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Original Research Article

Dietary practices and nutritional status of primigravida women attending antenatal clinic at Embu level five hospital, Kenya

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ABSTRACT

Background: Good nutrition during the antenatal period is vital for the well-being of the gravid woman and the developing fetus. There is limited data available regarding the dietary practices and nutrition status of pregnant women, specifically primigravida women. This study aimed at determining the dietary practices and nutrition status of primigravida women attending antenatal clinic at Embu Level Five Hospital, Kenya.
Methods: The study adopted a cross-sectional analytical study design. All primigravida mothers aged between 18 and 49 years meeting the inclusion criteria were recruited for the study. Data was collected in the month of August 2023 using a researcher-administered semi-structured questionnaire. Association between dietary practices and nutrition status was established using regression analysis.
Results: The majority 65.9%, (n=87) of the respondents had poor dietary practices while 70.5%, (n=93) of the participants were undernourished. The mean MUAC was SD 24.3±3.3 cm and the mean hemoglobin level was SD 12.04 ±1.6 g/dl. Those participants with good dietary practices were more likely to have good nutrition status compared to those with poor dietary practices (AOR = 1.61: 95% CI; 0.81–2.28).
Conclusions: The study revealed a high burden of poor dietary practices and undernutrition among participants, with a positive trend between good dietary habits and better nutritional status. Nutrition education and behavior change interventions should be prioritised to improve dietary practices and overall nutritional health.

Keywords: Antenatal care, Dietary practices, Dietary diversity, Meal frequency, Nutritional status, Primigravid women

INTRODUCTION

Maternal nutrient deficiency is a significant public health problem around the world, particularly in developing countries, leading to adverse maternal and child health outcomes. Good nutrition is crucial for a successful and healthy pregnancy.[1] The outcome of pregnancy is highly dependent on proper nutrition, making it essential to follow optimal dietary practices throughout this period.[1] Of note, nutritional status during the antenatal period affects both the mother's and the baby's health, so it is vital to maintain a healthy and balanced diet throughout pregnancy.[2,3] Malnutrition before or during pregnancy increases the risk of anemia and poor pregnancy outcomes.[4] Therefore, it is highly recommended that pregnant women should eat frequently to meet their growing nutritional needs.[5] Reduced meal frequency can lead to preterm birth, low birth weight infants, and poor maternal nutritional status, which can negatively impact both the mother and baby.[6] Thus, maintaining a healthy

and balanced diet throughout pregnancy is essential for the well-being of both the mother and the baby.

During pregnancy, it's essential for women to consume more food and have a varied diet to ensure that all the essential nutrients required for fetal growth and development are made available.[7,22] However, in third-world nations, there is a lack of food diversity due to food scarcity, leading to a dependence on available and affordable staple foods, which in turn increases the rates of poor nutrition among pregnant women. This can lead to undernutrition during pregnancy and the postpartum period and can have negative consequences for both mother and baby.[8]

To combat this issue, it's crucial to determine pregnant women's dietary practices and nutrition status, as well as the factors that influence them. Understanding this can help plan effective nutritional interventions during pregnancy and reduce the risk of adverse maternal and fetal outcomes.[9,10]

While some studies on dietary practices and nutrition status among pregnant women have been conducted in other parts of Kenya, there is a lack of data on primigravida women. Most studies have focused on all pregnant women, but not this specific group. Therefore, this study sought to determine the dietary practices and nutrition status of primigravida women attending antenatal clinics at Embu Level Five Hospital in Kenya.

METHODS

Study design and settings

The research adopted a cross-sectional analytical design for the study from 1st to 31st August 2023. The study was conducted at Embu level Five hospital which is a level 5 county Referral and Teaching Hospital, within Embu County, Kenya. Embu County is a county of Kenya. Embu County is a large and largely metropolitan area with a population of 608,599 persons 37, 15. The county borders Kirinyaga to the west, Kitui to the east, Tharaka Nithi to the north, and Machakos to the south. The county occupies an area of 2,821 km^2. The hospital is located approximately 120 kilometres (75 mi) northeast of Nairobi towards Mount Kenya.

Source population and study population

All pregnant primigravida women who lived in Embu County at the time of data collection were considered as the source population, and sampled first-time pregnant women attending the antenatal clinic at Emu County and Referral Hospital were taken as the study population.

