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Trends in The Double Burden of Malnutrition Among Indian Women: Evidence from NFHS-5 and NFHS-6

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Abstract- The coexistence of undernutrition and overnutrition presents a nutritional challenge in India, particularly among women of reproductive age. This study examines changes in the double burden of malnutrition among women aged 15-49 years across 35 Indian states and Union Territories, using data from the National Family Health Survey (NFHS-5, 2019-21) and NFHS-6 (2023-24). It analyses changes in underweight and overweight or obesity, state-level variations, and their associations with women's educational attainment, internet use, and child stunting. The study employs descriptive statistics, paired comparisons, Pearson and Spearman correlation coefficients, and ordinary least squares regression with HC3 heteroskedasticity-consistent standard errors. Nationally, underweight increased from 18.7% to 19.7%, while overweight or obesity rose from 24.0% to 30.7%; correspondingly, the share of women with normal BMI declined from 57.3% to 49.6%. Across states and Union Territories, overweight or obesity increased in 33 of 35 jurisdictions, whereas the average change in underweight was not statistically significant. Both forms of nutritional burden increased in 19 jurisdictions, while normal BMI declined in 32. Women's educational attainment was positively associated with overweight or obesity (r = 0.78) and negatively associated with underweight (r = -0.56). However, education was not significantly associated with changes in either indicator between survey rounds. The findings indicate that India's nutritional transition is not a uniform shift from undernutrition to overnutrition; rather, conditions coexist across regional contexts. The study underscores the need for geographically differentiated nutrition policies that address undernutrition and excess weight among women, supporting progress towards Sustainable Development Goal 2.

Keywords: double burden of malnutrition; underweight; overweight and obesity; women's nutrition; nutrition transition; NFHS-6; India; state/UT disparities

I. INTRODUCTION

Undernutrition and excess weight were long treated as separate problems belonging to different countries. They now coexist within countries, within communities and sometimes within the same household, a pattern usually called the double burden of malnutrition (wells et al., 2020). Pooled analyses of population surveys show that obesity has risen in almost every country since the 1970s while underweight has stayed common in south asia and parts of africa (ncd risk factor collaboration [ncd-risc], 2017).

The nutrition transition literature links this shift to changes in diets, work and urban living that arrive unevenly, first among better-off groups and later in the rest of the population (popkin, 1994; popkin et al., 2012). Women of reproductive age are particularly important in this context because their nutritional status has implications not only for their own health but also for pregnancy outcomes and the subsequent growth and development of their children (black et al., 2013; Wells et al., 2020).

The coexistence of undernutrition and overnutrition among indian women highlights the growing complexity of the country's nutritional challenges. Studies based on earlier nfhs rounds documented both burdens among indian women and their uneven social and geographic distribution (subramanian et al., 2007; Siddiqui & donato, 2016), and meenakshi (2016) added micronutrient deficiency to describe a triple burden. Cross-country evidence for low- and middle-income countries shows thinness clustering among poorer women and overweight among better-off women (subramanian et al., 2011). Projections built on past trends point to a continued rise in overweight and obesity in india (luhar et al., 2020).

Nfhs-6 fact sheets were released in may 2026 and give state and ut estimates for 2023-24 next to the nfhs-5 value for each indicator (iips, 2026). Early coverage has come mainly from news reports and policy commentary, which quote the national figures and a few states. Three questions remain open. First, is the rise in overweight concentrated in states that were already high, or is it spreading everywhere? Second, are the states where thinness fell the same ones where overweight rose, which would suggest a transition, or are both burdens growing together? Third, do women's schooling and digital access, which differ widely across states, track the level of each burden or the speed at which it changes?

This paper takes up those questions with state/ut data for 35 states/uts. It has four objectives: (i) to measure the change in underweight and in overweight or obesity among women aged 15-49 between nfhs-5 and nfhs-6, nationally and for each state/ut; (ii) to classify states/uts by the direction of change and by the level of each burden in 2023-24; (iii) to describe urban-rural differences; and (iv) to examine how levels and changes relate to women's schooling, internet use and child stunting.

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II. CONCEPTUAL FRAMEWORK IN THE CONTEXT OF SUSTAINABLE DEVELOPMENT GOALS

The framework combines the nutrition transition (popkin, 1994; popkin et al., 2012) With the account of the double burden set out by wells et al. (2020). In the nutrition transition, rising incomes, urbanisation and changes in food supply and work move a population from a pattern dominated by thinness towards one dominated by excess weight. The shift is uneven. Jaacks et al. (2019) Describe an obesity transition in stages, in which the burden of obesity moves over time from better-off groups towards poorer ones. A state can therefore sit at different points on this path for different groups of women at the same time, which is one reason both burdens may rise together.

Three tiers organise the analysis (figure 1). Tier 1 holds enabling conditions that differ across states: women's schooling and digital access, both measured in the fact sheets, and urban or rural residence, for which the fact sheets give separate nfhs-6 figures. Food environments and physical activity belong in the same tier but are not measured in the fact sheets. Tier 2 holds the two bmi outcomes, underweight (bmi below 18.5) And overweight or obesity (bmi of 25.0 Or above), together with the residual group of women in the normal range.

Tier 3 holds consequences: child stunting, which carries maternal and child nutrition across generations (black et al., 2013; Wells et al., 2020), And the risk of noncommunicable disease. Schooling and internet use stand in for tier 1 because both are available for every state in both survey rounds. Schooling is a standard marker of women's socioeconomic position in comparative studies of weight (subramanian et al., 2011). Internet use reflects exposure to information and to changing food and media environments, although the sign of its association with bmi is not obvious in advance.

The framework is closely aligned with the sustainable developmet goals (sdgs), particularly sdg 2. Target 2.2 Of sdg 2 calls for an end to all forms of malnutrition by 2030 and names the nutritional needs of adolescent girls and of pregnant and lactating women, so both thinness and excess weight among women of reproductive age fall within it. Target 3.4 Of sdg 3 addresses premature mortality from noncommunicable diseases, to which overweight and obesity contribute. Women's schooling and digital access connect the framework to sdg 5 (gender equality), and the state and urban-rural gaps examined here connect to sdg 10 (reduced inequalities).

