

Full Length Research Paper

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

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Received 11 March, 2014; Accepted 25 November, 2014

Food aversions, cravings and pica during pregnancy are commonly known all over the world. They are documented starting from long period of time, and their prevalence varies from 50 to 90% of pregnant women. Although pica behavior is practiced globally, it is more prevalent within African countries. To know prevalence of these practices and their association with nutritional status of pregnant women, community based cross-sectional study was conducted among 605 pregnant women in Dale Woreda, Sidama zone, Southern Nations, Nationalities, and Peoples' Region (SNNPRS), Ethiopia. Two-stage cluster sampling technique was used to select a representative sample. Statistical analysis was carried out using statistical package for social sciences (SPSS) version 17.0. The logistic regression and multiple linear regressions were carried out. From the total study participants, 67.9% of pregnant women were avoiding at least one food during their pregnancy period. Since food aversions, cravings and pica practicing are closely linked to meal pattern of pregnant woman, understanding these behaviors is important in addressing the issue of maternal nutrition in a pregnant woman. Unhealthy cravings for non-food items should be discouraged as there is no known nutritional benefit of such habit and can lead to intestinal problems like abdominal pain, constipation and infection. This study showed that the study participants had poor nutritional status. Food aversion, craving and pica practicing should be investigated during antenatal follow-up, and advice should be offered.

Key words: Food aversion, food craving, pica practicing and pregnant women.

INTRODUCTION

The woman who enters pregnancy with full nutrient stores, sound eating habits and a healthy body weight will

be assured of an optimal pregnancy if medically well. She will benefit further if she eats a variety of nutrient dense

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foods in terms of improving her own health and that of her infant. Full nutrient stores before pregnancy are essential both to conception and to healthy infant development during pregnancy (Corbett et al., 2003). In the early weeks of pregnancy, significant developmental changes occur that depend on a woman's nutrient stores. The food pregnant mothers eat on a daily basis affects how their bodies work and how they maintain energy and strength. It also determines the basic nutritional health that their children are born with, and provides a model for their eating habits during childhood and beyond. Pregnancy is the time in their life when their eating habits directly affect their fetus (Tsegaye et al., 1998). Their decision to incorporate delicious vegetables, whole grains and legumes, lean protein and other wise food choices into their eating plan before and during pregnancy will give strength to their body and helps them to give birth to healthy baby. The risk of giving birth to a low birth weight baby is related with mother's nutritional status (EDHS, 2005). Therefore, dietary consumption during pregnancy can have significant health implications for both a mother and fetus. Studies showed it can affect a range of factors including the course of pregnancy and the incidence of prematurity and congenital malformations in the infant (Knox et al., 1994).

Most of the time, pregnant women face the problems which are unfavorable to both the pregnant mother and her fetus. These include nutritionally related problems that most of the time mothers cope with (Hutter, 1996). In order to cope with these problems and to proceed with a successful pregnancy, a mother experiences a number of physiological and behavioral adjustments, such as food cravings and food aversions during pregnancy. Food cravings are intense desire to obtain foods which are very interesting to the individual. It is generally described as a distinct state characterized by an intense urge to obtain a food substance. On the other hand, food aversions are strong dislike and ignorance of particular foods during pregnancy. Food cravings and food aversions, which refer to a strong desire and strong dislike, respectively for certain foods are common during pregnancy (Walker et al., 1985; Caplan, 2001).

Problem statement

Studies show that food aversions and cravings during pregnancy are commonly known all over the world (Tierson et al., 1985; Coronios-Vargas et al., 1991). They are documented, starting from long period of time and their prevalence varies from 50 to 90% of pregnant women (Bayley et al., 2002). Although pica behavior is practiced globally, it is more prevalent within African countries (Margaret, 2007). Soil or clay eating has been reported among pregnant women in various parts of the

world, it has been consumed by some people other than pregnant women (Anderson, 2001). The study conducted in Zahedan, Iran showed that, pica practicing among pregnant women was 15.5%, in which 25.3% of them ate dirt, 60.9% ice, and others, substances such as chalk, clay, freezer frost, tea stuff and other non-food substances (Mortazavi and Mohammadi, 2010). The study conducted in Tanzania showed that during pregnancy, the prevalence of food craving, aversion and pica were 73.5, 70.1 and 63.7%, respectively (Nyaruhucha, 2009). Similarly, study conducted in Nigeria showed that during pregnancy, food aversion and craving were 57.2 and 61.3% (Olusayna and Ogundip, 2009). Another study conducted in Kenya showed that 74% pregnant women were practicing pica during pregnancy period (Ngozi, 2008) and study conducted in Ghana showed that 44.8, 67.7 and 48% of pregnant women were practicing food aversion, food craving and pica during pregnancy period (Koryo-Dabrah et al., 2012). Similarly, the study conducted in Hadiya zone, southern Ethiopia showed that, 65 and 72% pregnant women avoided and craved at least one food, respectively during pregnancy (Tsegaye et al., 1998), so that, this study can give information on the prevalence, and association between food craving, aversion and pica practice with the nutritional status of pregnant women to the community, health workers and any other organizations which are interested in implementing interventions to improve the nutritional status of pregnant women.

