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Article · December 2022

DOI: 10.36347/sjams.2022.v10i12.024

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Scholars Journal of Applied Medical Sciences
Abbreviated Key Title: Sch J App Med Sci
ISSN 2347-954X (Print) | ISSN 2320-6691 (Online)
Journal homepage: https://saspublishers.com

OPEN ACCESS

Rural Studies

Health and Nutritional Status of Women in Different Regions of West Bengal, India: A Comparative Study between NFHS-4 and NFHS-5

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DOI: 10.36347/sjams.2022.v10i12.024 | **Received:** 21.10.2022 | **Accepted:** 03.12.2022 | **Published:** 07.12.2022

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Abstract **Original Research Article**

Women are the important pillar of society but they are not getting proper health care and nutrition which makes them more vulnerable. This study is based on secondary data which has been taken from National Family and Health Survey (NFHS-4, 2015-2016 & NFHS-5, 2019-2021).The study aims to understand the change in health status among women aged 15-49 years in different districts of West Bengal by comparing different health parameters (BMI, obesity, anaemia, high blood sugar and high blood pressure) between two rounds of NFHS. It has been observed that the prevalence of underweight women has decreased from the 4th round of NFHS to the 5th round whereas the rate of obesity has increased in most of the districts of West Bengal except the southern region. Increasing trends of obesity, anaemia, diabetes and hypertension among women have been revealed that make a threat to women's health and development as well as to society. The nutritional and health status among women needs more attention and concern. The initiative should be taken to aware women of their nutrition, nutritional deficiency, health and public health care facilities.

Keywords: Women, Health status, NFHS, BMI, Hypertension, Diabetes.

1. INTRODUCTION

Women's health and nutritional status is an important factor that not only contributes to maintaining a healthy family and healthy children but also influences economic growth globally. Women's health is affected by various important factors like malnutrition, poverty, lack of nutrition education, early marriage, early pregnancy, gender inequality, lack of healthcare facilities, domestic violence, insufficient knowledge and awareness etc. The present research has the objective to understand the nutritional and health status of women in different districts of West Bengal by comparing different parameters between two rounds of the National Family and Health Survey (NFHS-4 & NFHS-5).

Women are the important pillar of society, yet they are not getting proper health care which makes them more vulnerable and negatively affects their growth and development (Singh 2020).Women of India are suffering from malnutrition for a longer period. Lack of consumption of essential nutrients or overconsumption of unhealthy foods may lead to malnutrition. Under nutrition and over nutrition both are considered malnutrition as the imbalance of essential nutrient components has occurred in both of these situations. An adequate amount of essential nutrients are important for both men and women. But Women's nutrition should be focused more as there is a complex relationship between their good health and its effect on human development (Jose 2008). However, an ample number of studies stated that women's health and nutrition do not get proper attention due to inequality and social, cultural and economic discrimination in society (Desai S, 1994). BMI is used to evaluate the various level of nutrition. A woman with a low BMI indicates poor nutritional status, which may cause short stature, anaemia and deficiency of essential micronutrients. Low BMI has a greater risk of obstructed labour, having a low birth weight baby, adverse pregnancy outcomes, producing lower quality breast milk, death due to postpartum haemorrhage, and frequent sickness of the mother and her baby (Mandal S *et al.*, 2011). For optimum growth and development and to achieve good health, balanced nutrition plays a major role which includes an adequate amount of macro and micronutrients (Sarkar S, 2021) and deficiency of these

essential nutrients can cause malnutrition (Radhakrishnan and Ravi 2004; Akpom, C. A., & Warren, K. S., 1975; Garn *et al.,* 2016; Lone *et al.,* 2019).

Anaemia among women is one of the vital public health problems worldwide. Around 30% of the world's population suffers from anaemia (DeMaeyera E *et al.,* 1985) and most of them are from developing countries. Anaemia is one of the most common nutritional disorders. Worldwide, the prevalence of anaemia among reproductive-aged women (15-49 years) was 29.9 % (WHO, 2019) and in India, the prevalence was 53.1 % according to NHFS-4 (NFHS 4, 2015-2016) whereas 57 % as per NFHS-5 (NFHS 5, 2019-2021). The prevalence of anaemia was observed highest among lactating women (78%) followed by pregnant women (75%) and adolescent girls (70%) (National Nutrition Monitoring Bureau 2003). There are various causes of anaemia but iron deficiency is the major cause of nutritional anaemia (DeMaeyer EM *et al.,* 1989).

