

FOOD INSECURITY IN THE RURAL POPULATION OF SOUTH KARNATAKA

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Abstract

According to World conference on Youth (2014), Many Rural development Programmes had been implemented at the gross root level in the aim of food security and poverty alleviation at the global level. Even though so many programmes had been implemented, studies show that more than 842 million suffered from hidden hunger and 200 billion people suffered from unemployment. India is one of the developing countries experiencing transformation in consumption pattern rapidly from staple food commodities, which are rich in energy to animal derived products, fruits and vegetables and edible oils, which are rich in protein, fat and vitamins. India's position on the Global hunger index has been fallen.

This study was aimed to assess the food insecurity and nutritional status of preconception women in a rural population of north Karnataka. The purpose of the study is (i) to understand the BMI and WH ratio (ii) To understand the anemic condition based on socio economic class(iii) To examine the Calorie and Nutrient Intake in the Research Area. The methods of the study are based on both primary and secondary data. The sample size for the study is 770 respondents from Rural areas of South Karnataka state. A questionnaire is designed to determine the various factors of Health aspect. The study is based on simple random sampling method. Anthropometric measurements and hemoglobin estimation were carried out at the health centers. In 2015-16, 58.6% of the children were suffering from anemia. In 2019-21 the proportion of such children had increased to 67.1%. The government had implemented many programs to improve the hemoglobin content for sustainable livelihood, through which carb- enhancing tablets , nutritious food ,milk and eggs are provided to the gross root level however anemia among children in this age group has increased dramatically. Significant

associations were found between socio-economic status and anemia ($p = 0.0006$) and between food insecurity and anemia ($p = 0.0001$).

Keywords: Nutrition and food security, Nutritional status, Socio-economic status, Malnutrition, Anemia, Sustainable Livelihood

Introduction

More than 40 crores of people lack basic facilities like electricity, health, sanitation, education, employment and food security in India (Amartya sen and Jean Dreze). As per the Human development Index (HDI), India stands 132nd rank among the total of 191 countries in terms of development and health (Human Development report 2021-22) . Present research studies says India's position on the Global hunger index has been fallen.

According to World conference on Youth (2014), Many Rural development Programmes had been implemented at the gross root level in the aim of food security and poverty alleviation at the global level. Even though so many programmes had been implemented, studies show that more than 842 million suffered from hidden hunger and 200 billion people suffered from unemployment. India is one of the developing countries experiencing transformation in consumption pattern rapidly from staple food commodities, which are rich in energy to animal derived products, fruits and vegetables and edible oils, which are rich in protein, fat and vitamins.

Maternal nutritional status is important for the health and quality of life of women and for the health of their newborns. India is home to more than 217 million undernourished people as per The State of Food Insecurity in the World (2012) estimates. Previous studies in Indian urban settings have found the prevalence of food insecurity ranging from 51 to 77%. However, data on food insecurity in the rural areas is lacking which constitutes about 70% of Indian population. This study was aimed to assess the food insecurity, socio demographic factors, nutritional status, macro and micronutrient adequacy of diets in the pre- conception period among rural women of North Karnataka.

Review of Literature

World Health Organization ,(2000) reported that BMI >25.0 and >30.0 kg/m² was taken as cut offs for overweight and obesity, respectively. WC cut-offs were taken as >94 cm for males and >80 cm for females to define overweight.

Webb GP,(2002)The cut-off used for WHR were >0.9 kg/m² for males and >0.8 kg/m² for females.

Coutinho T et al ,(2011) said that people with central obesity have higher mortality even when the BMI is normal and so waist circumference should be recorded and pursued in every person in addition to BMI for good risk stratification and therapeutic considerations.

Smita t patil et al, (2012) have taken 111 males and 93 females. Out of 204 patients, 111 (54%) were males and 93 (46%) were females. BMI (18-22.9 kg/m) was found in 39 patients (19%), 114 patients (58 %) were overweight (23-24.9 kg/m) and 51 patients (23%) were obese BMI >25 kg/m. Women had a higher incidence of abnormal waist circumference compared to the men. 53% males BMI = 25 Kg/m² were defined as obese. (n=60) had waist circumference above 90cm and 72% females (n=66) had waist circumference above 80cm.

Olumide A Abiodun et al ,(2014) have taken total 776 individuals, 200 (25.8%) males and 576 (74.2%) females were examined. Among them, 232 (29.9%) were overweight and 136 (17.5%) were obese while, 28 (3.6%) were underweight.