Objective of the study

To study the prevalence of food aversions, cravings and pica practice during pregnancy and their association with nutritional status of pregnant women in Dale Woreda, Sidama Zone, Southern Nations, Nationalities, and Peoples' Region (SNNPRS), Ethiopia.

MATERIALS AND METHODS

Community based cross-sectional study was carried out from February 16, 2012 to March 17, 2012 in rural community of Dale Woreda which is located south of Hawasa in Sidama zone of SNNPR and it is 48 km away from Hawasa, the capital city of SNNPRS and 326 km away from Addis Ababa (Dale Woreda administrative office, 2011). In this Woreda, there are 7 public health centers and 36 public health posts. This study was carried out in rural Kebeles of the Woreda. The total rural population of the Woreda was 248,295. Out of this population, males were 126,630 and females were 121,665. From this rural population, 9,916 were pregnant women (Dale Woreda Health Office, 2011).

Source population and study subjects

The source population for this study was pregnant women aged 19 to 49 years residing in rural communities of the Woreda. The study

population was pregnant women in selected Kebeles who have a known pregnancy.

Inclusion and exclusion criteria

Pregnant women in the age range of 19 to 49 years who were apparently healthy were included in this study. Third trimester pregnant women, age less than 19 years and unhealthy pregnant women were excluded. Unhealthy pregnant women who have evidence of chronic disease such as HIV/AIDS, TB and acute infectious disease such as malaria, typhoid fever and typhus were excluded from the study. According to Ethiopian National Constitution and United Nations Children's Fund (UNICEF) (2000), the age range should be restricted, that is the age below 19 years and the age above 49 years were excluded from the study.

Sample size

The determination of sample size was based on the single population proportion formula. It was considered as anticipated population proportion of 50%, since it gives maximum sample size.

$$n_i = \frac{(Z\alpha/2)^2 p \times (1-p)}{d^2}$$

$$n_i = \frac{(1.96)^2 \times 0.5 \times (1-0.5)}{(0.05)^2} \quad n_i = 384$$

$n_f = DE * n_i = 384 \times 1.5 = 576$ and by adding 5% contingency, $n_f = 576 + 28.8 = 604.8 \approx 605$

Sampling technique

Two-stage cluster sampling technique was used to select a representative sample. In the first stage, the list of existing Kebeles of the Woreda was obtained from the Dale Woreda health Office. Then, from the list of 36 Kebeles, six Kebeles were selected using population proportion to size (PPS) sampling technique. Then, list of pregnant women was obtained by house to house registration of pregnant women in the study Kebeles with the help of health extension workers. To make the selection of an individual, a simple random sampling method was employed.

Study variables

Food aversion, food craving and pica practice are dependent variables and MUAC, triceps skin fold thickness (TSFT), meal consumption pattern, socio-economic, demographic and cultural factors are independent variables of the study.

Data collection instrument

A pre-tested and structured questionnaire was used to gather data related to the objectives of the study. MUAC measuring tape and TSFT measuring Holtain caliper were used to collect anthropometric

measurements of pregnant women in the study.

Data collection procedure

Data collectors, who were fluent in the local languages both in Sidamogna and Amharic and at least grade 12 completed, administered the pre-tested questionnaire to selected pregnant women in their respective residence. Mid-upper-arm circumference (MUAC) and TSFT measurements were taken after giving training for the data collectors using the standard methods described (Gibson, 1990). A non-stretchable tape was used to measure MUAC and a Holtain caliper, calibrated to the nearest 0.2 mm, was used to measure triceps skin fold thickness. For dietary practice assessment, using the food frequency questionnaire, the respondents were interviewed to recall their dietary consumption. The meal frequency of the pregnant women was asked in order to understand that at least one additional meal has been consumed by the subjects as it was recommended in essential nutrition action program (ENA) (2008).

