

Food Aversion During Pregnancy and Its Association With Nutritional Status of Pregnant Women in Boricha Woreda, Sidama Zone, Southern Ethiopia, 2019. A Community Based Mixed Crosssectional Study Design

Abel Yalew (✉ abelyalew@gmail.com)

Abel medium clinic

Wondwosen T/Silasie

Hawassa University College of Medicine and Health Sciences

Anchamo Anato

Hawassa University College of Agriculture

Anteneh Fikrie

Bule Hora University

Research

Keywords: Pregnancy, food aversions, nutritional status, Boricha Woreda, Southern Ethiopia

Posted Date: December 11th, 2020

DOI: <https://doi.org/10.21203/rs.3.rs-124356/v1>

License:  This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Abstract

Background: Despite high prevalence, food aversions are closely linked to the dietary intake of pregnant women. Thus, understanding this behavior is important in addressing the issue of maternal nutrition. Therefore, the aim of this study is to provide information on the prevalence and associated factors of food aversion and its relationship with the nutritional status of pregnant women in Boricha Woreda, Sidama Zone, Southern Ethiopia, 2019.

Methods: A community based mixed cross sectional study was conducted among 505 randomly selected pregnant mothers at Boricha Woreda, Southern Ethiopia from June 1-20, 2019. Pre-tested and structured face-to-face interview questionnaire and focus group discussion guide were used to collect quantitative and qualitative data respectively. The quantitative data were cleaned, coded and entered into Epi Info version 7.1.4.0 and then exported to SPSS IBM version 20 for further analysis. The qualitative data were analyzed manually using a content analysis. The bi-variable and multivariable logistic regression was used to identify the possible factors of food aversion. Pearson's Chi-square test was used to assess the relationship between food aversion and nutritional status of pregnant women. AOR with the respective 95% CIs was used to declare statistical significance.

Results: Nearly, seven-in-ten (69.2%) of the pregnant women were averted of at least one food. Cereal (45.9%) and enset (44.2%) were averted by majority of the participants. The mean (\pm SD) MUAC measurement was 22.7 (\pm 2.4) cm. For age group 19 – 23 [AOR= 2.36, 95%CI (1.32 – 4.21)] and 24 – 28 of years [AOR= 2.84, 95% CI (1.61 – 5.01)], nausea [AOR= 1.70, 95%CI (1.10 – 2.65)] and having additional meal [AOR= 1.70, 95% CI (1.06 – 2.73)] were significantly associated with food aversion. Maternal nutritional status and food aversion was statistically significant (p-value=0.008).

Conclusion: High prevalence of food aversions (69.2%) and under nutrition (34.6%) among pregnant women is found. Therefore, the Woreda Health Office needs to intensify the integration of maternal nutrition into ANC services and training of health providers as well as critical appraisal of health extension workers should also be considered.

Plain English Summary

Pregnancy is a complex and absolutely important period in women's life. Thus, in order to sustain a successful pregnancy, a mother experiences a number of physiological and behavioral changes. Notably, food aversions are the number one changes experienced by pregnant women. Food aversions are characterized by the repulsion and avoidance of particular foods and the most common aversions are nonalcoholic caffeinated beverages, meat, fish, poultry and eggs. Therefore, the aim of this study was to determine the magnitude and its association with nutritional status of Pregnant Women in order to provide concrete scientific evidence for the concerned stakeholders.

A community based mixed cross-sectional study was conducted among 505 pregnant mothers selected from five randomly selected kebeles of Boricha Woreda. Pregnant women in the age range of 18 to 49

years and who were apparently healthy were interviewed. Four hundred ninety seven participants were interviewed voluntarily with a response rate of 98.4%. The mean (\pm SD) age of the women was 22.3 (\pm 5.5) years. Pregnant women who were averted at least one food were 344(69.2%); where cereal (45.9%) and enset (44.2%) were averted by the majority of the participants. Hence pregnant women who practice food aversion were more likely to be malnourished. Pregnant women who were less than thirty years of age, who had nausea and ate additional meal were more urged to avoid a particular foods.

In conclusion; despite a pregnant woman requires a healthy diet embedded with adequate intake of energy, protein, vitamins and minerals to meet maternal and fetal needs, the magnitude of food aversion and maternal under nutrition in the study area was high.

Background

Pregnancy is a complex and absolutely important period in women's life. Its physiology is of great biological and nutritional importance (1). Also the fetoplacental growth is significantly dependent on the stipulation of nutrients from the mother, coming from diet and supplied via blood supply. Maternal nutrition is a basic determinant of fetal growth, birth weight and infant morbidity (2). Therefore, the contribution of nutrients should be adequate both in quantity and quality of food items because both contribute to the process of embryogenesis, development of the fetus and for the improvement of the health of the mother (1).

Unsurprisingly, pregnant mother sustain innumerable physiological and behavioral changes during the period of their pregnancy. Changes that will occur during the pregnancy period could lead to poor maternal and fetal health outcomes (3). Notably, food aversions are the number one changes experienced by pregnant women. Nearly all pregnant mothers' experience cravings during pregnancy and most experience at least one aversion throughout the period of pregnancy (4). Food aversions are characterized by sudden appearance with strong intensity of the repulsion of a certain kind of food, often the one previously enjoyed and absent prior to pregnancy (5) and usually emerged at the end of the first trimester and intensified during the second trimester and gradually became diminished (6).

