

Metabolic state of the nation: Results of the National Family Health Survey-4

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The National Family Health Survey-4 (NFHS-4) reveals interesting data regarding the prevalence of metabolic syndrome (MetS) in India. Perhaps the largest exercise of its kind in the world, NFHS assesses the health status of our nation.^[1] Traditionally, NFHS has focused on family planning, maternal and child health, nutritional makers of health, and communicable disease risk factors.^[2] In keeping with recent changes in morbidity patterns, NFHS has now begun to monitor metabolic health as well. This approach is welcome, as it helps assess the prevalence of various noncommunicable diseases in India. NFHS uses robust methods to collate data regarding the health of the country and ensures accuracy by comprehensive, well-documented training of field staff.^[3]

The NFHS-4 (2014–2015) has recently reported findings from 15 Indian states and union territories (UT). The data related to metabolic health makes interesting reading. As part of its data collection exercise, NFHS has measured body mass index (BMI), random blood glucose (RBG), and blood pressure in adults. Prevalence is reported BMI <18.5 and >25.0 kg/m², for men and women, as well as urban and rural inhabitants separately. Gender-specific prevalence of adults with “high blood sugar” (>140 mg %) and “very high blood sugar” (>160 mg %) is given. Similarly, the prevalence of high blood pressure has been classified as mild, moderate, and severe, based on systolic and/or diastolic blood pressure.

The prevalence of obesity (BMI >25 kg/m²) varies from state to state, with Andaman and Nicobar Islands (AN) men and Puducherry women being the heaviest (38.2% and 36.7%), respectively [Table 1]. The heaviest states for men, after AN, are Puducherry (37.1%), Sikkim (34.8%), Andhra Pradesh (AP) (33.5%), and Goa (32.6%).^[4] Puducherry women are followed by

Table 1: Top five states in metabolic dysfunction - from the findings of National Family Health Survey-4

	Obesity (%)		High glucose (%)		High blood pressure (%)	
	Men	Women	Men	Women	Men	Women
1	AN	Puducherry	AN	AN	AN	Sikkim
2	Puducherry	Goa	Goa	Goa	Sikkim	Tripura
3	Sikkim	AP	WB	AP	Telangana	WB
4	AP	AN	AP	Puducherry	Uttarakhand	Telangana
5	Goa	TN	TN	Tripura	Haryana	AP

AN: Andaman and Nicobar, AP: Andhra Pradesh, TN: Tamil Nadu, WB: West Bengal

Goa (33.5%) AP (33.2%), AN (31.8%), and Tamil Nadu (TN) (30.9%) far as the prevalence of obesity is concerned. The least prevalence of male obesity is found in Meghalaya (10.1%), Madhya Pradesh (MP) (10.9%), Bihar (12.6%), West Bengal (WB) (14.2%), and Tripura (15.9%). The lowest percentage of obese women is reported from Bihar (11.7%), Meghalaya (12.2%), MP (13.6%), and Tripura (16.0%) [Table 2]. The high rates of obesity in general, and in some states/UTs in particular, create concern for future metabolic health. Obesity is the forerunner of metabolic dysfunction and predisposes to illnesses such as diabetes and hypertension.

NFHS-4 has captured cross-section data related to the occurrence of “high sugar” as well. Although it does not purport to be an epidemiologic study of diabetes prevalence, it does indicate the burden of uncontrolled glycemia in the community. NFHS-4 uses the word “sugar” in its tables but clarifies in its manuals that RBG was checked. According to NFHS-4, the highest prevalence of “high blood sugar” in adult men is in AN (26.0%), followed Goa (19.6%), WB (17.3%), AP (15.7%), and TN (15.3%). Dysglycemia is relatively less prevalent in women, with AN (14.5%), Goa (14.1%), AP (13.1%), Puducherry (11.7%), and Tripura (11.7%) taking the top five spots. The “least diabetic” states are Haryana (8.2%), Meghalaya (9.3%), MP (9.6%), Bihar (10.0%), and Telangana (10.1%) for men, and Bihar (6.1%), Meghalaya (6.1%), Haryana (6.6%), MP (7.2%), and Uttarakhand (8.6%) for women.^[4]

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Table 2: Top five states in metabolic health - from the findings of National Family Health Survey-4

	Obesity (%)		High glucose (%)		High blood pressure (%)	
	Men	Women	Men	Women	Men	Women
1	Meghalaya	Bihar	Haryana	Bihar	Bihar	Bihar
2	MP	Meghalaya	Meghalaya	Meghalaya	Meghalaya	MP
3	Bihar	MP	MP	Haryana	MP	Tamil Nadu
4	WB	Tripura	Bihar	MP	Goa	Goa
5	Tripura	WB	Telangana	Uttarakhand	Tripura	Andaman and Nicobar

