Research Article

Study on Assessment of Nutritional Status of Pregnant Women Leading to Malnutrition

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ABSTRACT

Background: Pregnancy is a wonderful physiological period to be in. Maternal sustenance and wellbeing are significant variables that influence embryonic development. Maternal malnutrition has a significant, serious and long-term impact on the mother and children which plays an important role in premature birth, still birth condition and also affects their fetus. Consequently, it is important to assess the nourishing status of pregnant women to stay away from complications

Objective: To determine the nutritional health of pregnant women who are at risk of malnutrition.

Materials and methods: An observational study was directed to evaluate healthful status of pregnant ladies. The wholesome state of 150 pregnant ladies going to ANC in tertiary consideration medical care was evaluated. A fundamental arbitrary system was utilized to pick the subjects. Educated assent and moral endorsement were acquired. Information was acquired by utilizing information assortment structures which included patient demographics, income anthropometric measurements and 24 hr dietary history. The information was analyzed with SPSS programming and genuinely classified utilizing recurrence and rate, just as the chi-square test was utilized.

Results: A sum of 150 pregnant ladies were included in the study , of which larger part 67.3% of them were in the age gathering of 20-25 years and few of them 4.0% were <20 years of age.BMI of most of the pregnant women 58.7%(88) was normal, few of them 11.3%(17) were overweight and 30%(45) of them were underweight.BMI had significant relationship with nutritional status (P value=0.000**).Majority of them had mild anemia 72(48.0%), some of them 64(42.7%) had normal hemoglobin and few of them 14(9.3%) had moderate anemia(P value=0.000**). 92%(138) of the pregnant women had high food diversity and 8%(12) of them had medium food diversity (P value=0.002).By assessing the data we found that 62(41.3%) of them were malnourished and 88(58.7%) of them were well nourished.

Conclusion: The study's findings demonstrate the general well-being significance of undernutrition among pregnant women in the study area. Wholesome status of pregnant ladies was influenced by variables like Income, Type of family, Hemoglobin levels, their weight record and furthermore their dietary intake.

Keywords: Malnutrition, Nutritional Status, BMI, Anemia, Anthropometric.

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INTRODUCTION

WHO defines malnutrition as "the cellular imbalance between nutrient and energy and the body's demand for them to ensure growth, maintenance and specific functions''. The term malnutrition covers two broad groups of conditions. One is 'undernutrition' which includes stunting (low weight for age), wasting (low weight for height), underweight (low weight for age) and micronutrient deficiencies or insufficiencies (a lack of vitamins and minerals). The other is overweight, obesity and diet related diseases.[1]

Pregnancy is a lovely physiological stage in which a zygote develops into a 3.175 kg newborn baby during 40 weeks within the mother's womb (9 months).[2] Pregnant women's dietary state is critical to their health and the success of their pregnancy. Pregnancy necessitates increased nutritional requirements is a crucial time for the body to meet its demand for macronutrients and micronutrients.[3] From a nutritional standpoint, pregnant women are one of the most susceptible groups of the population.[4] Maternity is a period of dynamic development for women that necessitates a great deal of focus and care because the fetus is fed directly through the mother's placenta.[5]

The deficit has been linked to substantial health implications, including increased maternal and infant morbidity and mortality. With hundreds of millions of pregnant women worldwide, malnutrition is the leading cause of disease and mortality.[3] Prenatal under nutrition in mothers has a significant impact on both their own and their children's health. Increased perinatal and neonatal mortality, a higher risk of low birth weight and stunted babies, intrauterine growth restriction, stillbirths, and miscarriage are some of the consequences of female under nutrition, which further undermines the family's and society's human capital development and perpetuates the cycle of poverty and malnutrition.[6] Malnutrition is still one of the world's major health problems, not only because its consequences are so broad and long-lasting, but also because it is effectively prevented.[3]

The health and nutrition of the mother are significant determinants in the growth of the embryo. A healthy mother is more likely to have a healthy child. If a woman is underweight, she is more likely to give birth to weak or undernourished babies, with a high infant mortality rate as a result.[7]

India is a large country with the world's second-largest population, yet it continues to account for a quarter of all maternal deaths. It is responsible for almost 20% of all births worldwide. Every year, approximately 30,000,000 women are pregnant, with approximately 27,000,000 of these go with delivery. Approximately one lakh thirty six thousands of mothers and newborn babies are killed. National Family Health Examination Survey (NFHS) revealed that one in every three women in India is undernourished (33.0% have a low BMI) and every second woman (56.2%) is anaemic. Women of childbearing age are anaemic).