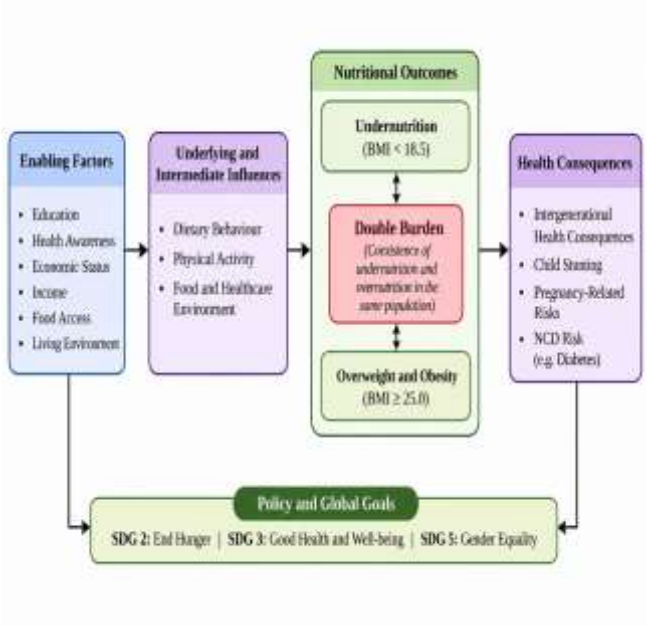


Figure 1: Conceptual framework linking enabling conditions, the two BMI burdens, their consequences and the SDGs
Source: authors' own illustration based on literature.

III. MATERIALS AND METHODS

1. Data source

The study draws on the nfhs-6 (2023-24) india and state/ut fact sheets (iips, 2026). Conducted between may 2023 and december 2024, the survey covered 679,238 households, 716,397 women aged 15-49 and 100,977 men. State-level estimates are available for 35 states/uts, excluding manipur. The fact sheets provide 101 indicators, reporting nfhs-6 estimates separately for rural, urban and total populations, alongside corresponding total estimates from nfhs-5 (2019-21). As the published fact sheets are provisional, the estimates are interpreted with caution, avoiding conclusions based solely on individual state-level observations.

2. Selection and classification of indicators

The study employs five indicators, as presented in table 1, to examine the nutritional status of women. Bmi categories are classified using the standard who thresholds, with a bmi below 18.5 Kg/m² indicating underweight and a bmi of 25.0 Kg/m² or above indicating overweight (who, 1995, 2000). Although asian-specific bmi thresholds identify a larger proportion of women as overweight (who expert consultation, 2004), the analysis retains the standard who classification to ensure consistency with the categories reported in the nfhs-6 fact sheets.

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Table 1: Indicators selected for the study

Component	Indicator	Abbreviation and use	Basis
Outcome	Women age 15-49 whose BMI is below normal (BMI <18.5 kg/m²) (%)	UW; first BMI burden	WHO (1995)
Outcome	Women age 15-49 who are overweight or obese (BMI ≥25.0 kg/m²) (%)	OW; second BMI burden	WHO (2000)
Enabling condition	Women age 15-49 with 10 or more years of schooling (%)	SCH; correlate and regressor	Subramanian et al. (2011)
Enabling condition	Women age 15-49 who have ever used the internet (%)	NET; correlate	Chaudhary and Mandala, (2025), Urooj et al., (2022)
Consequence	Children under 5 years who are stunted (height-for-age) (%)	STUNT; correlate and regressor	Black et al. (2013)

Source: authors' own compilation from the nfhs-6 fact sheets.

3. Derived measures

For each state/ut *I* , The change in each bmi related burden is calculated in percentage points (pp), and the share of women in the normal bmi range, which is the remainder because the three bmi groups are exclusive:

$$\Delta ki = kinfhs\text{-}6 - kinfhs\text{-}5, \quad k \in uw, ow \quad (1)$$

$$Ni = 100 - uwi - ow$$

The analysis further examines the overweight-to-underweight ratio (ow/uw) and two urban-rural gaps from the nfhs-6 columns: rural minus urban underweight, and urban minus rural overweight. States/uts are grouped in two ways. The level-based typology uses india's nfhs-6 estimates as reference thresholds (uw 19.7%, Ow 30.7%) To identify four groups: low underweight and low overweight, low underweight and high overweight, high underweight and low overweight, and high on both. The change-based typology relies on the direction of change in underweight (δuw) and overweight (δow), distinguishing four patterns: nutritional transition (declining underweight and rising overweight), simultaneous increases in both, simultaneous declines in both, and rising underweight alongside declining overweight.

4. Statistical analysis

The unit of analysis is the state/ut (N = 35). Means are unweighted across states, so they describe a typical state and not the national population; national estimates are obtained directly from the india-level figures reported in the fact sheets. The statistical analysis includes mean changes with 95% confidence intervals from the *T* Distribution, paired *T*-Tests and wilcoxon signed-rank tests comparing nfhs-5 with nfhs-6, pearson correlations with fisher confidence intervals, and spearman rank correlations. Regressions use ordinary least squares with hc3 heteroskedasticity-consistent standard errors (mackinnon & white, 1985), which suit small samples:

$$\Delta owi = \beta 0 + \beta 1 owinfhs\text{-}5 + \beta 2 schi + \varepsilon i$$

$$\Delta uwi = \beta 0 + \beta 1 uwinfhs\text{-}5 + \beta 2 schi + \varepsilon i$$

$$Uwi = \beta 0\ \beta 0 + \beta 1 schi + \beta 2 stunti + \varepsilon i$$

$$Owi = \beta 0 + \beta 1 schi + \beta 2 stunti + \varepsilon i$$

Here sch is the share of women with 10 or more years of schooling and stunt the share of children under five who are stunted, both from nfhs-6; uw and ow in equations 5 and 6 are nfhs-6 values. Equations 3 and 4 ask whether change depends on where a state started (a negative coefficient on the baseline would mean convergence) and on schooling. Equations 5 and 6 describe levels. The fact sheets publish relative standard errors only for india (0.004 For women's underweight), so changes for individual states cannot be tested and differences of a few points in small states/uts may be within sampling error.

