Intersecting Inequalities: The Hidden Burden of Domesticity on Currently Married Women's Health in India

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Abstract

Sedentary lifestyles and unpaid labor significantly contribute to obesity and the risk of non-communicable diseases (NCDs). The unequal burden of domestic responsibilities borne by Indian women is substantial, with their workforce participation remaining low. This article offers novel insight into the emerging epidemic of obesity in India. While evidence links obesity with higher socioeconomic status in India, no study has explored the intersection of women's domesticity—defined as household confinement—and economic class in increasing the risk of abdominal obesity, a marker of NCDs. Using data from NFHS-5 (2019-2021), this study examines the relationship between employment status, wealth class, and the likelihood of unhealthy waist-to-hip ratio (WHR), a more accurate measure of abdominal fat and NCD risk among women. Logistic regression results indicate that 1) women engaged only in housework over the past year are at higher risk of unhealthy WHR, and 2) middle-class women who are currently not working are particularly vulnerable, both in rural and urban areas. Prolonged sedentary lifestyles contribute to unhealthy WHR, raising the risk of NCDs, especially among middle-class. This study underscores the importance of an intersectional approach to better identify vulnerable groups for targeted health policies in India, where socioeconomic diversity is significant.

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Confinement within the household, a sedentary lifestyle, and unpaid labor have been recognized as social determinants of health among women (Ervin et al., 2023; McMunn, 2023). Women frequently take on a disproportionate share of household and caregiving responsibilities, negatively impacting their physical and mental well-being (Wang, 2022; Murphy et al., 2013). Studies show that in-house activities correlates with higher rates of obesity, elevated triglycerides, metabolic syndromes, and pre-hypertension (Wang et al., 2022) among working-age women in both high- and low- to middle-income countries. These activities typically involve extended periods of sedentary behavior or minimal physical movement, leading to weight gain and associated health problems. Additionally, the repetitive, monotonous, and often undervalued nature of these tasks can result in chronic stress and sleep deprivation—both of which are significant risk factors for obesity, metabolic disorders, and mental health issues (Suchert et al., 2015; Fatima et al., 2015).

These findings highlight the need to consider the health implications of domesticity, particularly in low- and middle-income countries (LMICs) like India, where a significant number of women are unemployed and disproportionately confined to the household. Global evidence shows that long hours spent on household chores and caregiving are associated with a higher likelihood of obesity, elevated BMI, somatic complaints, heartburn, chest pain, and poor mental health in adult women (Agrawal et al., 2013; Ervin et al., 2023; Owoo & Lambon-Quayefio, 2021; Sperlich et al., 2013; Xue & McMunn, 2021; Wang et al., 2022). Various mechanisms have been proposed in the literature, including the non-rewarding nature of domestic work (Sperlich et al., 2013), adherence to traditional gender roles, reduced participation in the labor force, and lower economic participation (He & Xie, 2022). Other factors include limited physical activity linked to housework (Murphy et al., 2013), sedentary lifestyles (Agrawal et al., 2013), sleep deprivation (Fan et al., 2021), and stress arising from household and caregiving responsibilities (Wang et al., 2022; Chakraborty et al., 2023; Ervin et al., 2023; Owoo & Lambon-

Quayefio, 2021). Thus, the domesticity of women—defined as the confinement of their roles and activities within the household—is widely recognized as a significant social determinant of women's health and well-being (McMunn, 2023).

This study is the first in India to explore the relationship between domesticity of currently married women and their risk of a higher waist-to-hip ratio using an intersectional approach. Over the few decades, numerous studies have raised awareness of abdominal obesity. In 1997, the World Health Organization (WHO) acknowledged the importance of abdominal obesity and recommended indicators such as waist-to-hip ratio to identify populations at greater risk of NCDs. Obesity has increased globally, including in India, especially among women (Corsi & Subramanian, 2019) warranting further examination to assess the potential risks of increased abdominal obesity and its associated socio-economic characteristics.

Low workforce participation, sedentary lifestyle, and weight gain among women: Story of India

Women's workforce participation has remained remarkably low for decades, largely due to conservative social norms and both demand- and supply-side factors. This persistence is paradoxical, especially in light of increasing levels of education. According to the latest NFHS-5 (2019-21), employment status among currently married women aged 15-49 is defined as "*Respondents are considered to be employed if they have **done any work other than their housework** in the 12 months before the survey*". Despite this, 73.44% of these currently married women were not employed and had only engaged in housework during that period.