The prevalence of food aversions occurrences globally varies from 50–90%, being less common in European populations and more common in the African continent (1). The study conducted in Tanzania showed that the prevalence of food aversion during pregnancy were 70.1% (7). Similarly, study conducted in Nigeria showed 57.2% prevalence of food aversion during pregnancy (8). Studies conducted in Southern Ethiopia; Hadiya Zone and Sidama Zone showed that, the prevalence of food aversion during pregnancy were 65% and 67.8% respectively (6). Pertaining to food avoided, western women were highly avoided a protein-rich foods of animal origin whereas cereals, tea, stiff porridge and vegetables were the most frequently avoided foods by Africa and Asian pregnant women (1, 7).

Similarly, studies conducted in Ethiopia revealed that, cereal foods and *kocho* (inset product), despite being staple foods in the study areas, were the top most commonly avoided foods. Others like; roots, vegetables, mango, avocado, coffee, egg, legumes, meat, fish and milk products were also reported to be

avoided by the pregnant women (6). Noteworthy, food aversion during the period of pregnancy highly influence the type and amount of foods consumed, for instance aversions to vegetables, which are an important source of micro nutrients possibly lead to folic acid deficiency which in turn upshots both the mother and the developing fetus (5, 9).

Moreover, a national survey of nutritional status of women of reproductive age revealed that, twenty-two percent of Ethiopian women of age 15–49 are thin (BMI less than 18.5), and vulnerable to chronic energy deficiency and malnutrition due to low dietary intake, inequitable distribution of food within the household, dietary taboos, infectious diseases, and inadequate care practices; which are the major risk factor for adverse birth outcomes (10). Inadequate maternal recommended food intake and poor nutritional quality of diets are known for having negative impact on birth weight, length and other physiological changes that occur during fetal development (2). Likewise, a study conducted in Guildford reported that pregnant women who practice aversion were found to consume less carbohydrate, riboflavin and iron which are vital for the health of both mother and developing fetus (11).

Although causes and consequences of food aversion are little known (1), certain factors were identified as the causes for the occurrences of the turn-ons and turn-offs of women's appetite during their pregnancy period (4). Poor socio-economic and low educational statuses were identified as factors by other studies (12). On the other hand, nausea and vomiting were mentioned as the principal factors leading to the development of food aversions (13, 14). Contrariwise, nausea and vomiting during pregnancy thought to expel potentially dangerous food in addition to motivating women so as to avoid consumption of foods that increase their risk of developing metabolic syndrome and/ or gestational diabetes mellitus (1, 15).

A Pregnant woman requires a healthy diet which embedded an adequate intake of energy, protein, vitamins and minerals to meet maternal and fetal needs. However, many pregnant women from low income countries have poor dietary intake of vegetables, meat, dairy products and fruit which is often insufficient to meet those needs. Due to this fact, the revised WHO guideline for Ante Natal Care (ANC) emphasized the importances of ANC visits as it is the best opportunities to provide information to women on maternal diet and/or weight gain during pregnancy. Additionally, it helps to identify women with an "unhealthy" dietary pattern in early pregnancy (16). Infact, maternal diet counselling and messaging can also be integrated into community level activities, such as home visits carried out by community-level health workers or engaging elder women and fathers through mother to mother or community support groups. However, there is limited available evidence on the type and quality of information and counseling received on maternal nutrition during pregnancy (17).

Remarkably, despite the high prevalence of food aversion and its significant impact on the health of fetus and nutritional status of pregnant women, there is scarce research done on food aversion and its association with nutritional status of pregnant women globally as well as in the study area. As food aversions are closely linked to the dietary intake of pregnant women, understanding this behaviour is important in addressing the issue of maternal nutrition. Therefore, the aim of this study is to provide information on the prevalence and associated factors of food aversion, the relationship with the

nutritional status of pregnant women and exploring the notion of the community about food aversion during pregnancy in Boricha Woreda, Sidama Zone, Southern Ethiopia, 2019

Methods And Materials

Study setting

The study was conducted in Boricha District, Southern Ethiopia. The District is one of the 33 districts of Sidama Zone in Southern Nation Nationalities and People Regional (SNNPR) State. It is located 32 km far from the Zonal and Regional City, Hawassa and 297 km far southwest of Addis Ababa, the capital City of Ethiopia. The climatic condition of the district is 'kola', with an altitude of 1400 m above sea level and has an average temperature of 29°C. As the data from the Boricha district health office shows, the woreda has 14 kebeles (1 urban and 13 rural kebeles) with a total population of 121,648, of which 60,216 male whereas 61 are, 432 are females. The estimated number of pregnant women in the district is 4209. Regarding the health infrastructure of the district, there are 3 governmental Health Centers, 13 Health Posts and 1 District Hospital. Sidama Zone Health Department report revealed that, Boricha District categorized under hot spot for malnutrition. The staple foods in the district are maize and 'Enset' (18).

