International Journal of Innovative Research & Growth
A Peer Reviewed Journal
E-ISSN: 2455-1848
homepage: http://www.ijirg.com/ijirg/
Volume: 13 Issue: 2, April 2024

Assessment of Micronutrient Deficiencies and their Impact on Maternal Health in Secunderabad

Rashmi Singh[1*], Preeti Sharma[2], Nakuleshwar Dut Jasuja[3]
[1]Research Scholar, School of Basic and Applied Sciences, Nirwan University, Jaipur-303305, Raj., India
[2]Dean, School of Basic and Applied Sciences, Nirwan University, Jaipur-303305, Raj., India
[3]Professor, School of Basic and Applied Sciences, Nirwan University, Jaipur-303305, Raj., India
E-mail: rashmi.singh@nirwanuniversity.ac.in
* Corresponding Author

Article Info
Received 10 March 2024
Received in revised form 18 March 2024
Accepted for publication 1 April 2024
DOI: 10.26671/IJIRG.2024.2.13.101
Cited as
Singh, R., Sharma, P., and Jasuja, N. D. (2024). Assessment of Micronutrient Deficiencies and their Impact on Maternal Health in Secunderabad. *Int J Innovat Res Growth*, 13, 32-41.

Abstract

The present study was conducted to assess the micronutrient deficiencies and their impact on maternal health in Secunderabad. The sample of the study comprised 100 pregnant and lactating women as subjects selected randomly from Yashoda Hospital, KIMS Hospital, and Anganwadi Turkapally of Secunderabad district in Telangana state. The data were collected using a questionnaire which consisted of questions based on anthropometric measurements, nutritional knowledge, attitude and practices. The data were analyzed and percentage, mean and chi square test were applied. Less than 600 IU/d (international units per day) and less than 400 micrograms of folic acid per day were consumed by most lactating and pregnant women. The majority of pregnant and breastfeeding women in Secunderabad ingested insufficient amounts of Vitamin B12 (2.2-5.5 mcg/day) and Vitamin A (2,800–3,000 µg RAE/day) in their diets. Out of 100 pregnant and lactating women as subjects, it was found out that vitamin D deficiency (48%) was the most common micronutrient deficiency, followed by folic acid deficiency (47%), iron deficiency (42%) and vitamin A and B12 deficiencies (41%). Micronutrient deficiency does have significant impact on the health of pregnant and lactating women in Secunderabad. Vitamin D, folic acid, iron, vitamin A and B12 deficiencies were found to be more common in studies involving different age groups and nutritional status.
Keywords: - Micronutrient, Maternal health, Pregnant women, Folic acid, Iron.

1. Introduction

Micronutrients are substances that are needed in extremely small amounts, less than 100 mg/d. eg. minerals and vitamins. The synthesis of hormones, enzymes, and other molecules that control growth and development depends on micronutrients. Micronutrients come in four different varieties, each with special health benefits. Water-soluble vitamins dissolve readily in water and are not long-term stored by the body. The body may hold fat-soluble vitamins in its fatty tissues for extended periods of time because they breakdown in fat. The body needs macro minerals, or greater concentrations of minerals, to control a number of internal processes.

Micronutrient deficiency is the absence of vital vitamins and minerals that the body needs in trace levels for healthy growth and development (Enyew, 2023). The following are examples of essential micronutrients: iron, zinc, calcium, iodine, vitamin A, B vitamins, and vitamin C. Inadequate intake of certain micronutrients may lead to impaired cognitive and physical development, susceptibility to or worsening of illnesses, mental retardation, blindness, and overall reductions in potential and production. The negative health effects of micronutrient deficiencies are not often immediately apparent, in contrast to energy-protein undernourishment. Thus, "hidden hunger" is another name for micronutrient inadequacy, and the two phrases are frequently used synonymously.

Minerals and vitamins are necessary for human growth and well-being. Worldwide, an estimated 2 billion people are thought to be deficient in at least one micronutrient. Micronutrient deficiencies during pregnancy have been linked to unfavourable pregnancy outcomes (Garcia & Anderson, 2021), however it is unclear how they would affect the

offspring's long-term health. It has been suggested that the developing foetus and neonate's hormonal regulation pathways are influenced by the maternal micronutrient status. For instance, a lack of iron or zinc may decrease the activity of insulin-like growth factor-1 and its receptors (Olson et al., 2021), which might impede the growth of the foetus. Micronutrient limitation may result in organ abnormalities during organ development. The developing foetus may have teratogenic consequences from severe micronutrient excesses or shortages. More subtle damage may result from moderate nutritional excesses or deficiencies during critical foetal development periods (Beal et al., 2021). For instance, a decrease in glutathione levels, an increase in lipid peroxidation, and decreased glutathione peroxidase and catalase activity within the kidney are all signs of renal oxidative damage caused by maternal zinc limitation.

The nutritional status of nursing mothers is a significant public health concern because it can affect the amount and quality of nutrients contained in breast milk, as well as the depletion of the mothers' own body stores due to maintaining the nutrients in the breast milk (Venkatesh et al., 2021). A nursing mother bears enormous duty within the family and lives not just for herself but also for the child, the family, and society (Hundera, 2015). Mothers need to consume roughly 500 extra calories per day to promote breastfeeding and preserve maternal reserves since lactation requires more nutrition than pregnancy does because nursing mothers produce 0.7 to 0.8 L/d of milk (Yeneabat et al., 2019).

