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Assessment of Dietary Practice and Anthropometric Status of Pregnant Women in Aleta Chuko Woreda Southern Nations, Nationalities and People's™ Region /SNNPR/, Ethiopia: Descriptive Cross-Sectional Study

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Abstract

Background: Good maternal nutrition is important for the health and reproductive performance of women and the health, survival, and development of their children. Malnutrition in women, including pregnant women, is not conspicuous and remains, to a large extent, uncounted and unreported; thus, insufficient attention has been given to the extent, causes, and consequences of malnutrition in women. As a result, inadequate resources and efforts have been allocated to improving women's nutrition compared with other nutritional and public health actions. The limited available data and the few experiences with programs that do exist come mostly from small-scale efforts to improve nutrition during pregnancy, often through nutritional supplementation to enhance fetal growth and birth weight. This study was implemented to assess the dietary practice and anthropometric status of pregnant women in Aleta Cuko Woreda, SNNPR, and Ethiopia.

Objectives: To assess the prevalence of dietary practice and anthropometric status among pregnant women in Aleta Chuko woreda, SNNPR Ethiopia.

Methods: A health center-based descriptive cross sectional study was conducted between May 2015 and June 2015 among pregnant women in Aleta Chuko woreda, SNNPR Ethiopia.

Data was entered and analyzed through using Statistical Package for the Social Sciences (SPSS) software for windows version 16.0.

Results: The prevalence of MUAC measurement <19 cm 2.1%, 19 cm-23 cm were 69%, and ≥23 cm 28.1%. About 76.7% of Iron/float supplementation, 57.6% of advice about dietary practice during ANC, and 92.4% of sable diet in the study area were Enset.

Conclusions: Individual counseling with any action points and reinforcement can bring about improvement in nutritional status during pregnancy.

Keywords: Dietary practice; Anthropometric status; Prevalence

Abbreviations: ANC: Antenatal Care; BMI: Body Mass Index; CVD: Cardiovascular Disease; EC: Ethiopian Calendar; ETB: Ethiopian Birr; LBW: Low Birth Weight; MUAC: Middle Upper Arm Circumference; NE: Nutrition Education; PNC: Postnatal Care; SNNPR: South Nation Nationalities People Region; SPSS: Statistical Package for the Social Science

Introduction

Statement of the problem

During pregnancy it is essential that the diet provide the energy and nutrients required to keep the mother healthy, to prevent pregnancy-related diseases and to allow the fetus to grow and develop in favorable conditions. The mother's nutritional status during the preconception period and/or during pregnancy not only can affect the perinatal phase of pregnancy outcome but may also be related to the development of cardiovascular disorders, hypertension and noninsulin dependent diabetes mellitus in her adult child [1].

Maternal nutritional status is considered to be an important factor that affects the successful completion of pregnancy. In extreme cases of chronic under nutrition, low energy intake during pregnancy was associated with low birth-weight (LB-W). However, the effect of moderate malnutrition on fetal growth is not clear. Other interacting factors, such as racial and genetic background, age, general health, educational status, cigarette smoking, past nutritional status of the mother, parity, multiple pregnancies, climate, socioeconomic conditions related to sanitation and infections, and the availability of health services make interpretation of the association between maternal nutrition and fetal development difficult. Although the importance of these factors in comprehensive maternal care is recognized, this study was limited to the background for a protocol for the monitoring of pregnancy weight gain [2].

Any nutritional education and/or intervention policy that aims to improve women's habits during the reproductive and/or pregnancy cycle requires knowledge of the habitual dietary patterns in these stages of life. Using 'factor analysis' to describe dietary patterns during the reproductive cycle, pregnancy and the postpartum will make it possible to describe the various combinations of food groups that are consumed. It is also interesting to identify the lifestyles, and the anthropometric and sociodemographic characteristics associated to these patterns. Knowledge of all this can facilitate the design and application of more effective policies of nutritional prevention in these periods [3,4].

Good maternal nutrition is important for the health and reproductive performance of women and the health, survival, and development of their children. Malnutrition in women, including pregnant women, is not conspicuous and remains, to a large extent, uncounted and unreported; thus, insufficient attention has been given to the extent, causes, and consequences of malnutrition in women. As a result, inadequate resources and efforts have been allocated to improving women's nutrition compared with other nutritional and public health actions. The limited available data and the few experiences with programs that do exist come mostly from small-scale efforts to improve nutrition during pregnancy, often through nutritional supplementation to enhance fetal growth and birth weight. It was suggested that highly publicized initiatives such as "child survival" and "safe motherhood" have not had the expected effect because too little attention has been given to the nutritional status of women, including mothers. Programs; and the increased opportunities for policies and programs that can be implemented through existing health systems, which are expanding and providing better coverage, particularly in prenatal care, in most developing countries [5].

