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Preliminary Factsheet of Malnutrition among Adults in Karnataka: Revelations from NFHS-4 and NFHS-5: A Review

Chaitanya Itagi[1], Pavankumar B. Gamanagatti[2]

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ABSTRACT

In India there are wide variations in the malnutrition status between the States as it is having diversified climatic conditions. This study investigates the current situation of malnutrition among adults of Karnataka state. In this review the secondary data of NFHS-4 (2015-16) and NFHS-5 (2019-20) were used for analysis. The data certainly showed that malnutrition is indeed one of the most underrated problems faced by the state. Over NFHS-4 to NFHS-5, there was reduction in under nutrition of urban and rural women by 20.37 and 18.11 per cent respectively. Whereas overweight/obese was increased much more in both men and women but in case of men population it is alarming with 14.20 and 18.40 per cent increase in urban and rural respectively. In case of vulnerable groups like pregnant and breast feeding women, anaemia has been increased to about 50 per cent. Compared to earlier data, South Karnataka districts showed improvement by reducing the anaemia status of women. Over the course of time, Governments have initiated several large scale supplementary feeding programmes. Even though most of these programmes which are aimed at children, lactating mothers, pregnant women and women in reproductive age groups have brought in results, its large scale implementation is still a distant dream for the nation.

Key words: Anaemia, Malnutrition, Obesity, Undernutrition.

"The doctor of the future will give no medicine but will interest his patient in the care of the human frame, diet and in the cause and prevention of disease"said by Thomas Edison 1903. It's been more than a century since Edison said this, but it seems like the world has taken a long time to realise the essence of those words. Nutrition and dietary plans have taken a front seat in the healthcare routine of individuals all across the globe.

The most popular word 'malnutrition' refers to deficiencies, excesses or imbalances in a person's intake of energy and/or nutrients. The term malnutrition covers two broad groups of conditions. One is 'undernutrition' which includes stunting (low height for age), wasting (low weight for height), underweight (low weight for age) and micronutrient deficiencies or insufficiencies (a lack of important vitamins and minerals). The other group is 'overweight', 'obesity' and diet-related non-communicable diseases (such as heart disease, stroke, diabetes and cancer).

India is one of the world's largest producers of milk and pulses and ranks second largest producer of rice, wheat, sugarcane, groundnut, vegetables, fruits and cotton, as per Food and agriculture organization of the united nations (FAO, 2021). The atate of food security and nutrition in the world, 2020 reported that 14 per cent of India's population is undernourished. The global hunger index (GHI) a tool that comprehensively measures hunger across the world. During 2020, India ranked 94 among 107 countries and which is in 'serious' hunger category with a score of 27.2. However, the neighbouring countries like Pakistan, Nepal and Bangladesh have secured better ranking compared to India. While Nepal is ranked 73, Bangladesh and Pakistan are ranked 75 and 88 respectively.

[1]Department of Food Science and Nutrition, College of Community Science, University of Agricultural Sciences, Dharwad-580 005, Karnataka, India.
[2]Department of Agriculture Economics, University of Agriculture Sciences, Bengaluru-560 065, Karnataka, India.

Corresponding Author: Chaitanya Itagi, Department of Food Science and Nutrition, College of Community Science, University of Agricultural Sciences, Dharwad-580 005, Karnataka, India. Email: itagicr@uasd.in

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The Global Nutrition Report (2020) stated that India is among 88 countries that are likely to miss global nutrition targets by 2025 and is also identified as the country with highest rates of domestic inequalities in malnutrition. One in two women of reproductive age is anaemic. In India, more than 135 million individuals are affected by obesity which leading to several medical and financial burdens to the government. And globally, approximately 2.8 million deaths reported due to obesity or overweight. From various studies it is noticed that, the prevalence of obesity or overweight is significantly higher in women than in men (Ahirwar and Mondal, 2019) and is nearly double to that.

In India there are wide variations in the malnutrition status between the States as it is having diversified climatic conditions. Accordingly every state has unique food environment. Food environment refers to physical,

economic, political and socio-cultural contexts in which consumers engage with the food system to make their decisions about acquiring, preparing and consuming food. It is important therefore to study the malnutrition in a manner that is suitable for the trends and context of each State.

For this study Karnataka State was purposively selected for analysis. The focus of the paper is to present the preliminary factsheet of malnutrition among adult men and women. The attempt was done to conduct comparative analysis of malnutrition between men and women during NFHS-4 (2015-16) (NFHS-4 report 2017) and NFHS-5 (2019-20)(NFHS-5 report 2021). It also provides district level malnutrition status of Karnataka. The survey covered women and men aged between 15-49 years.

