

Nutritional Status of Women of India and Bangladesh: A Comparative Study

S. Banerjee¹, S. Biswas², S. Roy³, M. Pal⁴, M.G. Hossain⁵ and P. Bharati⁶

Citation: Banerjee S, Biswas S, Roy S, Pal M, Hossain MG and Bharati P. 2020. Nutritional Status of Women of India and Bangladesh: A Comparative Study. Human Biology Review, 9 (4), 344-357.

¹Sreeparna Banerjee, Research scholar, Department of Anthropology, West Bengal State University, Berunanpukuria, PO-Malikapur, Barasat, West Bengal, India 700126, Email: banerjeesree15@gmail.com; Mob.9748256018.

²Subir Biswas, Professor, Department of Anthropology, West Bengal State University, Berunanpukuria, PO-Malikapur, Barasat, West Bengal, India 700126, Email: gargisubir@gmail.com; Mob.9434874018.

³Shimul Roy, Assistant Professor, Department of Anthropology, Vidyasagar University, Midnapore 721102, West Bengal, India, Email: shimulroy888@gmail.com; Mob.9830813481.

⁴Manoranjan Pal, Retired Professor, Economic Research Unit, Indian Statistical Institute, 203 BT Road, Kolkata 700 108, West Bengal, India. Email: manoranjan.pal@gmail.com; Mob.9433563962.

⁵Md. Golam Hossain, Professor of Health Research Group, Department of Statistics, University of Rajshahi, Rajshahi 6205, Bangladesh, Email:hossain95@yahoo.com; Mob.+880 19 14254013.

⁶Premananda Bharati, Retired Professor, Biological Anthropology, Indian Statistical Institute, 203 BT Road, Kolkata 700 108, West Bengal, India, Email: pbharati@gmail.com; Mob.9830261859

Corresponding author: Premananda Bharati, Retired Professor, Biological Anthropology, Indian Statistical Institute, 203 BT Road, Kolkata 700 108, West Bengal, India, Email: pbharati@gmail.com; Mob.9830261859

ABSTRACT

The study tries to assess and compare the nutritional status of ever-married women aged 15-49 years in India and Bangladesh. It also tries to find out the effect of socio-economic and demographic factors on women's nutritional status. It is a comparative as well as ex-post-facto research. The present study is based on the unit level data extracted from the National Family Health Survey (NFHS-4, 2015-16) of India and Bangladesh Demographic and Health Survey (BDHS-2014). Data of 494264 ever-married women age 15-19 years are included in this study. Pearson Chi-square test, logistic regression and z-proportional tests have been done to see the differences in the nutritional status of Bangladeshi and Indian women with respect to different socio-economic and demographic variables. The level of significance is taken as 0.05 or higher (i.e., 0.01). The present study reveals that higher number of Bangladeshi women (23.4 percent) are underweight than that of Indian women (18.8 percent), while the higher number (percentages) of Indian women are overweight and obese than women of Bangladesh; however, the differences are not significant at 5 percent level in the latter case. Women with higher educational levels have higher percentages of overweight and obesity in both countries than women with lower educational levels. The present study also reveals that women residing in a rural area are much more affected by undernutrition compared to urban women in both countries. From the results of regression analysis, it is clear that in most cases socio-economic and demographic factors have a significant impact on women's nutritional status. The study concludes that socio-economic and demographic variables have a significant impact on the nutritional status of women. Further research on the nutritional status of women is needed to be carried out in both countries.