Variables of the study

Nutrition status was the dependent variable while demographic and socioeconomic, maternal characteristics, and dietary practices were the independent variables.

Inclusion and exclusion criteria

All primigravida pregnant women who lived for at least six months in the study area and were not critically ill were included. Additionally, primigravida above 18 years who consented were included while those who were very sick were excluded.

Sample size and sampling techniques

The researcher used a census (100%) of the mothers meeting the inclusion criteria within one month. The study recruited and reported data on 132 primigravida women.

Data collection tools and procedures

The researcher used a researcher-administered questionnaire. The questionnaire had four parts. These were socio-demographic, maternal characteristics (pregnancy related characteristics), dietary practices, and nutritional status. Respondents were recruited at Embu Level 5 Hospital, mother and child antenatal clinic for the study. All primigravida mothers were interviewed and assessed during the study period. Dietary practices were measured using dietary diversity and meal frequency. Dietary diversity was measured using the ten food groups suggested by the Food and Agriculture Organization (FAO). The women were asked how frequently they consumed a particular food for the last 3 days from each food group. Based on the FAO cut of points; dietary diversity was considered adequate (good) if a woman consumed at least five food categories in the previous 3 days before the date of data collection and inadequate (poor) if she consumed less than five food groups. The ten food groups included were: (1. Grains and cereals, 2. seeds and nuts, 3. Pulses, 4. dairy, 5. eggs, 6. poultry and fish, 7. Meat, 8. Vitamin A-rich fruits and vegetables 9. dark green leafy vegetables,10. other vegetables).

The number of food groups consumed by each woman was used to assess the dietary diversity score of the women. Meal frequency was assessed as the number of meals the pregnant women consumed in the preceding 24 hours from the time of data collection. The nutritional status of the primigravida women was evaluated by measuring the mid-upper arm circumference (MUAC) of the respondents by use of a standardized non-stretchable tape and by determination of their hemoglobin levels in the blood that had been taken from the laboratory tests done as a routine for all the antenatal mothers attending ANC.

Data quality assurance

The data collection tools were pretested at Kerugoya County Hospital. The hospital was chosen for pre-testing

since it was of the same characteristics as the hospital where the study was conducted. The researcher pre-tested the tool among 14 participants which comprised 10% of the expected sample size. The pre-test was carried out on data collection tools to determine if the tools would produce the required information precisely.

Data processing and analysis

Dietary diversity was measured using the ten food groups suggested by the Food and Agriculture Organization (FAO). Based on the FAO cut of points; dietary diversity was considered good if a woman consumes at least five food categories and poor if she consumes less than five food groups during the reference period. Furthermore, meal frequency was considered good if a woman consumed three or more meals in a day and poor if she consumed less than three meals. The nutritional status of the primigravida women was evaluated by MUAC and HB levels. MUAC of less than 23 cm was considered as malnutrition. According to WHO, MUAC <19 cm indicates severe malnutrition, MUAC between 19-22.9 cm indicates mild malnutrition while that >23 cm is normal. In addition, a hemoglobin level of less than 11.5 g/dl, was considered as being anemic while that above that was considered normal.

A respondent was considered malnourished if she was wasted or had anemia in pregnancy, while respondents with neither wasting nor anemia, were considered as being adequately nourished. Descriptive statistics like percentage, mean and standard deviation were used to describe the study population. The association between dietary practices and nutrition status was established using logistic regression. The results of the association were presented by the odds ratio with a 95% confidence interval. A p value of <0.05 is used to declare a statistically significant association.

Operational definition of terms

Dietary practices

Dietary diversity and meal frequency of the respondents.

Good dietary practices

Practice of consuming more than five food groups out of ten and three or more meals per day

Nutrition status

The mid-upper arm circumference and the hemoglobin levels of the primigravida women.

Good nutrition status

Having a Hb level of above 11 g/dl and MUAC value of 23 and above.

RESULTS

Characteristics of the study population

The demographic and socio-economic characteristics included in the study were: age in completed years, marital status, education level of the participant, employment status, and average income per week. The majority (68.9%) of the primigravida women were aged 21-30 years, were married (73.5%), and had secondary education (45.5%) as their highest level of education. The employment status showed that the majority (54.5%) of the respondents were unemployed at the time of data collection. Out of the total study participants, 97 (73.5%) reported to be earning below KSh 2000 per week.

