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Dietary Consumption Patterns and Associated Factors among Pregnant Women Attending Antenatal Care in Public and Private Health Facilities in Gar-owe, Puntland, Somalia

MPH thesis

By:

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HARAMAYA UNIVERSITY, HARAR, ETHIOPIA

Dietary Consumption Patterns and Associated Factors among Pregnant Women Attending Antenatal Care in Public and Private Health Facilities in Gar-owe, Puntland, Somalia

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Zainab said abdullahi

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APPROVAL SHEET

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POSTGRADUATE PROGRAM DIRECTORATE

As the advisors of this study on behalf of Harmaya University, Health and Medical Science Colla ge, School of public Health, we have the title ***"Dietary consumption patterns and associated factors among pregnant women attending antenatal care in public and private health facilities in Gar-owe, Puntland, Somalia"*** read and verify as the student's MPH thesis and suggest that it be submitted as meeting the thesis requirements.

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As a member of the MPH open Defense Examination board of examiners, I attest to having read, assessed, and examined the candidate's thesis, which which was prepared by Zainab. The thesis should be approved as meeting the requirements for the Master of Public Health in Nutrition degree, in my opinion.

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BIOGRAPHICAL SKETCH

My name is Zainab Abdullahi, and I am the thesis' author. Born in 1998, I grew up in Bosaso, Puntland, Somalia. I want to Nawawi Primary and Secondary School in Qardho, Puntland, Somalia, for both my elementary and secondary education. When I finished high school, I enrolled at the University of Health Science in 2017 and earned my degree in nutrition and food science in 2021

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LIST OF ABBREVIATIONS AND ACRONYMS

ANC	Antenatal care
CI	Confidence interval
DPs	Dietary patterns
GDM	Gestational diabetic mellitus
IHRERC	Institutional Health Research Ethics Review Committee
LBW	Low birth weight
LMICs	Low- and middle- income countries
MDD-W	Minimal dietary diversity for women
OR	Odds ratio
SGA	Short gestational weight
WHO	World health organization

ABSTRACT

Background: Adequate maternal nutrient intake during pregnancy is important to ensure optimal maternal health outcomes. But the usual dietary intake estimates are not comprehensive, is challenging and prone to errors. Dietary pattern analysis gives a novel opportunity to holistically and comprehensively evaluate dietary consumption with a better prediction. However, studies using these methods is lacking among pregnancy women in Somalia, particularly Gar-owe city.

Objectives: To assess dietary consumpion patterns and associated factors among pregnancy women who attended antenatal care both public and private Health care in Gar-owe City, Puntland, Somalia, from June 20 to July 20 2024

Methods: Afacility based cross-sectional study was carried out on 420 randomly selected pregnant women was conducted. Data was collected using pretested and structural questionnaire. Avalidated food frequency questionnaire over the past one month was used to assess dietary intake. An exploratory factor analysis was done to identify dietary patterns and the corresponding factors scores were ranked as high and low consumption quartiles. Both bivariable and multivariable logistic regression was performed to identify the factors associated with major dietary patterns among pregnant women level of statically significance was declared at p-value <0.05. Adjusted odds ratio with 95% confidence interval is reported.

Results: three major dietary patterns (“Nutrient dense”, “Fruits and vegetable”, “Animal source and sweety foods”) were identified explaining 24.736% of total variance. A total of 56.3%, had high terciles of “Nutrient dense, “Fruits and vegetable”, “Animal source and sweety foods”, respectively. Education of mother Collage and above (AOR= 3.4, 95% CI 1.1-10.9) and the middle family size (AOR= 4.38, 95% CI 1.60-11.9), income high socioeconomic (AOR= 1.87, 95% CI 1.0-3.47) had significantly associated with higher tercile o f legumes and nutrient dense and fruits and vegetable. Women with no craving (AOR= 2.52, 95% CI 1.45-4.39) and no food aversion (AOR= 1.62, 95% CI 1.01-2.60) women received nutritional counseling (AOR= 1.88, 95% CI 1.08-3.25) were sigficantly positively associated with higher tercile of Nutrient dense and fruits and vegetable consumption. Urban residence (AOR= 1.97 95% CI 1.1-3.4) and food restriction (AOR= 2.0, 95% CI 1.15-3.46) had association with higher tercile of Animal source and sweety foods consumption.

Conclusion: In general three major dietary patterns composed of cereals and tubers, legumes and vegetable and fruits, explain the major variation indietary consumption of pregnant women

INTRODUCTION

1.1.Background

Pregnancy is most vital time for the development offspring and fetal growth in the intrauterine during sensitive periods of development, fetal programing can produce structural and functional changes in cell tissues, and organ systems (Lindsay et al., 2019). Pregnancy-related physiological changes and the fetus's optimal growth and development depend on a healthy, balanced diet. Eating foods with the right quantity of energy for the macronutrient and micronutrient is one of the mother's key dietary habits throughout pregnancy (Martin et al., 2015).

Pregnancy-related maternal diet has a lasting impact on the health of the fetus. Nutritional deficits in mothers, there is no denying the significance of nutrition at any stage of life, but it is especially crucial during pregnancy (Grieger et al., 2014). Women's health and the cycle of malnutrition are greatly influenced by the promotion of women's health and the prevention of medical treatment from conception to adulthood. The Recommended nutritional intake rise for the majority of nutrients throughout pregnancy (Gernand et al., 2016). Pregnancy outcomes and neonatal health can have a substantial impact on poor dietary intakes or deficiencies in key macronutrient and micronutrient (Mousa et al., 2019b).
Particularly for reproductive women, multiple micronutrient deficiencies continue to be a serious public health problem in low- and middle-income countries (LMICs). Women who are pregnant have higher dietary requirements because their bodies need more nutrients to fulfill the demands of both the growing fetus and the expectant mother. Adequate nutrient intake during pregnancy was found to reduce the risk of low birth weight (19%), small-for-gestational-age birth (8%), preterm birth (16%), and infant mortality (15%) (Abu-Saad and Fraser, 2010)

All mothers require more varied and patterns nutrient-dense diets as well as supplements during pregnancy. During the second and third trimesters, the need for energy increases. In order to fulfill their increased energy needs, women particularly during the third trimester of pregnancy, need additional protein, carbohydrates, and lipids (Thompson et al., 2010). The brain and visual development is negatively impacted by inadequate consumption of foods high in polyunsaturated fatty acids (PUFAs) (Marangoni et al., 2016).
Maternal malnutrition are strongly associated with an increased mortality and morbidity results in loss cognitive development of fetal, premature, low birth weight, intrauterine growth retardation and other negative consequences of mother and newborn babies (Chakravarty et al., 2019). Undernutrition was

found in 19.5% of pregnant women and poor dietary practice was present in 54.8% of them, suggesting that undernutrition is comparatively high and dietary behavior is suboptimal (Diddana, 2019).

1.2. Statement of the problem

Poor dietary consumption patterns while pregnancy can raise the possibility of low birth weight, early birth, stillbirths, and maternal and neonatal mortality.(Nana and Zema, 2018b) Approximately 11% of births globally occur before 37 gestational weak points, 15-20% are low birth weight (LBW; birth weight <2500 g), and macrosomia is more common than expected. (Chia et al., 2019) Reduced fetal growth and a variety of early developmental factors are linked to altered neurodevelopment and an increased risk of neonatal death and morbidity as a result of poor food intake during pregnancy. (Ancira-Moreno et al., 2020). The studies were conducted England Maternal undernutrition remains a huge public health problem globally the burden around 10% of women being undernourished (Di Cesare M, 2016).

One of the most common complications during pregnancy is gestational diabetes mellitus is characterized as glucose intolerance and has a serious, long-term consequences for both mother and babies (Chen et al., 2016) hypertensive disorders of pregnancy the mostly encountered that accounts for 20-80% of maternal mortality in developing countries for many years diets has been suggested to a play a role (Endeshaw et al., 2014).

Studies have shown the influence of maternal nutrition on a number of problems, including short gestational age (SGA), intrauterine growth restriction, pre-eclampsia, and gestational diabetes mellitus (GDM). Research has indicated a correlation between premature birth and inadequate nutrition or overindulgence in food. Also connected with GDM was dietary antioxidant consumption before conception (Zareei et al., 2018).

Sub-Saharan Africa had high rates of these and other micronutrient deficiencies, including those in zinc, iodine, and vitamin B-12 (Ruel et al., 2010). Poor dietary consumption patterns during pregnancy can raise the risk of low birth weight, early birth, stillbirths, and maternal and neonatal Mortality (Nana and Zema, 2018b) Anemic women had a greater 69% of premature births, according to a research. Similar findings were seen in another study, with 45% of the anemic women and 29% of the non-anemic women having an immediate caesarian section. In this study, the anemic women's percentage is 53.3%, while the non-anemic population's is 30.9% (Shah et al., 2022).

In Africa about 23.5% pregnant women are malnourished (Desyibelew and Dadi, 2019). An Estimated 23.3% and 60% of women had chronic energy deficiency. Zinc deficiency was prevalent in pregnant women (59.9%), Nigeria (28.1%), In Ethiopia, 38% of women were undernourished (Workicho et al., 2019). During their pregnancy, 31.7% of women experienced anemia. When regional differences were examined, the Somali region had the highest anemia frequency (60%) (Dufera et al., 2024).

Despite the importance of adequate nutrition during pregnancy there is very limited information on the dietary habits of pregnant women in Somalia specifically no published study in Puntland conducted on dietary consumption patterns among pregnancy women, this lack of evedinace creates a critical gap in understanding the nutritional challenges faced by pregnant women and limits the capacity of health authorities to design effective maternal nutritional interventation.

Therefore, it's assential to examine dietary consumption patterns of pregnant women in Garowe to generate the evidence that can support appropriate policies and programs.

Significance of the study

This conclusion of the study will contribute to policy and program maker towards improved dietary consumption patterns and associated factors among pregnancy women in gar-owe Puntland Somalia. Health office administrator other concerned organizations to the issue and take the necessary actions to start the sustainable micronutrient and macronutrient and also provide useful information for the gar-owe city health service providers especially during antenatal care visits by enabaling them plan contextualized interventions to promote healthy dietary behaviors for optimal pregnancy outcomes.

Additionally, based on the study findings to act in collaboration with government and nongovernment organizations and all pregnant women in gar-owe will benefit from findings of this research and will provide baseline data for further research to be conducted in the area.

1.4. Objectives

1.4.1. General objectives

- To assess dietary consumption pattern and associated factors among pregnancy women who attended antenatal care both public and private Health care in Gar-owe City, Puntland, Somalia, from June 20 to July 20 2024.

1.4.2. Specific objectives

- To identify the level of major dietary consumption patterns among pregnant women attending antenatal care in health facilities in Gar-owe City, Puntland, Somalia.
- To identify factors associated with major dietary consumption patterns among pregnant women attending antenatal care in health facilities in Gar-owe City, Puntland.

2. LITERATURE REVIEW

2.1 Dietary consumption patterns among pregnancy women

The mother's and the newborn's health can be greatly impacted by pregnancy-related dietary conditions. During pregnancy, there is an increased need for macronutrients including protein and energy to sustain both maternal homeostasis and fetal growth. Pregnancy is a time of profound and quick physiological changes from the time of conception to delivery. Pregnancy increases the need for nutrients to sustain the mother's metabolism and tissue accretion while also supporting the fetus's growth and development (Mousa et al., 2019a).

Among pregnant women in the Nigerian study, we discovered 5 dietary patterns: "fruits," "protein-rich diet with non-alcoholic beverages," "typical diet with alcohol," legumes, and "refined grains." Additionally, we determined which sociodemographic variables were connected to the food habits of mothers (Adeoye and Okekunle, 2022). Another study in Ethiopia indicated that consumption of fruits and green leafy vegetables were occasionally consumed, although intakes varied significantly among studies. Studies conducted in Morocco, Ethiopia, and South Africa revealed that beverages like coffee and sweetened tea were commonly and extensively consumed (Lee et al., 2013).

There may be health benefits associated with maintaining a healthy diet that emphasizes whole grains, legumes, and seafood while limiting intake of processed meat, refined grains, and sweetened foods (Vajdi and Farhangi, 2020). The other study indicated production of crops and vegetables may have an impact on the accessibility and availability of food, which directly contributes to a healthy diet for mothers (Demilew et al., 2020).

A traditional Mediterranean diet that emphasizes a lot of vegetables, whole grains, nuts, and olive oil is closely linked to a sufficient consumption of dietary fiber, calcium, iodine, and vitamins B9, D, and E (Cano-Ibáñez et al., 2020).

For healthy fetal growth throughout the human prenatal period, nutrient status and sufficient food consumption are crucial. Despite the fact that during all three trimesters of pregnancy, a woman's need for certain nutrients is increased, research indicates that pregnant women are more susceptible to micro- and macronutrient deficiencies. Physical activity level and metabolic rate. During the last month of

pregnancy, the mother's nutritional requirements also rise due to the fetus's rapid growth, which is linked to an increase in weight (Khammarnia et al., 2024).

"Animal-source foods and fruits," "cereals, tubers, and sweaty foods," and "pulses (legumes) and vegetables" are the three main dietary categories among pregnant women in east Ethiopia. Research (Oumer et al., 2022). An unbalanced diet is one that is typically low in energy (5500 kJ) and does not contain the recommended servings of any of the major food groups (Williams et al., 2020).

The study was conducted Poland of the women, about 60% reported eating fruits and 50% vegetables four to six times a week; only 3.3% and 1.2%, respectively, reported eating fruits and vegetables every day. Less than 35% of the women said they ate fish at least once a week, and 5% said they never ate it. They ate whole grains one to six times a week (Wesołowska et al., 2019).

2.2 Factors associated dietary patterns among pregnancy women

2.2.1. Sociodemographic factors

The study was conducted on Mexican women with higher education and their associations with fruit and vegetable patterns (Jansen et al., 2020).The research was conducted in Ethiopia. Women with medium knowledge levels in this study were 1.81 times [AOR = 1.81, 95% CI: (1.1, 3.1)] and high knowledge levels were 3.23 times [AOR = 3.23, 95% CI: (1.9, 5.5)] more likely to follow appropriate dietary patterns than were women with low knowledge levels. (Demilew et al., 2020). Of the study participants, 11.4% had completed secondary education or higher. The majority of spouses (53.8%) only completed elementary school (Yalewdeg et al., 2020).