Study design and period

A community based cross sectional study design supplemented with a phenomenological qualitative approach was employed at Boricha Woreda, Sidama Zone, Southern Ethiopia from June 1–20, 2019.

Source, study population and eligibility criteria

All pregnant women who lived in Boricha Woreda were the source population of the study whereas pregnant women in a randomly selected five kebeles were our study populations. Pregnant women in the age range of 19 to 49 years and who were apparently healthy were included in this study. Whereas, pregnant women who lived less than six months in Boricha Woreda and Pregnant women who have chronic disease such as HIV/AIDS, TB and acute infectious disease such as malaria, typhoid fever and typhus were excluded from the study.

Sample size determination for quantitative data

Sample size for first objective, assessing the magnitude of food aversion was calculated using single population proportion formula. The specifications made during the computation were: Prevalence of food aversion, 65% from a study conducted at Southern Ethiopia (12), marginal error (d) of 5%, 95% confidence level, 1.5 Design effect and 10% of non-response rate was assumed; then the sample size calculated became 576. Sample size for second objective, identify factors associated with food aversion was examined using Epi info7 Statcalc version 7.1.4.0 software. Hence, the calculated sample size for second objective was comparably smaller than the first objective; as a result we took the largest one which was 576. However, the number of pregnant women in the district are finite or less than 10,000 (4,209), we used

the population correction formula to get the appropriate representative sample size. Consequently, the final sample size calculated became 505. On the otherhand,

Sample size determination for the qualitative data

There was no predefined sample size determination for the qualitative data. Sample size for the FGDs was determined by informational redundancy or saturation; the point at which no new information or categories are emerging from the data. To ascertain saturation, at the end of each day of data collection, the data were checked for the occurrence of categories and if the need for further FGD. That means the researcher moves back and forth through the data to discover, compare, and confirm the categories. After having gained an insight of what the emerging categories are and ensuing FGDs are no longer generating new categories it is assured that saturation have reached.

Sampling technique and procedure for the quantitative data

A multi stage sampling technique was employed to select participants of the study. In the first stage, the list of Kebeles of the Woreda was obtained from the Boricha Woreda Health Office. Then, after stratifying into rural (13 kebeles) and urban (1 kebele), the only 1 urban kebele and 4 rural kebeles were selected randomly. Next, all eligible study subjects were identified and enumerated according to the inclusion criterion home to home visit by the data collectors so that a sampling frame containing a list of 2216 pregnant women was prepared. Further, sample sizes were allocated to each kebele based on population proportion allocation. Ultimately, simple random sampling technique by using random numbers generated by OpenEpi software was employed to select 505 study participants.

Sampling technique and procedure for the qualitative data

Qualitative data were collected from pregnant women and mothers in law who has daughters in laws who are pregnant and/or have children. To select those who could provide the most meaningful information on the topic, the participants were identified and invited, with the help of the health extension workers who were working in the selected kebele, based on their knowledge and experience on pregnant womens' nutrition.

Data collection and quality assurance

Five diploma holder nurses and two BSc holder Public Health Officers were recruited as data collectors and supervisors respectively. Two days training was given for both data collectors and supervisors on research ethical principles and quality data collection techniques and procedures and on the basic techniques of MUAC measurement record. Furthermore, the investigators also assessed the quality of the data during the data entry and analysis stage to verify the completeness of the collected data.

Socio-demographic and economic, meal pattern and maternal health information were collected by a pretested and structured face-to-face-interviewer administered questionnaire which were adapted from previous similar studies (6). Additionally, for the assessment of nutritional status the pregnant women Mid Upper Arm Circumference (MUAC) measuring tape, a non stretchable tape calibrated to 0.1 cm was taken. MUAC measurement alone is used as a screening tool for pregnant women particularly; when immediate results are needed or resources are severely limited. Noteworthy, MUAC does not change significantly through pregnancy. According to the sphere project minimum standards in food security, nutrition and food aid cut-off point; a pregnant women with MUAC < 23.0 cm (Undernourished) and pregnant women with MUAC \geq 23.0 cm (well-nourished) (19). Whereas the qualitative data were collected through Focus Group Discussion, using an open ended focus group discussion guide. Data were recorded by audio taped. Focus Group Discussions were conducted in circular seating pattern where participants could engage face to face in comfortable places, where privacy and low ambient noise for recording is optimal.

Data processing and analysis for quantitative data

The data were thoroughly checked, cleaned, coded and then entered into Epi Info version 7.1.4.0 and exported to the Statistical Package for Social Science (SPSS) version 20 for analysis. Descriptive analysis was ran to assess missing values and presence of outliers. Mean and Standard deviation were used to summarize the numerical variables and the data were presented using frequency tables, figures and charts. Principal component analysis (PCA) was computed for constructing the wealth index of the study participants. The bi-variable and multivariable logistic regression was used to identify the possible factors of food aversion. A variable with p-value \leq 0.25 during bivariate analysis were further entered into multivariate logistic regression to control the effect of confounding variables. Pearsons Chi – square (χ^2) test was used to assess the relationship between food aversion and nutritional status of pregnant women. Multi co-linearity was checked by Variance inflation factor. Finally, Adjusted Odds Ratio (AOR) and 95% Confidence Intervals (CIs) were used to declare statistical significance.