Keywords: Women, Malnutrition, India, Bangladesh, NFHS -4, BDHS-2014

INTRODUCTION

Women's health is influenced by interrelated biological, social, and cultural factors (Shanmugan 2017). The fourth report on the world nutrition situation (2000) reveals that at least 120 million women in developing countries are underweight globally (Sub-Committee on Nutrition 2000). Approximately 450 million adult women in developing countries are stunted (Tinker et al., 1994). Malnutrition is a serious health concern; it threatens the life of mothers and their future generation. Adequate nutrition is a keystone to maintain a healthy life, especially for a woman. A malnourished mother inevitably gives birth to a malnourished baby. Babies born to malnourished women face multiple complications like short stature, low resistance to infections etc. (Jukariya et al., 2018). The World Health Organization (WHO 2011) estimates that South Asian countries recorded a 21 percent rise in total mortality in a 10-year time frame (2005-2015) (World Health Organization 2011). The burdens of undernutrition and overnutrition have steadily increased in India (Dutta et al., 2019). Overnutrition has been rising tremendously, but underweight has not been falling significantly in Bangladesh (Tanwi et al., 2019). In India, the share of undernutrition among adults is the highest globally and overnutrition is rising (Razak et al., 2015 and NCD Risk Factor Collaboration 2016). Similarly, Bangladesh is also facing a high prevalence of underweight among adults, along with growing overweight and obesity (Hasan et al., 2017 and Rawal et al., 2018). The prevalence of underweight declined markedly in India and substantially in Bangladesh during the period 1996-2006. During this time, the prevalence of overnutrition has increased from 2.7 to 8.9 percent in Bangladesh and 10.6 to 14.8 percent in India (Balarajan and Villamor 2009). According to NFHS-4 (2015-2016), a quarter of women of reproductive age in India are undernourished according to BMI scale of less than 18.5 Kg/m² (Ministry of Health and Family Welfare 2015-2016). Agriculture and Consumer Protection Department (2010) finds that in Bangladesh, more than 50 percent of women are suffering from chronic energy deficiencies and many studies show that over the past 20 years, there has been little improvement in women's nutritional status (Agriculture and consumer Protection 2010). Literacy among women reduces the chance of under nutrition and increases the chance of over nutrition. They also find that socio-economic and demographic factors appear to be important determinants of nutritional status of women in India (Banerjee et al., 2018). According to Press Information Bureau Government of India Ministry of Women and Child Development (2020) revealed that 22.9 percent of women aged 15-49 years have BMI less than 18.5 kg/m² in India (Pres Information

Bureau Government of India Ministry of Women and child Development 2020). Overnutrition has increased markedly among Bangladeshi women during 2004 to 2014, from 10.7 percent to 25.1 percent. In the same period of time, a steady decline can be observed concerning undernutrition of Bangladeshi women (Biswas et al., 2019). It is clear from previous studies that nutritional status of Indian and Bangladeshi women is in a transitional period and huge changes are occurring in a short period of time. So, it is very important to monitor nutritional status of women of both the countries. It is also very important to understand how both the country is performing concerning women's nutritional status. The present study tries to assess and compare the nutritional status of ever-married women of age 15 to 49 years in India and Bangladesh, and to know the effect of socio-economic and demographic factors on women's nutritional status.

METHODS

The latest data of the National Family Health Survey (NFHS-4 2015-2016) of India and Bangladesh Demographic and Survey (BDHS-2014) were used for this study. It provides information on various socio-economic and demographic variables for both women and men. NFHS-4 2015-2016 and BDHS-2014 canvassed three types of questionnaire namely, household questionnaire, the women's questionnaire and the men's questionnaire. The present study mainly focused on the nutritional status of women with respect to socio-economic and demographic factors, so the discussion will be restricted to the women's questionnaire only. It is a comparative as well as ex- post-facto research. All the states of India are included in the study and all the Union Territories except Delhi are excluded from the study. In Bangladesh, all the divisions are taken covered urban and rural areas for the study. Total sample size consists of 494264 of ever-married women in reproductive age. Among the total participants 486488 are from India and 7776 from Bangladesh. The present study considers only ever-married women aged 15-49 years.

Body mass index (BMI) is the target variable of this study, and it has been categorized into four categories according to the widely use cut-off points of BMI, such as (i) underweight ($BMI < 18.5 \text{ kg/m}^2$), (ii) normal weight ($18.5 \text{ kg/m}^2 \leq BMI < 25 \text{ kg/m}^2$), (iii) over weight ($25 \text{ kg/m}^2 \leq BMI < 30 \text{ kg/m}^2$) and (iv) obese ($BMI \geq 30$) (WHO 2006). The determining or independent variables are some socio-economic and demographic variables which are mainly associated factors of nutritional status (Tables 1 and 2).

