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Multidimensional poverty at the epicentre: analysing socio-religious disparities in Uttar Pradesh, India

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Abstract

Purpose – This study aims to present a comprehensive analysis of multidimensional poverty in Uttar Pradesh, revealing specific deprivation faced by various social and religious groups. It identifies poverty risks and changes in deprivations to assess inter-group disparities among social and religious groups, offering insights for targeted policies.

Design/methodology/approach – The study uses the updated and harmonised global multidimensional poverty index methodology, using unit-level records from past three National Family Health Surveys conducted between 2005–2006 and 2019–2021. This study used multivariate regression analysis to examine how social, religious, household and regional factors interact to influence deprivation.

Findings – Scheduled castes and Muslims face disproportionately high poverty levels and intense deprivations, surpassing their population shares significantly. Inter-group poverty differences are narrowing, but Muslims experience slower improvement. Rural–urban poverty disparities persist, notably among less disadvantageous groups. Deprivational challenges persist in education-related indicators, undernutrition, sanitation, cooking fuel and housing. Scheduled castes experience significant deprivation across all ten indicators, while both Hindus and Muslims are highly deprived in housing and cooking fuel indicators. Muslims face persistent educational challenges. Marginalised groups (SCs, Muslims), larger households, households living in rural areas and female-headed households experience higher deprivation; non-nuclear families and bank account access are associated with lower deprivation.

Originality/value – In addressing Uttar Pradesh's significant role in global poverty, this study fills a vital gap in the literature. As the state pursues social and economic progress, the findings of the study will provide a roadmap for a more equitable future.

Keywords Dalit, Muslims, Social inequality, Multidimensional poverty, Uttar Pradesh, NFHS, Global MPI

Paper type Research paper

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1. Introduction

The 2023 global multidimensional poverty report shows that 1.1 billion people (18.2%) are living in poverty (UNDP and OPHI, 2023). India bears the unfortunate burden of having the highest number of people living in multidimensional poverty (230 million or 20.7% of global poor). Among the 1,281 subnational regions analysed in the report of UNDP and OPHI (2023), Uttar Pradesh (UP) stands out with the largest share of global poverty (4.84% or 54 million). Moreover, UP's significance in poverty research is underscored by its disproportionately high poverty levels and unique demographic makeup. As per the 2011 Indian population census, UP has the largest share of SC population (20.5%), rural population (18.6%) and Muslim population (22.4%) of the country. These factors, combined with its status as a global poverty epicentre, make UP a crucial area for in-depth poverty analysis (Arora, 2024).

In vast states like UP, effective poverty eradication strategy may necessitate prioritising the monitoring of acute poverty, particularly among historically marginalised and deeply impoverished groups. However, addressing this multifaceted challenge demands comprehensive poverty analyses and targeted policies that address the state's diverse socio-economic disparities (Diwakar, 2009 and Arora and Singh, 2015). With limited time to achieve the Sustainable Development Goals (SDGs) by 2030, prioritising efforts and identifying target population is crucial if the dictum of "leaving no one behind" is to be followed in spirit.

Despite the urgent need to address poverty, there remains a notable research gap in this direction. The prevalence of poverty is deeply intertwined with caste and religion, making it a persistent and critical issue in India generally (Alkire *et al*., 2021; Das *et al*., 2023; Pradhan *et al*., 2022), and particularly so in Uttar Pradesh (Diwakar, 2009; Kozel and Parker, 2003; Arora and Singh, 2015; Arora, 2024). However, research examining the multidimensional aspects of poverty, particularly among social and religious groups (SRGs) in UP, remains limited. Monitoring poverty within SRGs is crucial given UP's history of social movements, like the Dalit movement, which aimed to empower these communities and bring about socio-economic reforms. Furthermore, previous data did not include separate information for other backward classes (OBCs) due to a lack of classified data.

This study addresses a crucial research gap by examining inter-group disparities in multidimensional poverty in UP over 15 years (2005–2006 to 2019–2021), aiming to inform targeted poverty reduction strategies. It aimed to evaluate variations in multidimensional poverty across SRGs, identifying alarming poverty levels and analysing the contributions of poverty dimensions and indicators over time. The study includes a literature review, data and methodology, an exploration of multidimensional poverty across SRGs in UP and concludes with a discussion of findings and policy implications, along with limitations and future research directions.

1.1 Literature review

Research has been conducted to evaluate consumption notion of poverty among various SRGs in India (Government of India, 2011; Panagariya and More, 2014; Panagariya and Mukim, 2014; Sundaram and Tendulkar, 2003; Thorat, 2010; Thorat and Dubey, 2012, and others). These studies consistently reveal that SCs, STs and Muslims often face higher vulnerability and poverty, with improvements observed over time (Thorat, 2010; Government of India, 2011). Few studies have examined the consumption poverty across SRGs in the state (Diwakar, 2009; Kozel and Parker, 2003; Arora and Singh, 2015, 2017; Arora, 2024). These studies emphasise class and caste often intersect with the contemporary

social reality. Notably, SCs and Muslims, while historically among the poorest, have shown improvements in living standards over time.

While several consumption poverty-based studies discuss SRGs disparity, there is a lack of similar study in multidimensional poverty space. Recent national-level studies highlight significant disparities in multidimensional poverty, with Muslims and SC/STs experiencing higher deprivation in dimensions like living standards, health and sanitation (Alkire *et al.*, 2021; Das *et al.*, 2023; Pradhan *et al.*, 2022). Hindus generally experience lower poverty than Muslims, except in sanitation and drainage (Bennett and Mitra, 2013). Das *et al.* (2023) find that vulnerabilities persisted among STs and Muslims, with no decrease in inter-caste and inter-religion poverty gaps between 2005–2006 and 2019–2021. By contrast, Ravi (2023) suggests that minorities experienced the fastest improvements in access to basic amenities between 2015–2016 and 2019–2021. While this may be true at the national level, it is crucial to specifically examine this claim within the context of UP.

Currently, there is a lack of in-depth research on multidimensional poverty among SRGs in UP. This study addresses this gap using the latest National Family Health Surveys (NFHS) data. This is crucial due to the decade-long gap in consumption expenditure data, allowing us to examine poverty trends beyond 2011–2012 and assess disparities in poverty reduction across socio-religious groups from 2005–2006 to 2019–2021, with an intervening time point of 2015–2016.

2. Data and method

2.1 Data

The NFHS[1], akin to the global Demographic and Health Surveys (DHS), is widely used to measure multidimensional poverty. This study uses unit-level data from NFHS-3 (2005–2006), NFHS-4 (2015–2016) and NFHS-5 (2019–2021) to assess multidimensional poverty among SRGs in UP. The study uses "last decade" for 2005–2006 to 2015–2016 and "recent period" for 2015–2016 to 2019–2021 when analysing poverty trends.

The NFHS classifies social groups as STs, SCs, OBCs and other social groups (Other SGs), popularly known as "General" or "Upper Caste", and religious groups as Hindus, Muslims and others. This study focuses on SCs, OBCs, other social groups, Hindus and Muslims due to small sample sizes for other groups (refers to Supplementary Table 1). The analysis is conducted at the aggregated level to ensure reliability, as district-level analysis was not feasible due to sample size limitations, especially in urban areas.

2.2 Method

The present study applies Alkire and Foster's (2011) framework, using the revised[2] methodology of the global multidimensional poverty index (MPI) from the 2018 Human Development Report (Alkire *et al.* (2023, 2024), and UNDP, 2018). Initially introduced in 2010, the Global MPI included ten indicators categorised into three equally weighted dimensions: health, education, and living standards (SOL), as defined in Supplementary Table 2.[3] The study used the harmonised estimates across NFHS-3 (2005–2006), NFHS-4 (2015–2016) and NFHS-5 (2019–2021) surveys, ensuring consistency in definitions of indicators. Specifically, harmonisation[4] addressed discrepancies due to potential definitional changes in indicators between surveys or official NFHS reports.

