

# Determinants of Dietary Diversity among Pregnant Women Attending Public Health Facilities in Hossana town, South Ethiopia

Degefa Helamo Kobi (✉ [degefa.helamo@gmail.com](mailto:degefa.helamo@gmail.com))

Hossana college of health sciences

Romedan Delil

Hossana college of health sciences

Beakal Zinab

Jimma University

Desalegn Tamiru

Jimma University

---

## Research article

**Keywords:** Dietary diversity, Determinants, Pregnancy

**Posted Date:** August 3rd, 2019

**DOI:** <https://doi.org/10.21203/rs.2.11374/v1>

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

[Read Full License](#)

---

# Abstract

**Abstract Background:** Dietary diversity refers to increasing the consumption of a variety of foods across and within the food groups, adequate and diversified diets during pregnancy is essential for fetus health, body maintenance and enhancement of maternal health through protection of infectious and non-communicable diseases. Hence, this study was targets to assess dietary diversity and its determinants among pregnant women of public health facilities in Hossana town, south Ethiopia **Methods:** Facility based cross-sectional study was applied among selected 303 pregnant women in Hossana town from June 1 to July 15, 2018. Systematic random sampling procedure was employed to recruit study participants. Data were collected using an interviewer administered pretested semi-structured questionnaire, one week dietary consumption was used to compute women dietary diversity score. Descriptive statistics and multivariable logistic regression were done to isolate predictors of dietary diversity. **Result:** The prevalence of low, medium and high women's dietary diversity was 9.2, 48.2 and 42.6% respectively. Educational status (AOR=2.1; 95%CI: 4.8, 15.2), monthly income (AOR=2.1; 95% CI: 4.8, 15.2), nutritional education (AOR=2.3; 95% CI: 1.2, 4.4) and frequency of eating (AOR=12.9; 95% CI: 3.1, 52) were meaningfully associated with women dietary diversity. **Conclusions:** In this study women educational status, monthly income, receiving nutritional education and frequency of eating were determinants of women dietary diversity. Efforts should be strengthened towards improving women educational level, delivery of nutritional education and enhance frequency of eating among pregnant women to advance dietary diversity. **Keywords:** Dietary diversity, Determinants, Pregnancy

## Background

Adequate diversified diets are essential for fetus health, body maintenance and enhancement of maternal health through protection of infectious and non-communicable diseases globally [1]. Dietary diversity refers to increasing the consumption of a variety of food across and within the food groups; it has been recognized as a crucial indicator for surveillance of actions that aim to challenge various nutrition-related problems and food insecurity among pregnant women in the developed and developing world [2]. In resource-poor environments across the world, low quality monotonous diets are the habit; when grain or tuber-based staple foods dominate and diets lack vegetables, fruits and animal source foods, micronutrient deficiencies is high; whereas information on micronutrient deficiencies is scarce, it is clear that poor micronutrient status among women is a global problem and is most severe for poor women, information about dietary patterns and diet quality for women across countries is limited [3]; inadequate food intake, poor nutritional quality of diets, frequent infections and short inter-pregnancy intervals are among the most common immediate causes of maternal and newborn malnutrition [4].

Nutrient deficiencies and imbalanced dietary intake tend to occur during the reproductive period in developed and developing countries of pregnant women in urban and rural areas [5], intake of different variety of foods has been an endorsement of achieving adequate nutrient intake and the recommendation appears the dietary diversity guideline of various countries[6]. Maternal nutritional requirement of macro and micronutrients increase during pregnancy meeting these requirements is

crucial for the appropriate health, growth, development of fetus and women healthy life [7], healthy eating practices and consumption of food from variety of dietary groups during pregnancy affects fetal health and contributes to prevention of pregnancy-related complications [8]. Among food groups ingesting cereals, wheat, pulses, roots and tubers are the major component of the diet in most part of Africa [9].