In many traditional Indian households, women bear primary responsibility for domestic chores such as cooking, cleaning, and childcare. Women are often assigned household tasks and expected to provide "Sewa" or services to the family, which is seen as a duty tied to their gender (Dube, 1988). Consequently, in addition to supply-side factors, the cultural belief in the domestication of women confines them to the household and discourages their participation in the labor market (Kandiyoti, 1988). These tasks often

require long hours of sedentary work, with limited opportunities for physical activity or leisure, increasing the risk of weight gain and obesity (Pampel, Denney, & Krueger, 2012).

Household Wealth status and weight gain

India reported an increase in overweight and obesity rates among women aged 15-49, from 20.26% in NFHS-4 (2015-16) to 23.69% in NFHS-5 (2019-21) (Let et al., 2023). Previous research suggests that household wealth increases the likelihood of obesity (Corsi & Subramanian, 2019), with women from higher socioeconomic backgrounds being more prone to obesity than those from lower socioeconomic strata. Among the richest wealth quintile, the prevalence rose by 2.6 percentage points. However, the increase was more pronounced in the poorest wealth quintile, where it rose by 3.9 percentage points (Let et al., 2023). These findings indicate that while overweight and obesity are rising among the wealthiest, the poorest segment is experiencing a significantly faster rate of growth (Let et al., 2023).

Urbanization, Lifestyle Changes, and the Nutrition Transition: Drivers of Obesity Among Indian Women

Rapid urbanization and lifestyle changes, such as increased sedentary behavior and unhealthy dietary habits, have contributed to the rising rates of obesity and overweight among Indian women. Mishra and Ray (2020) emphasize how urbanization has altered dietary patterns and physical activity levels, heightening the risk of obesity and related non-communicable diseases in urban women. Using data from India's first nationwide time-use survey (NSO TUS-2019), research focusing on the urban population (aged six and over) found that mobility—defined as leaving the home at least once a day—is low in urban India. This decrease is especially steep for adult women, mainly due to their engagement in unpaid household work (Goel, 2022). This often leads to a sedentary lifestyle and social isolation for women (Goel, 2022).

India's nutrition transition is driven by several factors, including dietary patterns, reduced physical activity, urbanization, and the proliferation of obesogenic technologies. The typical Indian diet is

characterized by a high intake of cereals, dairy products, and ultra-processed foods, along with low consumption of fruits, vegetables, and meat, resulting in poor dietary diversity (Meenakshi, 2016; Sharma et al., 2020). Additionally, energy expenditure has decreased due to the mechanization of agriculture (Gulati & Juneja, 2020), structural shifts in the labor market (Dang et al., 2019), and the adoption of obesogenic technologies (Aiyar et al., 2021).

Global pattern suggests that during this nutrition transition, the wealthier segments of the population experience declining obesity risks, while lower socioeconomic groups and rural areas see an increase (Popkin, 1998; 1999; Popkin et al., 2012). This trend is evident in India, where obesity rates are rising among lower-income, rural populations, particularly in states that are in advanced stage in the nutrition transition (Luhar et al., 2018; Sengupta et al., 2015).

Present Study

Women who are not participating in the labor market often bear significant responsibilities within the household and lead a sedentary lifestyle, which can increase their risk of weight gain. In India, both in rural and urban areas, women spend considerably more time on domestic activities (Baliyan, 2017; Goel, 2022). Therefore, I hypothesize that women who are not employed may have a higher risk of an unhealthy waist-to-hip ratio—a marker of abdominal obesity—compared to currently working women, who are less confined to the household and lead less sedentary lives.

Additionally, existing research suggests that women from wealthier backgrounds are more likely to be obese than those from lower economic backgrounds (Corsi & Subramanian, 2019). Thus, I hypothesize that unemployed women from wealthier households are at a higher risk of an unhealthy waist-to-hip ratio compared to those from less wealthy households.

Furthermore, given India's nutritional transition and the increasing prevalence of obesogenic environments in urban and rural areas, unhealthy weight status affects both rural and urban women

(Sengupta et al., 2015). I hypothesize that unemployed women from wealthier quintiles, across both rural and urban areas, are at a higher risk of an unhealthy waist-to-hip ratio.

The present study addresses the following research questions using the latest NFHS-5 data (2019-20):

1) Does non-working (not in the 12 months and past year) status influence the likelihood of an unhealthy waist-to-hip ratio among currently married women?
2) Does household wealth moderate the influence of non-working status on waist-to-hip ratio?
3) Are there differences in these associations between rural and urban areas?