Statistical analyses

Statistical analyses were carried out using SPSS version 17.0. The logistic regression test was carried out to see the association between dependent and independent variables. Then, the variables were checked for statistical significance. Multivariate analysis of logistic regression was also performed to examine the combined effect of each independent variable on dependent variables. All continuous variables were checked for normality using Kolmogorov-Smirnov tests. A *P*-value less than 0.05 was considered for statistical significance.

Data quality assurance

For the sake of quality assurance, a pre-tested and modified questionnaire was used to gather needed data. Data collectors who have completed at least 12 grade were selected, and training was given both on the collection of the data and administration of the questionnaire. Supervision, checking consistency as well as completeness, and data cleaning were performed in the study to assure data quality.

Ethical consideration

Prior to starting the work, the proposal was submitted to Hawassa University Institutional Review Board for ethical approval. Then, the Ethical Review Committee of the Hawassa University approved the study. Information was collected after securing consent from study participant. Data obtained from each study participant was kept confidential.

RESULTS

Socio-economic and demographic characteristics of study participants

In this study, six hundred and five pregnant women were interviewed with a response rate of 100%. The study

Table 1. Socio-demographic characteristics of pregnant mothers in Dale Woreda, Sidama Zone, SNNPR, Ethiopia, 2012.

Variable	Frequency (n)	Percent (%)
Maternal age(in years)		
19-24	176	29.1
25-29	265	43.8
30-34	116	19.2
35-49	48	7.9
Maternal education		
No education	236	39.0
Read and write	241	39.8
Elementary	78	12.9
Secondary level	46	7.6
Higher level	4	0.7
Husbands' education		
No education	121	20.0
Read/write	181	29.9
Elementary	233	38.5
Secondary level	58	9.6
Higher level	12	2.0
Mothers' Occupation		
House wife	547	90.5
Petty trader	48	7.9
Daily laborer	8	1.3
Employee	2	0.3
Family size		
2-4 family member	355	58.7
5-7 family member	222	36.7
>7 family member	28	4.6
Husbands' occupation		
Farming	551	91.1
Daily laborer	16	2.7
Merchant	22	3.6
Employee	16	2.6
Ethnicity of the mother		
Sidama	576	95.2
Oromo	9	1.5
Wolaita	20	3.3
Religion of the mother		
Orthodox	76	12.6
Protestant	461	76.1

Table 1. Contd.

Catholic	10	1.7
Muslim	8	1.3
Only Jesus	46	7.6
Seventh days	4	0.7

participants included in this study were pregnant women in first and second trimester pregnancy with age ranging from 19 to 49 years. As indicated in Table 1, the socio-demographic characteristics of the study participants include age, educational status, occupation, family size, ethnicity, religion etc. The average age of the study participants was (mean \pm SD) 26.8 \pm 4.6 years and their average family size was (mean \pm SD) 4.3 \pm 1.7 persons, while 41.3% of the households had more than 5 family members. More than three fourth (78.8%) of the study participants and about half (49.9%) of their husbands had no formal education. Most of the pregnant mothers (90.4%) were housewives and 91.1% of their husbands were farmers. About 43.8% of the study participants were in the age range of 25 to 29 years, 29.1% were 19 to 24 years old and the remaining 27.1% were 30 and above years old. About 10.7% of their husbands had more than one wife. Religion wise, the study participants were protestant (76.1%), followed by orthodox Jew (12.6%), only Jesus (believers only Jesus) (7.6%), Catholic (1.7%), Muslim (1.3%), and Seventh Days Adventist (0.7%) based on the religion classification. Almost all (95.2%) of the participated mothers were Sidama and the rest were Wolaita (3.3%) and Oromo (1.5%) according to participants ethnicity (Table 1).

Housing condition and other assets of the study participants

Table 2 explains housing condition and other assets of the study subjects. From the total 605 study participants, 59.2% of the pregnant mother lived in houses made from mud wall and grass roof hut, 38.5% in houses whose wall covered with mud and corrugated iron sheet roof and 2.3% in houses of walls covered with cement and corrugated iron sheet. Nearly half (48.9%), 21.8 and 29.3% of the study participants had access to tap water, protected spring water which is safe for drinking and unprotected sources, respectively. From the total respondents, 57.2% of the households had latrines covered with a shade, 35.2% of house-holds had latrine without shade and 7.6% of household did not have latrine at all. Most (96.7%) of the study participants were farm land owner with different land size, ranging from \leq 0.25 hectare for most (49.8%), \geq 0.5 hectare to one fifth

Table 2. Housing condition and other assets of the pregnant mothers in Dale Woreda Sidama zone, South Ethiopia, 2012.

