The Health Factor in Multidimensional Poverty: Trends and Inequalities in India, 2005-2021

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India's commitment to Sustainable Development Goal 1—to end poverty in all its forms—necessitates a multidimensional approach beyond conventional income measures. This study investigates the evolution and determinants of multidimensional poverty in India, analyzing its incidence, intensity, and structural drivers across demographic and social groups using the Alkire-Foster framework. Using data from three National Family Health Survey (NFHS) rounds (2005–06, 2015–16, and 2019–21), the study computes the Multidimensional Poverty Index (MPI) across health, education, and living standard dimensions. Advanced decomposition techniques such as Kitagawa and Blinder-Oaxaca were employed to quantify the relative contributions of headcount ratios, poverty intensity, and socioeconomic characteristics across caste, wealth quintiles, religion, and regions. India's MPI declined markedly from 0.282 in 2005–06 to 0.066 in 2019–21, driven by reductions in the headcount ratio (52.3% to 14.7%) and moderate improvement in intensity (53.9% to 44.5%). The Scheduled Tribes, children under 14 years, rural households, and females remained the most deprived groups. Decomposition analyses indicated that 85–89% of poverty reduction stemmed from falling headcount ratios, with improvements in endowments especially education, maternal health, and access to assets playing a key role. The nutrition indicator emerged as the single largest contributor to poverty, accounting for over one-third of total deprivations. Despite remarkable progress in reducing multidimensional poverty, substantial intergroup and regional disparities persist. Strengthening nutrition, education, and social inclusion policies is essential for accelerating equitable poverty reduction and achieving sustainable human development in India.

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The United Nations' Sustainable Development Goal[1] established a mandate to end poverty in all its forms everywhere by 2030 (United Nations, 2024). Poverty is widely acknowledged as a multifaceted phenomenon that includes multiple deprivations, including but not limited to health, education, and other often overlooked dimensions. Consequently, an assessment of poverty necessitates a multidimensional approach. This multidimensional perspective on resource scarcity has gradually emerged as a critique of mainstream economic development paradigms, historically prioritizing growth in per capita Gross National Product (GNP) (Roy et al., 2019). Nevertheless, poverty analysis in many countries continues to be constrained by a unidimensional framework. These analyses rely solely on equivalent consumption as a proxy for poverty, thereby neglecting to capture the full extent of deprivations experienced by populations.

In response to these methodological limitations, scholars have proposed various refinements to poverty measurement frameworks. from the Human Poverty Index (HPI) and Human Development Index (HDI), which first introduced multidimensional perspectives in the late 1990s (Sen & Anand, 1997; UNDP, 1997) to the Multidimensional Poverty Index (MPI) developed by Alkire and Foster (Alkire & Foster, 2011; Alkire & Santos, 2011). The MPI represents a pivotal advancement, enabling direct measurement of cumulative deprivations at the household level through a dual-cutoff counting methodology for poverty classification. Unlike its predecessors, the MPI's theoretical architecture covers three dimensions operationalized through ten distinct indicators, facilitating granular analysis of both the nature and intensity of household-level deprivations. India has adopted a domestically adapted MPI developed by the NITI Aayog, adhering to the Alkire and Foster (AF) methodology employed in the global MPI. While incorporating all ten global MPI deprivation indicators, the national index expands its scope to include maternal health and bank accounts, aligning with India's development priorities (Alkire & Santos, 2011).

The Multidimensional Poverty Index offers valuable insights into the multifaceted nature of poverty beyond simple headcount measures. Existing research has explored multidimensional poverty patterns in India (Pradhan et al., 2022; Das et al., 2022), consistently demonstrating significant correlations between poverty indices and deprivation patterns among marginalized groups, particularly Scheduled Castes and Scheduled Tribes (Pradhan et al., 2022; Bagli & Tewari, 2019; Kaibarta et al., 2022), Muslim communities (Das et al., 2022) and rural inhabitants (Das et al., 2023). While existing literature has explored multidimensional poverty patterns in India, few studies have provided a long-term analysis spanning 15 years of demographic shifts. This study contributes to the literature by filling a critical methodological gap: the application of the Blinder-Oaxaca decomposition to the Multidimensional Poverty Index (MPI). Unlike previous studies that largely rely on descriptive trends or standard regression analyses, this paper systematically disentangles the ‘endowment effects’ (changes in population characteristics) from ‘coefficient effects’ (returns to those characteristics). This offers a perspective on whether the reduction in poverty among marginalized groups (SCs/STs) is due to improved attributes or structural reductions in the disadvantages they face.This comprehensive approach not only highlights intersectional disparities but also aims to identify targeted intervention opportunities, ultimately aiming to develop more precise and effective strategies for poverty alleviation.

Methodology

The global multidimensional poverty index has undergone important methodological evolutions since its inception in 2010. Currently, the dual-cutoff counting methodology developed by (Alkire and Foster., 2011) is being utilised in the calculation of global multidimensional poverty index. The Alkire-Foster framework for measuring multidimensional poverty is grounded in Amartya Sen’s concept of capability deprivation and Atkinson’s counting methods. This methodology employs a two-step approach: identification and aggregation. The dual cut-off method involves setting thresholds for both poverty and deprivation. An individual is considered poor if their deprivation score reaches or surpasses the poverty cutoff, ‘k’. A universal cutoff of one-third (k=0.333) has been established. The Alkire-Foster (AF) methodology is particularly advantageous for this analysis vis-à-vis other poverty measures because of its property of subgroup decomposability. Unlike standard headcount ratios or regression residuals, the AF method allows the Multidimensional Poverty Index (MPI) to be broken down by population subgroups (such as caste, religion, or region) and by dimensions (health, education, living standards). This feature is essential for identifying whether poverty reduction is driven by a decrease in the number of poor people (incidence) or a reduction in the intensity of their deprivation, a nuance often lost in unidimensional poverty measurements.

The global MPI structure constitutes of three dimensions including health, education and living standards and ten indicators with both dimensions and indicators equally weighted. A deprivation profile is established for each person pointing towards the deprived indicators. Along with it, a headcount ratio (H) indicating the proportion of multidimensionally poor people in the population and intensity of poverty (A) represented by the average percentage of weighted deprivations experienced by the poor is obtained. MPI is calculated as a multiplicative sum of H x A (NITI Aayog, 2023). The H and A are defined as :

$$H = \frac{1}{n}\sum_{i=1}^{n}\rho(g_i^0, w, k),\ A = \frac{1}{q}\sum_{i=1}^{n}(\rho(g_i^0, w, k) \times c_i),\ \text{where } q = \sum_{i=1}^{n}\rho(g_i^0, w, k)$$

Consequently, the adjusted poverty headcount ratio (MPI) is calculated as :

$$\text{MPI} = M_0 = H \times A = \frac{1}{n}\sum_{i=1}^{n}(\rho(g_i^0, w, k) \times c_i)$$

The NITI Aayog constructed a national MPI adhering to the Alkire and Foster (AF) methodology employed in the global MPI creating an indigenized measure of assessing multidimensional poverty. While incorporating all ten global MPI indicators, the national index expands its scope to include maternal health and bank accounts, aligning with India's development priorities (NITI Aayog, 2023). India's Multidimensional Poverty Index (MPI) approach defines individuals under five years of age and within the working-age range of 15 to 54 for men and 15 to 49 for women as relevant population segments. However, when assessing child-adolescent mortality, a narrower age group is employed, including children aged 0 to 59 months and adolescents aged 10 to 18 years. In contrast to traditional monetary poverty assessments based on consumption expenditure, the national MPI provides a granular analysis of deprivations at the district level.

The dual cut off methodology employs majorly two steps namely identification and aggregation. Identification involves building a deprivation profile by applying cutoffs within an indicator and identifying the incidence of multidimensional poverty by applying a cut-off across all indicators. The deprivation of each individual is marked as either 0 or 1 indicating not deprived (0) and deprived (1). If the achievement of an individual i in indicator j is denoted by x_{ij}, the first order cut off for indicator j is denoted by z_j, and the status of the individual is denoted by $g_{ij°}$, then

$$g_{ij°} = 1 \text{ if } x_{ij}, < z_j \text{ and } g_{ij°} = 0 \text{ otherwise for all } i = 1,2,\ldots.n \text{ and } j = 1,2,\ldots.d$$

The counting vector or deprivation score is the sum of the weighted status of all the indicators for an individual.