The study utilized secondary data reported in the various publications of National Family Health Survey (NFHS) of India. The data pertained to food consumption pattern and anthropometric indicators of men and women are from NFHS-4 and NFHS-5. Percentage, mean and other statistical tools were computed wherever necessary for the above variables.

The comparison of food consumption pattern between NFHS-4 and NFHS-5 revealed that there was a consistent behavioural gender difference which is dependent on various factors that affect human behaviour for their choices on specific food items. The basic food consumption pattern has to be in accordance with nutrients supply to the body but in society it is more than just sustenance. People's choice of food is not in accordance with the biological needs; their choices also address many factors like economic status, social norms, gender issues, food availability, hygiene, psychological and emotional issues, family size, employment situation *etc*. The results reported in Table 1 seem to suggest huge difference in food consumption pattern among the men and women population of Karnataka. The results related to frequency of daily food consumption revealed that, most of the women had much frequent in daily consumption of staple food items like milk or curd, pulses or beans, dark green leafy vegetables and fruits over the men, whereas men had much frequent in consumption of high value food items like eggs, fish, chicken/ meat, fried foods and aerated drinks. From this Table 1 we can also observe that over the period from NFHS-4 to NFHS-5, the frequency of daily food item consumption in women was decreased and in case of men it was increased specifically of staple food items and reduced in high value food items consumption. In majority of the Indian societies men were the bread earner and family head, thus it become traditional, cultural and societal practice to prioritise them for serving food. This might had reduced women's food consumption frequency. In recent year due to some economics corrections we can observe reduction in per capita income and increase in unemployment might have reduced the food consumption frequency. According to Tripathi (2021) in rural areas the common occupation of the family is agriculture, the higher depedence of family members on agriculture may leads to unemployment among youths. And also the unemployment rate increased from 5.64 to 23.5 during 2010-2020 (Gupta, 2020).

It is observed that, dark green leafy vegetable and fruits consumption frequency reduced drastically and they shifted to weekly consumption from daily among both men and women. Similar findings were indicated, where the consumption of fruits and vegetables has been decreased and increased in consumption of energy dense foods (Choudhury *et al*., 2020). The study on food insecurity and nutritional status in north Karnataka by Mastiholi *et al.* (2018) indicated that, food insecurity in the study area was 27.4 per cent and proportion of calorie intake and macronutrients consumption among women were less than 50% of the RDA, 15.8% for energy, 39.6% for protein and 18.2% for lipids. With such food consumption pattern it was observed that, malnutrition per cent was more than 50 per cent *i.e*. underweight (36.6%) and overweight and obesity (17.8%). Anaemic women were found to be more than 94 per cent.

Nutritional status of the adult can be encountered using the parameter Body Mass Index (BMI) which shows malnourishment status in adults. From the Table 2 we can understand that there is inverse relationship between age and under nutrition and direct relationship with the over nutrition. It has been observed that women were under nourished compared to men. Over the period of NFHS-4 to NFHS-5 there is reduction in the under nourishment percentage in both men and women except in case of men with the age group of 15-19 years and also the incidence of over nutrition has shown considerable increase. While comparing with urban and rural set of adults it is clearly understood that rural women and men were most under nourished, when compared to urban adults and is exactly opposite in case of obesity. Over NFHS-4 to NFHS-5, there is reduction in under nutrition of urban and rural women by 20.37 and 18.11 per cent respectively. Whereas overweight/ obese was increased much more in both men and women but in case of men population it is alarming with 14.20 and 18.40 per cent increase in urban and rural respectively. The similar results were revealed that among adult men and women, it found large reductions in underweight from 2006 to 2016, especially in rural and urban slum areas, but over the same period it found that overweight/obesity was doubled in adult men and women population (Popkin *et al*., 2020; Young *et al*., 2020). This is consistent with the global trend observed in Low to Middle Income Countries (LMICs), the prevalence of underweight has declined substantially in the past few decades whereas rates of overweight/ obesity have increased.

The study of BMI clarified about the way of life style and further the important deficiency disorder called anaemia which is caused due to deficiency of iron. It is indicated asthe parameters with <12 g/dL and <13 g/dL of haemoglobin in the blood for women and men respectively. Unlike BMI, anaemia (Table 3) is not related to age and around 45 per cent of the women across all the age group were found anaemic and >45 per cent in case of vulnerable groups like

Table 1: Food consumption pattern of adult men and women in Karnataka, NFHS-4 and 5.