Two- and higher- way cross frequency tables are computed to see the numbers along with percentages for each combination of categories. Pearson Chi-square test has been used for finding the association between outcome and independent factors. The Z-proportion test is utilized to determine the significant differences in each category of BMI between Indian and Bangladeshi women. SPSS 18.0 is used for analyzing the data. The level of significance is taken as 0.05 or higher (i.e., 0.01). For assessing nutritional status, overweight and obese categories are merged and termed as overweight or obese (BMI more than 25). Categorical binary logistic regression and multiple linear regression have been done to show the impact of socio-economic and demographic factors on women's nutritional status. Underweight is coded as '0' and normal (not underweight) is coded as '1' while calculating binary logistic regression.

RESULTS

Table 1 highlights that underweight remains a problem in both the countries. The present study shows the prevalence of underweight women is higher in Bangladesh (23.4%) than in India (18.8%). The percentage of underweight remains high in the age group 15-19 years in India (31.1%) as well as in Bangladesh (35.9%). With the increasing age group, the percentage of underweight decreases and the percentage of overweight and obesity increases among Bangladeshi and Indian women. Chi-square test was performed to understand the age-group wise differences in nutritional status of Bangladeshi and Indian women. In all the age-groups, the differences in nutritional status between Indian and Bangladeshi women are found to be statistically significant ($p < 0.05$). The table also depicts that percentage of underweight women among illiterate women (Bangladesh: 32.6% and India: 23.9%) is higher compared to primary (Bangladesh: 20.0% and India: 27.9%), secondary (Bangladesh: 16.0% and India: 20.3%) and higher education group women (Bangladesh: 10.3% and India: 12.0%). The percentage of underweight women decreases notably in higher education levels. But, overweight and obesity are higher among higher education groups. Underweight among Bangladeshi women is more than Indian Women, whereas overweight and obesity is higher among Indian women. Chi square test has been done between Indian and Bangladeshi women's nutritional status with respect to the educational attainment of the respondent. In all the educational attainment groups, the differences in nutritional status between Indian and Bangladeshi women are statistically significant ($p < 0.05$). In most education groups, Indian women show better nutritional status than

Bangladeshi women. The problems of underweight are more among rural women than urban women, whereas it is just the opposite in the cases of overweight and obese women – urban women are more overweight than rural women. 26.2 percent of rural Bangladeshi women are underweight compared to 21.5 percent of Indian women. The table also reveals that Indian women are more overweight and obese than Bangladeshi women. The study shows that the nutritional status of Indian women is better than the nutritional status of Bangladeshi women. Rural-urban differences in nutritional status between Indian and Bangladeshi women are statistically significant ($p < 0.05$).

Despite the small sample size Bangladesh has an almost equal number of Hindus, Muslims, Christians, and others in the sample. Thus, it is possible to see if there is any difference in the status of nutrition among religious groups. India, however, took a representative sample. India could afford it because it had a very large sample size. It thus gives us an opportunity to compare the health status of women in the different religious groups between Bangladesh and India. There is almost the same percentage of underweight Hindu women in the two countries, which is slightly more than one-fifth. But Bangladesh Muslims have the highest percentage of underweight women (25.0%). In India, the position of Muslim women, with only 16.5 percent underweight is better than Bangladesh women. The nutritional status of Christian women in Bangladesh, with 18.4 percent underweight, is much worse than the Christian women in India, with only 9.9 percent underweight.

Table 1: Nutritional status of ever-married women aged 15-49 years with respect of socio-demographic factors

Age (in years)	Country	Nutritional status				Chi- square
		Underweight	Normal	Overweight	Obesity	
15-19	India	5079(31.1)	10508(64.3)	644(3.9)	112(0.7)	50.158*
	Bangladesh	405(35.9)	629(55.8)	82(7.3)	12(1.1)	
20-24	India	19716(26.4)	47755(64.0)	5943(8.0)	1186(1.6)	103.297**
	Bangladesh	668(25.0)	1586(59.5)	348(13.0)	65(2.4)	
25-29	India	20190(21.0)	60265(62.7)	12702(13.2)	2990(3.1)	73.352**
	Bangladesh	382(18.0)	1254(59.2)	412(19.5)	69(3.3)	
30-34	India	14961(17.3)	51476(59.5)	15544(18.0)	4463(5.2)	18.660**
	Bangladesh	223(18.8)	646(54.6)	262(22.1)	53(4.5)	
35-39	India	12116(15.2)	46266(57.9)	16254(20.3)	5297(6.6)	12.291**
	Bangladesh	97(20.5)	244(51.5)	100(21.1)	33(7.0)	
40-44	India	9759(14.8)	36493(55.3)	14583(22.1)	5140(7.8)	14.057**
	Bangladesh	29(26.4)	59(53.6)	18(16.4)	4(3.6)	
45-49	India	8555(14.2)	32617(54.2)	14029(23.3)	5011(8.3)	11.436*
	Bangladesh	6(15.4)	30(76.9)	1(2.6)	2(5.1)	