The deprivation score of the individual i can be denoted as:

$$c_i = w_1 g_{i1}{}^0 + w_2 g_{i2}{}^0 + \ldots. + w_j g_{ij}{}^0, \text{ or } c_{i = \Sigma_{j=1}^{d}} w_j g^0{}_{ij}$$

where c_i is the counting vector for individual i upto the j^{th} indicator, $g_{ij°}$ is the status of each indicator and w_j is the weight assigned to each indicator.

The poverty cut-off also mentioned as the second order cut-off is deployed to be 0.33 (33%) is the minimum deprivation score as individuals having a deprivation score greater than or equal to the second order cut off are considered to be multidimensionally poor. A score less than second order cut off is replaced with 0.

Headcount Ratio (H), where q is the total number of multidimensionally poor people in a population n is computed as,

$$\text{H} = \frac{q}{n}$$

Similarly, the average proportion of deprivations experienced by multidimensionally poor individuals denoted by Intensity of Poverty (A) is computed as,

$$A = \frac{1}{q}\sum_{i=1}^{q} c_i(k)$$

$$\textit{MPI is represented as } M_0 = H \times A,$$

$$Or\ H \times A = \frac{q}{n} * \frac{1}{q}\sum_{i=1}^{q} c_i(k) = \frac{1}{n}\sum_{i=1}^{n} c_i(k) = \frac{1}{n}\sum_{i=1}^{n} \sum_{j=1}^{d} w_j\, g_{ij}{}^{\circ}(k)$$

(where, c_i (k) is the censured deprivation score up to the i^{th} individual and q is the number of multidimensionally poor individuals. Further,g_{ij} is household member status and w_j is the weight of j^{th} indicator. Here, n is the total population and d is the number of dimensions)

Table 1: Dimension, Indicators, and Derivation conditions (NITI Aayog)

Dimension of Poverty	Indicator	Deprivation condition	Weight
Health (1/3)	Nutrition	Any person under 70 years of age for whom nutritional information is available is undernourished[1].	1/6
	Child -Adolescent Mortality	A child under 18 has died in the household in the five years preceding the survey	1/12
	Maternal Health	Any woman in the household who has given birth in the 5 years preceding the survey, has not received at least 4 antenatal care visits for the most recent birth or has not received assistance from trained skilled medical personnel during the most recent childbirth	1/12
Education (1/3)	Years of Schooling	No eligible household member has completed six years of schooling	1/6
	School Attendance	Any school-aged child3 is not attending school up to the age at which he/she would complete class 8	1/6
Standard of Living (1/3)	Cooking Fuel	A household cooks using solid fuel, such as dung, crops, shrubs, wood, charcoal, or coal	1/21
	Sanitation	The household has unimproved or no sanitation facility or it is improved but shared with other households	1/21
	Drinking Water	The household’s source of drinking water is not safe or safe drinking water is a 30-minute walk or longer walk from home, roundtrip	1/21
	Electricity	The household has no electricity	1/21
	Housing	The household has inadequate housing materials in any of the three components: floor, roof, or wall	1/21
	Assets	The household does not own more than one of these assets: radio, TV, telephone, computer, animal cart, bicycle, motorbike, or refrigerator, and does not own a car or truck	1/21
	Bank Account	No household member has a bank account or a post office account.	1/21

$$\text{Deprivation Score} = \frac{1}{3}\text{Health}_i + \frac{1}{3}\text{Education}_i + \frac{1}{3}\text{ Standard of Living}_i,$$

$$[\frac{1}{3}\text{Health}_i = \frac{1}{6}\text{Nutrition}_i + \frac{1}{12}\text{ Child – Adolescent Mortality}_i + \frac{1}{12}\text{ Maternal Health}_i$$

$$\frac{1}{3}\text{Education}_i = \frac{1}{6}\text{ Years of schooling}_i + \frac{1}{6}\text{ School Attendance}_i$$

$$\frac{1}{3}\text{ Standard of Living}_i = \frac{1}{21}\text{ Cooking Fuel}_i + \frac{1}{21}\text{Sanitation}_i + \frac{1}{21}\text{ Drinking Water}_i + \frac{1}{21}\text{Electricity}_i + \frac{1}{21}\text{Housing}_i + \frac{1}{21}\text{Assets}_i + \frac{1}{21}\text{ Bank Account}_i]$$

Data

The National Family Health Survey (NFHS), a representative of the Indian Demographic Health Survey (DHS), is executed by the International Institute for Population Sciences (IIPS), Mumbai under the mandate of India's Ministry of Health and Family Welfare. The primary objectives of the NFHS constitutes the provision of data and technical assistance to inform the formulation and implementation of health and family welfare policies and programs. Moreover, the NFHS offers valuable insights into contemporary health and family welfare challenges. This study employs micro survey data from three rounds of NFHS surveys, (NFHS-3, NFHS-4 and NFHS -5) analysing socio – economic characteristics such as age, caste, religion, place of residence, wealth status, household size etc of different social groups such as Scheduled Castes (SC), Scheduled Tribes (ST), Other Backward Classes (OBC) and Others (IIPS, n.d.).

Outcomes

Primarily, our research study presents a comprehensive analysis of multidimensional poverty across diverse socioeconomic and social groups in India, examining three critical time periods (2005-06, 2015-16, and 2019-21). Through the systematic computation of Multidimensional Poverty Index (MPI) values, we evaluated poverty dynamics across various socio-economic groups and geographical regions. Our investigation extended beyond conventional poverty metrics to capture the temporal evolution of multidimensional deprivation patterns across different social groups. The research systematically decomposed the contributing factors to MPI variations, with particular attention to the interplay between headcount ratios and intensity of poverty. Furthermore, we conducted an in-depth examination of specific deprivation indicators and their relative contributions to overall poverty measures. By implementing decomposition techniques to analyze mean differences in MPI across groups, we identified and quantified the fundamental drivers of poverty disparities, thereby providing insights into both observed characteristics and underlying structural factors that perpetuate poverty across different social segments.

Socioeconomic Status Characteristics

The analysis incorporated multiple socioeconomic status indicators through a comprehensive set of demographic and social parameters. Age stratification comprised four distinct categories: early childhood (0-5 years), school-age (6-14 years), working-age adults (15-59 years), and elderly (60+ years), enabling examination across the complete lifespan. Marital status was classified into three categories: married, unmarried, and widowed/separated/divorced. Household composition was categorized by size: small (≤4 members), medium (5-6 members), and large (>6 members). The analysis was deepened by examining the data through the lens of social groups, including caste (Scheduled Castes, Scheduled Tribes, Other Backward Classes, and Others) and religion (Hindu, Muslim, Christian, Sikh, and Others). Economic status was assessed through wealth quintiles (poorest, poorer, middle, richer, richest). Additional demographic variables comprising gender (male/female) and residential location (rural/urban) were also utilised in the analysis.

Statistical Analysis

Our analytical framework incorporates multiple methodological approaches to examine multidimensional poverty across social groups. Initially, we compute the Multidimensional Poverty Index (MPI) values across various socioeconomic status (SES) categories by calculating their respective headcount ratios and intensities spanning three National Family Health Survey (NFHS) periods (2005-06, 2015-16, and 2019-21). This analysis is extended to state-level disaggregation of MPI values across different social groups for the corresponding time periods.To assess the probability of experiencing multidimensional poverty by background characteristics, we employ pooled logistic regression analysis, generating odds ratios based on unadjusted headcount ratios while controlling for relevant covariates performed using STATA 17 and MLwiN 3.09. We further employ the Kitagawa Decomposition Method to analyze the relative contributions of headcount ratio and intensity to multidimensional poverty across social groups over consecutive NFHS periods (NFHS 3-4, NFHS 4-5, and NFHS 3-5), along with the net differences in MPI across these intervals. Finally, we implement the Blinder-Oaxaca Decomposition to analyse mean differences in multidimensional poverty across different groups over the appended time periods (NFHS 3-4, NFHS 4-5, and NFHS 3-5). To ensure the robustness of the trend analysis, the comparability of indicators across the three NFHS rounds was carefully maintained. While minor changes in survey questionnaires occurred over the 15-year period, the definitions of the core 12 indicators used for the MPI construction—specifically regarding nutrition, mortality, and standard of living assets—were harmonized to match the standardized definitions utilized by the Oxford Poverty and Human Development Initiative (OPHI) and NITI Aayog for longitudinal analysis. Finally, it is imperative to note that the factors identified through the logistic regression and decomposition analyses represent statistical associations. Given the cross-sectional nature of the NFHS data, these findings should be interpreted as correlational rather than establishing definitive causal relationships between socioeconomic characteristics and multidimensional poverty.

