



AI in Healthcare - Lifestyle Factors and Associated Health Risks among Women in India

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Abstract:

This study examines the links between lifestyle factors and health risks among Indian women aged 15–49 years, using data from the National Family Health Survey (NFHS). Key indicators analyzed include education level, internet access, age at marriage, fertility rate, and body mass index (BMI), with their associations to obesity, elevated blood sugar, and high blood pressure. Descriptive analysis highlights notable disparities between rural and urban populations, while regression models identify early marriage, obesity, and literacy as primary predictors of metabolic health concerns. Findings emphasize the importance of delaying early marriage, promoting female education, enhancing nutritional balance, and leveraging digital health tools to reduce non-communicable disease prevalence

Keywords: Artificial Intelligence, Statistical Models, Health Analytics, Risk Prediction, Digital Health, Public Health Policy

Introduction:

Women's health significantly impacts both public health outcomes and socio-economic development. In India, women experience a dual burden of malnutrition: persistent under nutrition in rural areas and growing obesity rates in urban regions. Socio-cultural factors such as early marriage and limited educational attainment further contribute to adverse health outcomes. With rapid urbanization and evolving digital access, understanding these factors has become essential. This study investigates lifestyle determinants (education, internet use, early marriage, fertility, BMI) and their links to obesity, high blood sugar, and elevated blood pressure in women aged 15–49 years.

Literature Review:

- Sex differences in Type 2 Diabetes — implications for women**
Summary: Reviews biological and psychosocial differences in type 2 diabetes (T2DM) between sexes: women are often diagnosed at older ages and higher BMI, have greater relative CVD risk from diabetes (especially young women), higher rates of depression/diabetes distress, and distinct patterns of fat distribution and micro/macrovacular risk. Implication: earlier screening in high-risk women, attention to mental-health and CVD risk factor clustering, and sex-aware prevention/management. [PMCBioMed Central](#)

2. **“Diabetes and women’s health” — broad review of diabetes effects in women**

Summary: Focuses on how diabetes uniquely affects women across lifespan — reproductive health (PCOS associations), pregnancy (GDM risk), menopause effects, obesity/metabolic syndrome prevalence, and higher relative cardiovascular mortality in women with diabetes. Care implication: integrate reproductive history (GDM, PCOS, pregnancy complications) into long-term diabetes risk stratification and management for women. [PMCOxford Academic](#)

3. **Comprehensive review of Gestational Diabetes Mellitus (GDM)**

Summary: Reviews epidemiology, pathophysiology, screening, short- and long-term maternal/offspring risks, and preventive/therapeutic strategies for GDM. Key point: GDM increases later maternal risk of T2DM and CVD — postpartum screening and lifestyle interventions are critical. Implication: structured postpartum follow-up and early prevention programs for mothers with GDM. [PMC](#)

4. **Sex differences in Hypertension and its management (recent AHA / Hypertension review)**

Summary: Examines how blood-pressure patterns, risks, and treatment responses vary by sex and life stage (e.g., pregnancy, menopause). Findings include differing age patterns (men higher BP at younger ages; women’s hypertension burden rising after menopause), and that some BP thresholds/risk implications may

be sex-specific. Implication: consider sex and reproductive history (preeclampsia, pregnancy HTN) when assessing lifetime CVD risk; tailor lifestyle and pharmacologic strategies accordingly.

[AHA JournalsPMC](#)

5. **WHO guideline + systematic evidence on BP treatment & community interventions relevant to women**

Summary: The WHO pharmacological-treatment guideline (2021) plus systematic reviews of BP management interventions show best practices for initiating/combining drugs, thresholds, and program delivery (including community/family-based interventions). For women, the guideline emphasizes integrating CVD risk assessment (including pregnancy history) and task-sharing approaches which can improve access. Implication: apply guideline thresholds while accounting for female-specific risk enhancers (preeclampsia, GDM history) and use community-based follow-up to improve control. [PMC+1](#)

Data and Methodology:

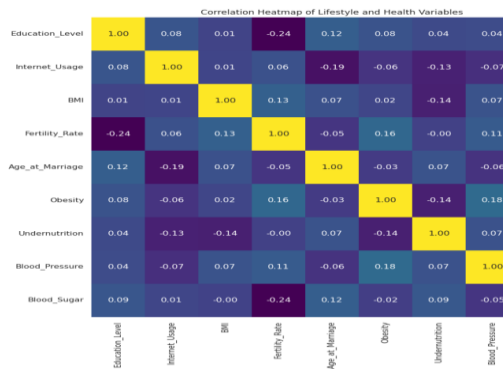
1. Data Source: National Family Health Survey (NFHS-5), a nationally representative dataset capturing demographic, health, and nutrition indicators.

2. Sample: Women aged 15–49 years across all Indian states and union territories, categorized by rural and urban residence.

3. Variables Considered: Lifestyle Factors: Education level, internet access, age at marriage, fertility rate. Health Risk Indicators: Body Mass Index (BMI), blood sugar levels, blood pressure, waist-to-hip ratio, obesity, and under nutrition.