A metabolic disorder is a group of different metabolic risk factors which include hypertension, central obesity, impaired glucose tolerance, low serum high-density lipoprotein (HDL) and high serum triglycerides, and serum high- density lipoprotein (HDL) and high serum triglycerides (Grundy SM, 2004). Some studies revealed that women are more susceptible to metabolic syndrome than men (Mangat C *et al.,* 2010; Pathania D *et al.,* 2014). The prevalence of diabetes among women is very high in developed and developing countries along with excessive body fat and increased lipid profile (Cheekurthy AJP *et al.,* 2016). Metabolic syndrome can enhance the risk of developing chronic diseases (Meher T & Sahoo H, 2020). In India, for the first time, the National Family Health Survey has collected information on diabetes and hypertension across the states within India (NFHS-4, 2015-16). Diabetes is a chronic disorder occurred by elevated blood sugar and Hypertension is a condition of high blood pressure. According to recent research, the prevalence of diabetes and hypertension is very in India. Indian Diabetes Federation (2022) data revealed that 1 in 10 adults are living with diabetes and it is also responsible for 6.7 million deaths in 2021 which is 1 death per 5 seconds.

2. MATERIALS & METHODS

2.1 Collection of Data

The present study is based on secondary data. The data has been collected from the two rounds of the National Family Health Survey (NFHS-4 & NFHS-5) conducted during 2015-2016 and 2019-2021 respectively. Nutritional status and various health-related parameters of women in West Bengal have been considered as the data for this study. This study gathered information about below normal BMI, overweight or obesity, anaemia, high blood sugar and high blood pressure among women aged 15-49 years, who were usual residents of different districts of West Bengal. As the NFHS-4 & NFHS-5 round had almost similar content, it is possible to compare the different nutritional and health status parameters of women within the districts of West Bengal, India. District-level data has been compiled and analysed for this study. NFHS-4, for the first time, provides district-level estimates for many important indicators.

2.2 Sampling Procedure

Every district of West Bengal has been taken for this study. All Women aged 15-49 years within these districts have been considered as a sample. There were 19districts according to the NFHS 4 fact sheet report which further came up with 20 as Barddhaman district divided into 2 divisions, Purba and Paschim. For the convenience of comparison within NFHS 4 & 5 parameters, the mean value of the Barddhaman district has been taken to analyse the data.

2.3 Parameters of Study

BMI (Body Mass Index) is a commonly used indicator to estimate nutritional status. BMI less than 18.5 is considered a low normal BMI or under nutrition and BMI greater than 25.0 is considered overweight or obese. Body Mass Index or BMI defined as weight in Kilogram is divided by height in meters square.

Diabetes is a chronic metabolic disorder that is measured by elevated blood glucose levels which should be ≥ 140mg/dl in postprandial conditions. For the present study, data has been taken for the reproductive-age women having high or very high blood sugar levels or taking medicine to control the level. NFHS measured the blood sugar level randomly.

Hypertension is measured by elevated blood pressure which should be ≥140 mmHg for systolic pressure and ≥90 mmHg for diastolic pressure. For this study, data has been taken for the reproductive-age women who have high blood pressure or taking medicine to control it.

Anaemia is a condition of a low level of Haemoglobin in the blood. All women aged 15-49 years with haemoglobin levels<12 gm/dl have been taken for this study.

2.4 Data Analysis

The district-level changes within various nutritional and health parameters have been estimated by calculating differences between two rounds of NFHS (Round 4 & 5). The data has been analysed by using SPSS version 22. Compared means are used for all the variables studied. A T-test has been undertaken for analysing the significance level ($p<0.05$) between NFHS-4 and NFHS-5.According to the NSSO (National Sample Survey Organization) employment unemployment survey, West Bengal is divided into five

regions which are the Himalayan region, Eastern Plain, Central Plain, Western Plain and Southern Plain. To represent the changes of different variables between these regions and between NFHS-4 & NFHS-5, a bar diagram has been plotted.

3. RESULT

3.1. Region/ District-Wise Differences among underweight Women in West Bengal

As per Table 1, decreasing trends in the percentage of underweight women have been observed for most of the districts. Jalpaiguri, Dakshin Dinajpur and Puruliya are the most improving districts of West Bengal where a maximum reduction (more than 10 %) of underweight women has been noticed between the two rounds of NFHS. On the other side, no such changes occurred in Kolkata and Murshidabad districts within these 5 years. However, Puruliya and Bankura are the most vulnerable districts where the percentage of underweight women is still high (more than 25%) according to the NFHS-5 fact sheet data.

Table 1: District-Wise differences among underweight women in West Bengal

Districts of West Bengal	Below normal BMI (%)		Differences in %
	NFHS-4	NFHS-5	
Himalayan Region			
Darjeeling	15.4	11.8	-3.6
Jalpaiguri	26.1	15.8	-10.3
Koch Bihar	24.8	18.1	-6.7
Mean	**22.1**	**15.2**	**-6.9**
Eastern Plain			
Uttar Dinajpur	25.7	16.5	-9.2
Dakshin Dinajpur	24.9	14.9	-10
Malda	23.9	15.7	-8.2
Murshidabad	21.1	19.9	-1.2
Nadia	11.9	8.3	-3.6
Birbhum	30.3	20.5	-9.8
Mean	**23.0**	**16.0**	**-7**
Central Plain			
Barddhaman	24	17.4	-6.6
Hugli	18.3	14.1	-4.2
Haora	16.5	10.3	-6.2
Mean	**19.6**	**14.0**	**-5.7**
Western Plain			
Puruliya	47.5	33.7	-13.8
Bankura	33.3	28.0	-5.3
Purba Medinipur	19.4	16.5	-2.9
Paschim Medinipur	29.9	18.9	-11
Mean	**32.5**	**24.3**	**-8.3**
Southern Plain			
Kolkata	7.3	6.6	-0.7
North Twenty Four Parganas	11.5	6.5	-5
South Twenty Four Parganas	18.8	9.9	-8.9
Mean	**12.5**	**7.7**	**-4.9**