Data processing and analysis for qualitative data

The qualitative data were analyzed manually using a qualitative content analysis method. First the data from the FGDs were transcribed in into the local language “Sidamic” in an intelligent verbatim style that is avoiding background noises like door openings and bangs; nonverbal communications like sighs, laughter, and coughs and repetitions without adding and or decreasing the words of the speakers. During the transcription of the data the speakers were identified as moderator, participant 1, participant 2 and so on. When it is not possible to identify the speakers i.e. during an overlap speech it was phrased as cross talk. The transcribed data was reviewed and cross checked with the recorded data to ensure the accuracy of the data. Then the transcribed data were translated in to English. After the completion of the translation the data were coded and categorized accordingly. Finally after the information was reached at

saturation the preliminary categories were reviewed, modified, defined and refined to gather together all the data that is relevant to each category and identify the essences of each category.

Results

Socio-demographic and economic characteristics of the study participants

From a total of 505 randomly selected pregnant women, 497 were interviewed voluntarily with a response rate of 98.4%. Nearly, four in five 389 (78.3%) of the respondents were rural residents. The mean (\pm SD) age of the women was 22.3 (\pm 5.5) years and the majority, 188 (37.8%), were in between 24-28 years of age. More than three fourth (396) of the study participants were Protestant religion followers. Nearly four in nine (223 and 225) of the study participants and their husbands had not attend any formal education respectively. The majority of the study participants and their husbands were house wives and farmers respectively. Regarding the wealth index of the study participants, the two extremities were almost equally represented with the poorest-to-richest ratio of 0.97 (Table 1).

Maternal health and anthropometric characteristics

One hundred twelve (22.5%) of the study participants were in their first pregnancy. Two hundred and seventy three (54.9%) of the study subjects were in their second trimester of pregnancy and 315 (63.4%) of the study participants reported that they have ANC follow up during the study period. Out of the total study participants 188 (37.8%) of the women didn't experience nausea and/or vomiting during their current pregnancy but more than half, 282 (56.7%) of the women said they experience nausea during their current pregnancy. The average MUAC of the study participants was 22.7 ± 2.4 cm. More than one-third, 172 (34.6%) of the study participants was undernourished (MUAC < 23 cm) (Table 2).

Meal pattern of the study participants

Out of the total study participants, 245 (49.3%) eat three times per day. Majority, 347 (69.8%) of the study subjects did not eat an additional meal during the period of their current pregnancy. Of those women who ate an additional meal during the period of their pregnancy 137 (91.3%) and 13 (8.7%) of them ate one and two additional meals per day respectively. According to meal skipping practice, 102 (20.5%) of the women skip at least one meal per day and lunch was the most frequently skipped meal, with the proportion of 67 (65.7%) followed by dinner, 35 (34.3%) (Table 3).

Prevalence of food aversion of the study participants

Out of the total study participants, 344 (69.2% (95% CI: 67.2%-71.2%)), had reported food aversion of at least one food during their current pregnancy (Figure 1).

Out of 344 pregnant women who reported food aversion, nearly three-fourth, 252 (73.3%) of the participants, avert more than two kinds of food. Whereas, cereal and its products 45.9% and enset products 44.2% were found to be averted by majority of the women. In contrary, Egg 1.7% and fish 2.3% were found to be the least food categories averted by the study participants. Regarding the participants reasons for the aversion of food, the majority (35.8%) reported that they do not know the reason why they averted a specific food during their pregnancy. Whereas, 22.4% and 25.9% of women reported that, their reason of avoiding a certain kind of food was because of nausea and vomiting (Table 4).

In line with the finding of the quantitative part of the study, many of the pregnant women and mothers in law who participated in the FGDs said “they do not know why pregnant women avoid or hate certain foods during their pregnancy”. However, most participants gives that nausea amd vomiting are the reason for food aversion occurred during pregnancy.

“I used to avoid foods which has strong smell and foods which are cooked with butter during the first four months of my pregnancy since they gives me nausea and vomiting. But latter, just after I turned to my six months of pregnancy, I started to eat those foods that I used to avoid during the early stage of my pregnancy.”(An eight month 30 years old pregnant woman)

“My daughter in law used to avoid different types of foods during the first three months of her pregnancy. Since many of the foods we used to give she during that time gives her nausea and vomiting.....”(A 40 years old woman who has five children and one daughter)

Similarly health concern of both the mother and the baby was given as a reason food aversion practice during pregnancy. The participants of the FGDs believe that, pregnant women avoid certain foods since the woman’s body hates it because it is not good for the health of the baby and/or the mother’s own health.

“I used to avoid meat during the first three months of pregnancy. I don’t know why I hate meat but I believe that it is since my baby hates it or my body dislikes this particular food.”(A thirty seven years old woman who has three children and on her seven months of pregnancy)

Factors associated with food aversion

Pregnant women of age group 19 – 23 and 24 – 28 of years were 2.3 and 2.8 times more likely to experience food aversion as compared to pregnant women of age \geq 34 years of age [AOR= 2.36, 95%CI (1.32 – 4.21)] and [AOR= 2.84, 95% CI (1.61 – 5.01)] respectively. Pregnant women who experienced nausea during pregnancy were found to be 1.7 times more likely to have food aversion [AOR= 1.70, 95%CI (1.10 – 2.65)]. Additionally pregnant women who ate additional meal were 1.7 times more likely to suffer from food aversion as compared to their counter parts [AOR= 1.70, 95%CI (1.06 – 2.73)] (Table 5).