Pregnant and lactating women's physiological needs make numerous vitamins and minerals more necessary. Food sources can provide for these needs. The primary nutrients that are increased during pregnancy and lactation are: iron, zinc, iodine, protein, folate, and fibre. According to (Sharma et al., 2021), they can be found in lean meats, dairy products, nuts, legumes, whole grains, and fresh fruits and vegetables.

Prenatal iron deficiency anaemia is estimated to affect 15–20% of mothers worldwide; anaemia is defined as having a haemoglobin level of less than 110 g/l. (Black, 2013). In low-income countries, around 15% of pregnant women suffer from vitamin A deficiency, which is characterised by a low serum retinol level (<0.70 μmol/l). A vitamin A deficit is severe enough to cause night blindness affects 8% of expectant mothers. Although there are no worldwide estimates available, studies conducted on a population-based basis in South Asia, which includes India, Bangladesh, and Nepal, have reported deficiencies in pregnant women's zinc levels (15–74%), vitamin B12 levels (19–74%), vitamin E (as α-tocopherol, 50–70%), and folate levels (0–26%).

It is critical to recognise that there are many factors that contribute to maternal malnutrition, such as misinformation, poverty, food insecurity, and improper food distribution (Marshall, 2022). This adds a socioeconomic dimension to this public health issue. Undernutrition in pregnant and breastfeeding women is largely caused by a combination of factors such as inadequate nutritional intake, unequal household food distribution, food taboos, misunderstandings, recurring illnesses, and subpar care (Zerfu et al., 2016). In order to collect, process, and analyse nutritional indicators so as to keep an eye on such initiatives, nutritional surveillance becomes essential in this regard. The "one nutrient or food" strategy has always been the main focus of nutrition surveillance. Conversely, dietary pattern analysis has become recognised as a realistic and balanced method that accurately represents how food is actually consumed in daily life (White & Miller, 2020). The food frequency questionnaire (FFQ) technique is a straightforward, economical, and time-efficient dietary assessment method that may be applied to large-scale community-based nutritional monitoring to understand dietary patterns (Turner & Wilson, 2021).

2. Research Methodology

Data collection and analysis phases of the study are guided by the research design. The information gathered for this study was organised according to the principles of descriptive and empirical research. Research questions that have not yet been thoroughly addressed are examined in empirical research. The descriptive study design methodically gathers data to describe a phenomena, circumstance, or population. The primary data for this quantitative inquiry were gathered through a well-designed and well-structured survey questionnaire. The questionnaire was designed on the basis of Likert scale.

2.1 Population Sample & Sampling

2.1.1 Procurement of the Sample

Yashoda Hospital, KIMS Hospital, Anganwadi Turkapally of Secunderabad district in Telangana state were selected as the area of the study and a total number of 100 pregnant and lactating women were selected as subjects.

2.1.2 Sample Size

The sample size of the study was 100 pregnant and lactating women out of which 51 were lactating women and 49 were pregnant women.

2.1.3 Sampling Procedure

The sample for the study was selected by means of simple random sampling technique. The importance and the purpose of the study were explained to them. Data collection was done through a questionnaire as a tool. After data collection, the data were analyzed.

2.2 Plan of Work

The pregnant and lactating women were contacted to obtain permission. Once permission was granted, the day and time to collect data from their working and non-working locations was scheduled. Survey forms were distributed to all pregnant and lactating women. After distribution of the forms, the purpose of the study was explained to them and they were instructed to read through the form and complete it within a short period of time. All survey forms were collected upon completion. A close ended questionnaire, where they were asked to choose from a list of answer choice was designed to conduct the survey at respective institutions. The questionnaire included general information including height and weight and the questions regarding nutritional knowledge, attitude, and practices, health history and food frequency patterns.

2.3 Application of Statistical Procedures

Data were manually coded and put into the computer. Every analysis was done using Microsoft Excel. Tables and graphs were used to display the collected data. For the descriptive analysis, percentages and frequencies were computed. Chi- square test was used to test the hypothesis concerning the impact of micronutrient deficiency on maternal health of pregnant and lactating women in Secunderabad.

3. Results

3.1 Chi-Square Test: A Chi-Squared test ($\chi 2$) is a data analysis based on the observations of a random collection of variables. Chi-Square contrasts expected and actual frequency distributions. On the basis of calculations carried out, the following results are tabulated as shown Table 1:

Table 1: Chi-Square Test Values

Particulars	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	**81.403**	**6**	**0.001**
Likelihood Ratio	**54.606**	**6**	**0.000**
Linear-by-Linear Association	**34.263**	**1**	**0.000**
Number of Valid Cases (N)	**100**		

As shown in Table 1, the Chi-Square value is less than the significant value ($0.001 < 0.01$). Therefore, the micronutrient deficiency does have significant impact on maternal health of pregnant and lactating women in Secunderabad.