3.2. Region-Wise Changes among underweight Women in West Bengal

According to figure 1, every region showed a decreasing trend of underweight women which is a positive approach based on the nutritional status of women. The prevalence of underweight women, aged 15-49, was highest in the western region and lowest in the southern region according to the NFHS-4 data. Maximum decreasing trends of under nutrition were observed in the western region (8.3%) of West Bengal, mentioned in Table 1.

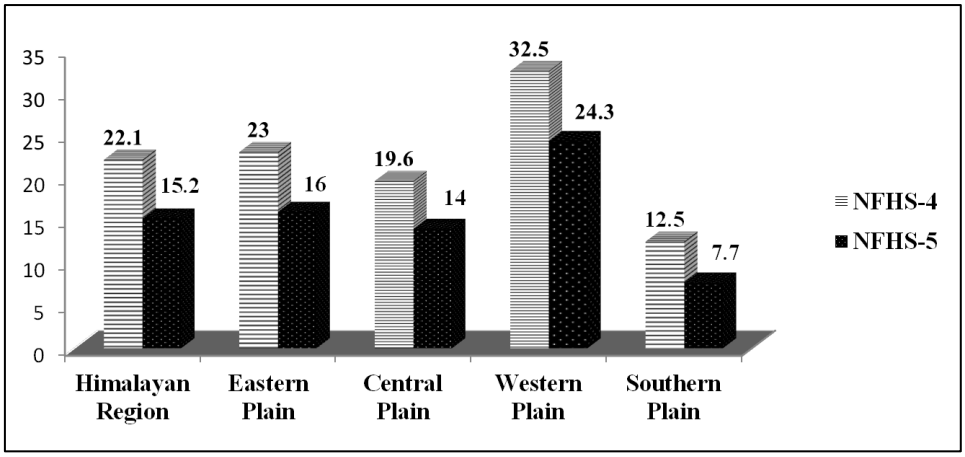

Figure 1: Region-wise changes among underweight women in West Bengal

3.3. Region/ District-Wise differences among overweight or Obese Women in West Bengal

Table 2 illustrates that there are 12 districts of West Bengal where a steadily increasing percentage of overweight or obese women has been identified. Malda and Murshidabad are the major two districts where a maximum increasing rate (10% and more) of obesity has been observed. However, 4 districts of West Bengal named Haora, Kolkata, North 24 Parganas and South 24 Parganas showed a positive result as the decreasing percentage of obesity among women. The percentage of obesity among women declined maximum in the Kolkata district comparing between NFHS-4 and 5.

Table 2: Region/ District-Wise differences among overweight or obese women in West Bengal

Districts of West Bengal	Overweight or Obese (%)		Differences in %
	NFHS-4	NFHS-5	
Himalayan Region			
Darjeeling	23.6	28.3	4.7
Jalpaiguri	14.8	16.7	1.9
Koch Bihar	9.7	16.5	6.8
Mean	**16.0**	**20.5**	**4.5**
Eastern Plain			
Uttar Dinajpur	11.1	14.6	3.5
Dakshin Dinajpur	12.1	20.2	8.1
Malda	12	22	10
Murshidabad	14.8	25.2	10.4
Nadia	24.9	28.6	3.7
Birbhum	10.3	13.4	3.1
Mean	**14.2**	**20.7**	**6.5**
Central Plain			
Barddhaman	17	22.2	5.2
Hugli	29.9	34.6	4.7
Haora	25.9	22.8	-3.1
Mean	**24.3**	**26.5**	**2.3**
Western Plain			
Puruliya	4.7	9.6	4.9
Bankura	9.4	13	3.6
Purba Medinipur	20.9	27.4	6.5
Paschim Medinipur	15.6	19.1	3.5
Mean	**12.7**	**17.3**	**4.6**
Southern Plain			
Kolkata	40.6	29	-11.6
North Twenty Four Parganas	28.9	26.4	-2.5
South Twenty Four Parganas	22.6	21.2	-1.4
Mean	**30.7**	**25.5**	**-5.2**

3.4. Region-Wise Changes among overweight or Obese Women in West Bengal

Figure 2 represented the region-wise increasing trends of overweight or obesity among women. Only in the southern plain, the percentage of prevalence was lower. The trends of overweight or obesity were maximum (6.5%) in the eastern plain and minimum (2.3%) in the central zone.