The situation is not dire, however. By translating and integrating existing biological and socioeconomic knowledge into practical action, a solid basis for policy and program decisions can be developed. This study was implemented to assess the dietary practice and anthropometric status of pregnant women in Aleta Cuko Woreda, SNNPR Ethiopia.

Significance of the study

Assessment of nutritional status in pregnancy is extremely important at several levels. It is critical for monitoring and quantifying risk among specific populations for policy and program development. It is also an important adjunct in the management of women's health care due to its use in detecting abnormality in both the pre-reproductive and reproductive phases of women's lives. Furthermore the result of this study will be used by the team for planned future intervention and project work on dietary practice.

Literature Review

Maternal nutrition plays a fundamental role in optimizing pregnancy outcome and unlike other factors, such as heredity or pre-existing conditions; the nutritional status is amenable to change. Research relating to pregnancy outcome has documented the critical need of nutrition education (NE) for optimal pregnancy outcome [4].

Poor maternal nutrition and the resulting low birth weight (LBW) infants remain the single most important cause of infant morbidity and mortality in the world and reduction in the rate of LBW has been named by WHO as one of the global indicators of progress. In majority of LBW infants the seed of death is sown much before they are born which increases the risk of perinatal, neonatal mortality and growth retardation and chronic diseases as adults [5].

The magnitude of female under nutrition and the enormous social, economic, health, and developmental implications of poor prenatal nutrition of women and children provide a compelling rationale for systematic stronger action. Because of the reproductive consequences and the long-term effects of childhood malnutrition on adult physical and intellectual productivity, as well as of the widespread effect of women's health and nutrition on child survival, women's productivity, family welfare, and poverty reduction in the community as a whole, securing adequate nutrition of women, particularly before and during pregnancy, is a socially and economically important goal for developing countries [2].

The effect of women's prenatal health and nutritional status on child growth, health, survival, and development occurs both through reproductive performance and survival and through fetal Growth and development. Review of studies on the nutritional status of pregnant and lactating women showed that women in developing countries consumed only about two-thirds of the recommended daily intake of energy and that their average weight for height was, in most cases, well below the 50th percentile for small-framed women in developed countries. Moreover, the energy and nutrient intakes of pregnant and lactating women tended to be only slightly higher than those of no pregnant women, although the nutritional requirements of pregnant and lactating women were significantly greater [6].

The definitive negative outcome of poor prenatal health and nutrition, as well as inadequate care during pregnancy and delivery, is reflected in the high prevalence of maternal mortality in developing countries; nearly 600000 women die each year from pregnancy- related causes. Although poor prenatal nutrition contributes directly and indirectly to this large mortality rate, the extent of its contribution has not been measured because the main reported causes of maternal mortality (hemorrhage, obstructed delivery, eclampsia, sepsis, and unsafe abortion) greatly overshadow the role of nutrition itself [5,6].

Other studies showed that micronutrient deficiencies, particularly deficiencies of iron and vitamin B-12, were frequent in pregnant women in Mexico. Poor health and nutrition are associated with repeated, closely spaced pregnancies that progressively reduce women's nutritional reserves to the point of nutritional depletion, known as the maternal depletion syndrome [7]. Anthropometric measurements, among the most frequently applied methods for assessing nutritional status in pregnant women, are recognized as effective tools in the prevention of perinatal morbid-mortality, the prognosis of child health, and the promotion of women's health, and have undergone considerable improvement over the past five decades. In addition, their easy application, low cost, and non-invasive nature reinforce their viability as a nutritional assessment method [7,8].

In terms of anthropometric assessment, pregnancy is characterized as a brief observation periodin which the anthropometric index undergoes rapid changes. Conducting anthropometric measurements during the prenatal period is a routine practice. However, its actual effectiveness depends on the availability of services, the number of prenatal care visits, and women's consent to having their measurements taken. Ensuring the most beneficial outcome requires the use of anthropometric assessment methods that help develop an effective and practical application instrument capable of predicting maternal and infant health conditions and allowing for adequate nutritional intervention during this period of high biological vulnerability [3,7,8].

