ሁለተኛ ዲግሪዬን ለማሟላት እየተካሄደ ያለ ምርምር እያከናወንኩ ነው፣ ርዕሱም “በዋጁ ከተማ፣ ሰሜን-ምስራቅ ኢትዮጵያ ውስጥ በላጋ ህፃናት የበቂ ፍራፍሬ ወይም አትክልት መመገብና ከእርሱ ጋር የተያያዙ ምክንያቶች” ይባላል።ፍራፍሬና አትክልት መመገብ ለህፃናት አጠቃላይ ጤናና ደህንነት አስፈላጊ ነው። በዚህ ጥናት ለመሳተፍ በዕድል ተመርጠዋል፣ እና ተሳትፎም እጅግ አስፈላጊ ነው። ለመሳተፍ ከተስማሙ፣ ከ636 ተሳታፊዎች አንዲት ይሆናሉ፣ እና የመረጃ ስብስብ ሂደቱ 20-30 ደቂቃ ይወስዳል።ተሳትፎም ሙሉ በሙሉ በፈቃድ የተመሠረተ ሲሆን፣ በማንኛውም ጊዜ ያለምንም ችግኝ ወይም ቅጣት ከጥናቱ መውጣት ይችላሉ። እንደ ስምዎ ያሉ የግል መለያ መረጃዎች አይመዘገቡም፣ እና የሚሰበሰበው መረጃ ሁሉ በጥብቅ ሚስጥራዊነት ይጠበቃል። የተሰበሰበው መረጃ ለምርምር ዓላማ ብቻ የሚውል ሲሆን፣ እርስዎ የሚሰጡት መረጃ የህፃናት ጤናና ምግብ ሁኔታ ማሻሻል ላይ አስተዋፅኦ ያደርጋል።ለመሳተፍ ውሳኔ ከመስጠትዎ በፊት ማንኛውንም ጥያቄ መጠየቅ ወይም ተጨማሪ ማብራሪያ መጠየቅ ይችላሉ። ስለ ትብብርዎ እጅግ እናመሰግናለን።

በዚህ ጥናት ለመሳተፍ ፈቃደኛ ነዎት? **አዎ** ____ **አይ** ____

የመረጃ ሰብሳቢው/ዋ ስም ____ **ፊርማ** _____ **ቀን** __

APPENDIX IV: AMHARIC VERSION QUESTIONNAIRE (አባሪ IV፡ የአማርኛ መጠይቅ)

1. የቤተሰብ ማህበራዊ-ሕዝባዊና ኢኮኖሚያዊ ባህሪያት

ጥያቄ	ምላሽ

ጥ1. የቤተሰቡ እራስ ፆታ ምንድን ነው?		1. ሴት 2. ወንድ
ጥ2. የሥራ አይነትዎ ምንድን ነው?		1. የቤትእመቤት 2. የመንግስትሰራተኛ 3. የራስ-ሰርሥራ 4. ዕለታዊ ሰራተኛ
ጥ3. የትምህርት ደረጃዎ ምንድን ነው?		1. መደበኛ ትምህርት ያልተማሩ 2. መጀመሪያደረጃ 3. ሁለተኛደረጃ 4. ከፍተኛ ትምህርት
ጥ4. በቤተሰብዎ ውስጥ ቢያንስ ባለፉት 6 ወራት እዚህ የኖሩ፣ አብረው የሚኖሩና ምግብ የሚጋሩ ሰዎች ብዛት ስንት ነው? (ጎብኚዎችን ወይም ጊዜያዊ እንግዶችን አትካትቱ)		ቁጥር [_____]
የቤተሰብ የሀብት መለኪያ መጠይቅ		
ጥያቄ ቁጥር	ጥያቄ	ምላሽ
301	የምትኖሩበት ቤት ባለቤት ማን ነው?	1. የግል 2. ኪራይ 3. ሌላ (ግለጹ) _____
302	የቤቱ ውጫዊ ግድግዳ ዋና የተሰራበት ቁሳቁስ ምንድን ነው?	1. ሲሚንት 2. እንጨት ከጭቃ ጋር 3. ሌላ(ግለጹ) _____
303	የቤቱ ጣሪያ ዋና የተሰራበት ቁሳቁስ ምንድን ነው?	1. ሲሚንት/ኮንክሪት 2. ቆርቆሮ/ብረት 3. ሌላ (ግለጹ) _____
304	የቤቱ ወለል ዋና የተሰራበት ቁሳቁስ ምንድን ነው?	1. ጭቃ 2. አሻዋ 3. ሲሚንት 4. ሴራሚክ
305	ለመኝታ የተለየ ክፍል አለዎት?	1. አዎ 2. አይ
306	ለማብሰል የተለየ ክፍል (ወጥ ቤት) አለዎት?	1. አዎ 2. አይ
307	ለመታጠቢያና ለመፀዳጃ የተለየ ክፍል አለዎት?	1. አዎ 2. አይ
308	እባክዎ ቤተሰብዎ ከሚከተሉት ንብረቶች መካከል ያለውን ያመልክቱ	
	ሀ.ኤሌክትሪክአላችሁ?	1.አዎ 2.የለም

