OPEN ACCESS

Saudi Journal of Economics and Finance
Abbreviated Key Title: Saudi J Econ Fin
ISSN 2523-9414 (Print) | ISSN 2523-6563 (Online)
Scholars Middle East Publishers, Dubai, United Arab Emirates
Journal homepage: http://saudijournals.com

Original Research Article

Understanding the Dynamics of Multi-Dimensional Poverty Index: BIMARU States: An Econometrics Approach

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DOI: 10.36348/sjef.2023.v07i09.001 | **Received:** 25.07.2023 | **Accepted:** 30.08.2023 | **Published:** 02.09.2023

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Abstract

The research study analyzes multidimensional poverty in seven states of India, namely Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Odisha, Rajasthan, and Uttar Pradesh. The study focuses on three key dimensions of poverty: infant mortality rate, birth rate, and educational dropout rates at both primary and upper primary levels. Additionally, the study examines the availability of basic amenities such as clean cooking fuel, improved sanitation facilities, and safe drinking water. By calculating the Multidimensional Poverty Index (MPI), the study ranks the states based on their performance in these dimensions. Madhya Pradesh emerges as the top-performing state with the lowest MPI score of 0.310745, followed by Uttar Pradesh, Rajasthan, Chhattisgarh, Odisha, Bihar, and Jharkhand. The study reveals that despite having relatively low MPI scores, Madhya Pradesh and Uttar Pradesh still struggle with high infant mortality rates and birth rates. This indicates the need for targeted interventions to improve healthcare and family planning services in these states. Additionally, the study highlights the importance of education in poverty reduction. It identifies Jharkhand and Chhattisgarh as states with the highest primary and upper primary education dropout rates. This emphasizes the need for improving the quality of education and implementing strategies to encourage school completion. It also states the importance of addressing issues related to healthcare, education, and basic amenities in order to reduce poverty and improve overall well-being. The normalized index approach used in this study provides a comprehensive and objective measure of poverty, enabling policymakers and stakeholders to make informed decisions and allocate resources effectively.

Keywords: MPI, BIMARU States, SDGs, IMR, Dropout Rate. MNREGA.

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INTRODUCTION

The incidence of poverty refers to the percentage of individuals or households living below the poverty line. It is a measure of the prevalence and severity of poverty in a given population. The Planning Commission of India, which was a government body responsible for formulating development plans, defined poverty incidence based on the monthly per capita consumption expenditure (MPCE). According to their estimates, the poverty incidence in India decreased from 37.2% in 2004-05 to 21.9% in 2011-12 (Planning Commission, 2014). The UNDP defines poverty incidence as the percentage of people living below the international poverty line of $1.90 per day (in Purchasing Power Parity, PPP terms). Using this global benchmark, the UNDP estimated that the poverty incidence in India was 21.2% as of 2011 (UNDP, 2019). The World Bank defines poverty incidence as the percentage of the population living below the national poverty line. In India, the national poverty line is measured using a specific threshold of consumption expenditure. As of the latest available data (2011-12), the poverty incidence in India was estimated to be around 21.9% (based on the national poverty line) (World Bank, 2021). Understanding the incidence of poverty is crucial for policymakers and organizations working to alleviate poverty and promote inclusive development.

India has still a high incidence of poverty, with nearly 14.96% of the population with multi-dimensional poverty. To address this issue, the Indian government

has implemented various planning processes. The Five Year Plans have been crucial for economic development and poverty alleviation. These plans focus on sectors like agriculture, education, health, and infrastructure development in order to uplift the poor. Additionally, poverty eradication programs like the Mahatma Gandhi National Rural Employment Guarantee Act (MNREGA) provide rural employment opportunities and income security. The government's planning process aims to reduce poverty by improving socio-economic conditions and providing basic amenities to all citizens. The Sustainable Development Goals (SDGs) aim to eradicate poverty by 2030 and promote sustainable and inclusive development. In the case of India, achieving these goals requires a multi-faceted approach, including efforts to improve access to quality education, healthcare, and adequate housing. Additionally, creating more job opportunities, especially in rural areas, is crucial. By addressing poverty, India can align its developmental strategies with the SDGs and ensure a more equitable and sustainable future for its citizens.