Decomposition

- **Kitagawa Decomposition**

Decomposition techniques serve as essential analytical tools for disaggregating demographic variables into their constituent components, thereby addressing the methodological challenges posed by confounding compositional effects (Canudas Romo, 2003). Building upon Kitagawa's (1955) seminal work on 'components of a difference between two rates,' which advanced beyond the limitations of traditional standardisation techniques, our analytical framework focuses on decomposing inequalities across distinct social groups (Scheduled Castes, Scheduled Tribes, Other Backward Classes, and Others). The temporal analysis spans three intervals of the National Family Health Survey (NFHS): between NFHS-3 and NFHS-4, NFHS-4 and NFHS-5, and the comprehensive period between NFHS-3 and NFHS-5. This approach enables the examination of variations in both the headcount ratio (H) and intensity (A) of multidimensional poverty across different socio-economic strata.

The overall rate of difference in headcount ratio across two groups can be decomposed as:

$$\Delta = MPI^A - MPI^B = \sum_i H_i^B . A_i^B - \sum_i H_i^A . A_i^A$$

where MPI denotes the value of Multidimensional Poverty Index, H denotes headcount ratio and A represents the intensity of poverty across two time periods A and B.

Each of these terms will be divided into two equal parts with certain additional terms added and subtracted, implying that the difference (Δ) will be constant:

$$\Delta = \frac{\Sigma_i H_i^B \cdot A_i^B}{2} + \frac{\Sigma_i H_i^B \cdot A_i^B}{2} - \frac{\Sigma_i H_i^A \cdot A_i^A}{2} - \frac{\Sigma_i H_i^A \cdot A_i^A}{2} + \frac{\Sigma_i H_i^B \cdot A_i^A}{2} - \frac{\Sigma_i H_i^B \cdot A_i^A}{2} + \frac{\Sigma_i H_i^A \cdot A_i^B}{2} - \frac{\Sigma_i H_i^A \cdot A_i^B}{2}$$

Therefore,

$$\Delta = \sum_i (H_i^B - H_i^A) . [\frac{A_i^B + A_i^A}{2}] + \sum_i (A_i^B - A_i^A) . [\frac{H_i^B + H_i^A}{2}] .$$

Here, the proposition attributable to each category is calculated over the specific decomposition time periods (Preston et al., 2001).

Oaxaca – Blinder Decomposition

The Oaxaca – Blinder decomposition facilitates an extension of the Kitagawa Decomposition method as a counterfactual decomposition technique applied in terms of linear regression models. Primarily, it sets forth the estimation of mean difference in the outcome variable between two different groups. This is further supplemented with the fact that the OB decomposition emphasizes on the interaction between the group parameter differences as well as the group characteristics (Oaxaca, 1973; Blinder, 1973).

Within this analytical framework, we designate two population groups, A and B, corresponding to the respective time periods in the National Family Health Survey (NFHS) rounds (3, 4, and 5). The outcome variable Y, designated for decomposition, represents the aggregate deprivations experienced by an individual, computed as the product of the unadjusted headcount ratio and the counting vector. The sample sizes for populations A and B are denoted by NA and NB respectively. The methodological approach incorporates a set of K mutually exclusive indicator variables, consolidated into a single categorical explanatory variable X, such that

$$\sum_{k=1}^{K} X_{ik} \; \forall \; i$$

i where i denotes the ith individual within a sample group. The outcome indicator variables for the respective population groups are represented by YiA and YiB (Oaxaco & Sierminska, 2025).

The group mean proportions are given by

$$\bar{Y}^{\mathrm{A}} = \frac{\sum_{i=1}^{N^A} Y_i^A}{N^A} = \frac{N_Y^A}{N^A}$$

$$\bar{Y}^{\mathrm{B}} = \frac{\sum_{i=1}^{N^B} Y_i^B}{N^B} = \frac{N_Y^B}{N^B}$$

Hence,

$$\bar{Y}^{\mathrm{A}} - \bar{Y}^{\mathrm{B}} = \frac{N_Y^A}{N^A} - \frac{N_Y^B}{N^B}$$

Let the outcome rates in the kth category of the predictor variable X for groups A and B be:

$$\bar{Y}_k^A = \frac{\sum_{i=1}^{N^A} Y_i^A X_{ik}}{N_k^A}, \text{ k = 1,....., K}$$

$$= \frac{N_{Yk}^A}{N_k^A}$$

$$\bar{Y}_k^B = \frac{\sum_{i=1}^{N^B} Y_i^B X_{ik}}{N_k^B}, \text{ k = 1,....., K}$$

$$= \frac{N_{Yk}^B}{N_k^B}$$

The linear probability regression model for the two population groups is presented as:

$$Y_i^A = \sum_{k=1}^{K} X_{ik}\beta_k^A + \varepsilon_i, i = 1, \ldots, N^A$$

$$Y_i^B = \sum_{k=1}^{K} X_{ik}\beta_k^B + \varepsilon_i, i = 1, \ldots, N^B$$

The OLS estimator corresponding to the separate linear regressions of Yi on each Xik indicator variable will be :

$$b_k^A = \frac{\sum_{i=1}^{N^A} X_{ik} Y_i^A}{\sum_{i=1}^{N^A} X_{ik}^2}, \text{ k = 1,....., K}$$

$$= \frac{N_{Yk}^A}{N_k^A} = \bar{Y}_k^A$$

$$b_k^B = \frac{\sum_{i=1}^{N^B} X_{ik} Y_i^B}{\sum_{i=1}^{N^B} X_{ik}^2}, \text{ k = 1,....., K}$$

$$= \frac{N_{Yk}^B}{N_k^B} = \bar{Y}_k^B$$

In Blinder Oaxaca Decomposition, one group is assigned as the reference group and we execute the simple averages of the two groups estimated coefficients such that,

$$b_k^* = \frac{(b_k^A + b_k^B)}{2}, \text{ k = 1,...., K } = \left(\frac{\bar{Y}_k^A + \bar{Y}_K^B}{2}\right)$$

Therefore, the OLS decomposition can be explained as the following :

$$\bar{Y}^{A} - \bar{Y}^{B} = \sum_{k=1}^{K} \bar{X}_k^A b_k^A - \sum_{k=1}^{K} \bar{X}_k^B b_k^B$$
$$= \sum_{k=1}^{K} \left(\bar{X}_k^A - \bar{X}_k^B\right) b_k^* + \sum_{k=1}^{K} \bar{X}_k^A \left(b_k^A - b_k^*\right) + \sum_{k=1}^{K} \bar{X}_k^B \left(b_k^* - b_k^B\right)$$

The initial component of the equation, represented by

$$\sum_{k=1}^{K} \left(\bar{X}_k^A - \bar{X}_k^B\right) b_k^*$$

quantifies the differential attributed to group variations in the explanatory variables, termed as the endowment effect . Along with it, the second component

$$\sum_{k=1}^{K} \bar{X}_k^A \left(b_k^A - b_k^*\right)$$

comprises the contribution arising from differences in coefficients, constituting the unexplained component, designated as the coefficients effect. Furthermore, interaction effect which is represented by the final part of the equation

$$\sum_{k=1}^{K} \bar{X}_k^B \left(b_k^* - b_k^B\right)$$

captures the simultaneous manifestation of differences in both endowments and coefficients between the two groups under consideration (Jann, 2008; Rahimi & Hashemi Nazari, 2021).

