ADDIS ABABA UNIVERSITY

COLLEGE OF HEALTH SCIENCES

SCHOOL OF PUBLIC HEALTH

Effect of nutrition education and counseling on knowledge and dietary practice of pregnant women: A cluster randomized controlled trial in urban setting of Ethiopia

Thesis submitted to school of public health for partial fulfilment of the requirement for master's degree in public health, Addis Ababa university

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January, 2017

Acknowledgement

All praise is to **Allah** the giver of wisdom and strength; the Omnipotent, without him I wouldn't be able to accomplish this and anything else in my life.

My deepest gratitude goes to Dr. Seifu Hagos and Dr. Bilal Shikur for believing in me, advising me through all the process, giving me extensive personal and professional guidance and helping me find the financial sources of this study. They have shown me by example what a good teacher (and person) should be and thought me more than I could ever give them credit for here. I am also very grateful for my advisor Mr. Demewoz Haile for his invaluable advice. Lots of appreciation for Professor Alemayehu Worku for his immense support in the design and analysis of this study. It was very humble of him making time for me in his tight schedule whenever I need help.

I would love to express my special thanks to Mr. Birara Melese (Head of Nutrition unit, Federal Ministry of Health) and Dr. Ephrem Tekle (Maternal and Child Health Directorate, Federal Ministry of Health) for allowing me take the training of BINLM training of trainers and making this research possible. Their supporting letters also made the process of this research smooth. I am grateful for Mr. Yeshiwas Beyene (Nutrition Focal personnel, Addis Ababa Health bureau) for his role in supervision of the training and monitoring health care providers/medical directors and Miss Hirut Jifara (Health Information, Education and Communication Program Officer, Addis Ababa Health bureau) for her assistance in the training.

This work would not have been possible without the financial support of Addis Ababa University Thematic research theme and an award from United Nations Fund for Population Activities (UNFPA). I would also love to thank (Ethiopian Public Health Association) EPHA for their support in the duplications of questionnaires, modules and provision of stationary.

Nobody had been more important to me in the pursuit of this research than my friends who supported me technically, emotionally, lifted me up whenever I was weak and their enormous love; and my family for their continuous prayers. I really am indebted to them.

All pregnant women and health care providers who participated in the study deserves appreciation for their patience throughout data collection, medical directors for their support in integration and our data collectors and supervisors for playing an important role with data quality.

Finally, my appreciation goes to all the people who have supported me to complete this research work directly or indirectly. I couldn’t finish mentioning all their names.

Contents

Acronyms

AARHB: Addis Ababa Regional Health Bureau

ANC: Antenatal Care

BINLM: Blended and Integrated Nutrition Learning Module

BMI: Body Mass Index

CRT: Cluster Randomized Controlled Trial

CSA: Central Statistical Agency

DID: Difference in Difference

EDHS: Ethiopian Demographic Health survey

FANTA: Food and Nutrition Technical assistance

FAO: Food and Agriculture Organization

FMOH: Federal Ministry of Health

GALIDRA: Greeting Ask Listen Identify Discuss Repeat Appoint

GWG: Gestational Weight Gain

HCP: Health Care Provider

ICC: Intra Cluster Coefficient

IEC: Information, Education and Communication

IFA: Iron Folic Acid

IOM: Institute of Medicine

IUGR: Intra Uterine Growth Restriction

KAP: Knowledge Attitude and Practice

LBW: Low Birth Weight

NE: Nutrition Education

NK: Nutrition Knowledge

PACTR: Pan African Clinical Trial Registration

TOT: Training of Trainers

UNFPA: United Nations Family Planning Agency

WHO: World Health Organization

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Abstract

Background: The first 1,000 days of life, from the first day of pregnancy until the child is 24 months old is a critical window of opportunity for health and development. It is essential for pregnant women to have adequate knowledge in order to achieve optimal nutritional status during pregnancy. Antenatal care is a key unit for provision of nutrition information for pregnant women. It is critical for health care providers to have adequate knowledge and skill necessary to be able to provide sufficient nutritional information for pregnant women. However, studies show lack of adequate knowledge and skill among health care providers.

Objective: To evaluate the effectiveness of nutrition education and counseling in improving knowledge and dietary behavior of pregnant women.

Method: We conducted a cluster randomized controlled trial in Addis Ababa, Ethiopia. Health centers were allocated to intervention and control arms using a matched-pair randomization scheme. 40 health care providers from intervention arm were trained on pregnancy nutrition and counseling skills. 683 pregnant women (347 from intervention and 336 from control) were included from 20 health centers. We estimated deference in deference (DID) impact of intervention using mixed-effect linear regression with health center catchment area as random effect.

Result: Pregnant women's knowledge on food groups, use of iron folic acid supplement, benefits of balanced diet and consequence of under nutrition showed a significant improvement (P <0.001) Pregnant women of intervention arm were observed to have a significantly higher knowledge on using iodized salt (difference in proportion (DP) 24.3% vs 1.7; DID 23%), duration of iron folic acid supplementation (DP 70.9% vs 3.4; DID 68%) and having one additional meal (DP 54.3% vs 4.3; DID 49.9%). Significant improvement was also observed on dietary diversity (DP 39.0% vs 4.5; DID 32.3%) and having one additional meal to the diet (DP 36.7% vs 24.7; DID 12.8%). Pregnant women of intervention arm improved their consumption of dairy per week (DID 1.2). Intake of iron folic acid supplement has shown an improvement of 3 more days per week (D 4.9 vs 1.6; DID 3.2). However, effect of knowledge on initiation of breast feeding (P = 0.089) and dietary frequency of grains (P = 0.067) appears to be statistically insignificant.

Conclusion: Nutrition education and counseling improves pregnant women's nutritional knowledge and dietary behavior in urban settings.

1. Introduction

1.1 Background

A woman's nutritional status throughout her course of pregnancy determines her ability to successfully carry her pregnancy to term, deliver her child and provide optimal care (1). The importance of good nutrition during pregnancy has been well documented (2-8). Poor quality diets during pregnancy is associated with unhealthy weight gain, preeclampsia, preterm birth or even miscarriage. Poor infant outcomes like intra uterine growth restriction (IUGR), preterm birth, low birth weight and still birth, have also been related with inadequate maternal nutrition (9, 10).

The first 1,000 days of life, from the first day of pregnancy until the child is 24 months old, is a critical window of opportunity for health and development. This is the period in which there is an increased nutrient requirement and pregnant women in Ethiopia in particular are most vulnerable to inadequate nutrition education and counseling (11). However, the need for most nutrient requirements are fulfilled by having a healthy diet during pregnancy (6).

Having knowledge about the importance of nutrition during pregnancy is one of the determinants of having a better nutritional practice. Therefore, it is critical for a pregnant woman to have adequate knowledge in order to fulfil her increased needs and achieve optimal nutritional status during pregnancy (4). Although availability of nutrition information for pregnant women varies to different sources, women were seen to have concerns about reliability, adequacy and extent of the information reaching out to them (2, 12, 13).

Antenatal care (ANC) is a reliable key unit in provision of nutrition information for pregnant women. Healthy and nutritious diet is essential component of ANC along with other advices. 62% of women in Ethiopia received ANC counseling from skilled health care provider and 32% of women made four or more antenatal care visits during their course of pregnancy. Sixty six percent of women who attended ANC have received nutritional counseling in the previous five years in Ethiopia (14). World Health Organization (WHO) recommendations on antenatal care for a positive pregnancy experience aims to provide pregnant women with respectful, individualized, person-centered care at every contact and provision of relevant and timely information by practitioners with good clinical and interpersonal skills (15).

According to Addis Ababa health bureau (AAHB), at the forefront of providing nutritional counseling in ANC of health centers in Addis Ababa are mostly midwives, nurses and health officers. Therefore, it is essential for these personnel to have adequate knowledge and the necessary counseling skill to be able to provide sufficient nutritional information for pregnant women.

However, studies show lack of adequate knowledge and skill among health care providers. Lack of knowledge can be considered as a primary cause for lack of confidence and inadequate counseling practice among health care providers although lack of time and client load are also listed as barriers. This could also lead to insufficient knowledge and practice of pregnant women (12, 16, 17).

There is lack of sufficient knowledge among pregnant women regarding the basic nutrients, adequate nutrition during pregnancy, the importance and sources of most of the types of vitamins and minerals and other essential elements (18). Energy and most of the nutrient intakes of women were also lower than recommended intakes showing the need for adequate nutritional counseling and awareness creation among pregnant women by health care providers (19).

It has been established that nutrition education and counseling during pregnancy is associated with positive pregnancy outcomes (20, 21). Correspondingly, pregnant women have shown interest in receiving nutritional information from their health care providers. They also stated that they would have a better nutritional practice if nutrition information about topics like gestational weight gain, folic acid supplementation and essential food elements during pregnancy was given sufficiently by their health care providers (13). Health care providers also showed a need for additional nutritional training to help them provide sufficient nutrition information for their clients (17).

Evidence regarding the effectiveness of training health care providers on knowledge and practice of pregnant women and the counseling quality of health care providers is limited in Ethiopia. However, studies in other places showed an improvement in knowledge and counseling skill of health care providers as well as improved maternal dietary practice and recall of nutritional recommendations after nutritional training (22-26).

1.2 Statement of the problem

It is essential for a pregnant woman to have adequate knowledge about the importance of good nutrition so that she will plan her diet properly and achieve optimal nutritional status during pregnancy (4). However, researches documented insufficient knowledge and dietary practice among pregnant women and suggested that pregnant women might not be receiving sufficient nutrition advice from their health care providers during their antenatal care visits (12, 13, 18, 27).

Women who reported to have better nutritional knowledge also had better nutritional practice (28). Nutritional inadequacy during pregnancy have been found to be associated with maternal undernourishment (9, 10). Malnutrition in pregnant women leads to an intergenerational cycle of nutrition problems which manifest as stillbirths, miscarriages, low birth weight, growth failure, increased risk of maternal and neonatal mortality, impaired cognitive development, sub-optimal productivity in adults and reduced economic growth for one nation (4, 9, 10, 29). 13 million infants are born with low birth weight (LBW) each year in Ethiopia. A malnourished woman is more likely to give birth to a baby of low birth weight hence, the intergenerational cycle of malnutrition begin again (11). Therefore, this cycle must be broken and it all begins with pregnant women.

According to Ethiopian Demographic Health survey (EDHS) 2016, In Ethiopia malnutrition among women is relatively high with 22% of women either thin or undernourished; that is having a body mass index (BMI) of less than 18.5 kg/m^2 with pregnancy related mortality rate of 412 per 100,000 live births. Similarly, prevalence of anemia among women in the reproductive age group (15–49) was found to be 24%. Pregnant women supplemented with iron folate during their last birth is 58% while those supplemented with greater than 90 tabs are only 5%. It is also reported that new born with low birth weight rate is 13% while neonatal, infant and perinatal mortality rates are 29, 48 and 33 deaths per 1000 live births respectively. Prevalence of goiter among women of reproductive age group (15-49) is 35.8%; all calling for adequate nutritional counseling and awareness creation among pregnant women by health care providers (14).

Nutrition education and counseling given at antenatal care unit promotes healthy and balanced diet to pregnant women making it effective in improving maternal and infant outcomes (30). In spite of its known advantages, Information education and communication (IEC) during ANC along with nutrition education and counseling is reported to be poorly executed and ANC is considered as a

missed opportunity for IEC (31). Little is known regarding the extent to which health care providers fulfill their role of nutrition education in Ethiopia.

Nutrition Education strategy is only achievable if there is adequate nutrition knowledge, positive attitude and correct practice among health care providers. Despite this fact, researches show inadequacy in knowledge of health care providers leading to insufficient counseling skill to provide the appropriate nutrition counseling to pregnant women (16, 17). WHO guideline for ANC noted the need for a strong training package for practitioners which includes a standardized evidence-based, sustainable, reproducible, accessible and adaptable to different cultural settings guidance on nutrition (15).

This study tried to evaluate the effectiveness of nutrition education and counseling package (NEC package) given at facility level on knowledge and dietary practice of pregnant women regarding pregnancy nutrition.

1.3 Significance of the study

The findings of this intervention study will contribute in improving knowledge about nutrition during pregnancy and promoting healthy and balanced diet to pregnant women. Having adequate nutritional knowledge will help pregnant women plan and improve their dietary practice. This in turn will contribute in improving nutritional status of pregnant women and birth outcomes in the city of Addis Ababa and the country as a whole.

The study will also contribute in filling the gap created by lack of adequate nutrition training in colleges/universities among health care providers. It improves their nutritional knowledge and counseling skills to be able to provide sufficient nutritional information.

The findings of this study can be an input for policy makers in the designing of effective nutrition intervention to improve nutritional status of pregnant women. It can also be used as a reference for other researchers working on maternal nutrition.

2. Literature review

Nutrition during pregnancy

Maternal nutritional status is an important determinant of the outcome of pregnancy. Women with good nutritional status at the time they became pregnant are better able to meet the demands imposed by pregnancy and have more successful outcomes. Nutritional intervention during pregnancy would overcome poor maternal weight gain and reduce incidence of low birth weight and premature deliveries using locally available and affordable foods (3). Having a balanced energy and protein supplementation during pregnancy improves fetal growth, and may reduce the risk of stillbirth and infants born small-for-gestational age (6). Daily antenatal iron supplementation increases hemoglobin levels in maternal blood both antenatal and postnatal. Women who receive daily antenatal iron supplementation are less likely to have iron deficiency and iron-deficiency anemia at term as defined by current cutoff values (8).

Knowledge and dietary practice of pregnant women

Adequate knowledge during pregnancy is important. Nutritional knowledge of pregnant women is strongly associated with gestational weight gain and hemoglobin levels (32). Therefore if a mother appreciated the importance of good nutrition during pregnancy, she will plan her diet properly which will be reflected on her pregnancy outcome (4).

About half of 124 women attending at El-Menshawy General Hospital, Tanta didn't have enough knowledge regarding the meaning, importance, and constituents of well-balanced diet for the pregnant women. These women lacked awareness of the consequences of inadequate nutrition during pregnancy on mother and fetus. Again, more than half of women (54%) didn't have the essential knowledge regarding the different food groups and the importance and sources of most of vitamins and minerals. The study states that, lack of awareness among pregnant mothers can be attributed to lack of better access to information about nutrition during pregnancy and low attendance of ANC visits. The study recommends in-service training programs to be carried out for nurses working antenatal units to enrich their knowledge regarding the importance of maternal nutrition during pregnancy (18).

In a recent descriptive study done among 294 women attending in Yerwa Clinic Maiduguri Metropolitan Council, majority of women have (65.3%) knowledge of dietary practices while 34.69% never heard about good dietary practice during pregnancy. Majority of the respondents (63.27%) increased their dietary intake during pregnancy while 36.73% didn't. Among several factors that affect dietary practice of pregnant women, Cultural belief and poor socio-economic have been found to be on top list of factors that impede good dietary practice while regular attendance of ante-natal clinic and good socio economic background were seen to enhance good dietary practice among pregnant women (33).

A cross-sectional study done in Malaysia showed that, although more than half of the participants (51.9%) in the study had a moderate nutritional knowledge score, most of the participant (59.7%) did not achieve recommended weight gain as recommended by Institute of Medicine (IOM) and (33.5%) of them were anemic. Inadequate intake of micronutrient like calcium, folic acid, niacin, and vitamin D was also observed among participants. Thus, the nutritional knowledge score was associated with gestational weight gains and hemoglobin level but did not correlate with nutrient intake (32).

This is supported by a formative research done on Caucasian pregnant women in USA which stated that although most women (65%) appeared to have adequate knowledge on foods they should avoid eating during pregnancy, 42% of them had no knowledge of how much gestational weight gain (GWG) they should gain in pregnancy. These women also stated that they are not receiving adequate information about how much they should eat or how to meet recommendations to achieve GWG. All women in this study reported that they would have benefited from receiving more nutrition information (13).

Most polish pregnant women (71.2%) involved in a study assessing their nutritional knowledge also stated that information about healthy diet practices during pregnancy is not widely available and not easily obtained. Proper amount of meals is consumed by only 52.7% of mothers regardless of their formal education level and only 24.1% of the women believe that they eat healthily. The recommended number of meals per day is taken in by 52.7% of the respondents. Low consumption levels of whole meal products, as well as red beef meat, poultry and fish were seen among women. The consumption of vegetables and fruits was also insufficient. Well-educated women were observed to eat right by consuming 3-4 meals per day. The main sources of information include

own experience (49.4%), doctor (32.2%), nurse (18.4%), friends and family (17.2%) and books (13.8%) (27).

Similarly, a cross-sectional study in East Wollega Zone, Ethiopia assessing the nutritional practice of pregnant mothers revealed higher dietary inadequacies among pregnant women. Only 20.3% of them are having a diet frequency of 3-4 meals per day while 66.1% have a frequency of only 1-2 meals per day. (35.8%) of the respondents also had practiced avoiding food during their pregnancy. Most women in this study (76.6%) reported to follow their weight during pregnancy. The study also identified that family size and information about nutrition during pregnancy are predictors of good nutritional practices of mothers during pregnancy (34).

Counseling skill and knowledge of health care providers

Having adequate knowledge and sufficient counseling skill is crucial for health care providers in order to provide appropriate nutritional counseling for pregnant women. Nevertheless, health care providers are seen to lack the necessary knowledge and counseling skills. Although there are a number of barriers that imped health care providers from sufficient practice, lack of knowledge is on top list of them (12, 16, 17).

A systematic review done in 2014 showed that, pregnant women are not receiving adequate nutrition education during their pregnancy enough to make informed decisions. Although healthcare practitioners perceived nutrition education is stated to be important, barriers to providing education to clients included lack of time, lack of resources and lack of relevant training. The review also suggested the need for identification of the most effective nutrition education strategies to improve nutrition knowledge and dietary behaviors for women during antenatal care. Studies in the review also found the tendency of women to comply with advice from health care providers and provide explanations on why the recommendation is important (12).

Similarly, a study regarding self-perceived skills of nutritional knowledge among Scandinavian doctors and nurses found insufficient knowledge to be the main barrier for insufficient nutritional practice. Among 4512 professionals, 25% of them found it difficult to identify patient in need of nutritional therapy, 39% lacked techniques for identifying malnourished patients, and 53% found it difficult to calculate the patients' energy requirement. Those with self-reported good nutritional knowledge also had a better nutritional practice (16).

A postal survey sent to all members of the New Zealand College of Midwives showed that of 370 midwives, (98.4%) of them indicated that nutrition was important or very important during pregnancy and that they had a significant or very significant role in educating pregnant women (94.9%) about nutrition. Midwives generally reported to be knowledgeable and have a high level of confidence in dealing with nutrition-related issues and majority of them indicated that they provided nutrition information to women (35).

In contrast, a systematic review showed that although midwives share a belief in the importance of nutrition during pregnancy and the significant role they should play in educating women about nutrition, they are reported to lack basic knowledge of nutrition requirements during pregnancy and attributed it to inadequate nutrition education provided in both undergraduate and postgraduate midwifery programs (17).

Effect of nutrition education

Nutrition counseling was identified as an effective tool in increasing adherence to a healthy diet and supplementation. Women were more likely to comply with advice from health care professionals when it is specific and provides explanations as to why the recommendation is important (12). Dietary counseling in pregnancy has benefits of enhancing maternal nutritional status of pregnant women, lower their risks of pregnancy complications and adverse birth outcomes while improving their own health in the long run(20, 30).

A cross-sectional study of 401 Malay pregnant mothers attending ANC showed that level of nutrition knowledge (NK) is satisfactory among pregnant mothers. However, the effect of NK on healthier practices and attitudes is not too powerful. A significant positive but not strong correlation between nutrition knowledge and practices, knowledge and attitude and attitude and practice was shown. Thus, the study stated the inability of NK to result satisfying nutritional behaviors among pregnant women. Lack of interest in making dietary changes, lack of money, time and inconvenience in taste are the hypothesized barriers for the low practice despite the satisfactory knowledge the women have; stating knowledge alone does not necessarily bring alteration in dietary practice. Nevertheless, the study recommended the need for frequent and continuous nutrition education for pregnant women to improve their nutritional knowledge and have healthier dietary practice (36).

In contrast, a cross-sectional study done on a sample of 400 pregnant women admitted to the Cuza-Vodă Obstetrics and Gynecology Clinical Hospital, Romania found that level of nutritional knowledge has a strong independent association with the use of supplements during pregnancy. The use of folic acid was independently associated with a higher level of formal education and an early start in prenatal care. Women with a higher education, more prenatal visits and those who received advice on breastfeeding were more likely to use iron during pregnancy (37).

This is supported by a comparative study conducted by giving nutrition education to Indian pregnant women which showed that NE, in the form of simple, easy to follow messages with constant reinforcement, results in improved compliance to iron folic acid supplements as well as improvements in the quality and quantity of dietary intake especially the consumption of green leafy vegetables (GLVs) improved mean hemoglobin levels and reduced prevalence of anemia among the subjects in the intervention group as compared to control group (20).

In a quasi-experimental study done on 100 pregnant women in western Iran, the awareness level of pregnant women about healthy nutrition significantly increased to 31% after the nutritional education intervention independent of maternal characteristics of age and levels of literacy. The study states that, the nutritional knowledge of pregnant women before intervention was very weak (3%) (38).

A randomized control trial studying women's postpartum beliefs and practices on women attending ANC clinic showed that women in the intervention groups exhibited significantly greater improvement in overall dietary behaviors, ate more fruits, have higher mean Vitamin C, Vitamin A and calcium intake as well as nutrition and health knowledge than those in the control groups. In addition, significantly more women in the intervention groups gave up the traditional behavior taboos. Incidence of constipation, leg cramp or joint pain also was significantly lower in the intervention groups as compared with the control groups (39).

A systematic review revealed that nutritional education and counseling during pregnancy is significantly associated with birth weight and reduction of preterm birth. The study further stated that NE could also reduce the risk of anemia in late pregnancy and increase gestational weight gain (30).

Effect of training health care providers

Although evidence regarding the effect of training health care providers on maternal knowledge and dietary habit during pregnancy is sparse, researches have also documented the effect of nutrition training on other aspects.

A cross-sectional study done in Addis Ababa on effect of nutrition education on maternal knowledge and dietary practice found significant improvements in pregnant women's knowledge from 53.9% to 97% after the intervention. These includes knowledge on variety of food, using iodized salt complications of maternal under nutrition, duration and use of IFA supplement and increasing amount of food during pregnancy. The study also found a significant improvement in healthy dietary practice of women which is from 46.8% to 83.7% after intervention was implemented. Changes in dietary practice include changes in intake of majority of food groups in a day except for grains and dairy, addition of one or more meal to pregnancy diet, consumption of IFA supplement and reduction of caffeine consumption during pregnancy (24).

A Maternal, Neonatal, and Child Health (MNCH) program evaluation in Bangladesh showed a significant difference in difference improvement in number of food groups consumed (1.6 food groups), maternal dietary diversity (30%), consumption of IFA supplements (9.8%) and exclusive breast feeding (31%) among women in nutrition focused MNCH groups. However, improvement on early initiation of breast feeding hadn't been found to be significant (25).

A cluster randomized trial done in Pakistan regarding complementary feeding counseling reported that training health workers improves their counselling and communication skills and enable them to apply these new skills in their practice during the weeks after training. Appropriate actions such as recommending specific changes in inappropriate feeding practices and explaining why the changes should be made were significantly more frequent in the intervention group than in the control group. The study showed a significant improvements of the results both weeks after and after 180 days of the intervention. Trained health visitors were seen to more likely plot the weight of the child, discuss the foods appropriate for the age of the child, and check if the mothers understood information provided. Mothers belonging to the intervention group were observed to recall correct advice delivered during the consultation (22).

Similarly, a cluster randomized trial done in Pelotas, Brazil found that training health care providers brought about a significant improvement in doctors' performance regarding making appropriate recommendations and communication skills like asking, checking understanding and listening to the mother. However, the study also observed worsening of doctors' performance after 180 days of intervention. The study also found a significant improvement in maternal recall of majority of nutritional recommendations by mothers of intervention group even after 180 days of intervention. Satisfaction with the quality of care, increased use of recommended foods, improved daily energy and fat intakes and increased weight gain in children was also observed in intervention arm compared to controls (23).

Another cluster randomized trial done in Pelotas, Brazil stated that, training physicians can bring about a significant improvement in nutritional counseling skills advising the women about specific foods and food preparations and communication skill of physicians. Significantly more physicians in the intervention arm praised and checked if the mother understood the message than those in controls. Women from intervention were seen to recall messages on specific foods (95 vs.27%) and feeding practice and food preparation recommendations (90 vs. 20%). However, proportions of the messages recalled on breast-feeding (60% vs. 30%) did not differ significantly (26).

Systematic reviews showed that nutritional training of health care providers improved quality of health workers by improving their nutrition knowledge, nutrition and general counseling skills, and under nutrition management skills making them more confident in these areas. It also makes them competent to improve nutrition status among children, improve feeding frequency, energy intake, dietary diversity of children, managing nutrition-related conditions and child under nutrition. It was found that In-service nutrition training interventions can help fill the gap created by the lack of adequate nutrition training in the existing medical and nursing education system. The reviews recommended the need for a scaled up training as well as further studies regarding effectiveness of in-service nutritional training (40, 41).

Similarly, in another cluster randomized trial (CRT) studying improvement of young children nutrition after intervention that enhance the quality of nutrition counselling through training and provision of simple, standardized, age-appropriate messages which is supported by flip charts and single-page recipe fliers containing key messages has shown improved knowledge, preventive health-care-seeking behavior, feeding practices, dietary intake and linear growth in children. The

intervention was also observed to reduce the rate of stunting by more than two thirds. The study came to conclusion that nutrition education can improve the dietary intake of young children and improve growth (42).

A cluster randomized controlled trial assessing the effectiveness of maternal nutrition counseling in improving child growth and health found association between facility-based personalized maternal nutrition counseling and improved pregnant women's diet, infant and young child feeding practices, minimum dietary diversity and birth weight of new born. Nevertheless, the study didn't found improvements in child wasting and linear growth during early childhood. The study further states that the ability to give a specific, personalized and socioeconomic sensitive intervention adapted to each woman might have contributed to their commitment as well as the positive outcomes. Thus, it is possible to improve dietary practices if there is a thorough individual communication which focuses on the need of the mother and child (43).

In contrast, training health care workers did not give a statistically significant overall reduction in dental caries among children in another cluster randomized trial of infant nutrition training for caries prevention despite a slight statistically insignificant reduction of caries observed among children whose mothers attended intervention arm clinics (44).

3. Objectives

3.1 General objective

- To evaluate the effect of nutrition education and counseling on knowledge and dietary practice of pregnant women attending antenatal care unit.

3.2 Specific objectives

- To evaluate the effectiveness of nutrition education and counseling on nutritional knowledge of pregnant women attending antenatal care unit.
- To evaluate the effectiveness of nutrition education and counseling on dietary practice of pregnant women attending antenatal care unit.

