Trend in nutritional status of women with food pattern and health outcomes- Maharashtra

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Abstract

Background: Nutritional status is influenced by the complex social, biological, environmental and cultural factors that are highly interrelated. The belief that a woman should eat better foods and more, but there has been a gap between the thought and the action. There is always a need for such a study to show the exact picture regarding food, nutrition and health.

Aim: To examine association between nutritional status with food pattern and health outcomes.

Material and Methods: National family health survey **(**NFHS-2 and 3) has been used for this study. Body Mass Index (BMI) was used to measure women's nutritional status. Women who are pregnant at the time of the survey and women who gave births during two month preceding the survey are excluded for the analysis and restricted to only ever-married women.

Results: In food pattern, it is found that, there is statistically highly association between nutritional status of women with milk or curd, green leafy vegetables, fruits, in both NFHS-2 and NFHS-3. In health outcomes, there is statistically highly association between nutritional status with delivery by caesarean section, During pregnancy: excessive fatigue, Pregnancy termination during reproductive life in NFHS-3. Time-trend analysis based on NFHS-2 and NFHS-3 data shows that there has been a decreasing trend in the prevalence of chronic energy deficiency and an increasing trend in the proportions of 'normal' and overweight, food pattern also affect the nutritional status of women.

Conclusion: Both chronic underweight have more, with important public health implications for the burden of diseases associated with both extremes of physical status.

Key words: NFHS, body mass index (BMI), Food pattern, health outcomes

Introduction

Nutrition is a fundamental human right and it plays a key role in health [1]. The nutritional status and health of women is important for both the quality of their lives, the survival and healthy development of their children. Better nutrition means stronger immune systems, less illness and better health. However, for social and biological reasons, most of women of the reproductive ages are amongst the most vulnerable to malnutrition. Increased perinatal and neonatal mortality, a higher risk of low birth weight babies, stillbirths, and miscarriage are some of the consequences of malnutrition in women [2]. Some evidences in developing countries indicate that malnourished women, with a BMI below 18.5, show a progressive increase in mortality rates as well as increase risk of illness [3].

India remains one of the poorest countries in the world, with a population of over one billion and a fertility rate well above replacement level and more than half of the world's undernourished population [4]. The family in India is one of the most important institutions for understanding Indian society [5]**.**

Despite greater opportunities for health care in urban areas, the urban poor are often more marginalized than rural populations in their ability to access health services because of constraints in financial resources that are necessary to access the services in urban areas, [6] also found that BMI is positively and significantly associated with socioeconomic level.

Conceptualization of variables:

Nutritional status is influenced by the complex social, biological, environmental and cultural factors that are highly interrelated. There is hardly any research focusing on the women nutrition in India. So, there is a need for such a study which may provide a clue to show the exact picture of the concern area. The belief that a woman should eat better foods and more foods (for pregnant women) is as old and has been held by both the extremes- laymen and scientists. But there has been a gap between the thought and the action. So there is always a need for such a study, which may provide a database to show the exact picture of food, nutrition and health.

The recently published NFHS-3 fact sheet shows that, women fall below normal BMI in Maharashtra (36.2%) which is also close to the national average

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(33%). Further, the existing data also suggest that the levels of malnutrition have also remained somewhat stagnant between 1992-93 and 1998-99. With this in view, the present study was undertaken to assess nutritional status of women between 1998-99 and 2005-06.

Instead of higher growth and urbanization in the state, the incidence of malnutrition among women and children is not declining [7]. Highly urbanized and higher per capita income districts have higher obesity among the women. It is opposite in the rural and less urbanized districts, where number of women with chronic energy deficiency are higher. In the state, women's health related issues require immediate and adequate attention because there is direct link of maternal health to child, infant malnutrition and mortality.

Objectives

1. To analyze changes in nutritional status of women between 1998-99 and 2005-06.

2. To examine the association between nutritional status of the women with food pattern.

3. To examine the association between nutritional status women with health outcomes.

Material and Methods

The nationwide data from India's National Family Health Survey (NFHS-2) [8] conducted during 1998-1999 and National Family Health Survey (NFHS-3) [9] conducted during 2005-2006, has been used for this study.

The feature of 1998-99 is measurement of the nutritional status of women. Total 5391 eligible women between age group of 15-49 were interviewed from 5830 households during the survey in Maharashtra. This study is also based on the 2005-06 data. This survey has collected comprehensive information about the women's education, fertility preferences, family planning knowledge and use, and nutrition. Total 16600 eligible women between age group of 15-49 were interviewed from 8315 households during the survey in state.