3.2 Analysis based on Questionnaire

I-II General Information and Demographic Profile of the Respondents/Pregnant and Lactating Women (Questions 1-5)

Table 2: General Information and Demographic Profile of the Pregnant and Lactating Women

Variables	Particulars	No. of Respondents	Percentages of Respondents
Gender	Male	0	0%
	Female	100	100%
Age	15-25 Years	7	7%
	25-35 Years	48	48%
	35-45 Years	38	38%
	45-60 Years	7	7%
Employment Status	Working	39	39%
	Non-working	61	61%
Educational Attainment	SSC or below	21	21%
	HSC	23	23%
	UG	23	23%
	PG	22	22%
	Other	11	11%
Monthly Income	Less than Rs. 15,000	25	25%
	Rs. 15,000-25,000	24	24%
	Rs. 25,000-35,000	28	28%
	Rs. 35,000-45,000	13	13%
	More than Rs. 45,000	10	10%

Table 2 shows that there were only females in the study as the present study were about pregnant and lactating women. Majority 48% of the respondents were of the age group 25 to 35 years. The highest 61% of the pregnant and lactating women were non-working. Majority of 23% and 23% of the respondents had Higher Secondary Certification (HSC) and Under Graduation (UG) degrees respectively while only 11% had other professional degrees. Greater segment of 28% of the respondents had monthly income in the range of Rs. 25,000 to 35,000.

III Anthropometric Measurements of the Pregnant and Lactating Women (Questions 6-9)

Table 3: Anthropometric Measurements of the Pregnant and Lactating Women

Variables	Particulars	No. of Respondents	Percentage of Respondents
Nutritional Status	Underweight	38	38%
	Normal weight	29	29%
	Overweight	15	21%
	Obese grade I	12	14%
	Obese grade II	6	6%
Height	<145 cm	6	6%
	≥145 cm	94	94%
Weight	<45 kg	45	45%
	≥45kg	55	55%
Undernutrition [BMI]	No	48	48%
	Yes	52	52%

According to Table 3, the highest percentage 38% of the respondents were underweight and 29% of the respondents were of normal weight. Majority of the 94% and 55% of the respondents had height ≥ 145 cm and weight ≥45 kg respectively. The highest 52% of the respondents were facing undernutrition in terms of Body Mass Index [BMI].

IV Knowledge Based Questions (Questions 10-14)

10) Eating Habits of the Pregnant and Lactating Women

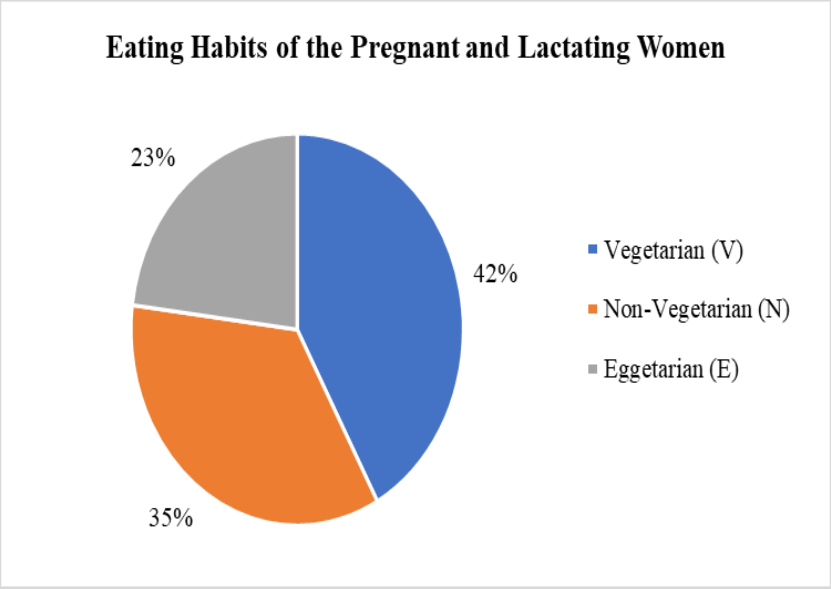

Figure-1 Eating Habits of the Pregnant and Lactating Women.

Figure 1, reveals that 42% of the respondents were vegetarian, 35% were non-vegetarian and 23% were eggetarian.

11) Daily Dietary Intake of Vitamin D of the Pregnant and Lactating Women

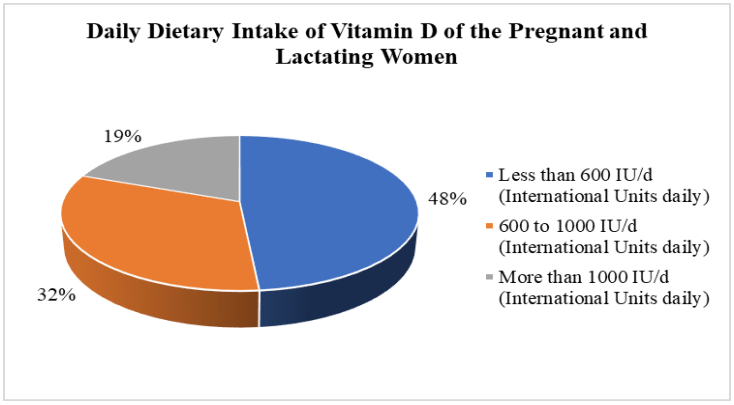

Figure-2 Daily Dietary Intake of Vitamin D of the Pregnant and Lactating Women.

As per Figure 2, majority of the 48% of the respondents said that their daily dietary intake of vitamin D was less than 600 IU/d (International Units daily). Whereas 32% of the respondents said that their daily dietary intake of vitamin D was between 600 to 1000 IU/d (International Units daily).