4. Method

4.1 Study area

The study was conducted in Addis Ababa, capital city of Ethiopia. It is found within altitude of 2355 meter above sea level and located at 9° 0' 19.4436" North latitude and 38° 45' 48.9996" East longitude with subtropical highland climate. Projected from Central Statistical Agency (CSA) report of 2007, Addis Ababa has a total population of 3,384,569 in 2016 with annual growth rate of 3.8%. The city has three layers of administration and consists of 10 sub-cities, 99 district administration and 116 Woredas. Under its administration, there are 94 health centers in which 8 to 11 health centers are located in each sub-city. According to EDHS 2016, percentage of pregnant women receiving antenatal care from skilled providers in the preceding 5 years in Addis Ababa is 97%. Among women with live birth in the past 5 years, only 18% took 90+ IFA supplements while 35.6 % of them didn't take any supplements in the city. Prevalence of anemia (<11.0g/dl) in Addis Ababa among women aged 15-49 is 16% (14). In addition, inadequate intake of iron, zinc and vitamin A in the city of Addis Ababa is 7.4%, 61.7% and 93% respectively (45).

4.2 Study design

A cluster randomized controlled trial was conducted from May 2017 through September 2017. The study was employed by considering health centers as clusters and a unit of randomization after they are stratified by sub-cities.

Pregnant women living in a catchment area of a specific health center usually attend their ANC visits in the same health center; creating more room for information contamination between arms. Considering ethical issues, feasibility and management in addition to information contamination, cluster randomization became a choice of appropriate design for this study targeting the intervention at the cluster level.

4.3 Source population

- All pregnant women attending ANC of health centers in Addis Ababa for ANC clients.
- All health care providers working in health centers of Addis Ababa are the source population for health care providers.

4.4 Study population

- Pregnant women attending ANC in selected health centers.
- Health care providers working in ANC of selected health centers.

4.5 Exclusion criteria

Pregnant women who are above 28 weeks of gestation (on their third and above visits) at baseline were excluded in order to follow them for their next two visits. We excluded pregnant women who had history of chronic diseases (such as HIV, TB, diabetics, hypertension) because it might affect their nutritional habit. Pregnant women with multiple pregnancies are usually referred to hospitals as the majority of health centers in Addis Ababa doesn't have enough services for them. Therefore, they were excluded from our study in order to decrease the number of lost to follow ups. In addition, pregnant women who won't keep their follow up at the same health center they are found during baseline or plan to leave the city in the coming 6 months were excluded. These women were excluded as they might not finish their follow ups in the same health center. Pregnant women less than 18 years of age were also excluded because of ethical issues.

4.6 Sample size

We calculated sample size for each specific objective using Stata version 13 software, a double population proportion for cluster randomized trial.

Objective 1

Sample size calculation for nutritional knowledge of pregnant women was done using the following assumptions.

- A 53% of knowledge prevalence on appropriate pregnancy nutrition (24),
- A 25% improvement on nutritional knowledge of pregnant women after intervention,
- Intra cluster coefficient (ICC) as 0.04,
- A power of 80%, A 95% confidence level and 15% drop out,

The resulted sample size was 315 women per arm.

Objective 2

Sample size for dietary practice of pregnant women was calculated using the following assumptions.

- A 46% of knowledge prevalence on appropriate pregnancy nutrition (24),
- A 15% improvement on dietary practice of pregnant women after intervention,
- Intra cluster coefficient (ICC) as 0.04,
- A power of 80%, A 95% confidence level, 15% drop out,

The resulted sample size was 330 pregnant women per arm. Taking the larger sample size, 330 pregnant women were allocated to each cluster.

We selected four health care providers working in ANC from each twenty selected health centers. A total of 40 health care providers from each arm participated in the study.

4.7 Sampling procedure

Table 1 shows list of sub-cities and health center allocations along with the average monthly case load and sample size distribution of ANC clients in each health center in Addis Ababa, 2017. There are 10 sub-cities and 94 health centers in Addis Ababa. Health centers are pre-stratified by sub-cities in which 8 -11 health centers are located in each of the sub-cities. Three non-governmental health centers and health centers with less than 50 average monthly ANC case load were excluded prior to selection. First we randomly selected one health center from each sub-city. A matched pair of the first selected health center was again selected from the same sub-city using the following matching criterion.

1. Health centers with non-adjacent catchment area from the first randomly selected health center (which is at least one Woreda in between the health centers) from each sub-city to prevent information contamination,

2. Health centers within ±15% range of an average monthly ANC case load from the first randomly selected health center in each sub-city in order to keep baseline balance.

Evidence of matching variables were obtained from AAHB database, sub-city maps on which health centers are located and sub-city HMIS reports.

Following a matched-pair randomization scheme, health centers were randomized with one health center per sub-city allocated to intervention and the other to control arms. Randomization was done after a public container ballot by a person who is not a member of this study. These 20 health centers were invited to participate prior to randomization without disclosure of allocation status.

Health centers in Addis Ababa usually have four health care providers in their ANC unit. All four health care providers working in ANC during the study period were included from each health center. The sample size for pregnant women was allocated to each cluster health centers proportionally according to their average monthly ANC case load. Pregnant women were selected consecutively from the medical registry so that they could easily be found when they return for their next ANC visit. Medical directors of each health center were consulted on annual leaves and rotations of health care providers.

Table 1: List of sub-cities and health center allocations along with the average monthly case load and sample size distribution of ANC clients in each health center, in Addis Ababa, 2017.

Intervention arm			Sub city	Control arm		
Name of HC	**Case load***	**Distribution**		**Name of HC**	**Case load ***	**Distribution**
Wereda 3	58	**17**	**Addis ketema**	Felegemeles	52	**18**
Gelan	108	**37**	**Akaki**	Saris	98	**32**
Kebena	53	**19**	**Arada**	Semen	114	**34**
Dilfire	133	**40**	**Bole**	Amoraw	140	**42**
Hidase	75	**29**	**Gulele**	Shiromeda	67	**27**
Meshualekiya	75	**29**	**Kirkos**	Kirkos	92	**30**
Wereda 6	108	**38**	**Kolfe**	Wereda 1	100	**33**
Teklehaymanot	87	**29**	**Lideta**	Beletshachew	60	**20**
Wereda 3	197	**55**	**Nifas silk**	Wereda 1	167	**52**
Wereda 12	178	**54**	**Yeka**	Yeka	151	**48**
Total	**1072**	**347**		**Total**	**1041**	**336**

Case load *: - Average monthly flow (4th visit) of each health center taken from sub-city HMIS reports; second quarter (Tikimt 2010 E.C – Tahisas 2010 E.C).

HC:- Health center

4.8 Intervention

Nutrition education and counseling package aimed at improving nutrition during pregnancy and counseling skill for health care providers working in ANC of intervention health centers

A standardized in-service nutritional training using a module derived and modified from blended and integrated nutrition learning module (BINLM) was given to 40 health care providers working in ANC of health centers selected as intervention arm. The module is a national nutritional module prepared by Federal Ministry of Health in Ethiopia (46).

The training was conducted in 4 consecutive days by assigning HCPs in two groups of training; each having 2 days' duration. Two health care providers from each health center attended the training in the first group and the other two in the next. The need for having two groups of similar training arose for two reasons. One is not to affect the routine ANC service which is delivered in the selected health centers by taking all HCPs to training while the other is to increase the quality of the training by limiting the number of trainees in a room. This made the training more convenient to deliver the message effectively and give adequate time for role plays.

The training was mainly facilitated by the principal investigator who is certified by training of trainers (TOT) in BINLM. Collaborators of the research, Health Information, Education and communication program officer and nutrition focal personnel from AAHB, invited nutritionist and a medical doctor played an important role assisting and supervising the training.

The training consisted of three sessions. Health care providers reflected on why we needed the training and raised their expectations of it while introducing to each other in the first session. The second session was aimed at introducing pregnancy nutrition by addressing energy needs during pregnancy, pregnancy weight gain, food group classifications, other food ingredients and life style issues, food safety issues, common problems associated with pregnancy, benefits of fulfilling nutrient requirement during pregnancy and consequence of maternal malnutrition. In the third session nutrition education and counseling, important counseling skills, key messages and doable actions and (Greet, Ask, Listen, Identify, Discuss, Repeat, Appoint) GALIDRA steps to counseling and reaching an agreement were discussed in detail in the fourth session. This session also contains

the use of health belief model in nutrition education and counseling as a delivering modality of messages and recommendations.

Health belief model is one of the behavioral change theories adapted to explain and predict health behaviors. Major constructs of the model are perceived susceptibility (an individual's assessment of their risk of getting a condition), perceived severity (an individual's assessment of seriousness of the condition and its potential consequences), perceived benefit (an individual's assessment of the positive consequences of adapting a behavior), perceived barriers (an individual's assessment of the influences that discourage adoption of the promoted behavior). The model suggests that an individual 's perceived threat of disease or negative outcome is a key determinant of whether he or she adopts a healthy behavior. It also suggests that the benefits and barriers of changing health behavior must be taken into consideration, as those who perceive more benefits than barriers are more likely to take action (47, 48).

Thus, health care providers discussed and practiced on how to give pregnant women a simple, personalized and specific recommendation of doable actions using case scenarios. They also incorporated health belief model in their nutritional counseling practice during role plays in the third session.

The training was supported by power point presentations, discussions and role plays. Trainees were also provided with additional materials like modules and summary pamphlets to display inside their ANC room. The training was evaluated by the results of Pre-post test questions given to the participants based on the training module. Discussions on areas that health care providers seem to be weak were made after the post-test in order to clear any misunderstandings throughout the sessions.

A one week follow up supervision was made to intervention arm health centers in order to help Identify and solve any difficulties while implementing the training and fill missing gaps if any. It was also observed to be helpful in motivating and boosting the moral of health care providers.

Take home brochures prepared in the local language Amharic were also distributed to pregnant women attending intervention health centers during their second ANC visits. The brochures include simple and easy to understand key messages and doable actions of maternal

recommendations as bullet points and explanations of components of pregnancy nutrition. Messages of the brochures also incorporated health belief model as a way of delivering the message.

The training was given assuming that the trained health care providers in the intervention arm will put in to practice what they have trained about pregnancy nutrition and practice effective counseling skills while those in control arm continue their usual practice of counseling in which they counsel pregnant women during ANC visits.

4.9 Data collection tools and procedures

Baseline data on knowledge and practice of pregnant women and counseling skill of health care providers was collected before the training. Exit interviews adapted from (Food and Agriculture Organization of the United Nations) FAO and Food and Nutrition Technical assistance (FANTA III) minimum dietary diversity of women of reproductive age groups, FAO Guidelines for assessing nutrition-related Knowledge, Attitudes and Practices (KAP) Manual and questions from other literature were used to assess the knowledge and practice of pregnant women (24, 49, 50). Interviews included socio-demographic information (such as, age, educational and occupational status, marital status and family size), obstetric information (such as: - parity, gravidity and gestational age), a 24 hr. dietary diversity questions, seven days' food frequency questions and questions assessing nutritional knowledge.

Observational checklist used to assess the counseling skill of HCPs consisted of essential counseling skill and nutritional counseling parts. Checklist was adapted from BINLM and other literatures (24, 26, 46). Background information (such as: - age, field of study, educational status, institute of graduation, previous nutritional training and self-reported confidence) were also asked from all health care providers participating in the study. Three independent observations from each health care provider were taken both at baseline and end line making a total of 240 observations.

End line data was collected the same way as the baseline; this time only according to the pregnant women's respective appointment. Questionnaires of both baseline and end line were the same except for two additional questions asking if the pregnant women received the specific take home

brochures we distributed. This helped us assess any possible contamination that might have happened between intervention and control arms.

The above data collection procedure applied for both intervention and control arms independently but in similar manner and at the same time.

Data collection tool was first prepared in English then translated to Amharic and then back to English translation by another person to check for consistency. It was also pretested before the baseline on the sample of pregnant women and health care providers from health centers not included in the study. Questionnaires were modified after the pretest and data from the pretest was also not included in the analysis of this study.

Each round of data collection and supervision was conducted by trained health professionals. Health care providers who work other than ANC and delivery units of health centers collected the data from pregnant women while health officers who don't work in the selected health centers collected observation checklists.

All data collectors, supervisors and pregnant women were blinded of allocation status. Informed consent also was obtained from each pregnant women and health care providers on each round of data collection (baseline and end line).

4.10 Follow-up protocol

After baseline data collection, pregnant women were supposed to come for their next ANC follow-up before they are interviewed in the end line. Contact addresses were collected from each woman during baseline data collection. Mobile and home phone numbers including contacts of the husband, neighbor or a friend of each pregnant woman were obtained. We were able to trace the women using their contact numbers and remind them of their appointment date for their next ANC visit as well as to take the take-home brochure (only for intervention arms). Data collectors designated for this purpose called and communicated each woman.

After the baseline, data collectors were able to call and remind the woman 3 days before her appointment for her next visit and call again on her day of appointment. For those women whose mobile number was not working, husband's and home contacts were used. If those numbers were

not unreachable, contact numbers of a neighbor or a friend were used instead to call and trace the woman. In case of a woman who didn't pick up their phone or with unreachable phone numbers, data collectors made a repeated call for 3 consecutive days after her appointment day in addition to the two attempts.

This procedure was repeated before end line data collection in which data collectors called the woman 3 days before her appointment day and on the same day of her appointment. During the phone calls, pregnant women were told to notify data collectors when they come to their follow-up visit and data collectors were stand by at the door of ANC waiting for her.

In case of a woman who changed her follow-up health center to another health center in the same arm, data collection was done at that new health center she changed to. For those pregnant women who couldn't come to their end line visits and were going to change health centers because of financial problems for transportation, a small transportation incentive was given after an appreciable convincing attempt made by data collectors. However, this method of tracing a woman was not as such successful as there was a limited resource.

Lost to follow-up was declared when all these methods of tracing a woman failed, pregnant woman moves from the city and is not returning during the study period, a woman changed health centers to different arm, a woman is referred to hospitals for various reasons and a woman said she is not coming for her next visit due to different reasons despite the convincing methods attempted by data collectors.

The above follow up protocol applied for both intervention and control health centers the same way and independently.

Study variables

Dependent variables

Nutritional knowledge of pregnant women

Variables used to assess nutritional knowledge of pregnant women were, knowledge on one additional meal, using iodized salt, adding salt when serving food, duration of iron folic acid supplement, pregnancy weight gain and initiation of breast feeding. **Table 2** shows variables used to assess mean nutritional knowledge of pregnant women such as knowledge on food groups, component of balanced diet, benefits of balanced diet, consequence of under nutrition, use of iron folic acid supplement, things to avoid/limit during pregnancy, solutions for common problems during pregnancy.

Dietary practice of pregnant women

Variables used to assess nutritional knowledge of pregnant women were, consumption of one additional meal, use of iodized salt, adding salt when serving, following weight during pregnancy and diet restrictions.

Dietary diversity of pregnant women was assessed by asking pregnant woman if she consumes food groups such as grains, pulses, dairy, meat poultry and fish, eggs, dark green leafy vegetables, vitamin A rich fruits and vegetables, other fruits, other vegetables and nuts and seeds in the previous 24-hour.

Food frequency of pregnant women was assessed by asking pregnant woman if she consumes food groups such as grains, pulses, dairy, meat poultry and fish, eggs, dark green leafy vegetables, vitamin A rich fruits and vegetables, other fruits, other vegetables and nuts and seeds in the previous 7 days.

Covariate variables

For health professionals

- Work experience (in years)
- Sex (male, female)
- Educational status (diploma, degree, masters)
- Field of training (medical doctor, health officer, midwife, nurse)
- Institution of graduation (private, public)
- Self-reported level of confidence (not confident, moderately confident, confident)
- Previous training on nutrition (yes, no)

For ANC clients

- Age (in completed years)
- Marital status (married, single, divorced, widow)
- Religion (Muslim, Orthodox, Protestant, Other)
- Gravidity (Prim gravida, Multi-gravida)
- Parity (Nulliparous, Prim para, Multi-para, Grand Multi-para)
- Number of ANC visits (1 visit, 2 visits, 3 visits, 4 and more visits)
- Educational status of pregnant women (Illiterate, Read and write, Primary Education, Secondary Education, Collage and above)
- Occupational status (employed, not employed)
- Husband's occupational status (employed, not employed)
- Husband's educational status (can't read and write, Read and write, Primary Education, Secondary Education, Collage and above)
- Monthly income (in birr)
- Source of nutrition Information (health care provider, Other pregnant women, family, friends, media, books, did not receive any information)

4.11 Data management and analysis procedure

EPI data version 4.2.0 was used to code and enter the collected and cleaned data. Data were analyzed using Stata version 14.0. Knowledge of pregnant women was the primary outcome while dietary practice of pregnant women to be the secondary outcome. Descriptive statistics (mean and standard deviation) was calculated for all continuous variables while frequency distribution was used for evaluating the distribution of categorical variables.

Baseline characteristics of both pregnant women as well as those who are lost to follow up and not lost to follow ups were compared using mixed-effect logistic regression. Baseline comparison of health care providers was also conducted using mixed-effect logistic regression. For analysis of all outcomes, we used mixed-effect linear regression with health center catchment area as random effect. Clustering effect was adjusted to get robust standard errors. Per Protocol analysis was used for analyzing outcomes of pregnant women. Results of all outcome variables are presented as difference in difference (DID) impact estimator to display the actual effect of the intervention. Statistical significance was declared at P value < 0.05 for all outcomes.

4.11.1 Nutritional knowledge of pregnant women

Knowledge on one additional meal, using iodized salt, adding salt when serving food, duration of iron folic acid supplement, pregnancy weight gain and initiation of breast feeding were analyzed using variables Yes/No (1/0). “1” was coded if the woman has the correct knowledge while “0” was codded for woman who doesn’t know correctly. Percentage of difference in difference impact estimator was displayed to show the effect.

Knowledge on one additional meal is defined “Yes” if pregnant woman knows that she has to add one extra meal to her daily diet. duration of IFA supplement was defined as “Yes” if the woman knows that supplements should be taken for at least 6 months. Women who answered that pregnant woman in a normal weight/body mass index state should gain between 10kg and 14 kg range was coded as “1”. A woman was regarded as she knows initiation of breast feeding when she answers that pregnant woman should start breast feeding immediately after birth or within one-hour duration.

Mean knowledge was calculated for questions regarding knowledge on food groups, component of balanced diet, benefits of balanced diet, consequence of under nutrition, use of iron folic acid supplement, things to avoid/limit during pregnancy, solutions for common problems during pregnancy each having 11, 8, 9, 8, 4, 7 and 5 scores respectively. Mean difference in difference was estimated to display the effect of the intervention.

Table 2: Definitions regarding nutritional knowledge of pregnant women along with their maximum score points

Outcomes	Definitions	Score points*
Knowledge on food groups	Main sources of iron + vitamin A + protein + calcium	**11**
Knowledge on component of balanced diet	Meat poultry and fish + eggs + fruits + DGLVs + dairy + pulses + grains + roots and tubers	**8**
knowledge on benefits of balanced diet	Benefits of balanced diet for pregnant woman (5) + benefits of balanced diet for the fetus (4)	**9**
Knowledge on consequences of under nutrition	consequences of under nutrition for pregnant woman (3) + consequences of under nutrition for the fetus (5)	**8**
Knowledge on use of iron folic acid supplement	Cognitive development + prevent LBW + prevent birth defects + prevent anemia	**4**
Knowledge on things to avoid/limit	Alcohol + smoking + caffeine + raw food/milk + work load + stress + taking pills out of prescription	**7**
Knowledge on common problems during pregnancy	Eat small and frequent + take IFA supplements after meal + drink more fluids + avoid sleeping immediately after meal + consult health care providers	**5**

DGLVs: - Dark green leafy vegetables, **Score points*: -** Maximum possible scores

4.11.2 Dietary practice of pregnant women

Total dietary diversity score was calculated from a qualitative 24-hour recall data using the list of food items (10 food groups) and asking the woman if she consumed them in the previous day. Food groups consumed by the woman were summed to create a dietary diversity of woman ranging from 1 to 10. Women who consumed 5 or more food groups in the previous day was grouped as having met the minimum dietary diversity score while women with consumption of less than 5 food groups were regarded as below the minimum dietary diversity (49).

Seven days' food frequency of pregnant women was analyzed for food groups using the 7 days' food frequency questionnaire. Pregnant women were asked for how many days each food group has been consumed by them. Iron folic acid supplement was also analyzed using the previous 7 days' frequency intake. Tea and coffee consumption were analyzed the same way using previous 7 days' frequency but they were measured in cups rather than days. Tea consumption was measured using the number of~90ml tea cups per week while coffee was measured using~70ml cup. Mean difference in difference impact estimator was used to display the impact of intervention on consumption of each food groups, iron folic acid supplements, tea and coffee.

Other dietary practice questions like consumption of one additional meal, use of iodized salt, adding salt when serving, following weight during pregnancy and diet restrictions were analyzed using variables as Yes/No (1/0). "1" was coded if the woman has the correct practice while "0" was codded for woman who has in correct practice. Percentage of difference in difference was estimated to display the impact.

4.11.3 Counseling skills of health care providers

Counseling skills of health care providers were analyzed from 240 observations. Essential counseling skills like greeting the client, listening, showing interest, informing risk, the need to extra energy, day time rest, minimum dietary diversity, one additional meal, measuring weight, gestational weight gain, checking track of gestational weight gain, identifying key problems, praising the woman, recommending doable actions, checking if the woman understood the recommendations, taking history and making appointments were analyzed using variables as Yes/No (0/1). "1" was coded for health care providers with correct practice and "0" was coded for

those with incorrect practices. Percentage of difference in difference estimate was used to display the impact. Mean score was used to analyze nutritional counseling skills and mean difference in difference was used to display the impact. All analysis of Essential and nutritional counseling skills was adjusted for institute of graduation of health care providers in the regression model.

Table 3: Definitions related to nutritional counseling skills of health care providers along with their maximum score points

Nutritional counseling skills	Definitions	Score points*
Informed about food groups	Grains + pulses + meat and poultry + fish/sea food + dairy + eggs +fruits and vegetables + fats and oils	**61**
Informed about iron folic acid supplement	Take every day+ importance + take after meal + checked adherence	**4**
Informed about consequence of under nutrition	Maternal complications + fetal complications	**11**
Informed things to avoid/limit	Smoking + alcohol + caffeine	**9**
Informed solutions to common problems during pregnancy	Nausea vomiting heart burn + constipation	**11**
Informed about salt	Use iodized salt + importance of iodine + add salt when serving food + storage of salt	**6**

Score points*: - Maximum possible score

4.12 Data quality Assurance

Measures taken to assure data quality include training data collectors and supervisors at each round of data collection, blinding pregnant women, data collectors and supervisors of the allocation status of intervention and control arms, pre-testing data collection tool to assess its clarity, length, completeness, consistency and required time to carry out the interview. Follow up supervision of health care providers' counseling, monitoring and supervising closely the data collection processes and follow-up protocols, coding and cleaning of data before entering.

4.13 Ethical Considerations

Ethical clearance was acquired from Addis Ababa University, college of health sciences school of public health research ethics committee and Addis Ababa health bureau ethical review committee. A separate letter of permission to give the training and invitations to the training for health care providers and their medical directors was acquired from AAHB. Informed consent were obtained from all pregnant women at each round of data collection masking them to the allocation status. Health care providers were also consented at each round of data collection. Informed consent prior to randomization and the beginning of data collection was acquired from all selected health centers. A detail explanation of the purpose of the study, data confidentiality, beneficence of the study and assurance that refusal to participate in the study won't affect their ANC service were made to all pregnant women, health care providers and health centers involved in the study before obtaining the consent. This trial is registered in Pan African trial registration (PACTR) website and acquired its own identification number.

4.14 Dissemination of result

The results of the study will be presented to Addis Ababa University, College of health sciences, school of public health as part of master of public health nutrition & it will also get shared to the selected health centers, Federal Ministry of Health (FMOH), AAHB, UNFPA and EPHA. Efforts will be made to present the results on scientific conferences and will be published in a reputable journal.

5. Result

Data were collected from May 2017 through September 2017. **Figure 1** shows flow diagram for distribution of cluster health centers and pregnant women's enrollment, allocation in each arm and analysis in Addis Ababa Ethiopia, 2017 G.C. We enrolled 683 pregnant women during baseline. After baseline, 96 (14%) women were lost before coming to the second visit; of which 55 (8%) were from intervention and 41(6%) were from control. In the third visit, 87 (12%) women dropped out of the study of which 32 (4.6%) were from intervention and 55(8%) were from control. A total of 183 (26.6%) women were lost to follow up in this study. Therefore, per protocol analysis was done with the remaining 500 pregnant women. A total of 20 health centers and 80 health care providers were enrolled in the study and all of them have completed with no loses to follow up.

There was no significant difference between socio demographic and other characteristics of lost to follow up women and non-lost to follow up women upon comparison **(Annex 2).** Some of the reasons for the lost to follow ups were inability to trace pregnant women because of unreachable phone numbers 72 (39.3%), women said they were unable to come to their next visit because of different reasons 47 (25.7%), referral to other health centers (self-referral in case of women who change locations and referral by health care providers) 34 (18.6%), moving to another place for different reasons and delivery 21 (11.5%) and abortion 9 (4.9%).

Table 4 shows comparison of baseline socio demographic factors between the two arms in Addis Ababa Ethiopia, 2017 G.C. Baseline characteristics including socio demographic characteristics between the two arms of pregnant women showed no significant difference upon comparison.

All 292 (84%) pregnant women who came for their second visit from the intervention arm took the take home brochure distributed to intervention arm health centers. None of the pregnant women in control arm stated that they have seen the specific take home brochure we distributed.