The body mass index is a good representative of women's nutritional status. The BMI below 18.5 is classified as Chronic Energy Deficiency (CED). BMI above 25 is classified as overweight and obesity among women. Women who are pregnant at the time of the survey and women who gave births during the two month preceding the survey are excluded for the analysis.

The independent variables used for the analysis are: Age, Education of the respondent and partners, Religion, Caste, Occupation of the respondent, and standard of living. The food pattern variable has been considered for the analysis which consists of milk, pulses or beans, vegetables, fruits, egg and chicken. To fulfil the proposed objectives, bi-variate analysis and cross-tabulation has been used with the dependent variable (BMI) and selected background characteristics of women, food pattern and health outcomes. This enables to understand variation in nutritional outcome. Chi-square test has been carried out to examine the association between nutritional status of women with food pattern and selected health outcomes. Logistic regression analysis also carried out to find the important factors determining the nutritional status of women. Data analysis was done by using software SPSS v16.0.

Results

Chronic Energy Deficiency among Women:

BMI has been categorized according to WHO guidelines, as underweight or non-underweight. In Table-1, the data shows that, 42% falls under the categories of malnourished which are showing relatively high chronic energy deficiency as compared to India (36.2%) in 1998-99 whereas, it was 36.2% in 2005-06. This shows that, the levels of chronic energy deficiency in the states have decreased between 1998-99 and 2005-06. It may be inferred that, nutritional status of women gradually improved from 1998-99 to 2005-06. But for obesity, it shows that gradual increase from 1998-99 (7.6%) to 2005-06 (11.6%).

Differentials of Women's Nutritional Status: The variation in BMI of women by socio-economic characteristics is presented in (Table-2).

For age character, it is found that, women who are in the age group 15-24 years is more malnutrition (48.3%) as compared to older age group i.e 25-34 years (34.4%), 35-49 years (23%) in 1998-99, similar trend also observed in 2005-06. Thus, it shows, even there is little improvement in nutritional status of women from 1998-99 to 2005-06, but younger age (15-24 years) women need more attention of proper nutrition.

With respect to education of women, it is found that, women who had high school and above education (27.8%) have less in malnutrition as compared to illiterate (48.9%) in 1998-99. Similar trends are also found in case of 2005-06. Thus, it shows that, as educational level of women increases, there is decrease in malnutrition.

With respect to current work status of women, it is

found that, it is about (36.7%) in women those who are not working. They have lower malnutrition as compared to working in family farm (48.6%), employed by somebody (52.2%) and self employed (51.4%) in 1998-99. Similar trend of results are also observed in 2005-06. With respect to religion, women who are having more malnutrition belong to Hindu (45 %) and Christian (39.4%) in 1998-99, whereas trend shows decline in 2005-06. Similar picture also observed with caste.

More malnutrition women belong to low standard of living (56.4%) as compared to 27.7% among high standard of living in 1998-99, similar trend of variation also found in 2005-06. This shows that, nutritional status is the direct outcome of standard of living. With respect to husband's education, most of them belong to illiterate (51.4%) as compared to 33.8% of high school and above in 1998-99. Similar trends of variation found in 2005-06 also. This reflects, as level of education increases, there is decrease in malnutrition.

The association between nutritional status of women with food pattern is presented in Table-3. In food pattern, there is statistically highly significant association between nutritional status of women with consumption of milk or curd ($p<0.0001$) in both 1998-99 and 2005-06 survey. Daily intake of milk or curd (35.1%) in food shows significant decrease in malnutrition in 1998-99, whereas similar results (28.5%) observed in 2005-06 as compared to weekly and occasionally consumption of milk or curd.

With respect to green leaf vegetables, it shows strong association between nutritional status of women with consumption of green leaf vegetables ($p<0.0001$) in 1998-99. Daily consumption of green leaf vegetables (35.5%) shows significant decrease in malnutrition as compared to weekly and occasionally in 1998-99, whereas no association was shown in 2005-06. With concerned to fruits, there is strong association between nutritional status of women with consumption of fruits ($p<0.0001$) in 1998-99 and 2005-06. With daily intake of fruits shows decrease in malnutrition (23.3%) in 1998-99, similar results (24.1%) observed in 2005-06 as compared to weekly and occasionally.

With regards to consumption of eggs, no association was seen in both 1998-99 and 2005-06 survey. Consumption of chicken, shows strong association with nutritional status of women in 1998-99 ($p<0.001$), eating chicken daily (36.5%) shows decrease in malnutrition, whereas similar results not observed in 2005-06.

