

Original Research Article

A study to assess the dietary intake among antenatal mothers attending selected CHCs at district Ambala

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ABSTRACT

Background: Maternal nutrition plays a crucial role in determining pregnancy outcomes and the health of both mother and fetus. Inadequate dietary intake during pregnancy is associated with complications such as anemia, low birth weight, preterm birth, and maternal morbidity. Despite national nutritional programs, maternal undernutrition remains a significant public health issue in India.

Methods: A quantitative non-experimental descriptive study was conducted among 100 antenatal mothers aged 18-40 years attending selected community health centers (CHCs) in District Ambala, Haryana. Convenient sampling technique was used. Data were collected using a structured tool consisting of socio-demographic variables, food frequency questionnaire (FFQ), and 24-hour dietary recall checklist. Dietary intake was assessed based on calorie and nutrient adequacy.

Results: The study revealed variability in dietary intake among antenatal mothers. A considerable proportion of participants exhibited inadequate nutrient intake, particularly in iron, protein, and micronutrients. Based on FFQ scoring, a significant number of mothers had fair to poor diet quality. Associations were observed between dietary intake and socio-demographic variables such as education, socioeconomic status, and antenatal visits. Food quality also showed a significant relationship with dietary intake.

Conclusions: The study highlights the need for targeted nutritional education and interventions among antenatal mothers. Strengthening antenatal counselling services and improving awareness regarding balanced diet can significantly enhance maternal and fetal outcomes.

Keywords: Antenatal mothers, Dietary intake, Food frequency questionnaire, India, Maternal nutrition, Pregnancy

INTRODUCTION

Pregnancy is a critical period characterized by increased nutritional demands necessary for fetal growth and maternal well-being.¹ A normal pregnancy lasts approximately 40 weeks and is divided into three trimesters, each associated with specific physiological and nutritional requirements.² Adequate maternal nutrition during this period is essential to prevent complications such as low birth weight, intrauterine growth restriction, gestational diabetes, and maternal anemia.³

Globally, maternal undernutrition remains a major public health concern, particularly in low- and middle-income countries.⁴ In India, a substantial proportion of pregnant women suffer from nutritional deficiencies, contributing significantly to maternal and neonatal morbidity and mortality. Studies suggest that maternal undernutrition accounts for nearly 68% of child deaths under five years of age in India.⁵

Socioeconomic factors, cultural beliefs, and lack of nutritional knowledge significantly influence dietary

practices during pregnancy. In many communities, food taboos and misconceptions restrict the intake of essential nutrients. Additionally, limited access to healthcare services and inadequate antenatal counselling further exacerbate the problem.⁶

Antenatal care (ANC) provides an important opportunity to educate mothers about proper nutrition. WHO guidelines (2016) emphasize nutritional counselling and supplementation as key components of ANC to improve maternal and neonatal outcomes.⁷

A 2016 United Nations Children Fund (UNICEF) analysis found that maternal nutritional status is influenced by a number of factors, including access to health care facilities, a healthy environment, maternal care practices, and household food security. Pregnant women's dietary diversity and nutritional status are also influenced by sociodemographic factors like age, wealth index, residence, occupation, farmland size, and illiteracy or low education, as well as maternal and health care-related factors like age at marriage, ANC visits, counselling during antenatal care, level of knowledge, awareness, attitude, and practices regarding nutritious food intake, food taboos, women's empowerment, and craving.⁸

Widespread maternal under nutrition has been blamed for low birth weight in India. Planning an effective intervention to increase the birth weight of Indian newborns requires a deeper understanding of the relationship between mother nutrition and birth size.⁹

In 2019 Patel et al surveyed 400 antenatal women and revealed that 47% had a diet that lacked essential nutrients, particularly proteins, vitamins, and minerals. The research identified a strong association between poor maternal nutrition and complications such as gestational diabetes, which was observed in 14% of participants. The authors emphasized the importance of improving dietary education and promoting nutrient-dense foods among pregnant women.¹⁰

Despite the importance of maternal nutrition, there is limited region-specific data on dietary intake among antenatal mothers in Haryana.

Therefore, this study was undertaken to assess dietary intake and its associated factors among antenatal mothers attending selected community health centers (CHCs) in district Ambala.

METHODS

A quantitative, non-experimental descriptive research design was adopted to assess dietary intake and associated factors among antenatal mothers. The study was conducted

in selected CHCs of district Ambala, Haryana, in November 2024 to December 2024. The target population included antenatal mothers aged 18-40 years attending CHCs. A total of 100 antenatal mothers were selected using a convenient sampling technique.