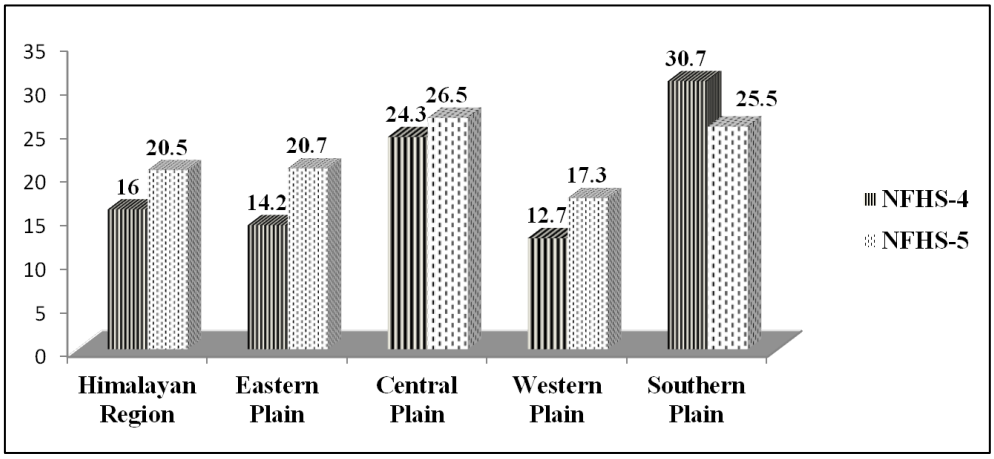

Figure 2: Region-wise changes among overweight or obese women in West Bengal

3.5. Region/District-Wise Differences among Anaemic Women Aged 15-49 in West Bengal

Table 3 illustrates the prevalence of all anaemic women aged 15-49 years in various districts of West Bengal who have low haemoglobin levels in their blood. According to NFHS, for pregnant women haemoglobin level less than 11g/dl and for non-pregnant women less than 12g/dl have been considered anaemia. As per the table, increasing trends of anaemia among women have been observed within all districts of West Bengal except south 24 Parganas. Puruliya and South 24 Parganas are the only two districts where decreasing trends of anaemia have been noticed. There are 10 vulnerable districts of West Bengal where increasing trends of anaemia have been observed i.e. 10% or more, compared with NFHS-4 fact sheet data. Murshidabad district had the highest increasing rate of anaemia among women.

Table 3: Region/District-wise differences among anaemic women aged 15-49 in West Bengal

Districts of West Bengal	Anaemia (%)		Differences in %
	NFHS-4	NFHS-5	
Himalayan Region			
Darjeeling	48.3	59.2	10.9
Jalpaiguri	67	71.4	4.4
Koch Bihar	69.1	74.8	5.7
Mean	**61.5**	**68.5**	**7**
Eastern Plain			
Uttar Dinajpur	62.1	72.4	10.3
Dakshin Dinajpur	77	82	5
Malda	59	73.6	14.6
Murshidabad	57.5	77.6	20.1
Nadia	57.1	73.4	16.3
Birbhum	63.8	77.7	13.9
Mean	**62.8**	**76.1**	**13.4**
Central Plain			
Barddhaman	63.3	71.9	8.6
Hugli	63.2	75.1	11.9
Haora	58.1	65.3	7.2
Mean	**61.5**	**70.8**	**9.2**
Western Plain			
Puruliya	80	76.7	-3.3
Bankura	66.9	77	10.1
Purba Medinipur	59	70.4	11.4
Paschim Medinipur	67	81.5	14.5
Mean	**68.2**	**76.4**	**8.2**

Districts of West Bengal	Anaemia (%)		Differences in %
	NFHS-4	NFHS-5	
Southern Plain			
Kolkata	46.4	58.2	11.8
North Twenty Four Parganas	62.7	65.3	2.6
South Twenty Four Parganas	66.8	61.6	-5.2
Mean	**58.6**	**61.7**	**3.1**

3.6. Region-Wise Changes among Anaemic Women aged 15-49 in West Bengal

Figure 3 represents the region-wise increasing trends of anaemia among women aged 15-49 years. The prevalence of anaemia was very high in every region of West Bengal. The Eastern region showed the highest changes within the last two rounds of NFHS. On the other hand, the difference in prevalence was lowest in the southern plain of West Bengal.