5. Sensitivity checks

To assess the robustness of the findings, four additional specifications are considered: (i) spearman correlations alongside pearson correlations; (ii) the exclusion of six states/uts with fewer than 3,000 women interviewed (chandigarh 766, goa 1,126, lakshadweep 1,150, ladakh 2,232, andaman and nicobar islands 2,369, and dadra and nagar haveli and daman and diu 2,503), reducing the analytical sample from 35 to 29 states; (iii) weighted least squares with the number of women interviewed as weights; and (iv) alternative typology cut-offs, namely the state medians (uw 15.1%, Ow 34.3%) And fixed cut-offs of 15% for underweight and 30% for overweight.

IV. RESULTS

1. National picture and descriptive statistics

In nfhs-6, 19.7% Of women aged 15-49 are underweight and 30.7% Are overweight or obese, compared with 18.7% And 24.0% , Respectively, in nfhs-5. The share of women with a bmi in the normal range therefore declines from 57.3% To 49.6%, Indicating that fewer than half of women fall within the normal range in 2023-24. The two burdens sit in different

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places: underweight is 13.2% In urban and 22.5% In rural areas, while overweight or obesity is 42.8% In urban and 25.5% In rural areas.

Table 2 summarises the 35 states/uts. The unweighted mean of underweight is 14.8% In nfhs-5 and 15.1% In nfhs-6, and the mean of overweight or obesity is 27.5% And 33.3%. These figures differ from the national estimates because every state/ut receives equal weight. In nfhs-6 underweight ranged from 3.1% (Andaman and nicobar islands) to 29.2% (Jharkhand), and while overweight or obesity from 13.8% (Meghalaya) to 51.3% (Puducherry). Schooling (women with 10 or more years) ranged from 32.9% In tripura to 86.6% In kerala, and internet use ranges from 48.8% In tripura to 94.0% In goa.

Table 2: Descriptive statistics across 35 states/UTs

Indicator	Mean	SD	Median	Min	Max
Underweight, NFHS-5 (%)	14.8	6.4	13.9	4.4	26.2
Underweight, NFHS-6 (%)	15.1	6.9	15.1	3.1	29.2
Change in underweight (pp)	0.3	2.7	0.7	-6.3	7.7
Overweight or obese, NFHS-5 (%)	27.5	9.9	28.3	11.5	46.3
Overweight or obese, NFHS-6 (%)	33.3	10.9	34.3	13.8	51.3
Change in overweight or obesity (pp)	5.8	4.2	5.4	-5.5	16.6
Normal BMI, NFHS-5 (%)	57.7	8.7	56.3	43.0	77.7
Normal BMI, NFHS-6 (%)	51.6	9.9	50.3	38.8	77.1
Change in normal BMI (pp)	-6.1	5.1	-6.3	-19.7	4.9
Overweight-to-underweight ratio, NFHS-6	3.07	2.65	2.29	0.58	14.35
Rural minus urban underweight, NFHS-6 (pp)	5.8	4.3	4.9	0.0	15.6
Urban minus rural overweight, NFHS-6 (pp)	11.2	6.7	11.6	-4.9	21.1
Women with 10+ years of schooling, NFHS-6 (%)	52.8	13.9	51.1	32.9	86.6
Women who have ever used the internet, NFHS-6 (%)	69.5	11.3	68.6	48.8	94.0
Children under 5 stunted, NFHS-6 (%)	26.3	5.7	26.1	16.6	37.1

Source: authors' own calculation based on nfhs-5 and nfhs-6 fact sheets. Unweighted across states/uts. Pp = percentage points. Normal bmi = 100 − uw − ow.

2. Change between NFHS-5 and NFHS-6 across states/UTs

Table 3 and figure 2 present the changes for each state/ut. Overweight or obesity increases by 5.8 Percentage points on average (95% ci 4.4 To 7.3; Paired $T = 8.18$, $P < 0.001$; Wilcoxon $P < 0.001$) And increased in 33 of 35 states/uts. The largest increases occur in lakshadweep (+16.6), Sikkim (+12.7), West bengal (+11.9), Andhra pradesh (+11.6) And karnataka (+11.0). Only chandigarh (−2.1) And ladakh (−5.5) Recorded a fall, and both are small-sample uts (766 and 2,232 women).

Underweight, in contrast, shows no clear direction. The mean change is +0.3 Points (95% ci −0.6 To 1.3; Paired $T = 0.66$, $P = 0.515$). It rise in 20 states/uts and fell in 15. The largest increases occur in rajasthan (+7.7), Jammu and kashmir (+4.3), Madhya pradesh (+3.5), Uttar pradesh (+3.2), Lakshadweep (+3.1) And jharkhand (+3.0). The largest declines occur in andaman and nicobar islands (−6.3), Andhra pradesh (−4.0), Dadra and nagar haveli and daman and diu (−3.8), Chandigarh (−2.8) And maharashtra (−2.4).

With overweight rising almost everywhere and underweight not falling, the normal-bmi share declined in 32 of 35 states/uts, by 6.1 Points on average (95% ci −7.9 To −4.3). It increase only in chandigarh (+4.9), Ladakh (+4.4) And dadra and nagar haveli and daman and diu (+1.7). The number of states/uts where fewer than half of women had a normal bmi grew from 7 in nfhs-5 to 16 in nfhs-6. The biggest falls are in lakshadweep (−19.7), Rajasthan (−15.1), West bengal (−12.2) And sikkim (−12.0).

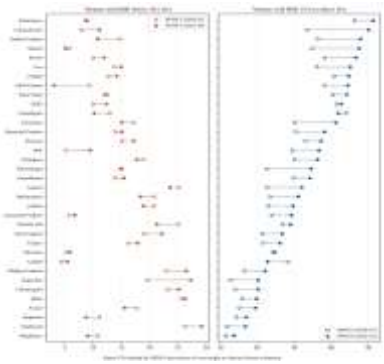


Figure 2: Women with BMI below 18.5 and with BMI of 25.0 or above, NFHS-5 and NFHS-6, by state/UTSource: authors' own illustration based on nfhs-5 and nfhs-6 fact sheets.

