International Journal of Research and Technology (IJRT)

International Open-Access, Peer-Reviewed, Refereed, Online Journal

ISSN (Print): 2321-7510 | ISSN (Online): 2321-7529

| An ISO 9001:2015 Certified Journal |

Rural-Urban Inequalities in Women's Health Deprivation in India: A Multidimensional State-wise Study Using Principal Component Analysis

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Abstract:

Although women constitute nearly half of India's population, the country's healthcare system continues to face significant disparities, particularly between rural and urban regions. Using data from the National Family Health Survey-5 (2019–2021), a Multidimensional Women's Health Deprivation Index (MWHDI) was developed through principal component analysis to evaluate the extent of rural-urban inequalities in women's health. The index encompasses 11 key dimensions, including age at first childbirth, prevalence of child marriage, access to shared household facilities, clean water, and electricity, as well as employment status, health insurance coverage, place of delivery, literacy levels, and exposure to violence. The results indicate that Bihar experiences high levels of deprivation in both rural and urban areas, reflecting persistent systemic challenges. In contrast, Goa and Mizoram exhibit low levels of deprivation, suggesting stronger healthcare infrastructure and social development. The MWHDI highlights the urgent need for targeted, region-specific policies to reduce women's health disparities across India.

Key words: Women's health, Health deprivation, Principal Component Analysis, Rural-urban inequality

Introduction:

The UN Gender Inequality Index highlights ongoing global gender gaps in key areas like reproductive health, education, and political involvement, even though women account for nearly half of the global population ((Borger, J.G. et.al, 2025).Despite making up nearly half of India's population and playing key roles in both paid work and domestic responsibilities, many women still struggle to access basic healthcare. Challenges such as economic hardship, limited health knowledge, systemic gender bias, and poor medical infrastructure continue to restrict their access to essential medical services. (Key, P. 1987). Access to healthcare for women in India is shaped by a complex mix of economic, social, cultural, and geographic challenges. Women in rural areas face significant disadvantages due to limited medical facilities, poor infrastructure, and lack of transportation. Low levels of education and poverty further hinder their ability to seek timely treatment. Cultural norms and gender roles often

discourage women from prioritizing their health, especially in matters related to reproductive care, and the scarcity of female doctors adds to the problem.

These interconnected barriers perpetuate inequality in health outcomes, particularly between urban and rural regions, highlighting the need for comprehensive, inclusive healthcare reforms (Pradhan et al., 2025). Women in rural areas experience far greater health-related deprivation due to limited access to maternal healthcare, preventive medicine, and basic health facilities. Many villages lack adequately equipped clinics, and even where facilities exist, they often operate with limited staff or underqualified personnel. The shortage of trained doctors, nurses, and specialists severely affects the quality of care. Specialized services, such as obstetrics, gynaecology, and paediatrics, are scarce in rural regions, compelling women to travel long distances for treatment. However, financial hardship and poor transportation infrastructure make such travel difficult, leading to delays or complete avoidance of medical care. By contrast, urban regions possess better healthcare infrastructure, including well-equipped hospitals, diagnostic centers, and a higher concentration of medical professionals. Urban women have easier access to preventive and curative healthcare, modern medical technologies, and a wider range of specialists. As a result, urban populations enjoy better health outcomes and greater health awareness. This stark divide reflects broader socioeconomic inequalities between India's rural and urban populations. Bridging this rural–urban healthcare gap is crucial for promoting women's overall well-being (Jangid, 2025). Data from the National Family Health Survey (NFHS-5) illustrates the depth of this disparity. For example, cervical cancer screening rates are significantly low, with only 1.8% of rural women undergoing screening compared to 2.4% of urban women. This difference is shaped by socio-demographic factors such as educational attainment, caste identity, and economic background. Women from marginalized communities, including Scheduled Tribes and low-income groups, face particularly high barriers to preventive and curative care. Women's health in India reflects sharp regional disparities—southern states benefit from stronger education, social infrastructure, and progressive healthcare policies, while northern and central regions struggle with poor services, low literacy, and restrictive gender norms (Guilmoto, 2024). Addressing these inequalities requires a holistic strategy that strengthens rural healthcare, expands female medical professionals, and prioritizes marginalized communities to ensure equity and accessibility.