	ለፌዴራል አላችሁ?	1.አዎ 2.የለም
	ሐ. ቴሌቪዥን አላችሁ?	1.አዎ 2.የለም
	መ. የቤትስልክ አላችሁ?	1.አዎ 2.የለም
	ሠ. ፍሪጅ አላችሁ?	1.አዎ 2.የለም
	ረ. ሶፋ/ወንበር አላችሁ?	1.አዎ 2.የለም
	ሰ. ጠረጴዛ አላችሁ ?	1.አዎ 2.የለም
	ሸ. አልጋ እና ከጥጥ/እስፓንጅ/ እስፕረንግ የተሰራ ፍራሻ/አላችሁ?	1.አዎ 2.የለም
	ቀ. የእጅ ሰዓት ?	1.አዎ 2.የለም
	በ. ሞባይል?	1.አዎ 2.የለም
	ተ. ሳይክል?	1.አዎ 2.የለም
	ቸ. ጋሪ?	1.አዎ 2.የለም
	ነ. መኪና?	1.አዎ 2.የለም
	ረ. የንብቀፎ?	1.አዎ 2.የለም
309	ቤተሰብዎ ለምግብ ማብሰል በዋናነት የሚጠቀሙበት ነዳጅ ምንድን ነው? (ከአንድ በላይ መምረጥ ይቻላል)	1.ኤሌክትሪክ 2.ጋዝ 3.እንጨት 4.ከሰል 5.የእንስሳ ፍግ 6.ሌላ _____

310	በቤትዎ ከብቶች፣ ሌሎች የእርሻ እንስሳት ወይም ዶሮ አሉት?	1.አዎ 2.የለም
	አዎ ከሆነ፣ ከሚከተሉት እንስሳት ስንት አሉዎት?	1.ላም _____ 2.በፊ _____ 3.ዶሮ _____ 4.ፍየል _____ 5.በግ _____ 6.አህያ/በቅሎ _____
311	ለእንስሳት የተለየ ክፍል አለዎት?	1.አዎ 2.የለም
312	ዋና የመጠጥ ውሃ ምንጭም ምንድን ነው?	1.ክፊትውሃ (ውንዝ/ጅረት/ሀይቅ) 2.ያልተጠበቀ ጉድጓድ/ምንጭ 3.የተጠበቀ ጉድጓድ/ምንጭ 4.የህዝብ ቧንቧ 5.ወደ ቤት የገባ ቧንቧ
የቤተሰብ የምግብ ደህንነት መዳረሻ መለኪያ		
201	ባለፉት አራት ሳምንታት ውስጥ ቤተሰብዎ በቂ ምግብ አላገኘም ብለው አስበው (ተጨንቀው) ነበር?	1.አዎ 2.የለም
201. U	መልስዎአዎከሆነ፣ ምን ያህል ጊዜ ተከስቶ ያዉቃል?	1 =አልፎአልፎ (1 ወይም 2 ጊዜ) 2 =አንዳንድ ጊዜ (ከ 3-10 ጊዜ) 3 =ብዙ ጊዜ (ከ 10 ጊዜ በላይ)
202	ባለፉት አራት ሳምንታት ውስጥ እርስዎ ይምከቤተሰብ አባልዎ መካከል በገንዘብ እጥረት ምክንያት የመረጣችሁትን ምግብ ስትመገቡ የቀራችሁበት ጊዜ ነበር?	1.አዎ 2.የለም
202 U	መልስዎአዎከሆነ፣ ምን ያህል ጊዜ ተከስቶ ያዉቃል?	1 =አልፎአልፎ (1 ወይም 2 ጊዜ) 2 =አንዳንድ ጊዜ (ከ 3-10 ጊዜ) 3 =ብዙ ጊዜ (ከ 10 ጊዜ በላይ)
203	ባለፉት አራት ሳምንታት ውስጥ እርስዎ ይምከቤተሰብ አባልዎ መካከል በገንዘብ እጥረት ምክንያት ውስን የምግብ አይነት መግባባት?	1.አዎ 2.የለም
203 U	መልስዎ አዎ ከሆነ፣ ምን ያህል ጊዜ ተከስቶ ያዉቃል?	1 =አልፎአልፎ (1 ወይም 2 ጊዜ) 2 =አንዳንድ ጊዜ (ከ 3-10 ጊዜ) 3 =ብዙ ጊዜ (ከ 10 ጊዜ በላይ)