The researchers reviewed the following literature for the study and presented below. Smith (2015) studied that stunting is commonly referred to as an indicator of “malnutrition,” evidence is accumulation for a vital role of the disease environment in shaping nutritional outcomes. Coffey (2014) stated that according to joint UNICEF and WHO (2012) estimates for 2010, 15% of the world population and 19% of people in developing countries defecate in the open without using any toilet or latrine. Of these 1.1 billion people, nearly 60% live in India, which means they make up more than half of the population of India. People in India are much more likely to defecate in the open than even people in much poorer sub-saharam African countries, on average, and open defecation in India has declined little despite rapid economic growth.

Shefali Chopra (2018) expressed that the key aim is to contribute to improving health and equity in India. It differentiates and address both the challenges to releasing India’s potential globally and the challenges like malaria, TB, water borne diseases, inadequate nutrition, high infant and child mortality rates, sanitation, clean drinking water and iodine related deficiencies to solving long-standing health and health services distribution problems internally.

Objectives of the Study

1. To understand the BMI and WH ratio

2. To understand the anaemic condition based on socio economic class
3. To examine the Calorie and Nutrient Intake in the Research Area.

Methodology

The methods of the study are based on both primary and secondary data. The sample size for the study is 770 respondent from Rural areas of South Karnataka state. A questionnaire is designed to determine the various factors of Health aspect. Primary data of the study includes study is based on simple random sampling method. The study is based on Interview method, Observation method, Group discussion . Secondary data includes Human development report, NFHS (National family health survey), World Bank Analysis Report, Health Guidelines , Articles, Journals, Books, Internet Articles , M. phil dissertation, PhD Thesis, Newspaper Cuttings etc. This was a cross sectional study conducted from January to December 2021. A total of 770 preconception women were enrolled belonging to 18 villages from 6 districts of South Karnataka . Women were identified through a household survey and selected by a cluster sampling method with the help of NurseMidwives and Accredited Social Health Activists (ASHAs). Women with children were selected for study. Those with hemoglobin less than 8 g/dL were excluded. Allopathy and Ayurvedic Doctors also guided and suggested for the present study. Socio-economic status (SES) was classified using the Modified Prasad classification for the study period (2014). SES was classified as upper, upper middle, middle, lower middle and lower Class based on per capita monthly income of Rupees 5357 and above, 2652–5356, 1570–2651, 812–1569 and 811 or less respectively Information regarding parity, age of marriage and history of consanguinity (matri- mony between closely related individuals) were collected as part of obstetric history. Food insecurity status was assessed based on a nine item questionnaire and categorized into four types: food secure, mildly food insecure, moderately food insecure and severe food insecure using Household Food Insecurity Access Scale (HFIAS) for measurement of food access .Hemoglobin (Sahli’s Method) was estimated by trained technicians using capillary blood in the health centres and anaemia was graded as per WHO criteria.

Table 1 Socio-demographic parameters, Food Security and Anaemic status of preconception Women.

Variables	Years	No	Percentage
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Age	15–19 years	126	16.4
	20–24 years	436	56.6
	25–29 years	174	22.6
	30–34 years	28	3.6
	35–39 years	6	0.8
Religion:	Hindu	64. 9	84.3
	Muslim	11 9	15.5
	Others	2	0.3
Education:	Illiterate	52	6.8
	Primary	22 8	29.5
	Secondary	33 1	43.0
	PUC	123	16.0
	Graduate/Post graduate	36	4.7
Socio economic status	Upper class	6	0.8
	Upper Middleclass	22	2.9
	Middle class	58	7.5
	Lower Middle class	185	24.0
	Lower class	499	64.8
Lacto-Vegetarian Diet:		375	48.7
Age of marriage: < 18		291	37.8
Consanguinity (Yes)		290	37.7
Parity	Nulliparous	258	33.5
	1 child	338	43.9

	2 child	141	18.3
	3 + child	33 4.3	3 + child
Hemoglobin: G/Dl	Moderate Anemia(8–10.9)	605	78.6%
	Mild Anemia (11–11.9)	119	15.5%
	Normal (≥12)	46 5.9%	Normal (≥12)
Household food insecurity access (HFIA) category	Food secure (HFAI 1)	559	72.6
	Mild food insecure(HFAI 2)	84	10.9
	Moderate food insecure (HFAI 3)	92	11.9
	Severe food insecure (HFAI 4)	35	04.6

calibrated study equipment. Subjects were lightly clothed with no footwear. BMI (kg/m^2) was calculated from recorded height and weight. The WHO recommended appropriate Body Mass Index (BMI) for Asian populations and their cut-off values were used for classification. The government has been running several programs to provide nutritious food to pregnant women in the age group of 15- 49 years and anemia has increased in the pregnant women.