Ethiopia is among the poor country in Africa with high rates of food insecurity, low-quality nutrients, monotonous diets and malnutrition; moreover, diet diversity among pregnant was significantly lower than non-pregnant women in south Ethiopia more than half of women avoided at least one food type during their pregnancy [10, 11]. Pregnancy is the utmost nutritionally demanding period in a woman's life; thus, pregnant women are advised to eat more diversified diet than usual; consumption of meat, fish, fruits and some vegetables during pregnancy despite some region remained lower than the pre-pregnancy period, a number of food misconceptions related to consumption of green leafy vegetables, yogurt, cheese, sugar cane and green pepper food items adversely affect nutritional status during pregnancy in Ethiopia [12]. Household dietary diversity score in south part Ethiopia is five, cereals are the most usually consumed food groups; in contrast fish, egg and fruits are the least consumed.

Animal source foods are eaten in greater amount among families with higher dietary diversity, identifying nutritional status individual members of the family important for new technologies supporting agricultural practices to enhance both native production and improved consumption diversified diets of pregnant women in Hadiya Zone [10]. The objective of this study was to assess dietary diversity and its determinants among pregnant women of public facilities in Hossana town, south Ethiopia and it might be used among all women of childbirth age, having data on low dietary diversity and less variety diet consumption is a proxy of low quality diet, nutritional status and food insecure among pregnant women in the town.

## Methods

### Study area and period

Facility based cross sectional study design was employed in all governmental health institution of Hossana town from June 1 to July 15, 2018.

### Source and study population

Source population were all pregnant women attending antenatal care at public health facilities of Hossana town but study population pregnant women who has follow up during data collection and study participants were randomly selected pregnant women attending ANC at public health facilities of the town during the study and who met the inclusion criteria; over-all 306 pregnant were recruited in this study who had residents of at least six month in the town. Pregnant women who had special dietary recommendations due to other morbidities or chronic diseases were excluded from the study.

# Sample size and sampling technique

The sample size was calculated using single population proportion formula based on the following assumptions proportion of dietary diversity of 34.3% [13] reported from the previous study and using the 95% confidence interval and 5% marginal error; by adding 10% for none response the final sample size was 306. First proportional allocation was made based on the number of pregnant mothers who were in ANC, and then systematic sampling was used to select study participants

## Data collection procedure and Measurements

Socio-economic and demographic factors, pregnancy and maternal clinical characteristics were collected from all selected participants using a pre-tested interview administered semi-structured questionnaire as well as dietary intake information was collected using standard of WHO/FAO classification guideline of nutritional intake and adapted to containing local food items to assess women dietary diversity.

The respondents were asked to report the number of food in the past week they consumed categories of the listed food items starting from prior of interviewed. The food groups used to construct the WDDS in this study were constructed from the list of food items the participants stated to consume according to the above international guideline are; cereals; egg; milk and milk product; other vitamin A rich fruits, tubers and vegetables; dark green leafy vegetables; meat, poultry and fish; nut and seeds; other vegetables; other fruits and pulse or legumes [14]. Consumers of a food item were defined as follows: intake of the food item at least once in the past week, regardless of the frequency, women that consumed a food group at least once in a week was scored as one; WDDS was constructed as the sum of numbers of food groups consumed over the past week.

Higher score indicates higher diversity, as more food groups were eaten; in the current study the minimum and maximum WDDS were three and nine respectively. There is no conventional cut-offs to indicate adequate or inadequate dietary diversity within a week for the women; greater WDDS is essential and higher number of food groups is important to meet desires of various nutrients. Hence, the score is converted into tertiles and the higher tertile of the score was taken as high or adequate women dietary diversity and the middle and low tertiles were merged together and considered as low or inadequate women dietary diversity.

## Data Processing and Analysis

Data were cleaned and checked for consistencies as well as completeness and entered to Epi Data version 3.5.1 and exported to SPSS version 20 for analysis. Descriptive and binary logistic regression analysis were done to see the association between the dependent and predictive variables in bivariate analysis variables which have statistically significant results ( $p$ -value $<0.25$ ) were entered in to

multivariable logistic regression model to identify the independent effect of each predictive variable on the outcome variable.