204	ባለፉት አራት ዓመት ታውሰው ጥገና ሲደረግ ወይም ከቤተሰብ አባል ወይም ከህዝብ አባል ጥረት ምክንያት ሌሎች የምግብ አይነቶችን ባለማግኘት ወይም መመገብ የሚፈልጉትን የምግብ አይነት ተመግቦ ዋል?	1.አዎ 2.የለም
204U	መልስዎ አዎ ከሆነ፣ ምን ያህል ጊዜ ተከስቶ ያዉቃል?	1 = አልፎ አልፎ (1 ወይም 2 ጊዜ) 2 = አንዳንድ ጊዜ (ከ 3-10 ጊዜ) 3 = ብዙ ጊዜ (ከ 10 ጊዜ በላይ)
205	ባለፉት አራት ዓመት ታውሰው ጥገና ሲደረግ ወይም ከቤተሰብ አባል ወይም ከህዝብ አባል ጥረት ምክንያት በቂ የምግብ ባለመኖሩ ከሚያስፈልግዎት (ከበቂ) በታች የሆነ የምግብ ተመግቦ ያውቃሉ	1.አዎ 2.የለም
205U	መልስዎ አዎ ከሆነ፣ ምን ያህል ጊዜ ተከስቶ ያዉቃል?	1 = አልፎ አልፎ (1 ወይም 2 ጊዜ) 2 = አንዳንድ ጊዜ (ከ 3-10 ጊዜ) 3 = ብዙ ጊዜ (ከ 10 ጊዜ በላይ)
206	ባለፉት አራት ዓመት ታውሰው ጥገና ሲደረግ ወይም ከቤተሰብ አባል ወይም ከህዝብ አባል ጥረት ምክንያት በቂ የምግብ ባለመኖሩ በቀን ውስጥ ከሚያስፈልግዎት ጊዜ በታች ተመግቦ ያውቃሉ	1.አዎ 2.የለም
206U	መልስዎ አዎ ከሆነ፣ ምን ያህል ጊዜ ተከስቶ ያዉቃል?	1 = አልፎ አልፎ (1 ወይም 2 ጊዜ) 2 = አንዳንድ ጊዜ (ከ 3-10 ጊዜ) 3 = ብዙ ጊዜ (ከ 10 ጊዜ በላይ)
207	ባለፉት አራት ዓመት ታውሰው በቤተሰብ ውስጥ በገንዘብ እና ጥረት ምክንያት የምግብ ባለመኖር ግኝት ወይም በቤተሰብ ውስጥ ምንም አይነት የሚባለ የምግብ አጥተው ነበር	1.አዎ 2.የለም
207U	መልስዎ አዎ ከሆነ፣ ምን ያህል ጊዜ ተከስቶ ያዉቃል?	1 = አልፎ አልፎ (1 ወይም 2 ጊዜ) 2 = አንዳንድ ጊዜ (ከ 3-10 ጊዜ) 3 = ብዙ ጊዜ (ከ 10 ጊዜ በላይ)
208	ባለፉት አራት ዓመት ታውሰው ጥገና ሲደረግ ወይም ከቤተሰብ አባል ወይም ከህዝብ አባል ጥረት ምክንያት የምግብ ሳትመገቡ አድራች ሁታውቃላችሁ	1.አዎ 2.የለም
208U	መልስዎ አዎ ከሆነ፣ ምን ያህል ጊዜ ተከስቶ ያዉቃል?	1 = አልፎ አልፎ (1 ወይም 2 ጊዜ) 2 = አንዳንድ ጊዜ (ከ 3-10 ጊዜ) 3 = ብዙ ጊዜ (ከ 10 ጊዜ በላይ)
209	ባለፉት አራት ዓመት ታውሰው ጥገና ሲደረግ ወይም ከቤተሰብ አባል ወይም ከህዝብ አባል ጥረት ምክንያት ሙሉ ቀንና ማታ ያለ ምንም ምግብ መመገብ ያሳለፋችሁት ጊዜ ነበር?	1.አዎ 2.የለም

209U	መልስዎ አዎ ከሆነ፡ምን ያህል ጊዜ ተከስቶ ያዉቃል?	1 =አልፎአልፎ (1 ወይም 2 ጊዜ) 2 =አንዳንድጊዜ (ከ 3-10 ጊዜ) 3 =ብዙጊዜ (ከ 10 ጊዜበላይ)
2. ከእናትና ከሕፃን ጋር የተያያዙ ሁኔታዎች መጠይቅ		
ጥ1.	የልጅዎ ዕድሜ ስንት ነው?	ቁጥር [_____]
ጥ2.	ይህን ልጅ ጨምሮ ከአንድ በላይ ልጅ ወልደዋልን?	1. አይ 2. አዎ
	አዎ ከሆነ፡ ከዚህ ልጅ በፊት የተወለደው ልጅ ከዚህ ልጅ ጋር ያለው የዕድሜ ልዩነት ስንት ነው?	ዓመት [_____]
ጥ3.	በሚከተሉት መንገዶች መካከል የመገናኛ መረጃ ተጋላጭነት (ራዲዮ፣ ቴሌቪዥን፣ ጋዜጣ/መጽሔት) አለዎት?	1.አይ(ቢያንስ በሳምንት አንድ ጊዜ ወይም ከዚያ በላይ ካልተጠቀሙ) 2.አዎ(ቢያንስ ከእነዚህአንዱን በሳምንት አንድ ጊዜ ወይም ከዚያ በላይ ከተጠቀሙ)
ጥ4.	ባለፉት 7 ቀናት ውስጥ ፍራፍሬ ወይም አትክልት ተመግዎን?	
	ቀን 1	1.አይ 2. አዎ
	ቀን 2	1.አይ 2. አዎ
	ቀን 3	1.አይ 2. አዎ
	ቀን 4	1.አይ 2. አዎ
	ቀን 5	1.አይ 2. አዎ
	ቀን 6	1.አይ 2. አዎ
	ቀን 7	1.አይ 2. አዎ
ከአካባቢና ግብርና ጋር የተያያዙ ጥያቄዎች		
የፍራፍሬና አትክልት አቅርቦት ጥያቄዎች		
ጥ1	ባለፉት 7 ቀናት በቤትዎ ውስጥ ፍራፍሬና አትክልት ምን ያህል ነበሩ?	1.አንድጊዜም አልነበረም 2.አልፎ አልፎ(1-2ቀን) 3.አንዳንድ ጊዜ (3-4 ቀን) 4.ብዙ ጊዜ (5-6 ቀን) 5.ሁልጊዜ(7ቀን)
ጥ2	በአካባቢው የሚገኙ ገበያዎች ወይም ሱቆች ውስጥ ፍራፍሬና አትክልት አቅርቦት እንዴት ነው ?	1.እጅግደካማ 2.ደካማ 3.መካከለኛ