Results

India's MPI exhibited significant reductions across three NFHS rounds (2005-06 to 2019-21), declining substantially from 0.282 to 0.066 (Table 2.1). This decline was driven by both a decrease in the headcount ratio (from 52.3% to 14.7%) and a moderate improvement in intensity (from 53.9% to 44.5%). The annual rate of reduction increased from 8.5% between NFHS 3 and 4 to 10.5% between NFHS 4 and 5. Among demographic groups, changes were observed in wealth quintiles, with the poorest wealth quintile experiencing a reduction in multidimensionally poor population, declining from 92.8% to 42.1% between NFHS 3 and 5. While children aged 0-14 years demonstrated improvements (from 63.0% to 23.4%), they consistently remained the most vulnerable age group across all rounds. The Scheduled Tribes consistently exhibited the highest poverty rates (26.8% in 2019-21), significantly exceeding other groups. The rural-urban divide persisted, with rural areas (18.9%) exhibiting higher multidimensionally poor populations compared to urban areas (5.3%) in 2019-21. Furthermore, despite similar household characteristics, females consistently displayed slightly higher MPI scores than males across all three rounds. (Table 2.2)

Table 2.1 : Multidimensional Poverty Headcount(H), Intensity(A), and Index values by background characteristics, India

Background Variables	NFHS-3 (2005-06)			NFHS-4 (2015-16)			NFHS-5 (2019-21)		
	H	A	MPI	H	A	MPI	H	A	MPI
Age									
0-14 yrs.	0.630	0.571	0.360	0.348	0.494	0.172	0.234	0.462	0.108
15-59 yrs.	0.466	0.522	0.243	0.200	0.461	0.092	0.116	0.436	0.051
60+ yrs.	0.500	0.490	0.245	0.217	0.436	0.094	0.115	0.413	0.048
Sex									
Male	0.512	0.537	0.275	0.232	0.470	0.109	0.139	0.444	0.062
Female	0.535	0.541	0.289	0.255	0.473	0.121	0.155	0.446	0.069
Household size									
<=4 members	0.437	0.502	0.22	0.173	0.453	0.078	0.097	0.432	0.042
5 to 6 members	0.515	0.547	0.281	0.234	0.481	0.113	0.148	0.455	0.067
6+ members	0.620	0.558	0.346	0.349	0.476	0.166	0.228	0.444	0.101
Marital Status									
Married	0.496	0.526	0.261	0.220	0.462	0.102	0.130	0.435	0.057
Unmarried	0.453	0.524	0.238	0.151	0.449	0.068	0.078	0.430	0.033
Widow/separated/ Divorced	0.535	0.506	0.271	0.237	0.446	0.106	0.129	0.423	0.055
Wealth Quintile									
Richest	0.055	0.404	0.022	0.012	0.376	0.004	0.010	0.380	0.004
Richer	0.259	0.440	0.114	0.051	0.398	0.020	0.033	0.390	0.013
Middle	0.596	0.477	0.284	0.148	0.413	0.061	0.077	0.403	0.031
Poorest	0.825	0.539	0.445	0.337	0.445	0.150	0.185	0.420	0.078
Poorer	0.928	0.619	0.575	0.654	0.506	0.331	0.421	0.469	0.198
Caste									
SC	0.632	0.545	0.345	0.286	0.474	0.136	0.182	0.450	0.082
ST	0.778	0.587	0.457	0.436	0.490	0.214	0.268	0.458	0.123
OBC	0.552	0.532	0.294	0.240	0.468	0.112	0.138	0.439	0.061
Others	0.341	0.514	0.176	0.137	0.457	0.063	0.074	0.433	0.032
Religion									
Hindu	0.524	0.532	0.279	0.242	0.467	0.113	0.144	0.441	0.063
Muslim	0.590	0.583	0.344	0.297	0.498	0.148	0.189	0.46	0.087
Christian	0.367	0.513	0.188	0.140	0.463	0.065	0.101	0.453	0.046
Sikh	0.218	0.473	0.103	0.058	0.433	0.025	0.048	0.419	0.020
Others	0.477	0.529	0.252	0.211	0.472	0.099	0.140	0.446	0.062
Place of Residence									
Rural	0.651	0.547	0.356	0.319	0.474	0.151	0.189	0.446	0.085
Urban	0.243	0.492	0.120	0.084	0.454	0.038	0.053	0.432	0.023
All India	0.523	0.539	0.282	0.243	0.472	0.115	0.147	0.445	0.066

Table 2.2: Multidimensional Poverty Index for Social Groups, Indian States (NFHS-5)

State /UT	SC			ST			OBC			Others			All India
	H	A	MPI	H	A	MPI	H	A	MPI	H	A	MPI	MPI
A & N Island	0.078	0.345	0.027	0.036	0.403	0.014	0.003	0.413	0.001	0.032	0.41	0.013	0.01
Andhra Pradesh	0.076	0.411	0.031	0.256	0.433	0.111	0.062	0.404	0.025	0.018	0.371	0.007	0.026
Arunachal Pradesh	0.127	0.427	0.054	0.129	0.419	0.054	0.219	0.475	0.104	0.168	0.456	0.076	0.06
Assam	0.164	0.431	0.071	0.126	0.432	0.054	0.159	0.451	0.072	0.173	0.439	0.076	0.086
Bihar	0.458	0.492	0.225	0.466	0.502	0.234	0.308	0.462	0.142	0.197	0.463	0.091	0.158
Chandigarh	0.03	0.381	0.011	-	-	-	0.06	0.433	0.026	0.025	0.586	0.015	0.017
Chhattisgarh	0.143	0.416	0.059	0.268	0.444	0.119	0.109	0.41	0.045	0.041	0.391	0.016	0.067
D & NH	0.023	0.436	0.01	0.169	0.414	0.07	0.048	0.421	0.02	0.041	0.463	0.019	0.042
Goa	0	.	0	0.016	0.346	0.006	0.001	0.357	0	0.004	0.341	0.001	0.003
Gujarat	0.109	0.418	0.045	0.256	0.451	0.116	0.111	0.425	0.047	0.031	0.403	0.013	0.051
Haryana	0.101	0.419	0.042	0.094	0.428	0.04	0.102	0.449	0.046	0.027	0.426	0.012	0.032
Himachal Pradesh	0.089	0.393	0.035	0.077	0.392	0.03	0.022	0.4	0.009	0.037	0.408	0.015	0.02
Jammu & Kashmir	0.061	0.417	0.026	0.145	0.439	0.064	0.091	0.422	0.038	0.03	0.413	0.012	0.021
Jharkhand	0.35	0.46	0.161	0.384	0.479	0.184	0.216	0.434	0.094	0.13	0.436	0.057	0.128
Karnataka	0.098	0.412	0.04	0.133	0.436	0.058	0.062	0.405	0.025	0.049	0.395	0.02	0.032
Kerala	0.012	0.374	0.005	0.066	0.405	0.027	0.006	0.356	0.002	0.001	0.352	0	0.002
Ladakh	0	.	0	0.046	0.408	0.019	-	-	-	0.008	0.405	0.003	0.017
Lakshadweep	0	.	0	0.009	0.376	0.003	0	.	0	0	.	0	0.003
Madhya Pradesh	0.225	0.434	0.098	0.357	0.457	0.163	0.157	0.423	0.066	0.076	0.409	0.031	0.087
Maharashtra	0.067	0.405	0.027	0.243	0.445	0.108	0.047	0.393	0.019	0.047	0.405	0.019	0.032
Manipur	0.116	0.429	0.05	0.155	0.424	0.066	0.062	0.399	0.025	0.047	0.404	0.019	0.036
Meghalaya	0.033	0.425	0.014	0.302	0.479	0.145	0.171	0.589	0.101	0.199	0.468	0.093	0.136
Mizoram	0.189	0.469	0.089	0.051	0.451	0.023	0.333	0.478	0.159	-	-	-	0.026
Nagaland	0.133	0.429	0.057	0.157	0.424	0.066	0.041	0.421	0.017	0.223	0.423	0.095	0.066

Table 2.2: Multidimensional Poverty Index for Social Groups, Indian States (NFHS-5)

State /UT	SC			ST			OBC			Others			All India
	H	A	MPI	H	A	MPI	H	A	MPI	H	A	MPI	MPI
NCT of Delhi	0.047	0.423	0.02	0.039	0.51	0.02	0.03	0.425	0.013	0.026	0.415	0.011	0.015
Odisha	0.15	0.429	0.064	0.328	0.468	0.154	0.078	0.419	0.033	0.038	0.4	0.015	0.067
Puducherry	0.01	0.393	0.004	0	.	0	0.009	0.376	0.003	0	.	0	0.003
Punjab	0.077	0.414	0.032	0.064	0.399	0.025	0.03	0.412	0.013	0.016	0.39	0.006	0.02
Rajasthan	0.19	0.432	0.082	0.262	0.446	0.117	0.13	0.419	0.054	0.074	0.411	0.03	0.065
Sikkim	0.057	0.43	0.025	0.035	0.39	0.014	0.021	0.431	0.009	0	.	0	0.012
Tamil Nadu	0.036	0.384	0.014	0.065	0.425	0.028	0.018	0.383	0.007	0.007	0.419	0.003	0.009
Telangana	0.065	0.408	0.027	0.124	0.425	0.053	0.05	0.402	0.02	0.022	0.393	0.009	0.024
Tripura	0.121	0.41	0.05	0.205	0.443	0.091	0.066	0.411	0.027	0.076	0.42	0.032	0.056
Uttar Pradesh	0.287	0.451	0.13	0.353	0.484	0.171	0.227	0.446	0.101	0.129	0.445	0.058	0.101
Uttarakhand	0.119	0.426	0.051	0.083	0.407	0.034	0.149	0.423	0.063	0.052	0.401	0.021	0.039
West Bengal	0.123	0.421	0.052	0.235	0.447	0.105	0.075	0.417	0.031	0.094	0.43	0.041	0.05
All India	0.182	0.449	0.082	0.269	0.458	0.123	0.138	0.439	0.061	0.075	0.433	0.032	0.066