## Result

### Socio-demographic and economic characteristics of the study participants

From this study, a total of 303 participants were involved with 99% response rate. The mean age of the attendants was  $28.3 \pm 2.7$ . Almost all (98%) of the respondents were married, nearly two third (68.6%) of the respondents were Hadiya. Only 24.1% of the respondents were can't read and write, 239 (78.9%) of the women were house wife as well as around one fifth (23.1%) of the respondents had less than 500 Ethiopia birr for monthly family members expenditure (Table 1).

### Pregnancy and Maternal clinical related Characteristics

The mean age of first delivery of the participants was  $20.7 \pm 1.7$  month. More than two third of respondents (78.9%) had previous pregnancy from those 58.7% of them delivered at health facility while the rest delivered at home. This study revealed closely one third of the participants 98 (32.3%) had two ANC visits plus with 45.2% of respondents were in the third trimester. The participants were also evaluated for whether they had history of some morbidity such as malaria, HIV/AIDS, Hypertension, diabetes mellitus, tuberculosis and intestinal helminthes during this study. Almost one fifth (19.5%) of respondents were reported history of malaria, intestinal helminthes and hypertension in the last one year; however, none of the respondent was diagnosed to have any of the rest major morbidity during the current pregnancy (Table 2).

### Women dietary diversity score

Out of ten food group consumption of the seven days, the mean of dietary diversity was  $7 \pm 1.3$  with scores ranging from 3 to 9 food groups. Based on the score of tertiles almost half of the respondents (48.2%) were in the medium (5–7 food groups), 9.2% in low (<5 food groups) and 42.6% had high dietary diversity ( $\geq 8$  food groups). There is no standard cut-offs to specify adequate or inadequate dietary diversity within a week for the women we used dietary diversity score by converting tertiles, according to this study 129 (42.6%) of study participants have adequate dietary diversity score or had greater than or equal to eight food groups but 174(57.4%) consumed inadequate dietary diversity that is less than eight food groups within a week (Table 3 and Figure 1).

#### Factors Associated with Dietary diversity among Pregnant Women

In this study, both bivariate and multivariable logistic regression analysis were computed, In bivariate analysis, education of women, occupation of the women, gap between the previous and current

pregnancy, history of health education about nutrition during pregnancy, monthly income of the family, number of family and frequency of meal were identified as the candidate for multivariable logistic regression analysis; in multivariable analysis revealed that; women who attended higher institution had 2.1 higher odds of attaining adequate dietary diversity as compared to those who can't read and write (AOR=2.1; CI: 4.8, 15.2), women whose family monthly income earned greater than 2000 Ethiopia birr 1.9 times (AOR=1.9; 95% CI: 1.06, 7.1) more likely to have adequate dietary diversity as compared to those less than 500 Ethiopia birr, in addition women who got health education about nutrition concerning eating additional meals, iron source and diversified foods during pregnancy (AOR=2.3; 95% CI: 1.2, 4.4) were 2.3 times more likely to have adequate dietary diversity as compared to those who didn't get the information; furthermore, women's frequency of meal 3 times per day 8.3 times (AOR=8.3; 95% CI: 4.5, 15.6) and  $\geq 4$  times (AOR=12.9; 95% CI: 3.1, 52) were 12.9 times had greater odds of achieving adequate dietary diversity than who had 2 times meal frequency per day (Table 5)

## Description of Nutritional Related Characteristics

This study revealed only thirty (9.9%) of the women have got information regarding nutrition such as iron source food, additional meal and healthy diets during pregnancy from different sources. The mean of twenty four hours meal intake frequency of the respondents was  $2.7 \pm 0.52$ . Almost all (98.4%) of study participants ate cereals while 99% pulses or legumes; less than half (40.3%) of pregnant women consumed milk and milk products while only 20.1% of women have consumed meat, poultry and fish. The mean of food variety consumed within a week of the respondents was  $19.4 \pm 3.6$ . From this study the participants have eaten teff (99.3%), wheat (95.5%), lentils (92.9%), potato (90%), peas (94.4%) and tomatoes (88.4%). Around all of the women ate below 50% of animal source food, however, butter (28.1%), meat (14.2%), oats (12%), Swiss chard (12.4%), millet (6.3%), kidney bean (4.2%), poultry (1.6%) and fish (0.3 %) were the least consumed food items in the study participants (Table 3 and 4).