Variable	Frequency (n)	Percent (%)
House type		
Grass roof hut	358	59.2
Walls covered with mud and corrugated iron roof	233	38.5
Cemented walls with and corrugated iron roof	14	2.3
Drinking water source		
Tap	296	48.9
Borehole	141	23.3
Protected wall	132	21.8
Unprotected wall	36	6.0
Latrine facility		
No latrine	46	7.6
Latrine without shade	213	35.2
Latrine with shade	346	57.2
Own food store		
Yes	353	58.3
No	252	41.7
Food store lasts (n=353)		
Less than two month	74	12.2
Two to four month	269	44.5
Five to eight month	10	1.7
Farm animals		
Own farm animals	529	87.4
Do not own farm animal	76	12.6
Farm lands		
Own farm lands	585	96.7
Do not own lands	20	3.3
Land size in hectares		
0-0.25	301	49.8
0.26-0.5	186	30.7
>0.5	118	19.5
Mosquito net		
Own mosquito net	545	90.1
Don't own mosquito net	60	9.9
Growing crops		
Coffee	521	86.1
Enset	527	87.1
Sweet potato	270	44.6
Potato	275	45.5
Legumes	173	28.6
Chat	112	18.5
Fruits	501	82.8

Table 3. Maternal health and anthropometry of the pregnant mothers in Dale Woreda Sidama zone, SNNPRS, Ethiopia, 2012.

Variable	Frequency	Percent (%)
Number of pregnancy		
1-2	226	37.4
3-4	223	36.8
5-6	132	21.8
≥7	24	4.0
Taking antenatal care		
Yes	397	65.6
No	208	34.4
Using family planning		
Yes	462	76.4
No	143	23.6
Parity (Gravida)		
1-2	133	22.0
3-4	184	30.4
≥ 5	60	9.9
MUAC (cm)		
MUAC<21	92	15.2
MUAC≥21	513	84.8
Mean MUAC(cm)	22.9±1.6	
TSFT (mm)		
TSFT< 9.0	153	25.3
TSFT≥ 9.0	452	74.7
Mean TSFT(mm)	11.2 ±1.16	

(19.5%) and 0.25 to 0.5 hectares for the remaining (30.7%) households, respectively. The study area is known for production of major crops such as coffee, enset, legumes, sweet potato, potato and fruit with 86.1, 87.1, 28.6, 44.6, 45.5 and 82.8% production rates, respectively. More than half of the participants (58.4%) reported that they had food store in their house, but not sufficient to feed the family member up to the next harvesting season. The majority (87.4%) of the households had animals (such as ox, cow, mule, donkey, goat or sheep) while 12.6% of them had no farm animals. The majority of the households (90.1%) were using mosquito net and the remaining 9.9% did not use it (Table 2).

Maternal health and anthropometric characteristics of the study participants

Table 3 indicates that out of the total study participants, about 65.6% of the study subjects were following

antenatal care during the study period. More than three fourth (76.4%) of the respondents reported that they had an experience of using family planning methods. From the total participants, 30.4% had 3 to 4 children and 9.9% had five and above children. The average MUAC of the study participants was 22.9 ± 1.6 cm, and majorities (84.8%) of the study participants were in a normal range by their MUAC measurement (≥ 21 cm). But 15.2% of them were undernourished (MUAC < 21). In addition to this, the average TSFT of the study participants was 11.2 ± 1.16 mm, and about three fourth (74.7%) of the study participants were above 5th percent (TSFT ≥ 9 mm) and the remaining 25.3% were below 5th percent (TSFT < 9 mm) (Table 3).

Meal pattern of the study participants

Table 4 shows that more than half (55.9%) of the study participants ate three times per day, more than one third

Table 4. Meal pattern of the pregnant mothers in Dale Woreda Sidama Zone, SNNPR Ethiopia, 2012.

Variable	Frequency	Percent (%)
Number of meals per day		
Twice	209	34.5
Three times	338	55.9
Four times	58	9.6
Eating additional meal		
Yes	190	31.4
No	415	68.6
Skipping meal		
Yes	221	36.5
No	384	63.5
Types of meal skipped		
Break fast	148	24.5
Lunch	68	11.2
Dinner	5	0.8
Number of additional meal		
One	160	26.4
Two	30	5.0
Household evaluation of amount of serving		
Not enough	291	48.1
Enough	314	51.9

(34.5%) ate twice per day and small number of participants (9.6%) ate four times per day. Most of the participants (68.6%) were not eating additional meal during pregnancy and about one third (31.4%) of the participants were eating additional meal during pregnancy. From the pregnant women who were eating additional meal, 26.4% eat one additional meal and 5% eat two additional meals according to health care recommendation. Based on household evaluation of serving size, more than half (51.9%) of the study participants felt that they had enough serving size and the rest (48.1%) had no enough serving size. In addition to these, 36.5% pregnant women were skipping meal (Table 4).