Inclusion criteria

Antenatal mothers aged 18-40 years. Attending selected CHCs. Able to understand Hindi. Willing to participate.

Exclusion criteria

Mothers attending other healthcare facilities. Not willing to participate.

Data collection tools

Socio-demographic variables included age, BMI, education, occupation, socioeconomic status, dietary habits, and obstetrical history.

Food frequency questionnaire (FFQ)- the FFQ assessed frequency of food intake across multiple food groups.

24-hour dietary recall: participants reported food intake over the previous 24 hours. Caloric intake was compared with recommended values: 1st trimester: 1800-2000 kcal, 2nd trimester: 2200-2400 kcal and 3rd trimester: 2400-2800 kcal.

Data was collected during the month of 9th November 2024 to 9th December 2024, using interview technique. Participants were informed about the purpose of the study and consent was obtained. Descriptive and inferential statistics were used to analyze the data. Associations between variables were tested at 0.05 level of significance.

RESULTS

The findings of the study demonstrated variability in dietary intake among antenatal mothers. A significant proportion of mothers had inadequate calorie intake compared to recommended standards. Many participants showed deficiencies in key nutrients, particularly iron, protein, and folic acid, depicts that a sample of 100 antenatal women, providing insights into their socio-demographic characteristics.

Table 2 depicts concerning trend in diet quality among the studied population, with only 3% exhibiting "excellent" and 18% demonstrating "good" dietary patterns. A significant proportion (79%) fell into the "fair" (38%) and "poor" (41%) categories. This suggests a potential for increased risk of chronic diseases.

Table 1: Frequency and percentage distribution of socio-demographic variables.

Socio-demographics	Frequency (%)
Age (in years)	
18-24	30 (30)
25-30	63 (63)
31-36	6 (6)
37-40	1 (1)
Height (in feet)	
5'0	7 (7)
5'1-5'5	76 (76)
5'6-6'0	16 (16)
5'6-6'0	1 (1)
Weight(kg)	
46-50	7 (7)
51-55	25 (25)
BMI	
18.5-24.9	95 (95)
25-29.9	5 (5)
30-34.9	0
>35	0
Educational status	
No formal education	3 (3)
Elementary	40 (40)
Higher Secondary	43 (43)
Graduate or above	14 (14)
Occupation	
Homemaker	83 (83)
Govt. Job	2 (2)
Private Job	8 (8)
Entrepreneur	7 (7)
Religion	
Hindu	96 (96)
Sikh	2 (2)
Muslim	2 (2)
Christian	0 (0)
Others	0 (0)
Type of family	
Nuclear family	57 (57)
Joint family	39 (39)
Extended family	4 (4)
Socio-economic status	
Upper class	2 (2)
Upper middle	11 (11)
Lower middle	61 (61)
Upper lower	24 (24)
Lower	2 (2)
Dietary habits	
Vegetarian	89 (89)
Non-vegetarian	11 (11)
Meals/day	
1	2 (2)
2	15 (15)
3	83 (83)
Snacks/smalls meals per day	
Once	26 (26)
Twice	55 (55)
Thrice	19 (19)

Continued.

Socio-demographics	Frequency (%)
Trimester	
1 st trimester	12 (12)
2 nd trimester	39 (39)
3 rd trimester	49 (49)
Gravida	
G1	51 (51)
G2	34 (34)
G3	15 (15)
>G3	0 (0)
Antenatal visit	
1-2	21 (21)
3-4	35 (35)
5-6	31 (31)
>6	13 (13)

Table 2: Frequency and percentage distribution of FFQ score.

Level of score	Frequency (%)
Excellent diet quality	3 (3)
Good diet quality	18 (18)
Fair diet quality	38 (38)
Poor diet quality	41 (41)

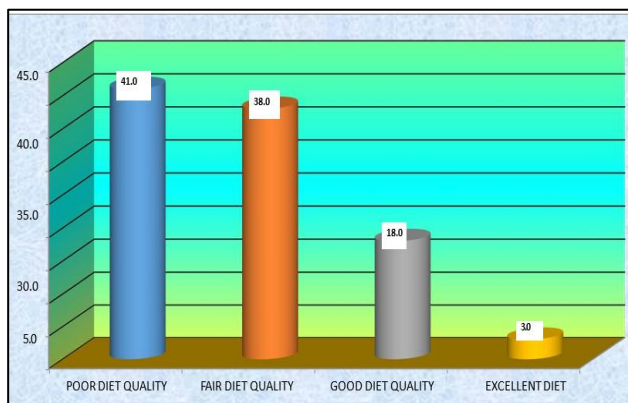


Figure 1: Bar graph showing frequency and percentage distribution of FFQ score.