## Discussion

Nutritional necessity increase during pregnancy so appropriate consumption of diversified diets is significant for maternal welfare as well as the growth, development and entire health of the fetus. The most important aim of determining dietary diversity is to encourage women to eat diversified diets rather than eating monotonous food all over their pregnancy.

This study revealed almost all 98.4% of women consumed cereals while only 20.1% ate meat, poultry and fish food group. The mean of dietary diversity was shown as  $7 \pm 1.3$ , this finding relates with the study done in Kenya among pregnant women where a mean DDS of  $6.84 \pm 1.46$  was recorded [15] but not related with study done in Pakistan *and* Mekele town which was shown  $6.17 \pm 0.99$ , 4.9 respectively [16, 17]. According to this study pregnant woman dietary diversity score low, medium and high were found to be 9.2%, 48.2% and 42.6% respectively; the amount of study participants with adequate dietary diversity in the current study was 42.6% which is similar with the study conducted in Addis Ababa 39% of have

high dietary diversity [10] and South Africa showed that 8.1% low, 44.2% medium and 47.7% of the women stated high-level dietary diversity [18], but this finding inconsistency the studies conducted on Gondar 21.1% low, 62.7% medium and 16.2% high and Malaysia 2.5% low, 9.1% medium and 88.4% of the participants have high dietary diversity [19, 20], this dissimilarity might be due to variations in socio-economic, geographic, seasonal variability, eating habit and other socio-demographic factors of women's found in diverse areas of the countries.

This study revealed women who attended educational institution had greater odds of attaining adequate dietary diversity as compared to those can't read and write, this outcome is comparable with study done in Kenya, South Africa and India [15,18,21], this might be due to women who attained school may have a better awareness about healthy diet during pregnancy.

This study also shown that women whose household monthly income earned greater than 2000 Ethiopia birr are more likely to have adequate dietary diversity as compared to those less than 500; this result is consistent with study done in Kenya and India [15, 21]. This consistency suggested due to women in low socioeconomic ranks are expected to have financial constraints to access, avail and afford diverse diets. In addition history of attending health education about importance nutrition during pregnancy was significantly associated with dietary diversity; women who got health education about nutrition concerning eating additional meals, iron source and diversified foods during pregnancy were 2.3 times more likely to have adequate dietary diversity as compared to those who didn't get the information, this is consistent with study conducted in Kenya [15]. This similarity might be due to women who have awareness of nutrition is believed to be wide-open to updated information about the health benefits of different food varieties through various media sources.

Furthermore, this study noted women's frequency of meal per day has a significant association with adequate dietary diversity, frequency of consumed three times per day is 8.3 and greater or equal to four time consumed is 12.9 times had greater odds of attaining adequate dietary diversity as compared to those women who had two time per day, this finding is related with another study in FinoteSelam, North Ethiopia [22]. This could be explained by the fact that increasing frequency of consuming food items than common eating pattern of the family for compensating the normal physiological demand which is used by the fetus and mother is one of the approaches to raise dietary diversity of women.

## Conclusion

In this study the prevalence of dietary diversity among pregnant women was 42.6%. The study revealed that educational status of mother, health education about nutrition during pregnancy, monthly income of the family and frequency of meal had significance association with dietary diversity among pregnant women. Based on the result efforts should be strengthened to improve economic and educational status of pregnant mothers similarly nutrition education plus rising meal frequency should be delivered during ANC follow-up. The limitation of this study are quantitative measurement of nutrients were not applied due to absence of dataset or amount used that afford information on the quantity of food consumed by

pregnant women to add up as among ten food group; recall and/or social desirability bias while subjects were requested to give dietary information and monthly income; furthermore, the study was cross sectional and may not display disparities of dietary practices the women by different seasons of the years.