After selecting the dimensions and indicators, the next step is to estimate a deprivation status matrix (d_j) for each household based on the specific deprivation cut-offs for each indicator (j), as shown in the third column of Supplementary Table 2. The total sum of weights assigned to all ten indicators (w_j) is equal to 1 (see Supplementary Table 2 (column 2) for details):

$$\sum_{j=1}^{10} w_j = 1 \tag{1}$$

A deprivation score (ranging between 0 and 1) is then calculated for i^{th} household (c_i) as per equation (2):

$$c_i = w_1 d_1 + w_2 d_2 \ldots\ldots\ldots\ldots w_{10} d_{10} \tag{2}$$

Using the poverty cut-off (k), which represents the share of (weighted) deprivations a household must experience to be categorised as poor, and the weighted deprivation scores c_i, a household is classified as multidimensionally poor [5] (MPI_{poor} = 1), as indicated by equation (3):

$$MPI_{poor} = 1 if\, c_i \geq k \tag{3}$$

The censored deprivation score $c_i(k)$, which represents the deprivation score of the poor households, is then calculated. Multidimensional poor households are identified using a censored deprivation score $c_i(k)$ with a threshold of $c_i(k) \geq 33.3\%$, in accordance with the global MPI methodology (UNDP and OPHI, 2023). Additionally, this study conducted a dominance analysis to evaluate MPI sensitivity, examining the ranking of poor households across SRGs for various $c_i(k)$ values. The results of this dominance analysis are elaborated upon in Section 3, with reference to Figure 2.

In the third step, poverty is aggregated based on the percentage of poor households (experiencing multiple deprivations) in the overall population, technically referred to as the headcount ratio (H) or *incidence of poverty.*[6] Next, the *intensity of poverty* (A) is calculated, representing the average percentage of weighted deprivations experienced by the poor. Finally, the MPI is calculated as a product of headcount ratio and intensity of poverty [refer to equation (4)]:

$$MPI = \mathrm{H} * \mathrm{A} \tag{4}$$

The contribution of j^{th} indicator to the MPI is determined as the ratio of number of deprived who are multidimensional poor in the j^{th} indicator to the total population and the overall MPI. The dimensional contribution ($Contri_{Dim}$) is the sum of the contributions of all indicators within a dimension (D) with respect to the MPI, as shown in equation (5):

$$Contri_{Dim} = \sum_{j=1}^{D} \frac{1}{D} \left(\frac{Contri_j}{MPI} \right) \tag{5}$$

The contribution of s^{th} SRG to overall poverty ($H_{S^{th}contri}$) is the function of s^{th} sub-group share in population and the level of poverty $\left(\frac{MPI_s}{MPI} \text{ or } \frac{H_s}{H}\right)$, as shown in equation (6):

$$H_{s^{th}contri} = \left(\frac{H_s}{H} * \text{contribution of } s^{th} \text{ sub} - \text{group to overall population} \right) * 100 \tag{6}$$

The absolute poverty risk[7] of s^{th} sub-group ($Absolute\ Poverty_s$) is evaluated using equation (7):

$$Absolute\ Poverty_s = \frac{H_s}{H} \tag{7}$$

The present study also investigated proximate factors influencing deprivation counts, using NFHS (2019–2021). Multivariate ordinary least squares (OLS) regression was used due to the continuous nature of deprivation count [refer to equations (8)–(9)]. The model included SRGs (social and religious), household size, and five SRG interaction variables (location or areas (rural/urban), gender of the household head (male/female), household structure (nuclear/non-nuclear), state regions (Western, Central, Southern and Eastern), and possession of a bank account (yes/no). Predicted values were plotted to visualise the impact of each factor on deprivation (refer to Supplementary Table 4 and Figure 9). This approach helps understand how these factors interact with SRGs to influence deprivation score.

For social groups:

$$\begin{aligned} &Deprivation\ score(c_i) \\ &\quad = \beta_0 + \beta_1 Social\ Groups\ (SCs^{\#}) + \beta_2 Hhd.\ size \\ &\qquad + \beta_3 Social\ Groups * Area\ (Urban^{\#}) + \beta_4 Social\ Groups * Headship\ (Female\ heads^{\#}) \\ &\qquad + \beta_5 Household\ Stucture\ (Nuclear^{\#}) + \beta_6 Social\ Groups * Regions\ (Central^{\#}) \\ &\qquad + \beta_7 Social\ Groups * Bank\ Account\ (No^{\#}) + e_i \end{aligned} \tag{8}$$

where # denotes the reference categories used in the regression model.

For religious groups:

$$\begin{aligned} &Deprivation\ score(c_i) \\ &\quad = \beta_0 + \beta_1 Religious\ Groups\ (Muslims^{\#}) + \beta_2 Religious\ Groups \\ &\qquad * Area\ (Urban^{\#}) + \beta_3 Religious\ Groups * Headship\ (Female\ heads^{\#}) \\ &\qquad + \beta_4 Household\ Stucture\ (Nuclear^{\#}) + \beta_5 Religious\ Groups \\ &\qquad * Bank\ Account\ (No^{\#}) + e_i \end{aligned} \tag{9}$$

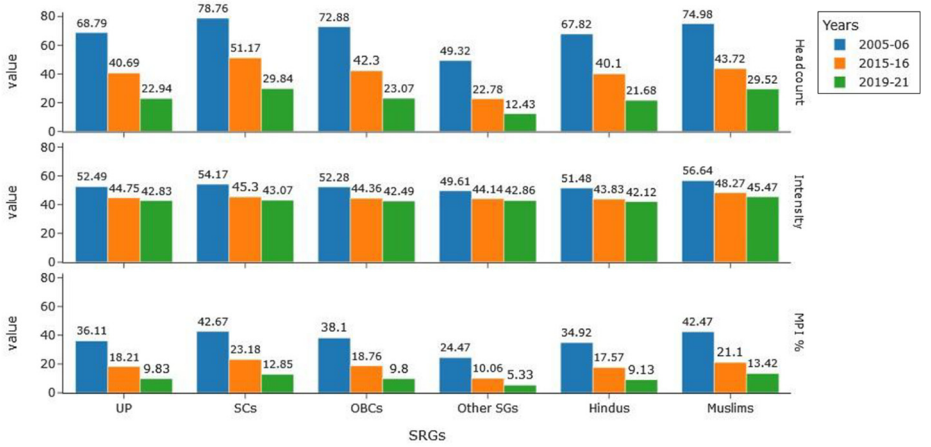
where # denotes the reference categories used in the regression model.

3. Results

3.1 Multidimensional poverty in Uttar Pradesh

Comparing UP's MPI estimate for 2019–21 (9.8) with the 2023 Global MPI estimates, UP [8] falls between Bangladesh (ranked 44th poorest country) and Lesotho (ranked 45th poorest country). UP's population grew from 19.98 crores in 2011 to 23.34 crores in 2019–2021 [9]. Approximately 5.35 crores of this population are identified as multidimensional poor, constituting about 22.9% of UP's population during 2019–2021, a significant decrease from 40.7% in 2015–2016 and 68.8% in 2005–2006 (refer to headcount estimates in Figure 1). The SCs consistently represented the poorest sub-group (29.8% in 2019–2021), with upper caste households consistently experienced the lowest level of poverty (12.4%).