Among pregnant women the study conducted southern Ethiopia there is association between the dietary patterns and income of less than $28.5 dollars per month, while 13.1% earned more than $57.5 dollars (Yalewdeg et al., 2020). Women's socioeconomic status is one of the factors linked to living Healthier lifestyle because it has been shown that those with more money can choose healthier products like fruits and vegetables (Corrales-Gutierrez et al., 2022).

Among pregnancy women study conducted Spanish an association exists between the employment and dietary patterns were the employment rates. 20.3% of people were unemployed, 47.1% were working, (Fernández-Gómez et al., 2020). Just 28% of the sample's women reported being unemployed, compared to 39% of full-time working women that is the association for the dietary patterns (Corrales-Gutierrez et al., 2022). Dietary patterns were significantly correlated with the employment status of expectant mothers (Fite et al., 2022).

Depending on their economic standing, milk, meat, eggs, and fruit are especially restricted in the Indian region of Nigeria (de Diego-Cordero et al., 2021). another study only women's employment status had a significant association with fruits (Adeoye and Okekunle, 2022).

2.2.2. Maternal related and obstructed

Culture is the set of values, beliefs, lifestyles, and customs that are passed down from one generation to the next. Cultural influences can impact food restrictions or inclusions, food preparation techniques, and the significance and interpretation placed on the act of eating or its rituals.(de Diego-Cordero et al., 2021)

The food that women eat is influenced by cultural taboos and practices, which increases their susceptibility to various micronutrient deficiencies. These deficiencies are particularly critical for pregnant women and include vitamin A, folate, iodine, iron, calcium, and zinc. However, a range of nutrient- and energy-dense foods, including fruits, vegetables, and animal products, are necessary for pregnant women (Chakona and Shackleton, 2019).

2.2.3. Nutritional Counseling during antenatal care

One strategy that is suggested for enhancing pregnant women's nutritional status is nutrition counseling. In order to prevent nutritional deficiencies, the WHO advises supporting expectant mothers to eat a healthy, balanced diet. Reviews of the literature indicate that a number of studies assessed pregnant women's knowledge, habits, and information sources on nutrition

During pregnancy. To enhance pregnant women's nutritional status, the World Health Organization (WHO) advises using nutrition education and counseling. Thus, the current study assessed how nutrition counseling affected pregnant women's food habits and nutritional status. (Kaleem et al., 2020).

2.2.4. Household food insecurity

Throughout the month prior to the survey, a certain level of food insecurity was experienced by households. There were 25.9% (95% CI: 19.0, 34.3) and 6.8% (95% CI: 4.2, 10.9) of households Experiencing moderate or severe hunger (Kang et al., 2019). According to the household food security status, there was secure food for 67.7% of households and insecure food for 32.3% of Households. Certain birth defects, like cleft palate, have been linked to maternal food insecurity. (Hoseini et al., 2018).

2.3. Conceptual frame work

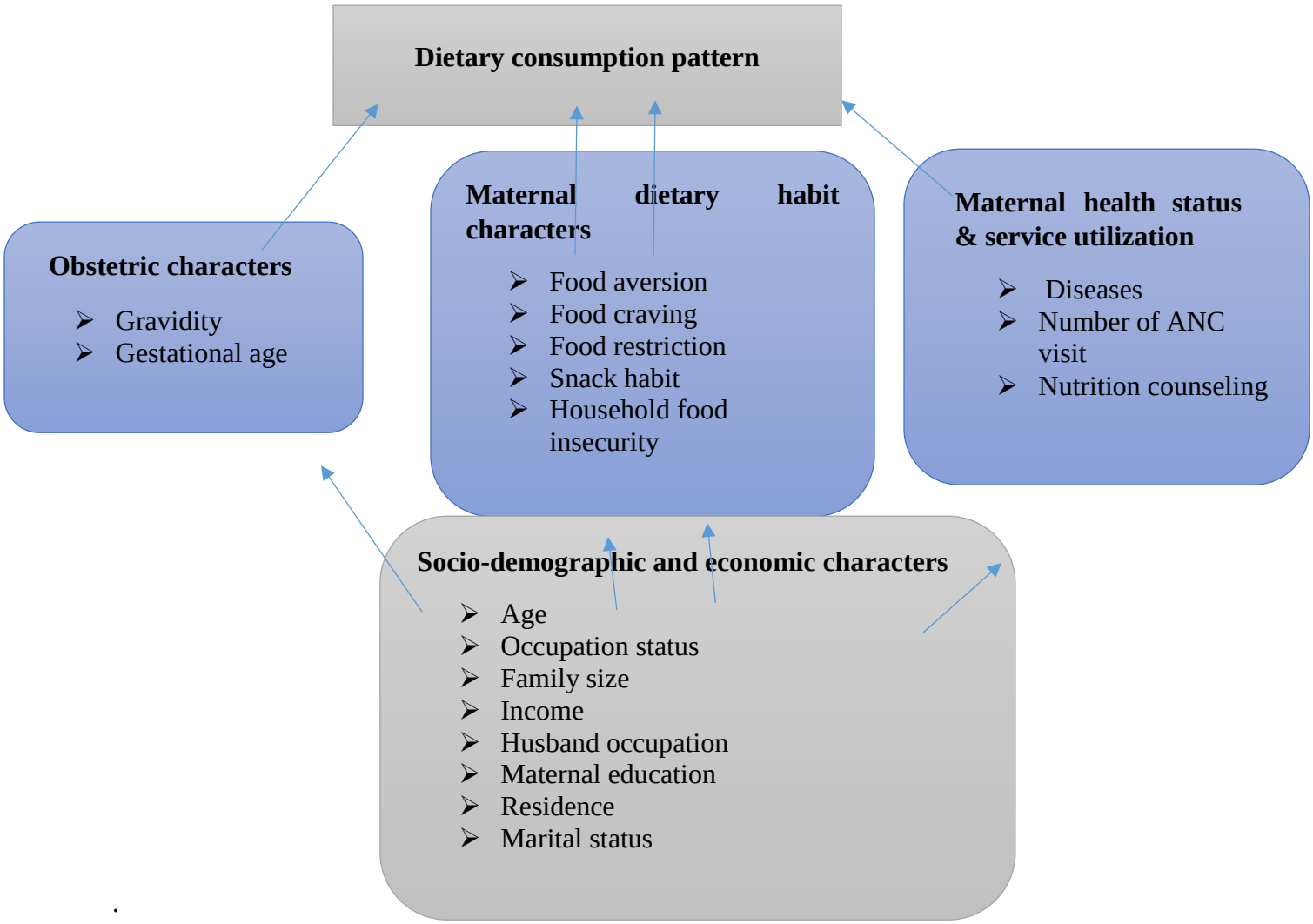

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Figure 1 Conceptual frame work diagram for factors associated with dietary consumption patterns among pregnancy women in Somalia, 2024.Source: modified and adopted from UNICEF conceptual frame work of malnutrition (UNICEF 20013) the variable source is different

3. METHODS AND MATERIAL

3.1. Study area/setting and study periods

Puntland is found in the northeastern region of Somalia. Gar-owe is the capital city of Puntland state of Somalia and is located in the Nugal region. An estimated population total population of 190, 0000 resident, including a significant number of displaced people. Gar-owe has a hot climate with typically hot, sunny weather., the average temperature reaches a maximum of about 41 °C over the summer period. Annual rainfall is low. The main ethnicity of the region is Somali and the religion is Muslim.

Gar-owe city has one public Referral hospital, and 6 private hospital and 10 health centers. The city has 100% health service coverage and more than 80% educational coverage, this study will be carried out in public and private health facilities that provide the maternity department is one of six main departments that provide health services to more than a million people. Where this research will be conducted among pregnant women attending there from to June 20, July 20, 2024.

3.2. Study design

Health institution- based cross-sectional study design was conducted

3.3. Population

3.3.1. Source population

All pregnant women attending antenatal care in public and private health facilities in Ga-owe Puntland Somalia

3.3.2. Study population

All pregnant women who visited antenatal care in the selected public and private health facilities in Gar-owe Puntland Somalia during the data collection period

3.4. Inclusion and exclusion criteria

3.4.1. Inclusion criteria

All the eligible pregnant women who attended ANC public and private health facilities in Garowe during the study period was included

3.4.2. Exclusion criteria

Women who were diagnosed with diabetes mellitus and hypertension was excluded as they may restrict certain diets due to medical recommendations. In addition, to reduce the effects of nausea and vomiting during pregnancy, those in the first trimester of pregnancy were excluded.

3.5. Sample size determination

3.5.1. Sample size calculation for first objective

The conventional formula for estimating a single proportion was used to determine the sample size. Since no prior study has been completed in Somalia that clearly demonstrates the prevalence percentage, the prevalence high dietary score in Ethiopia (Oumer et al., 2022)are taken into consideration, along with a 95% confidence level and a 5% margin of error. 10% of the calculated sample size was added to account for the non-response rate, where:

$N = (Z_{a/2})^2 pq/d^2 = 1.96^2 \times 0.47(1-0.47) \div (0.05)^2 = 382$

n: initial sample size

z: normal deviant at the portion of 95% confidence interval two tailed test 1.96

p: proportion of dietary consumption patterns among pregnant women

q: 1-p

d: margin of error acceptable 5% = 0.05

10% of non-response rate

The final sample size is 420.

3.5.2 Sample size determination for the second objectives

Sample size was calculated for dietary consumption patterns and associated factors among pregnancy women by using double proportion formula according assumptions such as two-sided confidence level of 95%, margin of error of 5% and power of 80% using epi Info 7 software for the double proportion formula, 10% of non-response rate and the respective odds ratio for each factor.

Table 1 sample size determination for different factors associated dietary consumption patterns among pregnancy women in Gar-owe Puntland Somalia

Factors	Assumptions	Sample with 10% of Non response rate	Ref
Nutrional counseling	AOR =1.96 Percent unexposed outcome =19.2 % Confidence = 95% Significance =5%	406	Oumer et al. 2022
Food craving	AOR =4.27 Percent unexposed outcome = 18.2% Confidence = 95% Significance =5%	86	Oumer et al. 2022

Hence, comparing the two sample sizes calculated for the first and second objective, the larger sample calculated for 420 Therefore, a total of 420 Sample pregnant women were required for this study

3.6 Sampling procedure and techniques

The city had one hospital of public health facility and 6 hospital in private and 10 health centers out of these, six (three hospital and three health centers) were chosen randomly by a simple and sampling methods. The ultimate sample size for this study 420, selected hospitals and health centers according to the quantity of patients flows or visits every month, using the last six month of registration data of selected health institutions, the total number of pregnant women who visit Garowe General Hospital, Arafat Hospital, Qaran Hospitals, Barwaqo, Daryeel, and Jawle Health Centers per month 650, 600, 400, 250, 200, and 150, in turn. Consequently, the necessary sample size from particular hospitals and health facilities is: Gar-owe general hospital (121), Qaran hospital (75), and Arafat hospital (112)

Barwaqo Health Center (47), Daryel Health center (37) and the Jawle Health center (28). The study participant will be recruited by a systematic random sampling technique using the prior registration data of chosen hospitals and health centers as a sampling frame till the entire sample size acquire.

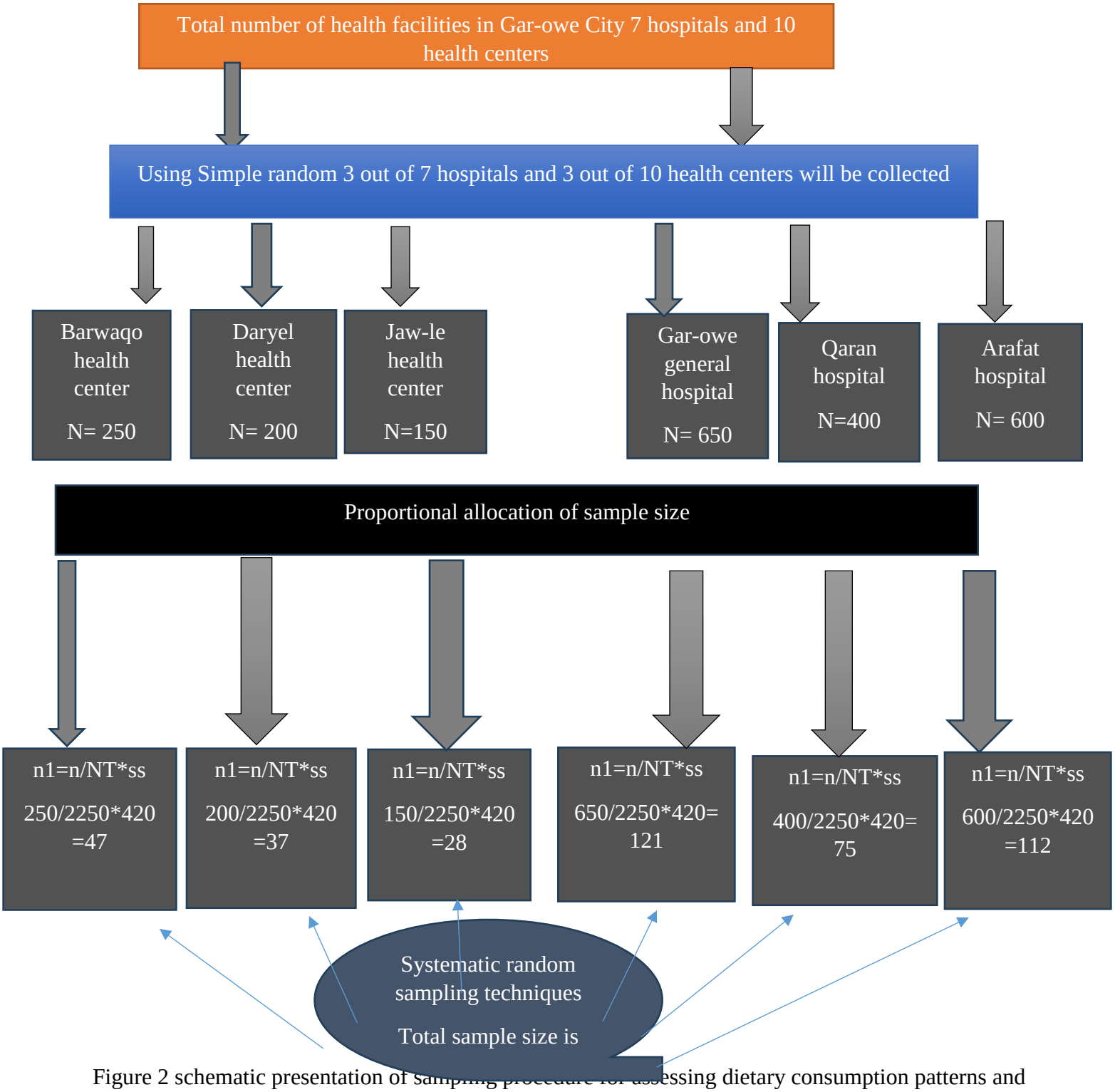

Figure 2 schematic presentation of sampling procedure for assessing dietary consumption patterns and associated factors among pregnancy attending antenatal public and private health facilities in Gar-owe Puntland Somalia

3.7. Data collection methods

3.7.1. Data collection tools

A standardized questionnaire produced in both English and Af-Somali, along with sociodemographic variables, household assets, obstetric history, dietary consumption, and the 43-item FFQ, was used to collect the data through in-person interviews that were pretested. Data on food consumption during the previous one-month recall period was gathered using a modified version of the FFQ. The frequency of consumption was recorded on a nine-point scale, from never to three times. Evidence suggests that the FFQ is a good instrument to predict micronutrient intakes, and the questionnaire asks about individual foods one at a time. The current frequency is a reasonably easy, valid, and reliable dietary assessment method that can be used to determine dietary patterns.