The overall baseline characteristics of health care providers were comparable except institute of graduation. More health care providers of intervention arm were graduated from government schools 35 (87.5%). More health care providers of control arm graduated from private schools 25 (62.5%) **(Annex 3).**

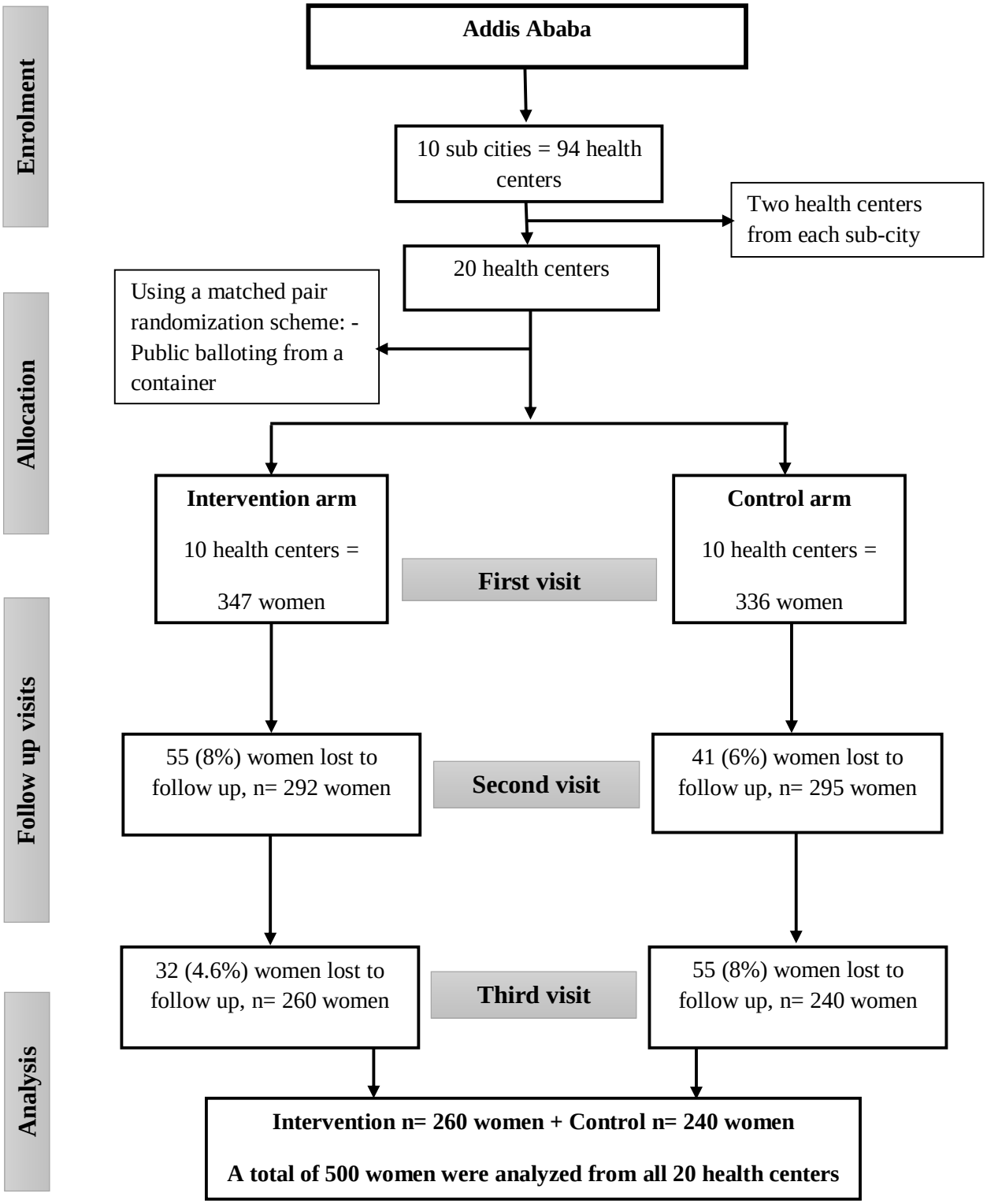

Figure 1: - Flow diagram for distribution of cluster health centers and pregnant women's enrollment, allocation in each arm and analysis in Addis Ababa Ethiopia, 2017 G.C

Table 4: Baseline characteristics of pregnant women by study arm from the selected health centers in Addis Ababa, 2017 G.C

Characteristics	Intervention N (347)		Control N (336)		P value*
	n	%	n	%	
Age (in completed years)					
18-24	155	44.7	134	39.9	**0.331**
25-34	176	50.7	183	54.5	
35-45	16	4.6	19	5.6	
Religion					
Orthodox	249	71.8	242	72.0	**0.726**
Muslim	68	19.6	73	21.7	
Protestant	30	8.6	21	6.2	
Ethnicity					
Amhara	162	46.7	168	50.00	**0.979**
Tigre	21	6.1	11	3.3	
Oromo	71	20.5	64	19.1	
Gurage	79	22.8	74	22.0	
Silt'e	14	4.0	19	5.6	
Educational status of a woman					
Can't read and write	40	11.5	50	14.9	**0.595**
Can read and write	63	18.2	66	19.6	
Primary school	122	35.2	106	31.5	
Secondary school	62	17.9	60	17.9	
College and above	60	17.3	54	16.1	
Occupational status of a woman					
Unemployed	50	14.4	43	12.8	**0.711**
Student	12	3.5	4	1.2	
House wife	119	34.3	130	38.7	
Daily laborer	11	3.2	8	2.4	
Merchant	13	3.7	9	2.7	
Civil servant	92	26.5	80	23.8	
Self employed	50	14.4	62	18.4	
Marital status					
Single	13	3.7	5	1.5	**0.188**
Divorced/separated	3	0.9	4	1.2	
Married/living together	331	95.4	327	97.3	
Husband's educational status					
Can't read and write	18	5.4	21	6.4	**0.393**
Can read and write	54	16.2	70	21.4	
Primary school	87	26.1	86	26.3	
Secondary school	85	25.5	65	19.9	
College and above	89	26.7	85	25.9	

Husband's occupational status (main income)					
Unemployed	4	1.2	4	1.2	**0.355**
Daily laborer	27	8.1	24	7.3	
Merchant	36	10.8	22	6.7	
Civil servant	144	43.2	122	37.3	
Self employed	122	36.6	155	47.4	
Family size					
< = 2	195	56.1	171	50.9	**0.492**
3- 4	82	23.6	96	28.6	
>4	70	20.2	69	20.5	
Family monthly income (in birr)					
<2000	41	11.82	34	10.12	**0.482**
2000 – 2999	52	14.99	45	13.39	
3000 – 4499	73	21.04	75	22.32	
>= 4500	67	19.31	47	13.99	
Missing	114	32.85	135	40.18	
Gestational age (in weeks)					
0-16	145	41.8	137	40.8	**0.643**
17-28	202	58.2	199	59.2	
Gravidity					
Prim gravida	186	53.6	158	47.0	**0.206**
Multi gravida	161	46.4	178	52.9	
Parity					
Nulliparous	211	60.8	181	53.9	**0.294**
Prim parous	85	24.5	104	30.9	
Multiparous	51	14.7	51	15.2	
Number of ANC visits					
First	212	61.1	186	55.4	**0.434**
Second	135	38.9	150	44.6	

*** Robust, adjusted for clustering effect using mixed effect logistic regression**

Nutritional knowledge of pregnant women

The overall baseline knowledge of pregnant women is comparable among the two arms. A statistically significant (P <0.001) effect was observed in almost all components of nutritional knowledge among pregnant women of intervention arm.

Table 5 shows the nutritional knowledge of pregnant women by study arm and study round (baseline and end line) in the selected health centers in Addis Ababa, 2017 G.C**.** Pregnant women of intervention arm were observed to have a significantly higher knowledge on adding salt when serving (difference in proportion (DP) intervention Vs control), (79.9% vs 2.9%); DID 77.4%; 95% CI: 70.67 - 84.13; P = 0.000), knowledge on using iodized salt (DP 24.3% vs 1.7%; DID 23%; 95% CI: 18.39 - 27.39; P = 0.000) and knowledge on duration of iron folic acid supplementation (DP 70.9% vs 3.4%; DID 68%; 95% CI: 57.36 - 79.09; P = 0.000). A significantly higher knowledge was also observed among pregnant women of intervention group on having one additional meal (DP 54.3% vs 4.3%; DID 49.9%; 95% CI: 37.82 - 62.16; P = 0.000) and amount of pregnancy weight gain (DP 57.1% vs 6.7%; DID 50.6%; 95% CI: 43.06 - 58.11; P = 0.000). However, effect of knowledge on initiation of breast feeding appears to be statistically insignificant (DP 13.0% vs 3.0%; DID 9.3%; 95% CI: -1.43 - 20.13; P = 0.089).

Table 6 shows the mean nutritional knowledge of pregnant women by study arm and study round (baseline and end line) of selected health centers in Addis Ababa, 2017 G.C. Pregnant women's knowledge showed a significant improvement on food groups (P= 0.000), use of IFA supplement (P= 0.000), benefits of balanced diet (P= 0.000) and consequence of under nutrition (P= 0.000) among intervention arm. Women of intervention arm were also observed to have a significant improvement on solutions for common problems during pregnancy such as nausea, vomiting, heart burn and constipation (P= 0.000).

Table 5: Nutritional knowledge of pregnant women by study arm and study round (baseline and end line) from the selected health centers in Addis Ababa, 2017 G.C

Outcomes		Intervention[3]		Control[4]		DID impact estimator[5]	95% CI[6]
		n	%	n	%	%	
Knowledge on one additional meal							
	Baseline[1]	121	34.9	124	36.9	**49.9***	37.82 - 62.16
	Follow up[2]	232	89.2	99	41.2		
Knowledge on using iodized salt							
	Baseline[1]	256	73.8	263	78.3	**23.0***	18.39 - 27.39
	Follow up[2]	255	98.1	192	80.0		
Knowledge on adding salt when serving							
	Baseline[1]	27	7.8	31	9.2	**77.4***	70.67 - 84.13
	Follow up[2]	228	87.7	29	12.1		
Knowledge on duration of IFA supplement [7]							
	Baseline[1]	25	7.2	28	8.3	**68.0***	57.36 - 79.09
	Follow up[2]	203	78.1	28	11.7		
Knowledge on pregnancy weight gain							
	Baseline[1]	70	20.2	60	17.9	**50.6***	43.06 - 58.11
	Follow up[2]	201	77.3	59	24.6		
Knowledge on early initiation of breast feeding							
	Baseline[1]	278	80.1	260	77.4	**9.3**	-1.43 - 20.13
	Follow up[2]	242	93.1	193	80.4		

[1] **Baseline** N= 683 [2] **Follow up** N= 500 [3] **Baseline intervention** N= 347 [3] **Follow up intervention** N= 260 [4] **Baseline control** N= 336 [4] **Follow up control** N=240, [5] Difference in difference impact estimator using mixed-effect linear regression with health center catchment area as random effects, [6] Adjusted for clustering effect to get robust standard error, **CI[6]** Confidence interval, [7] **IFA** – iron folic acid supplement, ***** P<0.001, ****** P<0.01

Table 6: Mean nutritional knowledge of pregnant women by study arm and study round (baseline and end line) of selected health centers in Addis Ababa, 2017 G.C

Outcomes		**Intervention** [3]		**Control** [4]		**DID impact estimator** [5]	**95% CI** [6]
		Mean	**SD** [7]	**Mean**	**SD** [7]	**Mean score**	
Knowledge on food groups [1]							
Out of 11 points	**Baseline**[1]	1.9	1.5	2.0	1.6	**3.4***	2.88 - 4.0
	Follow up[2]	5.4	2.1	2.0	1.5		
Knowledge on component of balanced diet							
Out of 8 points	**Baseline**[1]	2.5	1.2	2.5	1.2	**2.1***	1.7 - 2.43
	Follow up[2]	4.9	1.4	2.9	1.1		
Knowledge on benefits of balanced diet							
Out of 9 points	**Baseline**[1]	2.2	0.9	2.2	1.0	**2.0***	1.49 - 2.51
	Follow up[2]	4.3	1.5	2.3	0.9		
Knowledge on consequences of under nutrition							
Out of 8 points	**Baseline**[1]	2.1	0.9	2.1	0.9	**2.2***	1.89 - 2.53
	Follow up[2]	4.4	1.3	2.2	0.9		
Knowledge on use of iron folic acid supplement [12]							
Out of 4 points	**Baseline**[1]	0.6	0.6	0.6	0.6	**1.4***	1.16 - 1.55
	Follow up[2]	2.0	0.9	0.7	0.6		
Knowledge on what to avoid/limit during pregnancy							
Out of 7 points	**Baseline**[1]	1.8	1.2	1.9	1.1	**2.1***	1.68 - 2.48
	Follow up[2]	3.9	1.1	2.0	0.9		
Knowledge on solutions for common problems during pregnancy							
Out of 5 points	**Baseline**[1]	1.5	0.7	1.6	0.7	**1.3***	1.05 - 1.63
	Follow up[2]	3.0	0.9	1.8	0.6		

[1] **Baseline** N= 683 [2] **Follow up** N= 500 [3] **Baseline intervention** N= 347 [3] **Follow up intervention** N= 260 [4] **Baseline control** N= 336 [4] **Follow up control** N=240,[5] Average difference in difference impact estimator using mixed-effect linear regression with health center catchment area as random effects, [6] Adjusted for clustering effect to get robust standard error, [6]**CI** Confidence interval, [7] **SD** standard deviation, ***** P<0.001

Dietary practice of pregnant women

Table 7 shows dietary practice of pregnant women by study arm and study round (baseline and end line) in selected health centers in Addis Ababa, 2017 G.C. Pregnant women of intervention arm were observed to have a significant improvement on dietary diversity (consumption of > = 5 food groups) (DP 39.0% vs 4.5%; DID 32.3%; 95% CI: 18.07 - 46.59; P = 0.000) and improved number of food groups consumed by 2 food groups in a day/ 24 hour (DID 2; 95% CI: 1.57 – 2.61; P = 0.000). A significant improvement was also observed among women of intervention arm on using iodized salt (DP 34.3% vs -2.6%; DID 36.2%; 95% CI: 29.69 - 42.61; P = 0.000), adding salt when serving food (DP 75.0% vs 2.2%; DID 73.4%; 95% CI: 64.37 - 82.47; P = 0.000), having one additional meal to their diet (DP 36.7% vs 24.7%; DID 12.8%; 95% CI: 3.58 - 22.08; P = 0.007) and following their weight during pregnancy (DP 40.4% vs 6.8%; DID 32.1%; 95% CI: 19.03 - 45.19; P = 0.000). However, avoiding diet restriction didn't show a statistically significant reduction among women of intervention arm (DP -5.5% vs -0.8%; DID -3.2%; 95% CI: -6.64 - 0.16; P = 0.062).

Average intake of majority of food groups in the food frequency section were seen to have significant improvement (P < 0.01) in seven days' consumption. **Table 8** shows Seven days' dietary frequency of pregnant women including iron supplementation and caffeine intake, in Addis Ababa, 2017. Pregnant women of intervention arm improved their consumption of dairy by effect of one more day per week (difference (D) 1.2 vs -0.1; DID 1.2; 95% CI: 0.65 - 1.82; P = 0.000). A significant effect was observed on consumption of vitamin A rich fruits and vegetables (D 0.8 vs -0.3; DID 0.53; 95% CI: 0.04 - 1.44; P = 0.062). Meat and poultry appeared to have significant improvement in seven days' frequency which is on average close to one day per week (D 0.8 vs -0.3; DID 0.7; 95% CI: 0.11 - 1.27; P = 0.062). Seven days' consumption of fish was also observed to have a significant improvement of one quarter of a day per week among women of intervention arm (D 0.2 vs 0.0; DID 0.25; 95% CI: 0.07 - 0.42; P = 0.062). However, no significant effect was observed on dietary frequency of grains since both of the two arms improved their intake at the same time (D 0.5 vs 0.6; DID -0.19; 95% CI: -0.04 - 1.28; P = 0.067).

Pregnant women in intervention arm improved their intake of IFA supplement having an effect of 3 more days per week (D 4.9 vs 1.6; DID 3.2; 95% CI: 2.14 - 4.26; P = 0.000) **(Table 8).**

Significant reduction was observed among pregnant women of intervention arm on reduction of 4 cups of tea per week (D -3.9 vs -1.1; DID -4.1; 95% CI: -4.99 - -3.13; P = 0.000). A similar reduction was also observed on reduction of coffee having an effect of 5 cups of coffee per week (D -4.2 vs -0.5; DID -5.1; 95% CI: -6.67 - -3.56; P = 0.000) **(Table 8).**

Table 7: Dietary practice of pregnant women by study arm and study round (baseline and end line) in selected health centers in Addis Ababa, 2017 G.C

Outcomes		Intervention [3]		Control [4]		DID impact estimator [5]	95% CI [6]
		n	%	n	%	%	
Dietary diversity							
	Baseline[1]	189	54.5	195	58.0	**33.2***	18.07 - 46.59
	Follow up[2]	243	93.5	150	62.5		
Had one additional meal							
	Baseline[1]	73	21.0	85	25.3	**12.8****	3.58 - 22.08
	Follow up[2]	150	57.7	120	50.0		
Used iodized salt							
	Baseline[1]	220	63.4	230	68.4	**36.2***	29.69 - 42.61
	Follow up[2]	254	97.7	158	65.8		
Add salt when serving							
	Baseline[1]	8	2.3	5	1.5	**73.4***	64.37 - 82.47
	Follow up[2]	201	77.3	9	3.7		
Follow weight during pregnancy							
	Baseline[1]	167	48.1	155	46.1	**32.1***	19.03 - 45.19
	Follow up[2]	230	88.5	127	52.9		
Avoid diet restrictions during pregnancy							
	Baseline[1]	23	6.6	18	5.4	**-3.2**	-6.64 - 0.16
	Follow up[2]	3	1.1	11	4.6		

[1] **Baseline** N= 683 [2] **Follow up** N= 500 [3] **Baseline intervention** N= 347 [3] **Follow up intervention** N= 260 [4] **Baseline control** N=336, [4] **Follow up control** N=240 [5] Difference in difference impact estimator using mixed-effect linear regression with health center catchment area as random effects, [6] Adjusted for clustering effect to get robust standard error, **CI[6]** Confidence interval, * P<0.001, **P<0.01

Table 8: Seven days' food frequency of pregnant women including iron supplementation and caffeine intake, in Addis Ababa, 2017

Outcomes		Intervention [3]		Control [4]		DID impact estimator [5]	95% CI [6]
		Mean	SD	Mean	SD	Mean score	
Grains							
	Baseline[1]	6.0	1.7	6.0	1.8	**-0.19**	-0.04 - 1.28
	Follow up[2]	6.5	1.0	6.6	0.9		
Dairy							
	Baseline[1]	2.2	2.3	2.1	2.3	**1.2***	0.65 - 1.82
	Follow up[2]	3.4	2.0	2.0	1.7		
Meat and poultry							
	Baseline[1]	1.8	1.5	2.0	1.5	**0.7*****	0.11 - 1.27
	Follow up[2]	2.6	1.4	1.7	1.2		
Fish							
	Baseline[1]	0.1	0.3	0.1	0.3	**0.25****	0.07 - 0.42
	Follow up[2]	0.3	0.7	0.1	0.3		
Vitamin A rich fruits and vegetables							
	Baseline[1]	2.0	1.9	2.0	1.9	**0.53*****	0.55 - 1.44
	Follow up[2]	2.8	1.8	1.7	1.4		
Iron folic acid supplementation[8]							
	Baseline[1]	1.4	2.7	1.4	2.6	**3.2***	2.14 - 4.26
	Follow up[2]	6.3	1.9	3.0	3.1		
Tea							
	Baseline[1]	6.3	5.9	6.7	5.7	**-4.1***	-4.99 - -3.13
	Follow up[2]	2.4	3.4	5.6	5.9		
Coffee							
	Baseline[1]	5.7	6.8	5.2	6.5	**-5.1***	-6.67 - -3.56
	Follow up[2]	1.5	3.1	4.7	6.4		

[1] **Baseline** N= 683 [2] **Follow up** N= 500 [3] **Baseline intervention** N= 347 [3] **Follow up intervention** N= 260 [4] **Baseline control** N= 336 [4] **Follow up control** N=240 [5] Average difference in difference impact estimator using mixed-effect linear regression with health center catchment area as random effects [6] Adjust for clustering effect to get robust standard error, **CI[6]** Confidence interval [7] **SD** – standard deviation, * P<0.001, ** P<0.01, *** P<0.05, [8] Analysis of iron folic acid supplement is adjusted for number of antenatal care visits.

6. Discussion

This cluster randomized controlled trial tried to evaluate the effectiveness of nutrition education and counseling package on knowledge and dietary practice of pregnant women in urban setting of Ethiopia. Personalized NEC delivered at a facility level along with distribution of take home brochures was found to improve the overall nutritional knowledge of pregnant women. The study also found improvement on dietary diversity, weekly food frequency, having one additional meal, using iodized salt, intake of IFA supplementation and reduction in caffeine consumption among pregnant women of intervention arm. However, pregnant women's knowledge on early initiation of breast feeding and weekly dietary frequency of grains didn't bring about a statistically significant effect among pregnant women.

Nutrition education and counseling led to a significant improvement in pregnant women's knowledge and dietary practice which is consistent with previous studies (24-26, 43). These studies showed that, it is possible to improve maternal knowledge, recall of nutritional recommendations and their dietary practice through nutrition education by trained health care providers. Other studies also found it to be effective in improving maternal recall of nutritional recommendations of child feeding showing the significant improvement both immediately and after 180 days of intervention (22, 23).

Although frequency of fish consumption was observed to have a significant improvement by quarter of a day, consumption of fish among pregnant women of intervention arm is still very low (less than one day per week) and didn't meet weekly recommendations which is to consume fish/sea foods 2-3 times a week (51). This shows that nutrition education and counseling alone might not lead to changes in consumption of fish; indicating the need for additional nutrition interventions to improve fish consumption.

Consumption of caffeine was reduced by 4 and 5 cups of tea and coffee respectively after nutrition education. However, pregnant women were observed to keep their consumption of tea and coffee ranged to the recommendations at baseline (137ml/day) (15).

Pregnant women of intervention arm were observed to have a remarkable improvement in consumption of IFA supplements. Although tablets of IFA are available and free in almost all health centers of Addis Ababa, only 18% of women with live births in the past 5 years took 90+ tablets. In addition, more than one third (35.6%) of women didn't take any IFA supplement tablets and 16% of women aged 15-49 are anemic in the city (14). However, pregnant women in our study took their IFA supplementation tablets almost every day of the week (6.3 day/week) on average. The overall positive results of our intervention might be due to the design and delivery methods of nutrition education and counseling to pregnant women.

Our training included nutritional knowledge parts which are helpful in filling the gaps of nutritional knowledge and also essential counseling skills which helped health care providers in practicing counseling skills. In addition to its nutritional content, the training module we prepared included health belief model which contains perceived susceptibility, perceived severity, perceived beneficence and perceived barriers as constructs to explain and predict health behaviors.

Pregnant women of intervention arm were counseled and informed on how pregnant women are at risk of anemia, low birth weight and still birth. She was also informed on how the results of this conditions can cause a great harm to her, her child and even for the next generations. Having delivered these messages, pregnant women were then informed on the importance of taking IFA supplementations every day in preventing and decreasing the possible risks and susceptibilities of those problems. They were informed that the supplement is easily accessible and free of charge from their follow up health centers; as cost can be one of the barriers for adherence. In addition, pregnant women were notified about the possible side effects of taking supplements and their possible solutions.

Incorporating behavioral change theories in our training module helped health care providers to be able to provide personalized counseling and improve their approach to pregnant women. In addition to the standard nutritional training and supportive supervision given to health care providers, our nutritional intervention package includes easy to understand take home brochures. Brochures were also constructed by incorporating health belief model and contained simple doable actions and maternal recommendations. Researches also supported the effectiveness of

incorporating behavioral change theories into health and nutrition education in achieving the desired behavioral changes that will lead to positive outcomes (47, 52).

The overall significant dietary practice improvements detected in our study among pregnant women of intervention arm were aligned with the remarkable knowledge improvement they showed in each characteristics. This can serve as evidence that it is possible to change knowledge and dietary practice of pregnant women with an appropriately designed nutrition education and counseling. It also shows that, encouraging positive changes in dietary practice depends not only on the nutritional information content, but also how the information is communicated.

However, we found no significant effect on pregnant women's knowledge on early initiation of breast feeding. The insignificant effect in counseling of early initiation of breast feeding by health care providers in our study might have contributed to the insignificant knowledge improvement among pregnant women **(Annex 5).** Similar findings were also observed in Pelotas, Brazil where maternal recall of early initiation of breast feeding found to be insignificant (23). We also didn't detect a significant improvement on seven days' consumption of grains which is the staple food of Ethiopians.

In addition to improvements in knowledge and dietary practices, personalized nutrition education and counseling might relate to the decreased lost to follow up in the second visit among pregnant women of intervention arm compared to controls. It is evident from HMIS reports of ANC units in Ethiopia, particularly in Addis Ababa that ANC visit adherence decreases as the number of visits increase. Nevertheless, pregnant women in our study might have shown interest in their next follow up visits because of the improved and personalized approach of health care providers and easily understandability of recommended doable actions. Thus, the increased adherence to 3rd and 4th visits in our study might pertain to it. WHO ANC guideline noted that irrespective of the number of recommended contacts in the ANC model, women will not attend ANC if the quality of ANC is poor and women's experience of it is negative (15).

Regarding generalizability, it might be possible to infer the changes of our study to the city of Addis Ababa as our study included all the 10 sub-cities in the city and health centers were randomized as matched-pair in them. Conversely, health centers in Addis Ababa are better than other cities in Ethiopia by availability, accessibility, organization and staff arrangements. Health

care providers might be more motivated to put the training in to practice and conditions might also be favorable for implementation. Thus, interventions might bring about a greater improvement in Addis Ababa than in other settings. However, our training follows the standard module and training guide content (46, 53) and it is designed in a way that can be applicable anywhere in a health center setting. Hence, findings can be generalized to health care providers in other areas too.

Nevertheless, our same intervention might bring about different results of dietary practice among pregnant women living in rural parts of Ethiopia where the setting, socio economic status, availability, cost of food, and culture of the population is different than those in the capital city. In addition, pregnant women in Addis Ababa might be more sensitive to changes in practice due to their educational and occupational status and different sources of information which might bring about higher effects. Yet, pregnant women's knowledge of recommendations might not be affected since nutrition education and counseling will be given in the usual public health center services which are available to all pregnant women living in the area. Thus, regarded results might not differ in other settings/areas.

6.1 Strengths of the study

The strength of our study include blinding pregnant women, data collectors and supervisors, incorporating behavioral model in to our intervention and collecting baseline data before implementation of intervention to estimate the actual impact. Our intervention occurred during the usual health services and no interference with the counseling was done apart from the training. We also didn't give additional payment for health care providers of both arms.

6.2 Limitation of the study

Despite the merits of NEC, our results should be interpreted with caution as we were not able to control socially desirable answers from pregnant women. Pregnant women in our study might have given a favorable response to dietary practice questions asked because they have received appropriate nutrition counseling from their health care providers. Appointment reminder calls in our follow up protocol might also have caused a bias among women of intervention arm. Therefore, this might have overestimated the dietary practice impact of the intervention. Weekly

dietary assessment questions used in our study might also introduce recall biases as pregnant women might not be able to recall accurately. There might also be an inter observer bias in our study. However, pregnant women were blinded of allocation status to minimize the possible bias, data collectors were given training and data collection was done the same way between the two arms of pregnant women.

Proportion of lost to follow up women were greater than anticipated. Nevertheless, distribution of lost to follow up women did not differ statistically between the two arms.

7. Conclusion

Nutrition education and counseling package delivered at a facility level by training health care providers and distribution of take home brochures improves pregnant women's nutritional knowledge, dietary diversity, having one additional meal to the diet, use of iodized salt and importance and duration of IFA supplementation. It is also observed in improving seven days' consumption of meat, dairy, fish, vitamin A rich fruits and vegetables and IFA intake. However, there was no significant impact on knowledge about early initiation of breast feeding along with avoiding diet restrictions and seven days' consumption of grains.

8. Recommendations

We recommend federal ministry of health to conduct and strengthen a separate in-service nutritional training of ANC unit with supportive follow up supervisions. Incorporating behavioral theories in the training in addition to nutritional knowledge and skill sessions will help in improving effectiveness of the training. We also recommend preparation of ANC nutritional guidelines for health care providers and take home brochures for pregnant women. Guidelines and brochures could include key messages and doable actions along with behavioral model message delivering modalities. Scale up of the program in other cities especially in rural parts of Ethiopia will also help improve the national nutritional status of pregnant women.