In UP, SCs and Muslim households consistently remain the poorest, maintaining nearly similar levels of poverty headcounts, especially during 2005–2006 (SCs: 78.8%, Muslims: 75%) and 2019–2021 (SCs: 29.8%, Muslims: 29.5%). Notably, even in 2019–2021, every third household out of ten was multidimensionally poor among SCs and Muslims in the state (refer to Figure 1).

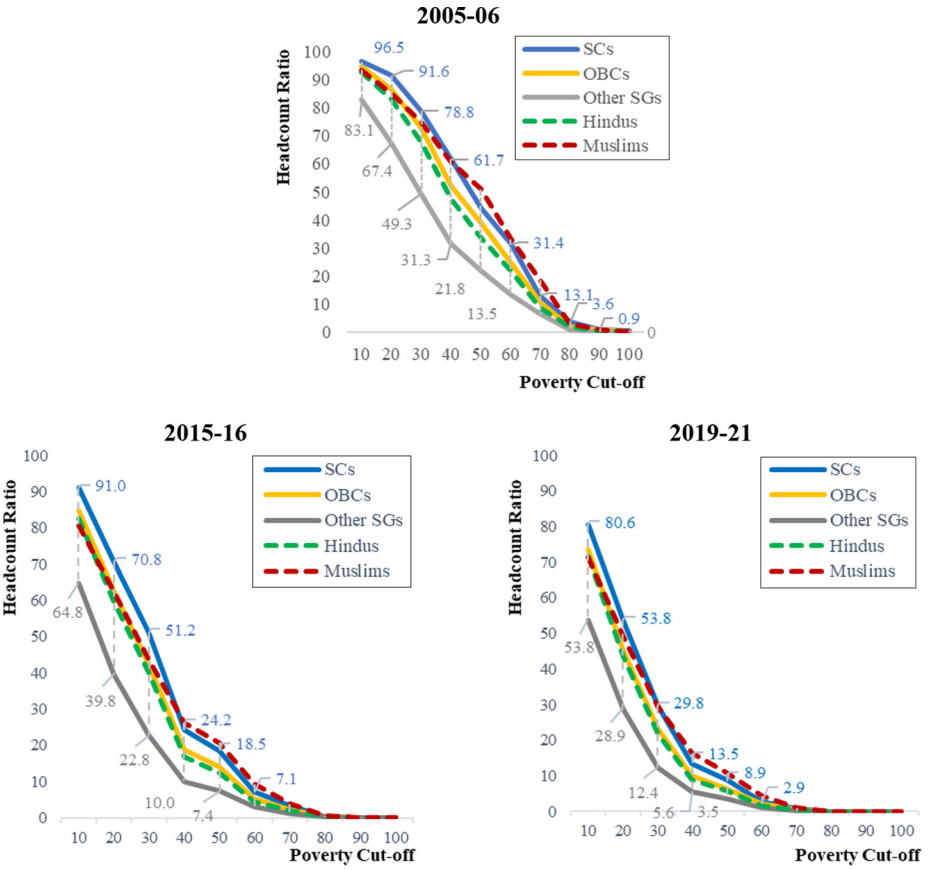


Source(s): Authors' calculation from unit level records of NFHS-3 (2005–2006), NFHS-4 (2015–2016) and NFHS-5 (2019–2021)

Figure 1. Multidimensional poverty headcount, intensity and MPI across SRGs of Uttar Pradesh, 2005–2006, 2015–2016 and 2019–2021

The Supplementary Table 3 shows a consistent decline in poverty headcount rates across SRGs in rural and urban UP from 2005–06 to 2019–2021, though disparities persist. SCs had the highest poverty prevalence, followed by OBCs and other SGs/General. While the fastest annual decline (2005–2006 to 2019–2021) was observed among other SGs (–8.78%), SCs experienced the slowest reduction (–6.27%), reflecting continued structural vulnerabilities. Among religious groups, Muslims consistently had higher poverty levels than Hindus but experienced slower overall reductions (–6.03% annually) compared to Hindus (–7.32%). However, in urban areas during 2015–2016 to 2019–2021, Muslim poverty reduction outpaced Hindus. Notably, poverty reduction accelerated across all groups (except urban Hindus) during 2015–2016 to 2019–2021, with rural areas showing faster declines than urban areas for most groups during this period. Over time, poverty has increasingly concentrated among socio-religious minorities, particularly SCs and Muslims, raising concerns about inclusive development. Surprisingly, the social gradient of poverty in the state (SCs, OBCs and other SGs/general) reveals an unexpected reversal compared to the annual rate of decline. Reorienting policies to address these persistent inequalities is crucial for sustainable growth. Nonetheless, the robustness of headcount estimates across SRGs will further refine the recent order of poverty ranking, as depicted in Figure 2.

The intensity of MPI in UP decreased to 42.8% on average in 2019–2021, compared to 44.7% in 2015–2016 and 52.5% in 2005–2006. Poor Muslim households experienced the highest poverty intensity (45.5%), followed by SC households (43.1%) in 2019–2021. Furthermore, intensity estimates remained relatively stable or minimal declines, especially in recent period, across all SRGs. Nonetheless, the intensity levels remain significant. This underscores that the disparity in MPI among SRGs is primarily driven by the headcount ratio. To effectively address poverty reduction, it is imperative to also prioritise addressing the intensity component of MPI. However, given our focus on understanding the disparity in poverty among SRGs, we will continue to place more emphasis on the headcount ratio moving forward.



Source(s): Authors' calculation from unit level records of NFHS-3 (2005–2006), NFHS-4 (2015–2016) and NFHS-5 (2019–2021)

Figure 2. Comparison of headcount ratio as per poverty cut-off across SRGs of Uttar Pradesh, 2005–2006, 2015–2016 and 2019–2021

Illustrating the robustness of headcount estimates and poverty rankings across SRGs, Figure 2 demonstrates the effect of varying poverty cut-off ratios, regardless of the established threshold of $c_i(k) \geq 33.3\%$ or any predefined poverty cut-off. SCs and Muslims (blue and red curves in Figure 2, respectively) emerge as the poorest, while other SGs/general (grey curve) are the least poor. Setting the poverty threshold criteria at $c_i(k) \geq 40\%$ in 2015–2016 and $c_i(k) \geq 30\%$ for 2019–2021, it is clear that poverty persists among Muslim households, with SC households in UP following closely.

3.2 Multidimensional poverty across areas and socially and religiously disadvantaged groups

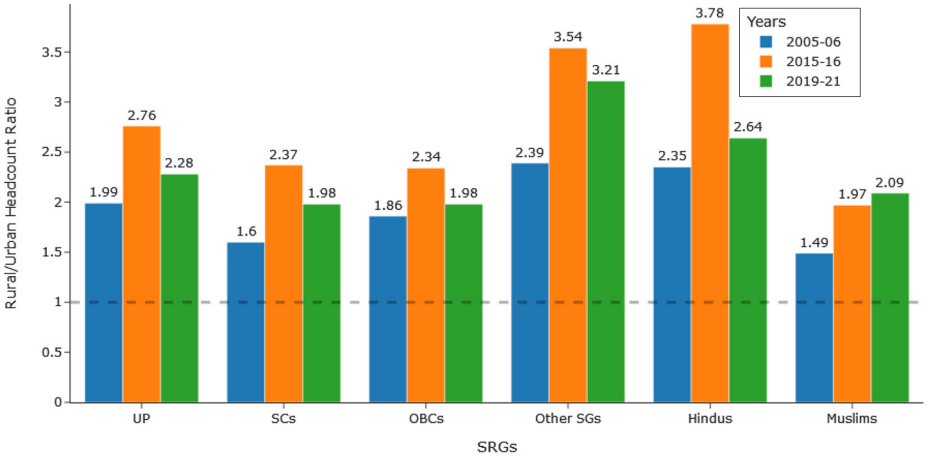
In UP, poverty exhibits stark disparities between rural and urban areas, particularly in terms of the number of poor individuals. Between 2019 and 2021, rural areas had approximately

seven times more poor individuals (4.72 crores) compared to urban areas (0.63 crores), despite rural areas having a population that is roughly three times larger (rural: 17.9 crores and urban: 5.44 crores). Although this rural–urban poverty disparity remains significant, it has been gradually narrowing over time (refer to Figures 3 and 4).