Literature review

The study explores the health conditions of Indian women in the context of the United Nations Decade for Women, highlighting persistent issues and recent developments. Women often face serious health risks due to frequent, closely spaced pregnancies and are disproportionately affected by malnutrition, infections, and diarrheal diseases. Despite these challenges, they access healthcare less often than men not because of lower need, but due to limited health awareness and entrenched social and cultural barriers. Insights from a health initiative in Odisha suggest targeted policy actions are essential to improve women's health outcomes effectively (Key, P. 1987). Although India's national caesarean delivery (CD) rate stands at 21.5%, these average masks significant inequalities across states, income groups, and healthcare sectors. CD rates vary widely from just 5.2% in Nagaland to 60.7% in Telangana and show stark contrasts among wealth quintiles, with some areas like Assam

reporting rates from 0% to 76.7%. Private hospitals consistently perform more caesarean deliveries than public ones, regardless of economic status. In most states, affluent women are at least twice as likely to undergo CD compared to those from poorer backgrounds.

The overall inequality ratio between the richest and poorest is 5.3, with disparities more evident in public healthcare settings (Dutta, R., Nathani, 2024). Nearly 84% of women in India report facing at least one obstacle in obtaining healthcare, with challenges varying widely by region. The most frequently cited issues include poor medical infrastructure and difficulties related to distance and affordability. Women who are older, educated, financially stable, and have access to technology and media tend to face fewer barriers. Conversely, those in rural areas, with limited education and resources, often struggle with inadequate facilities and a shortage of medical professionals. To reduce these inequalities, the study emphasizes the need to improve healthcare systems and promote health education, particularly for disadvantaged and rural communities, ensuring more equitable access to medical services. (Pradhan, M. R, et.al 2025) This study explores the uneven distribution of healthcare in India, emphasizing the differences between rural and urban regions in terms of health outcomes, access to services, and infrastructure. It draws attention to disparities in maternal and infant mortality rates and life expectancy, linking them to factors like geographic remoteness, economic inequality, and limited digital connectivity. To tackle these challenges, the paper suggests expanding telehealth services, enhancing rural medical infrastructure, incentivizing healthcare professionals, and fostering collaboration between public and private sectors. The aim is to promote inclusive, data-driven policies that support Universal Health Coverage across the country. (Jangid, A. K. 2025).The study, using the SWPER index, shows that forward caste women generally display higher empowerment levels, except in decision-making, where Scheduled Tribe women from Northeast India lead. Social independence is identified as a key factor influencing women's health and access to medical care. (Mal. P, et.al 2024). The study introduces a Women's Health Index tailored for India, using 17 indicators across key life stages to assess women's health comprehensively. It highlights regional disparities through spatial analysis and emphasizes the value of localized data for guiding targeted, policy-driven interventions to improve health outcomes (Sharma, N et.al.2025). Education is a powerful force for personal and societal transformation, especially among economically disadvantaged groups. Women's education enhances health, financial stability, and social awareness, making it a key strategy for reducing poverty especially within marginalized communities like the Muslim population (Sharma, N et.al.2025). Over 730 million women worldwide have experienced gender-based violence, with those in lower-income countries facing greater risks. The COVID-19 pandemic worsened the situation, increasing intimate partner violence due to economic stress, weakened support systems, and restricted mobility impacting both women's health and their children's well-being (Suri, S,2022).

Objectives:

1. To construct a multidimensional index of women's health deprivation using NFHS data.
2. To examine rural-urban differentials in women's health deprivation across Indian states.

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ISSN (Print): 2321-7510 | ISSN (Online): 2321-7529

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3. To identify state-level disparities and patterns of inequality in women's health outcomes.