		4. ጥሩ 5. እጅግ ጥሩ
የፍራፍሬና አትክልት ተደራሽነት ጥያቄዎች		
ጥ1	እርስዎ የፍራፍሬና አትክልት የሚገዙበት ገበያ ርቀት ስንት ነው?	1. 3 ኪ.ሜ በላይ 2. 1-3 ኪ.ሜ 3. 1 ኪ.ሜ በታች
ጥ2	ፍራፍሬና አትክልት የሚገዙበት ገበያ ለመድረስ ስንት ሰአት ይወስዳል?	1. 30 ደቂቃ በላይ 2. 15-30 ደቂቃ 3. 15 ደቂቃ በታች
ጥ3	ወደ ገበያ ለመድረግ ምን ዓይነት መጓጓዣ ይጠቀማሉ?	1. ብስክሌት 2. ሞተር ሳይክል 3. ባጃጅ 4. እግር መሄድ 5. ሌላ _____
ጥ4	ወደ ገበያ ለመድረግ ክፍያው ተመጣጣኝ ነው?	1. አይ 2. አዎ
	የፍራፍሬና አትክልት ዋጋ ለቤተሰቦችዎ የሚያቻልነው?	1. የማይቻል 2. አልፎ አልፎ 3. አንዳንድ ጊዜ 4. ሁል ጊዜ ቀላል
የግብርና ምርት አይነት ጥያቄዎች		
ጥ1	ባለፉት 12 ወራት ውስጥ፣ ቤተሰብዎ ከሚከተሉት ሰብሎች ወይም እንስሳት ውስጥ ለምግብም ሆነ ለሽያጭ አሳድጓል/አፍርቷል?	
	ጥራጥሬዎች	1. አይ 2. አዎ
	ሥሮች እና ቱቦዎች	1. አይ 2. አዎ
	አባባ ዝርት	1. አይ 2. አዎ
	የቅባት ዘር	1. አይ 2. አዎ
	አትክልት	1. አይ 2. አዎ
	ፍራፍሬ	1. አይ 2. አዎ
	ቅመማ ቅመም	1. አይ 2. አዎ
	ከብት	1. አይ 2. አዎ
	በግ ወይም ፍየል	1. አይ 2. አዎ
	ዶሮ	1. አይ 2. አዎ
	አህያ/ፈረስ/ግመል	1. አይ 2. አዎ
	ሌሎች እንስሳት	1. አይ 2. አዎ

የፍራፍሬ እና የአትክልት ፍጆታ መጠይቅ			
ጥ1	ልጅዎ ባለፉት ሶስት ቀናት ውስጥ አትክልትና ፍራፍሬ በልቷል?	1.አይ 2. አዎ	
	መልስዎ “አዎ” ከሆነ ከሚከተሉት ፍራፍሬ ወይም አትክልት ልጅዎ የትኛውን	ሙዝ ብርቱካን አሸካዶ ሎሚ ፖፖዖ ሐብሐብ	

	በልቷል?	ዘይቱን የተቀላቀለ የፍራፍሬ ጭማቂ ለጋ በቆሎ የሀበሻ ጎመን ጥቅል ጎመን ካሮት ቀይስር ዱባ ሰላጣ የተቀላቀለ አትክልት	
የፍራፍሬ ፍጆታ መጠይቅ			
ሙዝ			
ልጅዎ ሙዝ መቼ በላ?	ልጅዎ ሙዝ ስንት ጊዜ በላ?	ሙዝ ለመብላት ምን ዓይነት ዕቃ ጥቅም ላይ ውሏል?	ልጅዎ በእያንዳንዱ ጊዜ ስንት ሙዝ ይበላ ነበር?
1. ከአንድ ቀን በፊት 2. ከሁለት ቀናት በፊት 3. ከሦስት ቀናት በፊት	1. አንድ ጊዜ 2. ሁለት ጊዜ 3. ከሦስት ጊዜ	ማንኪያ በእጅ ተበላ	1. አንድ 2. ሁለት 3. ሶስት 4. ከሶስት በላይ (ቁጥር___) 1. ግማሽ የተላጠ (ቁጥር___) 2. ሙሉ በሙሉ የተላጠ