Relationship between food aversion and nutritional status of pregnant women

A Chi-square test (X^2) with 5% level of significance and 1 degree of freedom was performed to assess the relationship between food aversion and nutritional status of pregnant women. Hence, X^2 calculated (6.997) is greater than the X^2 tabulated (3.841), this mean that the null hypothesis of no association was rejected. This suggests that there is statistically significant (p -value=0.008) association between nutritional status of pregnant women and food aversion, the prevalence of food aversion being highest among undernourished pregnant women. Hence pregnant women who practice food aversion are more likely to be malnourished (Table 6).

Discussion

The prevalence of food aversion 69.2% (95% CI:67.2%-71.2%), found in this study is similar to the prevalence of food aversions reported globally by other researchers, ranged from 50–90% (1). The result of this study is in line with similar other studies conducted in Ethiopia: Hadiya Zone (12) and Sidama Zone Dale Woreda (20). Studies conducted elsewhere also concluded the same Tanzania (7), Nigeria (5) and Ecuador (14). However, the finding of this study is inconsistent with five other studies found a prevalence of an interval in between 39%-57% ,which are conducted out side Ethiopia (6).

Despite being the stable foods of the study area, cereal and its products and enset and enset products were the most frequently averted foods identified by this study. This finding is in line with the same studies conducted in Ethiopia: Hadiya Zone (12) and Sidama Zone (20). However, the result of this study is not in accord with a study result conducted at Tanzania; where the vast proportion of pregnant women avoided meat and fish (7). The observed variation might be due to the study participants difference in thier culture, tradition and socio-economic status as culture and traditions are highly tied into the preferences of food, and the chance of evolving food aversion (1).

Moreover, there is also an evidence that Ethiopian pregnant women crave for meat and its product rather than aversting it (6). The result also supports the notion that aversion to commonly consumed foods is an inbuilt mechanism to diversify the types of foods consumed by avoiding monotonous diet (4). Unsurprisingly, the high proportion of aversion to cereal, which contains a significant amount of phytate that reduce the bioavailability of zinc, iron and calcium, seen in this study supports the assumption that, pregnant women avoid foods that contain plant toxins/phytochemicals (15). More importantly, it supports the hypothesis; “dietary aversions as preventive of the metabolic syndrome during pregnancy”. Aversions to these carbohydrate-rich foods were possibly a mechanism to prevent the gestational metabolic syndrome (1).

A change in olifactory and taste sensitivity, which could result in nausea, is considered as possible factor that arbitrate the development of food aversion in pregnant women (1). Our study also found that pregnant women who experienced nausea were found to be 1.7 times more likely to have food aversion

than those who were not experienced nausea during their pregnancy [AOR = 1.70, 95%CI (1.10–2.65)]. This result is in line with the report of other similar studies conducted in different areas (6). Likewise, the finding of our result supports the assumptions of most anthropologists that aversion is mainly due to nausea (morning sickness) (4). This might be explained that; the presence of nausea help the women to expel offending foods containing potentially dangerous substances as the protection mechanism of both for her health and her baby's health (15).

The WHO recommended at least one additional meal during the period of pregnancy (2). Similarly, a systematic review on maternal diet during pregnancy revealed that; increased consumption of food during pregnancy was thought to “strengthen the child's body” (9). However, only about 31.3% of study participants were found to eat an additional meal. This is comparable to the report of the study done in Ethiopia; Sidama Zone Dale Woreda (20). The observed comparability is probably due to the similarity of the study area, Sidama Zone. On the other hand our study found significant association between food aversion and having additional meal. Thus, pregnant mothers who ate additional meal were 1.70 times more likely of avoiding food than those who had not ate additional meal [AOR = 1.70, 95%CI (1.06–2.73)]. This finding is similar with the same studies conducted in Hadiya Zone (12), and Sidama Zone Dale Woreda (20). This could be due to that pregnant mother who have an extra meals would avoid the food they dislike.

Young adult women were more likely to experience food aversion during their pregnancy. About 70 of the participants of this study who practiced food aversion were below the age of 29 years. Our study found that, pregnant women of age group 19–23 and 24–28 of years were 2.3 and 2.8 times more likely to experience food aversion as compared to pregnant women of age ≥ 34 years [AOR = 2.36, 95% CI (1.32–4.21)] and [AOR = 2.84, 95% CI (1.61–5.01)] respectively.

