

## 4.2.5 PHYSICAL MEASUREMENTS

During the survey, respondents (18-69 years) who consented for physical measurements underwent measurements of height (in cm), weight (in Kg), waist circumference (in cm) and blood pressure (mm of Hg). The Body Mass Index (BMI) was calculated using the information of height and weight of the participant by the formula:  $BMI = \text{Weight (Kg)} / \text{Height (m)}^2$ . BMI was used to categorize respondents into underweight, normal, overweight and obese. This section presents the BMI categories (as per WHO and Asian cut-offs), known and newly detected cases of raised blood pressure identified during the survey in the tables below. BMI was not calculated for pregnant women.

### KEY FINDINGS

#### Prevalence of:

- Overweight (including obesity) - **26.1%**
- Obesity - **6.2%**
- Central obesity - **32.2%**

Higher proportion in the urban areas and among women.

- Prevalence of raised blood pressure including those on medication was **28.5%**
- Survey observed **20.6%** of newly detected cases of raised blood pressure.

### Anthropometric measurements

Table 4.2.5.1 Measurements of height, weight, BMI and waist circumference by area of residence and gender (Mean)

18-69 years	Urban			Rural			Total		
	Men	Women	Combined	Men	Women	Combined	Men	Women	Combined
Height (cm)	165.3	152.3	159.3	163.6	151.3	157.7	164.2	151.6	158.2
Weight (Kg)	65.8	57.4	61.9	57.2	50.2	53.8	60.1	52.6	56.5
BMI (Kg/m <sup>2</sup> )	24.0	24.7	24.3	21.4	21.9	21.6	22.3	22.8	22.5
Waist circumference (cm)	86.6	82.3	84.6	78.8	75.3	77.1	81.4	77.6	79.6

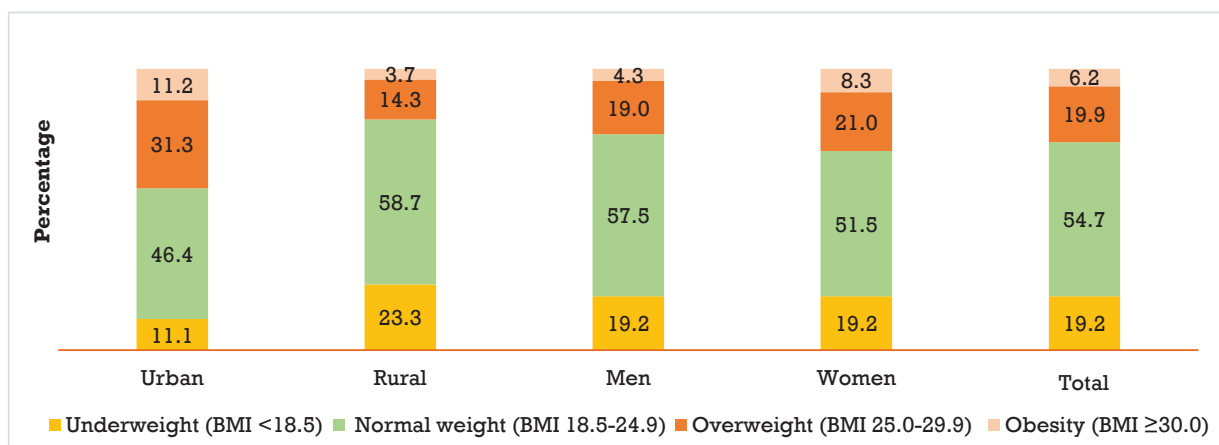
The mean weight (Kg) of adults was 56.5 Kg (60.1 Kg men and 52.6 Kg women). Adults from the urban areas weighed a mean of 61.9 Kg and those from the rural areas were 53.8 Kg. (*Table 4.2.5.1*)