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Table 3: underweight, overweight or obesity and normal bmi among women aged 15-49, by state/ut (%)

State/UT	UW NFHS-5	UW NFHS-6	ΔUW (pp)	OW NFHS-5	OW NFHS-6	ΔOW (pp)	Normal NFHS-6	Change type
India	18.7	19.7	+1.0	24.0	30.7	+6.7	49.6	Both rose
Puducherry	9.0	8.7	−0.3	46.3	51.3	+5.0	40.0	Transition
Lakshadweep	8.0	11.1	+3.1	33.5	50.1	+16.6	38.8	Both rose
Andhra Pradesh	14.8	10.8	−4.0	36.3	47.9	+11.6	41.3	Transition
Sikkim	5.8	5.1	−0.7	34.8	47.5	+12.7	47.4	Transition
Kerala	10.1	12.0	+1.9	38.2	46.7	+8.5	41.3	Both rose
Goa	13.8	15.0	+1.2	36.1	45.1	+9.0	39.9	Both rose
Punjab	12.7	14.2	+1.5	40.8	44.7	+3.9	41.1	Both rose
Andaman & Nicobar Islands	9.4	3.1	−6.3	38.1	44.5	+6.4	52.4	Transition
Tamil Nadu	12.6	12.1	−0.5	40.5	44.2	+3.7	43.7	Transition
NCT of Delhi	10.0	12.4	+2.4	41.4	42.7	+1.3	44.9	Both rose
Chandigarh	13.0	10.2	−2.8	44.0	41.9	−2.1	47.9	Both fell
Karnataka	17.2	15.1	−2.1	30.2	41.2	+11.0	43.7	Transition
Himachal Pradesh	13.9	15.1	+1.2	30.4	38.2	+7.8	46.7	Both rose
Haryana	15.1	17.2	+2.1	33.1	37.3	+4.2	45.5	Both rose
Jammu & Kashmir	5.2	9.5	+4.3	29.4	36.7	+7.3	53.8	Both rose
Telangana	18.8	17.7	−1.1	30.1	36.3	+6.2	46.0	Transition
West Bengal	14.8	15.1	+0.3	22.7	34.6	+11.9	50.3	Both rose
Uttarakhand	13.9	15.5	+1.6	29.8	34.3	+4.5	50.2	Both rose
Gujarat	25.2	23.6	−1.6	22.7	32.1	+9.4	44.3	Transition
Maharashtra	20.8	18.4	−2.4	23.5	31.1	+7.6	50.5	Transition
Odisha	20.8	18.9	−1.9	23.0	29.7	+6.7	51.4	Transition
Arunachal Pradesh	5.7	6.8	+1.1	23.9	29.3	+5.4	63.9	Both rose
Dadra & Nagar Haveli and Daman & Diu	25.1	21.3	−3.8	26.9	29.0	+2.1	49.7	Transition
Uttar Pradesh	19.0	22.2	+3.2	21.4	26.7	+5.3	51.1	Both rose
Tripura	16.2	17.9	+1.7	21.6	26.2	+4.6	55.9	Both rose
Mizoram	5.3	5.9	+0.6	24.2	24.8	+0.6	69.3	Both rose
Ladakh	4.4	5.5	+1.1	28.3	22.8	−5.5	71.7	UW up, OW down
Madhya Pradesh	23.0	26.5	+3.5	16.6	22.2	+5.6	51.3	Both rose
Chhattisgarh	23.1	25.2	+2.1	14.1	20.3	+6.2	54.5	Both rose
Rajasthan	19.6	27.3	+7.7	12.9	20.3	+7.4	52.4	Both rose
Bihar	25.6	26.3	+0.7	16.0	19.8	+3.8	53.9	Both rose
Assam	17.7	15.6	−2.1	15.2	19.6	+4.4	64.8	Transition
Nagaland	11.1	8.8	−2.3	14.4	17.2	+2.8	74.0	Transition
Jharkhand	26.2	29.2	+3.0	11.9	16.9	+5.0	53.9	Both rose
Meghalaya	10.8	9.1	−1.7	11.5	13.8	+2.3	77.1	Transition

Source: authors' own calculation based on nfhs-5 and nfhs-6 fact sheets. States/uts are ordered by nfhs-6 overweight or obesity. Uw = bmi below 18.5; Ow = bmi of 25.0 Or above; normal = 100 − uw − ow. Change type: transition = uw fell and ow rose; both rose; both fell; uw up, ow down.

3. Typologies of the double burden

The level typology (figure 3) puts 19 states/uts in the low-underweight, high-overweight group, which includes most southern, northern and island states. Seven states/uts have high underweight and low overweight (bihar, chhattisgarh, jharkhand, madhya pradesh, rajasthan, uttar pradesh, and dadra and nagar haveli and daman and diu). Gujarat is the only state above india's level on both. Eight states/uts are

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below india's level on both: arunachal pradesh, assam, meghalaya, mizoram, nagaland, odisha, tripura and ladakh. Six of the seven surveyed north-eastern states are in this last group; sikkim, with overweight at 47.5%, Is not.

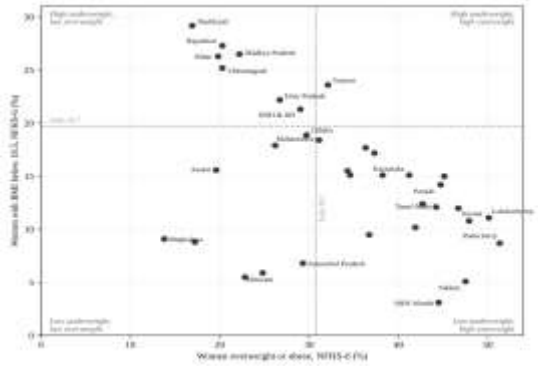


Figure 3: Level typology of states/UTs, NFHS-6 (dashed lines show India's values)
Source: authors' own illustration based on nfhs-6 fact sheets.

The change-based typology (figure 4) reveals considerable heterogeneity in state-level nutritional trajectories, rather than a uniform transition from undernutrition to overnutrition. Only 14 states/uts exhibit the transition pattern, characterised by a decline in underweight alongside an increase in overweight or obesity. These include andhra pradesh, assam, gujarat, karnataka, maharashtra, meghalaya, nagaland, odisha, sikkim, tamil nadu, telangana, andaman and nicobar islands, dadra and nagar haveli and daman and diu, and puducherry. In 19 states/uts both burdens increase together. Six of these (bihar, chhattisgarh, jharkhand, madhya pradesh, rajasthan and uttar pradesh) already record underweight prevalance of 20% or higher, indicating that the rising burden of overweight or obesity coexists with persistently high levels of undernutrition. Chandigarh is the only state in which both burdens declines, whereas ladakh is the only one where underweight incresases while overweight or obesity declines.