			(ቁጥር___)
ብርቱካን			
ልጅዎ ብርቱካን መቼ በላ?	ልጅዎ ስንት ጊዜ ብርቱካን በላ?	ብርቱካን ለመብላት ምን ዓይነት ዕቃ ጥቅም ላይ ውሏል?	ልጅዎ በእያንዳንዱ ጊዜ ስንት ብርቱካን ይበላ ነበር?
1.ከአንድ ቀን በፊት	1. አንድ ጊዜ	ማንኪያ	1.አንድ 2. ሁለት 3. ሶስት
2.ከሁለት ቀናት በፊት	2. ሁለት ጊዜ		4.ከሶስት በላይ(ቁጥር___)
3.ከሦስት ቀናት በፊት	3. ከሦስት ጊዜ	በእጅ የተበላ	1.ግማሽየተላጠ (ቁጥር___) 2.ሙሉበሙሉየተላጠ(ቁጥር___)
አሸካይ			
ልጅዎ አሸካይመቼ በላ?	ልጅዎ ስንት ጊዜ አሸካይ በላ?	አሸካይ ለመብላት ምን ዓይነት ዕቃ ጥቅም ላይ ውሏል?	ልጅዎ በእያንዳንዱ ጊዜ ስንት አሸካይ ይበላ ነበር?
1.ከአንድቀንበፊት	1. አንድ ጊዜ	ማንኪያ	1.አንድ 2. ሁለት 3. ሶስት
2.ከሁለትቀናትበፊት	2. ሁለት ጊዜ		4.ከሶስት በላይ(ቁጥር___)
3.ከሦስትቀናትበፊት	3. ከሦስት ጊዜ	በእጅ የተበላ	1.ግማሽየተላጠ (ቁጥር___) 2.ሙሉበሙሉየተላጠ(ቁጥር___)

ሎሚ			
ልጅዎ ሎሚ መቼ በላ?	ልጅዎ ስንት ጊዜ ሎሚ በላ?	ሎሚ ለመብላት ምን ዓይነት ዕቃ ጥቅም ላይ ውሏል?	ልጅዎ በእያንዳንዱ ጊዜ ስንት ሎሚ ይበላ ነበር?
1.ከአንድቀንበፊት	1. አንድ ጊዜ	ማንኪያ	1.አንድ 2. ሁለት 3. ሶስት
2.ከሁለትቀናትበፊት	2. ሁለት ጊዜ		4.ከሶስት በላይ(ቁጥር___)
3.ከሦስትቀናትበፊት	3. .ከሦስት ጊዜ		
		በእጅ የተበላ	1.ግማሽየተላጠ (ቁጥር___) 2.ሙሉበሙሉየተላጠ(ቁጥር___)
ፖፖያ			
ልጅዎ ፖፖያ መቼ በላ?	ልጅዎ ስንት ጊዜ ፖፖያ በላ?	ፖፖያ ለመብላት ምን ዓይነት ዕቃ ጥቅም ላይ ውሏል?	ልጅዎ በእያንዳንዱ ጊዜ ስንት ፖፖያ ይበላ ነበር?
1.ከአንድቀንበፊት	1. አንድ ጊዜ	ማንኪያ	1.አንድ 2. ሁለት 3. ሶስት
2.ከሁለትቀናትበፊት	2. ሁለት ጊዜ		4.ከሶስት በላይ(ቁጥር___)
3.ከሦስትቀናትበፊት	3. .ከሦስት ጊዜ		
		በእጅ የተበላ	ቁርጥ((ቁጥር___)
ሐብሐብ			
ልጅዎ ሐብሐብ መቼ በላ?	ልጅዎ ስንት ጊዜ ሐብሐብ በላ?	ሐብሐብ ለመብላት ምን ዓይነት ዕቃ ጥቅም ላይ ውሏል?	ልጅዎ በእያንዳንዱ ጊዜ ስንት ሐብሐብ ይበላ ነበር?