To precisely highlight poverty disparities across different SRGs and areas, Figure 3 presents headcount estimates using rural-to-urban (R-U) ratios. Ratios greater than one indicate significantly higher poverty levels in rural areas compared to urban areas. Notably, the R-U poverty disparity in headcount is more pronounced among relatively less disadvantaged population subgroups (forward caste and Hindus). In 2005–2006, the R-U ratio for forward caste was 2.39, which further increased to 3.54 times in 2015–2016 and 3.21 times in 2019–2021. For Hindus, it was 2.35 times in 2005–2006, reached 3.78 times in 2015–2016 but drastically reduced to 2.64 times in 2019–2021 due to a significant decline in poverty headcount in rural areas during the recent period. Notably, for all SRGs, the R-U ratio declines in the recent period; however, exceptionally for Muslims, it consistently increases over the study period.

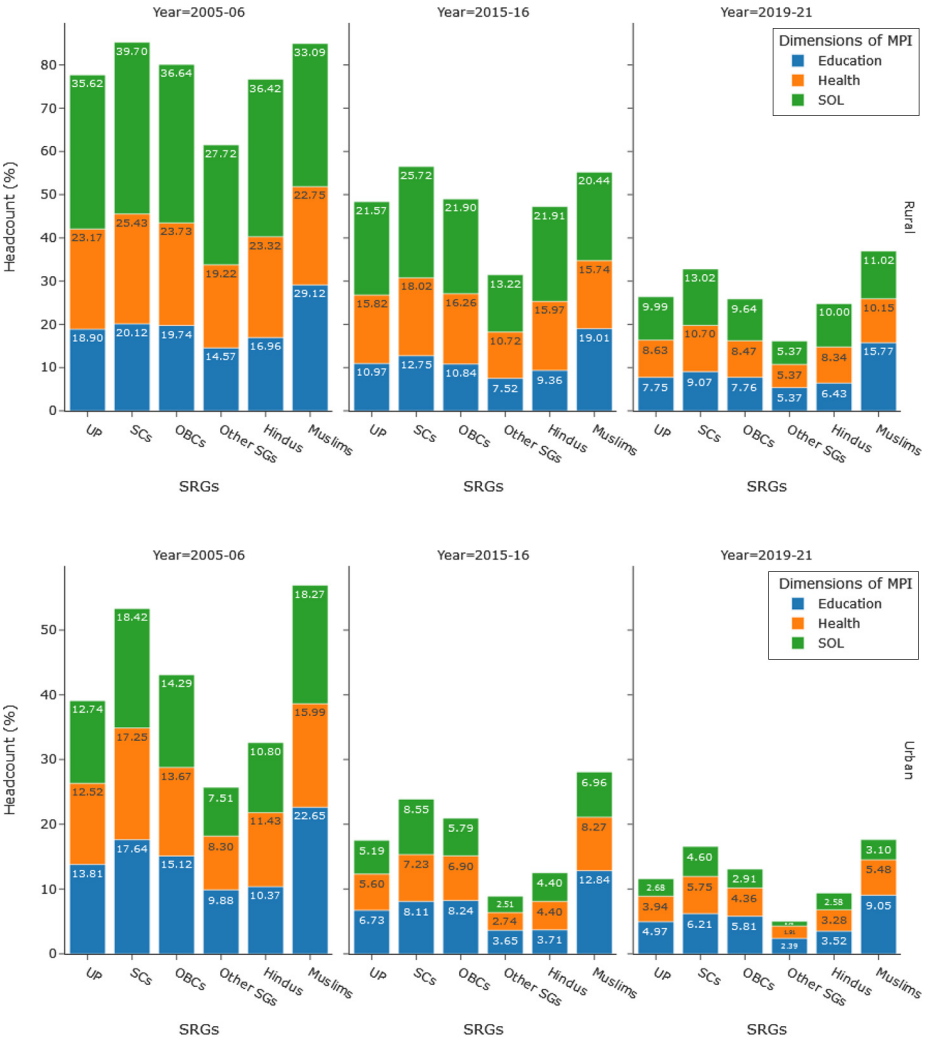
The stacked columns in Figure 4 display the absolute contributions of each dimension (red for education, yellow for health and green for SOL) to the overall headcount of SRGs [10]. Overall, SOL-related deprivations stand out as the primary contributor to poverty among all SRGs, except for Muslims, who experience significant deprivation in the education dimension. The health dimension ranks as the second most influential contributor of poverty across all SRGs, except for Muslims, where SOL becomes the second most influential dimension of poverty. It is worth noting that all SRGs have successfully reduced their SOL-related contributions to poverty. However, for Muslims, eliminating educational deprivation appears to be particularly challenging, given the minimal rate of decline observed over the entire study period.

Evaluating the contributions of dimensions and understanding the positions of SCs and Muslims, identified as the poorest SRGs, requires segregating headcounts into rural and



Source(s): Authors' calculation from unit level records of NFHS-3 (2005–2006), NFHS-4 (2015–2016) and NFHS-5 (2019–2021

Figure 3. Rural-urban headcount ratio across SRGs of Uttar Pradesh, 2005–2006, 2015–2016 and 2019–2021



Source(s): Authors' calculated from unit-level records of NFHS-3 (2005–2006), NFHS-4 (2015–2016) and NFHS-5 (2019–2021)

Figure 4. Poverty headcount by dimensions across SRGs and areas of Uttar Pradesh, 2005–2006, 2015–2016 and 2019–2021

urban areas. Figure 4's stacked columns depict both SCs and Muslims consistently have high and comparable poverty headcounts in both areas. In rural areas, SOL is the primary contributor to poverty for all SRGs, except for Muslims in 2019–2021, where education is significant. In urban areas, deprivation in education is the main factor contributing to poverty for all SRGs. Health deprivation is the second leading contributor to poverty in both rural and urban areas across SRGs in UP, especially in recent years.

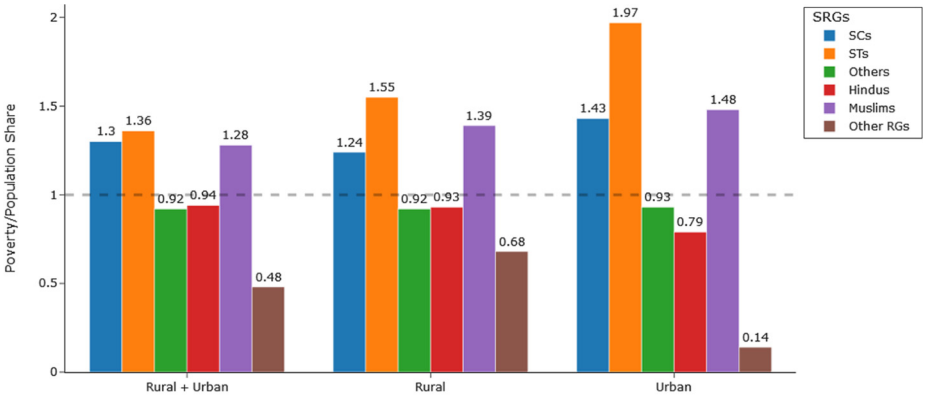
3.3 Poverty-population disproportion across socially and religiously disadvantaged groups

Figure 5 illustrates the distribution of the state's poor and overall population across SRGs in both rural and urban areas of UP [11]. This offers valuable insights into the poverty burden or absolute poverty risk faced by these sub-groups [refer to equation (7)], [12] revealing a significant and striking disparity. Muslims (purple) and SCs (blue) bear a significantly higher burden of poverty relative to their population shares in both rural and urban areas. This highlights the disproportionate poverty faced by Muslims compared to Hindus, and SCs compared to other social groups of the state.