H: Headcount Ratio, A: Intensity, MPI: Multidimensional Poverty Index Scores

The MPI for Indian states reveals significant disparities in poverty levels across different social groups in India (Table 3). Examining the NFHS-5 (2019-21) data, the Scheduled Tribe population emerges as the most disadvantaged population group with several states showing high headcount ratios and MPI scores. Jharkhand (H: 54.6%, MPI: 0.271), Chhattisgarh (H: 42.1%, MPI: 0.185), and Madhya Pradesh (H: 57.1%, MPI: 0.280) have the highest poverty levels among the ST population. The Scheduled Caste and Other Backward Classes also exhibit elevated poverty, though generally lower than the STs. Comparing the NFHS-4 (2015-16) and NFHS-3 (2005-06) data, some states have shown progress in reducing multidimensional poverty, particularly among the ST population. For instance, Andhra Pradesh witnessed a significant decrease in ST headcount ratio (from 73% to 40.2%) and MPI (from 0.420 to 0.181) over this period. Rajasthan also saw a decline in ST headcount ratio (from 89.1% to 58.8%) and MPI (from 0.532 to 0.304). However, other states like Uttar Pradesh and Jharkhand continue to struggle with high poverty levels, especially among the ST and SC communities, with limited improvement over the years. Notably, the intensity values, remain relatively similar across social groups and states.

A pooled regression analysis examining the multidimensional poverty headcount ratio revealed that Scheduled Castes (NFHS-5: OR 1.62, 95%, CI: 1.59-1.65), Scheduled Tribes (NFHS-5: OR 1.75, CI: 1.71-1.78), and Other Backward Classes (NFHS-5: OR 1.42, CI: 1.4-1.44) consistently demonstrated significantly higher likelihood of being multidimensionally poor across all three rounds (2005-06 to 2019-21) (Table 4). The poorest quantile showed a substantial reduction in the percentage of population experiencing multidimensional poverty, decreasing from 203.17 in NFHS-3 to 76.82 in NFHS-5. Similarly, the middle and poorer wealth quintiles showed significant decrease in odds of being multidimensional poor over the three rounds while being relatively higher in the same round than the richest and richer wealth quintiles. Households with more than six members exhibited increased likelihood of being multidimensionally poor (NFHS-5: OR 3.8, 95% CI: 3.75-3.84), while the 15-59 years' age cohort demonstrated a lower probability of multidimensional poverty (NFHS-5: OR 0.79, CI: 0.77-0.81) than under 14 age group. Rural populations, and certain religious groups, like Hindus and Muslims, also faced significantly higher risks of being multidimensionally poor. Despite similar household characteristics, females showed slightly more odds of being multidimensionally poor than males across all three rounds (NFHS-5: OR 1,07, CI:1.06-1.08).

The Kitagawa Decomposition analysis of multidimensional poverty headcount ratio and intensity across three NFHS survey periods was conducted (Table 5). The maximum net reduction in the MPI was observed between the NFHS 3 and NFHS 5 (0.216). The net MPI reductions observed between the consecutive survey rounds of NFHS 3-4 and NFHS 4-5 were 0.167 and 0.049, respectively. The headcount ratio

Table 3: Pooled logistic Regression based odds ratio (OR) for unadjusted headcount (H) by background characteristics

Background Characteristics	NFHS-3	NFHS-4	NFHS-5
	OR [95% CI]	OR [95% CI]	OR [95% CI]
Age			
0-14 yrs. (ref)	1	1	1
15-59 yrs.	0.69*** (0.66, 0.71)	0.84*** (0.83, 0.86)	0.79*** (0.77, 0.81)
60+ yrs.	0.59*** (0.56, 0.62)	0.77*** (0.75, 0.78)	0.68*** (0.66, 0.70)
Sex			
Male (ref)	1	1	1
Female	1.06*** (1.04, 1.08)	1.08*** (1.07, 1.09)	1.07*** (1.06, 1.08)
Household Size			
Household size <= 4 (ref)	1	1	1
Household size 5-6	1.39*** (1.36, 1.42)	1.33* (1.31, 1.34)	1.55*** (1.53, 1.56)
Household size >6	3.28*** (3.21, 3.36)	3.27*** (3.24, 3.31)	3.80*** (3.75, 3.84)
Marital Status			
Married	1.75*** (1.70, 1.79)	2.16*** (2.13, 2.18)	2.33*** (2.30, 2.36)
Unmarried (ref)	1	1	1
Widow/Seperated/Divorced	1.81*** (1.73, 1.89)	2.29*** (2.25, 2.34)	
Wealth Quintile			
Richest (ref)	1	1	1
Richer	5.50*** (5.29, 5.73)	4.09*** (3.95, 4.24)	3.17*** (3.05, 3.30)
Middle	25.12*** (24.13, 26.15)	12.75*** (12.33, 13.19)	7.89*** (7.60, 8.21)
Poorer	78.01*** (74.70, 81.46)	38.64*** (37.36, 39.95)	21.21*** (20.43, 22.03)
Poorest	203.17*** (193.44, 213.40)	153.29*** (148.19, 158.56)	76.82*** (73.97, 79.79)
Caste			
SC	1.57*** (1.52, 1.61)	1.37*** (1.35, 1.39)	1.62*** (1.59, 1.65)
ST	1.83*** (1.76, 1.91)	1.71*** (1.69, 1.74)	1.75*** (1.71, 1.78)
OBC	1.38*** (1.35, 1.41)	1.36*** (1.34, 1.38)	1.42*** (1.40, 1.44)
Others (ref)	1	1	1
Religion			
Hindu	1.15*** (1.09, 1.22)	1.12*** (1.08, 1.15)	0.98* (0.94, 1.01)
Muslim	2.21*** (2.07, 2.35)	2.16*** (2.10, 2.24)	1.84*** (1.77, 1.92)
Christian	0.97* (0.89, 1.05)	0.81*** (0.77, 0.85)	0.75*** (0.71, 0.79)
Others (ref)	1	1	1
Area			
Rural	1.26*** (1.23, 1.28)	1.14*** (1.13, 1.16)	1.02*** (1.01, 1.04)
Urban (ref)	1	1	1

demonstrated a substantial contribution to the observed MPI reduction throughout all survey rounds, increasing from 85% to 89% across consecutive periods (NFHS 3-4 and NFHS 4-5). The most significant MPI reduction was reported among the ST population, which experienced a 0.334 reduction between NFHS 3 and NFHS 5. This substantial improvement can be attributed to both a decrease in the proportion of the ST population living in multidimensional poverty and a decrease in the intensity of their poverty. In contrast, the proportion attributable to intensity marginally decreased across other social groups.

The analysis of the contribution of various indicators across the NFHS periods reveals that the Standard of Living dimension had the most significant contribution to the overall MPI in NFHS 3 (Table 5). However, this trend shifted over time, with the Health dimension emerging as the largest contributor, accounting for 42.8% of the MPI in NFHS 5. The Nutrition indicator was consistently the most significant contributor across all three NFHS rounds, demonstrating almost 6% increase in its contribution, from NFHS 3 to NFHS 5. This was followed by the education dimension, with the Years of Schooling indicator showing an increase from 13% in NFHS 3 to 17% in NFHS 5 accompanied by a decreasing headcount ratio. Within the Standard of Living dimension, the Bank Account indicator saw a significant decline, decreasing from a 7% contribution in NFHS 3 to just 1% in NFHS 5. While, certain other indicators, such as Assets, and Electricity, demonstrated substantial reductions in their contributions, indicators such as Housing and Cooking Fuel, maintained relatively consistent contributions.