The mean BMI of the surveyed respondents was 22.5 Kg/m<sup>2</sup>, the BMI of adults in the urban areas was 24.3 Kg/m<sup>2</sup> and those in rural areas was 21.6 Kg/m<sup>2</sup> (*Table 4.2.5.1*). The gender wise distribution of BMI was nearly similar to both men and women, but across the age groups, older adults (45-69 years) had a BMI 23.1 Kg/m<sup>2</sup> and younger adults (18-44 years) of 22.3 Kg/m<sup>2</sup>. (*Annexure table 4.2.5.1b*)

The mean waist circumference was 79.6 cm (urban 84.6 cm and rural 77.1 cm), among men it was 81.4 cm and women it was 77.6 cm. The mean waist circumference was observed to be higher in the older age group of 45-69 years (82.7cm). (*Annexure table 4.2.5.1b*)

**BMI categories as per WHO and Asian cut-offs**

The distribution of BMI categories as per WHO and Asian cut-off BMI among the surveyed population have been presented below.



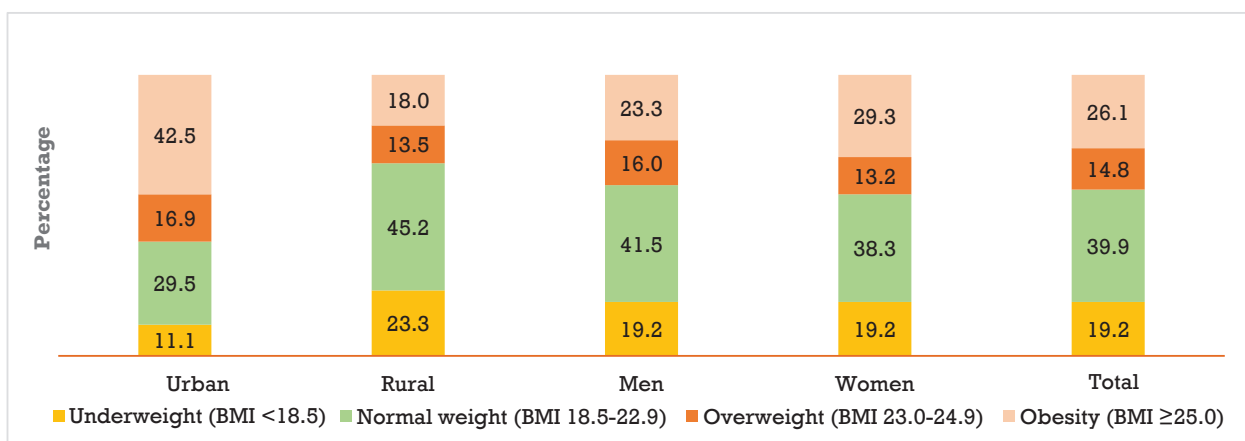
**Figure 4.2.5.1 BMI categories (WHO cut off) by area of residence and gender (Percentage)**

The proportion of underweight, overweight and obese adults were 19.2%, 19.9% and 6.2% respectively. (Figure 4.2.5.1)

In the rural areas, twice the percentage of adults (23.3%) were underweight to those in the urban areas (11.1%). Proportion of adults who were overweight and obese in the urban areas were 31.3% and 11.2% and rural areas were 14.3% and 3.7% respectively.

Across the gender, similar proportion of men and women were underweight, while women were proportionately overweight and obese (21.0% overweight and 8.3% obese) than men (19.0% overweight and 4.3% obese).

The age group distribution showed that higher proportion of older adults aged 45-69 years were overweight (23.4%) and obese (7.8%) than the adults of 18-44-year age group (overweight 18.4% and obese 5.5%). The opposite was observed for underweight category. (Annexure table 4.2.5.2b)



**Figure 4.2.5.2 BMI categories (Asian cut off) by area of residence and gender (Percentage)**

As per the Asian cut-offs of BMI, the differences for BMI cut-offs were observed in the overweight and obesity categories, while underweight and normal BMI were similar to WHO cut-offs. Overall, 39.9% of the surveyed population were of normal weight, 19.2% were underweight, while 14.8% were overweight and 26.1% were obese. In the urban areas and rural areas, the proportion of overweight and obesity were 16.9% and 13.5%; 42.5% and 18.0% respectively. (Figure 4.2.5.2)