In perspective, Muslims and SCs make up about 19.7% and 20.6% of the total population, respectively. However, their representation in the state's poverty is significantly higher, at 25.11% and 26.8%, respectively. This means households from these groups are 27.7% and 30% more likely, respectively, to experience poverty compared to the overall population in UP, highlighting a notable disparity. In urban areas, this situation worsens, with an alarming absolute poverty risk of 48.2% for Muslims and 43% for SCs. By contrast, rural areas show lower risks at 38.6% for Muslims and 24.4% for SCs.

3.4 Components of multidimensional poverty index: headcount and intensity

The MPI calculation combines headcount (*H*) and intensity (*A*) factors, essential for nuanced poverty analysis [refers to equation (4)]. Considering both *H* and *A* simultaneously reveals shifting subgroup rankings, highlighting the most disadvantaged sections of the population. Notably, subgroups with high values in both *H* and *A* are crucial, signifying the most disadvantaged. Unusual patterns arise when *A* surpasses *H*, indicating a distinctive poverty reduction trajectory, focusing on severe deprivation (Alkire and Santos, 2014). Normally, *H* reduces more than *A* due to scale differences (0%–100% for *H* and 33%–100% for *A*) and *A*'s



Note(s): 1. Estimated (extrapolated as on 1 March 2021) multidimensional poor population is 5.35 crore out of 23.34 crore total population. 2. Category "Others" encompasses both OBCs and forward castes, as per census classification. 3. Category labelled "Others RGs" corresponds to "Other Religious Groups"

Source(s): Authors' calculation based on NFHS-5 (2019–2021) and 2011 Indian Census

Figure 5. Poverty and population share across SRGs in rural and urban Uttar Pradesh, 2019–2021

natural inclination to rise as *H* decreases. This emphasises targeting policies for those near the poverty line (reducing *H*) and those in severe poverty (reducing *A*).

Figure 6 illustrates these trends from 2005–2006 to 2019–2021. SCs and Muslims consistently remain the poorest groups, while other SGs/general is relatively less disadvantaged. While poverty rankings based on headcount are distinct across SRGs, the intensity has become more comparable over time. The persistently high level of intensity indicates that differences in MPI across SRGs are primarily driven by variations in headcount. Notably, intensity consistently exceeds the headcount across all SRGs, particularly in recent years, revealing an unconventional pattern of multidimensional poverty reduction, as sub-groups lie above the diagonal line in Figure 6. This highlights the need for policies targeting severe poverty to reduce both intensity and headcount. Furthermore, the uniformity in poverty intensity reflects the sentiment that "once you are poor, you are equally poor".

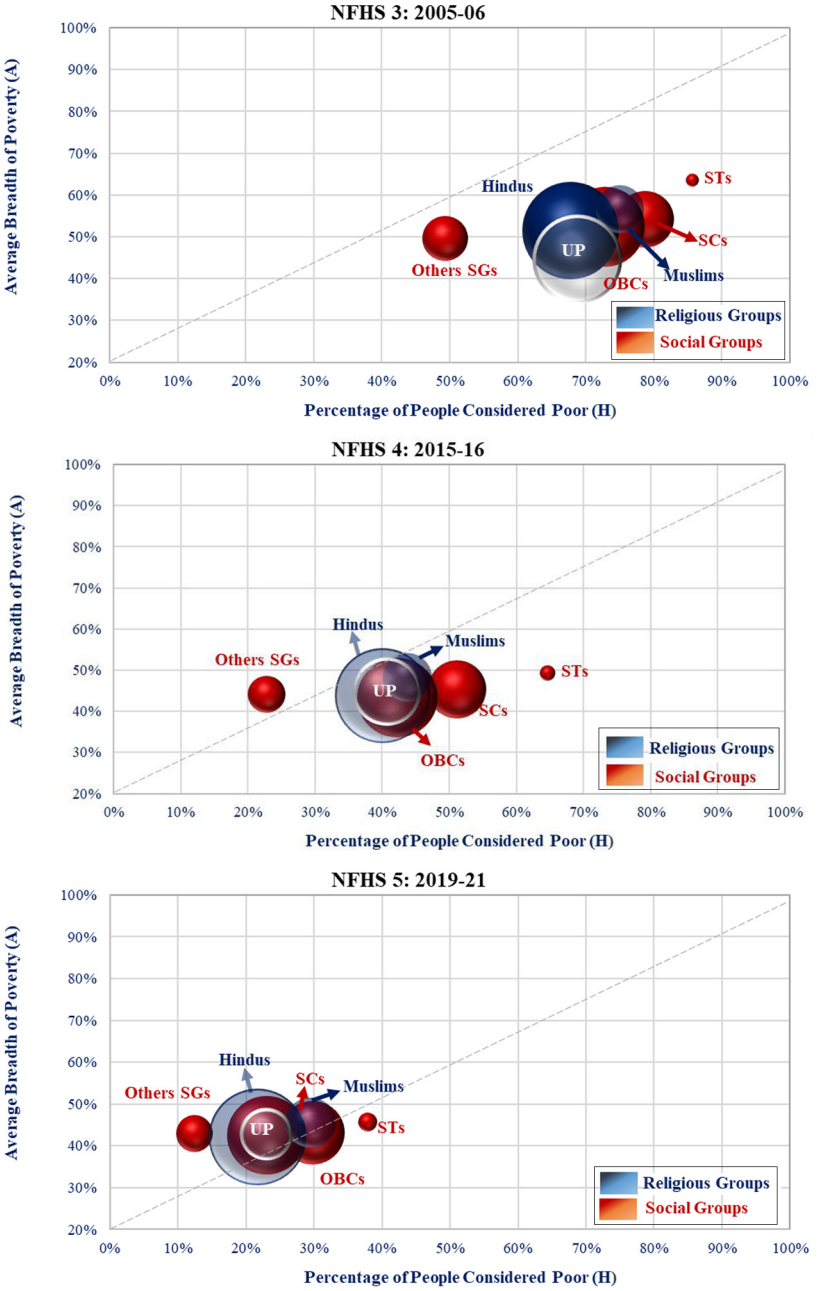
3.5 Contributions of dimensions and indicators to poverty

The contribution of each dimension and indicator to overall poverty is vital for understanding the poverty landscape. However, Alkire and Santos (2014) highlight two crucial points: firstly, interpreting these contributions requires considering the MPI level for accurate insights. Secondly, the contribution of SOL dimension can seem higher due to its higher deprivation incidence, creating higher implicit weights. Thus, while SOL indicators are easier to improve, addressing education and health deprivations, with higher weights, leads to more significant MPI reduction.