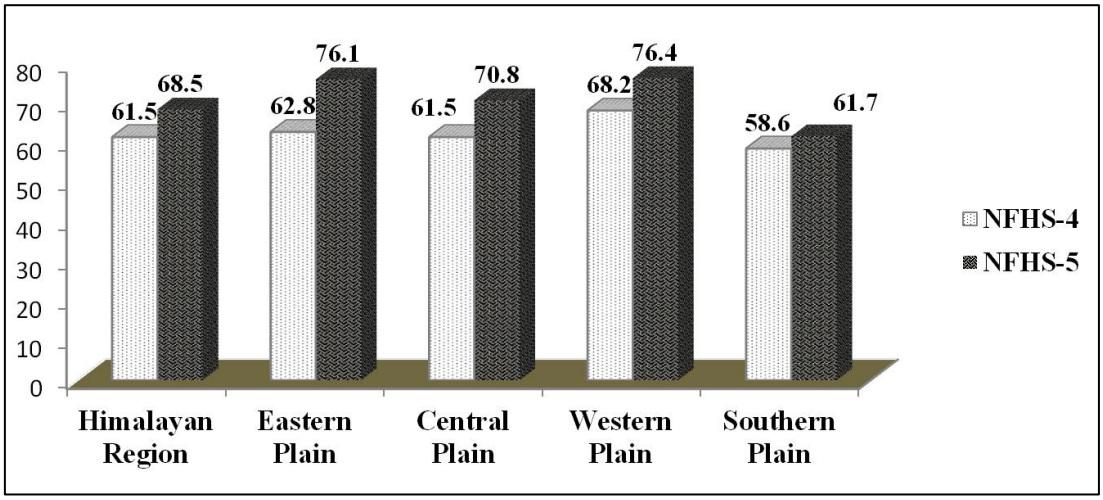

Figure 3: Region-wise changes among anaemic women aged 15-49 in West Bengal

3.7. District-Wise Differences among Women with High Blood Pressure in West Bengal

Among Women of West Bengal, an increasing trend of prevalence of high blood pressure has been observed according to the NFHS fact sheet data. Table 4 illustrates district-level changes in high blood pressure among women within the last five years in West Bengal. The table showed that 9 districts (Darjeeling, Murshidabad. Nadia, Hugli, Puruliya, Purba and Paschim Medinipur, Kolkata and South 24 Parganas) of West Bengal have greater than 10 % increasing trends of hypertension among women. The maximum increasing trends of hypertension have been observed in Darjeeling (15%) and South 24 Parganas (13.5%) districts of West Bengal. According to the NFHS-5 fact sheet, the current prevalence of high blood pressure among women of West Bengal showed highest in Darjeeling (29.2) followed by Kolkata (23.9).

Table 4: Region/ District-Wise differences among women with high blood pressure in West Bengal

Districts of West Bengal	High Blood pressure (%)		Differences in %
	NFHS-4	NFHS-5	
Himalayan Region			
Darjeeling	14.2	29.2	15
Jalpaiguri	18.3	21.2	2.9
Koch Bihar	11.7	21.7	10
Mean	**14.7**	**24.0**	**9.3**
Eastern Plain			
Uttar Dinajpur	12.4	16.3	3.9
Dakshin Dinajpur	11.9	17.6	5.7
Malda	10.2	19.3	9.1
Murshidabad	6.9	18.7	11.8
Nadia	10.3	21.2	10.9
Birbhum	10.4	17.5	7.1
Mean	**10.4**	**18.4**	**8.1**

Districts of West Bengal	High Blood pressure (%)		Differences in %
	NFHS-4	NFHS-5	
Central Plain			
Barddhaman	12.2	19.4	7.2
Hugli	13.4	24.1	10.7
Haora	14.6	24	9.4
Mean	**13.4**	**22.5**	**9.1**
Western Plain			
Puruliya	8.9	17.5	8.6
Bankura	8.8	21	12.2
Purba Medinipur	6.7	18.1	11.4
Paschim Medinipur	6.8	19.3	12.5
Mean	**7.8**	**19.0**	**11.2**
Southern Plain			
Kolkata	12.5	23.9	11.4
North Twenty Four Parganas	10.2	19	8.8
South Twenty Four Parganas	8	21.5	13.5
Mean	**10.2**	**21.5**	**11.2**

3.8. Region-Wise Changes among Women with High Blood Pressure in West Bengal

A highly increasing trend of hypertension was observed in figure 4. According to the bar diagram, the prevalence of high BP has been observed in each region of West Bengal. In the western plain and southern plain, the difference between two rounds of NFHS was very high and the difference is above 11%.

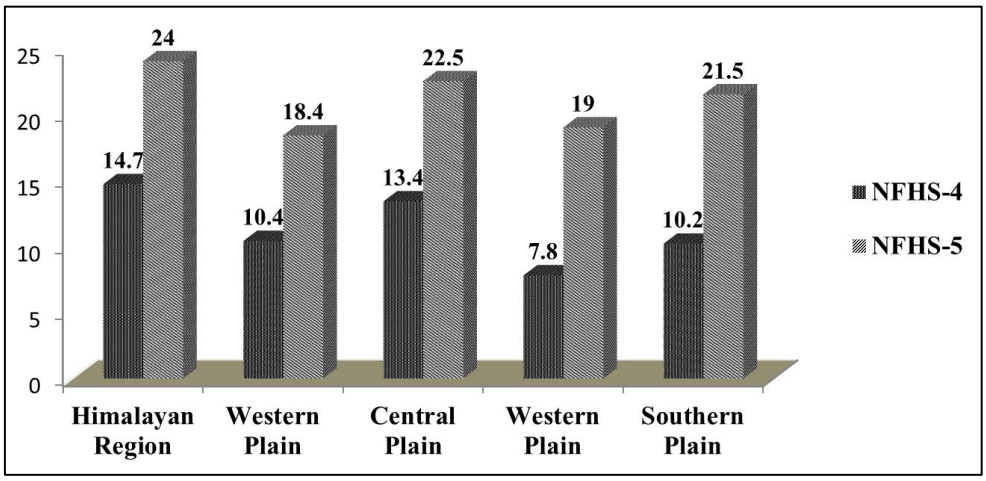

Figure 4: Region-wise changes among women with high blood pressure in West Bengal