Methods

Sample

We use the latest round of the nationally-representative National Family Health Survey: NFHS 5 (2019-21). NFHS is a part of USAID's Demographic and Health Survey (DHS) program initiated by the Ministry of Health and Family Welfare (MoHFW), Government of India. The survey protocols were approved by the ICF and International Institute for Population Sciences (IIPS) Institutional Review Board (IIPS & ICF, 2021).

The survey provide nationally representative cross-sectional data for women of reproductive ages (15 - 49 years). 2011 national censuses were used as sampling frames to select the primary sampling units for NFHS 5. Details of the sampling process are elaborated elsewhere (IIPS & ICF, 2021). These datasets were well suited for this study as they provided nationally representative data on women's employment status, household socioeconomic status, and anthropometric measurements. The survey collected employment information for only 15% of the total surveyed women 724,115 for NFHS 5. The response rates were high 96.9% for NFHS 5.

This study is limited to respondents who were currently married at the time of the survey, as employment information was collected using the definition “Respondents are considered to be employed if they have

done any work other than housework in the 12 months before the survey" only for currently married women. Women who were visitors were excluded because their household wealth status was not collected. Additionally, respondents with missing data or implausible waist-to-hip ratio values were excluded, accounting for 2.94% of the sample. The final sample size is 72,350 currently married women.

Independent Variables

Employment status

The NFHS-5 defines employment among currently married women as follows: "Respondents are considered employed if they have performed any work other than housework in the 12 months before the survey." (IIPS & ICF, 2021). Based on this definition, I have categorized respondents into three groups: (1) those currently working (reference category), and (2) those currently not working (who have not worked in the 12 months and past year), and (3) those currently not working but who worked in the past year. The rationale for dividing the non-working respondents into two groups is to distinguish between the effects of a prolonged sedentary lifestyle (currently not working, neither worked in the 12 months and past year) and a short-term sedentary lifestyle (currently not working but worked in the past year).

Wealth

The household's economic status was measured using household wealth, represented through an index of household assets and amenities. The index was constructed by combining household assets (e.g., agricultural land size, ownership of the home, vehicles, refrigerator, computer, mobile phone, and telephone) and service amenities (e.g., type of cooking fuel, roof, flooring material, sources of drinking water and sanitation facilities) using principal component analysis and categorized into five quintiles – poorest (reference), poorer, middle, richer, and richest.

Rural urban place of residence

In the study sample, 68.66% of the respondents were from rural areas, while 31.34% were from urban areas. These proportions are consistent with the national distribution of rural and urban populations in India.

Dependent Variable

The waist-to-hip ratio, which is calculated by dividing the circumference of the waist by that of the hips, is used to assess abdominal obesity and body fat distribution. This measure is more accurate than using skin folds and helps estimate both subcutaneous fat (under the skin) and intra-abdominal fat (around the organs) (Bjorntorp, 1987). While BMI (body mass index) is linked to an increased risk of various diseases in women, the waist-to-hip ratio is often a stronger independent risk factor than BMI (Lapidus et al., 1984). Wasit-to-hip ratio has been categorized into two groups- unhealthy and healthy following WHO guideline cut-off for South-Asian women (WHO, 2008). An unhealthy waist-to-hip ratio suggests a higher likelihood of developing non-communicable diseases.

Control Variables

The control variables can be grouped into four domains: individual socio-demographic indicators, nutritional intake, lifestyle risk factors, and place of residence. Individual socio-demographic variables include women's current age, the number of children ever born, educational attainment, caste, and religion. Educational attainment was categorized as having no formal education (reference category), primary, secondary, and higher education. Caste was categorized into general caste (reference), Scheduled Caste (SC), Scheduled Tribe (ST), Other Backward Class (OBC), none of the above (Others), and those who did not know their caste. Religion was defined as Hindu (reference), Muslim, Christian, Others (consisting of Sikhs, Buddhists, Jains, Jews, Parsis/Zoroastrians), and no religion. Additionally, I have accounted for the women's pregnancy status, including whether they gave birth in the two months prior to the survey. Pregnancy can significantly affect the waist-to-hip ratio, and giving birth within this period can result in retained abdominal fat. Nutritional intake was measured using dietary diversity score. The

dietary diversity score was created using the information on seven food items consumed by respondents on daily basis- 1) milk or curd, 2) pulses or beans, 3) dark green, leafy vegetables, 4) fruits, 5) eggs, 6) fish, 7) chicken or meat.