The foetal anabolic process is dependent on the mother eating a healthy and sufficient amount of food. If the mother does not gain enough weight during her pregnancy, the nutrients transferred to the baby will be of poor quality and quantity. If the mother is overweight, the blood circulation of the uterus is hampered, and the amount of nutrients transferred from the placenta to the baby is reduced. Both low and excessive weight gain are hazardous to the pregnant woman and her developing foetus.[8]

The World Health Organization (WHO) is yet to provide a universally applicable indicator for nutritional assessment and supplementation of pregnant and lactating women (PLW) in emergencies, although earlier recommendations suggested that all PLW could be eligible for targeted supplementary feeding (TSF). In humanitarian settings, mid-upper-arm circumference (MUAC) is often used for screening PLW, although cutoffs for defining acute malnutrition or maternal risk of having LBW infants varied. The broadly accepted SPHERE Guidelines also recommend the use of MUAC for PLW screening and entry of PLW into feeding programs. According to these guidelines, the MUAC values associated with adverse outcomes vary from country to country, typically ranging from 21 cm to 23 cm and values < 21 cm could be used for identifying and targeting PLW at risk for growth retardation.[9]

Mid-upper arm circumference (MUAC) is often used as a measure of fat-free mass. MUAC is a measurement of the circumference of the upper arm at the midpoint between the olecranon and acromion processes. Since the arm contains both subcutaneous fat and muscle, changes in MUAC can reflect a change in muscle mass, a change in subcutaneous fat, or both. In resource-poor settings, where individuals tend to have smaller amounts of subcutaneous fat, changes in MUAC are more likely to reflect changes in muscle mass. In these settings, MUAC measurements can be useful as an indicator of protein-energy malnutrition or starvation, particularly in situations where measurement of weight or height may not be feasible.

Anthropometry is the measurement of the physical dimensions and gross composition of the human body. Anthropometric measurements vary with age and nutritional status and are particularly useful as indicators of body composition when chronic imbalances of protein and energy have occurred. Most anthropometric measures are based on a two-compartment model of body composition: fat and fat-free mass. Fat-free mass consists of skeletal muscle, non-skeletal muscle, soft lean tissues, and the skeleton. It is composed of a mixture of water, minerals, and protein. Since most of the protein is stored in the muscle, techniques to assess muscle mass can be used as indicators of the protein reserves of the body.[10]

Dietary diversity has been defined as the number of different foods or food groups that are consumed over a specific reference period. The number of food groups consumed by pregnant women out of the fourteen food groups. These food groups included; Cereals, vitamin A rich vegetables and tubers, dark green leafy vegetables, other vegetables, white roots and tubers, vitamin A rich fruits, other fruits, flesh meat, organ meat, eggs, fish, pulses/legumes, nuts and seeds, milk and milk products, oils and fats. Using the 14 food groups, dietary diversity categories were formulated namely; low dietary diversity category (≤3 food groups); medium diversity category (4 to 5 food groups) and high diversity category (≥6 food groups). The respondent's dietary diversity score was then categorized based on their position on the categories.[11]

As a result, maternal malnourishment is a public health issue in general, and it is critical to assess the health status of pregnant women and identify the risk factors associated with maternal malnourishment that contribute to poor outcomes.

METHODOLOGY

A prospective, observational study on pregnant women in tertiary healthcare was carried out over a 3-month period (1st June to 31st August 2021). They were recruited through a simple random sampling technique when they visited ANC (Ante-Natal Checkup) in OBG Department of

Adichunchanagiri Health and Research Center. So, in total, 150 pregnant women were recruited for this study. Data was collected using a data collection form which included questions about socio-economic details, Anthropometric measurements, Biochemical Investigation, and 24 hour dietary recall. From this data we could conclude whether the pregnant woman was well nourished or malnourished. Suggestions regarding nutrition was given to the pregnant women who was malnourished.

Inclusion Criteria

Pregnant women of age 18-40 years, who gave consent.

Exclusion Criteria

Pregnant women who did not attend ANC during data collection period.