Figure 7 illustrates MPI contributions in UP, emphasising key points. Deprivations related to SOL are the primary contributor to poverty, except for Muslims, who exhibit exceptional deprivation in two education-related indicators. While Figure 7 displays the contribution to MPI by indicators for 2019–2021, we have also analysed MPI's dimensional and indicator-wise contributions across SRGs for the entire study period (refers to Supplementary Figure-I). Over time, trends reveal a decrease in SOL's contribution for all SRGs from 2015–2016 to 2019–2021 compared to the previous decade (2005–2006 to 2015–2016). However, for educational deprivations, except for Muslims, there has been an increase for all SRGs recently. Notably, health deprivation significantly contributes to poverty, with a drastic increase in the past decade among all SRGs, albeit minimal in recent years.

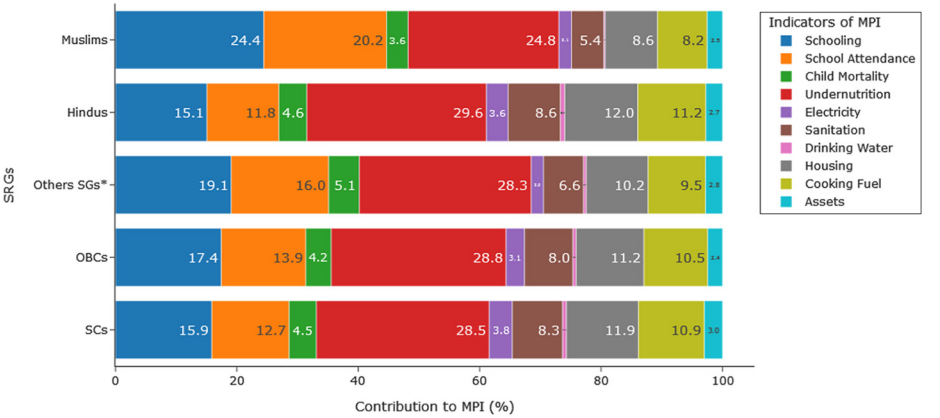
The analysis of the indicators' contribution to multidimensional poverty (refer to Figure 7 and Supplementary Figure 1) reveals key insights. Firstly, within the SOL dimension, sanitation, housing and cooking fuel are pivotal contributors to MPI across SRGs in UP. Disparities exist among SRGs; in 2019–2021, unsafe cooking fuel contributed between 8.2% among Muslims to 11.2% among Hindus, inadequate housing contributed between 8.6% among Muslims to 12% among Hindus and unimproved sanitation contributed between 5.4% among Muslims to 8.6% among Hindus. The remaining SOL indicators accounted for 4.7%–7.5% of deprivation among SRGs: unsafe water contributed 0.2%–0.7%, lack of electricity contributed 2%–3.8% and absence of essential assets contributed 2.4%–3%.

Secondly, when comparing educational deprivation from 2005–2006 to 2019–2021 (refers to Supplementary Figure 1), it can be observed that despite initially low contribution, educational deprivation has increased for all SRGs, particularly in Child School Attendance. In 2005–2006, schooling deprivation ranged from 11%–18% (Hindus-Muslims) and Child School Attendance from 11.9%–17.8% (Hindus–Muslims). By 2015–2016, it rose to 12.6%–21.6% (Hindus–Muslims) in schooling and ranged from 8%–15.8% (Hindus–Muslims) in Child School Attendance (refers to Supplementary Figure-I). In 2019–2021, Child School



Source(s): Authors' calculation from unit level records of NFHS-3 (2005–2006), NFHS-4 (2015–2016) and NFHS-5 (2019–2021)

Figure 6. Headcount and intensity of MPI for SRGs of Uttar Pradesh, 2005–2006 to 2019–2021



Source(s): Authors' calculation from unit level records of NFHS-5 (2019–2021)

Figure 7. Contribution to MPI by indicators in Uttar Pradesh, 2019–2021

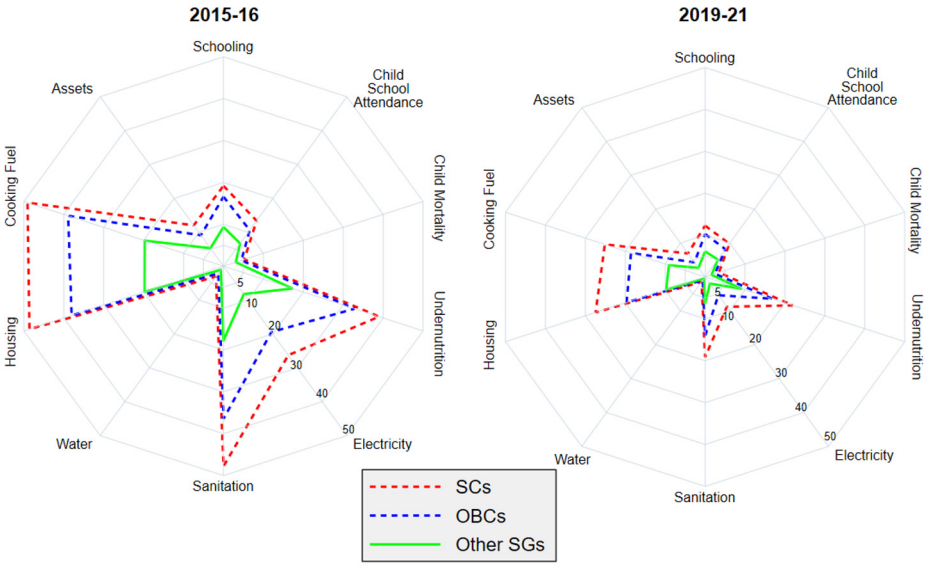
Attendance surged to 11.8%–20.2% (Hindus–Muslims) and schooling deprivation ranged from 15.1%–24.4% (Hindus–Muslims).

Thirdly, while health deprivation constitutes about one-third of multidimensional poverty in aggregate across all SRGs (except among Muslims), undernutrition stands out as the most significant contributor among the indicators, ranging from 28.3% in other SGs/general to 29.6% in Hindus in 2019–2021, except among Muslims (which is 24.8%[13]). These figures are alarming, especially considering India's higher average prevalence of undernourishment compared to Sub-Saharan Africa (Banerjee and Duflo, 2011).

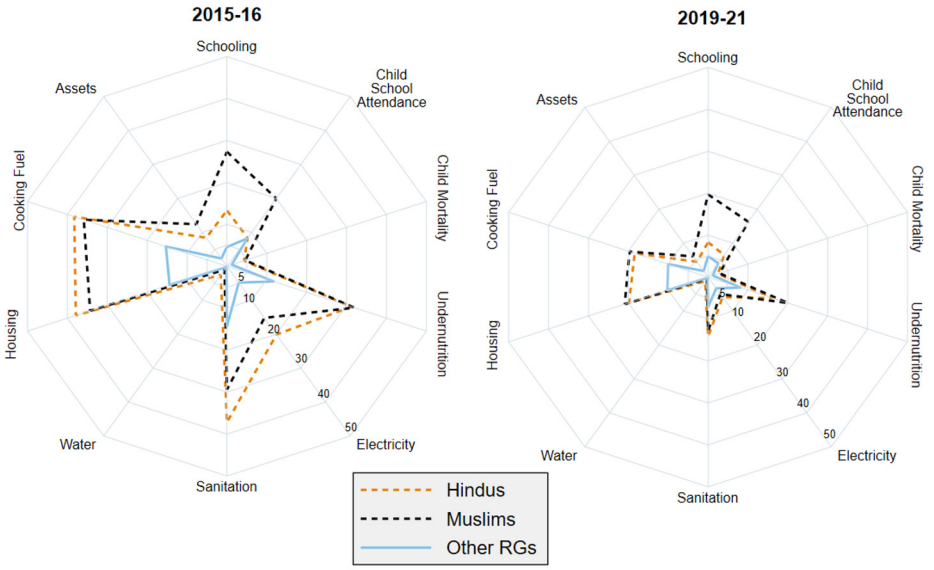
Analysis of the relative contributions of each dimension, as shown in Figure 7, offers insights into poverty drivers across SRGs in the state. To gain more precise insights, it is crucial to contextualise these contributions alongside absolute deprivation levels, illustrated in a radar-type figure (refers to Figure 8), considering the censored headcount [14] across all indicators.