## List Of Abbreviations

ANC: Antenatal care; FAO: Food and Agriculture Organization; WDDS: Women dietary diversity score; WHO: World Health Organization; AOR: Adjusted Odds Ratio; CI: Confidence Interval; COR: Crude Odds Ratio; DDS: Dietary Diversity Score; FVS: Food Varieties Score; SPSS: Statistical Package for Social Sciences, AIDS: Acquired immunodeficiency syndrome, HIV: human immunodeficiency virus

## Declarations

Ethics approval and consent to participate

This study was approved by the ethical review board of Jimma University and ethical review committee of Hossana College of health Sciences; then permission was received from Hossana town health unit and other relevant administrative officials. Finally, informed verbal consent was obtained from the study participants prior to the actual data collection process. The consent was received from the pregnant mothers and minors such as children were not involved in the study

Consent for publication

Not applicable

Availability of data and material

The dataset is available from the corresponding author on reasonable request. Therefore, please contact the corresponding author for the data requests in SPSS form

Competing interests

The authors declare that they have no conflict of interests.

Funding

Jimma University and Hossana college of Health Sciences funded for data collection tools and presented lap top for data entry, analysis and presentations of this study. Moreover, these institutions established a research committee to approve a research topic, participate in research design and data collection and analysis.

Authors' contributions

RD: wrote the research proposal, participated in data collection, analysis and wrote the manuscript, BZ, DH and DT: participated in data collection, analysis and reviewed the paper and DH prepared this manuscript for publication. All the authors read and approved the final version of the manuscript.

## Acknowledgment

First of all we would like to thank Jimma University and Hossana College of Health Science for financial and material support. Second our heartfelt thanks go to Hossana town health unit and other relevant stakeholders in the town for their cooperation. Finally we would like to thank data collectors, supervisors as well as the respondents for their invaluable contribution to this study.

## References

1. Ellen Muehlhoff, Anthony Bennett and Deirdre McMahon. Milk and dairy product in Human Nutrition, FAO OF THE UNITED NATION, Rome Italy, 2013: 28
2. Ruel M. Is dietary diversity an indicator of food security or dietary quality? A review of measurement issues and research needs, FCND Discussion Paper: J Health, 2004
3. Mary Arimond, LivElinTorheim, Doris Wiesmann, Maria Joseph and Alicia Carriquiry. Dietary diversity as a measure of women's diet quality in resource-poor areas, Bangladesh. Food and Nutrition Technical Assistance Project, J Nutri., 2008: 7
4. Ramakrishnan,U, B. Imhoff-Kunsch and R. Martorell. Maternal Nutrition Interventions to improve maternal, newborn and child health outcomes. Nestlé Nutrition Institute Workshop Series: Pediatric Program, J Nutri., 2014: 78
5. HaoyueGao, Caroline K. Stiller, VeronikaScherbaum, Hans KonradBiesalski, Qi Wang, Elizabeth Hormann and Anne C. Bellows, et al. Dietary Intake and Food Habits of Pregnant Women Residing in Urban and Rural Areas, China; J ClinNutri. 2013. 10/3390: 6-7
6. Gina Kennedy, Maria Regina Pedro, Chiara Seghieri, Guy Nantel, and IngeBrouwer, Dietary Diversity Score Is a Useful Indicator of Micronutrient Intake in Non-Breast-Feeding Filipino Children. *JNutri.*, 2011, 26-27.
7. Celeste Marinda and de Bruyn. Dietary adequacy, variety and diversity and associated factors (anthropometry and socioeconomic status) in pregnant women attending the Bishop LavisMou in Cape Town; 2015. 78
8. Martin CL, Sotres-Alvarez D, Siega-Riz AM and Saaka, M. Maternal Dietary diversity and infant outcome of pregnant women, in Ghana. 2015. 8
9. Habte TY and Krawinkel M. Dietary Diversity Score: A Measure of Nutritional Adequacy or an Indicator of Healthy Diet, Institute of Human Nutrition, Giessen, Germany, Journal of Nutrition and Health Sciences.