Lifestyle risk factors, measured as any current tobacco use and alcohol consumption, were included as they are associated with BMI. All analyses controlled for states and union territories of residence and whether they lived in an urban (reference category) or rural area.

Empirical Strategy

Descriptive statistics of individuals and their household characteristics were presented by their employment status (currently working, currently not working [not worked for the 12 months and past year], currently not working [worked in the past year]), as shown in Table 1.

Second, I have performed logistic regression analysis, as the outcome variable waist-to-hip ratio is a dichotomous variable. I test hypotheses in two nested models. In the first model, I include employment status and wealth quintiles along with all the controls, including rural urban place of residence to address the first research question. In a subsequent step, I include interaction terms between employment status and wealth quintiles to the first model to address the second research question. To address the third research question, the same method has been performed for rural and urban sub-sample. The results will also be presented using average marginal effects. All analyses were carried out using Stata 18 and estimated with sampling weights to ensure the results were nationally representative (Croft et al., 2018).

Results

Descriptive characteristics of the analytical sample, stratified by employment status, are presented in Table 1. The prevalence of currently married women who have not engaged in any work other than housework (not in the 12 months and past year) is 67.62%. This is followed by 27% of currently married women who are currently working, and 5.38% worked in the past year but are not currently employed. The prevalence of unhealthy waist-to-hip ratio is higher for women who have not engaged in any work

other than housework (in the 12 months and past year prior to the survey). No engagement in other work than housework (not in the 12 months and past year) is also associated with other socio-economic advantages, including high education, higher wealth, higher dietary diversity score, and a lower mean proportion of total number of children ever born relative to women who are currently working and worked in the past year but not currently working.

Table 1. Sample description

	Currently working	Not working (not in the 12 months and past year)	Not working (worked in the past year)
Unhealthy waist-to-hip ratio (WHR)	54.33	61.59	54.49
Wealth Quintiles			
Poorest	19.99	17.56	25.89
Poorer	21.88	19.3	24.17
Middle	23.29	19.14	22.87
Richer	19.33	21.32	16.27
Richest	15.5	22.69	10.81
Place of residence			
Rural	72.01	66.45	81.32
Urban	27.99	33.55	18.68
Age	35.74	32.85	34.76
Total number of children ever born	2.51	2.26	2.55
Dietary diversity score	1.66	1.82	1.55
Education			
No education	33.96	24.81	38.03
Primary	15.25	13.23	17.1
Secondary	39.34	48.49	37.2
Above secondary	11.44	13.47	7.67
Religion			
Hindu	87	78.19	88.39
Muslim	7.05	17.06	6.86
Christian	3.09	1.78	2.63
Others	2.75	2.96	0
No religion	0.11	0.01	2.11
Caste			
General caste	15.58	22.2	12.79
Scheduled caste	23.67	20.28	22.13
Scheduled tribe	13.4	7.05	16.35
Other backward class	43.68	43.58	45.06
Don't know	3.67	6.89	3.67

I first present models for waist-to-hip ratio (dichotomous variable) regressed on employment status (Table 2). Currently not working (not in the 12 months and past year) is associated with an increased risk of unhealthy waist-to-hip ratio in Model 1 compared to those are working currently. Additionally, with increased wealth of household, the likelihood of having unhealthy waist-to-hip ratio also increased.

Model 2 presents the results from the interaction between employment status and wealth quintiles. The goodness-of-fit tests confirm that this interaction model provides a better fit than the main effects model. After including the interaction term, the main effect of being currently not working (neither in the past 12 months nor the past year) becomes insignificant. However, the main effect for the richer and richest wealth quintiles remains statistically significant, as observed in Model 1. Moreover, the interaction term between currently not working (not in the past 12 months and past year) and the middle wealth quintile is positive and significant, indicating that currently not working (not in the 12 months and past year) increases the risk of an unhealthy waist-to-hip ratio specifically for women from middle-class households.

To address the third hypothesis, "Are there differences in these associations between rural and urban areas?", I performed a sub-sample analysis by rural and urban areas of residence. For rural areas, results for both the Model 1 and 2 provides a similar pattern like the total sample. Currently not working (not in the 12 months and past year) is associated with an increased risk of unhealthy waist-to-hip ratio in Model 1 compared to those are working currently. Additionally, with increased wealth of the household, the likelihood of having unhealthy waist-to-hip ratio also increased.