Reported food aversion, food craving and pica practice of the study participants

Table 5 shows food aversion, food craving and pica practice of the study participants, in which 67.8% of the study participants avoided at least one food. The most

avoided food by the study participants were enset products such as *kocho* (inset product) (21.5%), cereal products (9.6%), roots (8.6%), vegetable like cabbage, kale, carrot (7.3%), fruits like mango and avocado (6.6%), coffee (5.8%), egg (3.8%), legumes (2.0%), meat (1.3%), fish (0.8%) and milk products (0.7%). In this study, 26.9% of the study participants reported that they avoided food due to smell of food, 9.6% of pregnant women avoided food due to heart burn and 31.4% of respondents reported that they avoided food due to personal dislike during pregnancy. From the total participants, 43.5% pregnant women craved at least one food during their pregnancy period. The most craved food types were meat (23.6%), egg (9.8%), vegetable (2.8%), cereal products (2.5%), fruits (2.3%), legumes (0.7%), roots (1.3%), enset products (0.2%) and fish (0.3%). From this report, more than one third of the participants (38.9%) craved food due to flavor of the food and 4.6% of participants craved due to attractive color of the food. From the total food craved pregnant women, about 29.1% have got craved food to eat. One third of the study participants (30.4%) craved non-nutritious substance

Table 5. Reported food aversion, food craving and pica practicing of the pregnant women in Dale Woreda Sidama Zone, SNNPR, Ethiopia, 2012.

Variables	Frequency	Percent (%)
Food aversion		
Yes	411	67.9
No	194	32.1
Types of food avoided		
Meat	8	1.3
Egg	23	3.8
Vegetable	44	7.3
Fruits	40	6.6
Cereal products	58	9.6
Legumes	12	2.0
Roots	52	8.6
Enset products	130	21.5
Milk and milk products	4	0.7
Coffee	35	5.8
Fish	5	0.8
Reasons for food aversion		
Personal dislike	190	31.4
Smell of food	163	26.9
Heart burn	58	9.6
Food craving		
Yes	263	43.5
No	342	56.5
Types of food craved		
Meat	143	23.6
Egg	59	9.8
Vegetable	17	2.8
Fruits	14	2.3
Cereal products	15	2.5
Legumes	4	0.7
Roots	8	1.3
Kocho	1	0.2
Fish	2	0.3
Reason for food craving		
Color of food	28	4.6
Food flavor	235	38.9
Eating craved food		
Yes	176	29.1
No	87	14.4
Pica practice		
Yes	184	30.4
No	421	69.6

Table 5. Contd.

Types of pica		
Soft white stone	32	5.3
Soil(clay, sand, wall mud)	69	11.4
Ash	29	4.7
Coffee residue/grind	38	6.3
Old dried skin	4	0.7
Coffee leaf	12	2.0
Frequency of pica		
Less than once per day	31	5.1
Once per day	108	17.9
2-3 times per day	45	7.4
Reason for pica		
Personal interest	83	13.7
Smell of pica substance	101	16.7

called pica. The most practiced pica were soil (clay, sand, wall mud) by 11.4%, coffee residue/grind (6.3%), soft white stone (5.3%), ash (4.7%), old dried animal like oxen, cow and skin (0.7%) and green coffee leaf (2.0%). From their reports, the reason for pica were personal interest (13.7%) and smell of pica (16.7%). Based on the report, frequency of pica were less than once per day (5.1%), once per day (17.9%) and 2 to 3 times per day (7.4%) (Table 5).

Consumption frequency of food groups of pregnant women one month prior to the study time

Table 6 showed the consumption frequency of food groups of pregnant women. In this study, 50.5% consume cereals, 52.7% consume tea and coffee and 36.1% of respondents consume enset and its products more than once per day. More than half (51.7%) of respondents consume roots and tubers once per day followed by cereals (34.3%), vegetables (34.0%) and fruits (24.4%). Most (62.0%) of the participants consume meat, 53.5% of participants consume egg and 32.3% of participants consume oil and/or butter twice per month. Only 5.6% of the participants consume fish twice per month. Majority (93.0%) of the participants never consumed fish within the month period prior to survey (Table 6).

Association between some variables with nutritional status (MUAC and TSFT) of the study participants

Table 7 shows the association between some variables

with nutritional status (MUAC and TSFT) of the study participants. From the table below, mid upper arm circumference of the study participants was statistically associated with pica practice, land size, growing potato, serving size and educational status of the husbands of the study participants. In addition to this, triceps skin fold thickness (TSFT) was associated with pica practicing, serving size, husbands educational status, land size and antenatal care of the study participants but food aversion and food craving were statistically not associated with nutritional status of pregnant women in this study (Table 7).