3.7.2. Data collectors and supervisors

One bachelor's degree midwife was hired as a supervisor, while two diploma nurses and three diplomas in public health were hired as data collectors. They all received two days of training on how to approach and recruit study participants, interviewing tactics and processes, and how to complete the questionnaire. Pregnant women in the unselected health centers took a pretest prior to the real data collection and any necessary adjustments.

3.7.3. Data collection procedure

Data collectors and supervisors of data collection received three days of training. During that time, we learned how to complete questionnaires and how to approach respondents with structured questionnaires in order to get data through in-person interviews conducted by qualified nurses.

3.8 Variable of the study

3.8.1. Dependent variable

Dietary consumption patterns among pregnant women

3.8.2. Independent variable

Socio demographic (age, occupation status, family size, income, husband occupation, maternal education, residence marital status)

Obstetric characters (gravidity, gestational age)

Maternal dietary habits characters (food aversion, food craving, and food restriction, household food insecurity)

Maternal health status &service utilization (Disease, number of ANC visit, nutrition counseling)

3.9. Operational definition:

Dietary patterns consumptions: the habitual and recurring intake of food and beverages was assessed by asking respondents 43 questions regarding their frequency of consumption (daily, weekly, or monthly) the result identified three distinct dietary patterns. A dietary score greater than 50% was classified as high tercile, indicating strong adherence to a healthy dietary pattern. Conversely, a score below 50% was categorized as low tercile, reflecting poor dietary habits and insuffient consumption of assential nutrient. (Nana and Zema, 2018a).

Antenatal carevisit (ANC): is astructured health care encounter between a pregnant women and qualified healthcare provider the respondet was asked 2 questions questionnaire 2×4=8 those scored ≤ mean correctly was measured have good follow up during pregnancy and those scored < mean was measured have poor follow up during pregnancy (Duodu et al., 2022)

Household Food Insecurity: indicator categorizes households into four levels of household food insecurity (access): food secure, and mild, moderately and severely food insecure. Households are categorized as increasingly food insecure as they respond affirmatively to more severe conditions and/or experience those conditions more frequently (Coates et al., 2007).

Food Secure Household: Experiences none of the food insecurity (access) conditions, or just experiences worry, but rarely. (Coates et al., 2007).

A Mildly Food Insecure (Access): household worries about not having enough food sometimes or often, and/or is unable to eat preferred foods, and/or eats a more monotonous diet than desired and/or some foods considered undesirable, but only rarely. But it does not cut back on quantity nor experience any of three most severe conditions (running out of food, going to bed hungry, or going a whole day and night without eating). (Coates et al., 2007).

A Moderately Food Insecure Household: sacrifices quality more frequently, by eating a monotonous diet or undesirable foods sometimes or often, and/or has started to cut back on quantity by reducing the size of meals or number of meals, rarely or sometimes. But it does not experience any of the three most severe conditions. (Coates et al., 2007).

A Severely Food Insecure Household: has graduated to cutting back on meal size or number of meals often, and/or experiences any of the three most severe conditions (running out of food, going to bed hungry, or going a whole day and night without eating), even as infrequently as rarely. In other words, any household that experiences one of these three conditions even once in the last four weeks (30 days) is considered severely food insecure. (Coates et al., 2007).

3.10. Data quality and control

The questionnaire was first translated from English into Af-Somali, the native tongue, and then, using a variety of linguistic techniques, back to English. All supervisors and data collectors receive orientation and training on conducting interviews and documenting data prior to being assigned to each healthcare facility. A pretest was administered to 5% of the sample size in both public and private healthcare facilities, including Jawle Health Center, Qaran Hospital, Arafat Hospital, Barwaqo Health Center, Daryel Health Center, and Gar-owe General Hospital. In Somalia's Gar-owe Puntland. In order to evaluate the appropriateness of the wording, the clarity of the questions, and the responses to the questions, the supervisors and investigators were closely monitoring and supervising the data gathering process.

3.11. Data processing and analysis

The data collected using kobotoolbox, cleaned for completeness and exported to excel then subsequently exported to Stata 17 for data analysis. Descriptive statistics; mean, median, standard deviations, frequency was used to analyze the data. Appropriate statistical tables and charts where be used to present the results. Normality tests were done for continuous variables using normality plots. The HFIAS score and categories was computed and recoded as per the 2007 FANTA food insecurity measurement scale (Coates et al., 2007).

The FFQ data was coded and the mentioned frequencies was be categorized into daily, weekly and monthly frequency equivalents. Then, sequential exploratory factor analysis was conducted after checking multiple assumption using principal component analysis. Having a strong correlation (r above 0.3), sample adequacy tests (Kaiser Meyer Olkin (KMO) value of above 0.5 and strong overall correlation among items (barrelette Test of sphericity value below 0.05) was be used to sequentially screen items to be retained. Considering the Eigen value above 1, the percentage of variance explained above 40% with biological plausibility, the final factors or components or dietary patterns was be identified. Finally, the factor scores were generated using varimax method and ranked into three categories terciles.

A stepwise ordinal logistic regression was conducted to assess factors associated with each

Identified dietary patterns. The proportional odds assumption and constant slope parameters over three categories where checked using a test parallel lines. The variable with p0-bvalue below 0.2 in biavariable and entered into multivariable logistic regression other relevant variables from previous literatures was considered in the final model. Adjusted Odds ratio with 95% confidence interval was reported where statistical significance was declared at p-value below 0.05. Multicollinearity and effect modifications was checked by Hosmer and lemesshow of goodness of fit test.

3.12. Ethical considerations

The approval ethical clearance latter for the study obtained from Haramaya University College of Health and Medical Sciences Institutional Health Research Ethics Review Committee (IHRERC) and official latter was written by health instituations in Gar-owe Puntland, Somalia, and Ministry of Health, and data collecting was started after the ministry has been granted permission and cooperation. The heads of medical facilities and participants were given a thorough explanation of the study's goals, methods, and duration, as well as any potential dangers or advantages. The chiefs of the medical facilities and the expectant women then gave their written, signed, and individually informed consent. By keeping their names anonymous during the data collection process, the respondents were guaranteed confidentiality. They must be fully aware that, should they encounter any difficulties, they are free to decline participation in the study entirely or to leave at any moment.

3.14. Plan for information dissemination

The findings of this study will be shared with Haramaya University's School of Public Health order to complete the requirements for postgraduate study. The findings were presented to interested and concerned organizations as well as the Gar-owe administrative health bureau in order to design health initiatives on food patterns and related factors among pregnant women as a public health issue. The study will be promoted in both national and international journals.

4. RESULTS

4.1. Socio-demographic characteristics

Of the 420 study participants, 412 were interviewed (with a response rate of 98%). The average age of the respondents was 25.5 years (SD ±5.19). Almost one-fourth of mothers, 217 (52.65%), were unable to read and write. Based on the respondents' occupational status, 210 (50.97%) were unemployed, while 202 (49.03%) were employed. In terms of education, there were 58 (14.08%) who attended college or higher. There were 376 (91.26%) mothers who were currently married. Respondents had an average monthly income of 179 USD (SD ±61.36). In households with more than ten family members, 27 (6.55%) were the primary source of food, while 393 (95.39%) purchased food. (Table 2)

Table 2: socio-demographic characteristic of the participant in Public and Private Health Facilities in Gar-owe, Punt land, Somalia, APRIL 2025(n= 412)

Variable	Categories	Frequency	%
Residence area	Urban	384	93.2
	Rural	28	6.8
Marital status	Married	376	91.2
	Divorced	10	2.4
	Widowed	26	6.3
Age of the mother in years	15-24	188	45.6
	25-34	196	47.5
	>35	28	6.8
Education of the mother	No formal education	217	52.6
	Primary	28	6.8
	Secondary	109	26.4
	Collage and above	58	14.0
Income per month ($)	Poor	244	59.2
	Middle	75	18.2
	Wealth	93	22.5
Occupation of mother	Employed	202	49.0
	Un employed	210	50.9
Husband occupation	Daily labor	142	37.7
	Merchant or any busi	70	18.6
	Government employe	164	43.6
Family size	Small	294	71.3
	Middle	91	22.0
	Large	27	6.5
Source of family	Purchasing	393	95.3
	Production	12	2.9

	Food aid/relief	7	1.7
Husband support	Yes	370	89.8
	No	42	10.1
Methods of support	Purchasing variety fo	88	21.3
	By giving money		
	By farm gardening	311	75.4
		13	3.1

4.2. Maternal obstetric, health and service utilization status

In this study more than half of the women 210 (50.97%), reported receiving nutritional counseling, although 202 (49%) did not. Among the respondent, 160 (38.83%) had no reported a disease. Dyspepsia was the most frequently condition among those who did not receiving counseling, affecting 90(93.8%) of them. in total of 27 (30.00%) of the women were closely monitored, while 23 (25.55%) were diagnosed hypertension or diabetes and 4 (4.44%) presented with other conditions such as (pre eclampsia, and infection). With respect to antenatal care (ANC) utilization 216 (52.43%) of participant had attended only one visit, 139 (33.74%) had attended two visit, and 57 (13.83%) attended more than two visit. The average gestational age among of respondents was 25.5 weeks (SD ±4.42). Additionally, the study found that 45 (10.9%) of the women were primigravida. (Table 3)

Table 3 Maternal health status &service utilization in Public and Private Health Facilities in Gar-owe, Punt land, Somalia APRIL 2025 n= (412)

Variable	Categories	Frequency	%
Disease	Yes	252	61.1
	No	160	38.8
Skipped meals due to disease	No	6	6.5
	Yes	90	93.7
Types of disease	Diabetes	22	24.4
	Dyspepsia	27	30.0
	Heart disease	23	25.5
	Hypertension	14	15.5
	Other*	4	4.4
ANC visit	Once visit	216	52.4
	Second visit	139	33.7
	Third visit	57	13.8
Nutritional counseling	Yes	210	50.9
	No	202	49.0
Gravidity	Prim gravidity	45	10.9
	Multi gravidity	367	89.0
Gestational age in weeks	16-24	196	47.5
	25-34	181	43.9
	≥35	35	8.5

Others*(pre eclampsia, infection).

4.3. Maternal dietary habits characters

A study of pregnant women revealed that food craving were common, reported by 157 participants (38.11%), While participants 255(61.89) did not experience cravings. most respondent, 367 (89%), had 6-10 living children, 26 (6.3%) had 1-5 children, and 19 (4.6%) had more than 11 children. Food restrictions were reported by 119 participants (28.9%). primarily due to food allergies, 68 cases (94.4%) while a few reported restrictions for weight loss or lactose intolerance 2 participant (2.8%) regarding the reason for food restrictions, 196 (47.6%) were unaware of the reason for specific food restrictions, while 155 (37.6%) feared weight gain, and 56 (13.6%) were concerned about having a large baby. Only five participants (1.2%) attributed restrictions to culturally unacceptable practices. The most of respondents 328 (79.6%), reported consuming 2-3 meals per day, while 84 (20.4%) ate 4-5 meals daily. Most participants, 328 (79.6%), reported not eating snacks, while 103 (25%) did. (Table 4)

Table 4 Maternal dietary habits characters in Public and Private Health Facilities in Gar-owe, Punt land, Somalia APRIL 2025

Variable	**Categories**	**Frequency**	**%**
Food craving	Yes	157	38.1
	No	255	61.8
Food aversion	Yes	176	42.7
	No	236	57.2
Living children	1–5	26	6.3
	6-10	367	89.0
	>11	19	4.6
Food restriction	Yes	119	28.8
	No	293	71.1
Type of food restriction	Dating of weight loss	2	2.7
	Food allergies	68	94.4
	Lactose intolerance	2	2.7
Reason of some food restriction	Fearing weight gain	155	37.6
	Fearing big baby	56	13.6
	Culturally unacceptable	5	1.2
	I have no idea	196	47.5
Times of eating(meal time)	2-3	328	79.6
	4-5	84	20.3
Snacks	Yes	103	25.0
	No	309	75.0

4.4. Household food insecurity status

With regard to household food security, 121 households (29.37%) were classified as food secure, with a 95% confidence interval (CI) of 25%-33%. Meanwhile, 31 households (7.52%) were mildly food insecure (CI: 5%-10%), 198 (48.06%) were moderately food insecure (CI: 43%-52%), and the remaining 62 households (15.08%) were severely food insecure (CI: 11%-18%). (Figure 3).