Table 1: Socio-economic and demographic characteristics of the respondents (n=132).

Characteristics	Frequency (N)	%
Age in years		
20 and below	32	24.2
21-30	91	68.9
31-40	8	6.1
Above 40	1	0.8
Marital status		
Married	97	73.5
Single	35	26.5
Education level		
Tertiary	46	34.8
Secondary	60	45.5
Primary	22	16.7
No basic education	4	3
Employment status		
Formally employed	31	22.0
Informally employed	29	23.5
Unemployed	72	54.5
Income per week (Kenya shillings)		
Below 2000	97	73.5
2000-5000	31	23.5
Above 5000	4	3

Pregnancy-related characteristics of the participants

Table 2 shows that 36.4% (n=48) of the respondents were taking a combination of iron and ferrous supplements. As for the number of antennal clinic (ANC) visits, 34.1% (n=45) of the respondents had visited the clinic twice. Concerning the gestation ages of the participants' pregnancies, the majority 47% (n=62) were in the second trimester and another 47% (n=62) were in the third trimester.

Dietary practices of the respondents

Dietary practices entailed frequency of meals taken and dietary diversity among the respondents. These practices focused on foods consumed in the last three days, the

number of meals consumed in a day, and the number of snacks taken between meals.

Table 2: Pregnancy-related characteristics of the respondents (n=132).

Characteristics	Frequency (N)	%
Supplements intake		
Yes	82	62.1
No	50	37.9
Type of supplement		
Iron only	12	9.1
Ferrous only	6	4.5
Iron and ferrous combined	48	36.4
Unknown	16	12.1
None	50	37.9
Number of ANC visits		
One	39	29.5
Two	45	34.1
Three	20	15.2
Four	15	11.4
More than four	13	9.8
Gestation stage		
First trimester	8	6.1
Second trimester	62	47.0
Third trimester	62	47.0

Table 3: Number of meals consumed per day.

Number of meals	Frequency (N)	%
Less than 3 meals	59	44.7
3 meals	39	29.5
More than 3 meals	34	25.8
Total	132	100.0

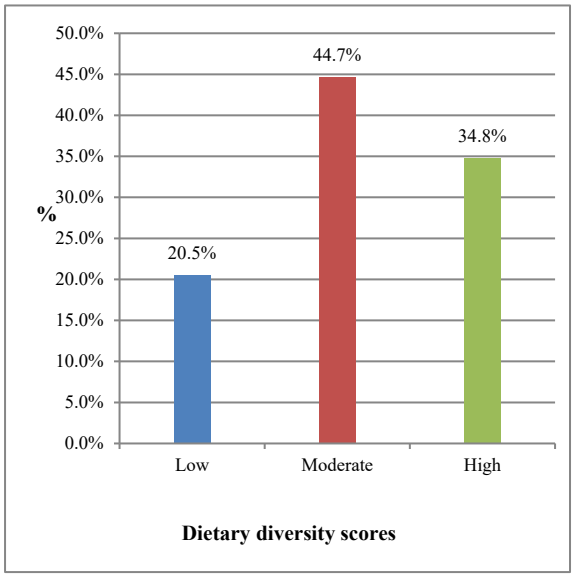

Figure 1: Dietary diversity scores among the participants.

Meal frequency per day

Table 3 on participant's meal frequency showed that 44.7% (n=59) of the respondents were taking less than 3 meals per day.

Dietary diversity of primigravida women

The results showed that all the respondents 100%, (n=132) of the respondents had consumed grains and cereals for the last 3 days before the study, 76.5% (n=101) had consumed pulses, with nuts and seeds 24.2% (n=32) being the least consumed as shown in Table 4.

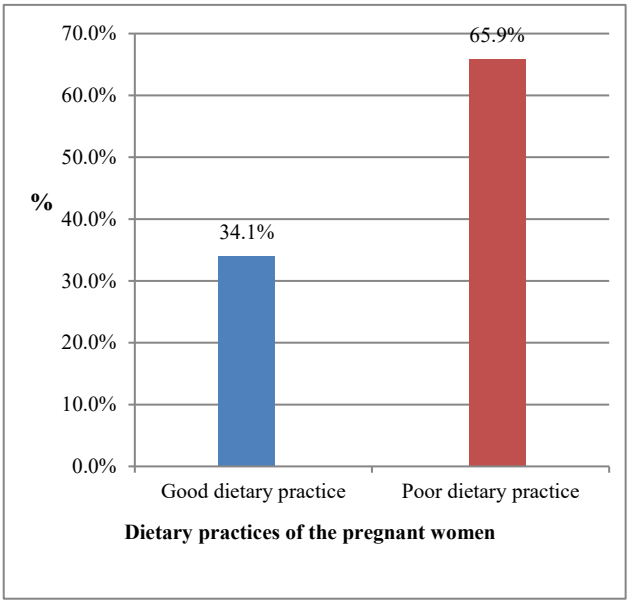

Figure 2: Dietary practices of the study participants.