Educational attainment						
No education	India	40018(23.9)	101737(60.8)	20149(12.0)	5350(3.2)	62.912**
	Bangladesh	387(32.6)	677(57.0)	109(9.2)	14(1.2)	
Primary	India	14141(20.0)	42417(60.1)	10783(15.3)	3212(4.6)	116.524**
	Bangladesh	600(27.9)	1269(58.9)	240(11.1)	44(2.0)	
Secondary	India	31877(16.0)	117552(58.8)	38234(19.1)	12106(6.1)	82.906**
	Bangladesh	725(20.3)	2077(58.3)	638(17.9)	125(3.5)	
Higher	India	4340(10.3)	23674(56.3)	10533(25.0)	3531(8.4)	12.171**
	Bangladesh	98(12.0)	425(52.2)	236(29.0)	55(6.8)	
Residential pattern						
Urban	India	15402(11.8)	69723(53.5)	32486(24.9)	12596(9.7)	103.460**
	Bangladesh	421(17.4)	1281(53.1)	574(23.8)	137(5.7)	
Rural	India	74974(21.5)	215657(61.7)	47213(13.5)	11603(3.3)	95.785**
	Bangladesh	1389(26.2)	3167(59.7)	649(12.2)	101(1.9)	
Religion						
Other	India	2572(11.2)	13498(58.5)	5150(22.3)	1839(8.0)	110.611**
	Bangladesh	267(19.8)	773(57.3)	248(18.4)	61(4.5)	
Hindu	India	74595(20.5)	215681(59.2)	56951(15.6)	16849(4.6)	21.253**
	Bangladesh	309(20.8)	843(56.7)	287(19.3)	47(3.2)	
Muslim	India	10099(16.5)	34522(56.4)	12161(19.9)	4383(7.2)	84.266**
	Bangladesh	223(25.0)	519(58.1)	135(15.1)	16(1.8)	
Christianity	India	3110(9.9)	21679(69.1)	5437(17.3)	1128(3.6)	70.118**
	Bangladesh	154(18.4)	498(59.6)	147(17.6)	36(4.3)	

**p<0.01*: p<0.05

Table 2 pointed out that the percentage of underweight women in Bangladesh is more than that of India with respect to most occupational groups. Higher underweight can be observed among Indian women who engage themselves in agriculture compared to Bangladeshi women. The percentage of underweight women is similar in case of manual-skilled labour women.

The study exhibits that Indian women are suffering from the dual burden of malnutrition. The percentage of overweight or obesity are high among Indian women than Bangladeshi women. However, among women in the professional/managerial and agricultural workers, Bangladesh has fewer percentages of underweight women than India. Chi-square test was performed to understand the differences in the nutritional status of Bangladeshi and Indian women of the different occupational groups of the respondent.

Women with better wealth Index have better nutritional status in both the countries. The percentage of underweight among Bangladeshi women was higher in each wealth index group than Indian women. Women belong to richer or richest wealth index showing a declining percentage of underweight and at the same time inclination of overweight and obesity in both the countries. Chi-square test was performed to understand the differences in the nutritional status of

Bangladeshi and Indian women of different wealth index groups. In each group, Indian women have better nutritional status than Bangladeshi women and it is statistically significant ($p < 0.05$).