Logistic regression analysis has been carried out to know the important factors determining the nutritional status of women and presented in Table-4. For this purpose, the BMI less than 18.5 and more than 18.5 has been categorized as 0 and 1. The independent variables are same as that discussed in bivariate table.

The variation in BMI, age group is supported by Logistic regression. It is found that, the younger women are less likely to be in BMI>18.5 as compared to older women in NFHS-2 and NFHS-3. In respect with education, the women with higher education are more likely to be in BMI>18.5 as compared to illiterate in NFHS-2, whereas higher school and above education of women are less likely to be in BMI<18.5 as compared to other education level in NFHS-3. This indicates that education is important factor in nutritional health. With concerned to current work status, it may be found that, with respect to those not working, are less likely to be in BMI>18.5 in NFHS-2, whereas working in the family farm are less likely to be in BMI>18.5 as compared to not working women in NFHS-3. In case of religion, Muslim shows significant association, which shows, Muslim women are more likely to be in BMI>18.5 in NFHS-2 and 3. The variation in BMI by standard of living shows significant association and it is also supported by logistic regression analysis. It may be noted that those in medium and high standard of living, are more likely to be in BMI>18.5 as compared to low standard of living in both. Thus, standard of living is an important factor in shaping health of women.

The variation in BMI by husband's education supported by logistic regression analysis , it may be noted that those in middle and high school and above, are more likely to be in BMI>18.5 as compared to illiterate in NFHS-2 and 3. Thus, education of husband is an important factor in nutritional women health.

The association between nutritional status of women with selected health outcomes in NFHS-3 is presented in Table-5. It is found that, birth weight, diabetes, asthma and goiter, during pregnancy convulsions not from fever, and during pregnancy: vaginal bleeding, do not shows association with nutritional status of women ($p>0.05$). With respect to delivery by caesarean section, during pregnancy: excessive fatigue, and Pregnancy termination during reproductive life, shows strong association with nutritional status of women ($p<0.001$).

BODY MASS INDEX	Maharashtra	
	NFHS-2 (N=1702)	NFHS-3 (N=2778)
<18.5	42.0	36.2
18.5-25	50.5	51.2
25+	7.6	11.6

Table 2.Variation in BMI of women less than 18.5 by socio-economic characteristics in Maharashtra (figures are in percentage)

Variables	Maharashtra	
	1998-99 (N=1702)	2005-06 (N=2778)
Age		
15-24	48.3	41.9
25-34	34.4	34.0
35-49	23.0	26.6
Education		
Illiterate	48.9	45.4
Primary School	45	38.4
Middle School	41.1	27.4
High School & above	27.8	17.4
Current Work Status		
Not working	36.7	33.4
Working in the family farm	48.6	54.4
Employed by somebody	52.2	32.9
Self employed	51.4	-
Religion		
Hindus	45.1	38.8
Muslims	32.1	29.7
Christian	39.4	26.7
Others	37.4	36.9
Caste		
SCs & STs	48.7	43.7
OBCs	47.2	36.8
Others	37.4	33.5
Standard of living		
Low	56.4	58.4
Medium	40.5	40.1
High	27.7	30.9
Husband s Education		
Illiterate	51.4	44
Primary School	45.6	39.8
Middle School	45	34.4
High School & above	33.8	14.4

Table 3. Association between nutritional status of the women less than 18.5 with food pattern (figures are in percentages)

Variables	Maharashtra	
	1998-99 (N=1702)	2005-06 (N=2778)
Age		
15-24	48.3	41.9
25-34	34.4	34.0
35-49	23.0	26.6
Education		
Illiterate	48.9	45.4
Primary School	45	38.4
Middle School	41.1	27.4
High School & above	27.8	17.4
Current Work Status		
Not working	36.7	33.4
Working in the family farm	48.6	54.4
Employed by somebody	52.2	32.9
Self employed	51.4	-
Religion		
Hindus	45.1	38.8
Muslims	32.1	29.7
Christian	39.4	26.7
Others	37.4	36.9
Caste		
SCs & STs	48.7	43.7
OBCs	47.2	36.8
Others	37.4	33.5
Standard of living		
Low	56.4	58.4
Medium	40.5	40.1
High	27.7	30.9
Husband s Education		
Illiterate	51.4	44
Primary School	45.6	39.8
Middle School	45	34.4
High School & above	33.8	14.4

Table 4. Result of Logistic regression by using Body Mass Index (BMI) as dependent variable with socio-economic characteristics in 1998-99 & 2005-06