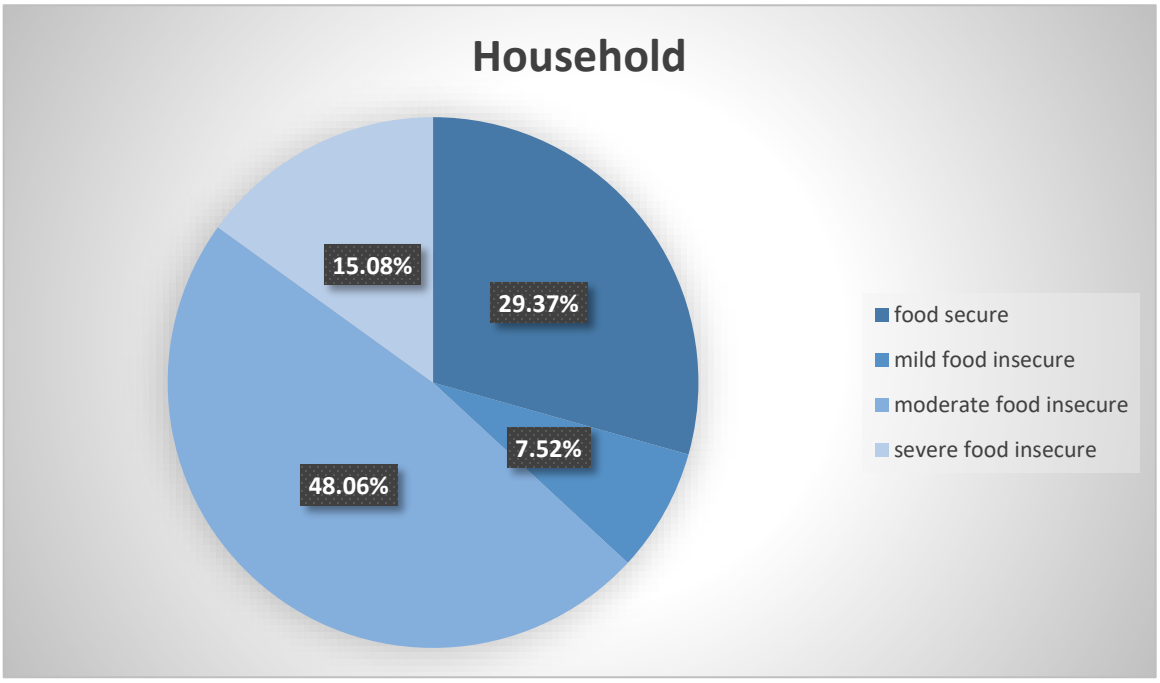

Figure 3 household food insecurity Public and Private Health Facilities in Gar-owe, Punt land, Somalia.

4.6. Dietary consumption patterns of pregnant women

After checking the presence of significant correlation among the food items and sample adequacy using KMO and the p value is 0.872, a total of 3 major dietary patterns explaining more than 29% of the dietary variation were identified. The number of dietary patterns was determined using various scenarios; total variance explained, significance of additional pattern on the variation, the number of food items loading to a particular dietary pattern. For instance, with the addition of the fourth dietary pattern, only one food item was loading to the fourth dietary pattern and does not have huge influence on the variation explained. Hence, a total of three dietary patterns were optimal where dietary pattern1which explained 24.736 of the total variances, include such foods vegetable (Green cabbage) starch stable (Spaghetti-pasta, Rice, Anjera-somali, Porridge) milk and milk product (Cheese, yoghurt, Goat milk), meat and poultry. This particular pattern of eating is referred to as "Nutrient-Dense" because it includes consumption of carbohydrates, proteins, fats, and micronutrients.

The dietary pattern2 which explained 2.364 of the total variance includes such foods such as tubers (potatoes) fruits (banana, watermelon, mango, orange, grape, papaya) vegetable (beetroot, carrot). This particular pattern of eating I s referred to as “fruits and vegetable”

The dietary pattern3 which explained 1.888 of the total variance includes such foods such as animal source (liver kidney, fish, camel milk, butter) fats and oil (palm oil) sweety (table sugar).

Table 5 Rotated component matrix showing the food with high factor loading with the identified dietary patterns among pregnant women in Punt land, Somalia

Food items	Dietary pattern 1	Dietary pattern 2	Dietary pattern 3
Green cabbage	0.44		
Spaghetti-pasta	0.54		
Meat	0.64		
Anjera-somali	0.50		
Rice	0.49		
Lentils	0.40		
Poultry	0.61		
Cheese	0.74		
Yoghurt	0.63		
Goat milk	0.50		
Porridge	0.54		
Potatoes		0.51	
Banana		0.71	
Watermelon		0.55	
Mango		0.63	
Orange		0.58	
Grape		0.52	
Papaya		0.48	
Beetroot		0.60	
Carrot		0.49	
Liver kidney			0.36
Fish			0.60
Camel milk			0.41
Butter			0.49
Palm oil			0.76
Table sugar			0.44

Dietary pattern 1 refers (Nutrient dense), dietary pattern 2 refer (Fruits and Vegetable) dietary pattern 3 (Animal source and sweety food)

4.6. Factors associated with dietary patterns among pregnancy women

Bivariate ordinal logistic regression analysis was used to check crude association of independent variable with dietary patterns among pregnancy women. Independent variable with p-value <0.20 with the dietary patterns in bivariate analysis Education, mother occupation, age of the mother, income, family size, husband occupation, and the place of residence. Were fitted into multivariable logistic regression model to control possible effect of confounders among independent variable. (Table 6, 7and 8)

During binary ordinal logistic analysis fourteen independent variable of nutrient dense and also eleven independent variable of fruit and vegetable and ten independent variable of Animal source and sweety foods were found for nominated as candidate for multiple logistic regressions Having P-value <0.20. However six independent factor of Nutrient dense and nine independent factor of Fruit and vegetable and also four independent factor of Animal source and sweety foods were found to be significance associated with dietary pattern among pregnancy women at p-value <0.05. (Table 6, 7 and 8).

The odds of achieving adequate nutrient density were 3.4 times higher **(**AOR 3.4, 95% CI: 1.1–10.9**)** among pregnant women who attended college or higher education compared to those with no formal education. The family middle size 4.38 times (4.38, 95% CI: 1.60-11.9) more likely than compared large family size. Women with high socioeconomic status were 1.87 times more likely **(**1.87, 95% CI: 1.0–3.47**)** to have better nutrient density than those with low socioeconomic status. Regarding gravidity, prim gravida women had 2.65 times higher odds **(**2.65, 95% CI: 1.13–6.18**)** compared to multigravida women. Similarly, pregnant women with a gestational age greater than 35 weeks were 2.99 times more likely **(**95% CI: 1.1–8.05**)** to achieve better nutrient density compared to those with a gestational age between 15 and 24 weeks**.** Women who did not experience food cravings were paradoxically 2.52 times more likely **(**2.52, 95% CI: 1.45–4.39**)** to report food cravings than those who did. Additionally, pregnant women without food aversion were 1.62 times more likely **(**1.62, 95% CI: 1.0–2.60**)** to experience food aversion compared to those who had it. Pregnant women who attended two antenatal care (ANC) visits were 1.77 times more likely **(**1.77, 95% CI: 1.04–3.02**)** to have improved nutrient density compared to those who attended only one visit. Lastly, those who received nutritional counseling were 1.88 times more likely (1.88, 95% CI: 1.08–3.25**)** to have improved nutrient intake compared to those who did not receive counseling. (Table 6)

Pregnant women whose mothers were aged 35 years or older were 4.7 times more likely (4.7, 95% CI: 1.6–13.9) to consume high terciles of fruits and vegetables compared to those whose mothers were

aged 25-34 years. Similarly, women from families with high socioeconomic status were 1.87 times more likely (1.87, 95% CI: 1.19–2.9) to consume higher terciles of fruits and vegetables than those from families with low socioeconomic status. Regarding gestational age, pregnant women who were ≥35 weeks were 4.6 times more likely (4.6, 95% CI: 1.7–12.6) to consume high terciles of fruits and vegetables compared to those between 15 and 24 weeks of gestation. Additionally, pregnant women who received nutritional counseling were 1.82 times more likely (1.82, 95% CI: 1.13–2.9) to follow dietary recommendations and consume high terciles of fruits and vegetables compared to those who did not receive counseling. (Table 7).

Urban residents were 1.92 times more likely (1.92, 95% CI: 1.1–3.4) to consume animal-source foods and sweet foods compared to those living in rural areas. Pregnant women aged 35 years or older were 2.9 times more likely (2.9, 95% CI: 1.07–7.9) to consume these foods compared to those aged 15–24 years. Mothers who did not have food restrictions were 2.0 times more likely (1.92, 95% CI: 1.13–3.3) to consume these foods compared to those who had food restrictions (Table 8).

Table 6 Factors associated with higher consumption of Nutrient dense among pregnancy women in Gar-owe Puntland, APRIL 2025

Factors	Categories	Nutrient dense		COR(95%CI)	P-valu	AOR(95%Cl)	P-value
		High	Low				
Residence	Urban	216(56.3)	168(43.8)	0.9(0.44-2.09)	0.92		
	Rural	16(57.8)	12(57.1)	1			
Marital status	Divorced	7(70.0)	3 (30.0)	1.84(0.46-7.2)	0.38		
	Widowed	15(57.7%)	11(42.3)	1.07(0.48-2.4)	0.84		
	Married	210(55.8)	166(44.1)	1			
Education of mother	No.formal educ	124(56.6)	95(43.3)	2.46(1.05-5.77)	**0.03**	1.43(0.5-3.97)	
	Primary	9(34.6)	17(65.3)	1			
	Secondary	45(49.4)	46(50.5)	1.84(0.74-4.5)	**0.18**	1.55(0.5-4.52)	0.45
	Collage and Above	54(71.0)	22(28..9)	4.63(1.7-11.9)	**0.002**	3.4(1.1-10.9)	**0.03**
Mother occupation	employed	131(62.3)	79(37.6)	1			
	Unemployed	101(50.0)	101(50.0)	1.65(1.1-2.4)	**0.012**	1.17(0.73-1.88)	0.50
Husband occupation	Merchant or any Business	36(51.4)	34(48.5)	0.85(0.49-1.49)	0.56		
	Daily labor	94(59.4)	64(40.5)	1.18(0.76-1.8)	0.44		
	Government employee	102(55.4)	82(44.5)	1			
Age of mother	15-24	126 (67.0)	62 (32.9)	2.7(1.2-6.0)	**0.01**	1.58(0.60-4.14)	0.34
	25-34	94 (47.9)	102(52.0)	1.2(0.5-2.7)	0.63	0.77(0.33-1.97)	0.58
	≥35	12(42.8)	16(57.1)	1			
Family size	Small	161(58.7)	113(41.2)	2.09(1.08-4.05)	**0.028**	1.50(0.66-3.43)	0.32
	Middle	54(56.2)	42(43.7)	1.83(0.9-3.94)	**0.090**	4.38(1.60-11.9)	**0.004**
	Large	17(48.4)	25(59.5)	1			
Income	High	78(55.7)	62(44.2)	2.08(1.2-3.4)	**0.037**	1.87(1.0-3.47)	**0.04**
	Middle	113(69.3)	50(30.6)	3.7(2.2-6.2)	**0.000**	2.49(1.29-4.79)	**0.006**
	Low	41(37.6)	68(62.3)	1			
Gravidity	Prim gravidity	35(77.7)	10(22.2)	3.02(1.45-6.28)	**0.003**	2.65(1.13-6.18)	**0.02**
	Multi gravidity	197(53.6)	170(46.3)	1			
Gestational age	≥35	26(74.2)	9(25.7)	2.4(1.09-5.5)	**0.030**	2.99(1.1-8.05)	**0.03**
	25-34	100(55.2)	81(44.7)	1.04(0.69-1.57)	0.820	0.76(0.45-1.26)	0.29
	16-24	106(54.0)	90(45.9)	1			
Food cravings	No	158 (61.9)	97(38.0)	1.82(1.2-2.7)	**0.003**	2.52(1.45-4.39)	**0.001**
	Yes	74(47.1)	83(52.8)	1			
Food aversion	No	147(62.2)	89(37.7)	1.76(1.1-2.6)	**0.005**	1.62(1.01-2.60)	**0.04**

	Yes	85(48.3)	91(51.7)	1			
Food restriction	No	54(75.0)	18(25.0)	2.7(1.5-4.8)	**0.001**	0.49(0.25-0.94)	0.34
	Yes	178(52.3)	162(47.6)	1			
Household food insecuri	Food insecure	179(61.5)	112(38.4)	2.05(1.3-3.15)	**0.001**	1.95(1.12-3.40)	0.17
	Food secure	53(43.8)	68(56.2)	1			
Disease	No	101(63.1)	59 (36.8)	1.58(1.05-2.38)	**0.027**	1.0(0.61-1.65)	0.97
	Yes	131 (56.3)	121 (48.0)	1			
ANC visit	3 times	34 (59.6)	23 (40.3)	1.59(0.8-2.8)	**0.12**	1.8(0.9-3.7)	0.08
	2 times	45 (32.3)	94 (67.6)	2.24(1.4-3.5)	**0.000**	1.77(1.04-3.02)	**0.02**
	1 time	104 (48.1)	112 (51.8)	1			
Nutritional counseling	Yes	132(62.8)	78 (37.1)	1.72(1.1-2.5)	**0.006**	1.88(1.08-3.25)	**0.02**
	No	100 (49.5)	102(50.5)	1			
Snacks consumption	Yes	53(51.4)	50(48.5)	0.76(0.49-1.20)	0.252		
	No	179(57.9)	130 (42.0)	1			

COR: crude odds ratio AOR: adjusted odds ratio

Table 7 Factors associated with higher consumption of Fruits and vegetable among pregnant women in Gar-owe Puntland Somalia APRIL 2025