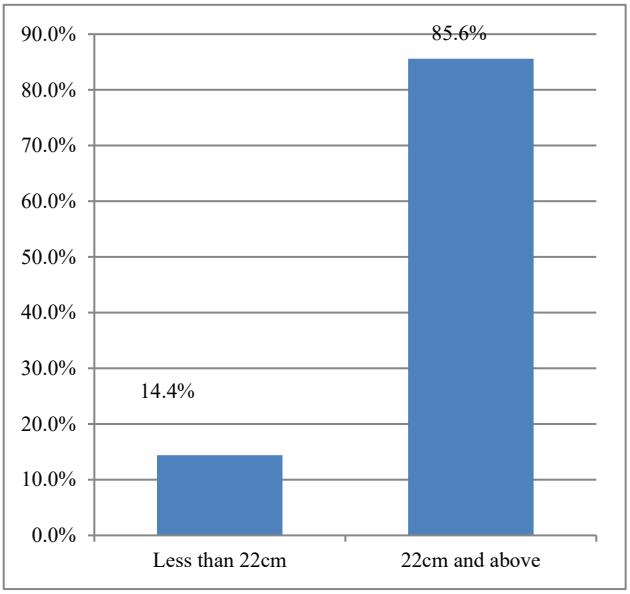

Figure 3: Mid-upper arm measurements of the respondents.

Dietary diversity score of the respondents

The dietary diversity scores were classified into low (1-4), medium (5-6), and high (7-10). The results summarized in Figure 1 show that most of the respondents (44.7%, n=59) had a moderate dietary diversity score with a mean DDS of 4.

The overall dietary practice

The overall dietary practice indicated that most of the respondents 65.9% (n=87) had poor dietary practice as shown in the Figure 2.

Table 4: Frequency of consumption per food group.

Food group description	Consumed	
	N	%
Grains and cereals e.g.: maize, wheat	**132**	**100**
Pulses (dry) e.g.: beans, peas, lentils	101	76.5
Nuts and seeds e.g.: sesame, sunflower, pumpkin, cashew nuts, macadamia, almond, walnuts, peanuts	32	24.2
Dairy (solid or liquid) e.g.: cow, goat, sheep, Carmel	69	52.3
Meat, fish, and poultry any organ meat like liver, spleen, poultry, fish, seafood.	63	47.7
Eggs (from any bird)	64	48.5
Dark green leafy vegetables (both local and non-local)	98	74.2
Fruits rich in Vitamin A and vegetables e.g. ripe mangoes, ripe papaya, pal fruit, passion, apricot, melon, oranges, ripe bananas	88	66.7
Other vegetables e.g.: fresh peas, green beans, cucumber, okra,	57	43.2
Other fruits e.g.: tomatoes	97	73.5

Nutrition status of the participants

Nutrition status of the participants by MUAC

The study revealed that 14.4% (n=19) of the respondents had MUAC of less than 23cm, which meant that they were malnourished, while the majority (85.6%, n=113) were well nourished. The mean MUAC was 24.3±3.3 cm, and the measurements ranged from 20-42cm.

Nutritional status by Hb levels

Most of the respondents (67.4%, n=89) had hemoglobin levels of less than the recommended 11.5 g/dl for the women. The mean Hb was 12.04 g/dl, and with a standard deviation of 1.6 g/dl. The hemoglobin level measurements ranged between 8.4 and 17.3g/dl.

Overall nutritional status of the participants

A respondent was considered malnourished if she was wasted or had anemia in pregnancy, while respondents with neither wasting nor anemia, were considered as being adequately nourished. The nutritional status of the respondents revealed that the majority (70.5%) of the respondents were undernourished as presented in Figure 4.