Table 2: Nutritional status of ever-married women aged 15-49 years with respect of socio-economic factors

Occupation	Country	Nutritional status				Chi-square
		Under-weight	Normal	Over-weight	Obesity	
Not working	India	10229(17.8)	33108(57.6)	10631(18.5)	3490(6.1)	190.551**
	Bangladesh	1382(24.3)	3170(55.8)	927(16.3)	204(3.6)	
Professional job	India	172(8.7)	1115(56.2)	530(26.7)	168(8.5)	11.137**
	Bangladesh	11(7.0)	86(54.8)	56(35.7)	4(2.5)	
Sales	India	106(8.7)	692(57.1)	309(25.5)	105(8.7)	48.898**
	Bangladesh	35(23.5)	95(63.8)	17(11.4)	2(1.3)	
Agriculture	India	3410(24.7)	8567(62.1)	1509(10.9)	309(2.2)	7.455*
	Bangladesh	211(22.6)	599(64.3)	111(11.9)	11(1.2)	
Service and others	India	399(15.3)	1498(57.3)	544(20.8)	173(6.6)	37.293**
	Bangladesh	62(25.1)	155(62.8)	28(11.3)	2(0.8)	
Manual-skilledlabour	India	960(20.1)	2787(58.2)	807(16.9)	234(4.9)	6.435
	Bangladesh	108(20.1)	333(61.9)	82(15.2)	15(2.8)	
Wealth Index						
Poorest	India	30706(31.5)	60791(62.3)	5286(5.4)	847(0.9)	26.953**
	Bangladesh	631(37.2)	970(57.2)	86(5.1)	9(0.5)	
Poorer	India	24766(23.6)	67254(64.1)	11002(10.5)	1978(1.9)	37.435**
	Bangladesh	433(29.3)	899(60.9)	136(9.2)	9(0.6)	
Middle	India	17016(17.2)	61419(61.9)	16748(16.9)	3977(4.0)	39.420**
	Bangladesh	322(21.7)	916(61.6)	222(14.9)	26(1.7)	
Richer	India	10957(12.0)	51701(56.7)	21684(23.8)	6848(7.5)	97.258**
	Bangladesh	274(17.5)	953(60.9)	285(18.2)	54(3.4)	
Richest	India	6931(8.0)	44215(51.0)	24979(28.8)	10549(12.2)	29.810**
	Bangladesh	150(10.0)	710(47.5)	494(33.1)	140(9.4)	

** $p < 0.01$ * $p < 0.05$

Table 3 depicts that the nutritional status of Bangladeshi women is worse than Indian women. There are 23.4 percent underweight women in Bangladesh as against 18.8 percent in India, z test for proportion demonstrated that the difference between two proportions is statistically significant ($p < 0.01$). The number of healthy (normal weight) women in Indian is significantly ($p < 0.05$) higher than that of Bangladesh. Indian women are more overweight and obese than Bangladeshi women in terms of percentages, however the differences are not significant ($p > 0.05$).

Table 3: Comparative study of nutritional status of India and Bangladesh

Nutritional status	India		Bangladesh		p-value for difference of proportions
	Total	Percentage	Total	Percentage	
Underweight	90376	18.8	1810	23.4	$p < 0.001$

Normal	285380	59.5	4448	57.6	p=0.010
Overweight	79699	16.6	1223	15.8	p=0.453
Obese	24199	5.0	238	3.1	p=0.180

Table 4 shows the effect of different socio-economic and demographic factors on women's nutritional status. The chance of being underweight is higher among below 30 years aged women compared to above 30 years aged women. The present study also revealed that literate women were more likely to be normal (not underweight) than non-literate women and it is significant at 1 percent level in India (1.471 times) and Bangladesh (1.678 times). In India, Women residing in urban area more likely (1.240 times) have normal status (not underweight) than women residing in the rural area and the result is significant at 1 percent level. But in case of Bangladesh, residential pattern has no significant influence on nutritional status of women. Women belonging to other community (Muslim, Christians etc) are more likely (1.599 times) to in normal nutritional status than Hindu community in India. This result is significant, though Bangladesh shows no significant association with nutritional status and religion. In India, women engaged in any kind of occupation were (0.917 times) likely to be normal but in Bangladesh working women shows better nutritional status (1.234 times) than not working women and it is significant. The present study also revealed that women belong to rich wealth index are more likely to have better nutritional status than women belong to the poor wealth Index category in India (2.189 times) and Bangladesh (1.881 times).