Factors	Categories	Fruit and vegetable		COR	P-value	AOR(95%Cl)	p-valu
		High	Low				
Residence	Urban	218(56.7)	166(43.2)	1.31(0.60-2.8)	0.487		
	Rural	14(50.0)	14(50.0)	1			
Marital status	Married	214(56.9)	162(43.0)	1.54(0.3-7.6)	0.459		
	Divorce	6(60.00)	4(40.00)	1.75(0.3-7.6)	0.288		
	Widowed	12(46.1)	14(53.8)	1			
Education	Collage and ab	46(60.5)	30(39.4)	1.57(0.92-2.67)	**0.093**	0.79(0.49-1.71)	0.483
	Secondary	59(64.8)	32(35.1)	1.89(1.14-3.14)	**0.013**	1.62(0.92-2.87)	0.096
	Primary	19(73.0)	7(26.9)	2.78(1.12-6.90)	**0.026**	2.3(0.85-6.3)	0.100
	No-formal education	108(49.3)	111(50.6)	1			
Mother occupation	Employed	138(57.5)	102 (45.3)	1.12(0.75-1.6)	0.562		
	Unemployed	94 (54.6)	78(45.3)	1			
Husband occupation	Daily laborer	83(52.5)	75(47.4)	1.05(0.6-1.62)	0.790	1.7(0.76-3.7)	0.192
	Merchant or business	55 (78.5)	15(21.4)	3.5(1.85-6.65)	**0.000**	0.8(0.5-1.2)	0.377
	Government employee	94 (51.0)	90 (48.9)	1			
Age of mother	≥35	23 (82.5)	5 (17.4)	5.2(1.19-14.3)	**0.001**	4.7(1.6-13.9**)**	**0.005**
	25-34	121(61.7)	75 (38.2)	1.83(1.22-2.7)	**0.003**	1.87(1.19-2.9)	**0.007**
	15-24	88 (46.8)	100 (53.1)	1			
Family size	Small	165(56.1)	129(43.8)	0.752(0.3-1.69)	0.494		
	Middle	50 (54.9)	41 (45.0)	0.717(0.291.73)	0.461		
	Large	10 (37.0)	17 (62.9)	1			
Income	High	33(35.4)	60(64.5)	1.62(0.98-2.65)	**0.055**	2.45(1.3-4.4)	**0.003**
	Middle	43(57.3)	32 (42.6)	1.19(0.7-2.0)	0.498	1.63(0.87-3.05)	0.125
	Low	129 (52.8)	115 (47.1)	1			
Gravidity	Multi--gravid	209 (56.9)	158 (43.0)	1.26(0.60-2.35)	0.457		
	Multi-gravid	23(51.1)	22(48.8)	1			
Gestational age	≥35	29 (82.8)	6 (17.1)	5.1(2.0-12.19)	**0.001**	4.6(1.7-12.6)	**0.005**
	25-34	108 (59.6)	73(40.3)	1.57(1.04-2.3)	**0.030**	1.2(0.79-2.02)	0.310
	16-24	95 (48.4)	101 (51.5)	1			
Food aversion	Yes	106(60.2)	70(39.7)	1.32(0.8-1.9)	**0.167**		
	No	126(53.3)	110 (46.6)	1			
Food cravings	Yes	81 (51.5)	76 (48.4)	0.73(0.49-1.02)	**0.130**	1.2(0.77-2.08)	0.336
	No	151(59.2)	104(40.7)	1			
Food restriction	Yes	42 (58.3)	30(41.6)	1.10(0.66-1.85)	0.703		
	No	190 (55.8)	150 (44.1)	1			
Household food insec	Food secure	86 (71.0)	35 (28.9)	2.44(1.54-3.84)	**0.000**	1.70(0.95 -3.05)	0.072
	Foodinsecure	146(50.1)	145(49.8)	1			
Disease	Yes	150(59.5)	102 (40.4)	1.39(0.9-2.08)	**0.099**	1.5(0.99-2.51)	0.054

	No	82 (51.2)	78 (48.7)	1			
ANC visit	3 times	33 (57.8)	24(42.1)	1.02(0.56-1.84)	0.947		
	2 times	75 (53.9)	64 (46.0)	0.86(0.56-1.33)	0.523		
	1 time	124 (57.4)	92 (42.5)	1			
Nutrition counseling	Yes	128(60.9)	82 (39.0)	1.47(0.99-2.17)	**0.053**	1.82(1.13-2.9)	**0.014**
	No	104 (51.4)	98(48.5)	1			
Snacks consumption	Yes	76(73.7)	27(26.2)	2.76(1.68-4.5)	**0.000**	1.72(0.91-3.22)	0.090
	No	156(50.4)	153(49.5)				

COR: crude odds ratio AOR: adjusted odds ratio

Table 8 Factors associated with higher consumption of Animal source and sweety foods among pregnancy women in Gar-owe Puntland Somalia APRIL 2025

Factors	**Categories**	**Animal source and sweety foods**		**COR(95%CI)**	**P-value**	**AOR((95%Cl)**	**P-valu**
		High	**Low**				
Residence	Urban	196(59.6)	133(40.4)	1.92(1.18-3.13)	**0.008**	1.74(0.99-3.05)	**0.016**
	Rural	36(43.4)	47(56.7)	1			
Marital status	Widowed	16 (61.5)	10 (38.4)	1.27(0.56-2.8)	0.555		
	Divorced	7 (70.0)	3(30.0)	1.84(0.47-7.3)	0.372		
	Married	209(55.2)	167(44.4)	1	0.555		
Education	Collage and above	44 (57.8)	32(42.1)	1.22(0.72-2.06)	0.458		
	Secondary	36 (39.5)	36(39.5)	1.35(0.82-2.2)	0.229		
	Primary	17 (65.3)	9(34.6)	1.67(0.71-2.08)	0.233		
	No-formal education	116(52.9)	103(47.0)	1			
Mother occupation	Employed	147(61.2)	93(38.7)	1.61(1.08-2.4)	**0.017**	1.22(0.78-1.90)	0.365
	Unemployed	85 (49.4)	87(50.5)	1			
Husband occupation	Government employee	101 (54.8)	83(45.1)	1.04(0.68-1.6)	0.840	1.12(0.70-1.78)	0.625
	Merchant or any busines	46(65.7)	24 (34.2)	1.64(0.68-1.6)	**0.095**	1.30(0.64-2.63)	0.563
	Daily laborer	85 (53.8)	73(46.2)	1			
Age of mother	≥35	22(78.5)	6(21.4)	3.4(1.3-8.8)	**0.011**	2.90(1.07-7.90)	**0.036**
	25-34	113(57.6)	83(42.3)	1.27(0.85-1.91)	0.234	1.18(0.77-1.81)	0.439
	15-24	97 (51.6)	91(48.4)	1			
Family size	Large	16 (59.2)	11(40.7)	1.3(0.54-3.11)			
	Small	168 (57.7)	128(42.8)	1.17(0.74-1.91)	0.461		
	Middle	48 (52.7)	43(47.2)	1			
Income	Low	143(58.6)	101(41.3)	1.38(0.85-2.2)	0.183		
	Middle	42(56.0)	33(44.0)	1.24(0.67-2.2)	0.481		
	High	47(50.5)	46(49.4)	1			
Gravidity	Multi- gravidity	212(57.7)	155(42.2)	1.70(0.91-3.1)	**0.092**	1.53(0.78-2.99)	0.207
	Prim gravidity	20 (44.4)	25(55.5)	1			
Gestational age	≥35	13(40.6)	19(59.3)	0.60(0.28-1.28)	**0.191**	0.77(0.33-1.80)	0.559
	25-34	108 (63.1)	63(36.8)	1.51(1.0-2.2)	**0.049**	1.55(0.98-2.44)	0.055
	16-24	111 (53.1)	98(46.8)	1			
Food aversion	No	78(66.1)	40(33.9)	1.77(1.13-2.76)	**0.012**	1.44(0.89-2.32)	0.132
	Yes	154(52.3)	140(47.6)	1			
Food craving	No	142(55.6)	113(44.3)	0.93(0.62-1.39)	0.745		
	Yes	90(57.3)	67(42.6)	1			
Food restriction	No	202(59.4)	138(40.5)	2.04(1.2-3.4)	**0.006**	1.92(1.11-3.33)	**0.019**
	Yes	30(41.6)	42(58.3)	1			
Household food insec	Food secure	79(65.2)	42(34.7)	1.69(1.09-2.63)	**0.018**	1.17(0.67-2.03)	0.576
	Food insecure	153(52.5)	138(47.4)	1			
Disease	Yes	144 (57.1)	108(42.8)	1.09(0.73-1.62)	0.669		

	No	88(55.0)	72(45.0)	1			
ANC visit	3 times	36 (63.1)	21 (36.8)	1.29(0.71-2.36)	0.398		
	2 times	73 (52.5)	66 (47.4)	0.83(0.54-1.28)	0.413		
	1 times	123 (56.9)	93 (43.0)	1			
Nutritional counselin	Yes	124 (59.0)	86(40.9)	1.25(0.84-1.85)	0.254		
	No	108 (53.4)	94(46.5)	1			
Snacks consumption	Yes	69(66.9)	34(33.0)	1.81(1.1-2.9)	**0.012**	1.48(0.83-2.64)	0.175
	No	163(52.7)	146(47.2)	1			

COR: crude odds ratio AOR: adjusted odds ratio

5. DISCUSSION

Current study was identified three main dietary patterns by using 43 items FFQ through factor analysis methods and association factors of each dietary pattern among pregnant women in Gar-owe Puntland Somalia. The identified dietary patterns Nutrient dense, Fruit and vegetables, Animal source and sweety foods. The overal high terciles of the dietary patterns 56.31% (95% CI: 51.4, 61.0). Factors with nutrient dense such as mother's education, family size, income, gestational age, ANC vistit, nutrional counseling. And the fruit and vegetable age of mother, income, gestational age, nutrional counseling, the animal and sweety foods such as residence area, age of the mother, food restriction had assignifacnce association with three dietary pattern.

The finding Previous Studies have shown that dietary patterns of pregnancy linked to the negative risks of pregnancy outcome like preterm, low birth weight, macrosomia, maternal obesity, and gestational diabetic. (Chen et al., 2016). In the current study, was found that animal source and cereal consumption was significant while fruit and vegetable was quite low. This findings was consistent with study conducted in Ethiopia which reports that cereal consumption is significant, while fruit and vegetable consumption is quite low among pregnant women (Oumer et al., 2022).This may make them more susceptible to current micronutrient deficiencies (deficit of zinc, iron, folic acid, and vitamin A). This is evidenced by the higher prevalence of anemia 49% (Barut and Mohamud, 2023) and malnutrition 32.2% (Zacks et al., 2021) among pregnant women in Somalia.

In the current study education of mother and family size had significant association on dietary consumption pattern particularly Nutrient dense Mothers with Collage and above 3.4(AOR= 3.4, 95% CI 1.1-10.9) times more likely to consume nutrient dense as compared to those with no. formal education. the another study in south Ethiopia 1.6 times more likely formal education than compared with no formal education (Fikadu et al., 2024) Previous research that conducted east Shoa Zone Ethiopia the education can help people learn about healthy and high-quality dietary practices women with formal education were more likely to consume a higher tercile of the "Nutrient-Dense" pattern than those without. (Wakwoya et al., 2023) Mothers with middle family size was 4.38(AOR= 4.38, 95% CI 1.60-11.9) times more likely for consuming nutrient dense compared to those with large family size. Conversely, mothers in large-sized families may experience difficulties in allocating resources leading to reduced nutrient dense Intake compared to those in middle families where communal eating and bulk purchases may prevail. Mothers with high socioeconomic status were 1.87 times more likely to consume higher terciles of nutrient dense

fruits and vegetables than those with low socioeconomic status. According to another study, Ethiopian mothers from higher socioeconomic backgrounds were 1.56 times more likely to consume greater amounts of the 'Cereals-Pulses and Dairy' and 'Nutrient-Dense' dietary patterns compared to mothers from lower socioeconomic backgrounds. This can be explained by their comparatively higher purchasing power, which allows them to afford and consume more of these foods. (Ameye et al., 2021) The gravidity and gestational age of the mothers indicate that primigravid mothers are 2.65 times more likely compared to multigravid mothers, while those with a gestational age of ≥ 35 weeks are 2.99 times more likely compared to those at 16–24 weeks. The other study from Ethiopia Primigravida and multigravida mothers had higher dietary patterns compared to grand multigravida mothers, likely because multigravida mothers have more family members. (Fikadu et al., 2014) Mothers with no food aversion (AOR = 1.62; 95% CI 1.01–2.60) and no food cravings (AOR = 2.52; 95% CI 1.45–4.39) were more likely to consume higher terciles of nutrient-dense foods compared to those who experienced food aversion and cravings. According to another study, mothers with no food aversion were 1.60 times more likely, and those with no food cravings were 4.27 times more likely, to consume higher terciles of nutrient-dense foods compared to those who experienced food aversion and cravings. (Oumer et al., 2022) Major factors influencing the consumption of non-food items and non-nutritious foods include hormonal changes during pregnancy, cultural food taboos, and specific dietary restrictions. (Koryo-Dabrah et al., 2012).

Mothers who attended two times ANC visits were 1.77 times more likely, and those who received nutritional counseling were 1.88 times more likely, to follow improved dietary patterns compared to those who did not receive nutritional counseling. In addition, a study from Ethiopia showed that women who received nutritional counseling were more likely to have a higher nutrient dense and fruits and vegetable. (Oumer et al., 2022). For optimal nutrition of both the mother and the fetus, these calls for more thorough and focused nutritional advice for expectant mothers should be reinforced. Also (49%) of women did not receive nutritional counseling during the recent ANC visit. (Wennberg et al., 2013).

Conversely, increased energy intake from animal-based foods may be linked to obesity and its complications, just as it is linked to increased consumption of Trans fats from fried foods and excessive weight gain during pregnancy. (Mattes, 2018). In a different Ethiopian study, only 39.3% of participants reported overall good dietary practices, compared to 60.7% of pregnant women who reported poor dietary practices. The study found that 61.4% of participants had good dietary knowledge, while 38.6% had poor dietary knowledge. (Nana and Zema, 2018b) thus to avoid of nutritious food of pregnant women such as

animal source foods, cereals and legumes, increase risk of micronutrient deficiencies. (Chakravarty et al., 2019) Furthermore, in this study, mothers aged ≥35 years (AOR = 2.9; 95% CI 1.07–7.9) were significantly more likely to consume higher terciles of fruits and vegetables compared to those aged 15–24 years. This could be that older mother, potentially benefiting from increased health awareness and financial stability, exhibit a higher likelihood of fruit and vegetable consumption. Urban women were 1.97 times more likely to consume the highest tercile of animal-sourced and sweet foods compared to those in rural areas. In Ethiopia, this study found that urban women were twice as likely to consume these foods compared to their rural counterparts. Mothers who did not have food restrictions were twice as likely to consume higher terciles of animal-sourced and sweet foods compared to those who had food restrictions. Dietary restriction have been related to anemia and preeclampsia, low birth weight and child development. (Iradukunda, 2020).

5.1. LIMITATIONS OF STUDY

It was not possible to rule out the possibility that respondents overreported their food intake. Social desirability may have influenced the use of rigorous measurement methods during data collection. Furthermore, since this study is cross-sectional, it cannot establish causation. Additionally, given the community's diversity, certain minor foods commonly consumed by the majority may not have been adequately recorded.