One day 24-h dietary recall was conducted by the trained dietary assistants in half of the study participants to estimate the intake of macro and micronutrients. Additionally, in 30% of the study participants, repeat dietary recall was performed to validate the nutritional intakes (Data not shown). The method employed for the 24-h dietary recall is published elsewhere

Anemia and poor nutrient intake (proportion of women with less than 50% intake of recommended daily allowance) with a significance level of 0.05. Data was entered in excel to prepare a master chart. SPSS version 21.0 software was used for analysis of the data.

Results

A total of 770 participants were included in the study. The mean age of

the participants was 22.5 (SD ± 3.19) years and the majority (93.6%) were less than 30 years. The majority of participants (84.3%) were Hindus whereas Muslims constituted 15.5%. Almost two-third of the participants (65%) had studied at a secondary or higher level. The majority of the women (89%) were classified as low or lower middle socio- economic class. About 38% of the participants had a history of consanguineous marriage and slightly more than one third were married before the age of 18 years (37.8%). Forty-four percent of the preconception women had one child and 33.5% were nulliparas. Al-most 94% of the women were anaemic with 78.6% and 15.5% classified as moderate and mild anemia re- spectively. Nearly a quarter of households were mild to moderate food insecure (27.4%) with severe food insecurity among 4.6% (Table 1) Food insecurity was prevalent across all the SES categories. It was found to be 33.7% in upper, upper-middle and middle clas- ses, 28.1% in lower middle classes and 26.1% in lower class families but the differences were not statistically significant ($p = 0.4334$). (Fig. 1).

One third of the study participants (36.6%) were underweight and about 18% were either overweight (8.7%) or obese (9.1%). The mean MUAC of the participants was 24.1 cm. Nearly 25% of the participants had a MUAC less than 22.0 cm. A total of 180 (23.4%) participants had W/H ratio more than or equal to 0.8 (Table 2).

The mean and median intakes of energy, macro and micronutrients are presented in Table 3. With respect to the energy and macronutrients, the proportion of women consuming less than 50% of the RDA were 15.8% for energy, 39.6% for protein and 18.2% for lipids. The consumption deficit was even greater for micronu- trients. The proportion of women taking less than half of the required daily allowance for calcium, iron, zinc, vitamin B12, folate, vitamin C and vitamin A was 32.8%, 77.7, 54.5, 35.4, 43.9, 38.5 and 44.5% respectively.

The anaemia prevalence was 94.1% and found to be present in women across all the SES categories. About 70% of the women from upper, upper-middle and middle income families had moderate anaemia whereas pre- valence was more in lower-middle (73%) and lower

Variables	N(%) (n=770)	Mean ± SD
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Height (in cm)		151.42 ± 5.58
Weight (in kg)		46.212 ± 8.4398
BMI: (Kg/m ²)		20.09 ± 3.39
Underweight (< 18.5)	282 (36.6%)	
Normal (18.5–22.9)	351 (45.6%)	
Overweight (23–24.9)	67 (8.7%)	
Obese ≥25	70 (9.1%)	
Waist circumference (cm)		65.18 ± 8.44
Hip circumference (cm)		85.22 ± 7.14
W/H ratio		0.76 ± 0.06
< 0.8	590 (76.6%)	
≥ 0.8	180 (23.4%)	
MUAC (cm)		24.06 ± 3.06
< 22	189 (24.5%)	
≥ 22	581 (75.5%)	

(82.2%) income families. Mild anemia was observed in 27.9% of upper, upper-middle and middle compared to 18.9 and 12% in lower-middle and lower income families respectively. The severity of anaemia was greater in lower SES categories and the association was statistically significant ($p = 0.0006$). (Table 4). Prevalence of moderate anemia was higher (82.6%) in food secure than in food insecure (67.8%) women. However, mild anemia was more prevalent in food insecure (21.3% vs 13.2%) women and the results

Table 3 Calorie and nutrient intake on selected Macro and micronutrients (n = 392)

Nutrient (RDA)	Mean ± SD	Median	Proportion of women with intake < 50% of RDA
Calorie (Kcal) (1900 kcal)	1302.66 ± 358.50	1263.32	15.8
Protein (g) (55 g)	31.24 ± 11.07	29.77	39.6
CHO (g) (280 g)	183.64 ± 49.42	180.67	1.0