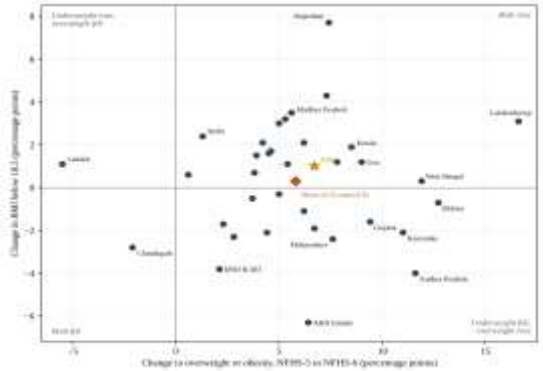


Figure 4: Change in underweight and in overweight or obesity between NFHS-5 and NFHS-6, by state/UT
Source: authors' own illustration based on nfhs-5 and nfhs-6 fact sheets.

Overweight or obesity exceeded underweight in 28 states/uts in nfhs-5 and in 30 in nfhs-6, with assam and gujarat crossing over. The median overweight-to-underweight ratio rise from 2.1 To 2.3. Five states continue to record underweight prevalance at least as high as overweight (bihar, chhattisgarh, jharkhand, madhya pradesh and rajasthan), and uttar pradesh was close behind with a ratio of 1.2. The typology depends on where the lines are drawn. With state medians as cut-offs, 6 states/uts are high on both burdens (haryana, himachal pradesh, karnataka, telangana, uttarakhand and west bengal); with cut-offs of 15% and 30%, nine are (those six plus goa, gujarat and maharashtra). Under both cut-offs these states come from several regions of the country.

4. Urban-rural differences

Overweight or obesity is higher in urban than in rural areas in 33 of 35 states/uts (the exceptions were chandigarh and puducherry), and underweight is higher in rural areas in 33 (arunachal pradesh and ladakh show equal values). The mean rural-minus-urban gap in underweight is 5.8 Points and the mean urban-minus-rural gap in overweight is 11.2 Points. Gujarat records the largest gaps in both (15.6 And 21.1 Points); jharkhand had the second-largest overweight gap (20.6) And a large underweight gap (13.2). The underweight gap grows with the level of underweight across states (R = 0.85, P < 0.001).

Rural women also experience a substantial burden of excess weight. In 18 states/uts, at least 30% of rural women are overweight or obese, while in ten (andhra pradesh, goa, kerala, punjab, sikkim, tamil nadu, andaman and nicobar islands, chandigarh, lakshadweep and puducherry), the prevalence reaches 40% or more. At the other end, 20% or more of rural women are underweight in ten states/uts, while urban underweight reaches 20% only in bihar (20.1%). Across state/uts, rural overweight and rural underweight exhibit a negative correlation (R = −0.47, P = 0.004). As nfhs-5 do not report separate urban and rural estimates, a comparison of whether rural overweight grow faster than urban.

5. Correlation analysis

Table 4 presents the correlations results. Across states, underweight and overweight are negatively correlated in both rounds (R = −0.50 In nfhs-5 and −0.46 In nfhs-6), so the two burdens tend to sit in different states, with exceptions such as gujarat. However, the changes in the two indicators show no meaningful association: states experiencing a decline in underweight are not necessarily those recording larger increases in overweight (R = 0.05). Similarly, the rise in overweight is unrelated to its starting level (R = 0.05), And the change in underweight is unrelated to its starting level (R = −0.02). These findings provide no evidence of either convergence or divergence in the two nutritional burdens across states.

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The prevalence levels show strong association with women's educational attainment. The share of women with 10 or more years of schooling correlates positively with overwight (R = 0.78; 95% Ci 0.61 To 0.89) And negatively with underweight (R = −0.56; −0.75 To −0.28). The correlation with the normal-bmi share is negative (−0.47), Because states with high schooling have more women above the normal range. Internet use shows the same signs with weaker strength (0.41 With overweight and −0.41 With underweight). Child stunting is positively correlated with women's underweight (0.51) And negatively with women's overweight (−0.59). However, none of the changes in nutritional indicators shows a significant association with schooling. Similarly, changes in internet use are not significantly associated with changes in overweight (R = 0.18, P = 0.296). He classification of states into three groups based on schooling levels further illustrates this pattern. Although the average prevalence of overweight in nfhs-6 increases substantially across the low-, middle- and high-schooling groups (23.5%, 33.2% And 43.3%, Respectively), the corresponding increases in overweight remain relatively similar at 6.1, 5.8 And 5.6 Percentage points. Thus, differences in educational attainment are more closely associated with the existing distribution of nutritional burdens than with their changes over time.

Table 4: correlations among bmi burdens, changes and enabling conditions (n = 35 states/uts)

Pair	Pearson r (95% CI)	p	Spearman ρ	p
Underweight and overweight, NFHS-5	−0.50 (−0.71 to −0.19)	0.002	−0.52	0.001
Underweight and overweight, NFHS-6	−0.46 (−0.69 to −0.15)	0.006	−0.44	0.008
Change in underweight and change in overweight	0.05 (−0.28 to 0.38)	0.757	0.06	0.727
Overweight NFHS-5 and change in overweight	0.05 (−0.29 to 0.37)	0.791	0.06	0.718
Underweight NFHS-5 and change in underweight	−0.02 (−0.35 to 0.32)	0.931	−0.02	0.890
Schooling and overweight, NFHS-6	0.78 (0.61 to 0.89)	<0.001	0.80	<0.001
Schooling and underweight, NFHS-6	−0.56 (−0.75 to −0.28)	<0.001	−0.58	<0.001
Schooling and normal BMI share, NFHS-6	−0.47 (−0.70 to −0.16)	0.004	−0.62	<0.001
Internet use and overweight, NFHS-6	0.41 (0.08 to 0.65)	0.016	0.39	0.021
Internet use and underweight, NFHS-6	−0.41 (−0.65 to −0.09)	0.014	−0.44	0.007
Child stunting and underweight, NFHS-6	0.51 (0.21 to 0.72)	0.002	0.53	0.001
Child stunting and overweight, NFHS-6	−0.59 (−0.77 to −0.31)	<0.001	−0.60	<0.001
Schooling and change in overweight	0.11 (−0.23 to 0.43)	0.537	0.11	0.537
Schooling and change in underweight	−0.07 (−0.40 to 0.27)	0.681	−0.06	0.712
Change in internet use and change in overweight	0.18 (−0.16 to 0.49)	0.296	0.19	0.284

Source: authors' own calculation based on nfhs-5 and nfhs-6 fact sheets. Δ = nfhs-6 minus nfhs-5.