We recommend further studies to evaluate the effectiveness of NEC package on pregnancy outcomes, pregnancy weight gain and anthropometric changes, assess dietary practice of pregnant women using quantitative dietary measurements to see if the women increased amount of food in

addition to its frequency and evaluate the effectiveness of our package by adding audio visual messages to it. We also recommend duplication of the study in rural parts of Ethiopia to evaluate applicability and effectiveness of the intervention in settings with different characteristics.

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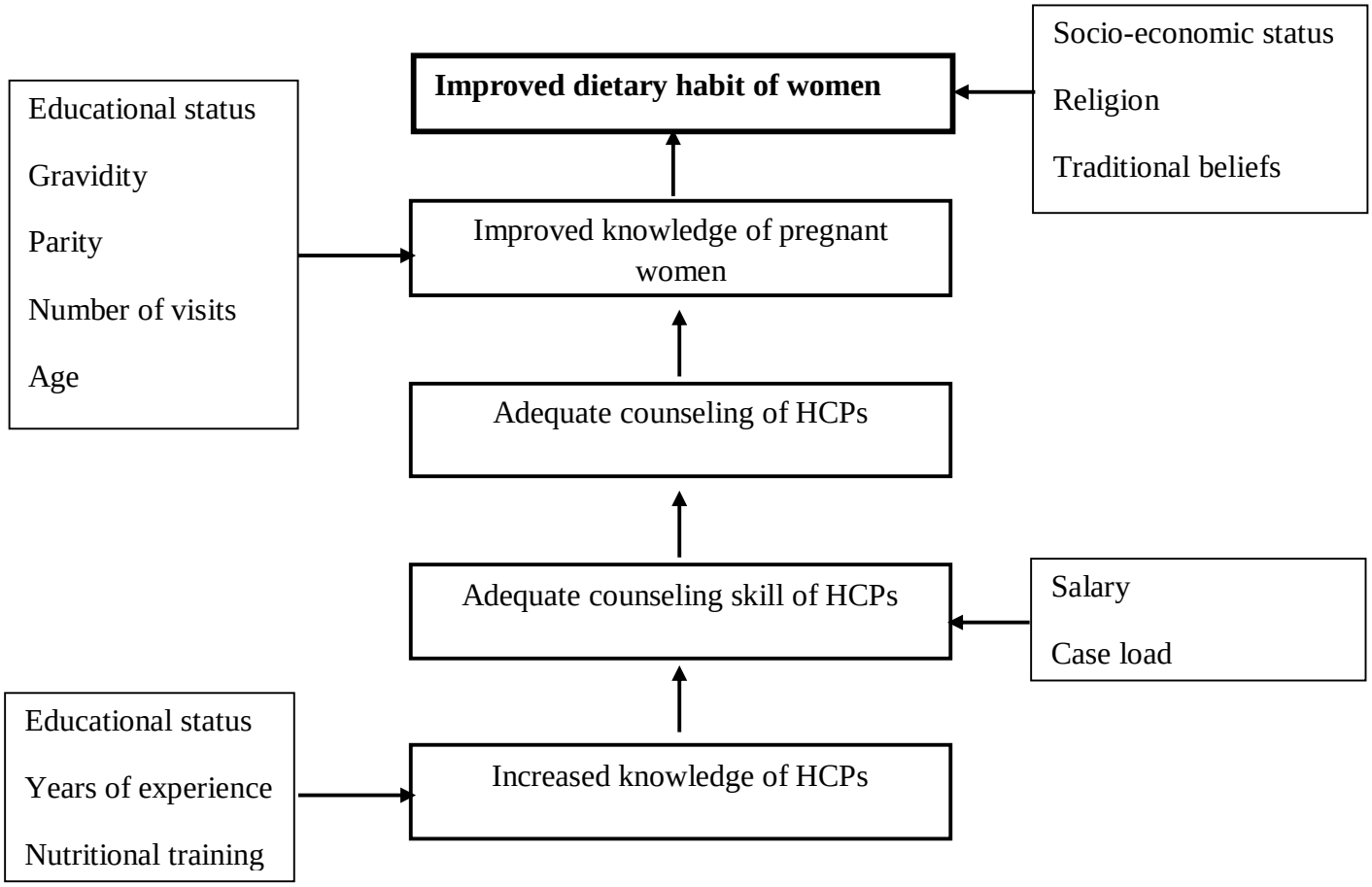
Annex 1

Diagrammatic representation of conceptual framework which is created from reviewing different literatures



Annex 2

Socio demographic characteristics of lost to follow up and non-lost to follow up women by study arm from the selected health centers in Addis Ababa, 2017 G.C

Socio-demographic characteristics of pregnant women	Lost to follow up N (183)		Per protocol N (500)		P value*
	n	%	n	%	
Program					
Intervention	87	47.5	260	52.0	**0.240**
Control	96	52.5	240	48.0	
Age					
18-24	75	40.9	214	42.8	**0.447**
25-34	96	52.5	263	52.6	
35-45	12	6.6	23	4.6	
Religion					
Orthodox	128	69.9	363	72.6	**0.733**
Muslim	43	23.5	98	19.6	
Protestant	12	6.6	39	7.80	
Ethnicity					
Amhara	82	44.8	248	49.6	**0.647**
Tigre	13	7.1	19	3.8	
Oromo	39	21.3	96	19.2	
Gurage	40	21.8	113	22.6	
Others	9	4.92	24	4.8	
Educational status of a woman					
Can't read and write	26	14.2	64	12.8	**0.999**
Can read and write	28	15.3	101	20.2	
Finished primary school	66	36.0	162	32.4	
Finished secondary school	35	19.1	87	17.4	
College and above	28	15.3	86	17.2	
Occupational status of a woman					
Unemployed	29	15.8	64	12.8	**0.436**
Student	5	2.7	11	2.2	
House wife	67	36.6	182	36.4	
Daily laborer	3	1.6	16	3.2	
Merchant	5	2.7	17	3.4	
Civil servant	48	26.2	124	24.8	
Self employed	26	14.2	86	17.2	
Marital status					
Single	7	3.83	11	2.2	**0.224**
Divorced/separated	2	1.09	5	1.0	
Married/living together	174	95.0	484	96.8	

Husband's educational status					
Can't read and write	9	5.17	30	6.1	**0.261**
Can read and write	38	21.8	86	17.7	
Finished primary school	50	28.7	123	25.3	
Finished secondary school	38	21.8	112	23.0	
College and above	39	22.4	135	27.7	
Husband's occupational status					
Unemployed	3	1.7	5	1.0	**0.713**
Daily laborer	15	8.6	36	7.4	
Merchant	13	7.4	45	9.2	
Civil servant	69	39.6	197	40.5	
Self employed	74	42.5	203	41.7	
Family size					
<=2	92	50.2.7	274	54.8	**0.272**
3 – 4	52	28.4	126	25.2	
> 4	39	21.3	100	20.0	
Family monthly income					
<2000	50	10.0	25	13.6	**0.568**
2000 – 2999	71	14.2	26	14.2	
3000 – 4499	106	21.2	42	22.9	
>= 4500	90	18.0	24	13.1	
Missing	183	36.6	66	36.0	
Gestational age					
0-16	67	36.6	215	43.0	**0.133**
17-28	116	63.3	285	57.0	
Gravidity					
Prim gravida	90	90.0	254	254	**0.694**
Multi gravida	93	50.8	246	49.2	
Parity					
Nulliparous	288	57.6	104	56.8	**0.605**
Prim parous	140	28.0	49	26.7	
Multiparous	72	14.4	30	16.3	
Number of ANC visits					
First	99	54.1	299	59.8	**0.177**
Second	84	45.9	201	40.2	

*** Robust, adjusted for clustering effect using mixed effect logistic regression**

Annex 3

Socio demographic characteristics of HCPs by study arm from selected HC in A.A

Socio-demographic characteristics of health care providers	Intervention N (40)		Control N (40)		P value*
	n	%	n	%	
Age					
21 – 30	35	87.5	31	77.5	**0.353**
31 – 40	4	10.0	9	22.5	
>40	1	2.5	0	0.0	
Sex					
Male	7	17.5	9	22.5	**0.591**
Female	33	82.5	31	77.5	
Field of study					
Midwife	29	72.5	24	60.0	**0.853**
Clinical nurse	4	10.0	3	7.5	
BSc nurse	2	5.0	9	22.5	
Health officer	5	12.5	4	10.0	
Educational status					
Diploma	27	67.5	17	42.5	**0.073**
Degree	13	32.5	23	57.5	
Institute of graduation					
Government	35	87.5	25	62.5	**0.015****
Private	5	12.50	15	37.5	
Marital status					
Single	28	70.0	25	62.5	**0.742**
Married/ living together	11	27.5	14	35.0	
Divorced/Separated	0	0.0	1	2.5	
Widowed	1	2.5	0	0.0	
Years of experience					
<=2	16	40.0	12	30.0	**0.182**
3-4	13	32.5	12	30.0	
>=5	11	27.5	16	40.0	
Previous nutritional training					
Yes	2	5.00	3	7.50	**0.733**
No	38	95.0	37	92.5	
Self-reported confidence					
Not confident	3	7.5	2	5.0	**0.374**
Moderately confident	25	62.5	21	52.5	
Confident	12	30.0	17	42.5	
Better counseling with additional training					
Yes	35	87.5	33	82.5	**0.551**
No	5	12.5	7	17.5	
* **Robust, adjusted for clustering effect using mixed effect logistic regression, ** P<0.05**					

Annex 4

Observed performance of health care providers on Essential counseling skills in the selected health centers in Addis Ababa,

Essential counseling skills		Intervention [3]		Control [4]		DID impact estimator [5]	95% CI [6]
		n	%	N	%	%	
Greeted the client							
	Baseline[1]	107	89.2	110	91.7	**5.8**	-4.23 - 15.90
	Follow up[2]	119	99.2	115	95.8		
Listens							
	Baseline[1]	119	99.2	120	100.0	**0.8**	0.76 - 2.42
	Follow up[2]	120	100.0	120	100.0		
Measured weight							
	Baseline[1]	1	0.83	4	3.33	**0.1*** **	0.00 - 0.17
	Follow up[2]	11	9.17	3	2.50		
Informed increased risk							
	Baseline[1]	27	22.50	28	23.33	**60.8***	42.59 - 79.07
	Follow up[2]	104	86.67	32	26.67		
Informed the need to extra energy							
	Baseline[1]	44	36.67	47	39.17	**58.3***	42.54 – 74.12
	Follow up[2]	118	98.33	51	42.50		
Informed about gestational weight gain							
	Baseline[1]	35	29.17	39	32.50	**76. 7***	59.94 – 93.39
	Follow up[2]	117	97.50	29	24.17		
Checked track of gestational weight gain							
	Baseline[1]	2	1.67	0	0.00	**38.3***	26.44 - 50.23
	Follow up[2]	48	40.00	0	0.00		
Informed about day time rest							
	Baseline[1]	43	35.83	40	33.33	**51. 7***	30.17 – 73.16
	Follow up[2]	120	68.57	55	31.43		

Informed about minimum dietary diversity							
	Baseline[1]	5	4.17	6	5.00	**75.0***	59.62 - 90.38
	Follow up[2]	92	76.67	3	2.50		
Informed about one additional meal							
	Baseline[1]	61	50.83	68	56.67	**50.0***	27.78 - 72.22
	Follow up[2]	120	100.00	67	55.83		
Informed about early initiation of breast feeding							
	Baseline[1]	28	23.33	18	15.00	**-2.5**	-2.41 – 1.91
	Follow up[2]	36	30.00	29	24.17		
Showed interest							
	Baseline[1]	94	78.3	107	89.2	**21. 7*****	18.10 – 41.52
	Follow up[2]	120	100.0	107	89.2		
Let her talk through before responding							
	Baseline[1]	113	94.2	116	96.7	**5.8**	-0.89 - 12.55
	Follow up[2]	120	100.0	116	96.7		
Praised her for what she is doing right							
	Baseline[1]	27	22.5	10	8.3	**30.0****	10.60 – 49.39
	Follow up[2]	61	50.8	8	6.7		
Identified key difficulties							
	Baseline[1]	31	25.83	30	25.00	**30.8****	11.54 – 50.12
	Follow up[2]	65	54.17	27	22.50		
Discussed options							
	Baseline[1]	8	6.7	2	1.7	**32.5***	19.99 - 45.01
	Follow up[2]	50	41.7	5	4.2		
Recommends doable actions							
	Baseline[1]	71	59.2	59	49.2	**31.7****	11.79 – 51.54
	Follow up[2]	96	80.0	46	38.3		
Helped her agree and repeat doable actions							
	Baseline[1]	1	0.83	1	0.8	**20.0*****	8.20 - 39.18
	Follow up[2]	24	20.0	0	0.0		

[1] **Baseline** N= 240 [2] **Follow up** N= 240 [3] **Baseline intervention** N= 120 [3] **Follow up intervention** N= 120 [4] **Baseline follow up** N=120 [4] **Follow up control** N=120, [5] Difference in difference impact estimator using mixed-effect linear regression with health center catchment area as random effects adjusted for health care provider's institute of graduation, [6] Adjust for clustering effect to get robust standard error, [6]**CI** Confidence interval, ***** P<0.001, ****** P<0.01, ******* P<0.05

Annex 5

Observed performance of health care providers' nutritional counseling skills in the selected health centers in Addis Ababa,

Nutritional counseling skills		Intervention [3]		Control [4]		DID impact estimator [5]	95% CI [6]
		Mean	SD	Mean	SD	Mean score	
Informed about IFA supplement							
Out of 4 points	**Baseline[1]**	1.4	0.8	1.5	0.8	**1.75***	1.47 - 2.03
	Follow up[2]	3.3	0.7	1.6	0.7		
informed about food groups							
Out of 61 points	**Baseline[1]**	2.5	2.9	2.2	2.4	**16***	13.33 - 18.52
	Follow up[2]	19.1	6.6	2.8	2.4		
informed about consequences of under nutrition							
Out of 11 points	**Baseline[1]**	0.5	0.9	.35	0.8	**4***	3.27 - 4.88
	Follow up[2]	4.7	2.3	0.4	0.8		
Informed about things to limit/avoid							
Out of 9 points	**Baseline[1]**	0.7	1.1	1.1	1.2	**3***	1.63 - 4.2
	Follow up[2]	3.9	1.7	1.4	1.1		
Informed solutions to common problems during pregnancy							
Out of 11 points	**Baseline[1]**	0.5	1.2	0.5	1.1	**2.3***	1.37 - 3.26
	Follow up[2]	2.9	3.1	0.6	1.2		
Informed about salt							
Out of 6 points	**Baseline[1]**	0.4	0.7	0.4	0.8	**2.6***	2.2 - 2.9
	Follow up[2]	3.2	0.8	0.6	0.9		

Baseline N= 240 [2] **Follow up** N= 240 [3] **Baseline intervention** N= 120 [3] **Follow up intervention** N= 120 [4] **Baseline follow up** N=120 [4] **Follow up control** N=120, [5] Average difference in difference impact estimator using mixed-effect linear regression with health center catchment area as random effects adjusted for health care provider's institute of graduation, [6] Adjust for clustering effect to get robust standard error, **CI[6]** Confidence interval , [7] **SD** – standard deviation, ***** P<0.00

Annex 6

Information Sheet for ANC clients

Good day madam, my name is _____ and I am working as a data collector for a study we are conducting in collaboration with Addis Ababa University (AAU). The main goal of the study is to assess the effect of in-service training on the knowledge and practice of health professionals and pregnant women on appropriate nutrition during pregnancy. This knowledge will help us in providing proper nutritional counseling for pregnant women in the future and will help in shaping the ANC care of the City for the better. We would appreciate your participation in this survey very much. If you agree to participate, I will ask you questions about basic information about you and your pregnancy, your basic knowledge of nutrition during pregnancy and your dietary practices during your current pregnancy. You will be asked this questions now and 8 weeks after receiving counseling by ANC provider on the subject. For the interview part, there is no right or wrong answer to each question.

Whatever information you provide will be kept strictly confidential by using codes and will not be shown to other individuals. Your contact information like phone Number will be taken as a follow up for your second interview. Your Participation is voluntary, and you can choose not to participate now or at any time during our interview. However, we hope that you will actively participate in this study since the insights and data we get from you are very important.

The interview will take only about 20-30 minutes of your time. You will not have any direct incentives by participating and your decision to participate in the study will not affect the service you will get from your ANC clinic.

If you have any questions, you can contact the Principal Investigator Afrah Mohammedsanni by (0912 79 69 99). At this time, do you want to ask me anything about the survey? (If yes answer her questions politely)

May I begin the interview now? (Circle) 1 = Yes 2 = No (Thank her for her time and end the interview)

Name &Signature of interviewer: _____ Date: _____

Name & Signature of Supervisor: _____Date: _____

Information sheet for health care providers

Good day to you Sir/Madam, my name is _____ and I am working on a cluster randomized trial in collaboration with Addis Ababa University (AAU). The main goal of the study is to assess the effect of in-service training on the knowledge and practice of health care providers working in ANC and pregnant women on appropriate nutrition during pregnancy. This knowledge will help us in providing proper counseling for pregnant women in the future and will help in shaping the ANC care of the City for the better. We would very much appreciate your participation in this survey. If you agree to participate, I will give you a self-administered questionnaire which asks about your social and professional background and you will also be assessed for your practice of counseling to your clients using observation checklist in two rounds (now and after about three months).

Whatever information you provide will be kept strictly confidential by using codes and will not be shown to other individuals not included in this study. You can choose not to participate now or at any time during our interview. However, we hope that you will actively participate in this study since the insights and data we get from you are very important. The questionnaire will only take about 30 minutes of your time. You will not have any direct incentives by participating in the interview. The knowledge and practice of your clients on appropriate nutrition during pregnancy will also be assessed in two rounds at a similar time.

If you have any questions you can ask the PI of the research Afrah Mohammedsanni by (09 44 25 77 32)

At this time, do you want to ask me anything about the survey? (If yes answer his/her questions politely)

May I give you the questionnaire now? (Circle)

1 = Yes 2 = No (Thank him/her for his/her time and end the interview)

Signature of participant: _____Date: _____

Name &Signature of interviewer: _____Date: _____

Name & Signature of Supervisor: _____Date: _____

Information sheet for health centers

Good morning/ Good afternoon

My name is Afrah Mohammedsanni, I am a second-year master's in public health nutrition student in Addis Ababa University (AAU). I am working on a cluster randomized trial in collaboration with AAU. The main goal of the study is to assess the effect of in-service training on the knowledge and practice of health care providers working in ANC and pregnant women on appropriate nutrition during pregnancy. This knowledge will help us in providing proper nutritional counseling for pregnant women in the future and will help in shaping the ANC care of the City for the better. We would very much appreciate your participation in this survey. If you agree to participate, data collection will be conducted in your health center and will include observational checklist to assess the counseling skill of health care providers working in your health center and exit interview of pregnant women attending your ANC clinic during data collection period. The observational checklist will be filled in a way that won't disturb the patient-health care provider communication. It will be conducted in a quiet way by trained data collectors so that the comfort of your client won't be affected. Informed consent will be sought from each health care provider before collecting both baseline and end line data. The exit interview will take only about 30 minutes of your client's time and prior consent will be sought from them at each round of data collection. Data will be collected two times (baseline and end line) each for about three weeks' duration and the end line after about three months of collecting the baseline data. You can choose not to participate now or at any time during our study. However, we hope that you will actively participate in this study since the insights and data we get from this study are very important.

If you have any questions you can ask the PI of the research Afrah Mohammedsanni by (0944 25 77 32) or by email- afrahsanni@gmail.com

Informed consent

I have read the consent form and willingly agreed to participate in the study as a medical director/ representative of the health center

Name of health center _____

Sub city _____

Name of the medical director/ representative of the health center _____

Signature _____ Date _____

Name of the principal investigator _____

Signature _____ Date _____

Annex 7

English questionnaires

1. Health center profile			
No.	**Questions**	**Answers and Coding**	**Skip**
101	Name of sub-city	_____	
102	Name of health center	_____	
Socio demographic characteristics			
201	Name Card N0.	_____ _____	
202	Phone number	Mobile:_____ Husband/home_____ Friend/neighbor_____	
203	Age (in completed years)	_____	
204	Religion	Orthodox …….. 1 Muslim ……..2 Protestant ……...3 Catholic …….4 Others _____	
205	Ethnicity	Amhara ……1 Tigre ……..2 Oromo …….3 Gurage …….4 Silte …… 5 Other_____	
206	Educational status	Can't read and write……1 Can read and write ……..2 Finished primary school ……..3 Finished secondary school ……4 College and above ……..5	
207	Occupational status (main source of income)	Unemployed ……1 Student …….2 Housewife ……3 Daily laborer ….. ……4 Merchant ……..5 Civil servant ……..5 Self-employed ……..5 Other_____	
208	Marital status	Single ……1 Divorced/separated …..…….2 Widowed…….. ……..3 Married/living together ……4	Skip to Q211
209	Husband education	Can't read and write……1	

		Can read and write ……..2 Finished primary school ……..3 Finished secondary school ……4 College and above ……..5	
210	Husband occupation	Unemployed ……1 Student ……...2 Daily laborer ……...3 Merchant ……..4 Civil servant …….5 Self-employed ……6 Other _____	
211	Family size	_____	
212	Monthly income in birr	_____	
2. Obstetric history			
301	Gestational age in weeks	_____	
302	How many times have you been pregnant including now	_____	If its first time skip to 401
303	How many children do you have (live birth)	_____	
3. Dietary habit questions			
401	Do you eat one or more additional meal per day during pregnancy?		
402	***I would like to ask you about the types of foods that you ate over the past 24 hours, from sunrise yesterday to sunrise today. Did you take any of the following foods?***		
A	Any food made from grains (teff, wheat,millet, Sorghum, Maize, Rice, etc) including Enjera, Bread and Biscuits?	Yes _____1 No _____2	
B	Any food made from legumes like Beans, Peas, Lentils?	Yes _____1 No _____2	
C	Any food made from roots or tubers? (Potatoes, Cassava, Enset, or other local roots or tubers)?	Yes _____1 No _____2	
D	Any food made from Pumpkins, Carrots, red sweet Potatoes, green leafy vegetables (such as Kale and Pepper), Mango, and Papaya?	Yes _____1 No _____2	
E	And dark green leafy vegetables (kale,)	Yes _____1 No _____2	
F	Any other fruit (banana, orange, pineapple, avocado, lemon, strawberry, watermelon, apple, dates, etc.	Yes _____1 No _____2	
G	Any other vegetable (cabbage, onion, eggplant, pepper green,	Yes _____1 No _____2	
H	Any meat (Beef, chicken, Pork, Lamb, camel, liver, kidney, heart etc.)?	Yes _____1 No _____2	
I	Any Cheese, Yogurt, Milk or other milk products	Yes _____1 No _____2	

J	Any Eggs	Yes _____1 No _____2	
K	Any fresh or dried Fish including tuna,	Yes _____1 No _____2	
L	Any food made with Oil, Fat or Butter, margarine, mayonnaise	Yes _____1 No _____2	
M	Any Sugar or Honey, candy, ice cream, cake,	Yes _____1 No _____2	
N	Any nuts including peanut butter	Yes _____1 No _____2	
O	Coffee and tea	Yes _____1 No _____2	
P	Any diet restriction	Yes _____1 No _____2	
406	***4. Now I want to ask you how many times you consumed the following food items in the preceding one week starting from _____ morning to the sunrise today.***		
A	Food prepared from any meat (sheep, goat, chicken, cow, pork, camel)	1. _____ day a week 2. I don't remember/ not sure	
B	Food prepared from any milk or milk products	1. _____ day a week 2. I don't remember/ not sure	
C	Food prepared from egg	1. _____ day a week 2. I don't remember/ not sure	
D	Food prepared from fish including sardine	1. _____ day a week 2. I don't remember/ not sure	
E	Enset based foods (like Kocho, Bulla etc…)	1. _____ day a week 2. I don't remember/ not sure	
F	Any food made from roots or tubers like Potatoes	1. _____ day a week 2. I don't remember/ not sure	
G	Any food made from grains (Millet, Sorghum, Maize, Rice, Wheat, Teff etc) including Enjera, Bread and Biscuits?	1. _____ day a week 2. I don't remember/ not sure	
H	Any food made from legumes?	1. _____ day a week 2. I don't remember/ not sure	
I	Any food made from Pumpkins, Carrots, red sweet Potatoes, green leafy vegetables (such as Kale and Pepper), Mango, and Papaya?	1. _____ day a week 2. I don't remember/ not sure	
J	Any other fruit (banana, orange, pineapple, avocado, lemon, strawberry, watermelon, apple, dates, etc.	1. _____ day a week 2. I don't remember/ not sure	
K	Any other vegetable (cabbage, onion, eggplant, pepper green,	1. _____ day a week 2. I don't remember/ not sure	
L	Any food made with Oil, Fat or Butter?	1. _____ day a week 2. I don't remember/ not sure	
M	How many iron folic acid supplements	1. _____ day a week 2. I don't remember/ not sure	
N	Average cups of tea	1. _____ day a week	

	Approximately 90ml cup	2. I don't remember/ not sure	
O	Average cups of coffee Approximately 70ml cup	1. _____ day a week 2. I don't remember/ not sure	
5. While preparing food for your household do you commonly perform the following food processing procedures?			
501	What type of salt do you use when preparing food?	_____	
502	When do you add salt on food?	_____	
503	Do you follow you weight during pregnancy?	Yes _____1 No _____2	
6. Knowledge questions			
601	How many times should a pregnant woman eat during pregnancy?	_____	
602	What type of salt should a pregnant woman use?	_____	
DC: ***please read (only the questions without the choices) for the following questions and circle the appropriate choice from her answer. If answers are not included in the choices, please write them down on the other section.***			
603	What are components of balanced diet	1. Meat poultry and fish 2. Eggs 3. Fruits 4. DGLVs 5. Dairy 6. Pulses 7. Grains 8. Roots and tubers 9. Other_____ 10. Don't know	
604	Main sources of iron	1. Meat poultry and fish 2. Eggs 3. Fruits 4. DGLVs 5. Dairy 6. Pulses 7. Grains 8. Roots and tubers 9. Other _____ 10. Don't know	
605	Main sources of vitamin A	1. Meat poultry and fish 2. Eggs 3. Fruits 4. DGLVs 5. Dairy	