4. Statistical Charts:

1) Correlation:



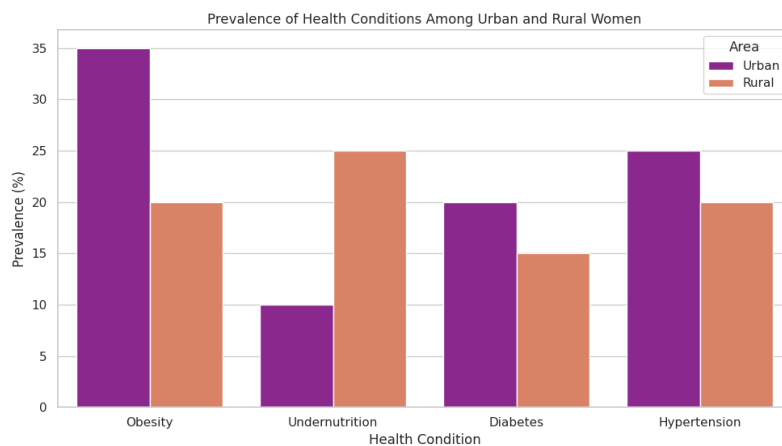
This heat map reveals the **strength and direction of relationships** between variables like:

- Education level
- Internet usage
- BMI
- Fertility rate

- Age at marriage and health outcomes such as obesity, under nutrition, blood pressure, and blood sugar.

For **strong positive or negative correlations** to spot impactful lifestyle factors.

2) Prevalence of Health Conditions Among Urban and Rural Women



This chart compares the prevalence of **obesity, under nutrition, diabetes, and hypertension** between urban and rural women. It highlights how **urban areas** tend to have higher rates of obesity and diabetes, while **rural areas** show more under nutrition.

Overall Observations:

- There's a **dual burden** of malnutrition: obesity in urban areas and under nutrition in rural ones.

- **Education** emerges as a strong social determinant—not just of knowledge, but of life choices and timing.
- These disparities highlight the need for **targeted policies**:
 - Urban wellness programs to combat obesity
 - Rural nutrition and food access initiatives
 - Education campaigns that empower individuals socially and economically

5. Analytical Methods

- Descriptive statistics for prevalence rates
- Correlation analysis to assess associations
- Multiple linear regression to model health outcomes
- Rural–urban comparative analysis

Descriptive Summary:

- Average households surveyed: 22,944 (range: 21–636,699)
- Average women interviewed: 26,094 (range: 26–724,115)
- Mean literacy rate (women 15–49): 79.86%
- Mean women with 10+ years of schooling: 47.6%
- Mean internet usage: 43.1%

Rural vs. Urban Health Metrics:

- Blood sugar: Urban 12–16%, Rural 6–8%
- Blood pressure: Urban 20–24%, Rural 12–16%
- Underweight BMI (<18.5): Rural ~20%, Urban ~13%
- Overweight/Obese BMI (≥ 25): Urban 30–35%, Rural 18–20%
- Waist-to-hip ratio ≥ 0.85 : Urban 55–60%, Rural 45–50%

Findings:

1. Blood Sugar Levels:

Urban women display nearly twice the prevalence of high (141–160 mg/dl) and very high (>160 mg/dl) blood sugar compared to rural women (12–16% vs. 6–8%), driven by sedentary lifestyles, processed food consumption, and higher stress levels.

2. Blood Pressure:

Hypertension prevalence is higher in urban settings (20–24%) compared to rural regions (12–16%). Moderate/severe cases (5–6%) are also more common in urban areas.

3. Body Mass Index (BMI):

- Underweight: Rural ~20%, Urban ~13%
- Overweight/Obese: Urban 30–35%, Rural 18–20%

This indicates under nutrition dominance in rural populations and obesity-related risks in urban populations.

4. Waist-to-Hip Ratio:

Urban prevalence (55–60%) suggests higher central obesity risk compared to rural areas (45–50%).

Statistical Analysis:

1. Correlation Results:

- Higher waist-to-hip ratios correlate with elevated blood pressure and blood sugar.
- Internet usage shows a positive association with preventive health care adoption.

2. Regression Models:

Model A – High/Very High Blood Sugar (%):

$$\text{Blood Sugar (\%)} = -21.88 + 0.26 (\text{Literate \%}) + 0.17 (\text{School_10+ \%}) - 0.07 (\text{Internet \%}) + 0.28 (\text{Married<18 \%}) - 0.44 (\text{TFR}) - 0.03 (\text{WHR HighRisk \%}) + 0.12 (\text{BMI Under \%}) + 0.23 (\text{BMI Over/Obese \%})$$

$$R^2 = 0.774, \text{RMSE} = 2.06$$

Key Drivers: Literacy, early marriage, and obesity increase blood sugar risk, while higher fertility rates seem protective.

Model B – Elevated Blood Pressure (%):

$$\text{Blood Pressure (\%)} = -3.29 + 0.11 (\text{Literate \%}) + 0.21 (\text{School_10+ \%}) - 0.08 (\text{Internet \%}) + 0.41 (\text{Married<18 \%}) - 0.99 (\text{TFR}) - 0.06 (\text{WHR HighRisk \%}) - 0.27 (\text{BMI Under \%}) + 0.20 (\text{BMI Over/Obese \%})$$

$$R^2 = 0.544, \text{RMSE} = 3.50$$

Key Drivers: Early marriage, obesity, and

literacy levels contribute to elevated blood pressure, whereas higher fertility and low BMI appear protective.

Policy Implications:

- Implement targeted rural nutrition initiatives.
- Promote digital health literacy through accessible online platforms.
- Encourage education-based interventions to delay marriage and improve health outcomes.
- Launch urban wellness programs addressing obesity and sedentary lifestyles.

Conclusion:

This research demonstrates the multifaceted interplay between lifestyle determinants and health risks among Indian women. Urbanization and improved education provide some protective effects but also introduce new metabolic health challenges. A data-driven, region-specific approach that integrates education, digital access, and nutrition policies can significantly improve women's health outcomes.

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