Methodology:

This study identifies a range of indicators to assess women's health deprivation, drawing on data from the National Family Health Survey (NFHS-5). To analyse these variables, Principal Component Analysis (PCA) was employed to assign appropriate weights and reduce dimensionality. A Multidimensional Women's Health Deprivation Index (MWHDI) was developed by inspiring the concept of the Alkire-Foster methodology, allowing for a comprehensive evaluation of deprivation across various dimensions. Separate indices were calculated for rural and urban populations at the state level to capture contextual differences. The rural-urban disparity was assessed by comparing MWHDI scores between these two settings, and states were ranked accordingly based on the extent of rural-urban health deprivation. To construct a comprehensive Women's Health Index (MWHDI), the first step involves defining specific thresholds known as deprivation cut-offs for each selected indicator.These cut-offs help to determine whether a woman is considered deprived in a particular health dimension. age at first childbirth, incidence of child marriage, the extent of shared household facilities, access to safe drinking water, availability of electricity, current employment status, health insurance coverage, place of delivery (particularly home births), literacy levels, and experiences of sexual or emotional violence, Once the deprivation status is established for each indicator, weights are assigned to reflect their relative importance. Next, individual deprivation scores are calculated by assessing the proportion of indicators in which each woman is deprived. Women who face deprivation in multiple key health areas will have higher overall scores. A health deprivation threshold, commonly set at 33% or 50% is then applied. If a woman's score exceeds this threshold, she is classified as multidimensionally deprived in health. To evaluate the broader population, the MWHDI aggregates individual scores using the concept of the Alkire-Foster framework. Headcount Ratio (H) i.e. the percentage of women identified as multidimensionally health deprived. Intensity (A) i,e the average deprivation score among those classified as deprived. Women's Health Index (MWHDI) i,e computed as $MWHDI = H \times A$, capturing both the prevalence and severity of health deprivation. A higher MWHDI value indicates more severe health deprivation among women.

Data & Analysis:

Table 1: COMBINED (AVI, HCR, MWHDI)

STATE NAME	AVI	HCR	MWHDI
Andaman & Nicobar Islands	0.2828	0.585	0.1654
Andhra Pradesh	0.2884	0.622	0.1794
Arunachal Pradesh	0.2805	0.593	0.1665
Assam	0.2818	0.615	0.1732
Bihar	0.3585	0.593	0.2127
Chandigarh	0.2754	0.508	0.1399
Chhattisgarh	0.2699	0.546	0.1474
Dadra & Nagar Haveli and Daman & Diu	0.2485	0.526	0.1391

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Goa	0.1581	0.531	0.0839
Gujarat	0.2737	0.579	0.1585
Haryana	0.2867	0.604	0.1732
Himachal Pradesh	0.2494	0.258	0.1446
Jammu & Kashmir	0.2549	0.566	0.1442

STATE NAME	AVI	HCR	MWHDI
Jharkhand	0.3345	0.607	0.2032
Karnataka	0.2973	0.617	0.1835
Kerala	0.2434	0.598	0.1454
Ladakh	0.2445	0.573	0.1401
Lakshadweep	0.2393	0.528	0.1263
Madhya Pradesh	0.3393	0.568	0.1927
Maharashtra	0.3002	0.613	0.2184
Manipur	0.3189	0.583	0.1861
Meghalaya	0.2728	0.609	0.1661
Mizoram	0.1952	0.627	0.1308
Nagaland	0.2561	0.632	0.1618
NCT of Delhi	0.2816	0.548	0.1542
Odisha	0.2939	0.593	0.1742
Puducherry	0.2505	0.594	0.1488
Punjab	0.2649	0.544	0.1441
Rajasthan	0.2751	0.574	0.1581
Sikkim	0.2723	0.607	0.1653
Tamil Nadu	0.2565	0.553	0.1419
Telangana	0.2979	0.632	0.1878
Tripura	0.319	0.647	0.2064
Uttar Pradesh	0.3153	0.574	0.1811
Uttarakhand	0.2619	0.581	0.1521
West Bengal	0.3348	0.622	0.2076
India	0.2946	0.589	0.1734
Note: From Author own Calculation			

The national rural AVI average of 0.2946 serves as a reference point for evaluating women's health deprivation across Indian states. States with AVI scores above this benchmark, including Bihar, Madhya Pradesh, and Uttar Pradesh, show high levels of rural health deprivation, often due to poor healthcare access, low literacy, and early marriage. Moderate-deprivation states like Andhra Pradesh, Karnataka, and Maharashtra hover around the national average, indicating some progress but ongoing challenges in maternal health and sanitation. In contrast, states such as Kerala, Mizoram, and Goa report lower AVI values, reflecting stronger healthcare systems, better education, and enhanced women's

empowerment. The data categorizes Indian states and Union Territories based on performance scores, highlighting regional disparities in development. High-performing regions like Mizoram, Tripura, Nagaland, Telangana, and West Bengal show strong progress in social and inclusive development indicators. States such as Andhra Pradesh, Karnataka, and Kerala fall into the moderate range, reflecting mixed but steady advancement. In contrast, areas like Chandigarh, Punjab, and Goa are among the low performers, with urban and coastal regions possibly affected by inequality or data variability. The data reveals significant regional disparities in women's health deprivation across India, as measured by the MWHDI. States like Bihar, Tripura, and West Bengal show the highest levels of deprivation, indicating persistent challenges in health and social indicators.