The Alagh committee was formed in 1979, with the objective of developing a new methodology to estimate poverty. Their approach took into account not only the consumption patterns and expenditure data but also the non-food items and other socio-economic indicators. The committee focused on identifying the minimum standard of living that should be considered for a person to be classified as poor. The Tendulkar committee, set up in 2005, built upon the methodology established by the Alagh committee. They refined the estimation by updating the consumption patterns and expenditure data, ensuring a more accurate representation of poverty in contemporary India. This committee also introduced the concept of purchasing power parity (PPP) to account for the regional variations in prices and living costs. The C Rajan committee, formed in 2012, aimed to further improve the measurement of poverty by taking into account additional dimensions such as health and education. They recommended the Multidimensional Poverty Index (MPI), which considers various factors like years of schooling, child mortality, and access to basic amenities, in addition to income or consumption levels.

There are several approaches adopted to measure the incidence of poverty in India, aiming to accurately capture the extent of poverty in the country by the year 2022. These approaches include:

1. Consumption-based approach: This approach involves measuring poverty based on the level of consumption expenditure of households. Surveys are conducted to collect data on household consumption patterns, including food, clothing, housing, education, and healthcare. The data collected is used to calculate poverty lines, which are thresholds indicating the minimum level of consumption required to meet basic needs. Households with consumption levels below the poverty line are considered poor.
2. Income-based approach: This approach focuses on measuring poverty based on household income levels. Similar to the consumption-based approach, surveys are conducted to collect data on household incomes. Poverty lines are then determined based on income thresholds, with households below these thresholds considered poor.
3. Multidimensional approach: Recognizing that poverty is a complex issue that cannot be captured solely by income or consumption levels, the multidimensional approach takes into account various dimensions of poverty. This includes education, health, living standards, and access to basic services. The data collected through surveys enables the identification of households that lack access to multiple dimensions, thereby providing a comprehensive measure of poverty.
4. Regional approach: Given the diversity and regional disparities in India, a regional approach is adopted to measure poverty. This approach recognizes that poverty levels can vary significantly across states and regions due to factors such as economic development, infrastructure, and social welfare programs. Regional measures of poverty provide a more nuanced understanding of poverty dynamics and help in the formulation of targeted policies.
5. Sustainable Development Goals (SDGs) approach: The SDGs provide a framework for measuring poverty in terms of broader development objectives. This approach considers indicators such as access to education, healthcare, clean water, sanitation, and decent work. By focusing on these indicators, the incidence of poverty is measured not only by income or consumption levels but also by the overall well-being and development outcomes of individuals and communities.

The BIMARU states, originally referring to the economically backward states of Bihar, Madhya Pradesh, Rajasthan, and Uttar Pradesh in India, later expanded to include Jharkhand and Chhattisgarh after their formation in the early 2000s. These states have historically struggled with various socio-economic indicators such as poverty, illiteracy, and inadequate healthcare facilities. The BIMARU states, including Bihar, Madhya Pradesh, Rajasthan, and Uttar Pradesh, have long been associated with high levels of poverty and underdevelopment in India. With the inclusion of Jharkhand and Chhattisgarh, these states collectively face multidimensional poverty challenges. According to the Global Multidimensional Poverty Index (MPI)

released by the UNDP, these six states account for more than half of the country's poor population. The index measures poverty based on various factors, such as health, education, and standard of living. Efforts to address multidimensional poverty in these states must be prioritized to improve the well-being of their populations (UNDP, 2019).

The multidimensional poverty index (MPI) is a measure that goes beyond income and takes into account various deprivations in health, education, and standard of living. It provides a more comprehensive picture of poverty, allowing policymakers to target specific areas for intervention. In India, the MPI has been used to track progress towards sustainable development goals (SDGs) by identifying vulnerable populations and directing resources towards them. By incorporating the MPI into the SDGs, India aims to eradicate poverty in all its forms, promote inclusive and sustainable economic growth, and ensure equal access to basic services for all citizens.