6. Regression results

Table 5 reports the four models. In models 3 and 4, neither the baseline level nor schooling explains the changes in overweight or underweight (R^2 Of 0.017 And 0.010, Repectively). In model 5, each additional percentage point in the proportion of women with 10 or more years of schooling is associated with 0.20 Points lower underweight (se 0.07, P = 0.009), Holding stunting constant, and each additional point of child stunting with 0.35 Points higher underweight (se 0.19, P = 0.075); The model explains 37.1% Of the variation across states. In model 6, a point of schooling is associated with 0.52 Points higher overweight (se 0.12, P < 0.001), And stunting is not significant once schooling is in the model (−0.42, P = 0.136). The model explains 64.5% Of the variation across states.

Table 5: OLS regression results (n = 35 states/UTs

Variable	Coefficient	(HC3 SE)	p	R^2	n
Model 3: ΔOW	Model 3: ΔOW	Model 3: ΔOW	Model 3: ΔOW	Model 3: ΔOW	Model 3: ΔOW
Constant	3.893	(3.095)	0.218		
OW, NFHS-5	−0.054	(0.156)	0.731		
SCH	0.064	(0.126)	0.613	0.017	35
Model 4: ΔUW	Model 4: ΔUW	Model 4: ΔUW	Model 4: ΔUW	Model 4: ΔUW	Model 4: ΔUW
Constant	2.105	(3.012)	0.490		

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Variable	Coefficient	(HC3 SE)	p	R^2	n
UW, NFHS-5	−0.036	(0.085)	0.673		
SCH	−0.024	(0.041)	0.563	0.010	35
Model 5: UW, NFHS-6	Model 5: UW, NFHS-6	Model 5: UW, NFHS-6	Model 5: UW, NFHS-6	Model 5: UW, NFHS-6	Model 5: UW, NFHS-6
Constant	16.361	(6.818)	0.022		
SCH	−0.200	(0.071)	0.009		
STUNT	0.352	(0.191)	0.075	0.371	35
Model 6: OW, NFHS-6	Model 6: OW, NFHS-6	Model 6: OW, NFHS-6	Model 6: OW, NFHS-6	Model 6: OW, NFHS-6	Model 6: OW, NFHS-6
Constant	16.667	(12.256)	0.183		
SCH	0.523	(0.117)	<0.001		
STUNT	−0.416	(0.272)	0.136	0.645	35

Source: authors' own calculation based on nfhs-5 and nfhs-6 fact sheets. Dependent variables are in the model headings. Sch = women with 10 or more years of schooling (%); stunt = children under 5 stunted (%), both nfhs-6.

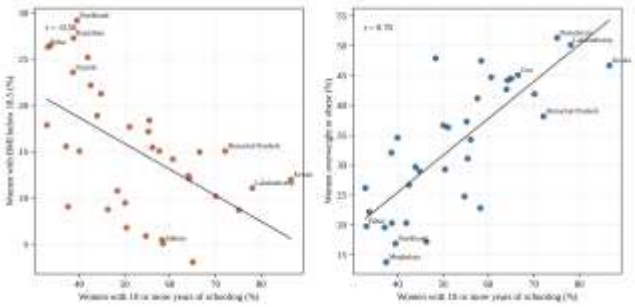


Figure 5: Women's schooling and the two BMI burdens across states/UTs, NFHS-6

Source: authors' own illustration based on nfhs-6 fact sheets. Lines are ols fits.

7. Results of sensitivity checks

The spearman correlations (table 4) are consistent with the pearson results in both direction and magnitude. State rankings also remain highly stable between survey rounds (spearman ρ between nfhs-5 and nfhs-6 of 0.92 For overweight and 0.93 For underweight). This indicates that the geographical distribution of the two nutritional burdens changes little, despite shifts in their prevalance. Dropping the six small states/uts and using weighted least squares (appendix 1) do not alter the findings regarding changes: no association with baseline level or schooling. The positive association between schooling and overweight also remains stable in direction and statistical significance, with coefficients of 0.41 And 0.50 (Both $P \leq 0.001$). However, the relative contributions of schooling and stunting to underweight are less robust. Schooling loses statistical significance when the small states/uts are excluded (P = 0.228), While stunting becomes significant when states are weighted by sample size (P = 0.014). Given the correlation between the two explanatory variables (R = −0.56) And the small sample size, model 5 is interpreted as indicating that both schooling and stunting are associated with underweight, without establishing their independent effects.

V. DISCUSSION

The central finding is that overweight increases across almost everywhere while underweight does not decline correspondingly. A conventional nutritional transition involves a decline in underweight alongside an increase in overweight. However, only 14 of the 35 states/uts follow this pattern. In 19 states/uts, both burdens increase, while the proportion of women within the normal bmi range declines in 32. Thus, the share of women in the normal bmi range is lower in 2023–24 than in 2019–21 in 32 of the 35 states/uts. The fact sheets do not provide evidence to explain these changes. Two features of the survey data also warrant caution when comparing the rounds: nfhs-5 fieldwork (2019–21) overlaps with the covid-19 pandemic, while nfhs-6 fieldwork extends to the end of 2024, with data collection taking place at different times across states.

The increase in overweight is broadly similar across states with low, middle and high levels of schooling (6.1, 5.8 And 5.6 Points), and it shows no dependency on the starting level of overweight. This pattern points to forces that act across states and not only where schooling is high, in line with stage-based descriptions of the obesity transition in which excess weight spreads from better-off groups to the rest (jaacks et al., 2019). It also fits the projections of continued increases in india (luhar et al., 2020). However, the available data do not identify the underlying drivers, as the fact sheets do not include information on diet, physical activity, food prices or work patterns.