Ethical Clearance

Ethical approval was obtained from the institutional ethics committee of Adhichunchanagiri Hospital and Research Centre, B.G. Nagara, Nagmangla Taluk, Mandya District Karnataka 571488.

Study Procedure

The approval of the ethics committee of the institution was obtained prior to the commencement of the study procedure.

The present study employed survey through data collection form. This provides a systematic means of collecting detailed information about Socio-economic details and anthropometric measurements such as height, weight, body mass index, MUAC, biochemical investigations such as Hemoglobin of pregnant women and 24 hours dietary recall which included 14 food groups.

The participants who satisfied the inclusion criteria were enrolled into the study after obtaining their written consent. The data was collected from the outpatient through data collection forms and through that data we assessed the nutritional status and malnutrition status of them.

Data Analysis

SPSS software was used to analyse the data. The Chisquare test was used to examine the relationship between nutritional status and demographic variables. Data was analysed and presented in a descriptive format, in terms of percentage and frequency.

RESULTS

The study included 150 pregnant women in total. Out of 150 pregnant women, 67.3% were between the ages of 20 and 25, 24.0% were between the ages of 26 and 30, 4% were under the age of 20, and 4.7% were between the age of 30 and 35. The majority of participants 42.0% had higher secondary level education, 24.7% had secondary level of education, and 33.3% had degree level of education.

87.3%of them were Housewives and 12.7% of them were working. 22.7%of them had family income less than 1 lakh, 48.7%of them had 1 to 2.5 lakh and 28.6% of them had more than 2.5 lakh of annual income. Similarly, 63.3% belonged to a joint family, while 36.7% belonged to a nuclear family (Table 1).

Table 1: Participants' socio-demographic characteristics.

Variable	Category	Frequency	Percentage	P value
Age (in years)	<20	6	4.0	0.498
	20-25	101	67.3	0.181
	26-30	36	24.0	0.473
	31-35	7	4.7	0.703
Education	Secondary	37	24.7	0.189
	Higher Secondary	63	42.0	0.070
	Degree	50	33.3	0.493
Occupation	House wives	131	87.3	0.671
	Working	19	12.7	0.257
Annual Income	< 1 Lakh	34	22.7	0.442
	1 Lakh to 2.5 Lakh	73	48.7	0.862
	>2.5 Lakh	43	28.6	0.326
Month of Pregnancy	First Trimester	25	16.7	0.127
	Second Trimester	36	24.0	0.235
	Third Trimester	89	59.3	0.058
Parity	First Baby	75	50.0	0.206
	Second Baby	69	46.0	0.326
	Third Baby	6	4.0	0.143
Type of Family	Joint	95	63.3	0.049*
	Nuclear	55	36.7	0.049*

**Table 2:** Distribution of Study Participants according to their BMI and MUAC.

Variable	Category	Frequency (%)	P Value
Body Mass Index	(<18.5) Underweight	45(30.0%)	0.000**
	(19-24.9) Normal	88(58.7%)	0.000**
	(25-29.9) Overweight	17(11.3%)	0.000**
MUAC	Low	02(1.3%)	0.807
	Normal	89(59.3%)	0.999
	High	59(39.3%)	0.512

Table 2 shows that out of 150 participants, 88 (58.7%) were normal, 17(11.3 %) were overweight, and 45 (30.0%) were underweight. 1.3% (02) of them had low MUAC,59.3% (89) of them had normal MUAC and 39.3% (59) of them had high MUAC.

Table 3: The distribution of study participants based on their haemoglobin levels.