Gender wise distribution showed that, higher percentage of men were overweight (16.0%), while higher proportion of women were obese (29.3%). It was observed that higher proportion of adults aged 45-69 years were obese. (Annexure table 4.2.5.3b)

### Prevalence of overweight (including obesity) and obesity

The prevalence of overweight (including obesity) and obesity has been defined as overweight (including obesity; BMI  $\geq 25.0$  Kg/m<sup>2</sup>) and obesity (BMI  $\geq 30.0$  Kg/m<sup>2</sup>). The table 4.2.5.2, presents the following:

**Table 4.2.5.2 Adults categorized as overweight (including obesity) and obese by area of residence and gender (Percentage)**

18-69 years	Urban			Rural			Total		
	Men	Women	Combined	Men	Women	Combined	Men	Women	Combined
Overweight (BMI $\geq 25.0$ Kg/m <sup>2</sup> )	40.2	45.1	42.5	14.6	21.7	18.0	23.3	29.3	26.1
Obesity (BMI $\geq 30.0$ Kg/m <sup>2</sup> )	8.6	14.1	11.2	2.1	5.5	3.7	4.3	8.3	6.2

The prevalence of overweight (including obesity) was 26.1% and obesity was 6.2% with a higher prevalence in the urban areas, in women and adults of age group 45-69 years. (Annexure table 4.2.5.4b)

### Central obesity

The table below has details on central obesity, waist circumference  $\geq 90$  cm for men and  $\geq 80$  cm for women were used to define central obesity.

**Table 4.2.5.3 Adults with central obesity by area of residence and gender (Percentage)**

18-69 years	Urban			Rural			Total		
	Men	Women	Combined	Men	Women	Combined	Men	Women	Combined
Central obesity	39.5	58.1	48.2	16.6	32.4	24.2	24.4	40.7	32.2

As shown in table 4.2.5.3, the overall proportion of adults with central obesity were 32.2%. Distribution by area of residence, gender and age groups showed that 48.2% of adults from the urban areas, 40.7% women and 41.9% of age 45-69 years were centrally obese. (Annexure table 4.2.5.5a)

### Blood pressure measurement

Three readings of blood pressure were recorded during the survey and the mean of last two readings were considered. The results of blood pressure measurement are presented in *table 4.2.5.4 to 4.2.5.6 and figure 4.2.5.3*.

**Table 4.2.5.4 Blood pressure measurements by area of residence and gender (Mean)**

18-69 years	Urban			Rural			Total		
	Men	Women	Combined	Men	Women	Combined	Men	Women	Combined
Systolic BP (mmHg)	129.4	123.6	126.7	124.4	121.0	122.7	126.1	121.8	124.1
Diastolic BP (mmHg)	84.3	80.8	82.7	80.4	79.7	80.1	81.8	80.1	80.9

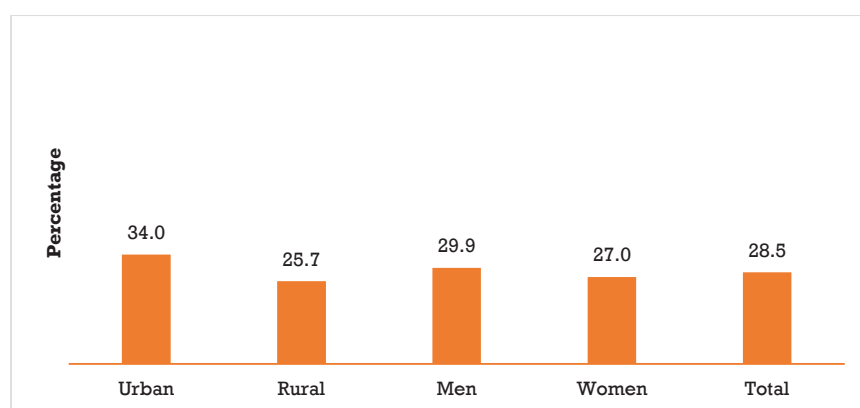
The mean systolic blood pressure (SBP) was 124.1 mm of Hg and diastolic blood pressure (DBP) was 80.9 mm of Hg (*Table 4.2.5.4*), with a SBP mean of 126.1 mm of Hg among men and 121.8 mm of Hg in women; and 133.6 mm of Hg among age group of 45-69 years. While the mean DBP was 81.8 mm of Hg in men; 80.1 mm of Hg in women and 83.1 mm of Hg in the older age group. (*Annexure table 4.2.5.6b*)