Table 4: Effect of socio-demographic and economic factors on nutritional status of women using binary logistic regression model

Independent variables	India			Bangladesh		
	95% C.I.of OR			95% C.I.of OR		
	OR	Lower	Upper	OR	Lower	Upper
Age group (years)						
15-29®						
30-49	1.802**	1.734	1.872	1.556**	1.283	1.887
Education						
Non-literate®						
Literate	1.471**	1.413	1.531	1.678	1.362	2.068
Residence						
Rural®						
Urban	1.240**	1.180	1.303	1.173	0.979	1.405
Religion						
Hindu ®						
Others	1.599**	1.528	1.675	0.981	0.839	1.147
Occupation						

Not working [®]						
Working	0.917**	0.882	0.954	1.234*	1.039	1.464
Wealth Index						
Poor [®]						
Rich	2.189**	2.087	2.296	2.093**	1.759	2.490
Constant	1.685			1.518		

[®]= Reference category; OR= Odds ratio; **p<0.01, *p<0.05; Source: Data Extracted from NFHS 4, 2015-2016 and BDHS-2014. Dependent variable= nutritional status (0= underweight, 1= normal)

Table 5 reveals that nutritional status of women aged 30-49 years have higher BMI by 1.79 and 1.23 respectively in India and Bangladesh than women aged 15-24 years in the corresponding countries. The result shows that age-group of respondents have significant influence on BMI of respondents. Literacy also plays a vital role in women's life. In both the countries, literate women have higher BMI than non-literate women and the effect is more among women in Bangladesh. The study also reveals that women residing in urban area are likely to have higher BMI than women residing in rural area in both countries and the result is significant at 1 percent level. Again working women have been found to have lower BMI than not working women in both the countries. The present study reveals that women belong to other religion have higher BMI than Hindu religion in India. Whereas in Bangladesh, religion has no significant influence on BMI. As expected, women belonging to richer wealth Index have higher BMI than women belonging to poor wealth Index in both countries and the result is significant at 1 percent level. To summarise, the results of multiple linear regression model are similar to the results of binary logistic regression model.

Table 5: Multiple linear regression influencing socio-demographic and economic factors on nutritional status of married women

Independent variables	India			Bangladesh		
	95% C.I. of AOR			95% C.I. of AOR		
	AOR	Lower	Upper	AOR	Lower	Upper
Age group	1.791**	1.725	1.866	1.228**	0.944	1.512
Literacy	0.817**	0.735	0.899	1.020**	0.660	1.380
Residence	0.724**	0.637	0.811	0.748**	0.477	1.019
Occupations	-0.330**	-0.408	-0.251	-0.282*	-0.548	-0.016
Religion	0.702**	0.620	0.783	-0.107	-0.354	0.140
Wealth Index	2.045**	1.960	2.129	1.881**	1.681	2.144
Constant	19.539			19.723		

N.B.: Age group: (15-29 years=0, 30-49 years=1); Literacy:(non-literate=0, Literate=1); Residence:(Rural=0, Urban=1); Occupation:(Not working=0, Working=1); Religion: (Hindu=0, Others=1); Wealth Index: (Poor=0, Rich=1)

**p<0.01, *p<0.05; dependent variable = BMI, and AOR=Adjusted odds ratio.

DISCUSSION

The present study reveals that the nutritional status of ever-married women age 15-49 years is not satisfactory in Bangladesh as well as in India. The nutritional status of Bangladeshi women is worse than Indian women. The women in the age group 15-19 years, experience high undernourishment than other age groups in both countries. But undernourished women are more in Bangladesh (35.9%) than in India (31.1%). The study points out that as age increases, the percentage of underweight women declines, and the percentages of overweight and obese women increase among women in India and Bangladesh, with a few exceptions of overweight and obesity in Bangladesh. Nearly one-third of women are undernourished with low BMI ($<18.5 \text{ Kg/m}^2$) (Ahmed et al., 2012). Another study points out that the percentage of undernutrition and overweight among non-pregnant women in India are 22.4 percent and 18.4 percent respectively. The study also finds that nutritional status depends on household income (Bharati et al., 2014). Another study was done in Dhaka city, observes much fewer percentages –13.7 percent underweight and 4.21 percent overweight (Haque et al., 2014). The present study finds that women with better education are more prone to become overweight and obese both in India and Bangladesh. The highest percentage of undernutrition is observed among the poorest group in both the countries. It has been observed that Bangladeshi women experience more undernutrition problems than Indian women and it is statistically significant ($p < 0.05$). A higher probability of underweight is observed among the poorest households in Cambodia (Hong and Hong 2007). The present study concluded that 11.8 percent of Indian Urban women and 21.5 percent of Indian rural women are underweight in terms of BMI, whereas in Bangladesh, 17.4 percent of urban women and 26.2 percent of rural women are underweight. The study also depicts that the percentage of overweight and obesity in rural areas is less in both countries. Women's occupation plays a significant role in the development of nutritional status. Women's occupation helps in reducing the chance of underweight. Women who are engaged in professional or technician work show a low percentage of underweight than other categories in both countries. Overweight and obesity were low among women engaged in agricultural, service, or household or domestic work in both countries. The prevalence of undernutrition is only 1 percent among women who are engaged in service, whereas it is 33.3 percent among women engaged in business (Kanrar 2018). The present paper finds that the Hindus in India have better nutritional status than Muslims in Bangladesh as the percentage of underweight among Hindu