In contrast, Goa, Lakshadweep, and Mizoram report the lowest MWHDI values, reflecting strong infrastructure, literacy, and inclusive policies. Moderate deprivation is observed in several large states such as Assam, Karnataka, and Uttar Pradesh, where progress coexists with ongoing inequalities in maternal and reproductive health. The wide gap between the highest and lowest MWHDI scores highlights the need for targeted interventions to address regional imbalances.

Regional Overview and spatial pattern:

Eastern & North-Eastern India	0.19-0.21	Bihar, West Bengal, Tripura, Jharkhand show the highest deprivation; indicates lagging progress in women's nutrition, maternal care, and sanitation
Northern & Central India	0.16-0.19	States like UP, MP, Haryana, Rajasthan show moderate deprivation; strong regional inequality and lower female autonomy are contributing factors.
Southern India	0.14-0.17	Relatively low deprivation: states like Kerala and Tamil Nadu perform well due to robust health systems and social empowerment.
Western India	0.13-0.16	Goa and Gujarat are better performers, strong economic base and better service delivery mechanisms.
Union Territories & Islands	0.13-0.15	Lakshadweep, Chandigarh, Puducherry show low deprivation due to compact populations and effective health administration

India's Multidimensional Women's Health Deprivation Index (MWHDI) average of 0.1734 reflects moderate deprivation, with rural areas contributing more heavily due to the country's predominantly rural population. Eastern and Northeastern states like Bihar, West Bengal, Tripura, and Jharkhand show high deprivation levels, driven by poverty, limited healthcare access, and poor maternal health. In contrast, states such as Goa, Mizoram, and Lakshadweep report the lowest deprivation, supported by strong health systems, literacy, and governance. The gap between the highest and lowest MWHDI values highlights stark regional

inequalities. Southern and Western states demonstrate better outcomes, emphasizing the importance of targeted investments in health and education to reduce disparities and support national goals for health and gender equality.

Table 2: RURAL (AVI, HCR, MWHDI)			
STATE NAME	**AVI**	**HCR**	**MWHDI**
Andaman & Nicobar Islands	0.2825	0.601	0.1698
Andhra Pradesh	0.2919	0.646	0.1886
Arunachal Pradesh	0.2848	0.602	0.1714
Assam	0.2838	0.621	0.1758
Bihar	0.3616	0.594	0.2148
Chandigarh	0.2967	0.654	0.1941
Chhattisgarh	0.2807	0.543	0.1523
Dadra & Nagar Haveli and Daman & Diu	0.2406	0.549	0.1321
Goa	0.1459	0.522	0.0761
Gujarat	0.2873	0.597	0.1716
Haryana	0.2934	0.625	0.1834
Himachal Pradesh	0.2564	0.568	0.1456
Jammu & Kashmir	0.2585	0.509	0.1524
Jharkhand	0.3451	0.609	0.2101
Karnataka	0.3043	0.631	0.1921
Kerala	0.2482	0.594	0.1474
Ladakh	0.2442	0.576	0.1407
Lakshadweep	0.2482	0.529	0.1312
Madhya Pradesh	0.3557	0.568	0.2021
Maharashtra	0.3137	0.627	0.1968
Manipur	0.3236	0.551	0.1851
Meghalaya	0.2809	0.611	0.1715
Mizoram	0.2364	0.622	0.1471
Nagaland	0.2557	0.647	0.1655
NCT of Delhi	0.2763	0.593	0.1638
Odisha	0.2297	0.594	0.1765
Puducherry	0.2236	0.473	0.1117
Punjab	0.2673	0.505	0.1469
Rajasthan	0.2874	0.574	0.1649
Sikkim	0.2275	0.619	0.1701
Tamil Nadu	0.2266	0.561	0.1492
Telangana	0.3035	0.652	0.1978
Tripura	0.3278	0.651	0.2131