1. Health: This component looks at indicators such as child mortality and nutrition to assess the health dimension of poverty.
2. Education: It considers indicators such as school attendance and years of schooling to assess the educational dimension of poverty.
3. Living standards: This component considers indicators such as access to electricity, sanitation, and clean water to assess the standard of living dimension of poverty.

Objective of the study

- To examine the dynamics of Multi-dimensional Poverty Index for selected states for year 2022-23.
- To give necessary suggestions and recommendations in context of research study.

LITERATURE REVIEW

Alkire, S., & Foster, J. (2011) This article discusses the Multidimensional Poverty Index (MPI) as a tool for measuring poverty beyond income-based approaches. It explores the theoretical foundations and practical implications of MPI, highlighting the importance of capturing multiple dimensions of poverty to inform effective policy interventions. The authors also compare MPI with other poverty measures and present case studies of its application in different countries.

Santos, M. E., & Villatoro, P. (2012) This study assesses multidimensional poverty in nine Latin American and Caribbean countries using an adapted version of the MPI. It examines the different dimensions and indicators considered in the index and provides a comprehensive analysis of poverty patterns and trends across the region. The findings highlight the heterogeneity of poverty experiences and the need for targeted policies to address specific deprivations.

Hashemi, A., & Chauhan, P. (2017) Focusing on India, this research paper explores the Multidimensional Poverty Index and its correlates. It examines the dimensions and indicators used in the index and analyzes the patterns and drivers of multidimensional poverty in India. The study also highlights the importance of considering regional and social disparities to design effective poverty reduction strategies.

Wolff, F. C., & Zuber, S. (2017) This article investigates the measurement of multidimensional poverty in three Southeast Asian countries: Cambodia, Myanmar, and Timor-Leste. It examines the challenges and opportunities of using the Multidimensional Poverty Index in these contexts and discusses the implications of the findings for poverty reduction policies. The study underscores the importance of refining the index to account for cultural and contextual factors.

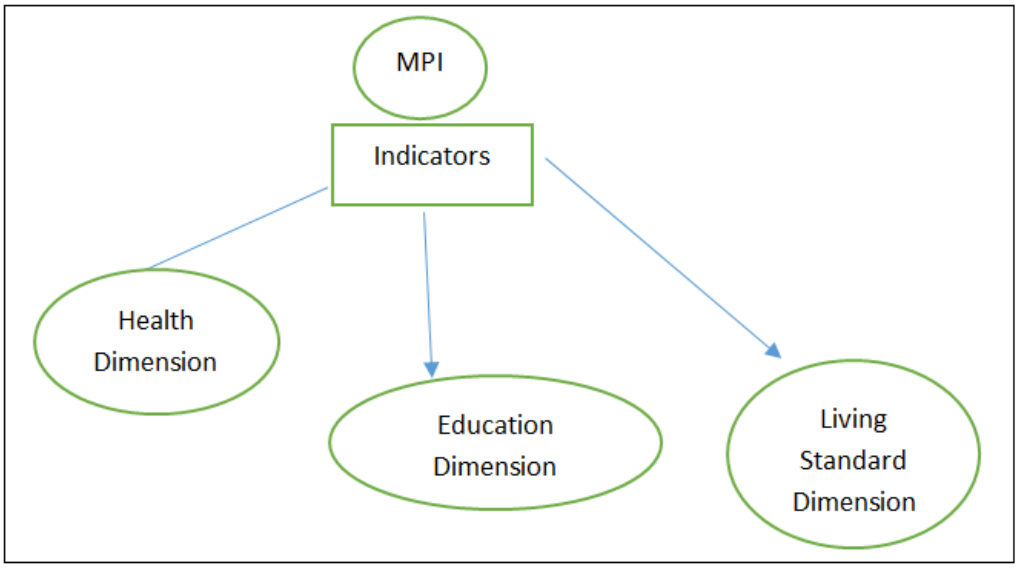
Meyer, T. (2018) This case study analyzes the advantages and disadvantages of using the Multidimensional Poverty Index in Germany. It explores the applicability of the index in a developed country context, considering the specific dimensions and indicators relevant to German society. The study sheds light on the potential of the index to complement income-based measures and inform targeted social policies for poverty reduction.