The upper portion of Figure 8 (Section A) reveals that SCs are the most impoverished (farthest from the origin, marked by red lines), whereas other SGs/general are the least poor (closest to the origin, denoted by green lines). Despite this, significant variations in deprivation levels persist across the state's social groups. A considerable portion of the poor population faces deprivation, especially in housing (ranging from 9.75% among other SGs to 27.4% among SCs), cooking fuel (9.06% among other SGs to 25.1% among SCs), undernutrition (9.04% among other SGs to 21.9% among SCs) and sanitation (6.29% in other SGs to 19.15% in SCs) in 2019–2021. Notably, there has been a decrease in sanitation-related deprivation among poor SCs (47.4% in 2015–2016), followed by cooking fuel (49.06% in 2015–2016), housing (48.6% in 2015–2016) and undernutrition (38.9% in 2015–2016). Despite improvements, challenges persist, underscoring the need for targeted interventions in these critical areas.

The lower section of Figure 8 (Section B), which examines indicator-wise deprivation trends among religious groups, reveals several key concerns. Firstly, poor Muslim households face notable education-related deprivation, with a persistent gap compared to Hindus (19.7% vs 8.3% for schooling, and 16.3% vs 6.5% for Child School Attendance in 2019–2021). Secondly, poor among Hindus and Muslims both encounter substantial housing



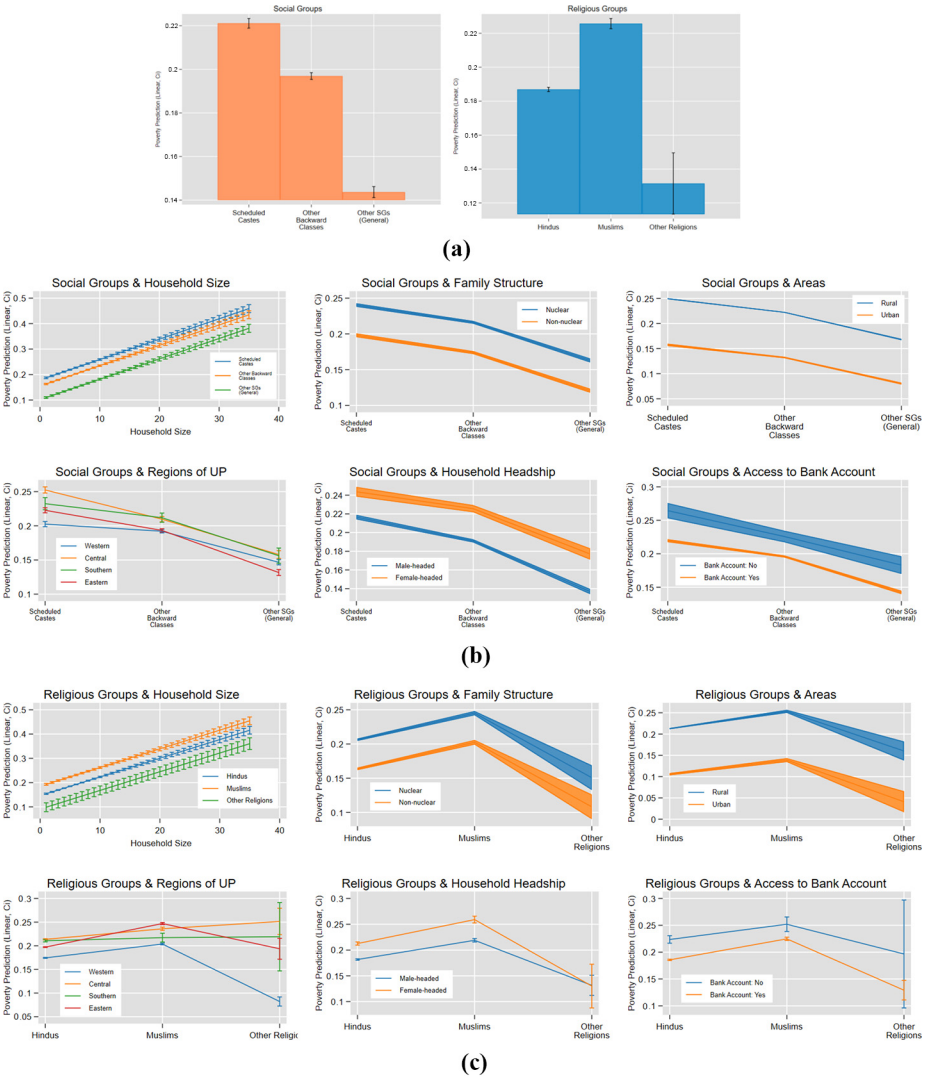
(a)



(b)

Note(s): (a) Social groups; (b) religious groups
Source(s): Authors' calculation from unit level records of NFHS-4 (2015–2016) and NFHS-5 (2019–2021)

Figure 8. Censored headcount ratio by indicators across SRGs of Uttar Pradesh



Note(s): (a) Social and religious groups; (b) social groups interactions; (c) religious groups interactions

Source(s): Authors' estimation based on regression

Figure 9. Predictive average deprivation score (with 95% CI) for social and religious groups of UP (2019–2021) as per regression estimates

(19.8% and 20.9%) and cooking fuel (18.4% and 19.7%) deprivations in 2019–21. Thirdly, undernutrition affects Muslims (20%) and Hindus (16.2%) in 2019–2021. Conversely, sanitation-related deprivation is higher among Hindus (14.2%), closely followed by Muslims (12.9%). These disparities underscore the urgent need for targeted interventions, especially

in education, housing, cooking fuel, undernutrition and sanitation, to address challenges faced by poor households in both Hindu and Muslim communities in the state.

3.6 Regression results

Regression analysis shows that social and religious groups are significant predictors of multidimensional poverty, even after controlling for other factors. SCs have the highest deprivation among social groups, while Muslims experience higher deprivation than Hindus.

Larger households are associated with higher multidimensional poverty, especially among SCs (followed by OBCs and Others) and Muslims (compared to Hindus). This aligns with previous research (Panagariya and More, 2014). Non-nuclear families generally show lower deprivation, particularly among SCs and Muslims. This may be due to better child care (Kumar and Ram, 2013) and/or strategic resource pooling (Neupert, 2019), but further research is needed to elucidate the specific mechanisms underlying this association.

Urban households experience lower deprivation and a less pronounced social gradient of deprivation compared to rural households (Mohanty and Vasishtha, 2021). This disparity is greatest for SCs and Muslims. Female-headed households experience higher poverty across all SRGs, confirming existing research (Chakrabarti, 2021). The Central region in UP has the highest predicted deprivation scores, corroborates the findings of Arora and Singh (2015, 2017). While the Southern region's significance is unclear, the Central region may also show higher poverty for OBCs and others. For Muslims, the Eastern region is poorest. Generally, the Western region has the lowest poverty, except for general/other SGs where the Eastern region is least poor. These findings highlight the need for in-depth, disaggregated poverty analysis. Bank account access reduces poverty for all groups, with the largest impact on SCs. While this aligns with NITI Aayog's approach in India's National MPI, it is important to remember that this is a correlation, not causation.