12) Daily Dietary Intake of Folic Acid of the Pregnant and Lactating Women

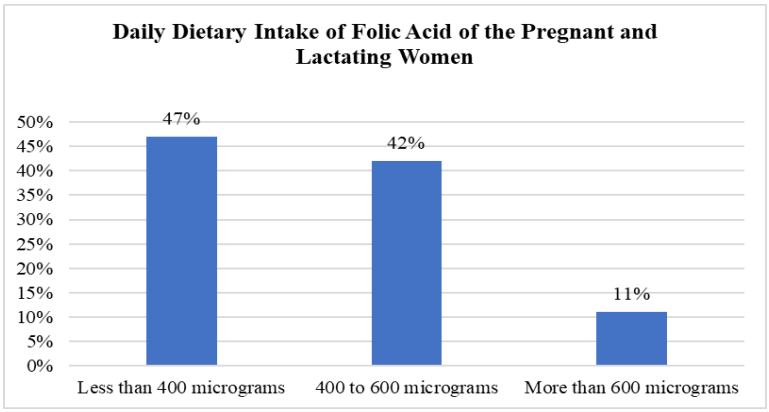

Figure-3 Daily Dietary Intake of Folic Acid of the Pregnant and Lactating Women

Figure 3 demonstrate that 47% of the pregnant and lactating women had less than 400 micrograms daily dietary intake of Folic Acid. 42% of them had 400 to 600 micrograms daily dietary intake of Folic Acid and 1% had more than 600 micrograms daily dietary intake of Folic Acid.

13) Dietary Diversity (Inclusion of Five Food Groups Namely, Fruit and Vegetables, Starchy Food, Dairy, Protein and Fat) in Daily Food Intake of the Pregnant and Lactating Women

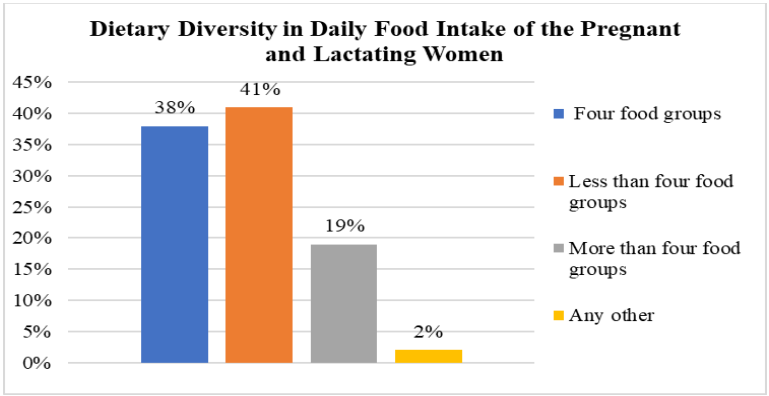

Figure-4 Diversity (Inclusion of Five Food Groups Namely, Fruit and Vegetables, Starchy Food, Dairy, Protein and Fat) in Daily Food Intake of the Pregnant and Lactating Women

Figure 4, shows that Dietary Diversity of majority of 41% of the pregnant and lactating women (Inclusion of Five Food Groups Namely, Fruit and Vegetables, Starchy Food, Dairy, Protein and Fat) in daily food intake was less than four food groups while only 1% of them had Dietary Diversity of any other form.

14) Daily Dietary Intake of Folic Acid of the Pregnant and Lactating Women

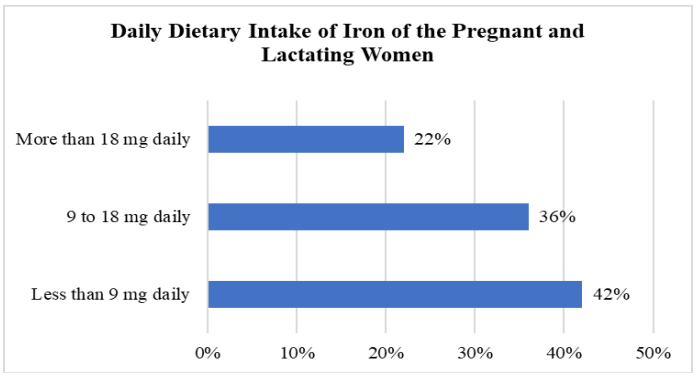

Figure-5 Daily Dietary Intake of Iron of the Pregnant and Lactating Women

It is observed in Figure 6, that maximum 42% of the respondents had less than 9 mg of daily dietary intake of Iron. 36% of them had 9 to 18 mg of daily dietary intake of Iron. Whereas 22% had more than18 mg of daily dietary intake of Iron.

V Attitude Based Questions (Questions 15-17)

15) Feeding Frequency of the Pregnant and Lactating Women

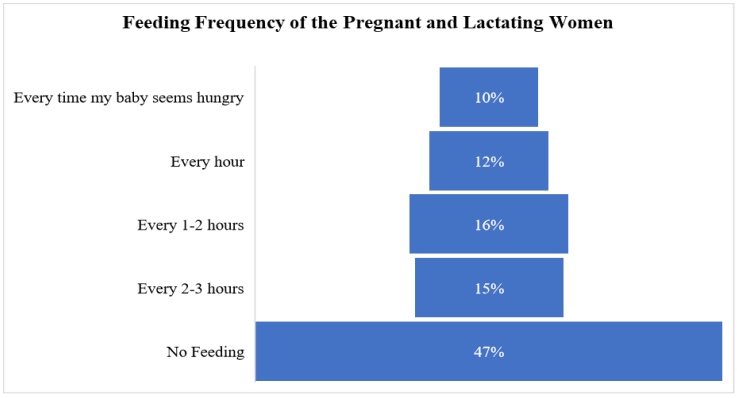

Figure-6 Feeding Frequency of the Pregnant and Lactating Women

Figure 6, shows that there was no feeding frequency of the 47% of the respondents as they were pregnant (Out of 49 respondents, 2 were pregnant as well as lactating). Feeding frequency of 16% of the lactating women was every 1 to 2 hours. 10% of the lactating women feed their babies every time their babies seem hungry.