women is 20.5 percent in India as against 25 percent among Muslim women in Bangladesh. Regression analyses reveal that socio-economic and demographic factors have significant influence on the nutritional status of a woman in both countries. Binary regression revealed that as the age of respondent increases, women likely to have better nutritional status. Non-literate women have higher chance to be underweight than literate women. In India, women residing in urban area (0.724 times) are more likely to have the chance of being normal than women resides in rural area. Whereas in Bangladesh residential pattern has no significant effect on the nutritional status of women. The study reveals that the chance of being underweight is higher among women belong to other religions compared to Hindu women in India. In Bangladesh, religion has no significant impact on nutritional status. One of the most important factors which has much influence on the nutritional status of women is wealth Index. Women having better Wealth Index have a higher chance to be normal (not underweight) than women belong to poor wealth Index in both countries. Multiple linear regression shows similar effect of respondent's age, literacy level, residence, occupation and Wealth Index on respondent's BMI.

Strength and limitation of this study

Women in both Bangladesh and India are vulnerable to undernutrition due to many socio-cultural and economic reasons. As women bear the future generation, so it is important for both mother and child, that women have normal nutritional status. In recent times, both India and Bangladesh are developing fast. So, it is very much necessary to continuously monitor the nutritional status of women towards improving the status of health of them. This study shows that the nutritional status women of both countries need improvement. Underweight is more among Bangladeshi women but overweight and obesity are more among Indian women. Overall malnutrition is very high in both countries. It is also very important to compare the nutritional status of women to understand who is performing better regarding the nutritional status of women among these two rapidly growing countries. And according to the results of this study Indian women enjoy better nutritional status compared to Bangladeshi women. Despite its importance, the present study has limitations. First and foremost is that the sample size of Bangladeshi women is very less compared to the sample size of Indian women.

Conclusion and recommendation

Given the results of the present study, it can be concluded that there is a wide variation in nutritional status between India and Bangladesh. The prevalence of underweight is more and overweight is less among Bangladeshi women than among Indian women regardless of whether it is found by age-group, educational attainment, Wealth Index, residence, occupation, or religion, though the nutritional status in both countries is not up to the mark. The educational attainment of women has a significant influence on the nutritional status of women. Better educated women have better nutritional status in India as well as in Bangladesh. More researches on women's nutrition are very important and should be given priority. In both, countries rural women are facing undernutrition problems. Health providers and planners especially Government agencies should focus more on rural women's nutritional status.

Acknowledgements

The authors are grateful to DHS international who permitted and provided us the data of Fourth National Family Health Survey, 2015-16. Without this data support, the present study could not have been possible to carry out.

REFERENCES

1. Shanmugam M. 2017. Health Status of the Indian women-a brief report. *MOJ Proteomics & Bioinformatics* 5(3): 2-4.
2. Sub-Committee on Nutrition (ACC/SCN).2000. Fourth report on the world nutrition situation: Nutrition throughout the Life Cycle. Washington, DC.
3. Tinker A, Daly P, Green C, Lakshminarayanan R and Gill K. 1994. Women's health and nutrition: making a difference. World Bank discussion paper WDP 256. The World Bank: Washington, DC.
4. Jukariya T, Sharma P, Singh S. 2018. Demographic profile and nutrition status of women in Rajasthan, India. *International Journal of Current Microbiology and Applied Science* 7: 1088-1095.
5. World Health Organization. 2011. Noncommunicable diseases in the South-East Asia Region: Situation and response. New Delhi: WHO Regional Office for South-East Asia.