On the other hand, anthropometric indices that indicate poor maternal nutritional status could predict a decrease in dietary aversions during pregnancy (1). Accordingly, our study result revealed that, more than one third (34.6%) of the study participants were found to be undernourished (MUAC < 23 cm), which is incomparable to the national prevalence (22%) (10). The observed high prevalence of undernutrition might be due to the presence of high prevalence of food aversions in this study among pregnant women, which decrease food choices and, thus, leading to reduced dietary intake, which in turn leads the woman to be undernourished. Furthermore, merely half (49.3%) of the study participants eat three times per day, which is normally recommended for non-pregnant women. Plus to this, about one-fifth (20.5%) of the participants skip their regular meals. Unfortunately, among participants who skipped meal, 76% of them experienced food aversion. This implies that, the study participants in this study area obtain suboptimal nutrition during their pregnancy period. As a result, the observed high prevalence of under nutrition among the women could be explained by such overlapping factors.

On the other hand, our study revealed that, nutritional status of pregnant women and food aversion have statistically significant association (p -value = 0.008). Meaning that, the prevalence of food aversion is being highest among undernourished pregnant women. Hence pregnant women who practice food

aversion are more likely to be malnourished. This might be due to the observed suboptimal nutrition and meal skipping practice of the study participants. It could also explain that, the study participants commonly avoid the staple foods without devising complement foods which will nourish them. Moreover, it might be due to the avoidance of foods with high nutrient value owing to the fear of having a big baby and enduring a difficult labor (17). Incongruous to this study, studies conducted in Nigeria and Ethiopia reported that pregnant women who experienced food aversions were found to have better nutritional status (6). On the other hand, similar study conducted at Southern Ethiopia revealed none significant association between food aversion and nutritional status of pregnant women (12). The observed difference could be due to socio-economic variation of the study participants as the economic constraints and intra-household distribution of food are key barriers to achieve adequate dietary intake during pregnancy (17).

The strength of this study is that it is amongst few community based studies in Ethiopia conducted to assess prevalence of food aversions and its association with nutritional status of pregnant women during pregnancy. Additionally, the study used relatively high sample size. The limitations of the study are there could be a recall bias on some variables as the data were taken through interviews and also the study relied on only MUAC for the anthropometric measurement so as to determine the nutritional status of pregnant women. Further, cross sectional design couldn't reveal the cause and effect relationships between food aversion and nutritional status of women.

Conclusion And Recommendations

A total of 497 pregnant women were interviewed voluntarily with a response rate of 98.4%. The finding of this study revealed that the overall prevalence of food aversion was relatively high (69.2 %) and cereal and enset were the most frequently averted foods. The mean (\pm SD) MUAC measurement of the study participants was 22.7(\pm 2.4)cm. Relatively high prevalence of undernutrition (34.6%) among pregnant women was found. Aged group 19 – 23 and 24 – 28 of years, nausea and having additional meal during pregnancy were significantly associated with food aversion. Likewise, statistically significant (p -value=0.008) association between nutritional status of pregnant women and food aversion was obtained. Therefore, the Woreda Health Office needs to be intensified on nutritional needs of pregnant women and the implications of food aversion during pregnancy to ensure pregnant women have optimal meal pattern and good nutritional status through strengthening nutrition education for each pregnant woman during routine ANC visit. Considering incorporation of maternal nutrition into preservice and in-service curriculums and trainings of health providers and community level workers is also critical. Further research concerning the relationship between aversion and nutritional status of the pregnant women is also crucial.

Abbreviations And Acronyms

ANC Ante Natal Care

AOR Adjusted Odds Ratio

BMI Body Mass Index

COR Crude Odds Ratio

DNA Deoxy-ribo Nucleic Acid

IDD Iodine Deficiency Disorder

LBW Low Birth Weight

MUAC Mid-Upper Arm Circumference

RDI Recommended Daily Intake

RNA Ribo Nucleic Acid

SNNPR South Nation Nationalities and People Region

SPSS Statistical Package for Social Sciences

WHO World Health Organization

Declarations

Ethics approval and consent to participate

Primarily an ethical approval letter was obtained from Institutional Review Board of Hawassa University College of Medicine and Health Sciences (Reference Number: IRB/225/11). Likewise, supplementary letter of support were also secured from Boricha Woreda Health Office and respected kebeles administrations. Moreover, verbal informed consent was maintained from each study participants. Information regarding any specific personal identifiers like name of the mothers was not collected and confidentiality of any personal information was kept throuout the study period

Consent for publication

"Not applicable"

Availability of data and materials

"Not applicable"

Competing interests

"The authors declare that they have no competing interests"

Funding

No funding sources

Authors' contributions

Conceptualization: AY AF. Investigation: AY. Supervision: AY AA WT AF. Software: AY AF. Writing paper: AY AF. Reviewing and editing: AY AA WT AF. Analyzing and interpreting the data: AY AF. All authors read and approved the final manuscript.

Acknowledgements

First of all, we would like to extend our heartfull gratitude and benevolence to the Almighty GOD who made it cleared all the predicaments we faced through our lives. Last but not least, we would also like to express our loving appreciation to our families and friends for their encouragement and support since the inception of this study.