1.ከአንድቀንበፊት	1. አንድ ጊዜ	ማንኪያ	1.አንድ 2. ሁለት 3. ሶስት
2.ከሁለትቀናትበፊት	2. ሁለት ጊዜ		4.ከሶስት በላይ(ቁጥር___)
3.ከሦስትቀናትበፊት	3. .ከሦስት ጊዜ		
		በእጅ የተበላ	ቁርጥ((ቁጥር___)
ዘይቱን			
ልጅዎ ዘይቱን መቼ በላ?	ልጅዎ ስንት ጊዜ ዘይቱን በላ?	ዘይቱን ለመብላት ምን ዓይነት ዕቃ ጥቅም ላይ ውሏል?	ልጅዎ በእያንዳንዱ ጊዜ ስንት ዘይቱን ይበላ ነበር?
1.ከአንድቀንበፊት	1. አንድ ጊዜ	ማንኪያ	1.አንድ 2. ሁለት 3. ሶስት
2.ከሁለትቀናትበፊት	2. ሁለት ጊዜ		4.ከሶስት በላይ(ቁጥር___)
3.ከሦስትቀናትበፊት	3. .ከሦስት ጊዜ		
		በእጅ የተበላ	1.ግማሽየተላጠ (ቁጥር___) 2.ሙሉበሙሉየተላጠ(ቁጥር___)
ጫማቂ			
ልጅዎ ጫማቂ መቼ ጠጣ?	ልጅዎ ስንት ጊዜ ጫማቂ ጠጣ?	ጫማቂ ለመጠጣት ምን ዓይነት ዕቃ ጥቅም ላይ ውሏል?	ልጅዎ በእያንዳንዱ ጊዜ ስንት ጫማቂ ይጠጣ ነበር?
1.ከአንድቀንበፊት	1. አንድ ጊዜ	ብርጫቆ	እፋብ
2.ከሁለትቀናትበፊት	2. ሁለት ጊዜ		ግማሽ
3.ከሦስትቀናትበፊት	3. .ከሦስት ጊዜ		አንድ
			ከአንድ በላይ (ቁጥር ___)
አትክልት ፍጆታመጠይቅ			
ለጋ በቆሎ			
ልጅዎ የተጠበሰ	ልጅዎ ስንት ጊዜ	የተጠበሰ	ልጅዎ በእያንዳንዱ ጊዜ ስንት

/የተቀቀበ ለጋ በቆሎ መቼ በላ?	የተጠበሰ /የተቀቀበ ለጋ በቆሎ በላ?	/የተቀቀበ ለጋ በቆሎ ለመብላት ምን ዓይነት ዕቃ ጥቅም ላይ ውሏል?	የተጠበሰ /የተቀቀበ ለጋ በቆሎ ይበላ ነበር?
1.ከአንድቀንበፊት	1. አንድ ጊዜ	ዝርግሳህን ሳህን ጎድጓዳ	እሩብ
2.ከሁለትቀናትበፊት	2. ሁለት ጊዜ		ግማሽ
3.ከሦስትቀናትበፊት	3. .ከሦስት ጊዜ		አንድ
		በእጅ የተበላ	1.ግማሽ (ቁጥር___) 2.መሉ(ቁጥር___)
የሀበሻ ጎመን			
ልጅዎ የሀበሻ ጎመን መቼ በላ?	ልጅዎ ስንት ጊዜ የሀበሻ ጎመን በላ?	የሀበሻ ጎመን ለመብላት ምን ዓይነት ዕቃ ጥቅም ላይ ውሏል?	ልጅዎ በእያንዳንዱ ጊዜ ስንት የሀበሻ ጎመን ይበላ ነበር?
1.ከአንድቀንበፊት	1. አንድ ጊዜ	ጭልፋ	1.አንድ 2. ሁለት 3. ሶስት
2.ከሁለትቀናትበፊት	2. ሁለት ጊዜ	ማንኪያ	4.ከሶስት በላይ(ቁጥር___)
3.ከሦስትቀናትበፊት	3. .ከሦስት ጊዜ		

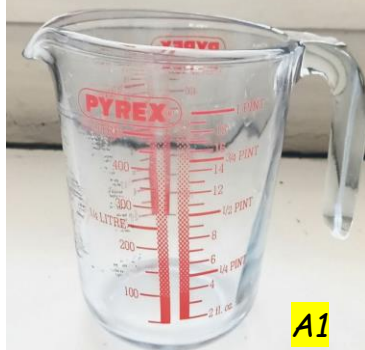
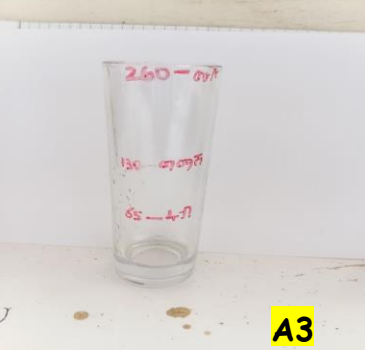
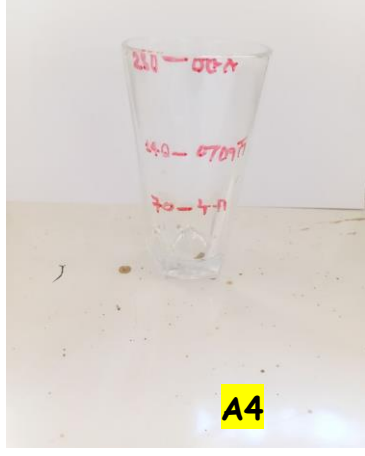
ጥቅል ጎመን			
ልጅዎ ጥቅል ጎመን መቼ በላ?	ልጅዎ ስንት ጊዜ ጥቅል ጎመን በላ?	ጥቅል ጎመን ለመብላት ምን ዓይነት ዕቃ ጥቅም ላይ ውሏል?	ልጅዎ በእያንዳንዱ ጊዜ ስንት ጥቅል ጎመን ይበላ ነበር?