RESEARCH METHODOLOGY

Research methodology refers to the systematic and structured techniques used to collect, analyze, and interpret data in order to answer research questions and achieve research objectives. In the case of constructing a Multi-dimensional poverty index (MPI), the research methodology involves a series of steps and approaches that are designed to ensure the accuracy and reliability of the index. The operational definitions of research methodology for constructing an MPI include the following:

1. Conceptualization: This step involves defining and identifying the dimensions and indicators of MPI that will be included in the final construction of MPI. A clear conceptual framework is developed that outlines the different aspects of multi-dimensional poverty to be measured.
2. Data collection: Data on the selected indicators is collected through various secondary sources, such as Family Health household surveys, published periodical records, and existing web databases. The data collection methodology involves rigorous and standardized approach to ensure consistency and comparability.

3. Indicator selection: Indicators are selected based on their relevance, reliability, and policy implications. Each indicator under selected components are taken to adequately represent the specific dimension of multi-dimensional poverty it seeks to measure.
4. Weighting and aggregation and ranking: The weights of different dimensions and indicators are assigned based on their relative importance in determining MPI and respective rankings of selected states under study.



Indicators under each dimension are as:

Health Dimension

Infant Mortality Rate (IMR), Birth Rate

Education Dimension

Drop-out rate at primary and upper primary level education.

Living Standard Dimension

Households Percentage share to clean cooking fuel

Households Percentage share to improved sanitation

Households Percentage share to safe drinking water

Before computation, value of indicator under each dimension has been normalized by using maximum and minimum across sub layers. { i, j,k …….}

$a_{ij} = \frac{Max\ value - variable\ value}{\max value - \min value}$ (in case of Positive variable under indicator)

$a_{ij} = \frac{variable\ value - \min value}{\max value - \min value}$ (in case of Negative variable under indicator)

(minimum and maximum value of indicator has been selected on basis of sustainable development index goal posts and other national level target fixed related to particular indicator)

$$\mathbf{MPI} = \frac{aij+bij+cij}{3} = \frac{\mathbf{Education+Helth+living\ standard}}{3}$$

Data Presentation, Analysis and Discussion

Table 1: Descriptive Statistics

State	IMR	Birth Rate	Primary Education Dropout Rate	Upper Primary Education Dropout Rate	Clean cooking fuel	Improved Sanitation facility	Safe drinking water
Bihar	27	25.5	0	4.6	37.8	49.4	99.2
Madhya Pradesh	43	24.1	3.1	8.8	40.1	65.1	89
Rajasthan	32	23.5	3.6	4.3	41.4	71.1	96.5
Uttar Pradesh	38	25.1	2.7	2.9	49.5	68.8	99.2
Chhattisgarh	38	22	0.8	4.1	33	76.8	95.5
Jharkhand	25	22	1.8	3.9	31.9	56.7	86.6
Odisha	36	17.7	0	7.3	34.7	60.5	91.1

Source: Col: 2, 3, SRS Bulletin (2020), Col: 4,5, www.educationforallinindia.com, Col: 6,7,8, NFHS (2020)

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1. Infant Mortality Rate (IMR):

Madhya Pradesh has the highest IMR at 43, indicating a higher number of infant deaths per 1,000 live births. Bihar has the lowest IMR at 27, suggesting comparatively better healthcare and lower infant mortality.

2. Birth Rate:

Uttar Pradesh has the highest birth rate at 25.1, implying a higher number of births per 1,000 population. Odisha has the lowest birth rate at 17.7, indicating a comparatively lower population growth.

3. Primary Education Dropout Rate:

Chhattisgarh has the lowest primary education dropout rate at 0.8%, suggesting better access and completion of primary education. Rajasthan has the highest primary education dropout rate at 3.6%, indicating a higher percentage of children not completing primary education.