		6. Pulses 7. Grains 8. Roots and tubers 9. Other _____ 10. Don't know
606	Main sources of protein	1. Meat poultry and fish 2. Eggs 3. Fruits 4. DGLVs 5. Dairy 6. Pulses 7. Grains 8. Roots and tubers 9. Other _____ 10. Don't know
607	Main source of calcium	1. Meat poultry and fish 2. Eggs 3. Fruits 4. DGLVs 5. Dairy 6. Pulses 7. Grains 8. Roots and tubers 9. Other _____ 10. Don't know
608	Benefits of balanced diet for the woman	1. Prevent pregnancy complications 2. Prevent delivery complications 3. Prevent anemia 4. Prevent from disease 5. Energy storage for lactation 6. Other _____ 7. Don't know
609	Benefits of balanced diet for the fetus	1. For brain and cognitive development 2. Prevent IUGR 3. Prevent LBW 4. Prevent still birth 5. Other _____ 6. Don't know
610	Consequences of under nutrition for woman	1. Cause anemia 2. Make her susceptible to disease 3. Cause delivery complications 4. Has no consequence 5. Other _____ 6. Don't know
611	Consequences of under nutrition for fetus	1. Causes low birth weight

		2. Causes still birth 3. Causes IUGR 4. Causes preterm 5. Causes impaired cognitive development 6. Has no consequence 7. Other_____ 8. Don't know
612	When should pregnant woman add salt	1. In the beginning of cooking 2. In the middle 3. At the end but still on fire 4. When serving food 5. I don't know 6. Other _____
613	Use of iron folic acid supplement	1. For cognitive development of fetus 2. Prevent LBW 3. Prevent birth defects 4. Prevent anemia 5. Don't know
614	Duration of iron folic acid supplement	_____
615	What should a woman do if she has IFA related heart burn?	1. Buy and take antacid 2. Stop taking IFA supplement 3. Take IFA after meal 4. Consult HCP 5. Do nothing 6. Other _____ 7. Don't know
616	What should pregnant woman avoid/limit during pregnancy?	1. Drinking alcohol 2. Smoking 3. Caffeine 4. Raw food meat, milk, 5. Taking pills unless prescribed 6. Work load 7. Stress 8. Other _____ 9. Don't know
617	What should a woman do if she has pregnancy related heart burn?	1. Buy and take antacid 2. Eat small and frequent 3. Drink more fluid 4. Consult HCP 5. Stop taking IFA 6. Do nothing 7. Other _____ 8. Don't know
618	How many kg should a pregnant woman with normal weight gain throughout her pregnancy	_____

619	Initiation of breast feeding	1. Within 1 hour 2. The next day 3. After colostrum 4. Other_____ 5. Don't know_____
620	Source of pregnancy related nutrition information	1. Health care provider 2. Family member 3. Other pregnant women 4. Friends 5. Books and magazines 6. Media 7. Other _____ 8. I had no nutrition information
621	Do you receive this specific brochure?	Yes _____1 No _____2
622		1. Very important 2. Important 3. Not important

<u>Part One: Background Information, please</u> fill out the following

No.	Questions and filters	Coding classifications	Skip

101	Name	_____	
102	Age in completed years	_____ Years	
103	Sex	Male …….. 1 Female ……..…... 2	
104	Field of study	Medical doctor ……..…..... 1 Health officer ……..…… 2 Clinical nurse ……..…… 3 BSc nurse ……..…….. 4 Midwife ……..……. 5	
105	Educational status	Diploma ……..1 Degree ……2 Masters and above …….. 3	
106	Institute of graduation	Government ……..…….. 1 Private ……...…….. 2	
107	Marital status	Single …… 1 Married/living together …….. 2 Separated …… 3 Divorced ……..4 Widowed ……. 5	
108	Monthly Salary	_____ ETB	
109	Years of experience	_____ Years	
110	Do you have previous nutritional training?	Yes …….. 1 No …… 2	
111	If yes, list the types of trainings you have	- _____ _____ _____	
112	How confident do you feel in providing nutrition counseling to your ANC clients?	1. Not confident 2. Moderately confident 3. Confident	
113	Do you think you would provide clients with a better quality nutritional counseling if you were given pregnancy related nutrition training?	1. Yes 2. No	

Part Two: Observation Checklist for nutrition counseling at ANC clinic

Number of observation _____ **Observation starting time : _____**	**Observation end time : _____**
Name of health care provider: _____ **Participant Code HCP : _____**	
Sub-city : _____	
Name of health facility : _____	

No	Character	Coding classification
301	ANC provider welcome and greeted the client	1. Yes 2. No
302	ANC provider measured weight	1. Correctly done 2. Incorrectly done 3. Not done
303	ANC provider informed the client that she is at risk of certain problems during pregnancy	1. Yes 2. No
304	ANC provider informed the client that she needs extra energy to fulfil the needs of her and her growing baby	1. Yes 2. No
305	ANC provider informed the client about weekly gestational weight gain according to her pre pregnancy weight	1. Yes 2. No
306	ANC provider checked if the woman is keeping track of her gestational weight gain	1. Yes 2. No
307	ANC provider asked and informed about the importance of day time rest and decreasing work load	1. Yes 2. No
308	**ANC provider informed the client about variety of food groups using locally available foods** **DC. Please circle only what the health care provider informed the woman**. NB: if he inform the woman on information other than listed, please write them on the left side of box	
A	Grains, white roots and tubers, and plantains like Teff, wheat, barely, corn, millet, sorghum, oats, rice, potato, etc. and anything made from them	1. Good source of carbohydrate 2. Good source of fiber 3. Source of iron and zinc 4. Soaking, germinating and fermenting help increase nutrient absorption 5. Should constituent 50-65 % of a diet 6. Informed but not specific 7. Not informed
B	Pulses (beans, peas and lentils) like beans, soybeans, peas, lentils, chickpeas, sweet peas etc. and anything made from them	1. Good plant based source of protein 2. Importance of protein

		3. Alternate for those who can't afford animal source 4. Soaking and germinating help increase nutrient absorption 5. A woman should eat 3 portions every day 6. Informed but not specific 7. Not informed
C	Meat and poultry which includes meat of any animal like sheep, goat, ox, camel, chicken etc.	1. Good source of hem iron 2. Importance of iron 3. Good source of protein 4. Avoid raw or undercooked meat 5. Trim fat and skin from meat before cooking 6. Eat 2 portion of meat and poultry every day 7. Informed but not specific 8. Not informed
D	Fish / Sea foods	1. Good source of omega 3 2. Importance of omega 3 3. Good source of protein 4. Good source of vitamin A 5. Good source of iodine 6. Avoid eating raw fish 7. Eat 3 portion of fish per week 8. Informed but not specific 9. Not informed
E	Salt	1. Use iodized salt every day 2. Good source of iodine 3. Importance of iodine 4. Add salt when serving food 5. Don't wash or expose to direct sunlight 6. Informed but not specific 7. Not informed
F	Peanut butter	1. Good source of choline 2. Importance of choline 3. Good source of protein 4. Eat 1-2 table spoon every day 5. Informed but not specific 6. Not informed
G	Dairy which includes milk from any animal like cow, goat, sheep or camels, yoghurt , soft and hard cheeses and yoghurt	1. Good source of calcium 2. Importance of calcium 3. Good source of good protein 4. Good source of vitamin A 5. Avoid raw/ unpasteurized milk 6. Drink 3-4 glasses of milk every day 7. Informed but not specific

		8. Not informed
H	Eggs	1. Good source of protein 2. Good source of vitamin A 3. Avoid eating raw eggs 4. Eat 2 eggs every day 5. Informed but not specific 6. Not informed
I	Fruits and vegetables includes all fruits and vegetables	1. Good source of iron 2. Good source of folate 3. Good source of vitamin A 4. Good source of vitamin C 5. Good source of fiber and choline 6. Eat from all vegetable subgroups 7. Wash vegetables thoroughly 8. Informed but not specific 9. Not informed
J	Dark green leafy vegetables includes spinach, kale, green pepper, broccoli etc.	1. Good source of non-hem iron 2. Good source of folate 3. Importance of folate 4. Good source of vitamin A 5. Wash vegetables very well 6. Eat 2 portions of GLV 7. Informed but not specific 8. Not informed
K	Vitamin A rich fruits and vegetables Fruits include, ripe mango and ripe papaya, watermelon etc. vegetables include, sweet potato, carrot, pumpkin etc	1. Good source of vitamin A 2. Importance of vitamin A 3. Eat 1 from vit A rich vegetable every day 4. Eat 1 from vit A rich fruit every day 5. Informed but not specific 6. Not informed
L	Citrus fruits include orange, lemon, tangerine and juices made from them.	1. Good source of vitamin C 2. Help enhance iron absorption 3. Recommended to take after meal 4. Source of folate 5. Source of fiber 6. Eat 1 citrus fruit every day 7. Informed but not specific 8. Not informed
M	Fat/Oils and sugars	1. Limit your oil and sugar intake to 2. Limit your sugar to 3 tea spoon per day 3. Limit your oil/fat 2 table spoon per day 4. Not informed
N	Informed about nuts like peanut butter	1. Yes 2. No
O	Minimum dietary diversification to eat at least 5 food groups every day	3. Yes 4. No

P	Eat 4 times a day	1. Yes 2. No
Q	Fluid intake	1. Increase your fluid intake 2. Drink at least 8 glasses of water every day 3. Not informed
R	Iron folate supplement	1. Take supplement everyday 2. Importance of supplement 3. Take supplement after meal 4. Checked for adherence 5. Not informed
S	Alcohol	1. Consequence of drinking alcohol 2. Avoid drinking alcohol
T	Caffeine includes, tea, coffee, cola beverages, chocolate	1. Limit your caffeine intake 2. Consequence of high dose of caffeine 3. Limit your tea to 2 cups per day 4. Limit your coffee to 1 cup per day 5. Avoid cola beverages or limit to 1 bottle
U	Smoking	1. Consequence of smoking 2. Avoid smoking
309	**Questions about common problems during pregnancy**	
A	Nausea, vomiting and reflux/ heart burn	1. Don't avoid eating 2. Eat small and frequent meals 3. Avoid fatty or spicy foods 4. Chew food well and eat slowly 5. Eat 3-4 hours before going to bed 6. Minimize odor while cooking (open window 7. Don't take medications unless prescribed 8. Didn't complain of such problems
B	Constipation	1. Eat high fiber foods 2. Drink at least 8 glasses of water every day 3. Iron folate supplement can cause constipation 4. Don't take medications unless prescribed 5. Didn't complain of such problems
310	ANC provider informed the client on maternal complications of under nutrition during pregnancy	1. Anemia 2. Infection 3. Miscarriage 4. Weakness and Poor productivity 5. Increased maternal mortality 6. Informed but not specific 7. Not informed
311	ANC provider informed the client on fetal complications of under nutrition during pregnancy	1. Low birth weight 2. IUGR 3. Still birth 4. Increased infant mortality

		5. Informed but not specific 6. Not informed
312	ANC provider gave information on the importance of early initiation and exclusive breast feeding	1. Yes 2. No
313	**Observations about important counseling skills**	
A	ANC provider listens to what the client has to say	1. Yes 2. No
B	ANC provider used responses and gestures that show interest	1. Yes 2. No
C	ANC provider let the client talk through her concerns before correcting information	1. Yes 2. No
D	ANC provider avoided using judging words	1. Yes 2. No
E	ANC provider recognized and praised what the client is doing correctly	1. Yes 2. No
F	ANC provider Identified key difficulties (if any) and selects with the client the most important one to work on	1. Yes 2. No 3. No difficulties identified
G	ANC provider discussed options and key difficulties the client raised	1. Yes 2. No
H	ANC provider recommends and negotiates do-able actions to help the client select the best option to try depending on her context and resources	1. Yes 2. No
I	ANC provider helped the client agree to try one of the options and asks them to repeat the agreed-upon do-able action	1. Yes 2. No
J	ANC provider recorded history of the client	1. Yes 2. No
K	Made appointment for the next follow-up visit	1. Yes 2. No

Annex 8

Amharic questionnaire

ለነፍሰ-ጡር እናቶች የተዘጋጀ መጠይቅ

ይህ መጠይቅ በጤና ተቋም የቅድመ-ወሊድ ክትትል ለሚያደርጉ ነፍሰጡር እናቶች የተዘጋጀ ነዉ።

የስምምነት ሰነድ

ጤና ይስጥልኝ፣ ስሜ_____ይባላል፣ ከአዲስ አበባ ዩኒቨርስቲ ጋር በመሆን በምናደርገው ጥናት ላይ የመረጃ ሰብሳቢ ነኝ። የጥናቱ ዋና አላማ የጤና ባለሙያዋችን ማሰልጠን በነፍሰጡር እናቶች በእርግዝና ጊዜ መኖር ስለሚገባው የአመጋገብ ሁኔታ ያላቸው እውቀትና ተግባር ላይ ያለውን ተፅዕኖ ማጥናት ነው። ይህንን ማወቃችን በከተማው ጤና ተቋማት በቅድመ-ወሊድ ክትትል ክፍል የሚደረግን የስነ-ምግብ ምክር አገልግሎት ለማሻሻል ይረዳናል። ጥናቱም ለማካሄድ የእርሶን ትብብር እንፈልጋለን። በጥናቱ ለመካፈል ፈቃደኛ ከሆኑ ስለእርሶና ስለእርግዝናዎ፣ በእርግዝና ወቅት ስለሚኖር የአመጋገብ ሁኔታ ያለዎትን እውቀትና በአሁኑ እርግዝና ጊዜዎት ስላሎት የአመጋገብ ሁኔታ ጥያቄዎችን እጠይቅዎታለሁ። እነዚህን ጥያቄዎች ሁለት ጊዜ (አሁንና ከ 3ወር ከባለሙያ ምክር ካገኙ በኋላ) እጠይቅዎታለሁ።

ማንኛዉም የሚሰጡን መረጃ ሚስጢራዊነቱ እንደሚጠበቅ እና ለማንኛዉም ሰዉ አሳልፈን የማንሰጥ መሆኑን እገልፅሎታለሁ። በዚህ ጥናት የእርሶ ተሳትፎ በፍቃደኝነት ላይ የተመሰረተ ነዉ እንዲሁም ከጥያቄዎቹ ሙሉዉን ወይም በከፊል መልስ አለመስጠት ይችላሉ። ሆኖም የሚሰጡን መረጃ ለዚህ ጥናት በጣም ስለሚጠቅመን በጥናቱ ንቁ ተሳትፎ እንደሚያረጉ ተስፋ አለን። ቃለመጠይቁ ከ 20-30 ደቂቃ ብቻ ይፈጃል። በጥናቱ በመሳተፎ ምንም አይነት ቀጥተኛ ጥቅም ባያገኙም ከእርግዝና ክትትል ክፍል የሚያገኙት የስነ-ምግብ ምክር አገልግሎት በተዘዋዋሪ ይጠቅሞታል። በጥናቱ የመሳተፍ ወይም ያለመሳተፍ ውሳኔዎት በሚያገኙት አገልግሎት ላይ ተፅዕኖ አያደርግም። በጥናቱ ወቅት ጥያቄ ካለዎት ዋና አጥኚዋን (አፍራህ መሀመድሳኒ – በ 09 44 25 77 32) ማግኘት ይችላሉ።

ስለ ጥናቱ ጥያቄ አለዎት? (አዎ ከሆነ ጥያቄውን በትህትና መልስ/ሺ) ጥያቄዎቹን መጀመር እችላለሁ?

1- አዎ (መጠይቁን ቀጥል (ይ)) 2- አይ (አመስግኖ መጠይቁን ማቆም)

የጤና ጣቢያው ስም _____

የመረጃ ሠብሳቢ ስም _____ ቀን_____ፊርማ _____

መጠይቁ የተጀመረበት ሠዓት _____መጠይቁ ያለቀበት ሠዓት _____

የሱፐርቫይዘር ስም _____ ቀን _____ ፊርማ _____

1. ጤና ጣቢያውን የተመለከቱ መሠረታዊ መረጃዎች

ተ.ቁ	ጥያቄዎች	ምርጫዎች	ማሰታወሻ
101	**ክፍለ ከተማ**	_____	
102	**የጤና ጣቢያው ስም**	_____	
	2. ተሳተፊውን የተመለከቱ መሠረታዊ መረጃዎች		
ተ.ቁ	**ጥያቄዎች**	**ምርጫዎች**	**ማሰታወሻ**
201	ሙሉ ስም ካርድ ቁጥር	_____ _____	
202	ስልክ ቁጥር	የሞባይል_____ የቤት/የባል_____ የጓደኛ/የጐረቤት_____	
203	ዕድሜ (በተጠናቀቀ ዓመት)	_____ዓመት	
204	ሐይማኖት	ኦርቶዶክስ_____1 ሙስሊም_____2 ኘሮቴስታንት_____3 ካቶሊክ _____4 ሌላ(ይግለፁ)_____	
205	ብሔር	አማራ_____1 ትግሬ_____2 ኦሮሞ_____3 ጉራጌ_____4 ስልጤ_____5 ሌላ(ይግለፁ)_____	
206	የትምህርት ደረጃ	ማንበብና መፃፍ የማይችሉ_____1 ማንበብና መፃፍ የሚችሉ_____2 የመጀመሪያ ደረጃ ያጠናቀቁ_____3 ሁለተኛ ደረጃ ያጠናቀቁ _____4 ኮሌጅ /ዩኒቨርሲቲ_____5	
207	የስራ ሁኔታ (ዋና የገቢ ምንጭ የሆነውን ይግለፁ)	ስራ የሌላት _____ 1 ተማሪ_____2 የቤት እመቤት _____3 የቀን ሰራተኛ _____4 ነጋዴ _____5 ተቀጥራ የምትሰራ _____6 የግል ስራ _____7	

		ሌላ (ይግለፁ)_____	
208	የጋብቻ ሁኔታ	ያላገቡ _____1 የተፋቱ/የተለያዩ_____2 ባለቤታቸው የሞቱባቸው_____3 ያገቡ /አብረው የሚኖሩ _____4	ወደ 211 ይለፉ
209	የባለቤትዎ የትምህርት ደረጃ	ማንበብና መፃፍ የማይችሉ_____1 ማንበብና መፃፍ የሚችሉ_____2 መጀመሪያ ደረጃ ያጠናቀቁ_____3 ሁለተኛ ደረጃ ያጠናቀቁ_____4 ኮሌጅ/ዩኒቨርሲቲ_____5	
210	የባለቤትዎ የሥራ ሁኔታ (ዋና የገቢ ምንጭ የሆነውን ይግለፁ)	ስራ የሌለው _____1 ተማሪ_____2 የቀን ሰራተኛ _____3 ነጋዴ _____4 ተቀጥሮ የሚሰራ _____5 የግል ስራ _____6 ሌላ (ይግለፁ)_____	
211	የቤተሰብ ቁጥር **(ቋሚ የቤተሰብ ነዋሪዎች ብቻ ይግለፁ)**	_____	
212	ወርሃዊ የቤተሰብ የገቢ መጠን	_____ ብር	
3. የተሣታፊውን ስነ-ተዋልዶ የተመለከቱ ጥያቄዎች			
301	እርግዝናዎ ምን ያህል ጊዜ ሆነው? **(ከመረጃ መዝገብ የሚረጋገጥ)**	_____ሣምንት	
302	ይሄንን እርግዝና ጨምሮ እስከ አሁን ስንት ጊዜ አርግዘዋል?	_____ጊዜ →	የመጀመሪያ ከሆነ ወደ 305 ይለፉ
303	እስከ አሁን በጠቅላላ ስንት ልጆችን ወልደዋል? **(በሕይወት የተወለዱትን ብቻ ይግለፁ)**	_____ ልጆች	
304	ለዚህ እርግዝና ዛሬ ለክትትል ሲመጡ ስንተኛ ጊዜዎ ነው? **(ከመረጃ መዝገብ የሚረጋገጥ)**	_____ ጊዜ	
4. የምግብ አመጋገብን የተመለከቱ ጥያቄዎች			
ተ.ቁ	**ጥያቄዎች**	**ምርጫዎች**	**ማሰታወሻ**
401	በዚህ የእርግዝና ወቅት ተጨማሪ ምግብ ይመገባሉ?	_____ ጊዜ	
403	**አሁን ደግሞ በባለፈው 24 ሰዓት ከትላንት ንጋት እስከ ዛሬ ንጋት ድረስ ስለተመገቧቸው የምግብ አይነቶች እጠይቅዎታለሁ። የሚከተሉትን ምግቦች ተመግበው ነበር?**		
ሀ	ከጤፍ፣ በቆሎ፣ስንዴ ፣ ገብስ ፣ሩዝ፣ አጃ፣ ዘንጋዳ፣ማሽላ፣ ወዘተ የተሰራ ምግብ (ዳቦ፣እንጀራ፣ብስኩት ፤ሞኮረኒ፤ ፓስታ የመሳሰሉትን ጨምሮ)	አዎ _____ 1 አይ _____ 2	

ለ	ከሽንብራ ፣ አተር፣ ምስር ፣ ባቄላ፣ አደንጓሬ፣ ቦለቄ፣ ወዘተ ካሉ የተሰራ ምግብ (ወጥ፣ ቆሎ፣ ንፍሮ የመሳሰሉትን ጨምሮ)	አዎ _____ 1 አይ _____ 2	
ሐ	እንደ ድንች ፣ ቆጮ እና ቡላ ካሉ ስራስሮችየተሰራ ምግብ	አዎ _____ 1 አይ _____ 2	
መ	እንደ ካሮት፣ ቀይስር፣ ዱባ፣ ስኪር ድንች፣ ዝኩኒ፣ ማንጐ፣ ፖፖዬ፣ የመሳሰሉትን አትክልትና ፍራፍሬዎች የተሰራምግብ	አዎ _____ 1 አይ _____ 2	
ሠ	እንደ ጐመንና ቆስጣ ካሉ አረንጓዴ ቅጠላቅጠሎች የተሰራ ምግብ	አዎ _____ 1 አይ _____ 2	
ረ	ከዚህ የተለየ ሌላ ፍራፍሬ (ሙዝ፣ ብርቱካን፣ አናናስ፣ ፣ አቮካዶ፣ እንጆሪ፣ ሀብሀብ፣መንደሪን ፣ አፕል፣ ቴምር፣ሎሚ፣ የመሳሰሉትን ጨምሮ)	አዎ _____ 1 አይ _____ 2	
ሰ	ከዚህ የተለየ ሌላ አትክልት (ጥቅል ጎመን፣ ሽንኩርት፣ ኪያር፣ በደርጃን፣ ቲማቲም፣ቃሪያ፣ የመሳሰሉትን ጨምሮ)	አዎ _____ 1 አይ _____ 2	
ሸ	ከማንኛውም አይነት ስጋ (የበግ፣ ፍየል፤ በሬ፣ ዶሮ፤ዓሳማ፤ ወዘተ) የተሰራ ምግብ (ጉበት፣ ኩላሊት እና ልብን ጨምሮ)	አዎ _____ 1 አይ _____ 2	
ቀ	ከማንኛውም ወተትና የወተት ውጤቶች (እርጐ ፣ አይብ) የተሰራ ምግብ	አዎ _____ 1 አይ _____ 2	
በ	ከእንቁላል የተሰራ ምግብ	አዎ _____ 1 አይ _____ 2	
ተ	ከዓሳ የተሰራ ምግብ በቆርቆሮ የታሸገ ሰርዲን ጨምሮ	አዎ _____ 1 አይ _____ 2	
ቸ	ከዘይት፣ቅቤ፣ ስብ፣ ማርገሪን፣ ማዮኔዝ፣የተሰራ ምግብ	አዎ _____ 1 አይ _____ 2	
ነ	ስኪር፣ማር፣ ማርማላት፣ ባቅላባ፣ ኬክ፣ ቸኮሌት ፣ ከረሜላ፣ ሀልዋ፣	አዎ _____ 1 አይ _____ 2	
ኘ	ከ ለውዝ (ለውዝ ቅቤ) እና የመሳሰሉ የተሰሩ ምግቦች	አዎ _____ 1 አይ _____ 2	

አ	ቡና እና ሻይ	አዎ _____ 1 አይ _____ 2	
404	በዚህ እርግዝና በተለምዶ፣ በባህል ወይም በሐይማኖት ምክንያት መብላት ያቆሙት ወይም የተከለከሉት የምግብ አይነት አለ?	አዎ _____ 1 አይ _____2 አላስታወስም/እርግጠኛአይደለሁም _88	ወደ 406 ይለፉ
405	መልስዎ አዎ ከሆነ የምግብ አይነቶቹን ይዘርዝሩ	1 _____ 2 _____ 3. _____	
406	**አሁን ቀጥለው የተዘረዘሩትን የምግብ አይነቶች በባለፈው አንድ ሣምንት (ሰባት ቀን) ውስጥ ምን ያህል ቀን ተመግበዋቸው እንደነበር እጠይቅዎታለሁ።**		
ሀ	ከማንኛውም አይነት ስጋ (የበግ፣ ፍየል፤ ዶሮ፣በሬ፤ዓሳማ፤ ወዘተ) የተሠራ ምግብ	1_____ቀን በሣምንት 2. ምንም ቀን አልበላሁም 3. አላስታውስም/ እርግጠኛ አይደለሁም	
ለ	ከማንኛውም ወተትና የወተት ውጤቶች የተሠራ ምግብ	1_____ቀን በሣምንት 2. ምንም ቀን አልበላሁም 3. አላስታውስም/ እርግጠኛ አይደለሁም	
ሐ	ከእንቁላል የተሠራ ምግብ	1_____ቀን በሣምንት 2. ምንም ቀን አልበላሁም 3. አላስታውስም/ እርግጠኛአይደለሁም	
መ	ከአሣ የተሠራ ምግብ በቆርቆሮ የታሸገ ሰርዲንን ጨምሮ	1_____ቀን በሣምንት 2. ምንም ቀን አልበላሁም 3. አላስታውስም /እርግጠኛ አይደለሁም	
ሰ	እንሠትን መሠረት ካደረጉ (እንደ ቆጮ፣ ቡላ፡ ወዘተ) የመሣሠሉት የተሠራ ምግብ	1_____ቀን በሣምንት 2. ምንም ቀን አልበላሁም 3. አላስታውስም /እርግጠኛ አይደለሁም	
ረ	እንደ ድንች ካለ ስራስር የተሠራ ምግብ?	1_____ቀን በሣምንት 2. ምንም ቀን አልበላሁም 3. አላስታውስም /እርግጠኛ አይደለሁም	
ሸ	ከጤፍ፣ በቆሎ ፣ ስንዴ ፣ ገብስ ፣ሩዝ፣ አጃ፣ ዘንጋዳ፣ ማሽላ፣ ወዘተ የተሰራ ምግብ (ዳቦ ፣እንጀራ ፣ብስኩት ፤መኮረኒ ፤ፓስታ የመሳሰሉትን ጨምሮ)	1_____ቀን በሣምንት 2. ምንም ቀን አልበላሁም 3. አላስታውስም /እርግጠኛ አይደለሁም	