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ISSN (Print): 2321-7510 | ISSN (Online): 2321-7529

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Uttar Pradesh	0.3223	0.576	0.1862
Uttarakhand	0.2745	0.565	0.1551
West Bengal	0.3225	0.621	0.2174
India	0.3048	0.594	0.1811
Note: From Author own Calculation			

The Average Variable Intensity (AVI) represents the mean level of multidimensional deprivation intensity observed across selected 11 variables within each state or union territory. In this context, AVI values closer to 1 indicate higher deprivation intensity (greater average shortfall across variables), while values closer to 0 denote lower deprivation intensity (better performance).

Range of AVI	**Interpretation**	**Implication**
0.10-0.25	Low intensity	Better performance, low deprivation
0.25-0.30	Moderate intensity	Average or slightly below-average performance
0.30-0.35	High intensity	Noticeable deprivation
>0.35	Very high intensity	Severe deprivation or lagging performance

The data highlights significant regional disparities in women's health deprivation across India, measured by the Average Deprivation Intensity (AVI). States like Goa, Kerala, and Mizoram report the lowest AVI scores, reflecting strong healthcare systems, higher literacy, and greater gender equality. Moderate AVI states such as Himachal Pradesh and Tamil Nadu have basic services in place but still face inequalities, especially in rural areas. In contrast, states like Andhra Pradesh and Maharashtra show higher-than-average deprivation, indicating uneven development. The most deprived states Bihar, Madhya Pradesh, Uttar Pradesh, and others struggle with severe health challenges linked to poor infrastructure, early marriage, low literacy, and limited access to essential services. With a national AVI average of 0.3048, the findings reveal a stark contrast between well-performing southern and northeastern regions and the underperforming central and eastern states. This underscores the need for targeted, region-specific policies to bridge the health equity gap for women. The Head Count Ratio (HCR) indicates the percentage of individuals facing at least one major form of deprivation across selected indicators. In India, the national HCR stands at 0.594, meaning about 59.4% of women experience some level of multidimensional deprivation. This measure highlights significant regional disparities in deprivation levels across different states and union territories. India's Head Count Ratio (HCR) of 0.594 reveals that nearly 60% of women face at least one form of multidimensional deprivation. Regional disparities are evident, with states like Andhra Pradesh, Telangana, and Karnataka showing high HCR despite developed infrastructure, likely due to internal inequalities. Northeastern states and urban centers such as Chandigarh also report elevated deprivation levels, often linked to geographic isolation and urban poverty. States like Bihar, Kerala, and Odisha align with the national average, indicating moderate deprivation. In contrast, regions such as Puducherry, Lakshadweep, and Tamil Nadu demonstrate lower HCR, reflecting stronger social services and better health and

education outcomes. Overall, the data underscores significant subnational inequality, with southern and coastal states performing better than central and eastern regions. Rural India's MWHDI average of 0.181 highlights moderate health deprivation among women, but masks significant regional differences. States like Bihar, West Bengal, Tripura, and Jharkhand show the highest levels of rural deprivation, driven by poor maternal care, sanitation, and nutrition. Central and southern states such as Madhya Pradesh, Telangana, and Maharashtra also face considerable challenges, despite economic growth. Medium-deprivation states, including Assam, Odisha, and Haryana, show mixed progress, with infrastructure improvements offset by persistent gender disparities. In contrast, regions like Goa, Puducherry, and Kerala report the lowest deprivation levels, benefiting from strong healthcare systems, high literacy, and inclusive policies. These patterns reveal a clear divide, with eastern and central states lagging better-performing southern and western regions.

Regional Pattern Overview:

Region	Average MWHDI	Interpretation
Eastern and Central India (Bihar, Jharkhand, MP, West Bengal)	High (0.20–0.22)	Deep-rooted deprivation; poor infrastructure and gender gaps.
Southern India (Andhra Pradesh, Telangana, Karnataka, Tamil Nadu, Kerala)	Mixed (0.14–0.19)	Uneven progress: Kerala performs well, Telangana lags.
Western India (Goa, Maharashtra, Gujarat)	Moderate (0.12–0.17)	Strong urban areas but moderate rural gaps.
Northern and Hill States (Punjab, HP, Uttarakhand, J&K, Ladakh)	Low (0.13–0.16)	Better access and outcomes due to robust social services.
Northeast (Tripura, Manipur, Mizoram, Nagaland, Meghalaya)	Highly variable (0.14–0.21)	Successes in Mizoram and Meghalaya, deprivation in Tripura and Manipur.