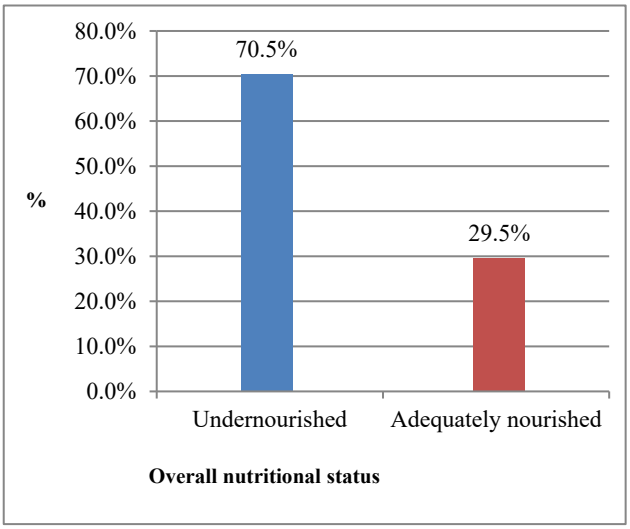

Figure 5: Overall nutrition status of the respondents.

Relationship between dietary practices and nutrition status

Regression analysis revealed statistically significant association between dietary practices and nutrition status (OR = 1.614; C.I 0.805-3.278; p value = 0.041). Those with good dietary practices were 1.61 times more likely to be adequately nourished as compared to those with poor dietary practices.

DISCUSSION

The dietary practices adopted by pregnant women have a significant impact on the long-term health and well-being of both the mother and her growing fetus. Suboptimal dietary practices during pregnancy can lead to a range of adverse outcomes including stillbirths, premature birth, low birth weight, maternal and prenatal mortality. The study aimed to investigate the dietary habits and nutritional status of first-time pregnant women in Embu County, Kenya. The findings of the study revealed that only 34.1% of the study participants had good dietary practices, suggesting a need for interventions to improve maternal nutrition and promote healthy pregnancies in the region. This study's findings are in line with other studies conducted in Ethiopia which reported a prevalence of 31.4%.[32] The magnitude of poor dietary practice in this study is higher than the 54.8% that was reported in Northeastern Ethiopia.[30] These variations may result from differences in the agro-economic practices followed in a

particular region, the specific cultural practices of a community, an individual's dietary preferences or restrictions, and the seasonal variation in food production and consumption. The unavailability of certain food items, climatic conditions, and socio-economic factors can also influence the food consumption patterns of a particular region. Therefore, the dietary habits of individuals can significantly vary based on the above factors and can have a profound impact on their overall health and well-being.

Regarding specific dietary practices, about 44.7% of pregnant women had a meal frequency of less than three per day. Moreover, over three-quarters of the women (76.5%) were snacking less than three times per day between meals. This is a concern, as pregnant women need to eat more calories and nutrients than non-pregnant women. Eating less than three main meals per day can lead to inadequate intake of calories and nutrients, which can have a negative impact on the health of both mother and baby. This study was in agreement with, who stated that 41.2% of pregnant women in Nairobi, Kenya, reported skipping at least one meal per day and about 25.8% of pregnant women are consuming less than three meals and two snacks daily.[27] Additionally, noted that 46.7% of primigravida women attending antenatal clinics in rural Ethiopia reported skipping at least one meal daily and about 32.5% of the women were consuming less than three meals and two snacks daily.[20,21,25] Another study in Ethiopia reported that about 47% of pregnant women had a meal frequency of less than three per day.[17,18,30] Similar study stated that 38.1% of primigravida women in India reported skipping at least one meal per day and about 27.4% of the primigravida women were consuming less than three meals and two snacks per day.[28]