Food	Daily			Weekly			Occasionally			Never		
items	NFHS-4	NFHS-5	% Change	NFHS-4	NFHS-5	% Change	NFHS-4	NFHS-5	% Change	NFHS-4	NFHS-5	% Change
						Women						
Milk or curd	78.00	77.90	-0.13	15.20	16.10	5.92	4.30	4.20	-2.33	2.50	1.80	-28.00
Pulses or beans	77.70	75.40	-2.96	20.00	21.70	8.50	2.10	2.80	33.33	0.30	0.10	-66.67
Dark green leafy vegetables	77.20	70.70	-8.42	19.60	26.80	36.73	3.10	2.40	-22.58	0.20	0.20	0.00
Fruits	30.20	26.90	-10.93	46.90	51.70	10.23	21.80	20.90	-4.13	1.10	0.60	-45.45
Eggs	8.70	8.50	-2.30	53.50	54.90	2.62	20.70	18.80	-9.18	17.10	17.80	4.09
Fish	4.90	3.70	-24.49	34.90	31.80	-8.88	31.40	33.30	6.05	28.80	31.20	8.33
Chicken or meat	2.90	2.80	-3.45	47.80	50.00	4.60	28.00	23.50	-16.07	21.30	23.60	10.80
Fish or chicken or meat	6.20	5.50	-11.29	51.00	52.20	2.35	23.10	19.90	-13.85	19.70	22.40	13.71
Fried foods	4.70	4.60	-2.13	43.50	38.00	-12.64	43.10	51.20	18.79	8.70	6.10	-29.89
Aerated drinks	7.30	3.50	-52.05	37.20	22.40	-39.78	44.30	60.20	35.89	11.20	13.90	24.11
						Men						
Milk or curd	68.90	76.20	10.60	18.80	18.70	-0.53	10.20	4.10	-59.80	2.10	1.00	-52.38
Pulses or beans	68.30	70.50	3.22	23.20	27.00	16.38	8.20	2.30	-71.95	0.40	0.20	-50.00
Dark green leafy vegetables	73.60	70.10	-4.76	18.90	24.40	29.10	7.40	5.50	-25.68	0.10	0.10	0.00
Fruits	26.00	21.40	-17.69	45.20	56.40	24.78	28.30	21.60	-23.67	0.50	0.50	0.00
Eggs	12.00	9.70	-19.17	53.70	56.60	5.40	24.40	23.30	-4.51	9.90	10.40	5.05
Fish	7.30	5.20	-28.77	37.80	36.40	-3.70	35.60	37.00	3.93	19.30	21.50	11.40
Chicken or meat	6.40	4.00	-37.50	51.20	49.70	-2.93	27.90	29.40	5.38	14.50	16.80	15.86
Fish or chicken or meat	9.40	7.30	-22.34	52.30	52.80	0.96	24.80	25.30	2.02	13.50	14.60	8.15
Fried foods	8.20	9.00	9.76	37.80	31.00	-17.99	46.00	47.90	4.13	8.00	12.10	51.25
Aerated drinks	10.60	6.70	-36.79	30.20	25.00	-17.22	52.00	52.60	1.15	7.20	15.60	116.67

Table 2: Body mass index of adults (%) by age and place of residence, Karnataka, NFHS-4 and 5.

	Body mass index (kg/m^2): Women						Body mass index (kg/m^2): Men					
	<18.5 (total thin)			>25 (overweight/obese)			<18.5 (total thin)			>25 (overweight/obese)		
Age (years)	NFHS-4	NFHS-5	% Change	NFHS-4	NFHS-5	% Change	NFHS-4	NFHS-5	% Change	NFHS-4	NFHS-5	% Change
15-19	43.90	42.40	-3.42	5.60	8.30	48.21	42.90	47.10	9.79	7.10	10.50	47.89
20-29	24.50	20.80	-15.10	15.80	21.50	36.08	15.10	11.60	-23.18	17.30	21.70	25.43
30-39	13.00	9.90	-23.85	29.30	37.70	28.67	9.00	7.40	-17.78	28.60	40.50	41.61
40-49	11.50	7.70	-33.04	36.40	42.90	17.86	10.40	6.10	-41.35	30.00	41.20	37.33
Residence												
Urban	16.20	12.90	-20.37	31.80	37.10	16.67	14.20	11.50	-19.01	28.60	39.40	37.76
Rural	24.30	19.90	-18.11	16.60	25.60	54.22	18.40	16.20	-11.96	17.10	35.00	104.68