References

1. Poy MS, López LB. What do we know about Food Cravings and Aversions during Pregnancy? Integrative Gynecology and Obstetrics Journal. 2019;2(3):1-7.
2. Nutrition of women in the preconception period, during pregnancy and the breastfeeding period. World Health Organization, 2012.
3. J K. Physiology of pregnancy and nutrient metabolism. American Journal of Clinical Nutrition. 2000;71(5):1218-25
4. Grünebaum A. Food Cravings, Pregnancy Cravings, Food Aversions June 20, 2019 [cited 2020 July 2]. Available from: <https://www.babymed.com/pregnancy/food-cravings-pregnancy-cravings-food-aversions>.
5. Benedeth MN. Food Craving And Aversion Among First Time Pregnant Women In Selected Health Facilities In Enugu Metropolis Enugu State [research]: : University Of Nigeria Enugu Campus; 2016.
6. . !!! INVALID CITATION !!!
7. Nyaruhucha CNM. Food cravings, aversions and pica among pregnant women in Dares Salaam, Tanzania. Tanzania Journal of Health Research. January, 2009;11(1):29-34.
8. Olusanya JO, O OF. Food aversion and craving among pregnant women in Akure, Onda state, Nigeria. International Journal of Tropical Medicine. 2009;4(3):100-3.
9. Tafese Z, Kebebu A. A Systematic Review of Maternal Feeding Practice and its Outcome in Developing Countries. Journal of Nursing and Women's Healthcare. 2017;01.
10. [Ethiopia] CSAC, ICF. Ethiopia Demographic and Health Survey 2016. Addis Ababa, Ethiopia, and Rockville, Maryland, USA: CSA and ICF, 2016.

11. Al-Rasasi B. Nausea and Vomiting in Pregnancy, Maternal Nutrition and Pregnancy Outcome.: University of Surrey.; 2003.
12. Demissie T, Muroki NM, Kogi-Makau W. Food aversions and cravings during pregnancy: Prevalence and significance for maternal nutrition in Ethiopia. Food and Nutrition Bulletin. 1998;19(1):20-6.
13. Patil CL. Appetite Sensations in Pregnancy among Agropastoral Women in Rural Tanzania. Ecology of Food and Nutrition. 2012;51:431 - 43.
14. Weigel MM, Coe K, Castro NP, Caiza ME, Tello N, M R. Food Aversions and Cravings during Early Pregnancy: Association with Nausea and Vomiting. . Ecology of Food and Nutrition. 2011;50:197 - 214.
15. Sherman PW, Flaxman SM. Nausea and vomiting of pregnancy in an evolutionary perspective. . American Journal of obstetric and gynecology. 2002;186.
16. Organization WH. WHO recommendations on antenatal care for a positive pregnancy experience. Geneva 27, Switzerland 2016.
17. Kavle JA, Landry M. Addressing barriers to maternal nutrition in low- and middle- income countries: A review of the evidence and programme implications. Maternal and Child Health July 2017.
18. A 2011 E.C Annual Performance Report. Boricha Woreda, Yirba Town: Sidama Zone Boricha Woreda Health Office, 2011.
19. The Humanitarian Charter and Minimum Standards in Disaster Response. Geneva 19, Switzerland: Sphere Project 2004; 2004.
20. Yoseph HH. Prevalence of food aversions, cravings and pica during pregnancy and their association with nutritional status of pregnant women in Dale Woreda, Sidama zone, SNNPRS, Ethiopia. International Journal of Nutrition and Metabolism. January 2015;7 (1):1-14.

Tables

Table 1: Socio-demographic characteristics of the pregnant women in Boricha woreda, Sidama zone, Southern Ethiopia, 2019

Variable (N = 497)	Frequency (N)	Percentage (%)
Residence		
Urban	108	21.7
Rural	389	78.3
Maternal age in years		
19 – 23	139	28
24 – 28	188	37.8
29 – 33	78	15.7
≥34	92	18.5
Religion		
Protestant	396	79.67
Orthodox	31	6.23
Muslim	70	14.1
Educational status women		
Above secondary	60	12.1
Secondary	65	13.1
Primary	149	30
No formal education	223	44.9
Educational status of husbands		
Above secondary	75	15.1
Secondary	88	17.7
Primary	109	21.9
No formal education	225	45.3
Occupation of women		
House wife	355	71.4
Student	22	4.4
Government employed	50	10.1
Merchant	58	11.7
Others	12	2.4
Occupation of husbands		
Government employed	68	13.7
Merchant	189	38
Farmer	197	39.6
Others	43	8.7
Wealth index		
Poorest	99	19.9
Poor	106	21.3
Middle	99	19.9
Rich	91	18.9
Richest	102	20.5

Table 2: Maternal health and anthropometric characteristics of pregnant women in Boricha Woreda, Southern Ethiopia, 2019

Variable (N = 497)	Frequency (N)	Percentage (%)
Trimester of pregnancy		
Second trimester	273	54.9
Third trimester	224	45.1
Attend antenatal care		
Yes	315	63.4
No	182	36.6
Parity		
Primiparous	112	22.5
Multiparous	385	77.5
Nausea and vomiting during pregnancy		
Nausea	282	56.7
Vomiting	148	29.8
Both nausea and vomiting	121	24.3
No	188	37.8
Nutritional status		
Well nourished (MUAC \geq 23cm)	325	65.4
Under nourished (MUAC < 23cm)	172	34.6

Table 3: Meal pattern of pregnant women in Boricha woreda, Sidama Zone, Sothern Ethiopia, 2019