Total lipids (Fat)(g) (40 g)	50.47 ± 17.78	48.72	18.2
Fiber (g) (30 g)	15.57 ± 5.25	14.97	49.8
Calcium(mg) (600 mg)	453.68 ± 252.16	389.59	32.8
Iron(mg) (21 mg)	8.20 ± 3.04	7.82	77.7
Zinc(mg) (10 mg)	5.04 ± 1.76	4.79	54.5
Vit B1(Thiamine) (mg) (1 mg)	0.51 ± 0.18	0.50	49.0
Vit B2 (Riboflavin)(mg) (1.1 mg)	0.75 ± 0.29	0.72	24.2
Vit B6 (Pyridoxal phosphate PLP)(mg) (2 mg)	0.97 ± 0.34	0.95	57.6
Dietary folate equiv.(DFE)(µg) (200 µg)	125.16 ± 67.03	112.35	43.9
Vit B12 (Cobalamin)(µg) (1 µg)	0.92 ± 0.80	0.621	35.4
Vit C (Ascorbic acid)(mg) (40 mg)	30.33 ± 22.54	24.69	38.5
Vit A RAE (µg) (400 µg)	266.54 ± 178.26	216.28	44.5

Table 4 Prevalence of anemia among different Socioeconomic classes

Socio economic status (SES)	Anaemia status			Total
	Moderate Anaemia	Mild Anaemia	Normal	
Upper, Upper Middle and Middle Class	60 (69.8%)	24 (27.9%)	2 (2.3%)	86
Lower Middle class	135 (73.0%)	35 (18.9%)	15 (8.1%)	185
Lower class	410 (82.2%)	60 (12%)	29 (5.8%)	499
Total	605	119	46	770
X ² = 19.6201 DF = 4 p = 0.0006				

were statistically significant. ($p = 0.00001$) (Fig. 2). The prevalence of moderate anaemia was slightly lower in Lacto-vegetarians (75.2%) than non-vegetarians (81.1%), whereas mild anemia was more prevalent in Lactovegetarians (18.5% vs 12.7%), which was not statistically significant ($p = 0.067771$). (Table 5) The association between dietary intake of micronutrients (iron, vitamin B6, folate and vitamin B12) and anaemia in vegetarians and non-vegetarians is presented in Table 6. There were no statistical differences in intake of these micronutrients and anaemia status in both the vegetarian and nonvegetarian groups.

Discussion

The results of the study indicate that nutritional status of preconception women is suboptimal although food insecurity does not appear to be a major concern in this population. Almost all of the women were anemic, about one-third underweight, majority had inadequate intake of micro and macronutrients and one-fourth were food insecure

This was a community based study with participants identified through household survey of Married Women of Reproductive Age from a cross section of rural areas of Belagavi District of North Karnataka region of India. Food insecurity as well as socioeconomic and nutritional status were determined using validated assessment methods. Additionally, actual intake of macro and micronutrients was assessed by a 24-h dietary recall by a trained dietician.

Studies conducted in central and eastern India have reported the prevalence of mild to moderate anaemia in the range of 42.1 to 60.8% and 39.6 to 48.0% respectively. However, National Family Health Survey- 2015-16 (NFHS-4) reported a lower prevalence of anaemia (41.2% for Belagavi district and 46.1% for Karnataka state). The lower prevalence may be due to methodological differences in the estimation of Hemoglobin. We found that anaemia was prevalent

Table 5 Association between type of diet and anemia

	Moderate Anemia	Mild Anemia	Normal	Total
Lacto-vegetarians	282 (75.2%)	69 (18.5%)	24 (6.3%)	375
Non-vegetarians	323 (81.1%)	50 (12.7%)	22 (6.2%)	395
Total	605	119	46	770

Among all the women irrespective of their socio- economic strata, however, the severity of anaemia was greater among lower SES women. Anthropometric evaluation showed that most of the women had either a normal BMI or were underweight. Another study in neighbouring Bangladesh showed that 25.6% of preconception women, especially adolescents were undernourished.

In 2015-16 58.6% of the children are suffering from anemia. In 2019-21 the proportion of such children has increased to 67.1%. The government has implemented many programs through which carb- enhancing tablets , nutritious food ,milk and eggs are provided to the grass root level however anemia among children in this age group has increased dramatically.

Out of every thousand children born in the country approximately 42 children die due to malnutrition. These numbers is more in rural areas where approximately 46 children die out of every thousand children under 5 years of age. Children are dying due to lack of proper nutrition and care. Children are considered malnourished if they do not grow tall enough for their age. 35.5% children under 5 years of age in the country are facing this problem.

Conclusion

The nutritional status of preconception women is poor and food security is common in this population. Anemia in women of reproductive age group can be a major public health hazard if not addressed strongly. The health of a woman in the reproductive age group has direct implications on the health of the new born babies she will bear in the future. Though emphasis is given for nutrition during pregnancy, there is an urgent need to create awareness through IEC (Information, Education and Conformation), Group discussion, Focus Group Discussion, Interpersonal communication, Participatory Healthy Home Survey, PRA (Participatory Rural Appraisal) and implement interventions to improve the nutritional status during the preconception period itself so as to improve the maternal health and in turn child health .

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