| Hemoglobin Values	Frequency	Percentage	P value
Mild Anemia (10-11 gm/dl)	72	48.0	
Moderate Anemia (7-9.9 gm/dl)	14	9.3	0.000**
No Anemia (Normal)	64	42.7	
Total	150	100.0	
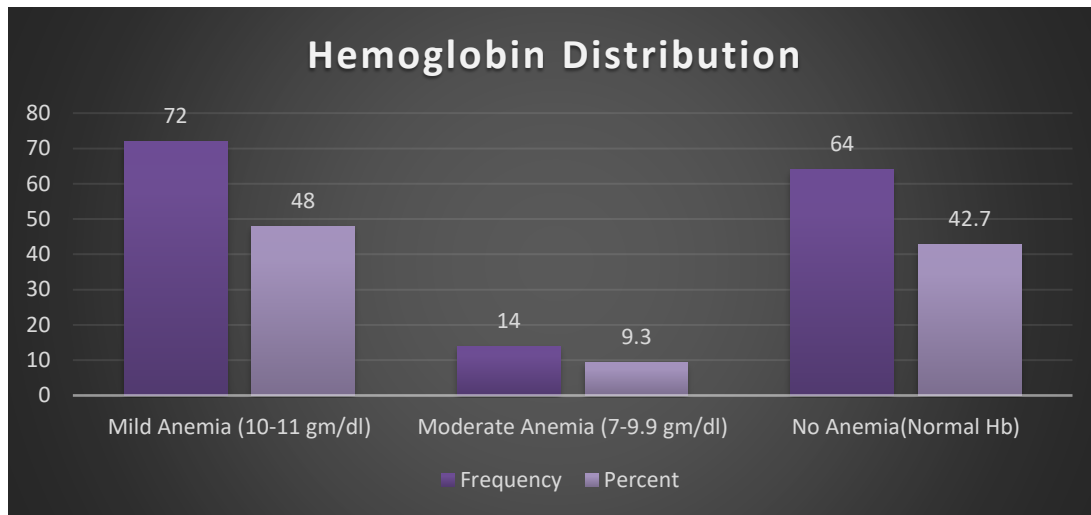
Figure 1: Hemoglobin Levels Distribution

Table 3 & Figure 1; Participants blood reports was assessed to know their hemoglobin levels. Out of 150 Pregnant women 72 (48.0 percent) were mildly anaemic, while 14 (9.3 percent) were moderately anaemic and 64 people (42.7percent) were normal. The Hemoglobin value had significant relationship with malnutrition status (P value = 0.000**).

Table 4: The association of Nutritional status with 24 hours dietary recall

| Food Consumption in 24hrs (Food Diversity)	Nutritional Status		Total	P value
	Malnourished	Well nourished		
6 or more food groups (High Food Diversity)	52(37.7%)	86(62.3%)	138	
4-5 food groups (Medium Food Diversity)	10(83.3%)	2(16.7%)	12	0.002*
Total	62	88	150	
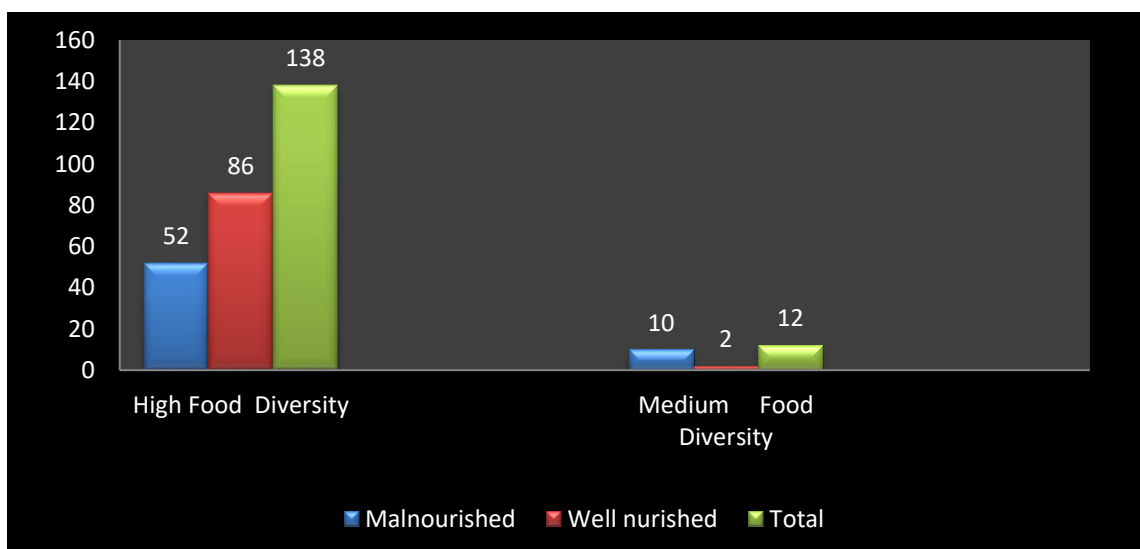
Figure 2: Food Consumption in 24hrs (Food Diversity) and Nutritional Status

Table 4 & Figure 2; Shows that out of 150 pregnant women 138 of them have high food diversity in 24hrs, among them 52(37.7%) of them were malnourished and 86(62.3%) of them were well nourished and 12 of them have medium food diversity in 24hrs, among them 10(83.3%) of them were malnourished and 2(16.7%) of them were well nourished. The study shows that there is significance relationship between food diversity of 24hours and nutritional status.