Variable (N = 497)	Frequency	Percentage (%)
Number of meal per day		
Two times	102	20.5
Three times	245	49.3
Four times	137	27.6
Five times	13	2.6
Skipping meal		
Yes	102	20.5
No	395	79.5
Type of meal skipped (n=102)		
Lunch	67	65.7
Dinner	35	34.3
Having additional meal		
Yes	150	30.2
No	347	69.8
Number of additional meal (n=150)		
One	137	91.3
Two	13	8.7

Table 4: Reported food aversion of pregnant women in Boricha woreda, Sidama Zone, Southern Ethiopia, 2019

Variable (N = 344)	Frequency (N)	Percentage (%)
Number of foods avoided		
1	92	26.7
≥2	252	73.3
Categories of foods		
Cereal and cereal products	158	45.9
Roots and tubers	50	14.5
Legumes and legume products	23	6.7
Vegetables	39	11.3
Fruits	59	17.2
Meat and meat products	18	5.2
Egg	6	1.7
Fish	8	2.3
Dairy products	31	9
Oils and fats	51	14.8
Coffee	48	14
Foods which has strong smell	48	14
Soft drinks	9	2.6
Sweets	12	3.5
Kocho/enset products	152	44.2
Reasons for food aversion		
Nausea and vomiting	77	22.4
Heart burn	89	25.9
Don't know	123	35.8
Personal dislike of the food	23	6.9
Smell and test of the food	48	14
Having/eating frequently	31	9
Believe dislike by the fetus	32	9.3

Table 5
Factors associated with food aversion during pregnancy in Boricha woreda, Sidama Zone, Southern Ethiopia, 2019

Variable		Food aversion		COR (95%CI)	AOR (95%CI)
		Yes N (%)	No N (%)		
Age	19–23	99 (71.2%)	40 (28.2%)	0.60 (0.27– 1.34)	2.36(1.32– 4.21)*
	24–28	145 (77.1%)	43 (32.1%)	0.38 (0.21– 0.69)	2.84(1.61– 5.01)*
	29–33	53(67.9%)	25 (24.5%)	0.41 (0.20– 0.85)	2.31(1.14– 4.67)*
	≥ 34	47 (51.1%)	45 (48.9%)	1	1
Residence	Urban	74 (68.5%)	34 (31.5%)	1.66 (0.82– 3.36)	0.64(0.33– 1.25)
	Rural	270 (69.4%)	119 (30.6%)	1	1
Educational status of women	Secondary & above	44 (73.3%)	16 (26.7%)	1.14(0.40– 3.23)	0.99(0.45– 2.16)
	Secondary	44 (67.7%)	21 (32.3%)	1.14(0.52– 2.50)	0.91(0.45– 1.83)
	Primary	104(69.8%)	45(30.2%)	0.65(0.56– 1.19)	1.09(0.67– 1.79)
	No formal education	152(68.2%)	71(31.8%)	1	1
Educational status of husband	Above secondary	54(72%)	21(28%)	0.88(0.31– 2.56)	-
	Secondary	52(59%)	36(41%)	1.57(0.79– 3.11)	-
	Primary	80(73.4%)	29(26.6%)	0.66(0.34– 1.30)	-
	No formal education*	158(69.8%)	45(30.2%)	1	1
Wealth index	Poorest	72(72.7%)	27(27.3%)	1.61(0.71– 3.69)	0.93(0.43– 1.98)
	Poor	72(70%)	34(30%)	1.99(0.91– 4.34)	0.74(0.36– 1.52)

	Middle	61(61.6%)	38(38.4%)	1.71(0.83–3.53)	0.63(0.31–1.27)
	Rich	65(71.4%)	26(28.6%)	1.12(0.56–2.24)	1.06(0.54–2.11)
	Richest	74(72.5%)	28(27.5%)		
Parity	Primi	84(75%)	28(25%)	0.66(0.30–1.47)	–
	Multi	260(67.5%)	125(32.5%)	1	–
ANC	Yes	218(69.2%)	97(30.8%)	1.15(0.73–1.81)	
	No	126(69.2%)	56(30.8%)	1	
Nausea	Yes	212(75%)	70(25%)	0.63(0.40–1.01)	1.70(1.10–2.65)*
	No	132(61.4%)	83(38.6%)	1	1
Vomiting	Yes	116(78.4%)	32(21.6%)	0.60(0.36–1.07)	1.63(0.98–2.70)
	No	228(65.3%)	121(34.7%)	1	1
Skipping meal	Yes	76(71.6%)	26(28.4%)	0.74(0.49–1.60)	–
	No	271(68.6%)	124(31.4%)	1	–
Additional meal	Yes	115(76.7%)	35(23.3%)	0.54(0.32–0.88)	1.70(1.01–2.73)*
	No	229(66%)	118(34%)	1	1

Table 6
Association between food aversion and nutritional status of pregnant women

Food aversion	Nutritional status of pregnant women		χ^2	P – Value
	Under nourished MUAC < 23 cm	Well-nourished MUAC \geq 23 cm		
Yes	132	212	6.997	0.008
No	40	113		
Total	172	325		

Figures



Figure 1

Prevalence of food aversion among pregnant women in Boricha woreda, Sidama Zone, Southern Ethiopia, 2019