With regards to dietary diversity, this study found that the women had a relatively high dietary diversity score), with 100% of them consuming cereals and grains, followed by pulses (76.9%). The frequency of consumption of the cereal food group was higher than that of the other food groups. All the women had consumed grains and cereals. One possible reason for this is that these foods are readily available in local markets at low prices (meaning they are affordable) and easy to prepare. It is important to note that dietary diversity does not necessarily equate to nutritional adequacy. Most of the respondents (44.7%, n=59) had a moderate dietary diversity score with a mean DDS of 4. Contrary to this study, found that the dietary diversity score of primigravida women at Meru, Kenya was 3.8 out of a possible 9.[26] However, the findings of food group consumption of that study were consistent with this study. The most commonly consumed food groups reported by the study were cereals and grains (100%), followed by pulses (76.9%). (19,25), reported a lower dietary diversity score (3.6 out of a possible 9) of primigravida women attending antenatal clinics in rural Ethiopia. The most commonly consumed food groups were also cereals and grains (99.1%), followed by pulses (80.5%) and vegetables (76.2%). Likewise, found that the mean dietary diversity score of pregnant women in Nairobi, Kenya was 3.5 out of a possible 9.[24,27,29] The most commonly consumed food groups were cereals and grains (97.9%), followed by pulses (74.7%), vegetables (72.4%), fruits (68.7%), meat and poultry (56.5%), fish (47.9%), eggs (45.4%), dairy products (37.4%), and oils and fats (34.5%). The discrepancies could be attributed to differences in study settings, agricultural practices of the regions, and demographic and socioeconomic characteristics of the study populations.

With regards to nutrition status, this study found that about 14.4% had a MUAC (mid-upper arm circumference) of below 23 cm. The result is consistent with other findings from Kenya where 19.3% of pregnant women were reported undernourished.[11] In addition, another study found that 14.4% of women had a MUAC of less than 22 cm.[26]

The findings of the present study indicate a higher prevalence of undernutrition in pregnant women compared to a study conducted in China, where only 11.8% of pregnant women were found to be undernourished.[26] However, the prevalence of undernutrition in this study was lower than that reported in Bangladesh (32%) and in the Boricha district of southern Ethiopia (35.5%).[23,34] These variations in prevalence rates could be attributed to several factors such as the stage of pregnancy, nutritional practices, seasonal variations in food consumption, and the use of different cut-off points for mid-upper arm measurement in different studies. It is important to consider these factors when interpreting the prevalence rates of undernutrition in pregnant women across different settings.

During pregnancy, maintaining a healthy hemoglobin (HB) level is crucial for both the mother and the baby's well-being. However, according to this study, nearly two-thirds of the women (67.4%) had an HB level of less than 11 g/dl, indicating a high prevalence of anemia among pregnant women. Anemia can cause various complications during pregnancy, such as maternal fatigue, weakness, and an increased risk of postpartum hemorrhage. It can also lead to impaired fetal growth, premature birth, and low birth weight, posing a serious threat to the baby's health. The study's findings are consistent with previous research conducted in Kenya, Indonesia, Ethiopia, and other regions, indicating that anemia is a common issue among pregnant women globally. For instance, another study conducted among primigravida women attending antenatal clinics in a public hospital in Indonesia reported a similar anemia prevalence rate of 67.4%. Similarly, a study in rural Ethiopia found that 73.2% of primigravida women attending antenatal clinics were anemic.[27] Reported that 65.4% of pregnant women in Nairobi were anemic.[12-14] These findings highlight the need for effective interventions to address anemia among pregnant women. Early detection and appropriate management of anemia

during pregnancy can help prevent adverse outcomes for both the mother and the baby. Therefore, it is essential to scale up efforts to improve maternal health and reduce the burden of anemia during pregnancy. The current research revealed that there was a significant association between dietary practices and nutrition status of the primigravida women. Notably, the study's findings are consistent with those of previous research which demonstrated a relationship between MUAC measurements and dietary diversity scores in pregnant women.[31,35] Similarly a significant correlation between MUAC and DDS in primigravida women was reported.[11,30,36] In summary, the research highlights the crucial role of dietary practices in determining the nutritional status of primigravida women. The study underscores the need for effective interventions to improve dietary practices among pregnant women to promote their overall health and that of their unborn children.

Strengths and limitations of the study

The study employed anthropometric and biochemical indicators alongside dietary assessments which provides a comprehensive picture of the participants' nutritional status. For limitations, since the study was conducted among primigravida women attending a specific hospital's antenatal clinic, the findings may not be generalizable to all pregnant women in the community especially those who do not seek antenatal care.