Association between some variables with food aversion of the study participants

Table 8 shows the association between some variables with food aversion of the study participants. Food aversion of the study participants statistically associated with husband's educational status, having additional meal, growing sweet potato, growing coffee and growing potato of the study participants (Table 8).

DISCUSSION

Maternal health and anthropometry of the study participants

The anthropometric measurement of MUAC revealed that 15.2% of the respondents were undernourished (MUAC < 21 cm) according to WHO and UNICEF cut off point. In

Table 6. Consumption frequency of food groups of pregnant women one month prior to the study time in Dale Woreda Sidama zone, SNNPRS Ethiopia, 2012.

Food group (%)	Frequency of food groups					
	More than once per day	Once per day	3-6 times per week	Once or twice per week	Twice per month	Never
Cereal	50.5	34.3	10.9	3.1	1.2	-
Roots and tubers	20.8	51.7	17.8	7.3	2.4	-
Enset and its products	36.1	30.6	26.4	3.7	3.0	0.2
Any vegetables	8.6	34.0	35.0	16.5	5.9	-
Any fruits	6.9	24.4	33.7	28.1	5.7	1.2
Meat	-	1.0	3.6	26.1	62.0	7.3
Egg	-	2.0	5.0	30.3	53.5	9.2
Fish	-	-	-	1.4	5.6	93.0
Legumes	3.0	26.1	41.6	22.1	6.2	1
Milk and milk products	-	9.6	25.4	48.5	16.5	-
Oil and/ or butter	1.0	7.6	20.8	37.0	32.3	1.3
Sugar and soft drinks	1.3	1.7	16.2	31.4	31.3	18.1
Tea and coffee	52.7	32.3	9.2	2.7	3.1	-

addition to this, the TSFT indicates 25.3% pregnant women below 5th percent. The reasons for the observed under nutrition on the current study participants might be due to their poor educational status, smaller land size, large family size and their pica practicing behavior. In addition to these, 50.5% of the study subjects were consuming cereal based foods more than once per day which are known to contain significant amount of phytate that reduce the bioavailability of the zinc, iron and calcium (Melaku et al., 2005) and 52.7% of the study participants were consuming tea and coffee more than once per day which are known to contain tannin and caffeine that reduce absorption of important nutrients such as Ca, Fe, vitamin D and other water soluble vitamins (Alec, 2011). Therefore, this might further aggravate the lower nutritional status of the study subjects.

This study showed that only 55.9% of pregnant women consumed three meals per day. About 51.9% of the respondents reported that amount of their serving size was adequate. Taking at least one additional meal during pregnancy is recommended for all pregnant women according to Emergency Nurses Association (ENA) (2008). Nevertheless, 68.6% of the subjects do not take any additional meal during pregnancy. According to ENA (2008), regular meals are not expected to be skipped during pregnancy; rather taking additional meal is recommended but the finding of this study showed that 36.5% of the respondents were skipping their regular meals. Of the meals, lunch (11.2%) and breakfast (24.5%) were skipped. These factors might contribute to lower maternal nutritional status.

Reported food aversion, food craving and pica practicing of the study participants

From total study participants, 67.8% of pregnant women were avoiding at least one food during their pregnancy period. This result is nearly comparable with the study conducted in Hadiya zone on pregnant women in which 65% of the study participants avoided at least one food (Tsegaye et al., 1998) and greater than the study conducted in Ghana (Koryo-Dabrah et al., 2012) and Nigeria (Olusayna and Ogundip, 2009) in which 44.8 and 57.2% of pregnant women avoided at least one food during their pregnancy period, respectively. But the result of this study is lower than from the same study conducted in Tanzania which showed that 70.1% of pregnant women avoiding at least one food during their pregnancy period (Nyaruhucha, 2009). In this study, more avoided foods were enset and enset products, cereals and sweet potato. These foods were more frequently consumed foods in the area. This result is also similar with the same study conducted in Hadiya zone which indicated the high prevalence of aversion to cereal foods (which were the most commonly consumed foods in the area) supports the idea that pregnant women avoid staple foods (Tsegaye et al., 1998).