Table 5: Nutritional Status Distribution

Nutrition Status	Frequency	Percent
Malnourished	62	41.3
Well nourished	88	58.7
Total	150	100.0
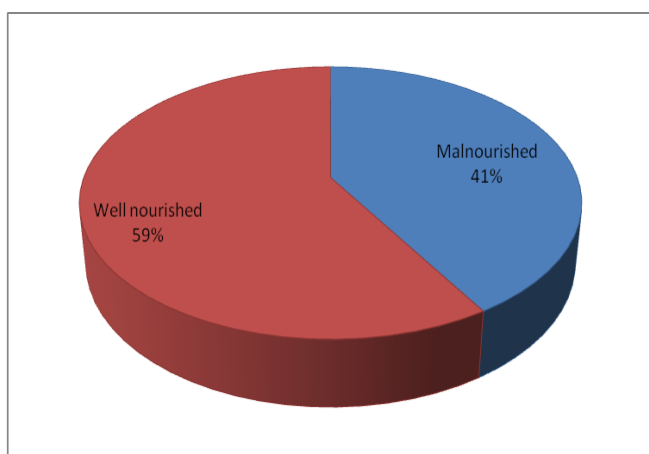
Figure 3: Nutritional Status Distribution

Table 5 and Figure 3; Shows that 88(58.7%) of pregnant women were well nourished and remaining 62(41.3%) were malnourished.

DISCUSSION

Mother's health and nutritional status have become major concerns. The prevalence and determinants of poor nutrition among pregnant women attending antenatal care were investigated in this study. The current study demonstrated the importance of undernutrition in the study area in terms of public health. The purpose of this study was to determine the nutritional status as well as malnutrition status of pregnant women.

The majority of the participants in this study were between the age 20-25 years. Another cross-sectional study revealed that the majority of study participants were between the age of 20-25years in rural areas of Belagavi.[2]Another similar cross-sectional study was conducted which also showed that the majority of study participants in rural Sri Lanka were between the ages of 20 - 29years.[5]The findings of this study are similar to the findings of our study.

One of the potential risk factors for poor nutritional status during pregnancy may be lack of education. When it came to educational attainment, most of the participants 42% had completed the higher secondary level of education and only 33.3% of them completed graduation. A study done in rural areas of Belgavi reported that majority 35.0% of the participants had secondary level education, 4.9% participants were under-graduate, almost all were educated except 1% who were illiterate.[2] Similarly, A research conducted in rural parts of Bangladesh's South West Region, 34.5% of participants had completed basic education, 30.5% had completed 6th to 10th grade, and 16.5% had completed secondary school.[15]The level of education is crucial in order to have understanding of nutritional requirements and to have enough nutrition.

A study in Sri Lanka, reported that 83.46% were Unemployed while 16.54% were Employed.[5] Our study reveals that 87.3% of them were Unemployed (House wives) while 12.7% were employed (working). The results are similar to present study.

In our study majority 48.7%of them had annual income between 1 lakh to 2.5 lakh approximately 8,000 to 20,000 per month and few of them 22.7% had below 1 lakh which means approximately ≤8,000 per month. In the previous study in rural parts of Bangladesh 60% had <5,000 monthly income, 20% had between 5000- 8000, 13.25% had between 8000-10,000 while 6.75% had >10,000.[15]In our study, most of the participants have good income as compared to past study.

According to the results of the current study, anemia and malnutrition have a substantial positive relationship. There is significant positive relationship between anemia and malnutrition. When compared to normal pregnant women, anemic pregnant women had a significantly higher proportion of undernutrition. In our study 48% were mild anemic, 9.3% moderate anemic, while 42.7% had no anemia i.e they normal Hb value. In the other study,53.4% were mild anemic, 23.3% moderate anemic, while 2.9% were severe anemic.[2]In our study mild anemic pregnant women were more as that of the previous study.