6. Dutta M, Selvamani Y, Singh P and Prashad L. 2019. The double burden of malnutrition among adults in India: evidence from the National Family Survey-4 (2015-2016). *Epidemiology and Health* 41:e2019050.
7. Tanwi TS, Chakrabarty S and Hasanuzzaman S. 2019. Double burden of malnutrition among ever-married women in Bangladesh: a pooled analysis. *BMC Womens Health* 19(1):1-24.
8. Razak F, Corsi DJ, Slutsky AS, Kurpad A, Berkman L, Laupacis A and Subramanian SV. 2015. Prevalence of body mass index lower than 16 among women in low-and middle-income countries. *JAMA* 314(20): 2164–2171.
9. NCD Risk Factor Collaboration. 2016. Trends in adult body-mass index in 200 countries from 1975 to 2014: a pooled analysis of 1698 population-based measurement studies with 19.2 million participants. *Lancet* 387: 1377–1396.
10. Hasan M, Sutradhar I, Shahabuddin A and Sarker M. 2017. Double burden of malnutrition among Bangladeshi women: a literature review. *Cureus* 9(12): 1-53.
11. Rawal LB, Kanda K, Mahumud RA, Joshi D, Mehata S, Shrestha N, Poudel P, Karki S, Renzaho A. 2018. Prevalence of underweight, overweight and obesity and their associated risk factors in Nepalese adults: data from a Nationwide Survey, 2016. *PLoS One* 13(11): e0205912.
12. Balarajan Y and Villamor. 2009. Nationally representative surveys show recent increases in the prevalence of overweight and obesity among women of reproductive age in Bangladesh, Nepal and India. *Journal of Nutrition* 139(11):2139-44.
13. Ministry of Health and Family Welfare (MoHFW). 2015-2016. National Family Health Survey report. <https://microdata.worldbank.org/index.php/catalog/2949>.
14. Agriculture and Consumer Protection (ACPD). 2010. Nutrition country profile. http://www.fao.org/ag/agn/nutrition/bgd_en.stm.
15. Banerjee S, Roy S, Biswas CS, Pal M, Bharati S and Bharati P. 2018. A Comparative study of Food consumption and nutritional status of women in West Bengal. *Journal of Life Science* 10(2):132-141.
16. Press Information Bureau Government of India Ministry of Women and Child Development. Malnutrition among women 2020. <https://pib.gov.in/newsite/PrintRelease.aspx?relid=200142>

17. Biswas RK, Rahman N, Khanam R, Baqui AH, Ahmed A. 2019. Double burden of underweight and overweight among women of reproductive age in Bangladesh. *Public Health Nutrition* 22(17):3163-3174.
18. Ahmed T, Mahfuz M, Ireen S, Ahmed AMS, Rahman S, Islam MM, Alam N, Hossain IM, Rahman SMM, Ali MM, Choudhury FP and Cravioto A. 2012. Nutrition of Children and women in Bangladesh: Trends and Directions for the Future. *Journal of Health Population Nutrition* 30(1): 1-11.
19. Bharati S, Pal M, Sen S and Bharati P. 2015. Malnutrition and anemia among adult women in India. *Journal of Biosocial Science* 51(5): 658-668.
20. Haque M, Bhuiyan R, Naser MA, Arafat Y, Roy KS and Khan HZ. 2014. Nutritional status of women dwelling in urban slum area. *Journal of nutrition health and food engineering* 1(3):92-94.
21. Hong R and Hong R. 2007. Economic inequality and undernutrition in women: Multilevel analysis of individual, household, and community levels in Cambodia. *Food Nutrition Bull* 28(1):59-66.
22. Kanrar P. 2018. A Study on the nutritional status and It's Association with Parents' Education and Occupation in Young Bengalee Adults of Kolkata, West Bengal. *Journal of Humanities and Social Sciences* 23(2):46-56.