ቀ	ከሽንብራ፣ አተር፣ ምስር፣ባቄላ ፣አደንዳሬ፡ ቦሎቄ ወዘተ ካሉ የተሠራ ምግብ	1_____ቀን በሣምንት 2. ምንም ቀን አልበላሁም 3. አላስታውስም /እርግጠኛ አይደለሁም	
በ	እንደ ካሮት፣ቀይስር፣ዝኩኒ፣ማንጎ፣ፓፓያ ከመሣሠሉት አትክልትና ፍራፍሬዎች ወይም እንደ ጐመን፣ቆስጣ ያሉ አረንጓዴ ቅጠላ ቅጠሎች የተሠራ ምግብ	1_____ቀን በሣምንት 2. ምንም ቀን አልበላሁም 3. አላስታውስም/ እርግጠኛ አይደለሁም	
ተ	ሌላ ከነዚህ የተለየ ፍራፍሬ(ሙዝ፣ ብርቱካን፣ አናናስ፣ ፣ አቮካዶ፣ እንጆሪ፣ ሀብሀብ፣መንደሪን ፣ አፕል፣ ቴምር፣ሎሚ፣ የመሳሰሉትን ጨምሮ)	1_____ቀን በሣምንት 2. ምንም ቀን አልበላሁም 3. አላስታውስም /እርግጠኛ አይደለሁም	
ቸ	ሌላ ከነዚህ የተለየ አትክልት (ጥቅልሳመን ፣ሽንኩርት፣ ኪያር፣ በደርጃን፣ ቲማቲም፣ ቃሪያ፣ የመሳሰሉትን ጨምሮ)	1_____ቀን በሣምንት 2. ምንም ቀን አልበላሁም 3. አላስታውስም/ እርግጠኛ አይደለሁም	
ነ	ከዘይት፣ቅቤ፣ ስብ፣ ማርገሪን፣ ማዮኔዝ፣ የተሰራ ምግብ	1_____ቀን በሣምንት 2. ምንም ቀን አልበላሁም 3. አላስታውስም /እርግጠኛ አይደለሁም	
ኘ	ባለፉት ሠባት ቀናት ምን ያህል የብረት ማዕድን (አይረን) ክኒን ወስደዋል?	1_____ክኒን 2. ምንም ክኒን አልወሰድኩም 3. አላስታውስም/ እርግጠኛ አይደለሁም	
አ	በአማካኝ ምን ያህል ሻይ ይጠጣሉ? **(መረጃ ሰብሳቢ፡-** መጠኑን በመካከለኛው የሻይ ብርጭቆ ይተምኑ)	1. በቀን_____ የሻይ ብርጭቆ 2. በሳምነት _____የሻይ ብርጭቆ 3. ሻይ በአብዛኛው ጊዜ አልጠጣም 4. አላስታውስም /እርግጠኛ አይደለሁም	
ከ	በአማካኝ ምን ያህል ቡና ይጠጣሉ **(መረጃ ሰብሳቢ፡-** መጠኑን በ70 ሚሊ መካከለኛው የቡና ሲኒ ይተምኑ)	1. በቀን_____ሲኒ 2. በሳምነት _____ሲኒ 3. ቡና በአብዛኛው ጊዜ አልጠጣም 4. አላስታውስም /እርግጠኛ አይደለሁም	
ወ	በዚህ እርግዝናዎ ወቅት የአልኮል መጠጦችን (እንደ ወይን ፣ ጠላ፣ ቢራ፣ ጠጅ፣ አረቄ፣ ውስኪ የመሳሰሉትን ጠጥተው ያውቃሉ?)	አዎ_____1 አይ_____2 ⟶	ወደ ዝ እለፍ
ዘ	መልስዎ አዎ ከሆነ ምን ያህል ይጠጣሉ?	1. በቀን_____ብርጭቆ/መለኪያ 2. በሳምነት_____ብርጭቆ/መለኪያ 3. የአልኮል መጠጦችን በአብዛኛው ጊዜ አልጠጣም	

	(መረጃ ሰብሳቢ፡- መጠኑን በ200ሚ.ሊ የውሃ ብርጭቆ ይተምኑ፣ **ለአረቄ** በመካከለኛው መለኪያ ይተምኑ	4. አላስታውስም /እርግጠኛ አይደለሁም	
ዠ	በዚህ እርግዝናዎ ወቅት ጫት ቅመው ያውቃሉ?	አዎ_____1 አይ_____2 →	ወደ ደ እለፍ
የ	መልስዎ አዎ ከሆነ ምን ያህል ጊዜ ይቅማሉ?	1. በየቀኑ 2. በሳምነት _____ጊዜ 3. ጫት በአብዛኛው ጊዜ አልቅምም 4. አላስታውስም /እርግጠኛአይደለሁም	
ደ	በዚህ እርግዝናዎ ወቀት ሲጋራ አጭሰው ያውቃሉ?	አዎ_____1 አይ_____2 →	ወደ ሚቀጥለው ክፍል እለፍ
ጀ	መልስዎ አዎ ከሆነ ስንት (ምን ያህል) ሲጋራ ያጨሳሉ?	1. በቀን _____ ሲጋራ 2. በሳምንት_____ ሲጋራ 3. አላስታውስም /እርግጠኛ አይደለሁም	
	5. አሁን ቀጥለው የተዘረዘሩት ጥያቄዎች በቤት ውስጥ ምግብ ሲያዘጋጁ የሚያደርጓቸውን ተግባራት ይመለከታሉ		
501	በቤትዎ ውስጥ ምግብ ሲያዘጋጁ ምን አይነት ጨው ነው የሚጠቀሙት?	_____	
502	ምግብ በሚያበስሉበት ጊዜ ጨውን መቼ ነው የሚጨምሩት?	_____	
503	በእርግዝናዎ ወቅት ክብደትዎን ይከታተላሉ?	አዎ_____1 አይ_____2	

ክፍል 6 የአመጋገብ ግንዛቤን የሚለኩ ጥያቄዎች

መረጃ ሰብሳቢ ፡-እባክዎ የሚከተሉትን ጥያቄዎች ለእናቷ ያንቡብላትና የሰጡትን መልስ አክብብ/ቢ መልሱን **ካላወቀችው** ወይም **እርግጠኛ ካልሆነች** እባክዎ **አላውቀውም** የሚለውን ያክብቡ

ተ.ቁ	ጥያቄዎች	ምርጫዎች
601	ነፍሠጡር እናት በቀን ስንት ጊዜ መመገብ አለባት?	_____ ጊዜ
602	ነፍሠጡር ሴት ምግብ ስታዛጋጅ ምን አይነት ጨው ነው መጠቀም ያለባት?	

መረጃ ሰብሳቢ፣ እባክዎ የሚቀጥሉትን ጥያቄዎች (ምርጫዎቹን ሳይጨምሩ) ለእናቷ ያንቡብላትና ለሰጡት መልስ ተገቢውን የምርጫ ክፍል ያክብቡ።።		
605	የነፍሠጡር የተመጣጠነ ምግብ ምን ምን ማካተት (መያዝ) አለበት? **(ከአንድ በላይ መልስ መስጠት ይቻላል)** **መረጃ ሰብሳቢ፣ እባክዎ ሌላስ ሌላስ እያሉ ይጠይቁት እና ያክብቡ**	**1.** ስጋ፤ዶሮ፤እና ዓሳ **2.** እንቁላል **3.** ፍራፍሬዎች(ማንጎ፣ፓፓያ፣ካሮት፣ቀይስር፣ዱባ፣ወዘተ **4.** አረንጓዴ አትክልቶች (ጎመን፣ቆስጣ፣) **5.** ወተት እና የወተት ውጤቶች **6.** ጥራጥሬዎች(ሽንብራ፣አተር፣ምስር፣ባቄላ፣ቦሎቄወዘተ **7.** እህሎች (ጤፍ፣ስንዴ፣ገብስ፣በቆሎ፣ሩዝ፣አጃ፣ወዘተ **8.** ስራስሮች (ድንች፣ቆጮ፣ቡላ፣ ወዘተ) **9.** አላውቅም **10.** ሌላ(ይግለፁ) _____ _____
606	በብዛት የብረት ማዕድን (አይረን) ንጥረ ነገርን የያዙ የሚባሉት የምግብ አይነቶች የትኞቹ ናቸው? **(ከአንድ በላይ መልስ መስጠት ይቻላል)** **መረጃ ሰብሳቢ፣ እባክዎ ሌላስ ሌላስ እያሉ ይጠይቁት እና ያክብቡ**	**1.** ስጋ፤ዶሮ፤እና ዓሳ **2.** እንቁላል **3.** ፍራፍሬዎች(ማንጎ፣ፓፓያ፣ካሮት፣ቀይስር፣ዱባ፣ወዘተ **4.** አረንጓዴ አትክልቶች (ጎመን፣ቆስጣ፣) **5.** ወተት እና የወተት ውጤቶች **6.** ጥራጥሬዎች(ሽንብራ፣አተር፣ምስር፣ባቄላ፣ቦሎቄወዘተ **7.** እህሎች (ጤፍ፣ስንዴ፣ገብስ፣በቆሎ፣ሩዝ፣አጃ፣ወዘተ **8.** ስራስሮች (ድንች፣ቆጮ፣ቡላ፣ ወዘተ) **9.** አላውቅም **10.** ሌላ(ይግለፁ) _____
607	በብዛት በቫይታሚን ኤ የበለፀጉ የሚባሉት ምግቦች የትኞቹ ናቸው? **(ከአንድ በላይ መልስ መስጠት ይቻላል)** **መረጃ ሰብሳቢ፣ እባክዎ ሌላስ ሌላስ እያሉ ይጠይቁት እና ያክብቡ**	**1.** ስጋ፤ዶሮ፤እና ዓሳ **2.** እንቁላል **3.** ፍራፍሬዎች(ማንጎ፣ፓፓያ፣ካሮት፣ቀይስር፣ዱባ፣ወዘተ **4.** አረንጓዴ አትክልቶች (ጎመን፣ቆስጣ፣) **5.** ወተት እና የወተት ውጤቶች **6.** ጥራጥሬዎች(ሽንብራ፣አተር፣ምስር፣ባቄላ፣ቦሎቄወዘተ **7.** እህሎች (ጤፍ፣ስንዴ፣ገብስ፣በቆሎ፣ሩዝ፣አጃ፣ወዘተ **8.** ስራስሮች (ድንች፣ቆጮ፣ቡላ፣ ወዘተ) **9.** አላውቅም **10.** ሌላ(ይግለፁ) _____
608	በብዛት በፕሮቲን የበለፀጉ የሚባሉት ምግቦች የትኞቹ ናቸው? **(ከአንድ በላይ መልስ መስጠት ይቻላል)** **መረጃ ሰብሳቢ፣ እባክዎ ሌላስ ሌላስ እያሉ ይጠይቁት እና ያክብቡ**	**1.** ስጋ፤ዶሮ፤እና ዓሳ **2.** እንቁላል **3.** ፍራፍሬዎች(ማንጎ፣ፓፓያ፣ካሮት፣ቀይስር፣ዱባ፣ወዘተ **4.** አረንጓዴ አትክልቶች (ጎመን፣ቆስጣ፣) **5.** ወተት እና የወተት ውጤቶች **6.** ጥራጥሬዎች(ሽንብራ፣አተር፣ምስር፣ባቄላ፣ቦሎቄወዘተ **7.** እህሎች (ጤፍ፣ስንዴ፣ገብስ፣በቆሎ፣ሩዝ፣አጃ፣ወዘተ **8.** ስራስሮች (ድንች፣ቆጮ፣ቡላ፣ ወዘተ) **9.** አላውቅም **10.** ሌላ(ይግለፁ) _____

609	በብዛት በካልሺየም የበለፀጉ የሚባሉት ምግቦች የትኞቹ ናቸው? **(ከአንድ በላይ መልስ መስጠት ይቻላል)** **መረጃ ሰብሳቢ፣ እባክዎ ሌላስ ሌላስ እያሉ ይጠይቁት እና ያክብቡ**	**1.** ስጋ፤ዶሮ፤እና ዓሳ **2.** እንቁላል **3.** ፍራፍሬዎች(ማንጎ፣ፓፓያ፣ካሮት፣ቀይስር፣ዱባ፣ወዘተ **4.** አረንጓዴ አትክልቶች (ጎመን፣ቆስጣ፣) **5.** ወተት እና የወተት ውጤቶች **6.** ጥራጥሬዎች(ሽንብራ፣አተር፣ምስር፣ባቄላ፣ቦሎቄወዘተ **7.** እህሎች (ጤፍ፣ስንዴ፣ገብስ፣በቆሎ፣ሩዝ፣አጃ፣ወዘተ **8.** ስራስሮች (ድንች፣ቆጮ፣ቡላ፣ ወዘተ) **9.** አላውቅም **10.** ሌላ(ይግለፁ) _____
610	ነፍሡጡር እናት የተመጣጠነ ምግብ መመገቢ ለምን ይጠቅማታል? **(ከአንድ በላይ መልስ መስጠት ይቻላል)** **መረጃ ሰብሳቢ፣ እባክዎ ሌላስ ሌላስ እያሉ ይጠይቁት እና ያክብቡ**	**1.** በእርግዝና ጊዜ ከሚኖሩ ችግሮች ይከላከልላታል **2.** ስትወልድ ከሚኖሩ ችግሮች ይከላከልላታል **3.** ከደም ማነስ ይከላከልላታል **4.** ከበሽታ ይከላከልላታል 5. ጡት በምታጠባበት ጊዜ በቂ ጉልበት ይሰጣታል 6. አላውቅም 7. ሌላ(ይግለፁ)_____ _____
611	ነፍሡጡር እናት የተመጣጠነ ምግብ መመገቢ ለፅንሡ ምን ይጠቅማል? **(ከአንድ በላይ መልስ መስጠት ይቻላል)** **መረጃ ሰብሳቢ፣ እባክዎ ሌላስ ሌላስ እያሉ ይጠይቁት እና ያክብቡ**	**1.** ለአእምሮው እድገት ይጠቅማል **2.** እድገቱ እንዳይገታ ይከላከላል **3.** ክብደቱ እንዳይቀንስ ይረዳዋል **4.** ማህፀንውስጥ እንዳይሞት ይከላከላል **5.** አላውቅም 8. ሌላ(ይግለፁ)_____
612	በቂ ወይም ያልተመጣጠነ ምግብ መመገብ በነፍሡጡር እናት ላይ የሚያስከትለው ችግር ምንድን ነው? **(ከአንድ በላይ መልስ መስጠት ይቻላል)** **መረጃ ሰብሳቢ፣ እባክዎ ሌላስ ሌላስ እያሉ ይጠይቁት እና ያክብቡ**	**1.** የደም ማነስ ያመጣል **2.** የአእምሮ ችግር ያስከትላል **3.** በምትወልድበት ጊዜ ምጥ ያስቸግራታል **4.** ለተለያዩ በሽታዎች ያጋልጣታል **5.** ምንም አይነት ችግር አያስከትልም 6. አላውቅም 7. ሌላ(ይግለፁ)_____
613	በቂ ወይም ያልተመጣጠነ ምግብ መመገብ በፅንሡ ላይ የሚያስከትለው ችግር ምንድን ነው? **(ከአንድ በላይ መልስ መስጠት ይቻላል)** **መረጃ ሰብሳቢ፣ እባክዎ ሌላስ ሌላስ እያሉ ይጠይቁት እና ያክብቡ**	**1.** የህፃኑ ክብደት መቀነስያስከትላል 2. በማህፀን እንዳለ መሞትን ያስከትላል 3. እድገቱ ይገታል 4. ልጁ ያለጊዜው ያወለዳል 5. በልጁ ላይ የአእምሮ ችግር ያስከትላል 6. ምንም አይነት ችግር አያስከትልም 7. አላውቅም 8. ሌላ(ይግለፁ)_____

614	ነፍሡጡር ሴት ምግብ ስታዛጋጅ ጨው መቼ ነው መጨመር ያለባት?	1. ማብሠል ስትጀምር 2. በመሀል 3. አብስላ ስትጨርስ እሳት ላይ እያለ 4. ከእሳት ከወጣ በኋላ/ ምግብ ሊቀርብ ሲል 5. አላውቅም 6. ሌላ(ይግለፁ)_____
615	የብረት/አይረን ክኒኖችን መውሠድ የሚሠጠው ጥቅም ምንድን ነው? **(ከአንድ በላይ መልስ መስጠት ይቻላል)** **መረጃ ሰብሳቢ፣ እባክዎ ሌላስ ሌላስ እያሉ ይጠይቁት እና ያክብቡ**	1. ለፅንሡ አእምሮ እድገት ፅንሡ 2. ክብደቱ እንዳይ ቀንስ ይከላከላል 3. ህፃኑ አካለ ጎደሎ ሆኖ አእንዳይወለድ ይከላከላል 4. ለእናት ከደም ማነስ ይከላከልላታል 5. አላውቅም 6. ሌላ(ይግለፁ)_____
616	ነፍሡጡር እናት በእርግዝናዋ ጊዜ የብረት/አይረን ክኒኖችን ለምን ያህል ቀናት ነው መውሠድ ያለባት?	_____
617	ነፍሡጡር እናት የብረት/አይረን ክኒኖችን በምትወስድበት ግዜ ቃር ወይም የጨጓራ ህመም ካጋጠማት ምን ማድረግ አለባት? **(ከአንድ በላይ መልስ መስጠት ይቻላል)** **መረጃ ሰብሳቢ፣ እባክዎ ሌላስ ሌላስ እያሉ ይጠይቁት እና ያክብቡ**	1. የጨጓራ መድሃኒት ገዝታ መውሰድ 2. የአይረን ኪኒኖችን ማቆም 3. የአይረን ኪኒኖችን ከምግብ በኋላ መውሰድ 4. የጤና ባለሙያ ማማከር 5. ምንም ማድረግ የለባትም 6. አላውቅም 7. ሌላ(ይግለፁ)_____
618	ነፍሰጡር ሴት በእርግዝናዋ ወቅት ማስወገድ ያለባት እሷንና ጽንሱን ሊጐዱ የሚችሉ ነገሮች ምን ምን ናቸው? **(ከአንድ በላይ መልስ መስጠት ይቻላል)** **መረጃ ሰብሳቢ፣ እባክዎ ሌላስ ሌላስ እያሉ ይጠይቁት እና ያክብቡ**	1. የአልኮል መጠጥ መጠጣት 2. ሲጋራ ማጨስ 3. የስራ ጫና ማብዛት 4. ቡናና ሻይ ማብዛት 5. ጭንቀት 6. መድሃኒት መውሰድ 7. አላውቅም 8. ሌላ(ይግለፁ)_____
619	ነፍሰጡር እናት ከእርግዝና ጋር የተያያዘ ማስመለስ ወይም የጨጓራ ሕመም ካጋጠማት ምን ማድረግ አለባት? **(ከአንድ በላይ መልስ መስጠት ይቻላል)** **መረጃ ሰብሳቢ፣ እባክዎ ሌላስ ሌላስ እያሉ ይጠይቁት እና ያክብቡ**	1. የጨጓራ መድሃኒት ገዝታ መውሰድ 2. ምግብ ትንሽ ትንሽ ቶሎቶሎ መመገብ 3. የጤና ባለሙያ ማማከር 4. የአይረን ኪኒኖችን ማቆም 5. ምንም ማድረግ የለባትም 6. ፈሳሽ መውሰድ 7. አላውቅም 8. ሌላ(ይግለፁ)_____

620	በ ጥሩ ክብደት ላይ ያለች ነፍሰጡር እናት እስከ እርግዝናዋ መጨረሻ ጊዜ ድረስ ስንት ኪሎ መጨመር አለባት?	_____ ኪሎ
622	ነፍሰጡር እናት ከወለደች በኋላ መቼ ነው ጡት ማጥባት መጀመር ያለባት?	1. በወለደች በአንድ ሰዓት ውስጥ 2. በወለደች በሚቀጥለው ቀን 3. እንገር/የመጀመሪያው ወተት ፈሶ ካለቀ በኋላ 4. አላውቅም 5. ሌላ(ይግለፁ)_____
623	በእርግዝናዎ ወቅት ስለሚኖርዎ የአመጋገብ ሁኔታ መረጃ የሚያገኙት ከየት /ከማን ነው? **(ከአንድ በላይ መልስ መስጠት ይቻላል)**	1. ከጤና ባለሙያ 2. ከሌላ ነፍሰጡር እናት 3. ከመጽሃፍ/መጽሄት 4. ከቤተሰብ አባል 5. ከጓደኛ 6. ከመገናኛ ብዙሃን 7. ምንም መረጃ አላገኘሁም 8. ሌላ(ይግለፁ) _____
624	በእርግዝናዎ ወቅት ምን አይነት የአመጋገብ ስርዓት መከተል እንዳለብዎ ለመወሰን የሚያስችል በቂ መረጃ አግኝቻለሁ ብለው ያስባሉ?	አዎ_____1 አይ_____2
625	ከዚህ በፊት ይህ በራሪ ወረቀት ደርሶታል?	አዎ_____ 1 አይ_____2 ⟶ አመስግኖ መጨረስ
626	በራሪ ወረቀቱ ምን ያህል ጠቃሚ ነው ብለው ያስባሉ?	1. በጣም ጠቃሚ ነው 2. ጠቃሚ ነው 3. ጠቃሚ አይደለም

ስለ ትብብርዎ እናመሰግናለን!!!

Annex 9

Amharic Brochure

Annex 10

Training Module

Training Module on Pregnancy Nutrition and ANC Nutritional Counseling Skills

Prepared by: Afrah Mohammedsanni (BSc)

In collaboration with: Dr. Seifu Hagos (BSc, MPH, MSc, PHD)

: Dr. Bilal Shikur (MD, MPH)

: Mr. Demewoz Haile (BSc, MSc)

1.1 Table of Contents

1.2 Acronyms

ANC: Antenatal Care

BMI – Body mass index

EDHS: Ethiopian Demographic Health survey

FANTA: Food and Nutrition Technical assistance

FAO – Food and agricultural organization

GALIDRA: Greeting Ask Listen Identify Discuss Repeat Appoint

GWG: Gestational Weight Gain

HCP: Health Care Provider

IDD: Iodine deficiency disorder

IEC: Information, Education and Communication

IFA: Iron Folic Acid

IOM – Institute of medicine

IOM: Institute of Medicine

IUGR: Intra Uterine Growth Restriction

LBW: Low Birth Weight

NE: Nutrition Education

NICE – National institute for health care excellence

NK: Nutrition Knowledge

WHO – World health organization

1.3 Session one: Why are we here?

Learning Objectives

By the end of the session, participants will be able to:

- Introduce themselves and from which facility they came from **(15 min)**
- Begin to name fellow participants and facilitators **(10 min)**
- Discuss objectives and expectations **(25 min)**
- Take pre assessment test **(40 min)**

Total Time

1 hour 30 minutes

1.4 Session two: Introduction to Pregnancy Nutrition

Learning Objectives

By the end of the session, participants will be able to:

- Explain the benefits of fulfilling nutrient requirement during pregnancy **(30 min)**
- Explain the consequence of maternal malnutrition **(30 min)**
- Describe energy needs during pregnancy **(30 min)**
- Explain appropriate weight gain during pregnancy based on pre pregnancy BMI **(30 min)**
- Explain the different food groups, their importance and adequate intakes **(1hour and 20 min**
- Describe common problems associated with pregnancy and their possible solution **30min**
- Post assessment test **(40 min)**

Total time

4 hours and 30 minutes

1.5 2.1 Introduction

A woman's nutritional status influences her capacity to successfully carry her pregnancy to term, deliver her child and provide optimal care. Physiological changes of women during pregnancy and lactation increases nutritional requirement. This is because of the need of nutrient for the growing fetus during pregnancy as well as for her own increased demand to cope up with the demanding nature of pregnancy and delivery. Lactation also places high demands on maternal stores of energy, protein, and other nutrients. These stores need to be established, conserved, and replenished starting from pregnancy time. The energy, protein, and other nutrients in breast milk come from a mother's diet or her own body stores.

Energy needs and many micronutrient requirements increase during pregnancy. The increased red blood cell mass along with the iron need of the developing fetus creates a higher iron requirement during pregnancy. Pregnant women are therefore at higher risk of developing iron deficiency anemia than non-pregnant women. Anemia in pregnant women is associated with pre-term delivery, LBW, and increased perinatal mortality. The risk of maternal mortality is also increased in pregnant women with decreasing hemoglobin levels. Vitamin A and iodine requirements also increases during pregnancy.

A mother's nutritional status, diet and lifestyle influence pregnancy outcomes and can have lasting effects on her offspring's health. Good nutrition is important for all pregnant women and contributes to maternal health and optimal birth outcomes. Poor nutrition during pregnancy can cause lethargy, weakness, difficulty in fighting infections and other serious health problems. Poor quality diets during pregnancy have been found to be associated with maternal undernourishment, anemia, unhealthy weight gain, preeclampsia, preterm birth or even miscarriage. Malnutrition in pregnant women leads to an intergenerational cycle of nutrition problems which manifest as stillbirths, low birth weight, intra uterine growth restriction (IUGR), birth defects, increased risk of maternal and neonatal mortality, impaired cognitive development, Sub-optimal productivity in adults and reduced economic growth for one nation. A diversified diet that supports appropriate maternal weight gain and meets maternal and fetal nutrient needs contributes to creating a favorable intrauterine environment.

Pregnant women have special dietary needs. Eating a balanced diet before, during, and after pregnancy is one part of good health. This module describes key nutrients pregnant women need, how much they need, sources of those nutrients and certain foods that a woman should limit or avoid during pregnancy because they pose certain risks.

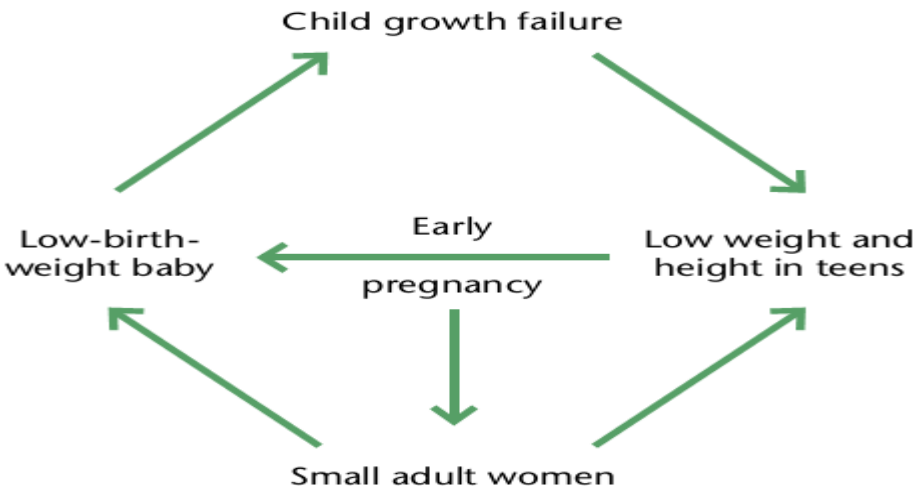


Figure 1: intergenerational cycle of malnutrition

Brainstorming:

What are the benefits of fulfilling nutrient requirements during pregnancy for the mother, fetus and the community**?**

What are consequences of maternal malnutrition**?**

1.6 2.2 Benefits of fulfilling nutrient requirements during pregnancy

Benefits for the mother:

- Decreases the risk of complications during pregnancy and delivery like miscarriage, obstructed labor
- Prevents miscarriage and abortion
- Prevents or controls anemia in the mother

- lowers the risk of mortality/morbidity during delivery and in the early postpartum period
- Ensures energy storage for lactation.