16) Frequency of Monitoring of Blood Glucose Level (BGL) of the Pregnant and Lactating Women

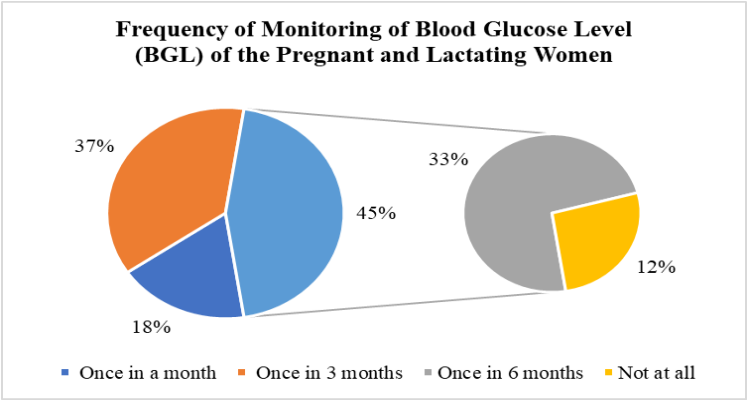

Figure-7 Frequency of Monitoring of Blood Glucose Level (BGL) of the Pregnant and Lactating Women

Figure 7, discloses that the frequency of monitoring of Blood Glucose Level (BGL) of 37% of the pregnant and lactating women was once in 3 months while 12% of them did not monitor their Blood Glucose Level (BGL).

17) Frequency of Monitoring of Haemoglobin (Hb) of the Pregnant and Lactating Women

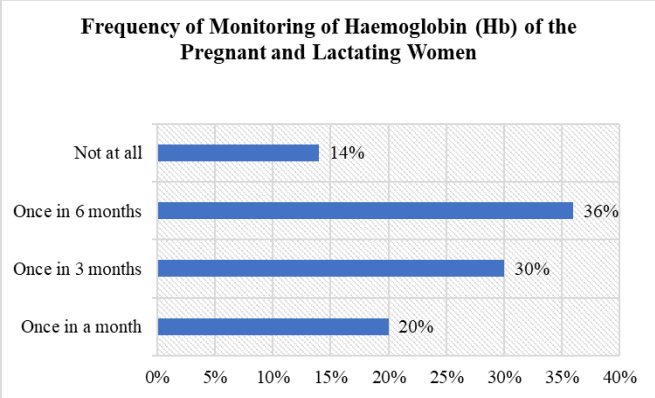

Figure-8 Frequency of Monitoring of Haemoglobin (Hb) of the Pregnant and Lactating Women

According to Figure 8, frequency of monitoring of Haemoglobin (Hb) of 36% of the pregnant and lactating women was once in 6 months. While 20% of them monitored once in a month. 14% did not monitor their Haemoglobin (Hb) at all.

VI Practice Based Questions (Questions 18-21)

18) Sufficient Intake of Vitamin A (2,800–3,000 µg RAE/day) and Vitamin B12 (2.2-5.5 mcg/day) in Diet of the Pregnant and Lactating Women

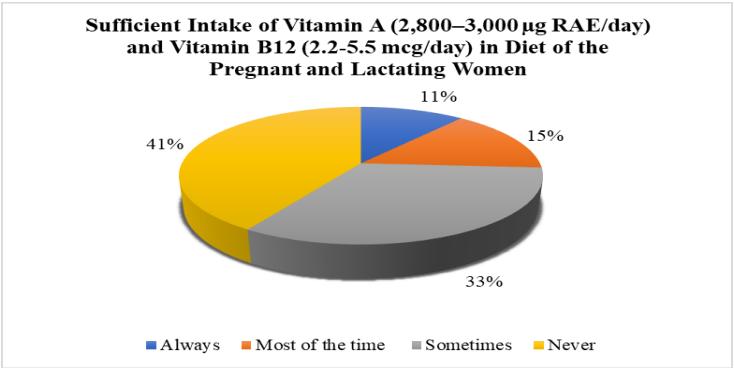

Figure-9 Sufficient Intake of Vitamin A (2,800–3,000 µg RAE/day) and Vitamin B12 (2.2-5.5 mcg/day) in Diet of the Pregnant and Lactating Women

Figure 9 exhibits that there was never sufficient intake of Vitamin A (2,800–3,000 µg RAE/day) and Vitamin B12 (2.2-5.5 mcg/day) in the diet of 41% of the pregnant and lactating women in Secunderabad. There was sometimes sufficient intake of Vitamin A (2,800–3,000 µg RAE/day) and Vitamin B12 (2.2-5.5 mcg/day) in the diet of 33% of them. Only 11% of the respondents said that there was always sufficient intake of Vitamin A (2,800–3,000 µg RAE/day) and Vitamin B12 (2.2-5.5 mcg/day) in diet.