1.ከአንድቀንበፊት	1. አንድ ጊዜ	ጭልፋ	1.አንድ 2. ሁለት
2.ከሁለትቀናትበፊት	2. ሁለት ጊዜ	ማንኪያ	3. ሶስት
3.ከሦስትቀናትበፊት	3. .ከሦስት ጊዜ		4.ከሶስት በላይ(ቁጥር___)
ካሮት			
ልጅዎ ካሮት መቼ በላ?	ልጅዎ ስንት ጊዜ ካሮት በላ?	ካሮት ለመብላት ምን ዓይነት ዕቃ ጥቅም ላይ ውሏል?	ልጅዎ በእያንዳንዱ ጊዜ ስንት ካሮት ይበላ ነበር?
1.ከአንድቀንበፊት	1. አንድ ጊዜ	ጭልፋ	1.አንድ 2. ሁለት
2.ከሁለትቀናትበፊት	2. ሁለት ጊዜ	ማንኪያ	3. ሶስት
3.ከሦስትቀናትበፊት	3. .ከሦስት ጊዜ		4.ከሶስት በላይ(ቁጥር___)
		በእጅ የተበላ	1.ግማሽ (ቁጥር___)
			2.ሙሉ(ቁጥር___)
ቀይስር			
ልጅዎ ቀይስር መቼ በላ?	ልጅዎ ስንት ጊዜ ቀይስር በላ?	ቀይስር ለመብላት ምን ዓይነት ዕቃ ጥቅም ላይ ውሏል?	ልጅዎ በእያንዳንዱ ጊዜ ስንት ቀይስር ይበላ ነበር?
1.ከአንድቀንበፊት	1. አንድ ጊዜ	ጭልፋ	1.አንድ 2. ሁለት
2.ከሁለትቀናትበፊት	2. ሁለት ጊዜ	ማንኪያ	3. ሶስት
3.ከሦስትቀናትበፊት	3. .ከሦስት ጊዜ		4.ከሶስት በላይ(ቁጥር___)
ዱባ			
ልጅዎ ዱባ መቼ በላ?	ልጅዎ ስንት ጊዜ ዱባ በላ?	ዱባ ለመብላት ምን ዓይነት ዕቃ ጥቅም ላይ ውሏል?	ልጅዎ በእያንዳንዱ ጊዜ ስንት ዱባ ይበላ ነበር?
1.ከአንድቀንበፊት	1. አንድ ጊዜ	ጭልፋ	1.አንድ 2. ሁለት
2.ከሁለትቀናትበፊት	2. ሁለት ጊዜ	ማንኪያ	3. ሶስት
3.ከሦስትቀናትበፊት	3. .ከሦስት ጊዜ		4.ከሶስት በላይ(ቁጥር___)

ሰላጣ			
ልጅዎ ሰላጣ መቼ በላ?	ልጅዎ ስንት ጊዜ ሰላጣ በላ?	ሰላጣ ለመብላት ምን ዓይነት ዕቃ ጥቅም ላይ ውሏል?	ልጅዎ በእያንዳንዱ ጊዜ ስንት ሰላጣ ይበላ ነበር?
1.ከአንድቀንበፊት 2.ከሁለትቀንበፊት 3.ከሦስትቀንበፊት	1. አንድ ጊዜ 2. ሁለት ጊዜ 3. .ከሦስት ጊዜ	ጭልፋ ማንኪያ	1.አንድ 2. ሁለት 3. ሶስት 4.ከሶስት በላይ(ቁጥር___)
የተቀላቀለ አትክልት			
ልጅዎ የተቀላቀለ አትክልት መቼ በላ?	ልጅዎ ስንት ጊዜ የተቀላቀለ አትክልት በላ?	የተቀላቀለ አትክልት ለመብላት ምን ዓይነት ዕቃ ጥቅም ላይ ውሏል?	ልጅዎ በእያንዳንዱ ጊዜ ስንት የተቀላቀለ አትክልት ይበላ ነበር?
1.ከአንድቀንበፊት 2.ከሁለትቀንበፊት 3.ከሦስትቀንበፊት	1. አንድ ጊዜ 2. ሁለት ጊዜ 3. .ከሦስት ጊዜ	ጭልፋ ማንኪያ	1.አንድ 2. ሁለት 3. ሶስት 4.ከሶስት በላይ(ቁጥር___)

APPENDIX V: PHOTOGRAPHS OF SEMI QUANTITATIVE FFQ

Graduated cylinder	Calibrated bowl	Calibrated glass
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Calibearted glass	Caliberated glass	Caliberated plate
		