Benefits for the infant and child

- Prevents intrauterine growth restriction (IUGR), still birth, micronutrient deficiencies, LBW and contributes to healthy growth and development.
- Cognitive development
- Well-nourished, healthy mothers are more available for child care and contribute more fully to the functioning of the family; and improved work productivity is associated with improved nutritional status.

Benefits for the community and the nation

- Increases productivity
- More than one third of child death and 20 % of maternal mortality is due to under nutrition therefore fulfilling nutrient requirement plays important role in decreasing maternal and child morbidity and mortality.

1.7 2.3 Consequences of Maternal Malnutrition

Consequences for maternal health

- Increased risk of maternal complications like anemia, obstructed labor, miscarriage
- Increased risk of maternal mortality
- Increased infection, Compromised immune functions
- Anemia
- Lethargy and weakness, lower productivity

Consequences for fetal and infant health

- Increased risk of fetal, neonatal, and infant death
- Intrauterine growth retardation, low birth weight, prematurity
- Birth defects like spinal bifida, cretinism
- Cretinism and reduced IQ
- Brain damage
- Increased risk of infection
- Preterm birth

	Benefits of fulfilling nutrient requirement	**Consequences of maternal under nutrition**
Mother	• Increased risk of complications • Prevents miscarriage and abortion • Prevents and controls anemia • Lowers risk of mortality • Ensures energy storage	• Increased risk of maternal complication • Increased risk of maternal morality • Increased infection • Anemia • Lethargy, weakness
Fetus/ child	• Prevents IUGR, LBW, still birth, • Prevents prematurity • Prevents micronutrient deficiencies • For healthy growth and development • For good cognitive development	• Increased fetal, neonatal, infant death • IUGR, LBW, prematurity • Birth defects • Increased risk of infection • Preterm birth • Brain damage
Community	• Increased productivity • Decreases maternal morbidity and mortality • Decreases infant morbidity and mortality	• Increased maternal morbidity and mortality • Increased infant morbidity and mortality • Lower productivity

Table 1: Summary of benefits of fulfilling nutrient requirement and consequences of under nutrition

1.8 2.4 Energy needs during pregnancy

Adequate energy intake is essential to promote optimal growth of the fetus while providing adequate energy for the mother. In contrast, inadequate maternal energy intake will result in reduced maternal weight gain during pregnancy, which in turn may result in restricted fetal growth and later infant development. Inadequate weight gain during pregnancy is associated with small for gestational age infants and preterm delivery. Conversely, excessive maternal weight during pregnancy is associated with large for gestational age infants, macrosomia, a higher caesarean section risk, in addition to a greater incidence of neonatal infection, hypoglycemia and respiratory distress.

The energy cost of pregnancy includes energy needed for accretion of maternal, fetal and placental tissues, the increase in the mother's basal metabolism, and the mother's physical activity level. Women are advised to increase their daily calorie intakes during pregnancy according to their pre-pregnancy weight and BMI, physical activity level, and week of gestation. Pregnant women should also be advised to decrease work load and increase day time rest during pregnancy to conserve energy.

The suggested calorie increase for women who conceive at a body weight in the normal range is 360 calories a day in the second trimester and 475 calories a day in the third trimester. Pregnant woman should add one extra meal in her diet every day.

When choosing foods to increase energy intake, focus should be given to foods which are rich in essential vitamins and minerals such as milk and milk products, high fiber foods, lean red meat, omega-3-rich fish and fruits and vegetables. The mother should be encouraged to consume a diet which will meet all her recommended nutritional intakes, rather than focusing on energy intake alone. Overweight or obese women should be encouraged to replace energy dense snacks with nutritious snacks.

1.9 2.5 Pregnancy weight gain

The amount of weight that a pregnant woman need to gain depends on her pre-pregnancy weight and body mass index (BMI). Healthy, well-nourished woman should gain 10 to 14 kg during pregnancy, with an average of 12 kg in order to increase the probability of delivering full-term infants with an average birth weight of 3.3 kg, and to reduce the risk of fetal and maternal complications. Pregnant women should keep in track of the weekly weight gain recommendation according to her pre pregnancy BMI.

Below the average weight gain (IOM 2009, NICE 2010):

Pre pregnancy BMI	**BMI**	**Total weight gain**	**Average rates of weight gain / Week 2nd and 3rd trimester**
Under weight	Less than 18.5	13kg to 18kg	0.5kg to 0.6kg
Normal weight	18.5 to 24.9	11.5kg to 16kg	0.4kg to 0.5kg
Over weight	25 to 29.9	7kg to 11.5kg	0.28kg to 0.33kg
Obese	30 or more	5kg to 9kg	0.22kg to 0.27kg

ANC provider should advice the woman about her weekly gestational weight gain according to her pre pregnancy BMI and check if she is keeping track on each visit.

1.10 2.6 Food group classifications

The ten food group classification of FAO for women of reproductive age group are as follows

1. Grains, white roots and tubers, and plantains
2. Pulses (beans, peas and lentils)
3. Nuts and seeds
4. Dairy
5. Meat, poultry and fish

6. Eggs
7. Dark green leafy vegetables
8. Other vitamin A-rich fruits and vegetables
9. Other vegetables
10. Other fruits

1.10.1 2.6.1 Grains, white roots and tubers, and plantains

Common examples include, Teff, wheat, barely, corn, millet, sorghum, oats, rice, potato.

This group is sometimes also called “starchy staples”. These foods provide energy and are main source of **carbohydrate** and **dietary fiber**.

Carbohydrates provide the largest source of energy in the diet. Pregnant women are recommended to get majority of their daily calories (about 45 to 65 percent of daily calorie intake) from carbohydrates. The mother’s carbohydrate intake is important during pregnancy to ensure adequate glucose for maternal brain metabolism and the fetus. Women should be advised that low carbohydrate diet is dangerous during pregnancy and could place a baby at risk of poor growth.

Fiber is an important component of a prenatal diet. The recommended adequate intake of fiber for pregnant women is 28g/day. Although the development of a fetus does not depend on adequate amount of dietary fiber, it is essential for proper gut function and regular laxation increasing the comfort of pregnant mother by helping to reduce constipation which is a common side effect of pregnancy.

Whole grains are also source of nutrients, such as, non-heme iron, zinc, folate, vitamin A and varying amounts of anti-nutrients, such as **phytates** which bind with certain minerals and prevent absorption.

Phytates interfere with the absorption of iron and zinc found from these sources. So pregnant women are advised to **ferment, germinate and soak grains before processing** them so that the bioavailability of such nutrients will increase.

Pregnant women are recommended to **make 50%to 65% of her diet from grains, white roots and tubers, and plantains every day** to fulfil their needs from these groups and also avoid soda drinks and drinks with added sugar to limit their **sugar intake to 2 table spoons per day.**

1.10.2 2.6.2 Pulses (beans, peas and lentils)

Common examples include, beans, soybeans, peas, lentils, chickpeas, sweet peas

The group is high in protein and B vitamins, although the protein is not "complete" and certain amino acids must be supplied by other foods. Pulses represent a very **important protein source in plant-based diets** and among populations where animal-source foods are largely unaffordable. Pulses contain varying amounts of anti-nutrients like phytates that inhibit absorption of certain nutrients therefore it is recommended that pregnant women **soak and germinate pulses** before processing them to increase bioavailability of nutrients.

1.10.3 2.6.3 Dairy

This group includes almost all liquid and solid dairy products from cows, goats, sheep or camels. Tinned or powdered milk, soft and hard cheeses and yoghurt are also included.

Dairy foods are easily understood as a group and are important sources of **high-quality protein**, **calcium**, **vitamin A** as well as vitamin B12, zinc and other micronutrients.

While consuming dairy products, pregnant women should take in to considerations of a certain safety issues **i.e.** cooking cheese very well, not consuming raw or unpasteurized milk and keeping them refrigerated as it makes them susceptible to certain diseases like listeriosis.

Listeria is a bacterium that contaminates food which can cause an infection called listeriosis. It can be a serious illness for pregnant women, possibly causing miscarriage if it is transmitted to the unborn baby.

Calcium has a key role in the development of healthy bones and teeth as well as muscle, and other tissues. Low level of calcium is associated to leg cramp and brittle bones.

During pregnancy women should be advised to consume 3 **– 4 glass of dairy every day (3 glass of milk and 1 glass of yogurt)**

1.10.4 2.6.4 Meat, poultry and fish

This group is sometimes referred to as “flesh foods”. All meats, organ meats, poultry and other birds and fresh and dried fish and seafood are included. All flesh foods are important sources of **high-quality protein** and bioavailable micronutrients, notably **hem iron, zinc** and vitamin B12 which is available only from animal-source foods.

As being rich in nutrients make meat, poultry and fish important to a pregnant woman, these groups can also cause a greater harm both to the mother and fetus by making them susceptible to diseases if eaten raw or undercooked. Therefore, a pregnant woman should avoid the consumption of raw or undercooked meat to keep her and her baby safe.

Pregnant women should also avoid eating liver due to its high content of vitamin A which can cause a teratogenic effect on the fetus.

Protein is essential in the development of a healthy baby. During pregnancy a woman must consume adequate amount of protein to meet the needs of her growing fetus in addition to meeting her own increased needs. There is no additional protein requirement in the first trimester of pregnancy. The RDI for protein for pregnant women in the second and third trimesters is 60 g per day. Protein intake of pregnant women should constitute not more than 20 percent of total energy. However, it is necessary to consider protein quality, because different sources of protein vary in their nutritional value and efficiency of utilization.

Proteins from animal sources, such as meat, fish, poultry, milk and milk products tend to be of higher protein quality as they provide all nine indispensable amino acids.

Pregnant women are recommended to **eat 2 portions of meat and poultry every day**

However, Women from lower socioeconomic groups are at higher risk of inadequate protein intake due to the associated costs of high quality sources of proteins such as meat, eggs poultry, fish, and dairy. Therefore, they should be advised a **less expensive way of getting protein** in their diet by encouraging them to consume a **variety of plant based foods** like pulses, beans and lentils to ensure that all essential amino acids are available to the fetus.

Proteins from plant-based sources tend to be limited in at least one indispensable amino acid and so are utilized less efficiently. Women who consume predominantly plant-based proteins, particularly from a less varied diet, may have a higher dietary requirement for protein in order to provide sufficient indispensable amino acid intake.

Fish in addition to being a high protein diet, it is also a very good source of important **fatty acids** like **omega 3**.

Fat in food is needed for good nutrition and good health. And its presence in the diet increases absorption of fat soluble vitamins and precursors such as vitamin A and pro-vitamin A carotenoid. Most importantly, these fat is needed for proper development of the baby. Therefore, a mother to be must include enough fat in her diet to meet the needs of her growing baby.

There is no separate RDA for fat intake during pregnancy, and the recommendation remains 20% to 35% of total calories, the same as for the general population. Diets high in fat are not recommended for pregnant women. Therefore, fat intake during pregnancy should emphasize on sources from which most fats come from **unsaturated fat sources** like fish, vegetable oils (olive, peanut, safflower, and sunflower oils) and nuts like **peanuts** that provide essential fatty acids and **choline** which is important for healthy brain function. Pregnant women should also select lean meat while cooking and trim visible fat and skin from it before using them and limit **fat/oil intake to 2 table spoons per day.**

Omega-3 and **Omega 6** are essential fatty acids which are important for babies' brain and eye development. They are found from food sources like oily fish (sardines, tuna, salmon), and green leafy vegetables, and oils (canola, flaxseed, walnut, soybean oils), nuts and seeds.

Pregnant and breastfeeding women should be encouraged to include more omega-3 rich foods in their diet, for example, oily fish (sardines, tuna, salmon), and green leafy vegetables, and oils (canola, flaxseed, walnut, soybean oils), nuts and seeds.

Therefore, women who are pregnant should consume **3 portion of fish per week and 1 -2 table spoon of peanut butter spread every day.**

See foods are also an important source of **iodine.**

Iodine is essential for the normal development of the brain of the fetus during pregnancy, infancy and early childhood. Individuals most at risk for iodine deficiency disorder are pregnant and lactating women, fetus and infants.

The fetus must obtain all required iodine from the mother. Fetal iodine deficiency is caused by maternal iodine deficiency. Iodine deficient pregnant women are more likely to give birth to mentally retarded children.

Severe cases can lead to cretinism (stunting of the body's physical and mental growth) and psychomotor defects.

Moreover, iodine deficiency during pregnancy has been associated with increased incidence of decreased fertility, spontaneous abortion, miscarriage, stillbirth, congenital abnormalities and neonatal mortality.

The richest dietary sources of iodine are sea foods (e.g., fish), seaweeds and **iodized salt.**

Iodine deficiency disorder can be eliminated by the daily consumption of iodized salt which is both a preventive and corrective measure for iodine deficiency. Therefore, pregnant women are highly recommended to **use iodized salt** as it is the most effective, low-cost and long-term solution to IDD.

However, the required amount of iodine in iodized salt is maintained only when the following conditions are met.

- Iodized salt should be sprinkled when serving food
- Washing iodized salt before use not recommended as the added iodine washes off
- Storage for more than recommended time

Iron

Iron is a mineral essential for normal neurodevelopment during fetal and early childhood development. Pregnant women are at higher risk of getting iron deficiency because of increased blood volume during pregnancy, increased needs of the fetus, and blood losses that occur during

delivery. Iron requirements of pregnant women are approximately double that of non-pregnant women. Women who are pregnant needs 27 mg of iron per day.

Iron deficiency in pregnant women causes impaired red blood cell function and symptoms of weariness, poor concentration, increased risk of mortality, heart failure, hemorrhage and increased risk of infection. Further, infants of iron-deficient mothers are more likely themselves to have low iron stores and be susceptible to iron deficiency

Severe maternal iron deficiency can result in suboptimal iron supply **to the fetus**, with associated increased risks of fetal death, perinatal mortality, preterm delivery, and lower birth weight. Long-term consequences of maternal iron deficiency on the offspring include effects on cognition, behavior, motor development, activity and physical capacity, and may not be reversible. Delayed cord clamping should be promoted.

Delayed cord clamping, after delivery of the baby more blood cells are transferred from the placenta to the newly born infant if the umbilical cord is not clamped and ligated until it stops pulsating. By holding the newborn on the mother's abdomen, continued blood flow to the newborn. This increases the body iron content of the infant which will help to prevent iron deficiency in later infancy.

There are two types of iron in our diet; **Hem and Non-hem iron.**

Hem iron from hemoglobin and myoglobin from meat is highly bioavailable and affected to a negligible degree by other components which hinder iron absorption.

Non-hem iron from plant-based foods is less bioavailable and absorption varies with physiological requirements and dietary composition.

Consumption of citrus fruits, fermented, soaked and germinated cereals and pulses help increase the bioavailability of non-hem iron from a diet. It is also as much important to limit dietary components like phytates, polyphenols and caffeine (found in tea, coffee, grains, and red wine) and anti-acids to prevent nutrient binding and hindering of iron absorption

Diets of poor people are often low in animal products (which contain iron that is more readily absorbed), low in fruit (which can enhance iron absorption) and high in some cereals (which contain phytate which hinders absorption).

1.10.5 2.6.5 Eggs

Like other animal-source foods, eggs are a good source of **protein**, vitamin A, vitamin B12 and a range of bioavailable micronutrients. Although eggs are an important constituent of prenatal diet, pregnant women should refrain from eating raw or under cooked eggs due to food safety issues as eating raw eggs might cause diseases like salmonella.

Pregnant women are recommended to eat **two well cooked eggs every day**

1.10.6 2.6.6 Fruits and Vegetables

Fruits and vegetables are important sources of many nutrients, including iron, folate, vitamin A, vitamin C, dietary fiber and choline.

Each of the fruits and vegetable subgroups contributes different combinations of nutrients, making it important for individuals to consume vegetables from all the subgroups.

2.6.6.1 Dark green leafy vegetables

Essentially all medium-to-dark green leafy vegetables are **vitamin A**-rich. In addition to being rich in vitamin A, many green leafy vegetables are rich in **iron, folate** and several other micronutrients like vitamin K. These includes spinach, kale, green pepper, broccoli etc.

Pregnant women are recommended to eat **2 portions of green leafy vegetables each day.**

Folate

Folic acid is involved in producing the genetic material called DNA and in numerous other bodily functions. Women who are pregnant or might become pregnant need folic acid to prevent miscarriage and “neural tube defects,” birth defects such as spinal bifida that occur when the fetus’s spine and back don’t close during development.

Pregnancy causes reserves of folic acid in a woman's body to be used by the growing baby. Pregnant women are at risk of becoming low in folic acid during the later stages of pregnancy, particularly if they don't eat well during pregnancy. Women with folate deficiency who become pregnant are more likely to give birth to low birth weight and premature infants, and infants with neural tube defects.

Foods that are naturally high in folic acid include dark leafy vegetables (such as spinach, broccoli, and lettuce), fruits (such as bananas, melons, and lemons), beans, mushrooms, meat (such as beef liver and kidney), orange juice, and tomato juice.

Extra folic acid (folate) is advised for at least the first 12 weeks of pregnancy for all women - even if healthy and have a good diet. If extra folic acid is taken in early pregnancy, there will be less chance of having a baby born with a spinal cord problem such as spinal bifida. It is best to start taking the extra folic acid before becoming pregnant. If the pregnancy is unplanned then start taking folic acid as soon as pregnancy is known.

In addition to consuming dietary sources, women should take their iron folate supplement according to the national protocol, the 400 mg/day daily dose of folic acid supplementation every day for 6 months. Although **adhering** to taking iron folate supplement every day is a **challenge** for some women causing gastrointestinal discomfort and associated constipation.

Pregnant women should be advised of ways to decrease the discomfort by **taking the supplements after meal** and encouraged to adhere to it as it is important for the growing fetus.

Vitamin A

Vitamin A is critical in fetal development because of its involvement on growth, vision, protein synthesis and cell differentiation. Vitamin A comes in two general forms: **preformed as retinol (**active vitamin A) which is found from animal products like meat, fish and milk and **beta carotene** which are found in fruits and vegetables.

Pregnant and breastfeeding women are vulnerable to vitamin A deficiency. Vitamin A status in pregnancy is positively correlated with birth weight, head circumference and length and gestational duration. Low status is associated with increased maternal mortality and decreased birth weight.

Despite the important role vitamin A plays in the body, the RDA for the pregnant women of 770 micrograms per day is only slightly higher than the RDA for non-pregnant women.

This is due to high **risk of birth defects associated with excessive doses of preformed vitamin A** early in pregnancy. To minimize risk associated with excess intake, a significant percentage intake of vitamin A should come from beta carotene instead of preformed vitamin A. beta carotene is not converted to vitamin A unless the body determines the need and thus it is a safer form to consume. Pregnant women should also avoid eating liver due to its high content of vitamin A.

Early initiation (with in 1 hour after delivery) of breast feeding is recommended because **Colostrum** is three times richer in vitamin A and ten times richer in beta-carotene (an active precursor form of vitamin A responsible for the yellow color of colostrum) than mature milk. Because of its high levels of vitamin A, antibodies, and other protective factors, colostrum is often considered the baby's first immunization

2.6.6.2 Other Vitamin A rich fruits and vegetables

The most common **vitamin A-rich fruits** are ripe mango and ripe papaya; others include ripe bananas and watermelon. These fruits also contain folate. Pregnant women are recommended to eat **one vitamin A rich fruit per day.**

Vitamin A-rich vegetables include orange-fleshed sweet potato, carrot, and pumpkin. Pregnant women are advised to take **one vitamin A rich vegetable every day**

Citrus fruits includes orange, lemon, tangerines and juices made from them. These fruits are an important source of vitamin C, folate and fiber.

Citrus fruits help enhance absorption of certain nutrients like iron especially when taken after meals. So pregnant women are recommended to eat **at least one citrus fruit per day**.

Especial attention needs to be given in **washing** raw vegetables and fruits very well and **cooking** other vegetables **thoroughly** and **refrigerating** leftover foods to prevent food borne diseases.

Choosing a variety of foods from all food groups will help to ensure that a woman gets the nutrition she requires to fulfil the needs of the growing fetus and of maternal tissues associated with

pregnancy. Therefore, dietary diversification should be promoted in order to address micronutrient deficiencies.

The minimum dietary diversification for women of reproductive age group is to consume five of the 10 food groups listed above. groups of women where a higher proportion consume food items from at least five of the ten food groups are likely to have higher micronutrient adequacy than other groups that have a lower proportion of women achieving the threshold of food items from **at least five food groups**. Groups of WRA who consume food items from five or more of the ten groups are also highly likely to consume at least one animal-source food and either pulses or nuts/seeds and food items from two or more of the fruit/vegetable food groups.

1.11 2.7 Other food ingredients and life style issues

1.11.1 2.7.1 Alcohol

Alcohol readily crosses the placenta so fetal blood alcohol levels will be similar to maternal levels; thus if the mother drinks, so does her unborn child and it may affect fetal neurological and behavioral development. Consumption of alcohol during pregnancy is associated with higher risk of birth defects and miscarriage. Infants exposed to alcohol in utero may show symptoms such as excessive crying, irritability, weak sucking, disturbed sleep patterns, tremors and seizures.

There is no known safe level for alcohol consumption at any stage during pregnancy.

Therefore, pregnant women should refrain from drinking any kind of alcohol drinks even in smaller amounts.

1.11.2 2.7.2 Caffeine

Caffeine is a mild central nervous system stimulant present in chocolate and beverages, such as coffee, tea and cola. Caffeine readily crosses the placenta to the fetus. High doses of caffeine in pregnancy have been associated with increased risk of congenital abnormalities, pregnancy loss, low birth weight and behavioral problems.

Pregnant women should be advised to limit caffeine consumption to 300 mg per day. 300 mg caffeine is roughly equivalent to **1 cups of coffee, 2 average cups of tea**, six cans of regular cola drinks, and four cans of energy drinks or 400 g of plain chocolate.

1.11.3 2.7.3 Smoking

Smoking is associated with poor outcomes of pregnancy, including decreased birth weight, increased early spontaneous abortion, and placental complications, such as premature placental abruption, sudden infant death syndrome, and preterm delivery. Exposure to tobacco smoke in the womb has also been linked to subsequent symptoms of attention deficit disorders in exposed children. In particular, exposure to cigarette smoke is a major risk factor for sudden infant death syndrome and also for respiratory infections in children.

Taking the above consequences of smoking in to account, **pregnant women should avoid smoking.**

1.12 2.8 Food safety issues

Food handling and food safety during pregnancy is of extra importance because food-borne illness may cause miscarriage, stillbirth, premature birth, or illness or death of the newborn infant.

Pregnant and breastfeeding women should be advised to follow these food safety precautions.

- All foods should be safely handled, stored and protected from cross-contamination.
- Wash hands before cooking food
- Keep cooked food and ready to eat foods separate from raw and unprocessed foods, so there is no cross-contamination.
- Eat freshly cooked foods as soon as possible after cooking.
- Use cooked or prepared foods that have been stored in the refrigerator within two days.
- Re-heat cooked food thoroughly so that it is steaming hot (i.e., about 70 °C).
- Take special care to heat thoroughly when using microwave ovens.
- Wash raw vegetables and fruits thoroughly.
- Wash your hands and utensils and chopping boards before using for a different food to avoid cross-contamination.

- Pregnant women should not eat raw eggs
- Avoid raw or under cooked meat
- Avoid unpasteurized or raw milk

1.13 2.9 Common problems associated to pregnancy

1.13.1 2.9.1 Nausea and vomiting of pregnancy

One of the most side effects of pregnancy is known as "Nausea and vomiting of pregnancy (NVP)". More commonly known as morning sickness. Ironically, morning sickness is not limited to morning, although that may be when a woman experience it more acutely. Most women will experience mild-to-moderate symptoms of NVP in the first half of pregnancy. Pregnant women should be counseled that nausea will wear off as pregnancy progresses.

Women should be encouraged not to avoid eating because adequate nutrition during this period is important for her own health and that of the development of the fetus and advised about the following simple dietary modifications that can prevent and be used as a first line treatment for women with mild nausea and vomiting.

- Eat small and frequent meals
- Avoid fatty or spicy foods
- Carbohydrate-rich snacks are a good option e.g. crackers, cereal or fruit.
- Chew food adequately and eat slowly
- Drink plenty of fluids outside of mealtimes
- Minimize odors while cooking (open window)
- Not take medication unless prescribed by health worker

2.9.2 Pica

Pica (craving for non-food items such as ice, soil, pencil leads and washing powder) may be manifested in pregnancy. Pica can be harmful if women eat non-food items containing heavy metals or pesticides. Pregnant women may need advice if their cravings are for foods of lower nutritional value

2.9.3 Reflux (heart burn)

Reflux, also known as heart burn, occurs when acid from the stomach makes its way through the lower esophageal sphincter, causing discomfort and burning sensation in the lower esophagus.

The following measures may help a woman having heart burn

- Eating small frequent meals instead of three large meals per day.
- Chew food adequately and eat slowly
- Eating at least three hours before going to bed to allow for digestion
- Not take medication even antacids unless prescribed by health worker

2.9.4 Constipation

Constipation may occur later in pregnancy and can be assisted by:

- Eating high-fiber foods such as at least 6 portions of whole grains, 2 portions of fruit and 3 portions of vegetables everyday
- Drinking at least 8 glasses of fluid everyday
- Gentle regular exercise
- Advise pregnant women on constipation resulting from use of iron supplementation
- Discourage the use of laxatives

Summary

Pregnancy is a critical time of human development and good nutrition. It is a vital component of fetal development and contributes to maternal health and optimal birth outcomes. During pregnancy a woman nutrient requirement increased and need extra meal each day. A woman who has been able to consume the recommended quantities of energy and nutrients during pregnancy will have adequate amounts of fat stored which will be used for lactation. Therefore pregnant woman should consume from each food group to get adequate amount of nutrient needed both for herself and her growing baby.

1.14 Session three: Nutrition Education and Counseling

Learning Objectives

By the end of the session, participants will be able to:

- Explain important counseling skills **(15 min)**
- Explain health belief model and its constructs **(15 min)**
- Explain key messages and maternal doable actions **(20 min)**
- Demonstrate GALIDRA steps to counseling and reaching an agreement **(40 min)**
- Role plays **(4 hours 30 min)**

Total time

6 hours

1.15 3.1 introduction

Nutrition education involves teaching the client about the importance of nutrition, providing educational materials that reinforce messages about healthy eating, teaching essential actions for making dietary change, and providing information on how to sustain behavior change. Information gathered during nutrition screening or assessment will provide the necessary information on which nutrition issues need to be addressed during nutrition education and counselling sessions. Nutrition education and counselling should include **key messages and doable actions** on dietary conditions of the mother.

1.16 3.2 Important Counseling Skills

Having the right counseling skills enable you to help a woman feel confident about her decision on what is best for her and her family. Supporting a mother is more useful than giving direct advice which she may not use. Hence, how much a mother is open to share her concerns and doubts in her dietary habit or any area depends how much she trusts you as a counselor. The following skills are recommended as important elements for effective counseling.