The use of anthropometric measurements in pregnancy to promote health and improve obstetric results—including maternal morbid-mortality indices, conditions at birth, and perinatal mortality— raises certain issues that underscore the need for validation of some of the practical aspects of the process as well as its universal applicability in normative terms. These issues include: water retention, which frequently causes edema; alteration in body composition; and postural, hormonal, and other physiological conditions of pregnancy that are directly reflected

In weight gain, the most common anthropometric measure used during pregnancy follow-up. Measurements of weight and height, and their associations, to produce pre-gestational Body Mass Index (BMI) indices, and (less commonly) the calculation of arm circumference and cutaneous folds, are also recommended in the anthropometric nutritional assessment of pregnant women [2,7-9].

Anthropometric assessment during pregnancy and differentiation of risk indicators, benefits, and responses to interventions in the elaboration of reference values for the various phases of gestation. In practice, however, very few studies have taken all of these factors into account in formulating recommendations for the use of maternal anthropometry [1,5,7].

Assessment of nutritional status in pregnancy is extremely important at several levels. It is critical for monitoring and quantifying risk among specific populations for policy and program development. It is also an important adjunct in the management of women's health care due to its use in detecting abnormality in both the pre-reproductive and reproductive phases of women's lives [2,7,9,10]. This type of assessment is therefore an important feature of antenatal care and must be feasible at the most peripheral level of the health care system. This study was carried out to assess the dietary practice and anthropometric status of pregnant women in Aleta Chuko woreda, SNNP Ethiopia (Figure 1).

Objectives

General objective

- To assess the dietary practice and anthropometric status among pregnant women in Aleta Chuko woreda, SNNPR Ethiopia.

Specific objectives

- To assess the dietary practice among pregnant women in Aleta Chuko woreda, SNNPR Ethiopia
- To measure the anthropometric status among pregnant women in Aleta chuko woreda, SNNPR Ethiopia

Methods

Study setting

A health center-based descriptive cross sectional study was conducted between May 2015 and June 2015 among pregnant women in Aleta Chuko woreda, SNNPR Ethiopia. The woreda is one of the 21 Woreda which is found in Sidama Zone SNNPR. The woreda has 26 rural kebeles and 5 urban kebeles, the total population is estimated about 203,971 of which female 117,795 and male is 86,176. Number of house hold estimated about 41,627. The number of under one children is 7,057, under five children is 31,840, women with child bearing age 15-49 is 47,525 and the number of pregnant mother is about 7,057 [11] (Figure 2).

Source: AletaChukoworeda annual health report for the year 2006 E.C [11].

As to the health service facilities, 8 health centers and 26 functional health posts .The woreda has 84% one visit ANC coverage, 64.2% four visit ANC coverage, institutional delivery 41%, postnatal care coverage 82%, and family planning 57% [11].

Study design

A health center based descriptive cross-sectional study among pregnant mother was held from May to June, 2015 in Aleta Chuko woreda, SNNPR Ethiopia.