19) An Effort to Take Extra Meal (More than 3 Meals) a Day of the Pregnant and Lactating Women

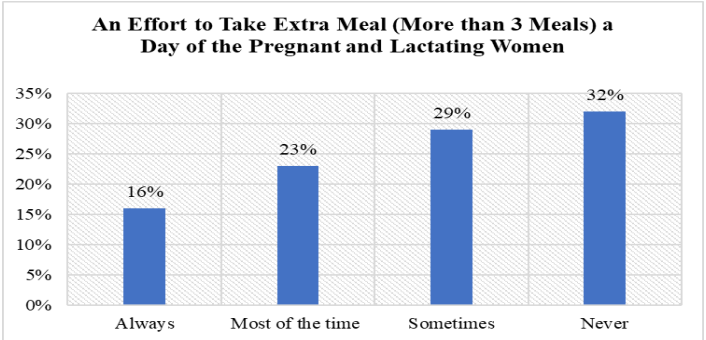

Figure-10 An Effort to Take Extra Meal (More than 3 Meals) a Day of the Pregnant and Lactating Women

Figure 10, indicates that there was never an effort to take extra meal (more than 3 meals) a day of 32% of the pregnant and lactating women. There was sometimes an effort to take extra meal (more than 3 meals) a day of 29% of them. Only 16% of the respondents said that there was always an effort to take extra meal (more than 3 meals) a day.

20) Satisfactory Consumption of Vitamin and Mineral Rich Foods such as Meat, Poultry, Seafood, Cereals, Legumes, Leafy Vegetables etc. which Immensely Effect Maternal Health of Women

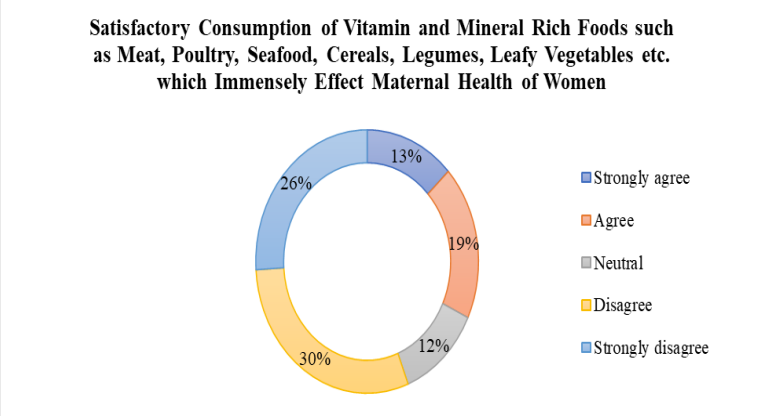

Figure- 11Satisfactory Consumption of Vitamin and Mineral Rich Foods such as Meat, Poultry, Seafood, Cereals, Legumes, Leafy Vegetables etc. which Immensely Effect Maternal Health of Women.

As shown in Figure 11, 30% of the respondents disagreed that there was satisfactory consumption of vitamin and mineral rich foods such as meat, poultry, seafood, cereals, legumes, leafy vegetables etc. by them which immensely affects the maternal health of women. 26% of the respondents strongly disagreed whereas 19% of the respondents agreed.

21) Satisfaction with Intake of Daily Diet Including Vital Micronutrient of the Pregnant and Lactating Women

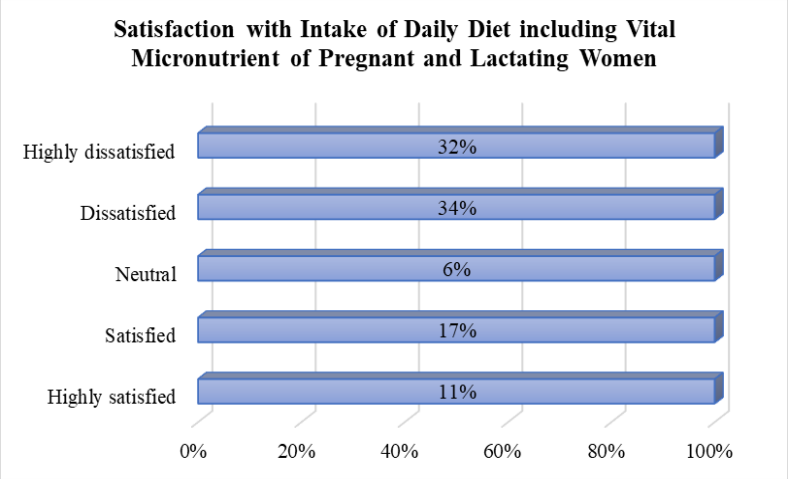

Figure-12 Satisfaction with Intake of Daily Diet including Vital Micronutrient of the Pregnant and Lactating Women

Figure 12 shows that 34% of the pregnant and lactating women were dissatisfied with the intake of daily diet including vital micronutrient. While 32% of them highly dissatisfied merely 11% of them were highly satisfied.