The Blinder-Oaxaca decomposition analysis of the changes in the MPI across the NFHS periods was conducted (Table 6). Examining the household size, the endowment effect shows a positive contribution of 1.32% between NFHS 3-4 and 3.04% between NFHS 4-5, indicating that that population shift towards smaller household sizes has been potentially favourable in reducing multidimensional poverty. The positive coefficient effect for larger household sizes is 6.93% and 9.04%, respectively, suggesting that the adverse impact of larger household sizes on multidimensional poverty has decreased over time. The endowment effects for the Poorest and Poorer wealth groups are substantial and negative, at -3.11% and -1.48% respectively, implying that the population movements towards these economically disadvantaged groups have hindered progress in alleviating multidimensional poverty. However, the coefficient effects for the Poorest (87.25%), Poorer (94.52%), and Middle (38.54%) wealth quintiles are positive and significant, indicating that the relationship between poverty and these wealth groups has become less severe. The analysis of social groups shows that the endowment effects for Scheduled Castes (-0.54%), Scheduled Tribes (-0.42%), and Other Backward Classes (-0.18%) are negative, suggesting that the demographic shifts towards these socially marginalized communities have contributed to the persistence of multidimensional deprivation. The coefficient effects for these social

Table 4: Kitagawa Decomposition for Contribution of Headcount(H) & Intensity(A) to Multidimensional Poverty Index

	MPI Difference			MPI Difference			MPI Difference		
	NFHS 3- NFHS 4			NFHS 4- NFHS 5			NFHS 3- NFHS 5		
Caste Groups	**Prop. Att. To H**	**Prop. Att. To A**	**Net Difference**	**Prop. Att. To H**	**Prop. Att. To A**	**Net Difference**	**Prop. Att. To H**	**Prop. Att. To A**	**Net Difference**
SC	84%	16%	0.209	89%	11%	0.054	85%	15%	0.263
ST	76%	24%	0.243	88%	12%	0.091	80%	20%	0.334
OBC	86%	14%	0.182	90%	10%	0.052	86%	14%	0.233
Others	88%	12%	0.113	92%	8%	0.03	88%	12%	0.143
All India	85%	15%	0.167	89%	11%	0.049	85%	15%	0.216

Table 5: Contribution of deprivations to Multidimensional Poverty Index Headcount Values

Dimensions	Indicators	Adjusted HCR			Indicator Contribution			Dimension Contribution		
		NFHS-3	NFHS-4	NFHS-5	NFHS-3	NFHS-4	NFHS-5	NFHS-3	NFHS-4	NFHS-5
Education	Years of schooling	0.04	0.02	0.01	13.30%	15.50%	16.80%	24.30%	23.00%	26.00%
	School Attendance	0.03	0.01	0.01	11.10%	7.60%	9.20%			
Health	Nutrition	0.07	0.03	0.02	24.40%	28.00%	29.80%	32.30%	39.20%	42.80%
	Child-Adolescent Mortality	0	0	0	1.00%	1.30%	1.50%			
	Maternal Health	0.02	0.01	0.01	6.90%	9.90%	11.50%			
Standard of Living	Electricity	0.01	0	0	4.60%	3.40%	1.30%	43.40%	37.70%	31.20%
	Sanitation	0.02	0.01	0	8.00%	8.60%	6.60%			
	Drinking Water	0.01	0	0	2.60%	2.10%	1.60%			
	Housing	0.02	0.01	0.01	7.10%	8.40%	8.60%			
	Cooking Fuel	0.02	0.01	0.01	8.40%	9.40%	8.80%			
	Bank Account	0.02	0	0	6.60%	2.20%	0.80%			
	Assets	0.02	0	0	6.00%	3.70%	3.40%			
Total		0.282	0.115	0.066	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Table 6: Blinder-Oaxaca Decomposition of the Multidimensional Poverty Index by Background Characteristics: Contribution to Total Effects

	NFHS 3-4	NFHS 3-5	NFHS 4-5
Endowment Effect			
Age	1.26%	1.25%	1.62%
Sex	0.06%	0.00%	0.00%
Household Size	1.32%	1.52%	3.04%
Marital Status	0.06%	0.14%	0.00%
WQ	-3.11%	-1.48%	-0.20%
Caste	-0.54%	-0.42%	-0.41%
Religion	-0.18%	0.00%	0.41%
Area	0.00%	0.00%	0.20%
States/UTs	-1.50%	-5.08%	-27.59%
Coefficient effect			
Age	-5.03%	-5.54%	-6.49%
Sex	4.91%	-0.79%	-2.23%
Household Size	9.04%	6.93%	2.03%
Marital Status	-1.38%	-1.06%	0.00%
WQ	84.91%	87.25%	94.52%
Caste	8.14%	6.93%	2.43%
Religion	2.40%	2.91%	5.07%
Area	4.73%	4.20%	2.03%
States/UTs	17.07%	16.95%	38.54%
Cons.	-22.04%	-28.45%	-67.95%
Interaction effect			
Age	0.42%	0.60%	0.20%
Sex	-0.12%	0.00%	0.00%
Household Size	0.72%	1.34%	0.41%
Marital Status	-0.30%	-0.28%	0.00%
WQ	-2.28%	-2.91%	0.00%
Caste	-0.66%	-0.74%	0.00%
Religion	-0.12%	0.00%	0.20%
Area	0.06%	-0.05%	0.00%
States/UTs	1.92%	16.49%	54.36%
Total Effect	0.167	0.217	0.049

groups are also positive, implying that the inherent disadvantages associated with these communities have diminished.

Examining regional disparities, the endowment effect for states such as Bihar (-1.50%), Odisha (-1.50%), and Jharkhand (-5.08%) is negative, reflecting that the concentration of vulnerable populations within these regions continues to pose a challenge to overall poverty reduction. Conversely, the coefficient effects for Uttar

Pradesh (38.54%), Bihar (38.54%), West Bengal (38.54%), and Andhra Pradesh (4.73%) are positive and significant. This suggests that state-specific structural factors and regional characteristics, such as governance, infrastructure, and state-level policy implementation, have become less associated with multidimensional poverty over time, indicating a relative improvement in the environment for poverty reduction in these states.

Discussion

The analysis of multidimensional poverty across three NFHS rounds revealed several key insights. Firstly, the Multidimensional Poverty Index demonstrated a significant decline across the three NFHS rounds, with the most substantial reductions observed among the poorest wealth quintiles, rural populations, and children aged 0-14 years. Notably, children, Scheduled Tribes, rural populations, and females consistently exhibited the highest poverty rates, with states like Uttar Pradesh and Jharkhand continuing to manifest multidimensional poverty. Additionally, despite overall national-level improvements, the Scheduled Tribe population's multidimensional poverty remained relatively high. Furthermore, the health dimension, particularly the nutrition indicator, emerged as the most significant contributor to MPI, accounting for the largest share of multidimensional poverty in 2019-21. The reductions in MPI were primarily attributable to improvements in weighted headcount ratios, with notable advancements in publicly provided variables such as health, education (years of schooling), bank accounts, assets, and electricity access. Lastly, the Blinder-Oaxaca decomposition revealed that, while population movements towards economically disadvantaged groups appeared to hinder poverty reduction, the analysis showed some improvements. The coefficient effects were positive and significant for the Poorest, Poorer, and Middle wealth quintiles, indicating a diminishing severity of poverty. Conversely, for Scheduled Castes, Scheduled Tribes, and Other Backward Classes, negative endowment effects suggested persistent demographic challenges, even as the coefficient effects implied reducing inherent disadvantages across different social groups and states.

The analysis reveals a significant reduction in multidimensional poverty in India, declining to 0.066 by 2019-21, aligning with NITI Aayog's findings (NITI Aayog, 2023). The national headcount ratio demonstrated a substantial 38% reduction between 2005-06 and 2019-21, effectively challenging South Asia's historical narrative of widespread poverty (OPHI, 2018). This reduction was most pronounced among the poorest wealth quintiles, with vulnerable populations experiencing more substantial improvements in absolute terms (Alkire & Seth, 2015; Alkire et al., 2021). Geographically, the poverty landscape revealed significant disparities, with states like Bihar, Meghalaya, Jharkhand, and Uttar Pradesh consistently demonstrating the highest Multidimensional Poverty Index (MPI) levels (Tripathi &

Yenneti, 2020). Furthermore, the poverty indicators remained significantly higher in rural areas compared to urban regions (Das et al., 2021). Additionally, women consistently experienced a higher likelihood of being multidimensionally poor. This trend extends beyond India, as evidenced by research on African nations, where women face similar challenges due to factors such as limited access to education, healthcare, and economic opportunities, as well as social norms and cultural practices that perpetuate gender inequality (Rogan, 2016).