Figure 1: Conceptual frame work

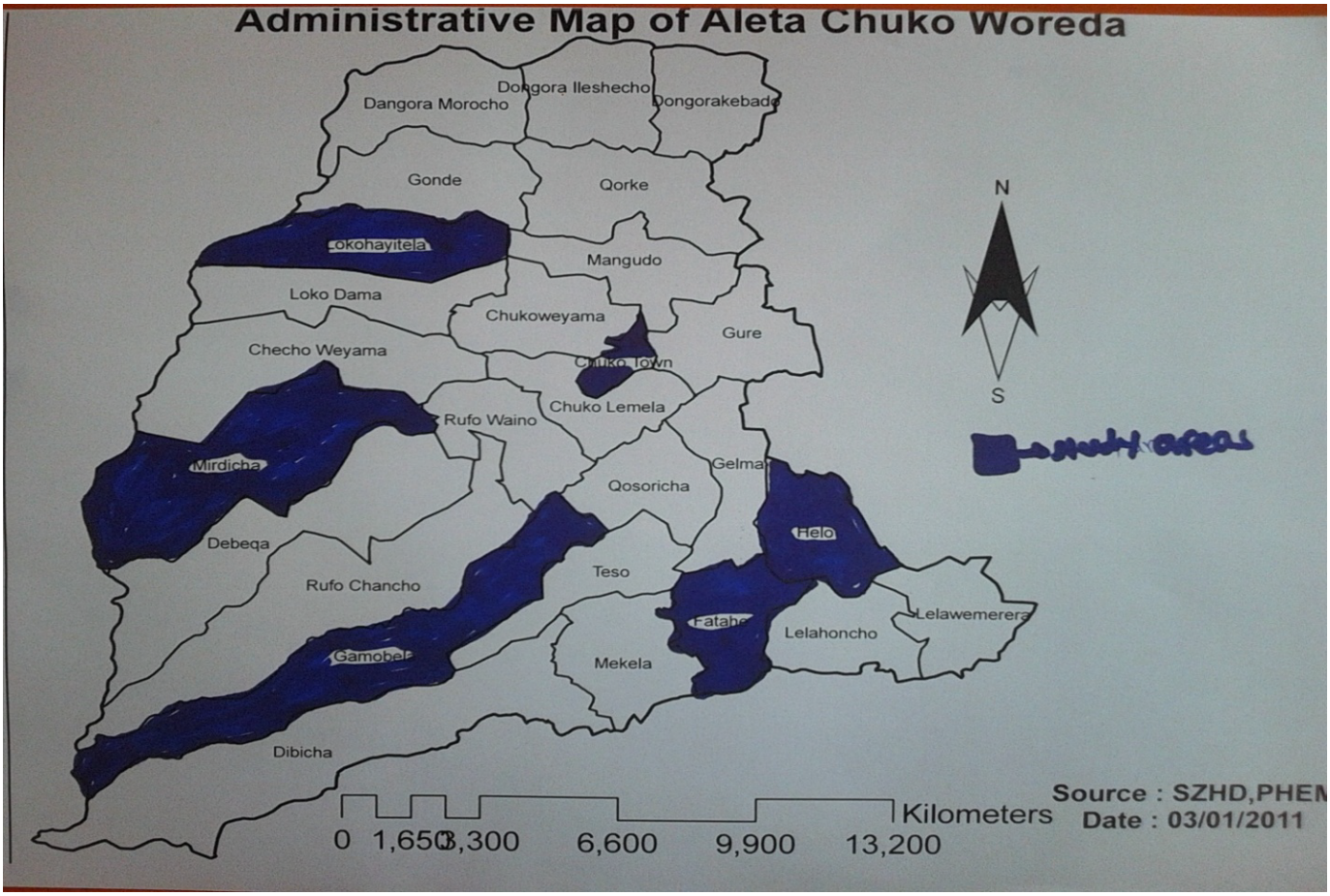

Figure 2: Area map of Aleta Chuka woreda

Study population

The source of populations for the study was all pregnant mothers in Aletachukoworeda. The proportion of pregnant mothers 7,057 of the total population. Therefore, the required sample sizes from each health center were calculated from the sampling frame produced for each health center according to the size of the population (was proportionate sample size allocation).

- **Inclusion criteria**

The study subject was all pregnant mothers who are attending antenatal care in the study area.

- **Exclusion criteria**

Not willing mothers, mothers too sick or mentally not stable to respond to questions.

Sample size

The sample size required for the study was calculated using the formula to estimate a single population proportions.

For the first objective:

$$n = \frac{[(Z\alpha/2)2\ p\ (1-p)]}{d2} = 226 + 226(5\%) = 237$$

Assumption: Based on the previous study in Nigeria, the prevalence of dietary practice is 82% [6].

Where: n = required sample sizes

15% = non - respondent rate

Zα/2 = critical value for normal distribution at 95% confidence interval which equals to 1.96

(Z value at alpha = 0.05)

d = an absolute precision (margin of error) = 5%

For the second objective:

$$n = \frac{[(Z\alpha/2)2\ p\ (1-p)]}{d2} = 134 + 134(5\%) = 142$$

Assumption: Based on the previous study in India, the prevalence of Anthropometric measurement 90.34% [12].

Where: n = required sample sizes

15%= non -respondent rate

Zα/2 = critical value for normal distribution at 95% confidence interval which equals to 1.96

(Z value at alpha = 0.05)

d = an absolute precision (margin of error) = 5%

Therefore for adequacy, representativeness and to meet the objective the first sample size which was 237 implemented for pregnant mothers who attending antenatal care (Figure 3).