WB: West Bengal, MP: Madhya Pradesh

High blood pressure tends to be more common in men from AN (27.9%), Sikkim (27.3%), Telangana (18.2%), Uttarakhand (17.2%), and Haryana (16.8%). In women, the highest prevalence of uncontrolled high pressure was seen in Sikkim (16.5%), Tripura (12.6%), WB (10.3%), Telangana (10.1%), and AP (10.0%) and lowest rates of hypertension were encountered in men from Bihar (9.4%), Meghalaya (10.4%), MP (10.9%), Goa (13.2%), and Tripura (13.6%). Among women, the least prevalence of hypertension was seen in Bihar (5.9%), MP (7.9%), and TN (8.3%), Goa (8.5%), and AN (9.0%).^[4]

The data presented by NFHS-4 reveals interesting trends [Table 1]. The most common metabolic morbidity is obesity, which coexists with malnutrition (low BMI). Although not discussed in this editorial, this is a unique characteristic of the Indian community phenotype, which needs public health attention. Dysglycemia and hypertension are equally prevalent, but males have a greater risk of these conditions as compared to females. AN males stand out as an extreme outlier: 26.0% of them have high blood glucose, whereas 27.9% are hypertensive.

Assuming the states/UTs as the cases and percentages of various dysfunctions in the states/UTs as the scores of respective states/UTs, paired *t*-test was applied, and significant intergender difference was found regards high blood glucose scores and the hypertension score values ($P < 0.05$). No significant difference was found between the values pertaining to the two sexes as regards the obesity percentage scores of the states/UTs ($P > 0.05$). In addition, significant correlation was obtained between men's and women's values of respective metabolic dysfunctions, i.e., obesity ($r = 0.937$, $P < 0.05$), high blood glucose ($r = 0.836$, $P < 0.05$), and hypertension ($r = 0.551$, $P < 0.05$). This data highlight the need to ensure gender-specific interventions where necessary and reinforces the need to have comprehensive promotive, preventive, and curative services for metabolic health, instead of creating separate verticals for different diseases.

The NFHS-4 did not include the history of known diabetes/intake of glucose lowering medication or history

of hypertension/blood pressure lowering medication in its ambit. This may explain the discrepancy between the higher rates of obesity (which are usually not affected by therapy, and which give an accurate idea of the burden of disease) and lower rates of high glucose and high blood pressure (which are impacted by therapy). It is possible that the prevalence of diabetes and hypertension is underreported in the NFHS, as many persons on adequate glucose lowering or blood pressure treatment would have been found to have normal glucose or blood pressure values.

Smaller states/UTs such as AN, Puducherry, and Goa, and larger southern states such as AP, Telangana, and TN have higher rates of metabolic dysfunction [Table 2]. The surprisingly high rank of Sikkim in the high blood pressure tables (#1 in women, #2 in men) may be due to dietary factors such as high salt intake. It is also plausible that the high rates of dysglycemia and hypertension reported from some states/UTs, for example, AN and Sikkim may be due to lack of earlier screening, diagnosis, and treatment.

Life in states/UTs such as AN, Goa, and Puducherry is perhaps more relaxed, and this may explain their absence from the list of top 5 hypertensive states. At the same time, however, their dominance of the obesity and high glucose tablets may be a fallout of increased caloric intake, coupled with reduced physical activity. The similarity between prevalence rates in neighboring Puducherry and TN, which share a common ethnocultural population, is striking. At the same time, a contrast can be made out between the contiguous states of Bihar and WB, which have strikingly different dietary patterns and lifestyles.

The lists of the top five states, in terms of least prevalence of obesity, high sugar, and high blood pressure, show significant concordance. Bihar, MP, and Meghalaya dominate all the three lists, lending support to the common etiopathology of these distinct metabolic conditions.

While not all states have reported the NFHS-4 data, currently available statistics need to be analyzed carefully. The high prevalence of metabolic dysfunction, especially

obesity, in India, cannot be ignored. A multipronged approach to prevention of the MetS including early screening, diagnosis, and management, public awareness, and legislation is required. Special emphasis must be paid to high prevalence regions such as AN, Goa, Puducherry, and Sikkim. At the same time, it must be noted that “low” prevalence states such as Bihar, Meghalaya, and MP also bear a huge burden of disease in terms of numbers affected. National prevention programmers must take all these factors into account while planning future strategies for control of metabolic health.

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