Despite economic progress in states like Telangana and Karnataka, rural women continue to face health challenges due to uneven development. In contrast, regions such as Kerala, Goa, Tamil Nadu, and Himachal Pradesh benefit from strong public health initiatives and gender-focused policies. The MWHDI highlights stark regional disparities, with eastern states like Bihar and West Bengal showing high deprivation, while southern and coastal areas like Goa and Kerala perform better. The findings emphasize that improving women's health in rural areas requires targeted efforts in nutrition, maternal care, and sanitation, supported by effective governance and inclusive social infrastructure.

Table 3: URBAN (AVI, HCR, MWHDI)

STATE NAME	AVI	HCR	MWHDI
Andaman & Nicobar Islands	0.2839	0.531	0.1509
Andhra Pradesh	0.2785	0.563	0.1568
Arunachal Pradesh	0.2636	0.562	0.1481
Assam	0.2666	0.581	0.1551

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Bihar	0.3328	0.589	0.1956
Chandigarh	0.2744	0.503	0.1381
Chhattisgarh	0.2255	0.561	0.1265
Dadra & Nagar Haveli and Daman & Diu	0.2551	0.569	0.1452
Goa	0.1655	0.537	0.0889
Gujarat	0.2394	0.538	0.1288
Haryana	0.2694	0.556	0.1499
Himachal Pradesh	0.1879	0.714	0.1342
Jammu & Kashmir	0.2336	0.456	0.1065
Jharkhand	0.2899	0.601	0.1744
Karnataka	0.2792	0.583	0.1628
Kerala	0.2367	0.603	0.1426
Ladakh	0.2455	0.561	0.1378
Lakshadweep	0.2367	0.527	0.1248
Madhya Pradesh	0.2777	0.568	0.1576
Maharashtra	0.2271	0.584	0.1584
Manipur	0.2821	0.669	0.1889
Meghalaya	0.2133	0.598	0.1274
Mizoram	0.1512	0.731	0.1104
Nagaland	0.2575	0.588	0.1513
NCT of Delhi	0.2818	0.546	0.1539
Odisha	0.2757	0.583	0.1607
Puducherry	0.2532	0.624	0.1581
Punjab	0.2591	0.531	0.1377
Rajasthan	0.2298	0.575	0.1322
Sikkim	0.2565	0.546	0.1401
Tamil Nadu	0.2432	0.543	0.1321
Telangana	0.2281	0.573	0.1611
Tripura	0.2789	0.633	0.1766
Uttar Pradesh	0.2827	0.566	0.1599
Uttarakhand	0.2163	0.648	0.1402
West Bengal	0.2985	0.617	0.1842
India	0.2624	0.573	0.1502
Note: From Author own Calculation			

The data highlights significant variation in women's health deprivation across Indian states. High-deprivation regions, including Bihar, West Bengal, and Jharkhand, exhibit severe challenges in women's health indicators. States like Andhra Pradesh, Karnataka, and Gujarat fall into the moderate-deprivation category, reflecting average performance. In contrast,

Mizoram, Goa, and Himachal Pradesh are among the best performers with low deprivation levels. Geographically, eastern states tend to show higher deprivation, while southern and western states generally report better outcomes. Union Territories display mixed results, with some performing well and others facing notable health challenges. The national multidimensional deprivation rate for women in India stands at 57.3%, indicating notable disparities across states. High-deprivation states, including many in the Northeast (Mizoram, Manipur, Tripura, Meghalaya, Nagaland) and hilly regions (Himachal Pradesh, Uttarakhand), show large proportions of deprived women due to factors such as difficult terrain, limited healthcare access, and socioeconomic vulnerabilities. Surprisingly, states like Kerala and Puducherry also record relatively high deprivation, likely driven by inequalities among specific groups such as rural, tribal, or elderly women.