4. Upper Primary Education Dropout Rate:

Bihar has the highest upper primary education dropout rate at 37.8%, indicating a relatively higher percentage of children dropping out during upper primary education. Rajasthan has the lowest upper primary education dropout rate at 4.3%, suggesting better retention in upper primary education.

5. Clean Cooking Fuel:

Bihar has the highest percentage (49.4%) of households not using clean cooking fuel, highlighting a significant lack of access to cleaner cooking technologies. Chhattisgarh has the lowest percentage (33%) of households not using clean cooking fuel, indicating relatively better access to clean cooking technologies.

6. Improved Sanitation Facility:

Chhattisgarh has the highest percentage (76.8%) of households with improved sanitation facilities, suggesting better access to toilets and proper sanitation practices. Rajasthan has the lowest percentage (41.4%) of households with improved sanitation facilities, indicating a relatively lower access to proper sanitation.

7. Safe Drinking Water:

Bihar and Uttar Pradesh have the highest percentage (99.2%) of households with access to safe drinking water, suggesting better water supply and infrastructure. Rajasthan has the lowest percentage (68.8%) of households with access to safe drinking water, indicating a relatively lower access to safe water sources.

Table 2: MPI

State	Index	Rank
Bihar	0.446445	5
Chhattisgarh	0.436246	4
Jharkhand	0.517381	7
Madhya Pradesh	0.310745	1
Odisha	0.507625	6
Rajasthan	0.394007	3
Uttar Pradesh	0.362616	2

Source: Author's calculation from Table 1.

The table above represents the Multi-dimensional Poverty Index (MPI) values for different states in India. The MPI is a measure of poverty that takes into account multiple indicators, such as education, health, and standard of living, to provide a comprehensive understanding of poverty levels.

1. Madhya Pradesh has the lowest MPI value of 0.310745, indicating a higher prevalence of multi-dimensional poverty compared to other states in the table. This suggests that a significant proportion of the population in Madhya Pradesh experiences deprivations in various dimensions of poverty.
2. Uttar Pradesh has the second-lowest MPI value of 0.362616, implying a relatively lower level of multi-dimensional poverty compared to Madhya Pradesh. However, it still indicates a significant number of people experiencing deprivations across multiple dimensions.
3. Rajasthan has an MPI value of 0.394007, showing a lower level of multi-dimensional poverty compared to Uttar Pradesh and Madhya Pradesh. This suggests that Rajasthan faces significant challenges in addressing poverty across various dimensions.
4. Chhattisgarh has an MPI value of 0.436246, indicating a relatively lower prevalence of multi-dimensional poverty compared to the previous states mentioned. This suggests that a significant proportion of the population in Chhattisgarh faces relatively low deprivations in education, health, and living standards.
5. Bihar has an MPI value of 0.446445, showing a lower level of multi-dimensional poverty than Chhattisgarh. This suggests that Bihar has significantly addressed the challenges in reducing poverty levels across various dimensions.

6. Odisha has an MPI value of 0.507625, indicating a relatively lower prevalence of multi-dimensional poverty compared to the states mentioned earlier. This suggests that a significant proportion of the population in Odisha experiences low deprivations in education, health, and living standards.
7. Jharkhand has the lowest MPI value of 0.517381 among the listed states, indicating the lowest prevalence of multi-dimensional poverty. This suggests that Jharkhand has performed well to challenges in addressing poverty across various dimensions and launched focused efforts to reduce poverty level.

In conclusion, the MPI values provide a comprehensive understanding of the multi-dimensional poverty levels among states in India. Lower MPI values indicate higher levels of multi-dimensional poverty, and higher MPI values indicate lower poverty levels.