Model 2 presents the results from the interaction between employment status and wealth quintiles. The goodness-of-fit tests confirm that this interaction model provides a better fit than the main effects model. After including the interaction term, the main effect of being currently not working (not in the past 12 months and past year) becomes insignificant. However, the main effect for the richer and richest wealth quintiles remains statistically significant, as observed in Model 1. Moreover, the interaction term between currently not working (not in the 12 months and past year) and the middle wealth quintile is positive and significant, indicating that currently not working (not in the 12 months and past year) increases the risk of an unhealthy waist-to-hip ratio specifically for women from middle-class households. Additionally, the interaction term between currently not working but worked in the past year and richer quintile is positive and significant, suggesting that currently not working (but worked in the past year) increases the risk of an unhealthy waist-to-hip ratio only for women from richer wealth quintile in rural areas.

For urban sample, I first present models for waist-to-hip ratio (dichotomous variable) regressed on employment status (Table 2). Currently not working (not in the 12 months and past year) is not associated with an increased risk of unhealthy waist-to-hip ratio in Model 1 unlike the results of rural and overall sample. Additionally, with increased wealth of household, the likelihood of having unhealthy waist-to-hip ratio also increased.

Model 2 presents the results from the interaction between employment status and wealth quintiles. The goodness-of-fit tests confirm that this interaction model provides a better fit than the main effects model. After including the interaction term, the main effect of being currently not working (neither in the past 12 months nor the past year) and all the wealth quintiles becomes insignificant. Moreover, the interaction term between currently not working (neither in the past 12 months nor the past year) and the middle wealth quintile is positive and significant, indicating that currently not working (not in the 12 months and past year) increases the risk of an unhealthy waist-to-hip ratio specifically for women from middle-class households.

Table 2. Logistic regression results: Women's employment, wealth quintiles, and unhealthy wait-to-hip ratio

	Total		Rural		Urban	
VARIABLES	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Not working (neither in the 12 months and past year)	0.121***	-0.001	0.156***	0.037	0.043	-0.500
(Ref. Currently working)	(0.031)	(0.056)	(0.034)	(0.056)	(0.065)	(0.367)
Not working (Worked in the past year)	0.040	0.006	0.094	0.028	-0.148	-0.460
	(0.050)	(0.086)	(0.053)	(0.087)	(0.138)	(0.519)
Poorer	0.148***	0.062	0.122***	0.059	0.486**	0.001
(Ref. Poorest)	(0.036)	(0.064)	(0.037)	(0.064)	(0.159)	(0.363)
Middle	0.270***	0.081	0.218***	0.045	0.629***	0.110
	(0.040)	(0.066)	(0.041)	(0.068)	(0.155)	(0.319)
Richer	0.286***	0.189**	0.308***	0.168*	0.495**	0.129
	(0.046)	(0.071)	(0.048)	(0.079)	(0.156)	(0.324)
Richest	0.375***	0.382***	0.349***	0.356**	0.634***	0.294
	(0.057)	(0.099)	(0.064)	(0.119)	(0.163)	(0.339)
rural	-0.194***	-0.193***				
	(0.043)	(0.044)				
Not worked in the 12 months and past year *poorer		0.135		0.100		0.691
		(0.076)		(0.075)		(0.437)

Not worked in the 12 months and past year*middle		0.293***		0.269***		0.739*
		(0.078)		(0.082)		(0.372)
Not worked in the 12 months and past year*richer		0.129		0.175		0.516
		(0.079)		(0.092)		(0.377)
Not worked in the 12 months and past year*richest		0.017		0.010		0.487
		(0.102)		(0.123)		(0.386)
Worked in the past year*poorer		-0.010		-0.029		0.471
		(0.126)		(0.129)		(0.610)
Worked in the past year*middle		0.057		0.053		0.501
		(0.133)		(0.138)		(0.589)
Worked in the past year*richer		0.255		0.444**		0.286
		(0.153)		(0.169)		(0.572)
Worked in the past year*richest		-0.183		-0.054		0.212
		(0.200)		(0.265)		(0.580)
Constant	0.239	0.318	-0.117	-0.042	0.350	0.737
	(0.182)	(0.186)	(0.187)	(0.190)	(0.435)	(0.523)
Observations	72,350	72,350	55,323	55,323	17,027	17,027

*p < .05, ** p < .01, *** p < .001. Control not shown: age, total number of children ever born, dietary diversity score, religion, caste, education, pregnancy status, gave birth of a child in the two months before the survey, tobacco use, alcohol consumption, states and union territories.

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