Recall bias may also be present, particularly in variables relying on recall-based data collection. Moreover, since the study was conducted in an institutional setting, its findings may not be generalizable to all pregnant women in the community.

6. CONCLUSION AND RECOMMENDATION

6.1. CONCLUSION

Pregnant women's dietary consumption varied greatly, and three main dietary patterns consisting of cereals and tubers, legumes, vegetables, and fruits were found to be responsible. Fruits, vegetables, and foods derived from animals are far too underconsumed. Behaviors food cravings and snacking Having dietary counseling, family size, gestational age, gravidity, and mother age were all significant predictors of pregnant women's eating habits.

6.2. RECOMMENDATION

For policy makers/programs/offices

Strongly advised dietary counseling massages should be created to address culturally specific unhealthy eating habits that prevent pregnant women from consuming foods high in nutrients. They should also be designed to enhance targeted and guided dietary counseling for pregnant women during the routine ANC visit.

- Through consistent capacity-building initiatives, health professionals' ability to effectively counsel women should also be improved. However, through extensive macro and microeconomic interventions, steps can be taken to improve people's economic ability and to make nutritious food more affordable.
- Lastly, I suggested that in addition to the standard analysis of food and nutrient intake, future dietary evaluations should consider dietary pattern analysis when characterizing dietary consumption.

For health office in Gar-owe bureau

- The identified inadequate diets of pregnant women receiving both public and private antenatal care must be addressed by the health office in order to improve maternal and child health in Gar-owe.
- The health office should place a high priority on improving maternal nutrition by implementing focused education programs using a variety of communication techniques, incorporating regular nutritional assessments and individualized counseling into antenatal care, and creating clear referral pathways, all of which are determined by your research on the dietary consumption patterns of pregnant women in Garowe, Puntland, Somalia.

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8. ANNEX

8.1. Information sheet and informed voluntary consent form for the heads of health facilities

Introduction:

Greeting, my name is Zainab said Abdullah, I am the principal investigator of this study to be conducted in this Health Facilities, I am studying for my master's degree at Haramaya University, the college of Health and Medical Science and I kindly request that you give me your attention so that I can explain to you about the study and why your institution was selected as the study setting.

The study title is "Assessment of dietary patterns consumption and associated factor among pregnant women attending Antenatal care in Public and Private Health facilities in Gar-owe, Puntland, Somalia"

Purpose of the study: the aim of this study is to write a thesis as a partial requirement for the fulfillment of a master's program in Public Health and Nutrition for the principal investigator, furthermore the finding of this study will be crucial for Hospitals, the Ministry of Health (MOH) and non-governmental organization(NGOs) working in reproductive age women for planning, implementing and designing intervention and counseling to improve the practice of pregnant women and they will provide more scientific knowledge about dietary patterns consumption among pregnant

Procedure and duration: I will be interviewing pregnant women using a questionnaire to provide me with pertinent data that is helpful for the study. There are some questions to answer where I will fill the questionnaire by interviewing them. The interview will take 40 minutes, and the 60 questions so I kindly request you to allow this study in your health facility.

Risks and benefits

The risk of participating in this study is minimal, only taking about 40 minutes from mothers' time. Participating in this study will be taken about 40 minutes of your working time. There will not be any direct payment for participating this study. Moreover, the finding from this research may reveal important information for the local health planners and implementers.

Confidentiality: all the information participants give will be anonymous and confidential, only used for the purposes for this research and only accessible to me. No third parties will have access to any of the

information you provide. The data will be collected, stored and disposed of in a secure manner. The information will be used in a way that will not allow you to be identified individually.

Rights: participation in this study is fully voluntary, pregnant women have the right to participate or not in the study if they decide to participate, They have the right to withdraw from the study at any time and this will not label them for any loss of benefits to which otherwise are entitled and they do not have to answer any question they do not want to answer. Additionally, the health facility has the right to stop the study from being conducted if misdeeds and unethical procedures are observed during data collection in the premise of the health facility.

Contact address: if there any question or inquires at any time about the study or procedure, please contact principal investigator: Zainab said Abdullah, phone number +252907352059, Email saynabsaid880@gmail.com Institutional Health Research Ethics Review Committee (IHRERC) at Office Phone (+251)- 0254662011 or P.O. Box 235, Harar Ethiopia

Declaration of informed voluntary consent:

I have read the participant information sheet, I have clearly understood the purpose of the study, the procedures, the risks and benefits, and issues of confidentiality, the right of participating, and the contact address for any queries, I have been giving opportunity to ask questions for things that may have been unclear. I also informed that participant have the right to withdraw from the study at any time or not to answer any question that they do not want. The hospital has right to stop this study from being conducted if any misdeeds and unethical procedures are observed during the data collection process on hospitals. Therefore, I declare my health care facilities to participate in this study with my initial (signature) as indicated below

Name and signature of head of health facilities _____ Date _____

Name of the principal investigator _____ Date _____

8.2. Participant information sheet and informed voluntary consent for participant aged ≥18 years

My name is: Zainab said Abdullah I am working as data collector for the study being conducted who studying her master's degree at Haramaya University, College of Health and Medical Science. I kindly request you to lend me your attention to explain you about the study and institution being selected as study setting.

Title of the study "dietary patterns consumption and associated factor among pregnant women attending Antenatal Care in Public and Private Health facilities in Gar-owe City, Puntland Somalia.

Purpose/aims of the study: the aim of this study is to write a thesis as a partial requirement for the fulfillment of a master's program for the principal investigator, furthermore the finding of this study will be crucial for Hospitals, the Ministry of Health (MOH) and non-governmental organization(NGOs) working in reproductive age women for panning, implementing and designing intervention and counseling to improve the practice of pregnant women and they will provide more scientific knowledge about dietary patterns consumption among pregnant.

Procedure and duration: I will be interviewing you using questionnaire to provide me with pertinent data that is helpful for the study. There are questions to answer where I fill the questionnaire by interviewing you. The interview will take about 40 minutes, and the 60 questions so I kindly request you to spare me this time for the interview.

Risks and benefits: There is minimal harm that may face participant when participating in this study will take about 40 minutes of your time to respond 60 questions. There will not be any direct payment for participating this study. Moreover, the finding from this research may reveal important information for the local health planners and implementers.

Confidentiality: the information you give will be anonymous and confidential, only used for the purposes for this research and only accessible to me. No third parties will have access to any of the information you provide. The data will be collected, stored and disposed of in a secure manner. The information will be used in a way that will not allow you to be identified individually.

Rights: participation in this study is fully voluntary. You have the right to declare to participate or not in the study. If you decides to participate, you have the right to withdraw from the study at any time and this will not label you for any loss of benefits which you otherwise are entitled. You should not answer. Questions that you do not to want to answer

Contact address: if there any question or inquires at any time about the study or procedure, please contact principal investigator: Zainab said Abdullah, cell phone: +252907352059 or+2521909412192, Email saynabsaid880@gmail.com Institutional Health Research Ethics Review Committee (IHRERC) at Office Phone (+251) - 0254662011 or P.O. Box 235, Harar Ethiopia.

Declaration of informed consent

I have read/read to me the participant information sheet, I have clearly understood the purpose of the study, the procedures, the risks and benefits, and issues of confidentiality, the right of participating, and the contact address for any queries, I have been giving opportunity to ask questions for things that may have been unclear. I was informed that I have the right to withdraw from the study at any time or not to answer any question that I do not want. Therefore, I declare may voluntarily consent to participate in this study with my initial (signature) as indicated below**.**

Name of signature of participants _____ Date _____

Name of signature of data collectors _____ Date _____

8.3. Participant information sheet and informed voluntary consent for participant aged≥18 years (Somali version)

Hordhac: subax galab wanagsan mudane/marwo! Magacaygu waa Zainab said abdullahi waxaan ka shaqaynayaa qaab xog aruurineed taas oo daraasaddan oo lagu fulinayo xaruntan caafimad, ama isbitaalka oo barata shahaadada masterk ee jaamacada Haramaya, kuliyada sayniska iyo caafimadka. Waxaan si naxariis leh kaaga codsanayaa inaad i amaahiso dareenkaaga si aan kaaga sharaxo daraasadda iyo in laguu xusho ka qaybgalka daraasadda.

Daraasadda: baahsanaanta qaabka cuntada loo qaato hooyada uurka leh iyo arrimaha la xiriira Hooyooyinka uurka leh ee Garowe Puntland Somalia.

Ujeeddooyinka: ujeeddada daraasaddan ayaa ah in la ogaado baahsanaanta iyo arimaha la xiriira habka cuntada loo qaato hooyada uurka leh ee u nool magaalada Garowe.daraasadaan oo muhiim u ah cusbitaalada, wasaarada caafimadka iyo ururada aan dawliga ahayn ee ka shaqeya taranka dumarka kuwaas oo qorshayana, fulinaya dawaynta iyo latalinta dumarka si ay uga hormariyan uurka iyo miisaanka saxda ah oo loo baahan yahay.

Nidaaamka iyo muddada: Waxaan ku waraysan doonaa adiga oo adeegsanaya xogwaraysi si aad noo siiso xog muhiim ah oo caawimaad u leh daraasadda. Waxaa jira suaalo laga jawaabayo oo aan foomka ku buuxin doono foomka suaalaha adiga oo ku waraysanay. Waraysiga wuxuu qaadanayaa ilaaa 40 daqiiiqo, iyo su;aalo tiradoodu dhantahay 60 xabo marka waxaa si naxariis leh kaaga codsanayaa inaa ii dhaafto markan waraysiga.

Khataraha iyo faaidooyinka: khatarta ka qayb galka daraasaddan waa mid aad u yar, lkn kaliya daqiiqado ka qaadanaya waqtigaaga. Ma jiro wax lacag bixin toos ah oo loogu talagalay kaqaybgalka daraasaddan. Lakiin natiijoyinka ka soo baxay cilmi baaristan ayaa laga yaaba inay muujiyaan macluumaad muhiim u ah qorshayaasha caafimaadka deegaanka.

Qarsoodi: Macluumaadka aad nasiiso wuxuu noqon doona mid sir ah. Majiri doono macluumad kuu aqoonsan doona gaar ahaan. Natiijooyinka daraasadda ayaa guud ahaan u noqon doonta bulshada daraasadda mana ka tarjumayo wax gaar ah oo shaqsiyeed ama guriyeyn ah.

Foomka su’aalaha waxaa lagu calaamadeyn doonaa si looga reebo magacyo muujinaya. Tixraac laguma sameyn doono warbixinno afka ah ama qoraal ah oo ku xiri kara ka-qaybgalayaasha cilmi-baarista.

Xuquuqda: kaqaybgalka daraasaddan waa ikhtiyaar ikhtiyaari ah. Waxaad xaq uleedahay inaad ku dhawaaqdo inaad ka qaybqaadato ama aanad kujirin daraasaddan. Hadii aad go, aansato inaad ka qayb qaadato, waxaad xaq u leedahay inaad ka noqoto**.** Laga soo bilaabo daraasadda waqti kasta iyo tan ayaan kugu calaamadeyn doonin luminta waxtarada oo aad si kle xaq ugu leedahay. Ma aha inlaid ka jawaabto suaal kasta oo aadan Rabin inaad ka jawaabto.

Cinwaanka lala xiriiro: hadii ay jiraan suaalo ama wax laga waydiiyo waqti kasta oo ku saabsan daraasadda ama nidaaamka, fadlan la xiriiro adreeska soo socda**.**

Investing baaraha guud: MS Zainab said Abdullah. Taleefanka gacanta+252097352059 ama +2510909412192. Email saynabsaid@gmail.com

Guddiga Dib u-eegista Anshaxa Cilmi baarista Caafimaadka ee Hayadda (IHRERC)

Taleefanka xafiiska: 0254662011 ama PO.BOX:253, Harar, Ethiopia

Bayaanka ogolaanshaha ikhtiyaariga ah ee la wargeliyay:

Waan akhriyay/waa lay akhriyay xaashida macluumaadka ka qaybgalaha.waxaan si cad u fahmay ujeedada cilmi barista, habraacyada, halista iyo faaidooyinka, arimaha sirta, xuquuqda kaqeybgalka iyo cinwaanka xiriirka wixii suaalo ah. Waxaa la isiiyay fursad aan ku waydiiyo suaalo waxyaabo aan cadayn Karin.waxaa la igu wargeliyay in isbitaalada iyo xarunta caafimad ay xaq u leeyihiin inay joojiyaan daraasadan in lasameeyo hadii wax khaladaad ah iyo hanaan anshax xumo ah lagu arkay inta lagu gudo jiro hawsha xog aruurinta ee dhismaha isbitaalada.

Magaca iyo saxiixa ka qaybgalka: _____ Taariikh _____

Magaca iyo saxiixa xog aruurinta: _____ Taarikh _____

8.4. Participant information sheet and informed voluntary consent for Parents/Guardians for participant aged <18 years

Introduction:

Good morning/afternoon My name is Zainab said abdullahi ---------- I am working as data collector from study being conducted in this health center, or hospital by they studying for her master's degree at Haramaya University, the College of Health and Medical Science. I kindly request you to give me your attention to explain you about the study and being selected as study participant.

Title of the study "dietary patterns consumption and associated factor among pregnant women attending Antenatal Care in Public and Private Health facilities in Gar-owe City, Puntland Somalia

Purpose of the study the purpose of this study is to write a thesis as a partial requirement for the fulfillment of a master's program in Nutrition for the principal investigator. The study will be crucial for hospitals, the ministary of health (MOH) and non-governmental organizations (NGOs) working in reproductive age women for planning, implementing and designing intervation and counseling

Procedure and duration: I will be interviewing your daughter/ wife using a questionnaire to provide me with a pertinent data that is helpful for the study. There are questions to answer where I will fill the questionnaire by interviewing your daughter/wife. The interview will take about 40 minutes, for 60 questions so I kindly request you to spare me this time for the interview.

Risks and benefits: the risk of being participating in this study is minimal, but only taking 40 minutes from your daughter/wife. There will not be any direct payment for participating in this study. But the finding from this research may reveal important information for the local health planners.

Confidentiality: the information your daughter/wife will provide me will be confidential. There will be no information that will identify her in particular. The finding of the study will be general from the study community and will not reflect anything particular of individual persons or housing.

The questionnaire will be coded to exclude showing names. No references will be made in oral or written reports that could link participants to the research.