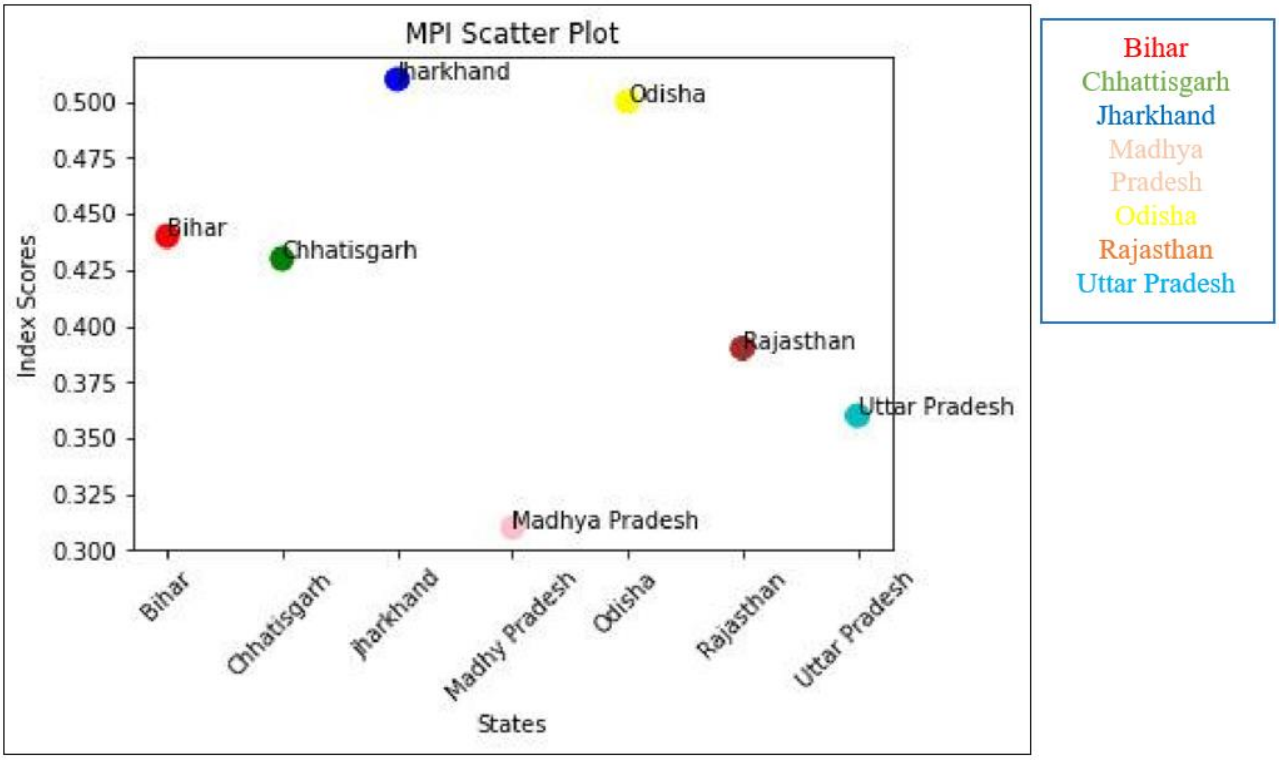

Figure 1: MPI

CONCLUSION

The research study analyzed multidimensional poverty in seven states of India as nomenclature of BIMRU including Jharkhand and Chhattisgarh, focusing on infant mortality rate, birth rate, primary education dropout rate, and upper primary education dropout rate, access to clean cooking fuel, improved sanitation facilities, and safe drinking water. The findings reveal that Madhya Pradesh has the highest level of multidimensional poverty, with a normalized index value of 0.310745, ranking first among the states. Uttar Pradesh follows closely behind, with a normalized index value of 0.362616. States such as Bihar, Chhattisgarh, Jharkhand, Odisha, and Rajasthan also exhibit significant levels of multidimensional poverty, with normalized index values ranging from 0.394007 to 0.517381. The study concludes that these states need urgent attention and targeted interventions to alleviate poverty and improve human development outcomes. Priority areas for intervention include addressing high infant mortality rates, reducing primary and upper primary education dropout rates, and improving access to clean cooking fuel, improved sanitation facilities, and safe drinking water. By focusing on these dimensions of poverty, policymakers can develop comprehensive strategies to tackle poverty in a holistic manner and improve overall well-being in these states.

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