4. Discussion

As the focus of this study was on pregnant and lactating mothers, all of the participants were female. The majority of the pregnant and lactating women were not working, and the major age group was 25 to 35 years old. The majority held Under Graduation (UG) and Higher Secondary Certification (HSC) degrees. The greater section earned between Rs. 25,000 and Rs. 35,000 per month. The majority of the women who were pregnant or lactating were underweight and of normal weight (Brown & Jones, 2020). They weighed >45 kg and stood ≥ 145 cm tall. When it came to Body Mass Index [BMI], the majority of them were undernourished. Vegetarian pregnant and lactating women made up the majority of the population; non-vegetarians came in second. The majority of lactating women fed their babies every one to two hours. Most pregnant and breastfeeding women had their Blood Glucose Levels (BGL) checked once every three months, and their Haemoglobin (Hb) levels were checked once every six months. Less than 600 IU/d (international

units per day) of vitamin D was utilised each day. Less than 400 micrograms of folic acid were consumed by the majority of lactating and pregnant women each day. Dietary diversity (inclusion of five food groups namely fruits and vegetables, starchy foods, dairy, protein, and fat) comprised less than four dietary groups daily by most of the lactating and pregnant women (Danielewicz, 2017). Less than 9 mg of iron was consumed daily by the majority of them. The majority of pregnant and breastfeeding women in Secunderabad ingested insufficient amounts of Vitamin B12 (2.2-5.5 mcg/day) and Vitamin A (2,800–3,000 µg RAE/day) in their diets.

For the most part, pregnant and lactating women did not make an attempt to eat more than three meals a day, except on rare occasions. The majority disagreed that they were enough consuming foods high in vitamins and minerals, such as meat, chicken, seafood, grains, legumes, green vegetables, etc, which have a significant impact on women's maternal health. Expectant and nursing mothers expressed dissatisfaction with their daily diet consumption, particularly with regard to essential micronutrients. The prevalence of underweight and normal weight individuals, coupled with the majority being undernourished as indicated by BMI, underscores the urgent need for targeted interventions (Smith, 2021). It is determined that micronutrient deficiencies in Secunderabad do have a major impact on the health of pregnant and lactating women. The findings advocate food fortification as a potential solution to combat micronutrient deficiencies. However, caution is warranted, as fortification alone may not be the panacea for the pervasive nutritional deficits identified in the study. Additional, context-specific interventions and creative approaches are crucial (Singh et al., 2021).

Thus, vitamin D deficiency (48%) was the most common micronutrient deficiency, followed by folic acid deficiency (47%) iron deficiency (42%) and vitamin A and B12 deficiencies (41%). Iron, folic acid, and vitamin D deficiency were found out to be more common in studies involving a range of age groups. The alarming prevalence of vitamin D deficiency (48%) calls for immediate attention and intervention (Patel & Kumar, 2022). The expressed dissatisfaction of expectant and nursing mothers with their daily diets underscores the importance of considering qualitative aspects in public health strategies; these are findings that align with (Mottaleb & Mishra, 2022). The current study's findings are meant to support information on micronutrient deficiencies of pregnant and lactating mothers in Secunderabad, India, and they might also help in the issue of food fortification. The technique of enhancing the nutritional content of regularly consumed foods through processing by adding vitamins and minerals is known as food fortification. Given the high prevalence of vitamin D deficiency in the community, it is imperative to implement evidence-based public health treatments, such as food fortification, to address the deficiencies (Jones & Singh, 2023). While fortification is promising, it might not be the only solution to the pervasive nutritional deficits and might require additional interventions in addition to creative and regionally tailored approaches.

4. Conclusion

This comprehensive study illuminates critical challenges faced by pregnant and lactating women in Secunderabad, India, as it has revealed alarming rates of micronutrient deficiencies. The prevalence of vitamin D, folic acid, iron, vitamin A, and B12 deficiencies underscores a pressing need for targeted interventions to improve maternal nutritional health. The majority of the participants, primarily within the 25 to 35 age group, demonstrated insufficient dietary practices, with notable deficiencies in essential vitamins and minerals. While the study advocates the potential efficacy of food fortification as an evidence-based public health intervention, it cautions against viewing it as a standalone solution. Instead, a multifaceted approach that incorporates creative and regionally tailored strategies to address the complex web of nutritional deficits is recommended. Recognizing the dissatisfaction expressed by expectant and nursing mothers with their daily diets emphasizes the importance of understanding and addressing maternal perceptions for sustainable health improvements. These findings not only contribute to the understanding of micronutrient deficiencies in the local context, but also provide a foundation for informed public health policies. Implementing targeted measures, particularly in response to the high prevalence of vitamin D deficiency, is imperative for enhancing the well-being of pregnant and lactating women in Secunderabad so as to ultimately promoting healthier outcomes for both mothers and their infants.

Acknowledgment

I would like to express my sincere gratitude to all those who have contributed to the completion of this research paper. First and foremost, I extend my heartfelt appreciation to medical officers of Yashoda Hospital, KIMS Hospital, and head teacher of Anganwadi Turkapally of Secunderabad district in Telangana state, for allowing us to conduct survey and their invaluable guidance, support, and encouragement throughout the duration of this study. Their expertise and mentorship have been instrumental in shaping the direction and methodology of this research. I am grateful to the participants who generously shared their time and insights, without which this study would not have been possible. Their willingness to participate and provide valuable data has been crucial to the success of this research project. Lastly, I am deeply grateful to my family for their unwavering support, understanding, and encouragement throughout this journey. Thank you to all who have contributed in any way to the completion of this research paper.