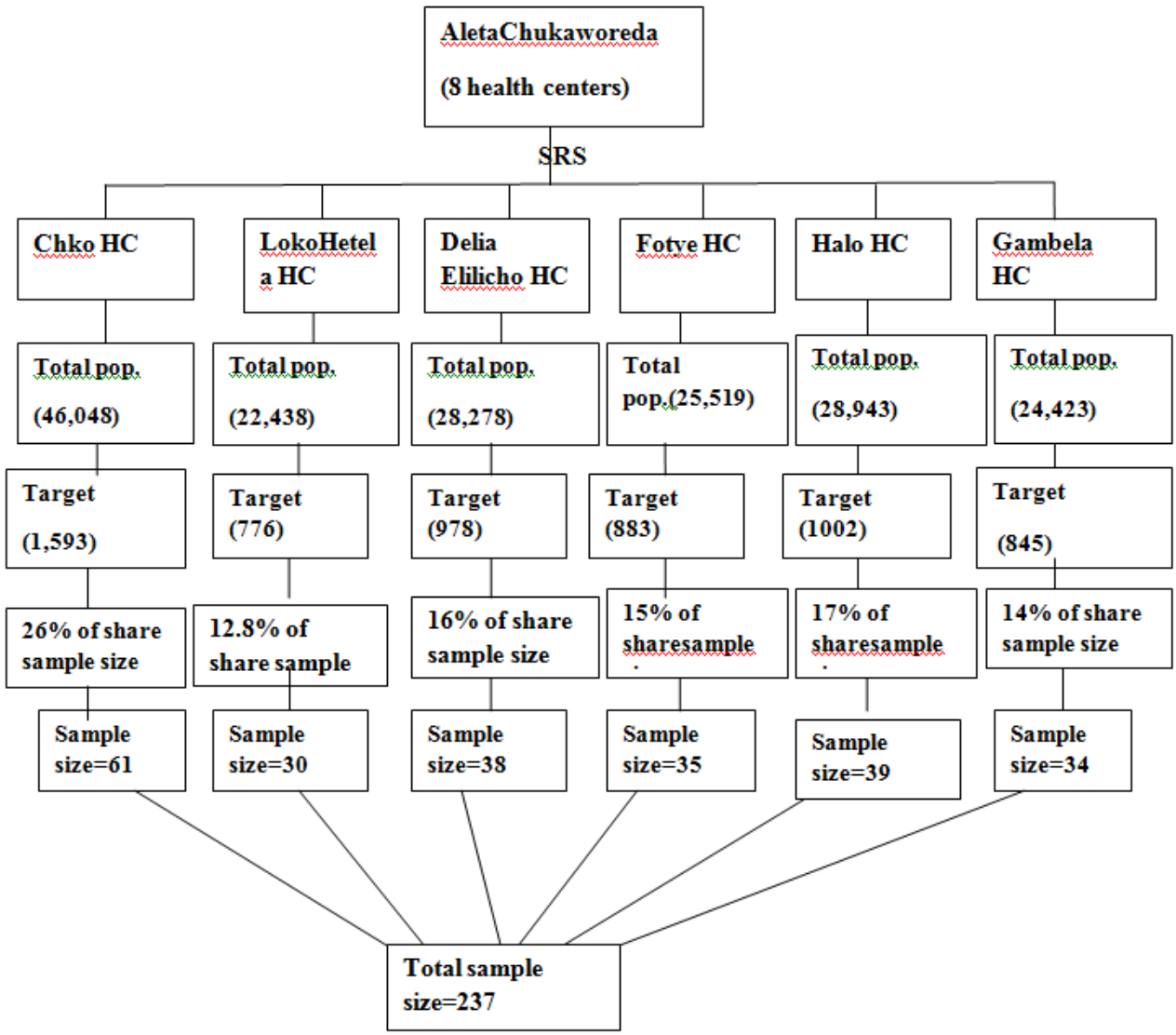

Figure 3: Schematic presentation of sampling technique

Sampling procedure

A random sampling technique was used in sampling the study subjects. All the 8 health centers were included in the sampling frame and out of which randomly selected 6health centers using the random number table proportional to the size of the health centers.

The total population size of the 6 health centers, as it was enumerated in the housing and population census 2007, was estimated the pregnant mothers. It is then from these target population that the required sample size was taken according to the size of sample frame in each health centers. Pregnant women were listed with the help of respective health workers working in delivery case team. Once the sampling unit was listed, the lottery method or computer generating method was implemented to identify the individual subject.

Data collection procedure

The participants were nutritionally accessed *via* 24-hour recall. Additionally anthropometric assessment MUAC measurement was involved. Structured questionnaire was developed and adopted from EDHS 2011, food frequency questionnaire and WHO standard .That all the variables to be assessed was incorporated [9,13]. Questionnaires was developed first in English then translated to Amharic version. The questionnaires were pre-tested before the actual data collection is started.