The results from the BMI analysis of study conducted in insecure zones in southern Ethiopia, the Sidama zone revealed that 28.1% of the women were malnourished (BMI <18.5) and 67.5% were normal (BMI 18.5 to <25.0), while the remaining small proportion (4.5%) fell in the overweight or obese.[12] In our present study 41.3% of pregnant women were malnourished based on BMI, In 41.3% of malnourished pregnant women 30% of them were underweight and 11.3% of them were overweight who were also considered as malnourished. Therfore BMI had significant relationship with malnutrition status.

Undernutrition (MUAC < 22 cm) was observed in 65 of 402 (16.1%) pregnant women studied and others had normal MUAC.[6] Present study shows that only 1.3% of women had MUAC less than 22cm others had normal MUAC.

Out of the 14 food groups, based on the categories developed, most respondents (61%) were in the high diversity category (≥6 food groups) and medium diversity category [37% (4–5 food groups)]. About 2% of the participants were in the low diversity category (≤3 food

groups).[11] Moreover, in the present study, 92% of the pregnant women belong to have high diversity category and only 8% of them belong to medium diversity category. Hence in our study food diversity category has significant relationship between malnutrition status.

Consumption of foods by respondents based on food groups was also determined. The most commonly eaten foods were cereals (99%), oils and fats (93%), other vegetables (93%) and milk and milk products (92%). Notably, foods of animal origin were minimally consumed in the study conducted in Laikipia County, Kenya.[11] In our study most commonly consumed foods were starchy staples (99%), milk and milk products (88%), vitamin A rich vegetables (84%) and legumes and nuts (79.3%). Animal-derived foods were consumed minimum. This information was comparable to what we found in our study.

As per our study's findings, 41.3 percent of pregnant women were malnourished. Few studies have been conducted in Ethiopia to determine the prevalence of poor nutrition in pregnant women, results from the BMI analysis revealed that 28.1% of the women were malnourished.[12] According to the current study, the prevalence of malnutrition among pregnant women is high when compared to previous study.

The studies consistently demonstrated the importance of poor nutrition in terms of public health. When compared to the previous studies, the prevalence of under nutrition among pregnant women is higher in our current study. Nutrition, maternal health, and other women's empowerment programs should be implemented by the government and other organizations. Furthermore, the variation could be due to geographical differences, smaller land holdings, ongoing food insecurity, and variations in data collection.

CONCLUSION

The study revealed that malnutrition status is associated with the socioeconomic status as well as anthropometric parameters of pregnant women. The findings clearly demonstrated the importance of education, occupation, income, type of family, and maternal morbidity status in achieving the minimum dietary diversity. Nutrient intake in pregnant women and anthropometric parameters like height, weight, MUAC and also hemoglobin values influence under nutrition status.

The findings of the study provide evidence for the public health significance of under nutrition among pregnant women in the study area. The important risk factors or predictors of under nutrition was underweight, MUAC, hemoglobin values and also dietary intake.

The study concluded that Nutritional status of most of the pregnant women was affected due to factors like type of family, low BMI (underweight), haemoglobin levels,24hours dietary intake. These all parameters had significant relationship between the malnutrition status. As a result, effective nutrition intervention should be directed toward

pregnant women in order to improve maternal nutritional status.

Recommendations:

Further studies can be done to identify the particular factors that may lead to malnutrition and overcome it. Nutritional programs in community should be encouraged to provide knowledge to pregnant women regarding importance having nutritious and healthy foods. Government can imply programs or schemes to improve the knowledge of maternal health.

The problem must be combated through an implementation of strategies like rural livelihood promotion, socio-economic empowerment of women and expansion of women's education, particularly in rural areas. Nutritional care should be integrated into maternity services.

We also suggest sustained nutrition education to enhance good nutritional awareness and practice of pregnant women.

Abbreviations:

WHO: World Health Organization, ANC: Antenatal Care, OBG: Obstetrics and Gynecology, MUAC: Mid Upper Arm Circumference, BMI: Body Mass Index, SPSS: Statistical Package for The Social Science, PLW: Pregnant and lactating women, SPHERE: Simulated Patient Health Environment for Research and Education, TSF: Targeted Supplementary Feeding, LBW: Low Birth Weight, NFHS: National Family Health Examination Survey.

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