Rights: participation for this study is fully voluntary, you and your daughter/wife the right to declare to participate or not in this study. If you decide to participate, you have the right to withdraw from the study

at any time and this will not label you for any loss of benefits which you otherwise are entitled. She. Does not have to answer any question that she does not want to answer.

Contact address: if there any question or inquires at any time about the study or procedure, please contact principal investigator: Zainab said Abdullah, cell phone: +252907352059or+2521909412192, Email saynabsaid880@gmail.com Institutional Health Research Ethics Review Committee (IHRERC) at Office Phone (+251) - 0254662011 or P.O. Box i235, Harare Ethiopia.

Declaration of informed voluntary consent

I have read/read to me the participant information sheet, I have clearly understood the purpose of the study, the procedures, the risks and benefits, and issues of confidentiality, the right of participating, and the contact address for any queries, I have been given the opportunity to ask questions for things that may have been unclear. I was informed that I have the right to withdraw my daughter/wife from the study at any time or not to answer any question that she do not want. Therefore, I declare may voluntarily consent on behalf my daughter to participate in this study with my initial (signature) as indicated below**.**

Name and signature of Parents/Guardian _____ Date _____

Name and signature of Data collector _____ Date _____

8.5. Participant information sheet and informed voluntary consent for participant aged <18 years (Somali version)

Hordhac: subax galab wanagsan mudane/marwo! Magacaygu waa Zainab said abdullah waxaan ka shaqaynayaa qaab xog aruurineed taas oo daraasaddan oo lagu fulinayo xaruntan caafimad, ama isbitaalka oo barata shahaadada masterk ee jaamacada Haramaya, kuliyada sayniska iyo caafimadka. Waxaan si naxariis leh kaaga codsanayaa inaad i amaahiso dareenkaaga si aan kaaga sharaxo daraasadda iyo in laguu xusho ka qaybgalka daraasadda.

Daraasadda: baahsanaanta qaabka cunta qaadashada hooyada uurka leh iyo arrimaha la xiriira Hooyooyinka uurka leh ee Garowe Puntland Somalia.

Ujeeddooyinka: ujeeddada daraasaddan ayaa ah in la ogaado baahsanaanta iyo arimaha la xiriira miisaanka ku kordha hooyada uurka leh ee u nool magaalada Garowe.daraasadaan oo muhiim u ah cusbitaalada, wasaarada caafimadka iyo ururada aan dawliga ahayn ee ka shaqeya taranka dumarka kuwaas oo qorshayana, fulinaya dawaynta iyo latalinta dumarka si ay uga hormariyan uurka iyo miisaanka saxda ah oo loo baahan yahay.

Nidaaamka iyo muddada: Waxaan waraysan doonagabadhada/xaaskaaga, aniga oo adeegsanaya xogwaraysi si aad noo siiso xog muhiim ah oo caawimaad u leh daraasadda. Waxaa jira suaalo laga jawaabayo oo aan foomka ku buuxin doono foomka suaalaha adiga oo ku waraysanay. Waraysiga wuxuu qaadanayaa ilaaa 40 daqiiiqo, iyo 60 su'aalood marka waxaa si naxariis leh kaaga codsanayaa inaa ii dhaafto markan waraysiga.

Khataraha iyo faaidooyinka: khatarta ka qayb galka daraasaddan waa mid aad u yar, lkn kaliya daqiiqado ka qaadanaya waqtiga gabadhaada/xaaskaga. Ma jiro wax lacag bixin toos ah oo loogu talagalay kaqaybgalka daraasaddan. Lakiin natiijoyinka ka soo baxay cilmi baaristan ayaa laga yaaba inay muujiyaan macluumaad muhiim u ah qorshayaasha caafimaadka deegaanka.

Qarsoodi: Macluumaadka ay nasiiso gabadhaada/xaaskaaga nasiiso wuxuu noqon doona mid sir ah. Majiri doono macluumad u aqoonsan doona gaar ahaan. Natiijooyinka daraasadda ayaa guud ahaan u noqon doonta bulshada daraasadda mana ka tarjumayo wax gaar ah oo shaqsiyeed ama guriyeyn ah.

Foomka su’aalaha waxaa lagu calaamadeyn doonaa si looga reebo magacyo muujinaya. Tixraac laguma sameyn doono warbixinno afka ah ama qoraal ah oo ku xiri Kara ka-qaybgalayaasha cilmi-baarista.

Xuquuqda: kaqaybgalka daraasaddan waa ikhtiyaar ikhtiyaari ah. Waxay xaq uleedahay inay gabadhaada/xaaskaaga ku dhawaaqdo inayka qaybqaadato ama aanad kujirin daraasaddan. Hadii ay go’aansato inay ka qayb qaadato, waxay xaq u leedahay inay ka noqoto**.** Laga soo bilaabo daraasadda waqti kasta iyo tan ayaan kugu calaamadeyn doonin luminta waxtarada oo aad si kle xaq ugu leedahay. Ma aha inaad ka jawaabto suaal kasta oo aadan Rabin inaad ka jawaabto.

Cinwaanka la xiriiro: hadii ay jiraan suaalo ama wax laga waydiiyo waqti kasta oo ku saabsan daraasadda ama nidaaamka, fadlan la xiriiro adreeska soo socda**.**

Investing baaraha guud: MS Zainab said abdullah. Taleefanka gacanta+252097352059 ama +25109412192. Email saynabsaid880@gmail.com

Guddiga Dib u-eegista Anshaxa Cilmi baarista Caafimaadka ee Hayadda (IHRERC)

Taleefanka xafiiska: 0254662011 ama PO.BOX:253, Harar, Ethiopia

Bayaanka ogolaanshaha ikhtiyaariga ah ee la wargeliyay:

Waan akhriyay/waa lay akhriyay xaashida macluumaadka ka qaybgalaha.waxaan si cad u fahmay ujeedada cilmi barista, habraacyada, halista iyo faaidooyinka, arimaha sirta, xuquuqda kaqeybgalka iyo cinwaanka xiriirka wixii su’aalo ah. Waxaa la isiiyay fursad aan ku waydiiyo suaalo waxyaabo aan cadayn Karin.waxaa la igu wargeliyay in isbitaalada iyo xarunta caafimad ay xaq u leeyihiin inay joojiyaan daraasadan in lasameeyo hadii wax khaladaad ah iyo hanaan anshax xumo ah lagu arkay inta lagu gudo jiro hawsha xog aruurinta ee dhismaha isbitaalada.

Magaca iyo saxiixa ka qaybgalka: _____ Taariikh _____

Magaca iyo saxiixa xog aruurinta: _____ Taarikh _____

8.6. English version questionnaire

QUESTIONNAIRE

Date……. Interview code…….

Part one sociodemographic factors			
Sr/no	Question	Response	Skip
101	How old are you?	_____ Years	
102	Where are you living?	1. Urban 2. Rural	
104	What is your current Mar status?	1. Married 2. Divorce 3. Widowed 4. Single	
105	What is your level of education?	1. No formal education 2. Primary 3. Secondary 4. Collage and above	
106	What is your occupation?	1. House wife 2. Merchant or any business 3. Daily laborer 4. Government employee 5. Self employed 6. Other (specify)	
107	What is your husband occupation?	1. Marchent or any business 2. Farmer 3. Daily laborer 4. Self employed 5. Other (specify)	
108	What is your family size?	_____ Number	
109	Do you have heard about restriction?	1. Yes 2. No	
110	If yes Q 109 what type restriction?	1. Specify _____	
111	Do you have any idea that is the reason of striction foods?	1. Fearing of big baby 2. Fearing of weight gain 3. Culturally unacceptable 4. I have no idea	
112	Is your husband support?	1. Yes 2. No	
113	If yes Q12, by what me support you?	1. By giving money 2. Purchusing variety of foo	

		3. By farm home gardining 4. Others	
Part two women health and related factors characteristic			
201	How many numbers of living (children) do you have at now?	_____	
202	How many ANC visits do you have in current pregnancy?	1. First visit 2. Second visit 3. Third visit 4. Fourth visit or above	
203	What is the main source of food for family	1. Own production 2. Purchasing 3. Food aid/relief 4. Other source	
204	How many times eating per day?	_____	
205	Have you developed disease cu pregnancy?	1. Yes 2. No	
206	If say yes Q 205, do you have skip mea to develop disease?	1. Yes 2. No	
207	If say yes, what type of disease?	1. Dyspepsia 2. Diabetes 3. Hypertension 4. Heart disease 5. Other	

Part three: questions to assess household food insecurity		
401	Is the past four weeks, did you worry that your hous would not have enough food?	Yes= 1 No= 0
401	If yes, how often did this happen?	1. Rarely (1 or 2 times) 2. Sometimes (3 to 10 time 3. Often (>10 times)
402	In the past four weeks, were you or any hous member not able to eat the kinds of foods you pref because of lack of resources?	Yes=1 No= 0
402	If yes, how often did this happen?	1. Rarely (1 or 2 time 2. Sometimes (3 t times) 3. Often (>10 times)
403	In the past four weeks, did you or any household me have to eat a limited variety due to lack of resources	Yes= 1 No=0
403	If yes, how often did this happen?	1. Rarely (1or 2 times)

		2. Sometimes (3 to 10 time 3. Often (>10 times)
404	In the past four weeks, did you or any household me have to eat some foods that you really did not want because of a lack of resources to obtain other typ food?	Yes =1 No =0
404	If yes, how often did this happen?	1. Rarely (1 or 2 times) 2. Sometimes (3 to 10 time 3. Often (>10)
405	In the past four weeks, did you or any household me have to eat a smaller meal than you felt you ne because there was not enough food?	Yes= 1 No =0
405	If yes, how often did this happen?	1. Rarely (1 or 2 times 2. Sometimes (3 or 10t 3. Often (>10 times)
406	In the past four weeks, did you or any other hous member have to eat fewer meals in a day because was not enough food?	Yes= No =0
406	If yes, how often did this happen?	1. Rarely (1 or 2 times) 2. Sometimes (3 or 10 time 3. Often (>10times)
407	In the past four weeks, was there ever no food to e any kind in your household because of lack of reso to get food?	Yes =1 No =0
407	If yes, how often did this happen?	1. Rarely (1 or 2 times) 2. Sometimes (1 to 10 time 3. Often (>10 times)
408	In the past four weeks, did you or any household me go to sleep at night hungry because there was not en food?	Yes =1 No = 0
408	If yes, how often did this happen?	1. Rarely (1 or 2 times) 2. Sometimes (1 to 10 time 3. Often (>10 times)
409	In the past four weeks, did you or any household me go a whole day and night without eating anything be there was not enough food?	Yes =1 No =0
409	If yes, how often did this happen?	1. Rarely (1or 2 times) 2. Sometimes (1 to 10 time 3. Often (>10 times)

PART FOUR: DIETARY ASSESSMENT DATA (FOOD FREQUENCY QUESTIONNAIRE)			
Now, I am going to ask you about your dietary experience. Remembering experience of the last one months (first two trimesters) pregnancy of the index child, frequently did you consume the following food items in a typical day/week/month?			
Grains and grain products			
501	Rice		Per day/times
502			Per week/times
			Per month/times
503	Spaghetti pasta		Per day/times
			Per week/times
			Per month/times
504	Macaroni		Per day/times
505			Per week/times
			Per month/times
506	Porridge		Per day/times
			Per week/times
			Per month/times
507	White Bread (Refined Cereals		Per day/times
			Per week/ times
			Per month/times
508	Wheat bread (Homemade B Whole grain		Per day/times
			Per week/times
			Per month/times
509	Potato		Per day/times
			Per week/times
			Per month/times
510	Potato chips		Per day/times
			Per week/times
			Per month/times
511	Soup		Per day/times
			Per week/times
			Per month/times

Vegetables and vegetable products			
512	Carrot		Per day/ times
			Per week/times
			Per month/times
513	Tomato		Per day/times
			Per week/times
			Per month/times
514	Chili		Per day/times
			Per week/times
			Per month/times
515	Green Cabbage		Per day/times
			Per week/times
			Per month/times
516	Pumpkin		Per day/times
			Per week/times
			Per month/times
517	Beetroot		Per day/times
			Per week/times
			Per month/times
Fruits and fruit products			
518	Banana		Per day/times
			Per week/times
			Per month/times
519	Apple		Per day/times
			Per week/ times
			Per month/times
520	Water malon		Per day/times
			Per week/times

			Per month/times
521	Mango		Per day/ times
			Per week/times
			Per month/times
522	Orange		Per day/times
			Per week/times
			Per month/times
523	Grape		Per day/times
			Per week/times
			Per month/times
524	Papaya		Per day/times
			Per week/times
			Per month/times
525	Avocado		Per day/times
			Per week/times
			Per month/times
Nuts and seeds			
526	Beans (all types)		Per day/times
			Per week/times
			Per month/times
527	Peanuts		Per day/ times
			Per week/times
			Per month/times
528	Lentils		Per day/times
			Per week/times
			Per month/times

Meat and meat products		
529	Meat	Per day/times
		Per week/times
		Per month/times
530	Poultry	Per day/times
		Per week times
		Per month/times
531	Liver(kidney)	Per day/times
		Per week/times
		Per month/times
Fish and sea food products		
532	Fish	Per day/times
		Per week/times
		Per month/times
Eggs and egg products		
533	Eggs	Per day/times
		Per week/times
		Per month/times
Milk, Milk Products and milk substitutes		
534	Milk	Per day/times
		Per week/times
		Per month/times
535	Cheese	Per day/times
		Per week/times
		Per month/times

536	Yoghurt		Per day/ times
			Per week/times
			Per month/times
537	Goat milk		Per day/times
			Per week/times
			Per month/times
538	Camel milk		Per day/times
			Per week/times
			Per month/times
Fat and oil			
539	Butter	Per day/times	
		Per week/times	
		Per month/times	
540	Margarine	Per day times	
		Per week/times	
		Per month/times	
541	Palm oil	Per day/times	
		Per week/times	
		Per month/times	
Sugars and sweets			
542	Honey	Per day/times	
		Per week/times	
		Per month/times	
543	Table sugar	Per day/times	
		Per week/times	
		Per month/times	

Beverages (no milk)			
544	Coffee		Per day/times
			Per week/times
			Per month/times
545	Tea	Per day/times	
		Per week/times	
		Per month/times	