The purpose of the pre-test was that to identify the non-respondents variable before the intervention begin and then amendments of the questionnaire was made before the actual data collection is started. The data collection was conducted by the health professional from the existing health system that to easily familiarized with the tool. The close follow-up by the very experienced supervisors was made whether the questionnaires was appropriately filled by the trained interviewers. Women was first informed about the study and its aim, and those agreeing to participate was gave a written consent. Face-to-face interviews were conducted with the participants while attending antenatal care in the respective health centers.

Operational definitions and variables

Malnutrition is a disease caused by not getting enough of the right food to eat or enough quantity of food. Causes of malnutrition are multifactorial and can be divided in to immediately, underlying and basic.

Antenatal care is a type of preventive healthcare with the goal of providing regular check-ups that allow doctors or midwives to treat and prevent potential health problems throughout the course of the pregnancy while promoting healthy lifestyles that benefit both mother and child.

Anthropometric measurement is a physical measurement of the body to assess the nutritional status of an individual.

Dependent variables: Dietary practice and anthropometry status of pregnant mothers

Data analysis plan and management

Data was entered and analyzed through using Statistical Package for the Social Sciences (SPSS) software for windows version 20. Descriptive statistics like mean, median, standard division to measure association between variables were implemented.

Ethical consideration

Ethical approval for the study was obtained from Hawassa University School of Nutrition, Food Science and Technology research committee. Letters was written first from Hawassa University School of Nutrition, Food Science and Technology to Aleta Chuko woreda health office, then individual letters was written for each respective health centers from Aleta Chuko woreda health office in order to get co-operation, participation and to inform them ahead of time about the research work. At the time of data collection, a written consent was taken from the mother to confirm whether they are willing to participate or not. Those not willing to participate were given the right to refuse. Confidentiality of the responses was ensured throughout the research process.

Results

Socio demographic characteristics

The response rate of the study was 99.6%.The age range of pregnant mothers considered in the study was 15-49 years, which is a childbearing age range. Out of the total study, 20 (8.5%) were young mothers aged 15-19 years, while 5 (2.2%) were aged 35 and above years. The mean (± Standard deviation) age of the mothers was nearly 24 years (0.24). The median age of the study subject was 25 years. The minimum and maximum age of the study subject was 16 years and 37 years respectively.

236 (100%) of the study subject were house wives. In this study Christian were 225 (95.3%) and Muslim were 10 (4.2%) of the study subjects. Two major Ethnic groups were identified of which, Sidama constitute the larger proportion 234 (99.2%). Among the study subjects 123 (52.1%) have attended formal education. Out of whom 11.9%, 89% and 3% have attended primary (1-4 grade) school, medium level (5-9 grade), secondary (10-12 grdae) school and 0.4% university diploma respectively. Around 100% percent of the respondents were married (Table1).

Among the total study subjects, 203 (86%) were housewives/ unemployed, 31 (13.2%) were workers and business women also 2 (0.8%) were students. 205 (86.9%) pregnant women in the study area were their average monthly income between 100-500 Birr, and about 25 (10.6) were between 500-1000 Birr (Table 1).

Health service related characteristics

The 172 (72.9%) gestational months of pregnancy in the study subject were between 6-7 months.

About 83 (35.2%), 129 (54.7%) and 24 (10.2%) of the mothers had followed antenatal one time, 2-3 times and more than 4 time respectively. The mean (± standard deviation) of antenatal follow-up was 1.96 (0.93) throughout the gestational age.

A total of 136 (57.6%) of the mothers have got advice /counseling particularly dietary practice as well as feeding option. In addition to advice 181 (76.7%) of the pregnant mothers supplemented iron/iron float. A total of 205 (86.9%) of the pregnant mothers were willing to attend delivery in health centers, the rest 8 (3.4%) and 23 (9.7%) were health post and home respectively (Table 2).

Dietary practice and anthropometric measurement related characteristics

About 218 (92.4%) of staple diet in the study area was Enset. Only 17 (7.2%) were from maize and teff base. None of 198 (83.9%) of the study subject ate food from plant sources like legumes within the last 24 hours. 124 (52.5%) of the pregnant mothers had grain based food such as barely, wheat, teff and the like one time per day. Regarding the animal source food like meat none of 197 (83.5%) had within the last one week. Accordingly, 158 (66.9%) were had green leafy vegetables one time per day, while 151 (64%) of mothers had yellow and red fruits one time per day (Table 3).