The percentage of children living in severe child food poverty accounts for 40% in India (UNICEF, 2024). Furthermore, health emerged as the most critical dimension, contributing over 40% to the MPI, with nutrition alone accounting for nearly 30% of multidimensional poverty. The Global Hunger Index's ranking of India at 105th further highlights the persistent challenges of the 'Triple Burden of Malnutrition' (Undernutrition, Overnutrition, and Micronutrient Deficiency) (UNICEF, 2024; WHH et al., 2024). Approximately 40% of children experience severe food poverty, with alarming rates of stunting (35.5%), wasting (19.3%), and underweight (32.1%) conditions (NFHS, 2021). Low-quality infant and young child feeding (IYCF) practices significantly contribute to poor nutritional outcomes (Menon et al., 2015; Ramachandran, 2010), while the burden of nutritional deprivation disproportionately affects vulnerable groups, including poor households, scheduled castes, children of underweight mothers, and illiterate women compared to affluent groups (Prasad et al., 2021). Raghunathan et al. (2021) estimated that 63-76% of rural poor cannot afford recommended diets, highlighting the critical need for targeted nutrition interventions and safety net programs. Studies have consistently emphasized that affordable prices coupled with safety net programs covering nutritional norms, dietary allowance, and adjusted calorie intake are vital in mitigating the multidimensional aspects of nutrition deprivation (Raghunathan et al., 2021; Ryckman et al., 2021; Bhuyan et al., 2020).

Consistent with the existing literature, our analysis revealed that the Scheduled Tribe population demonstrated the highest Multidimensional poverty index values (Alkire et al., 2021; Pradhan et al., 2022). The rate of multidimensional poverty among Scheduled Tribes and Scheduled Castes significantly exceeds other socioeconomic groups in India, stemming from complex historical and contemporary social dynamics characterized by systemic discrimination and social injustice (Sahoo et al., 2023; Rupavath, 2023). Scheduled Tribes face a compounded disadvantage of socio-economic and spatial marginalization, with job insecurity in the unorganized sector being a substantial contributor to their economic vulnerability (Singh, 2019). The limited participation in economic growth among STs substantially widens the inequality scale, with chronic poverty largely attributable to social exclusion that systematically denies equitable resource access (Dubey, 2009; Mehta & Shah, 2003). Empirical studies, including our findings and research by Kaibarta et al. (2022) and Pradhan et al. (2022), consistently demonstrate that the standard of living dimension contributes most significantly to the ST population's multidimensional poverty. While the Government of India has established the Ministry of Social Justice and Empowerment to address these issues, further efforts are needed to improve the coverage and quality of existing public welfare programs, ensuring they effectively target these vulnerable sections of society. These bottlenecks could be largely addressed by improving the coverageand provisions of existing public welfare programs such as Pradhan Mantri Awas Yojana (PMAY), Jal Jeevan Mission (JJM), Swachh Bharat Mission (SBM), Pradhan Mantri Sahaj Bijli Har Ghar Yojana (Saubhagya) and Pradhan Mantri Ujjwala Yojana (PMUY) or setting up of more targeted programs designed to address vulnerabilities of the population.

The Multidimensional Poverty approach, as envisaged by the UNDP, enables significant flexibility in incorporating country-specific indicators and weights. India's NITI Aayog, utilizing the Alkire-Foster methodology, innovatively added bank account (weight = 1/21) and maternal health (weight = 1/12) as additional indicators, reflecting the nation's unique developmental context (NITI Aayog, 2023). This methodological adaptation, driven by the success of large-scale policy programs such as Janani Suraksha Yojana(JSY), Pradhan Mantri Surakshit Matritva Abhiyan(PMSMA), and Pradhan Mantri Jan-Dhan Yojana(PMJDY), resulted in marginal variations in MPI calculations. While UNDP reported India's MPI for 2019-21 to be 0.069, the NITI Aayog report estimated it to be 0.066 (UNDP, 2023). Similarly, UNDP reported a poverty intensity of 42% for 2019-21, while NITI Aayog estimated it to be 44.39%. These findings indicate substantial progress in reducing multidimensional poverty in India, highlighting the effectiveness of equitable pro-poor programs and policy initiatives. The inclusion of additional indicators relevant to India's specific context provides a more comprehensive picture of poverty reduction efforts.

Targeted government interventions have been pivotal in addressing multidimensional poverty. Government interventions have been pivotal in addressing the specific deprivations tracked by the 12 MPI indicators. For Health (Nutrition, Child Mortality, Maternal Health), schemes such as Poshan Abhiyaan (Poshan 2.0), Janani Suraksha Yojana (JSY), and the Pradhan Mantri Matru Vandana Yojana (PMMVY) have directly targeted nutritional intake and maternal care coverage. In Education (Schooling and Attendance), the Samagra Shiksha Abhiyan and the Right to Education Act have been instrumental in improving enrollment and retention. The Standard of Living indicators have been addressed through targeted infrastructure missions: Pradhan Mantri Ujjwala Yojana (Cooking Fuel), Swachh Bharat Mission (Sanitation), Jal Jeevan Mission (Drinking Water), Saubhagya (Electricity), and Pradhan Mantri Awas Yojana (Housing). The Pradhan Mantri Jan Dhan Yojana (PMJDY) has specifically addressed the Bank Account indicator.Furthermore, specific interventions have been crucial for vulnerable groups. Income-enhancing schemes such as the Mahatma Gandhi National Rural

Employment Guarantee Act (MGNREGA) and the Deendayal Antyodaya Yojana-National Rural Livelihoods Mission (DAY-NRLM) have empowered rural households, particularly SCs and STs, by providing wage employment and strengthening self-help groups. For women, schemes like Stand Up India and Mahila Samman Savings Certificate promote financial independence, while the Beta Bachao Beti Padhao scheme addresses gender disparities in education, indirectly influencing future household income potential.

The Ministry of Social Justice and Empowerment has played a crucial role in improving public provisioning for marginalized communities. However, persistent multidimensional poverty remains evident among vulnerable populations. Flow characteristics suggest that continued focus on health, nutrition, and education dimensions could further reduce MPI, particularly among dependent populations and marginalized communities. For instance, the Integrated Child Development Programme played a major role in uplifting nutritional standards (Das et al., 2022). Nevertheless, continued refinement of intervention strategies remains crucial for sustained poverty reduction (Roy, 2025). Regular follow-up and evaluation of these programs are pivotal to ensure they achieve their objectives in the targeted groups. Furthermore, analysis at the administrative level is required to rigorously understand the causes of implementation gaps.

This study was subject to several methodological limitations that warrant careful consideration. The cross-sectional nature of the data inherently restricted our ability to establish any causal relationships. Methodological constraints require the omission of variables with missing values, and the reliance on self-reported data from the National Family Health Survey (NFHS) introduces potential reporting inaccuracies and bias. While our findings demonstrated broad consistency with the NITI Aayog report, slight variations arose from the nuanced methodology of indicator specification and weighting. The study was constrained to utilizing NITI Aayog's predefined indicators, predominantly focused on publicly provisioned metrics, which may not comprehensively capture the full complexity of individual poverty experiences. While this study analyzes social groups across states, it does not explicitly weight for the varying population shares of these groups within specific regions. For instance, while the share of the SC population may be proportionally higher in Punjab compared to Kerala, the economic and human development outcomes for SC households in Kerala may differ significantly due to state-specific socio-political histories. Such nuances regarding the interplay between population share and development outcomes require further granular research and were beyond the scope of this decomposition analysis.While we incorporated the two country-specific indicators (maternal health and bank accounts) to align with the NITI Aayog's national MPI, minor discrepancies in our estimates compared to the official report may persist due to slight variations in indicator operationalization within the Alkire-Foster framework.These methodological limitations highlight the need for further research to develop more refined approaches that can comprehensively capture the multidimensional nature of poverty. Future research could benefit from incorporating more granular data collection and analysis techniques to provide a nuanced understanding of socioeconomic deprivation.