States with deprivation levels near the national average including Andhra Pradesh, Madhya Pradesh, Uttar Pradesh, Rajasthan, Telangana, and Chhattisgarh reflect transitional conditions where progress coexists with remaining gaps in maternal health, sanitation, and education. Low-deprivation states and Union Territories, such as Jammu & Kashmir, Chandigarh, Goa, Lakshadweep, Delhi, Tamil Nadu, and Gujarat, show better outcomes due to stronger infrastructure, urbanization, and improved healthcare systems, though some still face rural gender disparities. Overall, the spatial pattern reveals that even regions with high human development continue to experience pockets of deprivation, particularly among rural, tribal, and marginalized populations. States such as Bihar (0.1956), Manipur (0.1889), West Bengal (0.1842), Tripura (0.1766), Jharkhand (0.1744), Odisha (0.1607), Telangana (0.1611), Karnataka (0.1628), Maharashtra (0.1584), Andhra Pradesh (0.1568), and Uttar Pradesh (0.1599) record high levels of deprivation. These patterns are driven by urban poverty, overcrowded slums, poor health infrastructure, and low female autonomy, indicating that rapid urban growth without equitable service delivery sustains deprivation. Regions including Delhi, Gujarat, Madhya Pradesh, Rajasthan, Tamil Nadu, Punjab, Kerala, Sikkim, Uttarakhand, Himachal Pradesh, Haryana, Chandigarh, Ladakh, and Telangana fall into this category. These states have seen improvements through better urban health systems, yet inequalities persist, especially among low-income or migrant populations. Strong governance and decentralized health programs have supported progress in states like Kerala, Tamil Nadu, and Himachal Pradesh. States such as Goa (0.0889), Mizoram (0.1104), Jammu & Kashmir (0.1065), Chhattisgarh (0.1265), Lakshadweep (0.1248), and Meghalaya (0.1274) exhibit low levels of deprivation due to high literacy, robust healthcare, sanitation, and effective governance. Their success demonstrates the importance of universal health coverage, women's empowerment, and community participation in improving urban women's health outcomes.

Regional Patterns in Urban MWHDI:

Eastern & Northeastern States	High (0.17-0.19)	Bihar, West Bengal, Tripura, and Manipur record high deprivation; persistent poverty and urban slum expansion are major causes.
Northern & Central States	Moderate (0.14-0.16)	Moderate deprivation due to mixed progress, improved urban access but continued inequality in UP, MP, Haryana.

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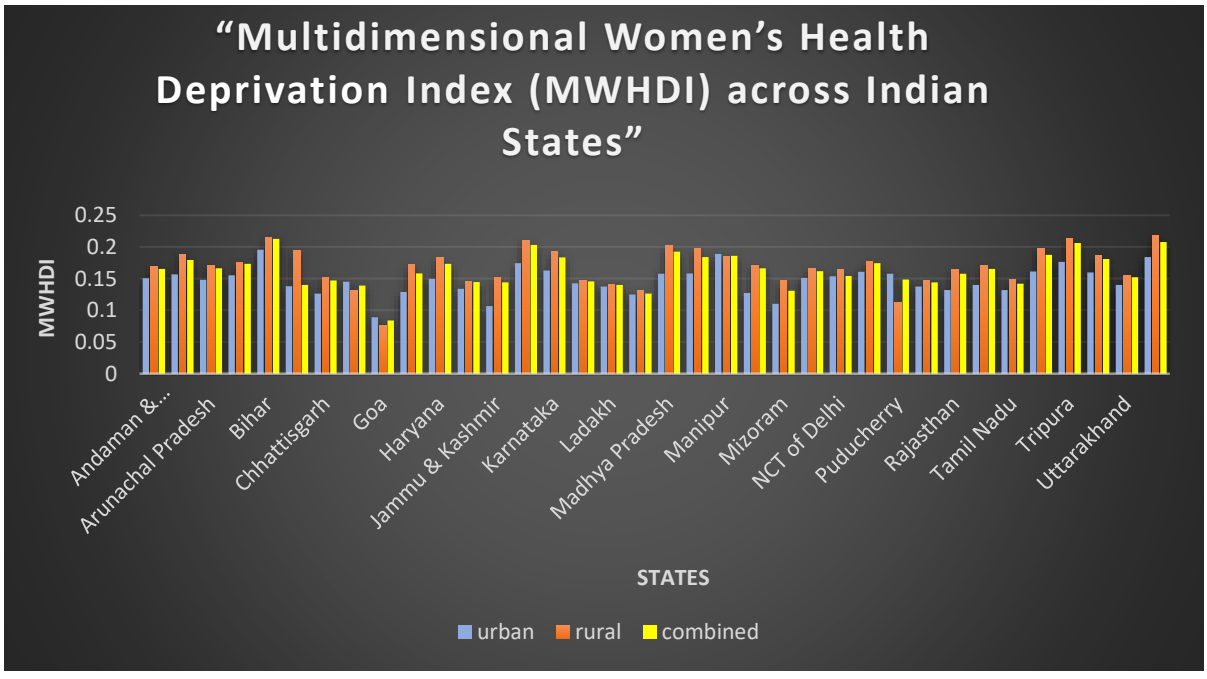
Southern States	Moderate (0.13-0.16)	Mixed outcomes: Kerala and Tamil Nadu perform well, but Telangana and Karnataka show uneven patterns.
Western & Union Territories	Low (0.09-0.14)	Goa, Gujarat, and Daman–Diu have low deprivation due to higher living standards and better service access.
Hill & Northeastern States	Low to High (0.11-0.19)	Wide variation -Mizoram low, Manipur high - indicating geographical and infrastructural disparities.