3.9. District-Wise Differences among Women with High Blood Sugar in West Bengal

According to NFHS fact sheets, the increasing prevalence trends of high blood sugar levels among women of West Bengal have been observed. Data in Table 5 illustrates that Nadia and Murshidabad are the most sensitive districts where the maximum increase rate of blood sugar has been noticed i.e. greater than 10%. Out of all five regions of West Bengal, the Eastern plain and Western Plain of West Bengal showed the increasing rate of high blood sugar whereas according to the NFHS-5 fact sheet Southern plain showed the current highest prevalence of high blood sugar among women.

Table 5: District-wise differences among women with high blood sugar in West Bengal

Districts of West Bengal	High Blood sugar level (%)		Differences in %
	NFHS-4	NFHS-5	
Himalayan Region			
Darjeeling	5.2	13.2	8
Jalpaiguri	9.2	13.8	4.6
Koch Bihar	10	13.6	3.6
Mean	**8.1**	**13.5**	**5.4**
Eastern Plain			

Districts of West Bengal	High Blood sugar level (%)		Differences in %
	NFHS-4	NFHS-5	
Uttar Dinajpur	8.4	13.6	5.2
Dakshin Dinajpur	8.3	17.5	9.2
Malda	11.6	16.7	5.1
Murshidabad	7.6	18.4	10.8
Nadia	9.7	20	10.3
Birbhum	6.9	16.4	9.5
Mean	**8.8**	**17.1**	**8.4**
Central Plain			
Barddhaman	11.3	16.4	5.1
Hugli	14.4	19.7	5.3
Haora	11.3	16.9	5.6
Mean	**12.3**	**17.7**	**5.3**
Western Plain			
Puruliya	6.4	15.3	8.9
Bankura	9.2	16.2	7
Purba Medinipur	12.4	21.3	8.9
Paschim Medinipur	10.2	17.9	7.7
Mean	**9.6**	**17.7**	**8.1**
Southern Plain			
Kolkata	13.7	21.6	7.9
North Twenty Four Parganas	16.8	18.8	2
South Twenty Four Parganas	11.1	16.5	5.4
Mean	**13.9**	**19.0**	**5.1**

3.10. Region-Wise Changes among Women with High Blood Sugar in West Bengal

Figure 5 represents the changes in high blood sugars among women of West Bengal. It stated that a highly elevated blood sugar level had been observed in all of the five regions. The data about blood sugar collected from NFHS fact sheets included the individual who had either high or very high blood sugar levels or who consumed medicine to control the sugar level.

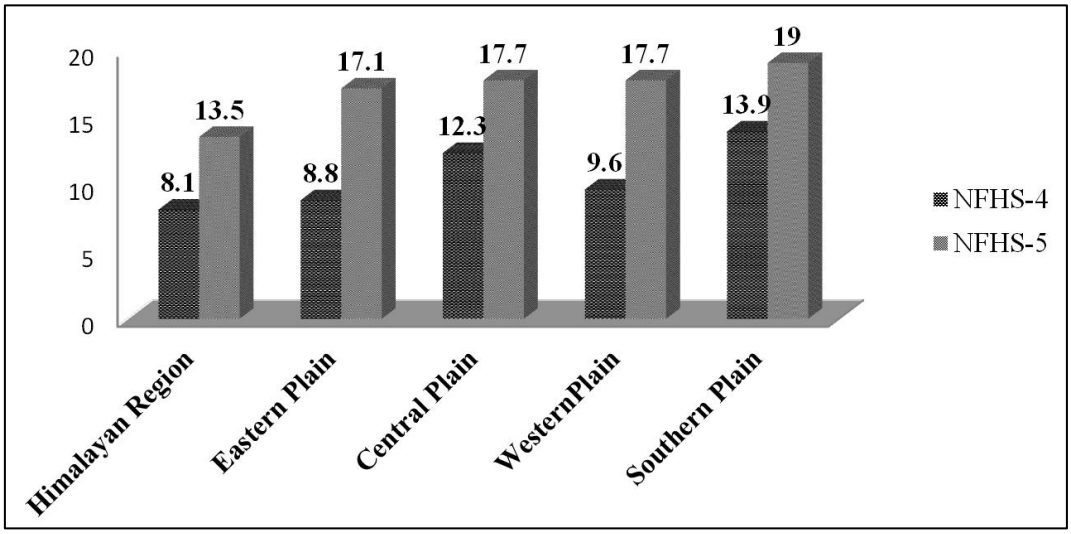

Figure 5: Region-wise changes among women with high blood sugar in West Bengal

3.11. Significant Differences in Various Health Indices within NFHS Round 4 & 5 in West Bengal

Table 6 represents the significant difference in various health indices (below normal BMI level, overweight or obesity, anaemia, high blood sugar and high blood pressure) within NFHS 4 andNFHS-5 fact sheet data. The table showed the significant difference (as $p<0.05$) between the parameters collected from NFHS-4 and 5 fact sheet data.