Socio demographic characteristics of pregnant women of study subjects (n=236)

Variables	Numbers	Percent (%)
Age of woman in years		
15-19	20	8.5
20-24	90	38
25-29	107	45.4
30-34	14	5.9
≥ 35	5	2.2
Relation of woman to head of the household		
Wife	236	100
Religion		
Muslim	10	4.2
Christian	225	95.3
Other	1	0.4
Ethnicity		
Sidama	234	99.2
Other	2	0.8
Attended formal school		
Yes	123	52.1
No	113	47.9
Highest grade completed		
Primary	28	11.9
Secondary	7	3
Medium level	89	37.7
University diploma	1	0.4
Marital status		
Married	236	100
Occupation		
Student	2	0.8
Worker/business women	31	13.2
House wife	203	86
Average monthly income		
100-500 Birr	205	86.9
500-1000 Birr	25	10.6
≥ 1000 Birr	6	2.5

Table 1: Frequency distribution of selected socio demographic characteristics among pregnant women of the study subject; AletachukoWoreda, SNNPR Ethiopia, 2015

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Maternity experience & health related characteristics of pregnant women of study subjects (n=236)		
Variables	**Numbers**	**Percent (%)**
Number of children now		
None	54	22.9
1-3	149	63
4-6	31	13
≥ 7	3	1.3
Gestational months of pregnancy		
3 m-5 m	40	16.9
6 m-8 m	172	72.9
≥ 9 m	24	10.2
Number of attended ANC		
1 time	83	35.2
2-3time	129	54.7
4 time	24	10.2
Given Iron/Float		
Yes	181	76.7
No	55	23.3
Advice about dietary practice/feeding option		
Yes	136	57.6
No	100	42.4
Place of birth		
Home	23	9.7
Health post	8	3.4
Health center/Hospital	205	86.9

Table 2: Frequency distribution of selected maternity experience and health service related variables among pregnant women of the study subject; Aleta chuko Woreda, SNNPR Ethiopia, 2015

A total of 217 (91.9%) %) of pregnant mothers fed any type of food three times within the last 24 hours and the rest 19 (8.1%) only fed any type of food four times within the last 24 hours. About 5 (2.1%) of the study subject were MUAC measurement less than 19 cm (<19 cm), 163 (69.1%) were 19 cm, 23 cm and 68 (28.1%) were measured greater than and equal 23 cm (≥ 23 cm) (Figure 4).

Discussion

In the present study of pregnant women receiving prenatal in general randomly selected public health center in Aleta chuko woreda. The study aimed to determine the assessment of dietary practice and to measure anthropometric MUAC measurement. We found the 92.4% of the staple diet was Enset. The frequency of one additional food from any type of

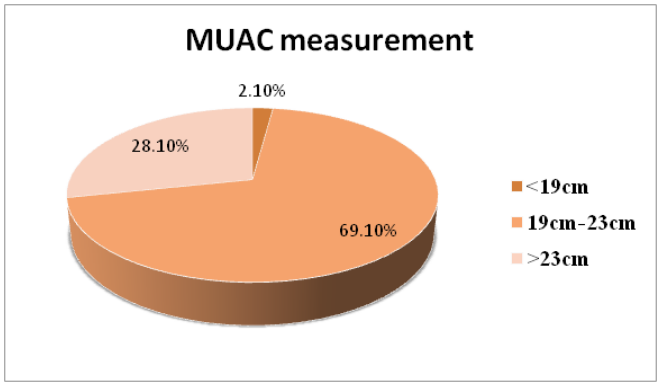

Figure 4: Frequency distribution of MUAC measurement of the study subject, 2015(n=236)