10. Abdulhalik Workicho, Tefera Belachew, Garumma Tolu, Beyene Wondafrash, Carl Lachat and Patrick Kolsteren, et al. Household dietary diversity and animal source food consumption in Ethiopia evidence from the 2011 welfare monitoring survey. *BMC Public Health*, 2016. 16(1192): 5-7.
11. Jemal A Haidar and Rebecca S Pobocik. Iron deficiency anemia is not a rare problem among women of reproductive ages in Ethiopia: a community based cross sectional study school of public health, Addis Ababa University Ethiopian health and nutrition. *BMC blood dis.* 2009. 10(7): 1471-1482.
12. Taddese Alemu Zerfu, Melaku Umeta and Kaleab Baye. *Dietary habits food taboos and perceptions towards weight gain during pregnancy in arsi, rural central Ethiopia.* *J Health Popul Nutr.* (2016) (35): 22-24.
13. Dires Igne Misker, Begosew Misker and Gistane Ayele. House hold dietary diversity and associated factors in Mirab Abaya wereda Southern Ethiopia, insight Medical publishing Group, 2016, 13(4): page.1
14. Marie Claude Dop. Guidelines for measuring dietary diversity of women (FAO–FANTA), Montpellier, France, Nutripass Nutrition research. 2016.15
15. Willy Kiboi, Judith Kimiywe and Peter Chege. Determinants of dietary diversity among pregnant women in Laikipia County, Kenya: BMC Nutrition, 2017; 3:12. 5-6
16. Fatima Ali, Inayat Thaver and Shahzad Ali. Assessment of dietary diversity and nutritional status among pregnant woman in Islamabad, Pakistan. *Jour. PubMed.* 2014. 26(4): 507-8.
17. Abrehet A, Melkie EY and Molla MW. Prevalence and associated factors of anemia among pregnant women of mekelle town. *BMC Res.*, 2014. 7(888): 7-9.
18. SAMUKELISIWE STHOKOZISIWE MADLALA. The dietary diversity, household food security status and presence of depression in relation to pregnancy pattern of weight gain and infant birth weight, PIETERMARITZBURG, SOUTH AFRICA, 2017: 85
19. Girma Nega, Melkie Endris, Degnet Teferi, Amanuel Nana and Rigbe W/Michael. Dietary Diversity and Associated Factors among Households in South Gondar, Ethiopia, 2015. 21
20. Shamsul Zainal, Jayashree Arcot, Sharifah Haron, Laily Paim, Norhasmah Sulaiman and Jariah Masud, et al. Food Variety and Dietary Diversity Scores to Understand the Food-Intake Pattern among Selected Household, Malaysia, *Ecology of Food and Nutrition*, 2012. 51:4. 278
21. Anu Rammohan, Srinivas Goli, Deepti Singh and Uma Singh. Maternal Dietary Diversity and Risk of Low Birth Weight: Empirical Findings from India, *J Nutr.* 2017. 8

22. GetnetMekuria, YalewsewWubneh and TilahunTewabe. Household dietary diversity and Associated factor among resident of FinoteSelam town, Ethiopia. BMC Nutri. 2017, 3:28.4-5

## Tables

Due to technical limitations, the tables are only available as a download from the supplemental file section

Table 1: Socio-demographic and economic related factors of the study participants in Hossana town, South Ethiopia, 2018 (n=303)