Table 6: Significant differences of various health indices within NFHS round 4 & 5 in West Bengal

Health indices	Paired sample t-test			
	Mean difference	Std. deviation	t-value	Sig. (2-tailed)
Below normal BMI or Underweight	-6.6947	3.5510	-8.218	.000
Overweight or Obese	3.2632	5.1204	2.778	.012
Anaemia	8.9895	6.3943	6.128	.000
High Blood Pressure	6.8474	2.4231	12.318	.000
High Blood Sugar	6.8474	2.4231	13.195	.000

4. DISCUSSION

According to the result, it has been observed that the prevalence of underweight women has decreased from the 4th round of NFHS to the 5th round which is a good sign for women's nutritional health. But still, the prevalence of under nutrition is very high in West Bengal. The rate of underweight women in Puruliya and Bakura districts has declined most (>10%) in the last four years. However, according to NFHS-5 Puruliya has the highest number of underweight women (33.7 %) as compared to other districts. Nutritional deficiency among women may occur for various reasons. Excessively workload, poverty, early marriage and childbirth, deficiency of nutrition and unhygienic practice may cause under nutrition and increase the risk of morbidity (Rao K. M *et al.,* 2010).Micronutrient deficiency among women of reproductive age has been noticed as they do not intake a balanced diet including enough fruits and vegetables (Bhandari S, Banjara M R 2015; Ruel MT 2013) which is cause malnutrition.

On the other hand, the rate of obesity is increased in most of the districts of West Bengal except the southern region. Within the southern region, the prevalence of obesity is the lowest in Kolkata. Malda and Murshidabad districts of the Eastern region are more vulnerable as the maximum percentage of overweight women has been observed there. Although the rate of under nutrition among women has decreased in West Bengal the prevalence of obesity has steadily increased in most of the regions. Obesity is a lifestyle disorder. People can gain weight for various reasons like inactivity, sedentary lifestyle, overeating of unhealthy foods, absence of awareness about notorious food etc. Uncontrollable fatty and junk food consumption are the major reasons for obesity. Prolonged working hour and a sedentary lifestyle makes people dependent on fast and junk food which is randomly increasing day by day. Economic security is one of the most important determinants of food consumption. (Sarkar S 2015) Consumption of food does not mean consumption of nutrient-rich food. To maintain good health balanced nutrition is required. To empower women and to provide economic security, the Government of West Bengal implemented various programmes related to women and child health. Kanyashree Prakalpa is an initiative taken by the West Bengal government that provide economic security to the girls of the economically weaker section which is necessary for their education, health and well-being and provides socio- economic security to them. Some studies assessed that this initiative helps to reduce child marriage and dropout rate of girls students (Nandy S 2019; Saha B, 2015), but it may also increase the tendency of adolescent girls to consume junk food and packet food, easily available in shops, as they sometimes cannot properly utilise the transfer money which may lead to overweight and obesity among them. A study explained that the prevalence of obesity is higher among women than men (Pradhan AD 2002). Another major effect is urbanization. Urban women and adolescent girls and women are more prone to obesity due to their unhealthy lifestyles. According to the NFHS data an exception has been observed in the metropolitan of West Bengal, Kolkata, where decreasing trends (11%) of obesity have been noticed. Health awareness and media coverage may be another reason for the trends among women of reproductive age group.

There is an increasing trend of diabetes and hypertension has been observed in all districts of West Bengal. The prevalence of diabetes is very high among women of all regions. According to NFHS-5, 17.5 % of women in West Bengal live with high blood glucose levels and among them, 19.4% and 16.5% are from urban and rural populations respectively. Diabetes and hypertension are lifestyle disorders that may cause by various reasons like sedentary work patterns, hereditary factors, and demographic and socio-economic factors. Besides this malnutrition and diabetes is a major public health problem nowadays. Urban people are more affected by high blood sugar due to overconsumption of fast food, physical inactivity, overweight or obesity etc. Another study also stated that high-income groups are more vulnerable to metabolic disorders due to their lifestyle (Prasad DS *et al.,* 2012; Ravikiran M *et al.,* 2010). There is a well- known association between obesity and metabolic disorder. Increasing trends of obesity are the major reason for insulin resistance along with hypertension and other metabolic disorder. An ample number of studies revealed that theory (Ramachandran A, 1997; Chandalia M, 1999). In the world, India is in a leading position for type 2 diabetes mellitus and diabetes is another important reason for the death of women (Cheekurthy AJP *et al.,* 2016). Another study observed that the prevalence of diabetes and hypertension is high among women, especially among overweight or obese women (Bansode B 2021). Abdominal obesity is very common among Asian