4. Discussion

The present study reveals a complex and evolving landscape of poverty in UP. While progress has been made in reducing poverty across social groups, disparities persist, with SCs and Muslims remaining particularly vulnerable. The faster decline in poverty among SCs is encouraging, but the slower progress for Muslims underscores the need for targeted interventions to address their unique challenges, particularly in education.

The multidimensional nature of poverty is evident in the varying deprivation profiles across SRGs. While SOL-related deprivations, especially sanitation, housing and cooking fuel, are widespread, education emerges as a critical challenge for Muslims. The increasing significance of educational deprivation, even in urban areas, highlights the need for educational reforms and investments. The persistent burden of health deprivations, especially undernutrition, across all groups demands urgent attention to improve nutrition and health outcomes in the state.

The dynamics of poverty also vary across household characteristics and regions. Larger households and female-headed households face greater poverty risks, underscoring the need for policies that support these vulnerable groups. The consistently high poverty rates in the Central region, coupled with regional variations in deprivation patterns, emphasise the importance of geographically targeted interventions.

While bank account access is associated with poverty reduction, further research is needed to establish causal relationships and explore the diverse impacts of financial inclusion across different SRGs. The unconventional pattern of poverty reduction, with absolute poverty risk exceeding the headcount ratio, highlights the need to prioritise policies that address the depth and severity of poverty, particularly among the most disadvantaged groups.

Overall, the present study emphasises the multifaceted nature of poverty in UP. Effective poverty alleviation strategies must consider the complex interplay of social, religious, regional and household factors. Disaggregated and in-depth poverty analysis is essential to inform targeted interventions that address the specific needs and challenges faced by different communities and individuals within the state.

5. Conclusion and policy implications

The study delved into extensive multidimensional poverty analysis in UP spanning 2005–2006 to 2019–2021, focusing on diverse SRGs. Despite notable poverty reduction, substantial disparities persist among SRGs, particularly affecting SCs and Muslims, underscoring their historical disadvantages. The concentration of poverty among socio-religious minorities underscores the need for inclusive development. Focused measures are required to address structural vulnerabilities and accelerate poverty reduction among SCs and Muslims.

Rural areas bear a disproportionate poverty burden across all SRGs. Policies should specifically target highlighted vulnerable groups to address disparities, particularly in rural areas where deprivation is more severe. It is essential to focus not only on reducing headcount ratios but also on addressing the intensity of poverty and specific deprivation indicators. While short-term poverty reduction is important, long-term efforts must concentrate on historically marginalised SRGs, considering their unique challenges.

The study identifies key areas of concern, such as access to education, housing conditions, clean cooking fuel, nutrition and improved sanitation facilities, where poor households, especially among SCs and Muslims, face substantial challenges. Education-related deprivations, particularly among Muslims, have risen significantly, suggesting that targeted scholarships, stipends and incentives for economically disadvantaged students could reduce dropout rates. Achieving an urban–rural balance through affordable housing schemes and improving access to basic amenities could also help improve living conditions. Undernutrition remains a significant concern, particularly for children, impairing physical and mental growth and limiting their educational and economic prospects. Addressing this through targeted nutritional programmes and awareness campaigns is crucial for enhancing overall health and development outcomes. While government programmes like Swachh Bharat Mission, Jal Jeevan Mission, Poshan Abhiyan, Samagra Shiksha and Pradhan Mantri Ujjwala Yojana aim to reduce poverty, further research is needed to assess their effectiveness and impact on different groups.

The regression analysis reveals that larger households, especially among SCs and Muslims, are linked to higher poverty. Policies promoting family planning, child care and resource pooling could help alleviate this burden. Non-nuclear families, particularly among SCs and Muslims, tend to show lower deprivation, suggesting the importance of social support networks and family-oriented policies. Additionally, region-specific interventions are needed, as areas such as the Central and Eastern regions of UP experience higher poverty rates. Access to bank accounts is shown to reduce poverty across all groups, with the largest impact on SCs, highlighting the importance of financial inclusion policies. However, while these correlations are significant, further research is required to establish causality.

In conclusion, despite the challenges, recognising these disparities and implementing evidence-based policies can guide UP towards a more equitable future. These efforts will foster social justice, ensuring a higher quality of life for all residents, particularly those from marginalised communities.

6. Limitations and future directions

This study reveals poverty disparities across SRGs in UP, focusing on empirical evidence rather than speculative interpretations regarding the underlying reasons for the observed patterns. Future research should investigate the rooted causes of these disparities and the

impact of interventions. While the NFHS data is valuable, it does not allow for a direct assessment of government programme impact. Further studies exploring this, along with more granular analysis of social and religious group sub-divisions and policy evaluations, would provide valuable insights for policy improvement.

Notes

1. NFHS, led by IIPS Mumbai under MOHFW, Govt. of India. For details, visit: http://rchiips.org/nfhs/and https://dhsprogram.com/
2. The effects of revised MPI methodology on the results are discussed in Alkire *et al.* (2022). For an in-depth understanding of the MPI methodology, refer to Technical Note 58 in Alkire *et al.* (2024), Technical Note 5 in UNDP and OPHI (2023) and Chapter 6 of Alkire *et al.* (2015).
3. While the standard OPHI/UNDP methodology for calculating the MPI is detailed in the cited sources, this study focuses on presenting novel empirical findings. In India, NITI Aayog applies a similar methodology, with the addition of "access to bank accounts" in the SOL dimension and "maternal mortality care" in the health dimension.
4. Harmonisation includes classifying "flush to don't know where" as improved sanitation, and "tanker trucks" and "bottled water" as improved water, aligning with NFHS-5 standards. "Kerosene", "other" and "no food cooked in household" were harmonised as non-solid fuels, following international guidelines.
5. A household is considered deprived in an indicator if it doesn't meet the minimum standard for that indicator (e.g. no one in the household has completed six years of schooling). The total deprivation score (c_i) is calculated by adding up and weighting the deprivations across all indicators. If this total exceeds a certain threshold, the household is classified as poor.
6. Since household is the unit of analysis, if a household is found to be multidimensionally poor, all individuals within that household are also classified as poor.
7. A value exceeding one indicates a greater burden of poverty compared to population shares.
8. For 2019–21, India's MPI is 6.9 and it is ranked 53th among the poorest 110 countries (UNDP and OPHI, 2023).
9. The 2019–2021 population for UP was extrapolated to 1 March 2021 using census data from 1991, 2001 and 2011, considering social/religious groups and rural/urban areas.
10. The headcount ratio has been converted into MPI's absolute dimensional share using the selected dimensions: education, health and SOL.
11. The poverty-population share has been calculated from 2005–2006 to 2019–2021 but is displayed only for 2019–2021 due to minimal variation, especially without decimal points.
12. The absolute poverty risk is determined by dividing the poverty share by the population share. A value exceeding one indicates a greater burden of poverty compared to population shares, highlighting that the group is relatively more poverty-prone.
13. Undernutrition is the main driver of poverty among Hindus, while both education and undernutrition play a significant role for Muslims. This discrepancy will be further explored in the upcoming figure on the censored headcount.
14. One can also calculate the uncensored headcount ratio, which measures deprivation in specific indicators across the entire population, including both poor and non-poor. As shown in Supplementary Figure 2, it highlights broader disparities and more widespread deprivation, with SCs and Muslims experiencing higher levels across indicators like housing, sanitation and undernutrition, as it includes non-poor individuals also facing these challenges.

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Further reading

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Supplementary material

The supplementary material for this article can be found online.

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