Additionally, food quality showed a strong relationship with overall dietary intake, indicating that frequency and diversity of food consumption directly impact nutritional status.

Table 3 analysis revealed a statistically significant association between adequate calorie intake and higher FFQ scores (p value =0.03), suggesting that mothers who reported consuming sufficient calories tended to have better overall dietary quality. This finding underscores the importance of ensuring adequate calorie intake during pregnancy to support both maternal and fetal health.

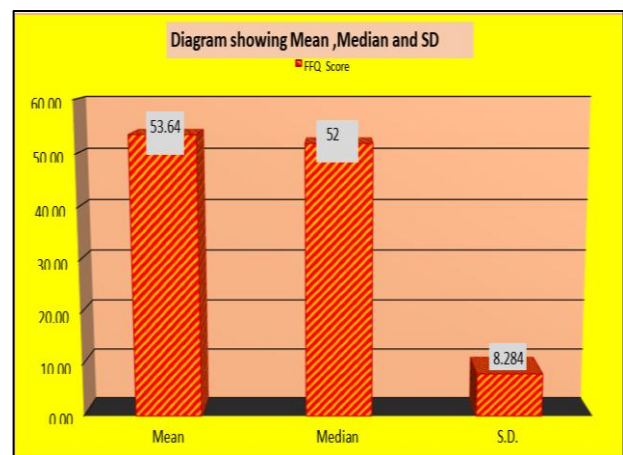


Figure 2: Bar graph showing mean, median and SD score of FFQ.

Table 3: Frequency and percentage distribution of 24-hour dietary recall score.

Observation	Frequency (%)
Adequate calorie intake	23 (23)
Calorie deficit	77 (77)

Findings in Table 4 indicate that age is a major factor, with younger adults (18-24) more likely to have poorer diet quality than those slightly older. Socioeconomic status and being a homemaker were also strongly linked to dietary challenges, likely due to limited resource access or household management burdens. Cultural influences also appeared significant, as Hinduism showed a notable association with specific dietary patterns. Conversely, factors like BMI, education, and meal frequency did not statistically impact diet quality in this group. Ultimately, the study highlights that occupation and social standing are more critical drivers of nutrition than physical or educational attributes.

Table 4: Association showing FFQ score with socio-demographic variables.

Demographic variables	Association with FFQ score				Chi ² test	df	P value
	Poor diet quality	Fair diet quality	Good diet quality	Excellent diet quality			
Age (in years)							
18-24	12	12	5	1	3.48 8	9	0.944 ^{NS}
25-30	25	23	13	2			
31-36	3	3	0	0			
37-40	1	0	0	0			
Height (in feet)							
5'0"	3	2	1	1	36.8 14	9	0.000*
5'1"-5'5"	31	30	14	1			
5'6"-6'0"	7	6	3	0			
>6'1"	0	0	0	1			
Weight							
46-50	4	2	1	0	17.1 39	15	0.311 ^{NS}
51-55	12	9	3	1			
56-60	13	12	8	0			
61-65	6	13	5	1			
66-70	4	2	0	0			
>70	2	0	1	1			
BMI							
18.5-24.9	38	36	18	3	1.57 4	3	0.665 ^{NS}
25-29.9	3	2	0	0			
30-34.9	0	0	0	0			
>35	0	0	0	0			
Educational Status							
No formal education	2	1	0	0	14.3 13	9	0.112 ^{NS}
Elementary	12	16	11	1			
Higher secondary	22	18	2	1			
Graduate and above	5	3	5	1			
Occupation							
Homemaker	37	34	11	1	21.2 54	9	0.012*
Government job	0	0	2	0			
Private job	3	2	2	1			
Entrepreneur	1	2	3	1			
Religion							
Hindu	41	36	17	2	21 56	6	0.002*
Sikh	0	0	1	1			
Muslim	0	2	0	0			
Christian	0	0	0	0			
Others	0	0	0	0			
Type of family							
Nuclear	21	24	10	2	9.49 9	6	0.147 ^{NS}
Joint	19	13	7	0			
Extended	1	1	1	1			
Socio economic status							
Upper class					84 30.1	12	0.003*
Upper middle	1	0	1	0			
Lower middle	2	1	6	2			
Upper lower	23	28	9	1			
Lower	13	9	2	0			
Dietary habits							
Vegetarian	39	33	15	2	3.86 9	3	0.276 ^{NS}
Non-vegetarian	2	5	3	1			

Continued.