**Table 4.2.5.5 Adults with raised blood pressure (known and newly detected) by area of residence and gender (Percentage)**

18-69 years	Urban			Rural			Total		
	Men	Women	Combined	Men	Women	Combined	Men	Women	Combined
Known	8.6	12.4	10.4	5.8	7.6	6.7	6.8	9.2	7.9
Newly detected	28.7	17.8	23.6	20.2	17.7	19.0	23.1	17.8	20.6

Raised blood pressure has been defined as  $\geq 140$  and/or  $\geq 90$  mm of Hg. 7.9% reported a diagnosed history of raised blood pressure; 10.4% urban and 6.7% rural; 9.2% women and 6.8% men. By age groups, 16.4% were from 45-69 years and 4.2% belonged to the younger age group of 18-44 years. (*Table 4.2.5.5 and annexure table 4.2.5.7b*)

Overall, the newly detected proportion of cases of raised blood pressure identified in the survey were 20.6%, urban 23.6% and rural 19.0%. Gender and age-wise distribution showed, 23.1% were men and 17.8% were women (*table 4.2.5.5*), while 30.7% were from the 45-69 years age group and 16.1% belonged to 18-44 years. (*Annexure table 4.2.5.7b*)



**Figure 4.2.5.3 Adults with raised blood pressure including those on medication by area of residence and gender (Percentage)**

The estimated prevalence of raised blood pressure including those on medication was 28.5% (29.9% men and 27.0% women) (*Figure 4.2.5.3*). In the older age group (45-69 years) the prevalence was 47.1%. (*Annexure table 4.2.5.8a*)

**Table 4.2.5.6 Blood pressure categories\* among those measured by area of residence and gender (Percentage)**

18-69 years		Urban			Rural			Total		
		Men	Women	Combined	Men	Women	Combined	Men	Women	Combined
Normal		22.4	36.5	29.0	33.6	42.4	37.9	29.8	40.5	34.9
Pre-hypertension		43.1	38.6	41.0	43.6	35.8	39.8	43.4	36.7	40.2
Hypertension	Stage 1	21.5	16.5	19.2	16.7	15.2	16.0	18.4	15.6	17.0
	Stage 2	13.0	8.4	10.8	6.1	6.6	6.3	8.4	7.2	7.9

\*Classification of hypertension (as recommended by JNC-7) is based on Systolic Blood Pressure (SBP) and Diastolic Blood Pressure (DBP) values: Normal (SBP<120; DBP<80) (mmHg), Pre-hypertension (SBP: 120-139; DBP=80-89); Hypertension Stage 1 (SBP: 140-159; DBP=90-99) (mmHg); Hypertension Stage 2 (SBP: ≥160; DBP: ≥100) (mmHg) among those measured.

*Table 4.2.5.6* shows, the distribution of blood pressure according to the Seventh report of the Joint National Committee (JNC-7)\*\* classification of hypertension. Overall, 34.9% were normotensive, 40.2% were pre-hypertensive (43.4% men and 36.7% women), 17.0% were in the stage-1 hypertension and 7.9% were in stage-2 hypertension.

The age wise distribution showed that, 25.3% of older adults (45-69 years) belonged to stage-1 hypertension and 42.1% of younger adults (18-44 years) were pre-hypertensive. (*Annexure table 4.2.5.9b*)

\*\* Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo L Jr, et al. National Heart, Lung, Blood Institute; National High Blood Pressure Education Program Coordinating Committee. Seventh report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. Hypertension 2003; 42:1206–1252.