Indian women. It is referred to asthe 'Asian Indian Phenotype or Paradox' (Joshi SR, 2003). Heredity, environment and dietary pattern are important factors for abdominal obesity, which is associated with an increased risk of type-2 diabetes and hypertension, heart disease and premature death. Waist-Hip ratio ≥ 0.85 among women increased the risk of disorders associated with abdominal obesity. For the first time, the 5th round of NFHS-5 measures the WHR which is an important factor to identify the distribution of body fat and assume abdominal obesity. Malnutrition also affects the blood sugar level of the body as a lack of essential nutrients body cannot produce an ample amount of insulin to regulate sugar levels which leads to increased blood sugar or diabetes. It is another major reason that the prevalence is very high among rural women who are not dealing with a sedentary lifestyle like urban people.

The prevalence of anaemia is very high among women of the reproductive age group of all regions of West Bengal. An increasing trend of low Hb levels has been observed in all districts except Puruliya and South 24 Pargnars where the percentage of anaemia decreased as compared with the NFHS-4 data. Inadequate nutrition, deficiency of iron and folic acid-rich food items in the diet, less consumption of vitamin c rich food, blood loss during menstruation, worm infestation, early marriage and early childbirth are the common cause of anaemia among women. But Iron deficiency is the major reason for anaemia among Indian women. The occurrence of anaemia is very high among adolescent girls (Bharati P *et al.,* 2009). The government of India implemented different projects to reduce anaemia prevalence among adolescents and women. WIFS (Weekly Iron Folic Acid Supplementation) is a school-based programme where supplementation of Iron-folic acid dosage (IFA) and deworming tablets has been given to adolescent students aged 15-19 years. Nevertheless, 70.8% of adolescent girls in West Bengal are anaemic according to NFHS-5 which is much more (8.6%) than the prevalence data of NFHS-4 i.e. 62.2%. It is almost 52 years since the implementation of the National Nutritional Anaemia Prophylaxis Programme (1970) and the burden of anaemia occurrence is still very high among women of West Bengal as well as India.

5. CONCLUSION

From the above findings, it can be concluded that there is a significant change has been observed between the two rounds of NFHS. The nutritional and health status among women needs more attention and concern. Increasing trends of obesity, anaemia, diabetes and hypertension among women of West Bengal have been revealed that make a threat to women's health and development as well as to society. The prevalence of anaemia is very high among both pregnant and non-pregnant women while the coverage of IFA tablet consumption is also increased. So there is a need to focus more on the effectiveness of IFA dosage. Impaired iron absorption can be another factor of anaemia. Lacks of vitamin C in the diet and worm infestation are major reasons which restrict the absorption of iron in the body. Increasing trends of obesity, hypertension and diabetes among women makes them more vulnerable to other associated metabolic disorder. Abdominal obesity among women increased the risk factor for diabetes and hypertension. The rate of hospitalization among diabetic women is very high due to untreated diabetes-related complications and lack of access to health care facilities due to social discrimination (Mahtab H *et al.,* 2009). As per NFHS data, the percentage of obese and overweight women is increased from 19.9% (NFHS-4) to 22.7% (NFHS-5) which also increases the risk of metabolic disorder. There is a severe change in nutritional status among women of West Bengal has been observed. The prevalence of obesity among women is increased whereas the percentage of under nutrition is decreased. The nutritional status of women is affected by many factors. But the major factor is the change in lifestyle patterns. Sedentary lifestyle, change in socioeconomic condition, inappropriate dietary pattern etc.

Another important factor which gives a negative impact on the health and nutritional status among women is the inaccessibility of healthcare facilities. Due to socio-economic status, cultural stigma, lack of health care facilities, lack of knowledge regarding health and disorders can affect the health and nutritional status of underprivileged women. A study revealed that more than half of the women population (58%) is unable to access public health facilities (Dalal K 2009). So it is important to take proper measures and attention to that particular problem. Here are some strategies that can make some difference in improving health and nutritional status among women of West Bengal. Health and nutrition-based programme and their effectiveness among women should be evaluated properly and have to take action regarding this. The initiative should be taken to aware women of their nutrition and health and health care facilities. More focus needs to be given to public health care facilities which are important for economically deprived sections. Proper region-specific action plans and implementation of programmes related to health, and effective social behavioural change communication may improve the overall health status of women that lead to a healthy population.

ACKNOWLEDGEMENTS

The authors thanks to the International Institute of Population Sciences (IIPS) for provide accessibility of the National Family Health Survey (NFHS) data.

FUNDING

This research received no specific grant from any funding agency in the public, commercial or not profit sectors.

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