Conflict of Interest

I, Rashmi Singh, declare that I am submitting a research paper entitled "Assessment of Micronutrients Deficiencies and Their Impact on Maternal Health in Secunderabad." for consideration for publication in International Journal of

Innovative Research & Growth. I hereby confirm that the following statements accurately represent any potential conflicts of interest that may arise from my involvement in this research:
1. Financial Interests: I declare that I have no financial interests or affiliations with any organization or entity that could be perceived as influencing the outcomes or interpretation of the research presented in the manuscript.
2. Affiliation: I am a research scholar in, Department of School of Basic and Applied Sciences, Nirwan University Jaipur, Rajasthan, India, and this organization have not provided any financial or material support for the research described in the manuscript. There are no conflicts arising from my employment or affiliation that could bias the results or conclusions of the research.
3. Personal Relationships: I have no personal relationships or connections with any individuals or organizations that could present a conflict of interest with the research conducted or the content presented in the manuscript.
4. Intellectual Property: I confirm that there are no patents, copyrights, or other forms of intellectual property associated with the research described in the manuscript that could create a conflict of interest.
5. Other Conflicts: I have disclosed any other potential conflicts of interest that could be relevant to the research or its publication in International Journal of Innovative Research & Growth.
I certify that all authors listed on the manuscript have reviewed and agreed to this conflict-of-interest declaration.
Thank you for considering my submission to International Journal of Innovative Research & Growth. Please do not hesitate to contact me if you require any further information or clarification regarding this matter.

References

[1] Beal, T., White, J. M., and Arsenault, J. E. (2021). Micronutrient gaps during the complementary feeding period in South Asia: A comprehensive nutrient gap assessment. Nutrition Reviews, 79(Suppl 1), 26–34.
[2] Black, R. E. (2013). Maternal and child undernutrition and overweight in low-income and middle-income countries. Lancet, 382(9890), 427–451.
[3] Brown, C. A., and Jones, S. M. (2020). Impact of maternal nutrition on fetal development: A comprehensive review. Journal of Nutrition and Health, 10(3), 123-145.
[4] Danielewicz, H. (2017). Diet in pregnancy—more than food. Journal of Pediatrics, 176(12), 1573–1579.
[5] Enyew, E. B. (2023). Micronutrient intake and associated factors among pregnant women in East Africa: Multilevel logistic regression analysis. PLoS One, 18(4), e0281427.
[6] Garcia, M. L., and Anderson, K. E. (2021). The role of social support in shaping maternal dietary choices: A longitudinal study. Journal of Social and Clinical Nutrition, 12(1), 45-62.
[7] Hundera, T. D. (2015). Nutritional status and associated factors among lactating mothers in Nekemte referral hospital and health centres, Ethiopia. International Journal of Nutrition and Food Science, 4(2), 216.
[8] Jones, L., and Singh, M. (2023). Contextualizing food fortification: beyond micronutrient numbers. Global Public Health, 30(1), 45-58.
[9] Marshall, N. E. (2022). The importance of nutrition in pregnancy and lactation: lifelong consequences. American Journal of Obstetrics and Gynaecology, 226(5), 607–632.
[10] Mottaleb, K. A., and Mishra, A. K. (2022). Income, urbanization and consumption of processed foods: implications for nutrition and health policies for India. Journal of International Development, 35(5), 668-715.
[11] Olson, R., Gavin-Smith, B., Ferraboschi, C., and Kraemer, K. (2021). Food fortification: The advantages, disadvantages and lessons from sight and life programs. Nutrients, 13(4), 1118.
[12] Patel, R., and Kumar, S. (2022). Addressing micronutrient deficiencies in pregnant and lactating women: a comprehensive review. Public Health Nutrition, 18(2), 67-82.
[13] Sharma, S., Maheshwari, S., and Mehra, S. (2021). Association between maternal dietary diversity and low birth weight in central India: A case-control study. Journal of Nutrition and Metabolism. 20(21), 6667608.
[14] Singh, D. P., Biradar, R. A., Halli, S. S., and Dwivedi, L. K. (2021). Effect of maternal nutritional status on children nutritional status in India. Children and Youth Services Review, 1(120), 105727.
[15] Smith, A. (2021). Maternal nutrition challenges in south Asian contexts. Journal of Nutrition, 25(4), 123-145.
[16] Turner, L., and Wilson, A. (2021). The association between maternal stress and dietary patterns during pregnancy: A longitudinal study. Journal of Obstetric, Gynaecologic and Neonatal Nursing, 46(2), 287-298.
[17] Venkatesh, U., Sharma, A., Ananthan, V. A., Subbiah, P., and Durga, R. (2021). Micronutrient's deficiency in India: A systematic review and meta-analysis. CSIR Summer Research Training Team. Journal of Nutrition Science, 10(1), 110.
[18] White, J., and Miller, A. (2020). Factors influencing maternal dietary choices in urban environments: A qualitative study. Journal of Urban Nutrition Research, 25(4), 301-318.
[19] Yeneabat, T., Adugna, H., and Asmamaw, T. (2019). Maternal dietary diversity and micronutrient adequacy during pregnancy and related factors in East Gojjam Zone, Northwest Ethiopia. BMC Pregnancy Childbirth, 19(1), 173.
[20] Zerfu, T. A., Umeta, M., and Baye, K. (2016). Dietary habits, food taboos, and perceptions towards weight gain during pregnancy in Arsi, rural central Ethiopia: a qualitative cross-sectional study. Journal of Health, Population and Nutrition, 21(2), 117-124.