Variables	NFHS-2 (1998-99) (N=1702)			NFHS-3 (2005-06) (N=2778)		
	B	Exp (B)	Signf.	B	Exp (B)	Signf.
Age						
15-24 ®						
25-34	.576	1.780	.000	.336	1.399	.000
35-49	1.142	3.132	.000	.687	1.987	.002
Education						
Illiterate ®						
Primary School	.048	1.049	.720	-.108	.898	.335
Middle School	.304	1.355	.059	.142	1.152	.481
High School & above	.697	2.007	.000	.561	1.752	.006
Current Work Status						
Not working ®						
Working in the family farm	-.711	.491	.006	-.776	.460	.000
Employed by somebody	-.513	.599	.000	-.066	.936	.611
Self employed	-.305	.737	.055	Nil	Nil	Nil
Religion						
Hindus ®						
Muslims	.350	1.419	.022	.346	1.414	.011
Christian	.406	1.501	.447	.184	1.202	.704
Others	.216	1.242	.313	.075	1.078	.654
Caste						
SCs & STs ®						
OBCs	-.065	.937	.693	-.021	.979	.874
Others	.250	1.285	.074	.071	1.074	.559
Standard of living						
Low ®						
Medium	.642	1.900	.000	.705	2.024	.000
High	1.218	3.380	.000	.806	2.238	.000
Husband s Education						
Illiterate ®						
Primary School	-.059	.943	0.611	.431	1.538	.008
Middle School	.245	1.278	0.071	.387	1.472	.003
High School & above	.183	1.200	0.021	1.169	3.218	.000

® - reference category of different background characteristics

Table 5. Association between nutritional status of the women with health outcome Maharashtra : 2005-06 (figures are in percentages)

Health Outcomes	Maharashtra (N=2778)		
	<18.5	>18.5	Significance level
Birth Weight			
<2.5	37.5	62.5	0.875
2.5 or more	37.1	62.9	
Diabetes			
Yes	8.3	91.7	0.116
No	37.3	62.7	
Don t Know	40	60	
Asthma			
Yes	34.3	65.7	0.53
No	37.2	62.8	
Don t Know	66.7	33.3	
Goiter			
Yes	20	80	0.401
No	37.2	62.8	
Don t Know	50	50	
Delivery by caesarean section			
Yes	22.9	77.1	0.000
No	39.8	60.2	
During pregnancy: convulsions not from fever			
Yes	28.9	71.1	0.447
No	36.3	63.7	
Don t Know	0	100	
During pregnancy: excessive fatigue			
Yes	31.9	68.1	0.025
No	37.9	62.1	
Don t Know	50	50	
During pregnancy: vaginal bleeding			
Yes	28.2	71.8	0.157
No	36.5	63.5	
Don t Know	0	100	
Pregnancy termination during reproductive life			
Yes	30.7	69.3	0.006
No	38.2	61.8	

Discussion

In India, there was some evidence of an emerging nutrition transition [10]. The state has made significant advances in demographic, epidemiological and health care transitions.

This study found that socioeconomic characteristics have a significant influence on nutrition in women. Standard of living, husband's education, woman's education, religion and woman's age are important determinants of nutrition among women. It was further found that food pattern also affect the nutritional status of women. Women of educated partner are at a lower risk of under nutrition. This indicates that women's who attain even a minimal basic education are generally more aware than those who are not educated [11,12]. It has been shown that education particularly that of women, is a key determinant for better nutritional status.

Conclusions

The proportion of ever-married women, who are thin (36.2%) in 2005-06, has been decreased slightly from (42%) 1998-99. While the focus of attention in the field of nutrition continues to be on the substantial proportion of women with a chronic energy deficiency, the problem of overweight and obesity cannot be ignored. In a study [13] observed that about 20 per cent of adults who were not overweight or obese as per the BMI definition still had abdominal obesity.

In sum, this study has shown that chronic underweight have more, with important public health implications for the burden of diseases associated with both extremes of physical status. Although the factors associated with underweight, obesity and overweight are very similar, the challenges and solutions required to, tackle the extremes of both over–and–underweight in the upper and lower socioeconomic groups are not same. Further research studies on socio-cultural practices, dietary practices, intra-household food distribution, women's physical activity patterns as well as life styles, seasonal food insecurity and other related factors are urgently required to obtain a fuller picture of high risk populations for both extremes of BMI. With the help of appropriate mass media, ever married women should be educated about nutrition and health and so also the general public regarding issues related to health and nutrition.

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