CONCLUSION

The study found that the majority of primigravida had poor dietary practices and nutritional status. This is a significant concern that highlights the urgent need for improved nutritional education and counselling for pregnant women. Nutrition education should be tailored specifically to pregnant women to meet their particular needs. Moreover, healthcare settings and community centers should provide educational resources and materials to pregnant women to improve their knowledge and understanding of proper nutrition. It is also crucial to develop peer support groups and community-based programs where pregnant women can come together to share their experiences, exchange tips, and provide each other with encouragement to adopt healthier dietary practices. These networks could also facilitate pregnant women's access to a variety of nutrient-dense foods, which would help them improve their nutritional status and ensure better health outcomes for both the mother and the child. Another important aspect is to provide income-generating activities for unemployed pregnant mothers. This would empower them economically and enable them to have the purchasing capacity to buy nutritious food for themselves and their family. By addressing these issues, we can create a healthier and more supportive environment for pregnant women, leading to better health outcomes for both the mother and the child.

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REFERENCES

1. Adhikari DR, Gautam DK, Chaudhari MK. Corporate Social Responsibility Domains and Related Activities in Nepalese Companies. International Journal of Law and Management. 2016;58:673-84.
2. Nana A, Zema T. Dietary practices and associated factors during pregnancy in northwestern Ethiopia. BMC Pregnancy Childbirth. 2018;18:183.
3. Riang'a RM, Nangulu AK, Broerse JE. When a woman is pregnant, her grave is open: health beliefs concerning dietary practices among pregnant Kalenjin women in rural Uasin Gishu County, Kenya. J Health Pop Nut. 2017;36(1):53.
4. Kang Y, Heidkamp RA, Mako-Mushaninga K. Factors associated with diet diversity among infants and young children in the Eastern and Southern Africa region. Mat Child Nutrition. 2023;19(3):e13487.
5. Diana R. Food taboos and suggestions among Madurese pregnant women: a qualitative study. Journal of Ethnic Foods. 2018.
6. Selekane AM. Assessment of Nutritional Status and Dietary Intake of Pregnant Women in Rural Area of Vhembe District, Limpopo Province. 2019;1690999.
7. Henderson, Hazel. Book review: "nourished planet" Editor, Danielle Nierenberg, Island Press, 2018.
8. Tessema Y. Dietary Diversity and Associated Factors among Pregnant Women Attending Antenatal care at in jibara General Hospital, Northwest Ethiopia. 2020.
9. Vorster HH, Kruger A, Margetts BM. The Nutrition Transition in Africa: Can It Be Steered into a More Positive Direction? Nutrients. 2017;3(12):429-41.
10. Rosen JG, Clermont A, Kodish SR, MatarSeck A, Salifou A, et al. Determinants of dietary practices during pregnancy: A longitudinal qualitative study in N iger. Mat Child Nutr. 2018;14(4):e12629.
11. Kiboi W, Kiminywe J, Chege P. Dietary diversity, nutrient intake and nutritional status among pregnant women in Laikipia County, Kenya. Int J Health Sci Research. 2016;378-9.
12. Herforth AW, Wiesmann D, Martínez-Steele E, Andrade G, Monteiro CA. Introducing a suite of low-burden diet quality indicators that reflect healthy diet patterns at population level. Current Develop Nutrit. 22020;4(12):nzaa168.
13. Aliwo S, Fentie M, Awoke T, Gizaw Z. Dietary diversity practice and associated factors among pregnant women in North East Ethiopia. BMC Research Notes. 2019;12.
14. Desta EA, Demissie B, Amele KW. Prelacteal feeding practice and its associated factors among mothers of