Based on food craving practice of the study participants, 43.5% of the pregnant women were craving at least one food during their pregnancy period. This result was lower when compared with the same study conducted in Hadiya zone (Tsegaye et al., 1998), Nigeria (Olusayna and Ogundip, 2009), Ghana (Koryo-Dabrah et al., 2012) and Tanzania (Nyaruhucha, 2009) which showed

Table 7. Association between some variables with maternal nutritional status (MUAC and TSFT) of the pregnant women in dale woreda Sidama zone, SNNPRS, Ethiopia, 2012.

Variables	Nutritional status		Crude OR (CI)	Adjusted OR (CI)
	Malnourished (MUAC < 21 cm) (No)	Normal (MUAC ≥ 21) (No)		
Pica practice				
Yes	39	145	1.364 (1.215-1.616)*	1.363(1.211-1.628)*
No	53	368	1	-
Land size				
<0.25ha	58	429	2.99 (1.846-4.856)**	3.304(1.828-5.972)**
> 0.25 ha	34	84	1	-
Growing potato				
Yes	30	247	1	-
No	62	266	1.46(1.301-1.785)*	2.016(1.238-3.28)*
Husbands education				
Educated	36	146	1	-
Not educated	56	367	1.616(1.020-2.561)*	2.43(1.363-4.335)*
No	47	337	1	-
Enough Serving size				
Yes	31	283	1	-
No	61	230	2.421 (1.519-3.858)**	1.424(1.231-1.778)*
Pica practice	TSFT<9	TSFT≥9	Crude OR (CI)	Adjusted OR (CI)
Yes	61	123	1.564 (1.384-1.828)*	1.588(1.392-1.882)*
No	92	329	1	-
Enough Serving size				
Yes	62	252	1	-
No	91	200	1.849 (1.274-2.684)*	2.3(1.393-3.798)*
Husbands education				
Educated	56	126	1	-
Not educated	97	326	1.669 (1.454-1.987)*	1.451(1.273-1.746)*
Land size				
<0.25ha	103	384	2.741 (1.792-4.193)**	2.589(1.663-4.03)**
≥0.25ha	50	68	1	-
Antenatal care				
Yes	111	286	1	-
No	42	166	1.534 (1.025-2.296)*	1.5(1.041-2.435)*

* = p value < 0.05, ** = p value < 0.001, and ha = hectare

that 72, 61.3, 67.7 and 73.5% of the study participants craved at least one food during pregnancy period,

respectively. In this study, more craved foods were meat, egg and vegetable which were scarce foods in the study

Table 8. Association between some variables with food aversion of the pregnant women in Dale Woreda Sidama zone, SNNPRS, Ethiopia, 2012.

Variables	Food aversion	No food aversion	Crude OR (CI)	Adjusted OR (CI)
Husbands education				
Educated	106	76	1	-
Not educated	305	118	1.54 (1.375-1.776)**	1.537 (1.356-1.811)*
Growing sweet potato				
Yes	216	54	2.87 (1.986-4.153)**	1.332 (1.221-1.498)**
No	195	140	1	-
Additional meal				
Yes	142	48	1.62 (1.424-1.915)*	1.516 (1.319-1.833)*
No	269	146	1	-
Growing potato				
Yes	209	66	2.03 (1.42-12.889)**	1.599 (1.404-1.887)*
No	202	128	1	-
Growing coffee				
Yes	339	182	3.2 (1.703-6.091)**	2.873 (1.453-5.678)*
No	72	12	1	-

*p value < 0.05, **p value < 0.001.

study area and this was similar with the study conducted in Hadiya zone (Tsegaye et al., 1998).

The high prevalence of craving for livestock foods and vegetables that were scarce at the area at the time of the study appears to support the idea that pregnant women crave for scarce foods. Based on pica practice of the study participants, 30.4% of the study participants were practicing non-nutritious substance called pica. The most frequently practiced pica substances in the study area were soft stone, soil (clay, sand and wall mud), ash, coffee residue/grind and coffee leaf. This prevalence was lower than the same study conducted in Tanzania (Nyaruhucha, 2009), Ghana (Koryo-Dabrah et al., 2012) and Kenya (Ngozi, 2008) in which 63.7, 48 and 74.0% of pregnant women were practicing pica during pregnancy period, respectively. Low prevalence of pica practice in this study might be health extension workers were working closely to pregnant mothers and they were giving nutrition education in the study area.