8.7. Questionnaire (Somali version)

AALADAHA URURINTA XOGTA

A. SU'AALO TAYO LEH

Qaybta kowaad: astamaha asalka ah			
Lambarka	Su'aalaha	Jawaab celinta	Kaboodi
101	Imisa sanno ayaa jirta?	---------- sanad	
102	Deganaansho?	1. Magaalada 2. Baadiyah	
103	Waa maxay diintada?	1. Islaam 2. Kiristaan 3. Diimaha kale	
104	Xalaadada guurka ee xiligan?	1. Laguursady 2. Garoob 3. Laga dhintay 4. Doobnimo	
105	Xagee ka gaartay heerkaga waxbarasho?	1. Waxna aan qorin waxn akhrin 2. hoose 3. sare 4. jaamacad	
106	Waa maxay shaqadaadu?	1. Guri jog 2. Ganacsi 3. Shaqaale dowladeed 4. Isagu naftiisa u shaqeys 5. Waxyaalo kale	
107	Shaqada ninkaaga?	1. Ganacsade 2. Beeraleey 3. Xoogsade 4. Kaligiis shaqeysta 5. Waxyaalo kale	
108	Tirade qoyska?	---------- lambar	
109	Ma maqashay cuntada xadidaade	1. Haa 2. Maya	
110	Hadey haa tahay	Ii cadeey------	
111	Maxay tahay argtida ka danbeys cuntooyinka qaar la xadido?	1. U baqid ilmaha 2. Ka baqid miisan kordhi 3. Dhaqanka 4. Argati kama haysto	
112	Maku caawiya xaajiga?	1. Haa 2. maya	
113	Hadey jawaabtadu tahay haa sid cawiya?	1. Lacag buu bixiya 2. Cunto kala gadisan ii k	

		3. Gurigu beer ku abuuray 4. Waxyaalo kale	

201	Imisa caruura kuu joog	----------	
202	Imisa jeer booqatay M xarunta darey dhalmada ka hor?	1. Hal jeer 2. Labo jeer 3. Sadex jeer 4. Afar jeer	
203	Isha dhaqaale?	1. Wax soo saarkii 2. Soo iibsasho 3. Caawimaad 4. Meelo kale	
204	Imisa jeer baa wax cun	1. Wax ka yar hal 2. Labo jeer 3. Sadex jeer kabadan	
205	Wax xanuuna kulantay?	1. Haa 2. Maya	
206	Hadey tahay jawaabtad makaga go'aday wax c	1. Haa 2. Maya	
207	Xanuunka noociisa?	1. Dheefshiidka shaqeynayn 2. Sonkorow 3. Dhiikar 4. Wadna xanuun 5. Xanuuna kale	

Qaybta sadexaad sida lagu cabrio hooyada uurka leh aqoonteeda nafaqada			
401	Afarti asbucii lasoo dhaafay marna welwesh inadan haysan cunto kugu filan?	1. Haa 2. Maya	
401	Hadey tahay jawaabtadu haa imisa jeer dhacday?	1. In yar (1 ilaa 2 jeer) 2. Wey soo noqnoqot ilaa 10 jeer) 3. In badan (>10 jeer)	
402	Afartii asbuucii lasoo dhaafay qof kamida xafaada inuu cuno cuntada qayb kamid saba ah waxa jirtay dhaqaali yari?	1. Haa 2. Maya	
402	Hadey tahay jawaabtadu haa imisa jeer bay dhacday?	1. In yar (1 ilaa 2 jeer) 2. Wey soo noqnoqota (3 ilaa 10 jeer) 3. In badan (>10 jeer)	
403	Afarrtii asbuucii lasoo dhaafay majirta canteen cunto xadidan dhaqaalo la'aan?	1. Haa 2. Maya	
403	Hadey tahay jawaabtadu haa imisa jeer bay dhacday?	1. In yar (1 ilaa 2 jeer) 2. Wey soo noqnoqot ilaa 10 jeer) 3. In badan (>10 jeer)	
404	Afartii asbuucii lasoo dhaafay ma cuntay cu qaybta ka mid aadan rabin sababto ah haysan cunto inaku filin?	1. Haa 2. Maya	
404	Hadey tahay jawaabtadu haa imisa jeer dhacday?	1. In yar (1 ilaa 2 jeer) 2. Wey soo noqnoqota (3 ilaa 10 jeer) 3. In badan (>10 jeer)	
405	Afartii asbuucii lasoo dhaafay ma canteen yar idinkoo cunto kale u baahan?	1. Haa 2. maya	
405	Hadey tahay jawaabtadu haa imisa jeer dhacday?	1. In yar (1 ilaa 2 jeer) 2. Wey soo noqnoqota (3 ilaa 10 jeer) 3. In badan (>10 jeer	
406	Afartii asbuuc lasoo dhaafay ma canteen inti rabay cuntada in ka yar sababto ah cunto filan ma haysan?	1. Haa 2. Maya	
406	Hadey tahay jawaabtadu haa imisa jeer dhacday?	1. In yar (1 ilaa 2 jeer) 2. Wey soo noqnoqota (3 ilaa 10 jeer) 3. In badan (>10 jeer	
407	Afartii asbuuc lasoo dhaafay waxba ma cunin sabatoo ah waxa weydeen cunto dhaqaale lagu soo gato?	1. Haa 2. Maya	
407	Hadey tahay jawaabtadu haa imisa jeer dhacday?	1. In yar (1 ilaa 2 jeer) 2. Wey soo noqnoqota (3 ilaa 10 jeer)	

		3. In badan (>10 jeer	
408	Afartii asbuuc lasoo dhafay mar aad ku seex gaajo sababto ah cunto idinku filan ma hays	1. Haa 2. maya	
408	Hadey tahay jawaabtadu haa imisa jeer dhacday?	1. In yar (1 ilaa 2 jeer) 2. Wey soo noqnoqota (3 ilaa 10 jeer) 3. In badan (>10 jeer	
409	Afartii asbuuc lasoo dhaafay maalin dhar habeenkii ineydan wax cunin sababto ma haysan cunto idinku filan?	1. Haa 2. May	
409	Hadey tahay jawaabtadu haa imisa jeer dhacday?	1. In yar (1 ilaa 2 jeer) 2. Wey soo noqnoqota (3 ilaa 10 jeer) 3. In badan (>10 jeer	

Qeybta sadexaad: aqoonta ay hooyadu u ledahay nafaqada			
301	Waligaa ma maqashay kala duwnashaha cunada?	1. Haa 2. Maya	
302	ma garaneeysaa kala duwnashaha cunadaa taas oo mu u xili walba	1. Haa 2. maya	
303	Ma ogtahay in xiliga uurka aad u bahantahay cuno f badan	1. Haa 2. Maya	
304	Ma ogtahay in qadashadada cuno aan dheli tirnen Qatar u leedahay hooyada iyo dhalaanka?	1. Haa 2. Maya	
305	Ma u bahan tahay in aad sare u qaado cunada uurka?	1. Haa 2. Maya	
306	Habqadashada cunada miyey is badashaa xiliga uur	1. Haa 2. Maya	
307	Ma garaneysaa isticmaalka cunadaa cusbada leh uurka?	1. Haa 2. Maya	

PART sadexaad: qiimeynta cuntada iyo qaab ururnta cuntada			
Hadda waxan raba inaa ku waydiiyo qaababka aad cuntada ma xusuusan k bishii u danbeysay cuntada qadatay hooyada uurka leh 3 bil oo hore iyo 3 b dhexe,iyo 3 bil ee danbe			
qamidiga			
501	Bariis		Maalinle /imisa jeer
			Asbuucle/imisa jeer
			Bishii /imisa jeer
502	Baasto		Maalinle /imisa jeer
			Asbuucle/imisa jeer
			Bishii /imisa jeer
503	Makaroona		Maalinle /imisa jeer
			Asbuucle/imisa jeer
			Bishii /imisa jeer
504	Boorash		Maalinle /imisa jeer
			Asbuucle/imisa jeer
			Bishii /imisa jeer
505	Rootiga burka dib loo habeeyey sameeyey		Maalinle /imisa jeer
			Asbuucle/imisa jeer
			Bishii /imisa jeer
506	Burka qamadiga asalka sameyey		Maalinle /imisa jeer
			Asbuucle/imisa jeer
			Bishii /imisa jeer
507	Bardho		Maalinle /imisa jeer
			Asbuucle/imisa jeer
			Bishii /imisa jeer
508	Baradho shiilan		Maalinle /imisa jeer
			Asbuucle/imisa jeer
			Bishii /imisa jeer

Khudaarta			
	Karooto		Maalinle /imisa jeer
			Asbuucle/imisa jeer
			Bishii /imisa jeer
	Yaanyo		Maalinle /imisa jeer
			Asbuucle/imisa jeer
			Bishii /imisa jeer
	Bisbaas		Maalinle /imisa jeer
			Asbuucle/imisa jeer
			Bishii /imisa jeer
	Kaabash		Maalinle /imisa jeer
			Asbuucle/imisa jeer
			Bishii /imisa jeer
	Bocor		Maalinle /imisa jeer
			Asbuucle/imisa jeer
			Bishii /imisa jeer
	Beytraaf		Maalinle /imisa jeer
			Asbuucle/imisa jeer
			Bishii /imisa jeer
Miraha			
	Mooska		Maalinle /imisa jeer
			Asbuucle/imisa jeer
			Bishii /imisa jeer
	Tufaax		Maalinle /imisa jeer
			Asbuucle/imisa jeer
			Bishii /imisa jeer

	canbe		Maalinle /imisa jeer
			Asbuucle/imisa jeer
			Bishii /imisa jeer
	Liin		Maalinle /imisa jeer
			Asbuucle/imisa jeer
			Bishii /imisa jeer
	cinab		Maalinle /imisa jeer
			Asbuucle/imisa jeer
			Bishii /imisa jeer
	Babaya		Maalinle /imisa jeer
			Asbuucle/imisa jeer
			Bishii /imisa jeer
	Afakaadho		Maalinle /imisa jeer
			Asbuucle/imisa jeer
			Bishii /imisa jeer
Lowska iyo digirta			
	Digirta qaybaheeda oo		Maalinle /imisa jeer
			Asbuucle/imisa jeer
			Bishii /imisa jeer
	Lowska		Maalinle /imisa jeer
			Asbuucle/imisa jeer
			Bishii /imisa jeer
	Qayb kamida digirta		Maalinle /imisa jeer
			Asbuucle/imisa jeer
			Bishii /imisa jeer

Hilibka		
	Hilibka jiirka	Maalinle /imisa jeer
		Asbuucle/imisa jeer
		Bishii /imisa jeer
	Digaaga	Maalinle /imisa jeer
		Asbuucle/imisa jeer
		Bishii /imisa jeer
	Beerka (kilyaha)	Maalinle /imisa jeer
		Asbuucle/imisa jeer
		Bishii /imisa jeer
Kaluunka iyo cuntada badda		
	Kaluun	Maalinle /imisa jeer
		Asbuucle/imisa jeer
		Bishii /imisa jeer
Eggs and egg products		
	Eggs	Maalinle /imisa jeer
		Asbuucle/imisa jeer
		Bishii /imisa jeer
Caanaha iyo waxyalaaha caanaha laga sameeyo		
	Caano	Maalinle /imisa jeer
		Asbuucle/imisa jeer
		Bishii /imisa jeer
	Jiiska	Maalinle /imisa jeer
		Asbuucle/imisa jeer
		Bishii /imisa jeer

	Caano garoor		Maalinle /imisa jeer

			Asbuucle/imisa jeer
			Bishii /imisa jeer
	Caanaha ri'da		Maalinle /imisa jeer
			Asbuucle/imisa jeer
			Bishii /imisa jeer
	Caano geel		Maalinle /imisa jeer
			Asbuucle/imisa jeer
			Bishii /imisa jeer
Subaga			
	Subaga	Maalinle /imisa jeer	
		Asbuucle/imisa jeer	
		Bishii /imisa jeer	
	Subaga qaybta adag	Maalinle /imisa jeer	
		Asbuucle/imisa jeer	
		Bishii /imisa jeer	
	Saliida cuntada	Maalinle /imisa jeer	
		Asbuucle/imisa jeer	
		Bishii /imisa jeer	
Sokorta iyo macmacaanka			
	Malab	Maalinle /imisa jeer	
		Asbuucle/imisa jeer	
		Bishii /imisa jeer	
	Sukarta cuntada	Maalinle /imisa jeer	
		Asbuucle/imisa jeer	
		Bishii /imisa jeer	

Shaah aan caano lahayan			
	Qaxwe		Maalinle /imisa jeer
			Asbuucle/imisa jeer
			Bishii /imisa jeer
	Shaah	Maalinle /imisa jeer	
		Asbuucle/imisa jeer	
		Bishii /imisa jeer	

Thank you for your participation

8.8. Curriculum vitae of principal investigator

1) PERSONAL INFORMATION

Name: - Zainab said Abdullah

Date of birth: - 05-12- 1998

Place of birth:-Gardo, Puntland, Somalia

Sex: - Female

Marital status:-single

Nationality: - Somali

Residence: Gardo, Puntland, Somalia

Address Tel:-Somalia +252907352059Ethiopian+2510909412192

E-mail:- saynabsaid880@gmail.com

2) EDUCATIONAL BACKGROUND

Program	**School/institution atte**	**Grade**	**Years of study**
Elementary	Al-imam Al-nawawi	1	2007
Elementary	Al-imam Al-nawawi	2-4	2008-2010
Primary	Al-imam Al-nawawi	5-8	2011-2013
Secondary	Al-imam Al-nawawi	9-12	2014-2017
Diploma program	University Of Health Science	1 year	Candidate

Degree program	University Of Health Science	3years	2018-2021
Master Degree	Haramaya University	2 years	Candidate

3) QUALIFICATION

- Bachelor of food science and nutrition
- Candidate of MPH in public health nutrition
- Diploma of nursing

4) WORK EXPERIENCE

- **2 year of experience of nutrition in isniino health center in bosaaso.**

5) SKILLS

- Computer skills
- Instructing /Teaching skill

6) LANGUAGE SKILLS

Languages	**Writing**	**Reading**	**Listening**	**Speaking**
Somali	Excellent	Excellent	Excellent	Excellent
English	Excellent	Very Good	Excellent	Very Good
Arabic	Excellent	Excellent	Excellent	Excellent

7) HOBBIES

- ✓ Reading different books
- ✓ Watching television movies
- ✓ Listening Quran
- ✓ Doing in a team and independently
- ✓ patience

10) REFERENCE

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