children age less than 24 months old in Southern Ethiopia. Ital J Pediatr. 2019;45:15.
15. Central Statistical Authority [Ethiopia] and ORC Macro: Ethiopia Demographic and Health Survey. Addis Ababa, Ethiopia, and Calverton. Maryland: Central Statistical Authority and ORC Macro; 2000;2001.
16. FAO and FHI 360. Minimum Dietary Diversity for Women: A Guide for Measurement. Rome: FAO. 2016.
17. Tang AM. Determining a Global Mid-Upper Arm Circumference Cutoff to Assess Malnutrition in Pregnant Women. Washington, DC: FHI 360/Food and Nutrition Technical Assistance III Project (FANTA). 2016.
18. Shehab L. Nutritional Awareness of Women during Pregnancy. J American Sci. 2012;8(7):1.
19. Mahrnood MFA SS, Mujeeb A, Bano N, Mubasher H. Assessment of Nutritional Beliefs and Practice in Pregnant and Lactating Mothers in an Urban and Rural Area of Pakistan. 2015:60-2.
20. Hoffmann JF, Nunes MAA, Schmidt MI, Olinto MTA, Melere C, Ozcariz SGI ea. Dietary patterns during pregnancy and the association with sociodemographic characteristics among women attending general practice in southern Brazil: the ECCAGe Study. Cadernos de Saude Publica. 2013;29(5):970-80.
21. Zelalem A, Endeshaw M, Ayenew M, Shiferaw S, Yirgu R. Effect of nutrition education on pregnancy specific nutrition knowledge and healthy dietary practice among pregnant women in Addis Ababa. Clinics Mother Child Health. 2017;14:265.
22. Krondl M, Coleman P. Social and biocultural determinants of food selection. Prog Food Nutr Sci. 1986;10:179–203.
23. Hossain B, Sarwar T, Reja S, Akter MN. Nutritional status of pregnant women in selected rural and urban area of Bangladesh. J Nutr Food Sci. 2013;3:219.
24. Diana R, Chistianti DF, Anwar F, Kusuma R, Rachmayanti RD, Khomsan A. Food suggestions, meal frequency and dietary diversity among pregnant women: a quantitative study. Future of Food: Journal on Food, Agriculture and Society. 2020;8(3):1.
25. Gelebo, D. G., Gebremichael, M. A., Asale, G. A., & Berbada, D. A. (2021). Prevalence of undernutrition and its associated factors among pregnant women in Konso district, southern Ethiopia: A community-based cross-sectional study. BMC Nutr. 2021;7(1):32.
26. Karanja J, Nyamongo M. Maternal underweight and the risk of preterm birth and low birth weight: a systematic review and meta-analyses. Int J Epidemiol. 2017;40(1):65-101.
27. Onyango D, Waudo J, Kuria EN. Dietary assessment of vitamin A and Iron among pregnant women at Ndhiwa Sub District Hospital–Kenya. African J Food Agriculture, Nutrit Develop. 2019;14(5):2114-28.
28. Sharma S, Patnaik L, Pattanaik S, Kar D, Bhuyan R. Nutritional Status of Pregnant Women in India. Ann Romanian Society for Cell Biol. 2021;25(2):1352-5.
29. Silambuselvi K, Muruguvalavan V. To assess the knowledge about nutrition and prevalence of anemia among primi gravida mothers. Asian J Multidimensional Res. 2018;7(2):198-204.
30. Diddana TZ. Factors associated with dietary practice and nutritional status of pregnant women in Dessie town, northeastern Ethiopia: a community-based cross-sectional study. BMC Pregnancy Childbirth. 2019;19:1-0.
31. Zerfu TA, Biadgilign S. Pregnant mothers have limited knowledge and poor dietary diversity practices, but favorable attitude towards nutritional recommendations in rural Ethiopia: evidence from community-based study. BMC Nutrition. 2018;4:1-9.
32. Yismaw WS, Teklu TS. Nutritional practice of pregnant women in Buno Bedele zone, Ethiopia: a community based cross-sectional study. Reprod Health. 2022;19:84.
33. Daba G, Beyene F, Fekadu H, Garoma W. Assessment of knowledge of pregnant mothers on maternal nutrition and associated factors in Guto Gida Woreda, East Wollega Zone, Ethiopia. J Nutr Disorders Ther. 2013;4(1):1-7.
34. Wassie MM, Gete AA, Yesuf ME, Alene GD, Belay A, Moges T. Predictors of nutritional status of Ethiopian adolescent girls: a community based cross sectional study. BMC Nutrit. 2015;1:1-7.
35. Ravaoarisoa L, Raherimandimby H, Rakotonirina J, Rakotomanga JD, Dramaix MW, Donnen P. Mothers' dietary practices in the Amoron'i Mania region Madagascar. Pan African Medical Journal. 2018;30(1):1.
36. Russell J, Lechner A, Hanich Q, Delisle A, Campbell B, Charlton K. Assessing food security using household consumption expenditure surveys (HCES): a scoping literature review. Public Health Nutrition. 2018;21(12):2200-10.
37. KNBS and ICF. 2023. Available at: https://www.knbs.or.ke. Accessed on 17 May 2024.
38. Food and Nutrition Technical Assistance III Project. (FANTA). 2016. Landscape of Nutrition Indicators within Government. Available at: https://www.fantaproject.org. Accessed on 17 May 2024.

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