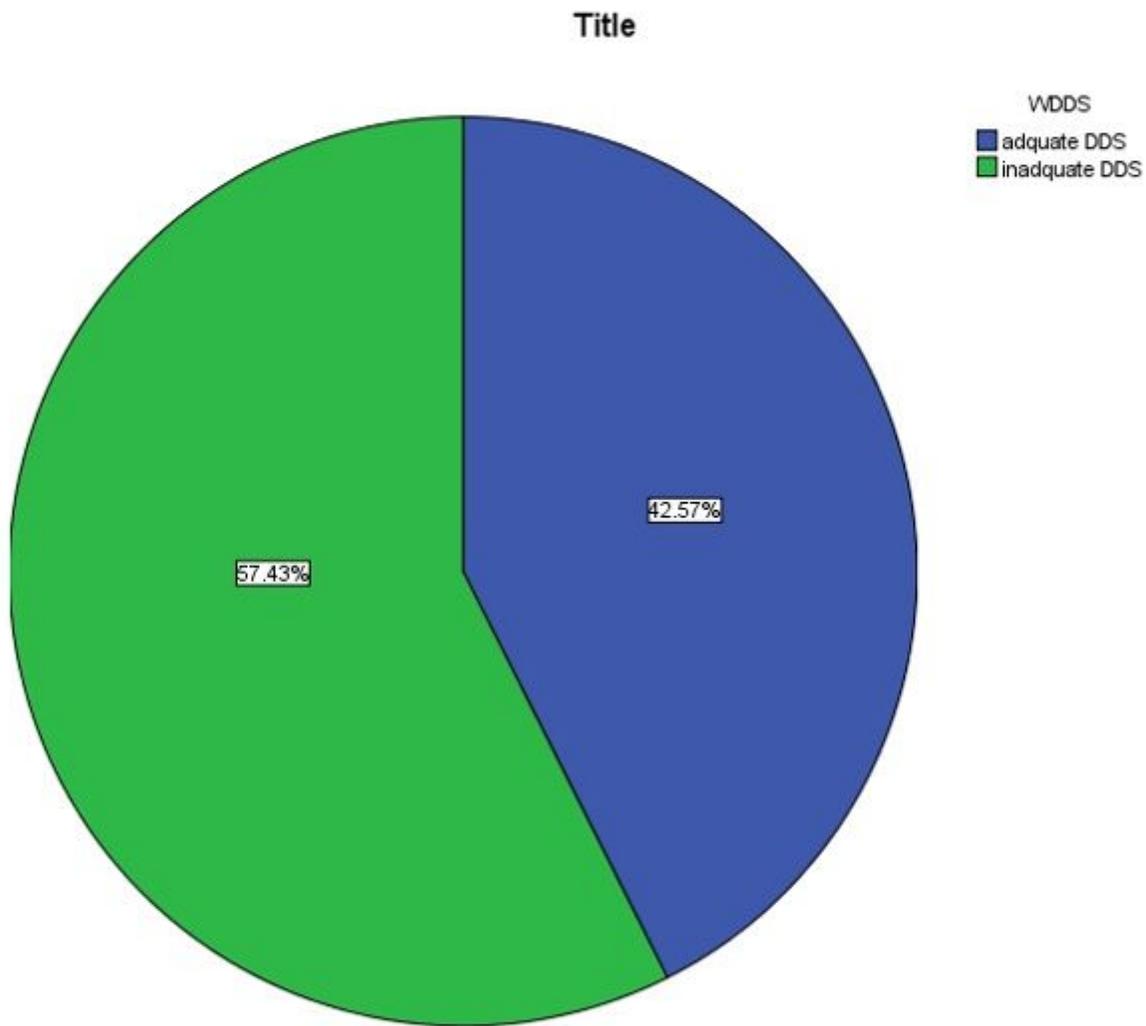
Table 2: Pregnancy and clinical related characteristics of study participants in Hossana town, South Ethiopia, 2018 (n=303)

Table 3: Dietary related characteristics of pregnant women in public health facilities in Hossana town, South Ethiopia, 2018 (n =303)

Table 4: Food groups consumption patterns of pregnant women in public health facilities in Hossana town, South Ethiopia, 2018 (n =303).

Table 5: Predictors of dietary diversity with socio-demographic and socio-economic, pregnancy plus clinical related characteristics and nutritional intake factors among pregnant women in public health facilities in Hossana town, South Ethiopia, 2018 ( $n = 303$ ).

## Figures



**Figure 1**

Prevalence of dietary diversity among pregnant women in public health facilities in Hossana town, South Ethiopia, 2018 ( $n = 303$ )

## Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [supplement1.pdf](#)