The levels, by contrast, are strongly patterned. States where more women have 10 or more years of schooling have more

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overweight women (R = 0.78) And fewer underweight women (R = −0.56), Matching the cross-country gradient reported by subramanian et al. (2011). This should not be read as schooling causing weight gain. At the state level, schooling travels with income, urbanisation and food environments, and the ecological design cannot separate them (robinson, 1950). What the pattern does show is that a state's progress on schooling does not protect its women from excess weight: the share in the normal range was lower in high-schooling states.

The double burden is not only a matter of different states. Within states the two burdens divide along urban and rural lines, with rural underweight and urban overweight both large in places such as gujarat and jharkhand. But rural overweight is also high, at 30% or more in 18 states/uts, so treating overweight as an urban problem would miss many women. The states/uts that are high on both burdens at moderate cut-offs, such as karnataka, telangana, haryana, west bengal and maharashtra, come from several regions, and in them both problems affect large numbers of women. The eight states/uts with underweight at or above 20% are a different case: overweight rose in all eight, and underweight rose as well in six.

The link with child stunting is worth a separate comment. Stunting fell in 33 of 35 states/uts, while women's overweight rose in 33. Across states, high underweight among women went with high child stunting (R = 0.51), Consistent with the view that maternal and child undernutrition move together (black et al., 2013; Wells et al., 2020), And high overweight went with low stunting (R = −0.59). State averages hide the household-level combinations that define a double burden within families, such as a stunted child and an overweight mother, and those can only be studied with the unit-level data.

VI. CONCLUSION AND POLICY IMPLICATIONS

This study compares the share of women aged 15-49 who are underweight and who are overweight or obese in nfhs-5 and nfhs-6 across 35 states/uts. Nationally, underweight edged up from 18.7% To 19.7% And overweight or obesity jumped from 24.0% To 30.7%. Across states/uts, overweight or obesity increases in 33 of 35 and the proportion of women within the normal bmi range declines in 32. Underweight shows no average declines across states. The prevalence of both nutritional burdens is closely associated with women's schooling, but their rates of change are not, suggesting that the factors driving weight gain operate across a broader range of socioeconomic settings.

Five implications emerge from these findings. First, women's nutrition targets and reporting for women's nutrition should cover both extremes and the normal-bmi share, in line with sdg target 2.2. Second, the eight states/uts with underweight at or above 20% require continued attention to thinness, and attention to overweight as well, since overweight increase in all eight and underweight also rises in six. Third, in the 12 states/uts with overweight at 40% or more, and in the 18 where rural overweight is 30% or more, weight screening and counselling should reach rural women and not only urban ones. Fourth, existing contact points such as antenatal visits, adolescent services and noncommunicable disease screening can record bmi and refer women at either extreme, so one platform can serve both tasks. Fifth, the next survey round and the district-level nfhs-6 data should be used to target action, and future rounds would gain from reporting waist circumference and asian bmi cut-offs.

1. Limitations of the study

The study has several limitations. First, the analysis covers only 35 state/ut-level observations and examines aggregate associations rather than individual-level effects (robinson, 1950). Second, the absence of nfhs-5 disaggregated estimates and state-level standard errors limits subgroup comparisons and statistical testing of state-level changes. Third, the fact sheets provide provisional estimates, while unweighted state means represent the average state rather than the national population. Fourth, bmi does not capture body-fat distribution, and standard who cut-offs may underestimate overweight among asian populations. Fifth, differences in fieldwork periods and the covid-19 pandemic overlap with nfhs-5 may affect comparability. Sixth, the absence of anaemia indicators limits the assessment of micronutrient-related malnutrition. Finally, values extracted from images for 13 state fact sheets may involve minor transcription errors despite cross-checking.

2. Appendix 1: Sensitivity of regression results

Table a1: coefficients under alternative samples and weights

Variable	Full b	(SE)	p	Excl. small b	(SE)	p	WLS b	p
Model 3: ΔOW	Model 3: ΔOW	Model 3: ΔOW	Model 3: ΔOW	Model 3: ΔOW	Model 3: ΔOW	Model 3: ΔOW	Model 3: ΔOW	Model 3: ΔOW

Variable	Full b	(SE)	p	Excl. small b	(SE)	p	WLS b	p
OW, NFHS-5	−0.054	(0.156)	0.731	0.074	(0.123)	0.556	0.010	0.925
SCH	0.064	(0.126)	0.613	−0.029	(0.091)	0.750	0.010	0.893
R^2	0.017			0.024			0.006	
Model 4: ΔUW	Model 4: ΔUW	Model 4: ΔUW	Model 4: ΔUW	Model 4: ΔUW	Model 4: ΔUW	Model 4: ΔUW	Model 4: ΔUW	Model 4: ΔUW
UW, NFHS-5	−0.036	(0.085)	0.673	0.001	(0.092)	0.994	−0.072	0.514
SCH	−0.024	(0.041)	0.563	−0.011	(0.040)	0.780	−0.078	0.224
R^2	0.010			0.004			0.064	
Model 5: UW, NFHS-6	Model 5: UW, NFHS-6	Model 5: UW, NFHS-6	Model 5: UW, NFHS-6	Model 5: UW, NFHS-6	Model 5: UW, NFHS-6	Model 5: UW, NFHS-6	Model 5: UW, NFHS-6	Model 5: UW, NFHS-6
SCH	−0.200	(0.071)	0.009	−0.110	(0.089)	0.228	−0.178	0.078
STUNT	0.352	(0.191)	0.075	0.566	(0.338)	0.106	0.609	0.014
R^2	0.371			0.383			0.513	
Model 6: OW, NFHS-6	Model 6: OW, NFHS-6	Model 6: OW, NFHS-6	Model 6: OW, NFHS-6	Model 6: OW, NFHS-6	Model 6: OW, NFHS-6	Model 6: OW, NFHS-6	Model 6: OW, NFHS-6	Model 6: OW, NFHS-6
SCH	0.523	(0.117)	<0.001	0.413	(0.114)	0.001	0.499	<0.001
STUNT	−0.416	(0.272)	0.136	−0.747	(0.297)	0.019	−0.512	0.104
R^2	0.645			0.663			0.692	

Source: authors' own calculation based on nfhs-5 and nfhs-6 fact sheets. "Full" = 35 states/uts with hc3 standard errors. "Excl. Small" = 29 states/uts with at least 3,000 women interviewed. Wls = weighted by women interviewed (hc3 standard errors; se not shown).