Demographic variables	Association with FFQ score				Chi ² test	df	P value
	Poor diet quality	Fair diet quality	Good diet quality	Excellent diet quality			
Meals/day							
Once	14	7	5	0	6.829	6	0.564 ^{NS}
Twice	22	20	11	2			
Thrice	5	11	1	1			
Snacks/Small meals per day							
Once	14	7	5	0	6.829	6	0.337 ^{NS}
Twice	22	20	11	2			
Thrice	5	11	2	1			
Trimester						6	0.896 ^{NS}
1 st trimester	5	5	2	0			
2 nd trimester	18	15	5	1			
3 rd trimester	18	18	11	2	2.244		
Gravida							
G ₁	23	20	7	1	9.817	6	0.133 ^{NS}
G ₂	15	12	7	0			
G ₃	3	6	4	2			
Antenatal visit							
01-Feb	9	9	2	1	41	9	0.144 ^{NS}
03-Apr	13	16	6	0			
05-Jun	16	9	4	2			
>6	3	4	6	0			

NS=Not Significant, *=significant

DISCUSSION

The findings of this study provide critical insights into the demographic profile and dietary behaviors of antenatal mothers, revealing a concerning trend of sub-optimal diet quality despite a predominantly normal body mass index (BMI). In this study, 95% of the mothers fell within the normal BMI range (18.5-24.9 kg/m²). While this suggests adequate pre-pregnancy energy balance, the dietary quality metrics paint a different picture: 79% of the participants consumed a diet classified as poor (41%) or fair (38%). This stark contrast indicates a state of “hidden hunger”, where caloric adequacy masking as a normal BMI coexists with severe micronutrient deficiencies. This phenomenon aligns with regional data from South Asia, where maternal diets are frequently rich in staple carbohydrates but deficient in diverse micronutrient-dense foods.^{11,12}

Socioeconomic and demographic factors emerged as powerful determinants of nutritional quality in this study. Mothers aged 18-24 years exhibited significantly poorer diet quality compared to those in the 25-30 age bracket. Younger maternal age is frequently tied to lower nutritional literacy, restricted autonomy in household food purchasing, and poor psychological readiness, all of which compromise dietary choices.^{13,14} Furthermore, our results showed that homemakers and individuals from lower-middle (61%) and upper-lower (21%) socioeconomic classes were disproportionately affected by poor diet quality. This heavily corroborates the findings of several global studies demonstrating that low socioeconomic

status is a primary barrier to dietary diversity due to the high cost of nutrient-rich foods like fruits, vegetables, and dairy products.^{15,16} Homemakers in lower-income settings often experience food insecurity or practice intra-household food distribution bias, prioritizing the dietary needs of other family members over their own.¹⁷

Meal architecture also played a crucial role in defining diet quality. Although over 90% of the mothers adhered to the core meals of breakfast, lunch, and dinner, approximately 36% routinely skipped morning snacks. During pregnancy, high metabolic demands make frequent, smaller meals necessary to maintain steady nutrient absorption. Skipping snacks reduces the opportunity to introduce key food groups (such as nuts, fruits, or dairy) that are typically eaten between major meals, driving down overall diet quality scores.¹⁸

Methodologically, this study established a statistically significant association between adequate calorie intake (derived via 24-hour dietary recall) and higher food frequency questionnaire (FFQ) scores (p value =0.03). This cross-method validation confirms that mothers who hit their baseline daily energy requirements are also those consuming a more diverse and stable variety of foods over time. This finding matches validation studies by saturated research groups indicating that higher dietary diversity and calorie adequacy go hand-in-hand in resource-limited settings.¹⁹ Ultimately, these findings underscore the urgent need for targeted antenatal counselling that goes beyond checking maternal weight, specifically focusing on

affordable dietary diversity for young, lower-income homemakers.

The study was limited to: participants of a specific age group (18-40 years) and exclude high risk pregnancies. Confined to a specific healthcare facility i.e. CHC only. Dietary intake assessment methods that only includes FFQ and 24-hour dietary recall.

CONCLUSION

Maternal nutrition is a critical determinant of pregnancy outcomes. The present study reveals that a significant proportion of antenatal mothers have inadequate dietary intake and poor diet quality. Socio-demographic factors and food quality significantly influence dietary intake. Addressing these factors through targeted interventions can improve maternal and fetal health outcomes.