The analysis reveals a significant decline in multidimensional poverty in India, primarily driven by targeted government interventions. However, disparities persist across regions and socioeconomic groups. While the headcount ratio has shown substantial improvement, the intensity of poverty remains a concern. Several Government initiatives have made strides in addressing these issues; however, the health dimension, particularly nutrition, continues to be a significant contributor to the MPI. To further accelerate poverty reduction, a sustained focus on vulnerable groups, especially Scheduled Tribes, females, children under 14 years of age, and rural populations, is essential. Additionally, enhancing the quality and coverage of public services, promoting inclusive growth, and addressing the root causes of poverty, such as inequality and social exclusion, will be crucial for achieving equitable growth.

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- **Author Contributions:** WJ conceived and designed the study and provided supervision and project administration. Data acquisition was carried out by KA, APE, and SK , while KA and APE performed the data analysis and interpretation. The manuscript was drafted by KA, APE, and SK. All authors (KA, APE, SK, and WJ) critically revised the manuscript, approved the final version to be published, and agreed to be accountable for all aspects of the work.

- **Supplementary Material:** Visit https://healthempirics.org/ for more information

References

Alkire, S., & Foster, J. (2011). Counting and multidimensional poverty measurement. Journal of public economics, 95(7-8), 476-487.

Alkire, S., & Santos, M. E. (2011). Acute multidimensional poverty: A new index for developing countries.

Alkire, S., & Seth, S. (2015). Multidimensional poverty reduction in India between 1999 and 2006: Where and how?. World Development, 72, 93-108.

Alkire, S., Kanagaratnam, U., & Suppa, N. (2024). A methodological note on the global Multidimensional Poverty Index (MPI) 2024 changes over time results for 86 countries.

Alkire, S., Oldiges, C., & Kanagaratnam, U. (2021). Examining multidimensional poverty reduction in India 2005/6–2015/16: Insights and oversights of the headcount ratio. World Development, 142, 105454.

Bagli, S., & Tewari, G. (2019). Multidimensional poverty: An exploratory study in Purulia district, West Bengal. Economic Affairs, 64(3), 517-527. 64. 10.30954/0424-2513.3.2019.7.

Bhuyan, B., Sahoo, B. K., & Suar, D. (2020). Nutritional status, poverty, and relative deprivation among socio-economic and gender groups in India: Is the growth inclusive?. World Development Perspectives, 18, 100180.

Blinder, A. S. (1973). Wage discrimination: reduced form and structural estimates. Journal of Human resources, 436-455.

Canudas Romo, V. (2003). Decomposition methods in demography (Unpublished internal doctoral thesis, University of Groningen). s.n.

Das, P., Ghosh, S., & Paria, B. (2022). Multidimensional poverty in India: a study on regional disparities. GeoJournal, 87(5), 3987-4006.

Das, P., Ghosh, S., & Paria, B. (2023). Multidimensional poverty in India: patterns of reduction across population subgroups and geographical locations during 2005–06 and 2019–21. GeoJournal, 88(4), 3851-3870.

Das, P., Paria, B., &Firdaush, S. (2021). Juxtaposing consumption poverty and multidimensional poverty: A study in Indian context. Social Indicators Research, 153(2), 469-501.

Dubey, A. (2009). Poverty and under-nutrition among scheduled tribes in India: A disaggregated analysis. IGIDR Proceedings/Project Reports Series,[from http://www. igidr. ac. in/pdf/publication/PP-062-13. pdf, accessed on 12-12-2013].

Government of India, Ministry of Health & Family Welfare. (2021). National Family Health Survey-5 (2019–21). http://rchiips.org/nfhs/pdf/NFHS5/India.pdf

IIPS. (n.d.). National Family Health Survey. International Institute for Population Sciences (IIPS). Retrieved from http://rchiips.org/nfhsnew/nfhsuser/index.php

Jann, B. (2008). The Blinder–Oaxaca decomposition for linear regression models. The stata journal, 8(4), 453-479.

Kaibarta, S., Mandal, S., Mandal, P., Bhattacharya, S., & Paul, S. (2022). Multidimensional poverty in slums: an empirical study from urban India. GeoJournal, 87(Suppl 4), 527-549.

Kitagawa, E. M. (1955). Components of a difference between two rates. Journal of the american statistical association, 50(272), 1168-1194.

Mehta, A. K., & Shah, A. (2003). Chronic poverty in India: Incidence, causes and policies. World Development, 31(3), 491-511.

Menon, P., Bamezai, A., Subandoro, A., Ayoya, M. A., & Aguayo, V. M. (2015). Age-appropriate infant and young child feeding practices are associated with child nutrition in I ndia: insights from nationally representative data. Maternal & child nutrition, 11(1), 73-87.

NITI Aayog. (2023). National Multidimensional Poverty Index: A progress review 2023. Government of India.

Oaxaca, R. (1973). Male-female wage differentials in urban labor markets. International economic review, 693-709.

Oaxaca, R. L., & Sierminska, E. (2025). Oaxaca-Blinder meets Kitagawa: What is the link?. PLoS One, 20(5), e0321874.

Oxford Poverty and Human Development Initiative. (2018). Global Multidimensional Poverty Index 2018: The most detailed picture to date of the world's poorest people.

Oxford Poverty and Human Development Initiative (OPHI), University of Oxford.

Pradhan, I., Kandapan, B., & Pradhan, J. (2022). Uneven burden of multidimensional poverty in India: A caste based analysis. Plos one, 17(7), e0271806.

Prasad, J. B., Pezhhan, A., & Patil, S. H. (2021). Effect of wealth, social inequality, Mother's BMI, and education level on child malnutrition in India. Diabetes & Metabolic Syndrome: Clinical Research & Reviews, 15(6), 102304.

Preston, S. H., Heuveline, P., & Guillot, M. (2001). Demography: Measuring and modeling population processes. Blackwell Publishers Ltd.

Raghunathan, K., Headey, D., & Herforth, A. (2021). Affordability of nutritious diets in rural India. Food Policy, 99, 101982.

Rahimi, E., & Hashemi Nazari, S. S. (2021). A detailed explanation and graphical representation of the Blinder-Oaxaca decomposition method with its application in health inequalities. Emerging Themes in Epidemiology, 18(1), 12

Ramachandran, P. (2010). Nutrition and child survival in India. The Indian Journal of Pediatrics, 77, 301-305.

Rogan, M. (2016). Gender and multidimensional poverty in South Africa: Applying the global multidimensional poverty index (MPI). Social Indicators Research, 126, 987-1006.

Roy, A. (2025). Multidimensional Poverty and Quality of Governance in Indian States. The Indian Economic Journal, 73(3), 548-566.

Roy, P., Ray, S., & Haldar, S. K. (2019). Socio-economic determinants of multidimensional poverty in rural West Bengal: A household level analysis. Journal of Quantitative Economics, 17(3), 603-622.

Rupavath, R. (2023). Poverty and education: Attainments and challenges for tribal communities. Contemporary Voice of Dalit, 15(2), 230-247.

Ryckman, T., Beal, T., Nordhagen, S., Murira, Z., & Torlesse, H. (2021). Affordability of nutritious foods for complementary feeding in South Asia. Nutrition reviews, 79(Supplement_1), 52-68.

Sahoo, P., Mondal, S., & Kumar, V. (2023). Multidimensional deprivations among social groups in rural India: A state level analysis. GeoJournal, 88(6), 6137-6159.

Sen, A. K., & Anand, S. (1997). Concept of human development and poverty: A multidimensional perspective. In Poverty and human development papers 1997 (pp. 1–20). United Nations Development Programme.

Singh, A. (2019). Social Justice and Empowerment for Marginalized Groups: Realities and Responses. Global Initiatives for Sustainable Development: Issues and Strategies, 184.

Tripathi, S., &Yenneti, K. (2020). Measurement of multidimensional poverty in India: A State-level analysis. Indian Journal of Human Development, 14(2), 257-274.

UNDP. (2023). 2023 Global Multidimensional Poverty Index (MPI): Unstacking global poverty: Data for high impact action. United Nations Development Programme.

United Nations Children's Fund. (2024). Child food poverty: Nutrition deprivation in early childhood (Child nutrition report, June 2024). UNICEF.

United Nations Development Programme. (1997). Human development report 1997. http://hdr.undp.org/en/content/human-development-report-1997

United Nations. (2024). Global indicator framework: SDG indicators. https://unstats.un.org/sdgs/indicators/Global-Indicator-Framework-after-2024-refinement-English.pdf

Welthungerhilfe (WHH), Concern Worldwide, & Institute for International Law of Peace and Armed Conflict (IFHV). (2024). 2024 Global Hunger Index: How gender justice can advance climate resilience and zero hunger. WHH; Concern Worldwide; IFHV.