Dietary practice & anthropometric measurement characteristics of pregnant women study subjects (n=236)		
Variables	**Numbers**	**Percent (%)**
Staple diet		
Enset	218	92.4
Maize and teff base	17	7.2
Other	1	0.4
Frequency of food from plant source like Legumes such as beans, chickpeas, lentils within 24 hrs.		
One time per day	33	14
Two or more time per day	5	2.1
None	198	83.9
Frequency of Grainssuch as Barely, Wheat, Teff, Sorghum within 24 hrs.		
One time per day	124	52.5
Two or more time per day	28	11.9
None	84	35.6
Frequency of animal source foods like, meat, liver & others with in the last one week		
One time per a week	34	14.4
Two or more times per a week	5	2.1
None	197	83.5
Frequency of Milk and milk products like cheese, yogurt & others with 24 hrs.		
One time per day	156	66.1
Two or more time per day	30	12.7
None	50	21.3
Frequency of Egg with in24hrs?		
One time per day	36	15.3
Two or more time per day	57	24.2
None	21	8.9
Frequency of Green Leafy vegetables with in 24 hrs?		
One time per day	158	66.9
Two or more time per day	57	24.2
None	21	8.9
Frequency of Yellow and Red fruits (mango, papaya, orange, carrot, tomato)		
One time per day	151	64
Two or more time per day	14	5.9
None	71	30.1
Frequency of butter or oil with your daily cooked food		
One time per day	207	87.7
Two or more time per day	13	5.5
None	16	6.8
Frequency of fed any type of food within last 24 hrs		
3 time	217	91.9
4 time	19	8.1
MUAC measurement		
<19 cm	5	2.1
19 cm-23 cm	163	69.1
≥ 23cm	68	28.1

Table 3: Frequency distribution of selected dietary practice and anthropometric measurement related variables among pregnant women of the study subject; AletachukoWoreda, SNNPR Ethiopia, 2015

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food within the last 24 hours was 8%. However, the frequency of regular fed 3times per day was 92.9%, this level indicating the need for nutritional guidance.

The prevalence of MUAC measurement 19 cm, 23 cm was 69% above the recommended value which was moderately malnorshid. However the antenatal care and advice about feeding option during the visit were high, the provider missed some intervention related to food diversification.

In the study population, the mean daily intake of almost all the foodstuffs and nutrients fell short of the recommendations and no significant difference was found in the mean intake of food and nutrients diversification of subjects between the middle and late gestation groups, suggesting no increase in the food intake with advancement of pregnancy. Similar results revealing inadequate dietary intake have been reported in a study done on rural pregnant women working in stone quarry [4].

Just 54.7% of pregnant women receive some antenatal care (2-3times) from a skilled provider, most commonly from a nurse or trained midwife, which is high comparing with the previous EDHS 2011 (34%). Additionally 76.7% of pregnant women took Iron/Iron float supplements during pregnancy while attending prenatal care/ANC; this is also very high when comparing with the previous EDHS 2011 (17%). These both are might be due to the health extension program and community based women development army promoting the importance of the antenatal care in the community level, one to five network meeting and pregnant forum [9,14].

The quality of antenatal care (ANC) is dependent on the qualifications of health providers and the number and frequency of ANC visits. The content of services received and the kinds of information given to women during their ANC visits are also important components of quality care. These services raise awareness of the danger signs during the pregnancy, delivery, and postnatal period, improve the health-seeking behavior of women, orient them to birth preparedness issues, and provide basic preventive and therapeutic care [8,9].

- **Strength of the study**

The use of validated questionnaires which was adapted from EDHS, 2011 and from food frequency equation, and the amendments made before actual field implementation were the strengths of this study.

- **Limitation of the study**

Since the study design was a cross sectional descriptive which studies are carried out at one time point or a short period and also recall bias.

Conclusion

Simple nutrition education messages using holistic approach of targeting all the major determinants such as the improved food intake within the socio-economic constraints, iron supplements, TT injection immunization, use of iodized salt and ANC, with periodic reinforcements and motivation, even if imparted primarily in the third trimester of pregnancy, but in a sustained manner, can be effective and can bring about improvements in the nutritional status of underprivileged pregnant women. Husbands and the mother-in laws also proved as important change agents.

Recommendations

Base on the current finding the following recommendations are suggested:

1. Advice/counselee the pregnant women on increase one additional meal every day to maintain her strength. The food need to eat diversified with animal products particularly meat, milk, eggs pus fruits and vegetables
2. Encourage consumption of iodized salt and food rich in iodine like fish
3. Encourage men's participation and decrease workload for pregnant mother
4. Link the moderately malnourished pregnant mother with supplementary program and assured they are provided by fortified food, Iron /folate, supplemented by deworming drugs and use of insecticide treated bed nets
5. At the community level the health extension workers should continue promoting key messages about dietary practice, when visiting pregnant mothers at house, during different contact points like community health day, pregnant forum and one to five network and women development army meeting.
6. To intensify efforts at informing pregnant women about the importance of dietary practice, the need to have printed BCC materials with simple message, and local mass media can also be used to increase awareness and positive attitude towards feeding option.

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