pregnant and breast feeding women during the survey of NFHS-4. Over the year from NFHS-4 to NFHS-5 anaemia has been increased to about 50 per cent. Even though there is increasing trend of anaemia in both rural and urban but the gap between them is high. From NFHS-4 to NFHS-5, anaemia status of women in urban and rural area has been increased by 2.33 and 8.87 per cent respectively. Similar results were encountered for Indian women population. Where around 55 per cent of women were found anaemic and about 70 per cent of women had encountered both chronic energy deficiency (CED) and anaemia (Jose and Navaneetham, 2018).

In contrast to women, anaemia percentage of men was less than 20 per cent except for the age group of 15-19 years. During young age specifically in young men there will be increased body needs of key mineral *i.e*, iron for muscle growth (myoglobin formation) and development. There are the factors that causes anaemia are differences in lean body weight and many factors affecting absorption of iron in the body. According to recommendations of ICMR (RDA, 2020) for iron in young men of age <19 years is 26 mg/d and for adult men of age >19 years is 19 mg/d, which clearly indicates that iron is much needed in younger age than in older males. Over the year we found that, there is an increasing trend in anaemic per cent in men, but there is a large gap observed between men and women.

Table 4 shows nutritional status of women by districts of Karnataka. In Karnataka, it was observed that anaemia in women increased up to 6.7 per cent. Compared to earlier data South Karnataka districts showed improvement by reducing the anaemia status of women in 9 out of 15districtsand those are Chikkaballapura (15.58%), Shimoga (13.79%), Hassan (9.64%), Bengaluru (10.35%), Tumkur (6.45%), Bengaluru rural (4.33%), Ramanagar (4.01%), Kolar (2.9%) and Chikmagalur (1.69%). On contrary, in North Karnataka the situation is much disturbing,out of 12 districts only Haveri district showed improvement with 3.61 per cent of reduction, where as Gulbarga (29.93%), Belgaum (28.4%), Bidar (26.19%), Bijapur (26.25%), Yadgir (20.13%), Gadag (22.87%), Koppal (20.18%), Bellary (16.43%), Bagalkot (17.65%), Dharwad (13.51%) and Raichur (2.9%) showed increased per cent. Anaemia per cent was also increased in Coastal Karnataka districts like Uttara Karnataka (6.44%) and Udupi (5.82%) except Dakshina Kannada (14.54%).

In contrary to anaemia status, the incidence of under nutrition has been declined in 27 districts *i.e*., women with BMI<18.5 with average decline is 16.91 per cent over the period. Dakshinakannada district shown highest decline in under nutrition (50.78%) followed by Chikmagalur, Uttarakannada and Ramanagara with more than 40 per cent decline. The districts like Raichur, Dharwad and Belgaum showed increased incidence of under nutrition in women with more than 7 per cent. Over weight is also one of the major concerns in view of women health which has increased about 29.74 per cent.

Table 3: Anaemia status (%) of adults by age, maternity status and place of residence, Karnataka, NFHS-4 and 5.

	Women (<12.0 g/dL)			Men (<13.0 g/dL)		
	NFHS-4	NFHS-5	% Change	NFHS-4	NFHS-5	% Change
Age (years)						
15-19	45.30	49.40	9.05	24.50	26.50	8.16
20-29	44.70	47.60	6.49	14.50	15.90	9.66
30-39	44.80	47.00	4.91	17.30	17.90	3.47
40-49	44.50	48.00	7.87	20.00	21.70	8.50
Maternity status						
Pregnant	45.40	45.70	0.66	NA	NA	NA
Breast feeding	48.10	45.00	-6.44	NA	NA	NA
Neither	44.30	48.20	8.80	NA	NA	NA
Residence						
Urban	42.90	43.90	2.33	18.10	17.30	-4.42
Rural	46.20	50.30	8.87	18.30	21.20	15.85

Table 4: Trends in nutritional status of women (%) by districts of Karnataka, NFHS-4 and 5.