The average MWHDI of urban India (0.1502) is notably lower than that of rural areas (0.181), highlighting an urban advantage in health outcomes. However, deep inequalities persist within cities, particularly in states with large slum populations. Bihar and West Bengal continue to record high urban deprivation, showing that economic growth has not ensured equitable health improvements. In contrast, Kerala, Tamil Nadu, and Gujarat maintain low deprivation levels, supported by strong public health systems and widespread literacy. When comparing urban and rural areas within states, regions like Bihar, West Bengal, and Jharkhand display only slight differences, indicating that urban deprivation remains disproportionately high and the typical urban advantage is weakened. Meanwhile, Union Territories such as Chandigarh, Lakshadweep, and Puducherry perform well, benefiting from efficient governance and effective health service delivery in smaller administrative setups.



The MWHDI analysis for urban India reveals that urbanization improves women's health outcomes only up to a point. States like Goa, Kerala, and Mizoram demonstrate effective urban health governance, while Bihar, West Bengal, and Tripura continue to face deep-rooted multidimensional deprivation even within urban areas. Hence, urban advantage is unevenly

distributed, and policy attention must shift from "urban averages" to "intra-urban inequalities" to ensure inclusive health progress.

Conclusion:

States	AVI		HCR		MWHDI	
	Rural	**Urban**	**Rural**	**Urban**	**Rural**	**Urban**
High	Bihar (0.3616)	Bihar (0.3328)	Chandigarh (0.654)	Mizoram (0.730)	Bihar (0.2148)	Bihar (0.1956)
Moderate	Himachal Pradesh (0.2564)	Andhra Pradesh	Arunachal Pradesh (0.602),	Uttar Pradesh (0.566)	Assam (0.1758),	Telangana (0.1611),
Low	Goa (0.1459)	Mizoram (0.1512)	Puducherry (0.473)	J&K (0.456)	Puducherry (0.1117)	Goa (0.0889)

Bihar consistently records high scores on the AVI, HCR, and MWHDI in both rural and urban areas, indicating deep-rooted structural health deprivation and making it a critical focus for policy intervention. In contrast, Goa and Puducherry perform well across all indices, reflecting strong governance, effective health systems, and the advantages of smaller population sizes. Generally, urban AVI values are slightly lower than rural ones, suggesting better access to healthcare and infrastructure in cities. However, the urban HCR is often higher, revealing that deprivation can still be widespread in urban areas. For example, Mizoram's urban areas have low AVI but high HCR, pointing to widespread deprivation despite lower vulnerability, while Chandigarh's rural zones display high HCR due to localized deprivation. These mismatches between vulnerability and deprivation highlight the need for targeted, context-specific interventions. Union Territories show low MWHDI values, benefiting from compact size and efficient administration. Meanwhile, Northeastern and hill states face uneven outcomes that demand region-specific health strategies. The urban–rural divide remains particularly visible in Northern, Central, and Western India, where urban progress often conceals persistent rural stagnation.

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