3. Appendix 2: Alternative typology cut-offs

Table a2: counts of states/uts under alternative cut-offs, nfhs-6

Cut-offs	Group	States/UTs
State medians (UW 15.1%, OW 34.3%)	High UW and high OW: 6	Haryana, Himachal Pradesh, Karnataka, Telangana, Uttarakhand, West Bengal
	High UW, low OW: 12	Assam, Bihar, Chhattisgarh, Gujarat, Jharkhand, Madhya Pradesh, Maharashtra, Odisha, Rajasthan, Tripura, Uttar Pradesh, Dadra & Nagar Haveli and Daman & Diu
	Low UW, high OW: 12	Andhra Pradesh, Goa, Kerala, Punjab, Sikkim, Tamil Nadu, Andaman & Nicobar Islands, Chandigarh, Jammu & Kashmir, Lakshadweep, NCT of Delhi, Puducherry
	Low UW, low OW: 5	Arunachal Pradesh, Meghalaya, Mizoram, Nagaland, Ladakh
Fixed (UW 15%, OW 30%)	High on both: 9	Goa, Gujarat, Haryana, Himachal Pradesh, Karnataka, Maharashtra, Telangana, Uttarakhand, West Bengal

Source: authors' own calculation based on nfhs-6 fact sheets.

REFERENCES

1. Black, R. E., Victora, C. G., Walker, S. P., Bhutta, Z. A., Christian, P., de Onis, M., Ezzati, M., Grantham-McGregor, S., Katz, J., Martorell, R., & Uauy, R. (2013). Maternal and child undernutrition and overweight in low-income and middle-income countries. The Lancet, 382(9890), 427–451.

2. Chaudhary, S., & Mandala, P. S. (2025). Role of socio-economic factors, women empowerment, and governance in menstrual hygiene management in EAG states, India. Journal of Health Policy and Outcomes Research, 1, 49.
3. International Institute for Population Sciences, & ICF. (2021). National Family Health Survey (NFHS-5), 2019-21: India. IIPS.
4. International Institute for Population Sciences. (2026). National Family Health Survey (NFHS-6), 2023-24: India and State/UT fact sheets. IIPS.
5. Jaacks, L. M., Vandevijvere, S., Pan, A., McGowan, C. J., Wallace, C., Imamura, F., Mozaffarian, D., Swinburn, B., & Ezzati, M. (2019). The obesity transition: Stages of the global epidemic. The Lancet Diabetes & Endocrinology, 7(3), 231–240.
6. Luhar, S., Timæus, I. M., Jones, R., Cunningham, S., Patel, S. A., Kinra, S., Clarke, L., & Houben, R. (2020). Forecasting the prevalence of overweight and obesity in India to 2040. PLOS ONE, 15(2), e0229438.
7. MacKinnon, J. G., & White, H. (1985). Some heteroskedasticity-consistent covariance matrix estimators with improved finite sample properties. Journal of Econometrics, 29(3), 305–325.
8. Meenakshi, J. V. (2016). Trends and patterns in the triple burden of malnutrition in India. Agricultural Economics, 47(S1), 115–134.
9. NCD Risk Factor Collaboration. (2017). Worldwide trends in body-mass index, underweight, overweight, and obesity from 1975 to 2016: A pooled analysis of 2416 population-based measurement studies in 128.9 million children, adolescents, and adults. The Lancet, 390(10113), 2627–2642.
10. Popkin, B. M. (1994). The nutrition transition in low-income countries: An emerging crisis. Nutrition Reviews, 52(9), 285–298.
11. Popkin, B. M., Adair, L. S., & Ng, S. W. (2012). Global nutrition transition and the pandemic of obesity in developing countries. Nutrition Reviews, 70(1), 3–21.
12. Robinson, W. S. (1950). Ecological correlations and the behavior of individuals. American Sociological Review, 15(3), 351–357.
13. Siddiqui, M. Z., & Donato, R. (2016). Overweight and obesity in India: Policy issues from an exploratory multi-level analysis. Health Policy and Planning, 31(5), 582–591.
14. Subramanian, S. V., Kawachi, I., & Smith, G. D. (2007). Income inequality and the double burden of under- and overnutrition in India. Journal of Epidemiology and Community Health, 61(9), 802–809.
15. Subramanian, S. V., Perkins, J. M., Özaltin, E., & Davey Smith, G. (2011). Weight of nations: A socioeconomic analysis of women in low- to middle-income countries. The American Journal of Clinical Nutrition, 93(2), 413–421.
16. United Nations. (2015). Transforming our world: The 2030 Agenda for Sustainable Development (A/RES/70/1). United Nations.
17. Urooj, K., Ahmad, T., Bhatti, M., & Hussain, A. (2022). Women Empowerment in Pakistan: Multilevel Measurements, Spatial Differences, and Contributing Factors. iRASD Journal of Economics.
18. Wells, J. C. K., Sawaya, A. L., Wibaek, R., Mwangome, M., Poullas, M. S., Yajnik, C. S., & Demaio, A. (2020). The double burden of malnutrition: Aetiological pathways and consequences for health. The Lancet, 395(10217), 75–88.
19. WHO Expert Consultation. (2004). Appropriate body-mass index for Asian populations and its implications for policy and intervention strategies. The Lancet, 363(9403), 157–163.
20. World Health Organization. (1995). Physical status: The use and interpretation of anthropometry (WHO Technical Report Series No. 854). WHO.
21. World Health Organization. (2000). Obesity: Preventing and managing the global epidemic (WHO Technical Report Series No. 894). WHO.
22. Miryala, M., & Ramachandran, K. K. (2025). The invisible hand of the cloud: An empirical study on how latency variability shapes user trust and cognitive load in distributed human-computer interfaces. International Journal of Cloud Computing, 3(1), 23–35.