Indicators / District	% of women having any anaemia (<12 g/dl)			% of women with BMI <18.5			% of women with BMI >25		
	NFHS-4	NFHS-5	% Change	NFHS-4	NFHS-5	% Change	NFHS-4	NFHS-5	% Change
Bengaluru	39.60	35.50	-10.35	14.00	10.00	-28.57	32.00	40.10	25.31
Bengaluru Rural	46.20	44.20	-4.33	21.30	14.10	-33.80	24.50	33.20	35.51
Chamarajanagar	44.40	46.30	4.28	26.10	17.90	-31.42	17.30	30.50	76.30
Chikkaballapura	53.90	45.50	-15.58	24.80	22.60	-8.87	22.90	26.60	16.16
Chikmagalur	41.50	40.80	-1.69	24.90	14.20	-42.97	23.50	33.20	41.28
Chitradurga	43.70	44.60	2.06	22.70	14.50	-36.12	13.10	37.40	185.50
Davanagere	46.90	51.70	10.23	22.70	15.90	-29.96	25.90	38.10	47.10
Hassan	46.70	42.20	-9.64	18.40	11.10	-39.67	27.90	36.10	29.39
Kodagu	35.30	39.80	12.75	19.60	12.00	-38.78	26.20	34.70	32.44
Kolar	44.90	43.60	-2.90	23.50	17.80	-24.26	23.60	27.90	18.22
Mandya	46.20	47.00	1.73	18.20	13.70	-24.73	26.60	38.70	45.49
Mysore	45.60	48.00	5.26	19.00	14.70	-22.63	29.30	36.40	24.23
Ramanagara	47.40	45.50	-4.01	22.40	13.20	-41.07	22.80	36.50	60.09
Shimoga	48.60	41.90	-13.79	22.60	15.00	-33.63	24.80	30.30	22.18
Tumkur	52.70	49.30	-6.45	20.30	15.20	-25.12	22.30	30.40	36.32
Bagalkot	40.80	48.00	17.65	21.20	17.10	-19.34	16.60	28.60	72.29
Belgaum	41.20	52.90	28.40	20.60	22.20	7.77	20.70	23.80	14.98
Bellary	49.90	58.10	16.43	23.60	22.20	-5.93	18.90	27.60	46.03
Bidar	44.30	55.90	26.19	26.00	24.90	-4.23	15.90	20.80	30.82
Bijapur	41.90	52.90	26.25	19.50	18.10	-7.18	18.00	27.40	52.22
Dharwad	45.90	52.10	13.51	16.00	17.30	8.13	29.40	33.80	14.97
Gadag	41.10	50.50	22.87	21.10	18.90	-10.43	11.70	30.60	161.54
Gulbarga	43.10	56.00	29.93	22.50	20.80	-7.56	14.80	21.80	47.30
Haveri	52.70	50.80	-3.61	21.50	19.90	-7.44	19.60	29.10	48.47
Koppal	45.60	54.80	20.18	26.90	24.90	-7.43	12.00	21.90	82.50
Raichur	58.70	60.40	2.90	20.80	23.30	12.02	19.80	19.90	0.51
Yadgir	47.70	57.30	20.13	27.40	26.00	-5.11	12.90	18.80	45.74
Dakshina Kannada	45.40	38.80	-14.54	25.60	12.60	-50.78	26.00	22.20	-14.62
Udupi	44.70	47.30	5.82	27.60	23.80	-13.77	20.70	22.90	10.63
Uttara Kannada	41.90	44.60	6.44	31.70	18.40	-41.96	20.40	22.60	10.78
Karnataka	44.80	47.80	6.70	20.70	17.20	-16.91	23.20	30.10	29.74

CONCLUSION

The data certainly shows that malnutrition is indeed one of the most underrated problems faced by the state. Over the course of time, Governments have initiated several large scale supplementary feeding programmes aimed at overcoming specific deficiency diseases to combat malnutrition. This includes programmes such as the distribution of prophylaxis against nutritional anaemia, Special Nutrition Programme, Balwadi Nutrition Programme, ICDS programme and Mid-day meal programmes. Even though most of these programmes which are aimed at children, lactating mothers, pregnant women and women in reproductive age groups have brought in results, its large scale implementation is still a distant dream for the nation. Anaemia is a huge concern in Karnataka. A comparison of recent and previous survey data shows anaemia in women has increased. As part of ICDS, pregnant women are given iron and folic acid (IFA) tablets to prevent nutritional anaemia with the recommendation of 100 tablets of iron and folic acid during pregnancy but because of some misconceptions and traditional beliefs it is yet showing any improvement over the years.

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