Factors associated with the nutritional status (MUAC and TSFT) of the study participants

In this study, pica practice was significantly ($p < 0.05$) associated with nutritional status (MUAC < 21 cm and

TSFT < 9) of pregnant women but food craving and food aversion were not significantly associated with nutritional status of pregnant women. But similar study conducted in Nigeria showed that food aversion was statistically associated with nutritional status of pregnant women (Olusayna and Ogundip, 2009; Sanusi, 2002). In this study, pregnant women who were practicing pica substance were 1.36 times more likely to have lower (MUAC < 21 cm) nutritional status than those who were not practicing pica substance. In addition to this, the participants who were practicing pica were 1.6 times more likely to have lower nutritional status (TSFT < 9) than those who were not practicing pica substance. This might be the practicing of pica substance interfere with the absorption of important nutrients. The same study conducted in Kenya showed that practicing of pica substance may interfere with nutritious substance absorption and causes intestinal obstructions (Ngozi, 2008). In addition to this, similar study showed that pica substances may contain toxic compounds or quantities of nutrients that were not tolerated, while some pica substances interfere with the absorption of certain mineral elements such as iron (Crosby, 1982; Tierson, 1997). Similarly, study conducted in Western Kenya observed that geophagia was associated with iron depletion and absorption of essential nutrients (Geissler

et al., 1998). Another study conducted in Tanzania showed that differences in mean hemoglobin concentration by pica behavior in pregnancy were statistically significant in linear regression models ($P < 0.001$) (Young et al., 2010). Similarly, the study conducted in Tanzania showed that amylophagy and geophagy are types of pica substance which are strongly positively associated with iron deficiency, and some gastrointestinal morbidities such as abdominal pain, constipation and diarrhea (Young et al., 2010). Therefore, this condition might contribute to low nutritional status in pregnant women who were practicing pica.

Factors associated with food aversion of pregnant mother

The current study showed that food aversion of the pregnant women was significantly (p -value < 0.05) associated with husbands educational status. The pregnant mothers from not educated husbands were 1.54 times more likely to avoid food than those whose husbands were educated. This might be because educated husbands can give good support for pregnant mother not to avoid or dislike nutritious food. Growing sweet potato, potato and coffee were significantly associated with food aversion of pregnant women. Growing sweet potato was 1.3 times, growing potato was 1.6 times and growing coffee was 2.87 times more likely avoiding food than those who were not growing these agricultural products. This might be that women who have access to these agricultural products can get alternative food from the market by selling these products. For this reason they may avoid what they dislike and they may receive what they desired. Having additional meal during pregnancy was statistically associated with food aversion. Pregnant mothers who were having additional meal were 1.62 times more likely avoiding food than those who were not having additional meal. This might be that pregnant mother who have additional meal can avoid the food that they dislike. This finding is similar with the same study conducted in Hadiya zone which showed that women who have access to food choice or are from good economic status were avoiding the food which they dislike (Tsegaye et al., 1998).

Conclusion

The study showed that the prevalence of food aversion (67%), food craving (43.5%) and pica practicing (30.4%) among pregnant women in the study area is relatively high. This study revealed that pica practicing is significantly associated with poor nutritional status (MUAC

and TSFT) of pregnant women but food aversion and food craving are not significantly associated with nutritional status (MUAC and TSFT) of pregnant women. Since food aversions, cravings and pica practicing are closely linked to dietary practice of pregnant woman, understanding these behaviors is important in addressing the issue of maternal nutrition during pregnancy. In addition to this, current study showed that the study participants had poor nutritional status. This was implied by the prevalence of under nutrition assessed by MUAC, TSFT and meal pattern. According to ENA (2008), pregnant women need at least one additional meal during pregnancy but the majority (68.6%) of pregnant women who participated in current study reported that they do not take additional meal during pregnancy. Skipping regular meal was observed in daily meal pattern of the study subjects. Overall, about 36.5% of the subjects were skipping from their regular meals. This implied that, the meal pattern of the study subjects were suboptimal. Therefore, the nutritional status and meal pattern of pregnant women in Dale Woreda were not in line with normal range to support the pregnant women. In addition to this prevalence of food aversion, food craving and pica practice was high in the area.

RECOMMENDATIONS

Based on the results of this study, an intervention is needed to decrease the prevalence of food aversion, food craving and pica practicing behavior and to ensure that the pregnant women in the study area have optimal meal pattern and good nutritional status. Alternative foods should be advised for pregnant mother who are practicing food aversion. Further research should be done to study the impact of food aversion, food craving and pica practicing using a prospective cohort study design.

ACKNOWLEDGEMENTS

Above all, I want to express my heartfelt thanks to Almighty God, who helped me to accomplish this work and lets His blessing for me throughout my life. I would like to extend my gratitude to my major advisor Dr. Tewolde Wubayehu and my co-advisor Mr. Alemzewd Challa, who kept encouraging me to go on with their unlimited support and constructive comments in shaping this thesis without any hesitation and unwillingness.

Conflict of interest

Author declares that there are no conflicts of interest.

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