Recommendations

Strengthen antenatal nutrition counseling services. Promote dietary diversity through awareness programs. Ensure availability of nutrient-rich foods at community level. Implement regular nutritional screening during ANC visits. Conduct further large-scale studies for generalization.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Wikipedia. Pregnancy. 2024. Available from: <https://en.m.wikipedia.org/wiki/Pregnancy>. Accessed on 11 December 2024.
2. Lybrate. Introduction to prenatal, intranatal, and postnatal care. Available from: <https://www.lybrate.com/topic/introduction-to-prenatal-intranatal-and-postnatal-care/09d48f98086e82c78f099f4226697363>. Accessed on 11 December 2024.
3. UNICEF. Antenatal care. Available from: <https://data.unicef.org/topic/maternal-health/antenatal-care/>. Accessed on 11 December 2024.
4. Xu X, Zhang Z, Lin Y, Xie H. Risk of excess maternal folic acid supplementation in offspring. *Nutrients*. 2024;16(5):755.
5. Gibore NS, Ngowi AF, Munyogwa MJ, Ali MM. Dietary habits associated with anemia in pregnant women attending antenatal care services. *Curr Dev Nutr*. 2021;5(1):nzaa178. Saaka M, Mutaru S, Osman SM. Determinants of dietary diversity and its relationship with the nutritional status of pregnant women. *J Nutr Sci*. 2021;10:e14.
6. Poston L, Briley AL, Barr S, Bell R, Croker H, Coxon K, et al. Developing a complex intervention for diet and activity behaviour change in obese pregnant women (the UPBEAT trial); assessment of behavioural change and process evaluation in a pilot randomised controlled trial. *BMC Pregnancy Childbirth*. 2013;13(1):148.
7. Moran VH. A systematic review of dietary assessments of pregnant adolescents in industrialised countries. *Br J Nutr*. 2007;97(3):411-25.
8. Moyo S, Ndlela B, Hlongwane M. Impact of micronutrient deficiencies on pregnancy outcomes in South Africa. *Nutr Health*. 2018;28(3):215-22.
9. Patel R, Sharma A, Desai R. Influence of prenatal diet on pregnancy outcomes in rural India. *Int J Women's Health*. 2019;11:123-30.
10. Mary Arimond, Doris Wiesmann, Elodie Becquey, Alicia Carriquiry, Melissa Daniels, Megan Deitchler et al. Dietary diversity as a measure of the nutritional quality of diets of women of reproductive age: Southern Asian perspective. *J Nutr*. 2010;140(11):2059S-69S.
11. Nguyen, P. H., et al. (2018). Factors influencing maternal dietary diversity in low-and-middle-income countries. *Maternal & Child Nutrition*, 14(3), e12565.
12. Abubakar, A., et al. (2018). Maternal age and its relationship with dietary intake and diversity among pregnant women. *BMC Pregnancy and Childbirth*, 18(1):234.
13. Barker, M., et al. (2015). Nutritional status of women of reproductive age: Why young mothers face greater dietary vulnerabilities. *The Lancet*, 385(9973), 1110-1121.
14. Darmon N, Drewnowski A. Does social class predict diet quality? A structured review. *Nutr Rev*. 2015;73(5):257-73.
15. Thorne-Lyman, A. L., et al. (2010). Household dietary diversity as an indicator of economic access to food and nutritional status in vulnerable populations. *Ecology of Food and Nutrition*, 49(1), 1-13.
16. Harris-Fry H, Shrestha N, Costello A, Saville NM. Determinants of intra-household food allocation between adults in South Asia- a systematic review. *Int J Equity Health*. 2017;16(1):107.
17. Moran, L. J., et al. (2018). Dietary intake and snack skipping patterns during pregnancy: Implications for maternal nutrition. *Nutrients*, 10(11), 1622.
18. Khan TA, et al. Maternal dietary patterns and risk of gestational diabetes mellitus: A systematic review and meta-analysis. *Maternal & Child Nutrition* 2023; 19(3): e13722..
19. Rajeshwari K, et al. Dietary diversity and pregnancy outcomes among antenatal mothers in India. *Nutrition & Food Science* 2023; 53(6): 931-943.
20. Medpark Hospital. Antenatal care. Available from: <http://womenshealth.gov/pregnancy/you-are-pregnant/stages-of-pregnancy.html>. Accessed on 11 December 2024.
21. Raghavan R, Dreibelbis C, Kingshipp BL, Wong YP, Abrams B, Gernand AD, et al. Dietary patterns before and during pregnancy and birth outcomes: a

- systematic review. *Am J Clin Nutr.* 2019;109(3):729S-56S.
22. Ayensu J, Annan R, Lutterodt H, Edusei A, Peng LS. Prevalence of anaemia and low intake of dietary nutrients in pregnant women living in rural and urban areas in the Ashanti region of Ghana. *PLoS One.* 2020;15(1):e0226026.
23. Costanza J, Camanni M, Ferrari MM, De Cosmi V, Tabano S, Fontana L, et al. Assessment of pregnancy

dietary intake and association with maternal and neonatal outcomes. *Pediatr Res.* 2022;91(7):1890-6.

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