Digital kitchen scale	Digital spoon scale	Large ladle



A7



A8



A9

Medium ladle	Small ladle	Large spoon
 A metal medium-sized ladle with a black handle, lying on a light-colored surface.	 A metal small-sized ladle with a black handle, lying on a light-colored surface.	 A metal large spoon with a black handle, lying on a light-colored surface.
A10	A11	A12

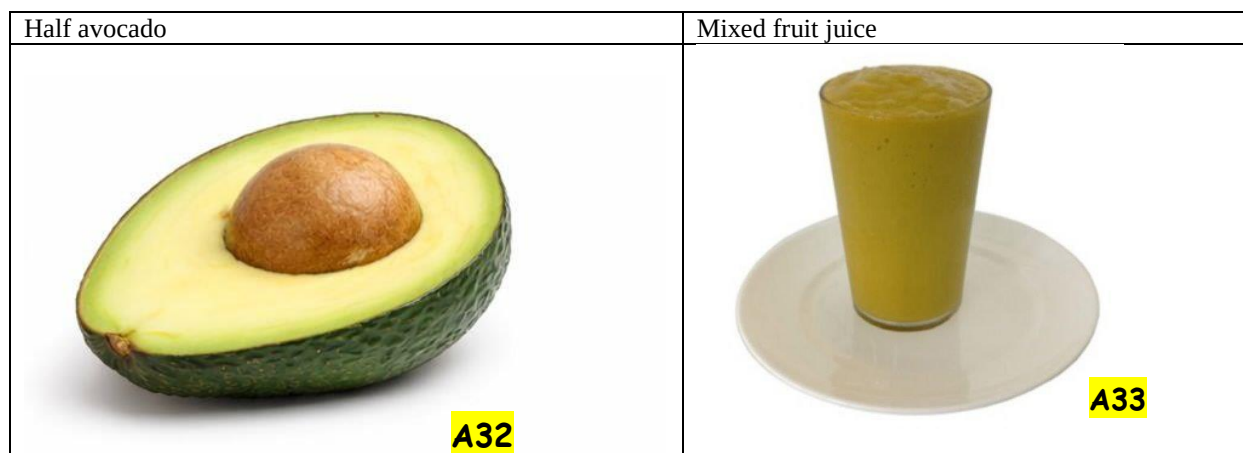
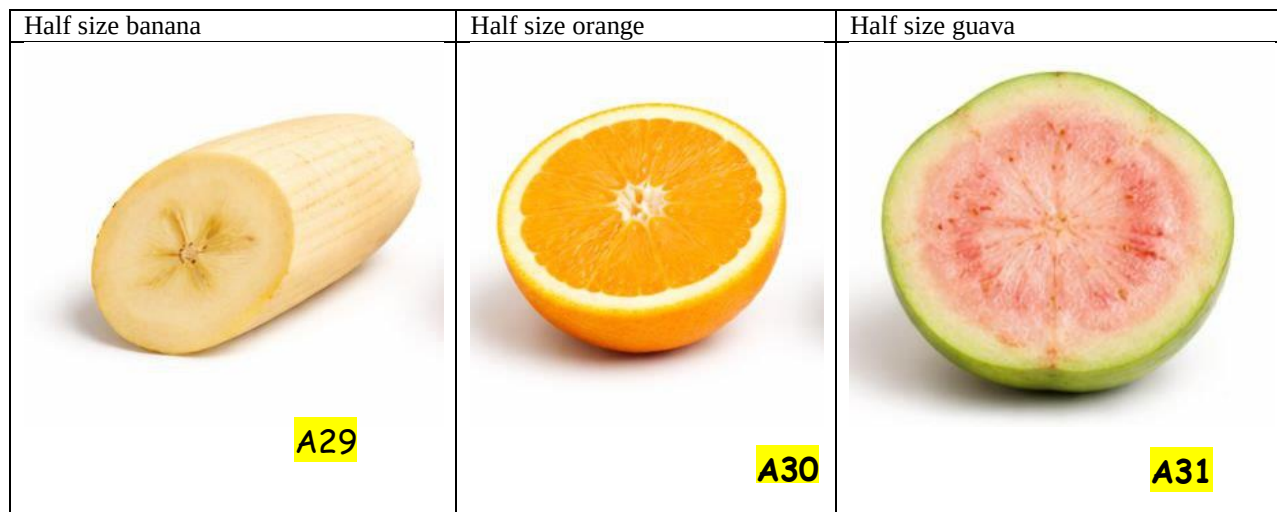
Medium spoon	Small spoon
 A13	 A14

Large size banana	Medium size banana	Small size banana
 A15	 A16	 A17
Large size avocado	Medium size avocado	Small size avocado
 A18	 A19	 A20

Large size orange	Medium size orange	Small size orange
		
A21	A22	A23

Large size guava	Medium size guava	Small size guava
		
A24	A25	A26

One slice watermelon	One slice papaya
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Large size carrot	Medium size carrot	Small size carrot
 A34	 A35	 A36
Half size carrot	Large size maize	Medium size maize
 A37	 A38	 A39
Small size maize		
 A40		