Counseling skills	
Listening and & Learning skills	**Building Confidence & Support skills**
✓ Use helpful non-verbal communication • Keep your head level with client • Pay attention (eye contact) • Remove barriers (tables and notes) • Take time • Appropriate touch ✓ Ask open ended questions that allows client to give detailed information. ✓ Use responses and gestures that show interest. ✓ Listen to the client's concerns. ✓ Reflect back what the client says. ✓ Avoid using judging words.	✓ Accept what the client thinks and feels (to establish confidence) ✓ Let the client talk through her concerns before correcting information. ✓ Recognize and praise what the client is doing correctly. ✓ Give practical help and relevant information. ✓ Use simple language. ✓ Make one or two suggestions, not commands.

1.17 3.3 The use of health belief model in nutrition education and counseling

Health belief model is one of the behavioral change models adapted to explain and predict health behaviors. Major constructs of the model are perceived susceptibility (an individual's assessment of their risk of getting a condition), perceived severity (an individual's assessment of seriousness of the condition and its potential consequences), perceived benefit (an individual's assessment of the positive consequences of adapting a behavior), perceived barriers (an individual's assessment of the influences that discourage adoption of the promoted behavior). The model suggests that an individual 's perceived threat of disease or negative outcome is a key determinant of whether he or she adopts a healthy behavior. It also suggests that the benefits and barriers of changing health behavior must be taken into consideration, as those who perceive more benefits than barriers are more likely to take action.

3.4 GALIDRAA steps to counseling and reaching an agreement

Steps of counseling and reaching an agreement (GALIDRAA)

Greet the client (pregnant women) and establish confidence to help her disclose desired information

- Welcome the client on arrival
- Discuss in a comfortable and private place
- Assure the pregnant woman of confidentiality
- Express caring and acceptance by words and gestures throughout the meeting

Ask/ observe/ review records about the client's nutrition behaviors and practices

- Number of ANC visits
- Encourage the pregnant woman to do two-thirds of the talking
- Ask mostly 'open' questions
- Pay attention to both what the client says and how it was said
- Put yourself in the woman's shoes — expressing understanding of what she said without criticism or judgment
- Ask about the pregnant woman's feelings
- Ask about her preferences
- Periodic weight measurement and weight gain rate
- Measure of height and weight, calculate BMI and classify nutritional status
- Taking history on energy dense food and one additional meal per day
- Day time rest
- Recommended dietary intake personal hygiene practice
- Use of iodized salt
- Iron/ folic acid supplementation given

Listens to what client has to say

Identifies key difficulties, if any, and selects with the client the most important one to work on

Discusses options and key difficulties the client raised

- Start the discussion focusing on the pregnant woman's preference(s)
- Avoid 'information overload'
- Use words familiar to the client

Recommends and negotiates do-able actions to help the client select the best options to try, depending on their context and resources

Helps the client agree to try one of the options and asks them to repeat the agreed-up on, do-able action

Make **appointment** for the follow-up visit

3.5 Key messages and doable actions

Pregnancy is a time of increased energy and nutrient needs for a woman in order to meet the needs of the growing fetus and of maternal tissues associated with pregnancy. Pregnancy put a woman at risk of certain problems like anemia, increased infection, miscarriage and even death to the mother and also making her unborn child susceptible to low birth weight, IUGR, mental retardation, still birth and it might also cause death to it. A pregnant woman can prevent these problems by getting adequate nutrition during pregnancy. Good nutrition is important for all pregnant women and contributes to maternal health and optimal birth outcomes. Therefore, pregnant women should follow the following key messages and doable actions every day

- ✓ Make 50- 60 % of your diet from injera, bread, porridge, pasta, macaroni, and the likes and eat every day to get enough carbohydrate and fiber.
- ✓ Eat two portions of green leafy vegetables like kale, spinach green pepper and broccoli to get iron, folate and vitamin A
- ✓ Eat one vitamin A rich vegetable like carrots, sweet potato or pumpkin
- ✓ Eat one vitamin A rich fruit like mango, papaya, water melon
- ✓ Avoid eating liver due to its high teratogenic effect
- ✓ Eat one citrus fruit like orange, tangerine or a glass of juice from them after meal to get vitamin C, folate and enhance iron absorption
- ✓ Take your iron folate supplement every day after a meal and adhere to it
- ✓ Drink 3-4 glass of milk and yogurt to get calcium

- ✓ Eat ¼ kg of meat and poultry to get protein and iron
- ✓ Eat ¼ kg of fish 3 times a week to get protein and essential fatty acids
- ✓ Eat 2 eggs to get protein
- ✓ Eat 3 cups of pulses like lentils and beans to get protein and fiber
- ✓ Use iodized salt and add salt when serving food
- ✓ Ferment, soak and germinate cereals and pulses before processing them to enhance nutrient absorption
- ✓ Limit your fat/oil intake to 2 table spoons per day
- ✓ Limit your sugar intake to 3 tea spoons per day
- ✓ Limit your caffeine intake especially after a meal to 1 cup of coffee and 2 cup of tea/day
- ✓ Eat 4 times a day
- ✓ Drink at least 8 glasses of water
- ✓ Keep your gestational weight gain on track based on your pre pregnancy BMI
- ✓ Avoid raw or uncooked meat, unpasteurized milk and wash vegetables very well to prevent food borne diseases.
- ✓ Eat small portions frequently to prevent discomfort, nausea, vomiting and heart burn
- ✓ Avoid taking medications even antacids unless prescribed by a physician
- ✓ Avoid alcohol and smoking
- ✓ Take day time rest and avoid strenuous exercise

YES, SHE NEEDS THOSE MESSAGES

1.1 Summary pamphlets

Nutrients	Main food sources	Advantage and/or consequences	Key messages
Carbohydrate	Grains, white roots and tubers	Largest source of energy and glucose Risk of poor growth if inadequate	Make half of your meal from carbohydrates
Protein	Meat poultry and fish, Pulses, Dairy, Eggs	For the development of the baby, Risk of poor growth, low birth weight	Eat ¼ kg meat every day Eat variety of pulses every day Eat 2 eggs every day
Fat	Unsaturated fat, from vegetable oils, fish, nuts,	For the proper development of the baby, Help in absorption of fat soluble vitamins Choline in peanut is important for healthy brain function	Trim visible fat from meat Limit your fat to 2 table spoons per day Eat 1-2 tablespoons of peanut butter spread per day
Omega 3	Fish	For baby's brain development	Eat ¼ kg of fish 3 times a week
Iron	Meat, grains, dark green leafy vegetables	For normal neurodevelopment, prevents anemia, decrease mortality Deficiency can cause increased infection, low birth weight, preterm, fetal death	Eat red lean meat ¼ kg/day Eat variety of grains 50% of daily meal Eat 2 portion of dark green leafy vegetables Promote delayed cord clamping
Folate	Dark green leafy vegetables(DGLV) Fruits	For DNA synthesis Prevents anemia and neural tube defects Prevents birth defects like spinal bifida Deficiency can cause LBW, prematurity,	Eat 2 portion of DGLV every day Eat at least 1 citrus fruit per day Take iron folic acid supplement every day
Vitamin A	Dark green leafy vegetables Mango, papaya watermelon, carrot, sweet potato, pumpkin Meat, fish and dairy	For vision and protein synthesis, Deficiency can cause low birth weight, maternal mortality	Take 2 of the vitamin A rich foods every day Promote early initiation of breast feeding as colostrum is rich in vitamin A
Iodine	Iodized salt	For cognitive development and IQ Deficiency can cause reduced in IQ, mental retardation of fetus, decreased fertility, miscarriage, still birth, congenital anomaly, neonatal mortality, goiter	Use iodized salt every day Sprinkle salt when serving food Don't wash salt or expose it to sun
Calcium	Dairy products	For healthy bone and teeth, prevents leg cramp	Drink 3-4 glasses of milk/yogurt every day
Fluid	Water	For proper hydration	Drink at least 8 glasses of water every day

Things to limit			
Things to limit	**Food sources**	**Consequences of high doses**	**Key messages**
Fats and oils	Butter, saturated fats like margarine,	Macrocosmic baby, hypoglycemia, risk of caesarian section	Limit your fat/oil to 2 tablespoons per day Trim visible fat from meat
Sugar	Sweet drinks, tea , coffee		Limit your sugar to 3 tea spoons per day
caffeine	Tea, coffee, cola drinks	Risk of LBW, congenital anomalies Crosses placenta	Limit your caffeine to 1 cup of coffee , two cup of tea every day
Strenuous exercise	-	Weakness as it burns more calories, Results in inadequate weight gain	Decrease work load Rest at the day time to conserve energy
Things to avoid			
Things to avoid	**Food sources**	**Consequences**	**Key messages**
Alcohol	Tela, areke, jin, beer, tej, wine, whisky, vodka, etc.	Crosses placenta, birth defects, miscarriage, irritability of infants, weak sucking, disturbed sleep pattern	Avoid drinking alcohol
Smoking	Cigarettes, shisha, etc	Low birth weight, abortion, sudden infant death syndrome, preterm, attention deficit	Avoid smoking
Raw/ undercooked meat, fish and eggs	Raw meat, fish and eggs	Food borne diseases like salmonella,	Cook meat, fish and eggs very well
Unpasteurized / raw milk	Unpasteurized or raw milk	Can cause listeria which in turn causes miscarriage	Avoid unpasteurized milk, boil milk before use Refrigerate leftover milk

Common problems associated with pregnancy		
Problems	**Possible causes/ triggers**	**Key messages/ possible doable actions**
Nausea, vomiting, heart burn ,	First weeks of pregnancy, or heart burn may be later when fundal height raises, smell of food, fatty foods, folic acid supplements	Do not avoid eating Eat small and frequent meals, Avoid spicy and fatty foods, Chew food well, Minimize odors while cooking, Eat at least 3 hrs. before bed, Do not stop taking iron folate supplements
Constipation	May occur later in pregnancy, folic acid supplement	Drink at least 8 glasses of water Eat fiber rich foods(grain, pulses, vegetables)
Pica	Not well known	Avoid eating non-food items like soil, ice, alcohol etc.

1.2 Role plays

Please be in groups of three (one pregnant woman, one physician and one observer) and discuss the following scenarios.

Scenario 1

Aisha is a 24 years old woman who make her living by selling coffee. She came to ANC clinic for her 2nd visit at 24 weeks of gestation. She has a pre pregnancy BMI of 22 and she is now 57kg. She has a heart burn especially when she is taking iron folate supplements. She hasn't been eating well either.

- **How do we advise Aisha?**
- **How many kilograms should Aisha gain till her 36th wks. of gestation?**

Scenario 2

Aisha returned to ANC clinic for her 3rd visit at her 32 wks. Of gestation. She said she has been doing well on what she is advised about except that she couldn't afford meat every day.

- **How do we advise Aisha?**

Scenario 3

Almaz is a 30 years old pregnant woman who is a strong woman who works in liquor factory. She came to ANC clinic at 14 wks. Of gestation. She doesn't know her pre pregnancy BMI. Yet she said she was 47 kg just before she was pregnant. When we measure her height she is 1.65 m tall. She has nausea, vomiting and loss of appetite. She is also feeling weak.

- **How do we advise Almaz?**

Scenario 4

Almaz returned to our ANC clinic at her 24 wks. Of gestation. Her nausea and vomiting is gone and she has been eating better than her first visit. Her weight now is 51 kg. But she is still feeling weak

- **How do we advise Almaz?**
- **How much weight does she needs to gain when she returns for her 3rd visit at 32 wks. Of gestation?**

Thank you for all your efforts

I am sure you will practice what you have trained about

1.3 References

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በእርግዝና ወቅት መኖር ስላለበት አመጋገብ ምን ያውቃሉ?

እርግዝና በሴት ልጅ ሕይወት ውስጥ አስደሳች እና ትልቁን ምዕራፍ የሚይዝ ክስተት ነው።።
አንዲት ሴት ነፍሰጡር በመሆኗ ብቻ ከሌሎች ሴቶች በተለየ ለችግሮች ተጋላጭ ናት።። ለምሣሌ፣ በእርግዝናዋ ወቅት ለተለያዩ በሽታዎች፣ ለደም ማነስ፣ ለውርጃ ፣ እንዲሁም ስትወልድ ምጥ ሊያስቸግራት ይችላል።። በጽንሱ ላይም የክብደት መቀነስ የዕድገት መገታት፣ ያለ ጊዜው ወይንም አካለ ጐዶሎ ሆኖ መወለድ፣ እንዲሁም ከተወለደ በኋላ በአዕምሮ እድገትና በት/ቤት የግንዛቤ ችግር ሊያጋጥመው ይችላል።።
ነፍሰ ጡር እናት በእርግዝናዋ ወቅት የተመጣጠነና በቂ ምግብ ካላገኘች የምትወልደው ልጅ ዕድገቱ የተገታ፣ ያለጊዜው የሚወለድ ፣ እናም ከተወለደ በኋላ ክብደቱ የቀነሰ ይሆናል።። በዚህ ሁኔታ የተወለደ ሕፃን የመሞት እድሉ ከፍተኛ ከመሆኑም በላይ አድጐ ከሕፃኑ የሚወለደው ልጅም እንደዚሁ የሰውነትና የአዕምሮ እድገቱ የተገታ ይሆናል።። ስለዚህ የነፍሰጡር እናት በቂ እና የመጣጠነ ምግብ አለማግኘት ከእሷ አልፎ ለልጅ ልጅ እና ለትውልድ የሚተላለፍ ችግር ያስከትላል ማለት ነው።።

እነዚህን ችግሮች ለመከላከል ነፍሰ ጡር እናት በእርግዝናዋ ወቅት የተመጣጠነ እና በቂ ምግብ ከሁሉም የምግብ ምድቦች መመገብ አለባት።።

ነፍሰጡር እናት በየቀኑ መመገብ ያለባት ምግቦች እና አስፈላጊ ድርጊቶች

- **በቀን 4 ጊዜ** መመገብ
- በቀን ውስጥ ከምትመገበው የምግብ መጠን ግማሽ ያህሉን ከጤፍ፣ ከስንዴ፣ ገብስ፣ አጃ፣ ሩዝ፣ ማሽላ፣ ዘንጋዳ፣ ድንች የመሳሰሉት እህሎች እና ስራስሮች ማድረግ
- አረንጓዴ አትክልቶች እና ቅጠላ ቅጠሎች
- በቀን ከ 2 ያላነሱ የወቅቱን ፍራፍሬዎች
- ወተት እና የወተት ውጤቶች
- ስጋ፣ እንቁላል እና ጥራጥሬዎች
- በአዮዲን የበለፀገ ጨው **ምግብ ሊቀርብ ሲል** መጨመር
- የአይረን ፎሌት /የብረት/ ክኒኖችን **በየቀኑ ለ6 ወራት** ሳታቋርጥ መውሰድ
- በ ጥሩ ክብደት ላይ ያለች ነፍሰጡር እናት እስከ እርግዝናዋ መጨረሻ ጊዜ ከ **10-14 ኪሎ** መጨመር አለባት
- አሳ በሳምንት ከ 3 ጊዜ ያላነሰ መመገብ
- ሻይ መቀነስ (በቀን ከ 2 ብርጭቆ ያልበለጠ)
- ቡና መቀነስ (በቀን ከ 1 ሲኒ ያልበለጠ)
- ስኳር መቀነስ (በቀን ከ2 ማንኪያ ያልበለጠ)
- ቅባት /ስብ መቀነስ (በቀን ከ3 የሾርባ ማንኪያ ያልበለጠ)
- ትንሽ ትንሽ ቶሎ ቶሎ መመገብ
- በየቀኑ ከ8 ብርጭቆ ያላነሰ **ውሃ** መጠጣት
- የስራ ጫና መቀነስ እና የቀን እረፍት ማድረግ
- ከሐኪም ትዕዛዝ ውጪ የጨጓራ ኪኒን /ሽሮኘ/ ከመውሰድ መቆጠብ
- ምንም አይነት የአልኮል መጠጥ ትንሽም ቢሆን ከመጠጣት መቆጠብ
- ጫትና ሲጋራን ማስወገድ
- ያልተፈላ ወተት ፣ ጥሬ ወይም ያልበሰለ ስጋ ፣ ዓሳ እና እንቁላል አለመጠቀም

<u>የነፍሰ ጡር እናት የተመጣጠነ ምግብ ምን ምን ማካተት አለበት?</u>

<u>የምግብ ምድቦችና ጠቃሚ ንጥረ ነገሮች</u>

በካርቦ ሃይድሬት የበለፀጉ ምግቦች፡- የሚባሉት ጤፍ፣ ስንዴ፣ ገብስ፣ አጃ፣ ሩዝ፣ ማሽላ፣ ዘንጋዳ፣ ድንች የመሳሰሉት እህሎች እና ስራስሮች እንዲሁም ከነዚህ የተሰሩ ማንኛውንም አይነት ምግብ ያካትታሉ።። እነዚህ የምግብ ምድቦች ለነፍሰ ጡር እናት ከፍተኛ የሆነ ጉልበት ይሰጣሉ።። የልጁንም እድገት ይደግፋሉ።። ስለሆነም ነፍሰጡር እናት በቀን ውስጥ ከምትመገበው የምግብ መጠን ግማሽ ያህሉን ከእነዚህ ምግቦች ማግኘት አለባት።። ነፍሰጡር እናት እህሎችን እና ጥራጥሬዎችን ከማዘጋጀቷ በፊት ትንሽ መዘፍዘፍ አለባት።።
ኘሮቲን፡- ኘሮቲን ለጽንሱ እድገትና ክብደቱ ቀንሶ እንዳይወለድ ይረዳል።። በኘሮቲን የበለፀጉ የሚባሉ ምግቦችን ከእንስሣትና ከእጽዋት ተዋጽኦ ማግኘት ይቻላል።። በኘሮቲን የበለፀጉ የእንስሣት ተዋጽኦ የሚባሉት ስጋ፣ ዶሮ ፣ አሣ ፣ ወተት ፣ እንቁላል፣ የመሳሰሉት ናቸው።። ከእነዚህም ነፍሰጡር እናት በየቀኑ መመገብ አለባት።።
በተጨማሪም **ዓሣ** በውስጡ **ኦሚጋ 3** የሚባል ለልጅ አዕምሮ እድገት የሚጠቅም ንጥረ ነገር በውስጡ ስለያዘ በነፍሰ ጡር እናት ምግብ ውስጥ መካተት አለበት።። ነፍሰ ጡር እናት በኘሮቲን የበለፀጉ የእንስሳት ተዋጽኦ ምግቦችን ማግኘት ካልቻለች የተለያዩ የእጽዋት ተዋጽኦችን በመመገብ ተቀራራቢ የሆነ ኘሮቲን ማግኘት ትችላለች።። በኘሮቲን የበለፀጉ የእጽዋት ተዋጽኦ ምግቦች የሚባሉት፡- ባቄላ፣ ሽምብራ፣ አተር፣ ምስር፣ የመሳሰሉትን እና ማንኛውንም ከእነዚህ የተሰሩ ምግቦችን ያካትታሉ።።

ቅባት /ስብ፡- ለጽንሱ እድገት እንዲሁም አንዳንድ ቫይታሚኖች በሰውነታችን ውስጥ ጥቅም ላይ እንዲውሉ ይረዳል፡፡ ነፍሰ ጡር እናት ቅባትን ከስጋ ፣ አትክልት ዘይት ፣ ዓሣ እንዲሁም ለውዝ ማግኘት ትችላለች፡፡ ሆኖም ከመጠን በላይ የሆነ ቅባትን መጠቀም የለባትም፡፡ በመሆኑም ስጋ ስትሰራ ነጭ ወይንም የሚታይ ስብ ማስወገድ እና ዘይት መቀነስ አለባት፡፡

አይረን /ብረት/ ፡- የአይረን እጥረት የደም ማነስን፣ የጽንሱ ያለጊዜው እና ክብደቱ ቀንሶ መወለድን የአዕምሮ እድገት መቀነስን፣ እንዲሁም የእናትና ጽንስ መሞትን ሊያስከትል ይችላል፡፡ እነዚህን ችግሮች ለመከላከል ነፍሰ ጡር እናት በአይረን የበለፀጉ ምግቦችን በየቀኑ መመገብ አለባት፡፡ በብዛት አይረን የያዙ ምግቦች የሚባሉት፡- እንደ ጎመን፣ ቆስጣ ያሉ አረንጓዴ አትክልቶች፣ እንደ ጤፍ ያሉ እህሎች፣ እንዲሁም ስጋ ናቸው፡፡

ፎሌት፡- ፎሌት የሚባለውን ንጥረ ነገር ከአረንጓዴ ቅጠላ ቅጠሎችና ከፍራፍሬዎች ማግኘት ይቻላል፡፡ በፎሌት የበለፀጉ ምግቦችን መመገብ ሕፃኑ አካለ ጐዶሎ እንዳይሆን፣ ክብደቱ እንዳይቀንስ እና ያለጊዜው እንዳይወለድ ይረዳል፡፡ እንዲሁም ለእናት ከደም ማነስ ይከላከላል፡፡ በፎሌት የበለፀጉ ምግቦችን ከመመገብ በተጨማሪ ነፍሰ ጡር እናት የአይረን ፎኔት /የብረት/ ክኒኖችን በየቀኑ ለ6 ወራት ሳታቋርጥ መውሰድ አለባት፡፡

ቫይታሚን ኤ፡- ነፍሰ ጡር እናት በቫይታሚን ኤ የበለፀጉ ምግቦችን ለምሣሌ፡- አረንጓዴ አትክልቶችን፣ እንደ ካሮት፣ ማንጎ፣ ፓፓያ ያሉ ፍራፍሬዎችን፣ ስጋ፣ ዓሣ፣ እንዲሁም ወተት፣ በየቀኑ መመገብ አለባት፡፡

አዮዲን፡- የአዮዲን እጥረት በጽንሱ ላይ የአዕምሮ ዝግመት፣ የአካል ጉዳት፣ በት/ቤት የመረዳት ችግር፣ ማህፀን ውስጥ ሞቶ መወለድ እንዲሁም በእናት ላይ ውርጃ እና እንቅርት ሊያስከትል ይችላል፡፡ አዮዲንን በአዮዲን ከበለፀገ ጨው ማግኘት ይቻላል፡፡ ሆኖም ነፍሰ ጡር እናት በአዮዲን የበለፀገ ጨውን በምትጠቀምበት ጊዜ **ጨውን መጨመር ያለባት ምግብ ሊቀርብ ሲል** ነው፡፡ ምክንያቱም አዮዲን የሚባለውን ንጥረ ነገር ከፍተኛ ሙቀት ያጠፋዋል፡፡ በመሆኑም ለእሣት ካጋለጥነው እንዲሁም ፀሐይ ላይ ካሰጣነው አዮዲኑ ይጠፋል፡፡ ስለዚህ ነፍሰጡር እናት በየቀኑ ምግብ ሊቀርብ ሲል በአዮዲን የበለፀገ ጨው መጠቀም አለባት፡፡

ካልሽየም ፡- ካልሽየምን ከወተትና ከወተት ውጤቶች በብዛት እናገኛለን፡፡ ለእናት ከአጥንት መሳሳት ፣ ከቁርጥማት ይከላከላል እንዲሁም ለልጁ ጥርሱና አጥንቱ እንዲጠነክር ይረዳዋል፡፡ በመሆኑም ነፍሰ ጡር እናት ወተትና የወተት ውጤቶችን በየቀኑ መጠቀም አለባት፡፡

ነፍሰ ጡር እናት በእርግዝናዋ ወቅት መቀነስ ያለባት ነገር ምን ምን ናቸው?

ስብ እና ቅባት የበዛባቸው ምግቦች፡- ነፍሰ ጡር እናት እንደ ማርጋሪን ፣ ቅቤ ፣ የመሳሰሉ ምግቦችን መቀነስ አለባት፡፡ ሥጋ ሰትሰራ የሚታይ /ቢጫ/ ስብ ቆርጣ መጣል አለባት፡፡

ስኳር ፡- በንጥረ ነገሮች ያነሰ ከመሆኑም በተጨማሪ የምግብ ፍላጐትን ስለሚቀንስ ነፍሰ ጡር እናት የስኳር መጠንን መቀነስ አለባት፡፡

ሻይ፣ ቡና ፣ እና ኮካ መጠጦች፡- በውስጣቸው ካፊን የሚባል ንጥረ ነገር ይዘዋል፡፡ ከመጠን በላይ የሆነ ካፊን በልጁ ላይ የክብደት መቀነስ ከማስከተሉም በላይ ከእጽዋት የምናገኘው አይረን በሰውነታችን ውስጥ ጥቅም ላይ እንዳይውል ያደርጋል፡፡ በመሆኑም ለደም ማነስ ያጋልጣል፡፡ ነፍሰ ጡር እናት በቀን ከአንድ ስኒ በላይ ቡና እና ከሁለት ብርጭቆ በላይ ሻይ መጠጣት የለባትም፡፡

ነፍሰ ጡር እናት በእርግዝናዋ ጊዜ ማስወገድ ያለባት ነገሮች ምን ምን ናቸው?

የአልኮል መጠጦች፡- ለምሣሌ፡- ጠጅ፣ ጠላ፣ ቢራ ፣ ውስኪ ፣ አረቄ ፣ ሾርካ የመሳሰሉትን ጨመሮ እንግዴ ልጁን አልፈው ወደ ጽንሱ የመግባት ችሎታ ስላላቸው ነፍሰ ጡር እናት የምትጠጣውን ያህል የአልኮል መጠጥ ልጁም እንዲደርሰው ያደርጋል፡፡ የአልኮል መጠጦች በጽንሱ ላይ የአካል ጉዳትን፣ ከተወለደ በኋላ ጡት መጥባት መቸገርን እና የባህሪ መነጫነጭን ያስከትላሉ እንዲሁም ነፍሰ ጡር እናትን ለውርጃ ይዳርጋሉ፡፡ በመሆኑም ነፍሰ ጡር እናት ምንም አይነት የአልኮል መጠጥ ትንሽም ቢሆን መጠጣት የለባትም፡፡

ሲጋራ እና ጫት ፡- በጽንሱ ላይ የክብደት መቀነስ ፣ያለጊዜ መወለድ እንዲሁም ለእናት ውርጃን ሊያስከትሉ የሚችሉ ንጥረ ነገሮችን በውስጣቸው ይዘዋል፡፡ በመሆኑም ነፍሰ ጡር እናት ጫትና ሲጋራን ማስወገድ አለባት፡፡

ጥሬ /በደንብ ያልበሰለ/ ስጋ ፣ ዓሳ፣ እንቁላል፣ ወተት እነዚህን ምግቦች በጥሬ ወይንም በደንብ ሳይበስሉ መጠቀም ነፍሰ ጡር እናትን ለተለያዩ በሽታዎች እና ለውርጃ ያጋልጣታል፡፡ በመሆኑም ነፍሰ ጡር እናት ያልተፈላ ወተት ፣ ጥሬ ወይም በደንብ ያልበሰለ ስጋ ፣ ዓሳ እና እንቁላል ከመጠቀም መቆጠብ አለባት፡፡

ጤናማ አመጋገቤ ለራሴ፣ ለልጄ፣ ለትውልድም ጭምር!!!

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