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A CAUSAL ANALYSIS OF RELATIONSHIP BETWEEN MULTIDIMENSIONAL POVERTY AND SELECT SOCIO-ECONOMIC INDICATORS IN INDIA

Dr Gaganpreet Kaur Kaushal*

*Assistant Professor of Economics,
Sri Guru Gobind Singh College,
Chandigarh, INDIA
Email id: gagankaushal78@gmail.com

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ABSTRACT

Poverty is immensely painful to experience and tremendously complex to understand as it entails comprehensive layers of human deprivation on parallelly occurring physical and psychological realities at multiple facets of socio-economic life of the poor people. The effects are generally so deeper that they engulf many generations in the poverty trap. Therefore, several socio-economic variables together need to be analysed to understand poverty in the true sense. The present study analyses eleven socio-economic parameters to make a comprehensive assessment of the possible causes of variations in the level of multi-dimensional poverty across states of India. The study makes use of correlation, step-wise regression, t-test and F-test to address the objectives of the study. The study concludes that value added in services, gross enrolment ratio at secondary level, average size of land holding and expenditure on education together can explain more than 80% of variations in the level of multi-dimensional poverty across the states of India. Therefore, prevention of further fragmentation of land holdings, greater expenditure on education and growth of service sector should be the major thrust areas in the national policy formulation.

KEYWORDS: *Multidimensional Poverty, Socio-Economic parameters, Step-Wise Regression Analysis, F-test.*

I.INTRODUCTION

"Poverty anywhere is a threat to prosperity everywhere."

ILO Declaration of Philadelphia, 1944.

Poverty is known to have unwarranted implications for global peace, stability and prosperity and the need to address poverty has been acknowledged by all the renowned international organisations and policy makers. Although lack of money is the simplest manifestation of poverty but poverty in its true form is more complex and challenging experience than this. Poor people are deprived of the basic requirements of leading a reasonable human life that makes them vulnerable in almost all spheres of human existence including health, education, sanitation, clean drinking water, reasonable employment etc. The parallel vulnerability in several aspects at the same time causes spiral effect of poverty in multiple dimensions of life that doesn't only remain confined to the existing generations but passed on to the future generations as well. To

pursue and achieve sustainable development goals (SDGs), it becomes extremely important to address poverty in all its forms and dimensions.

Economic parameters considered alone, such as GDP per capita, fail to capture the true reality of poverty and therefore the world felt the need to assess multidimensional aspects of poverty at different levels in a more comprehensive manner. India is also constantly grappling with the issue of poverty since independence, at both national and regional level. Wide pockets of poverty exist in many states and regions of India with a sizeable percentage of population living below poverty line, also known as headcount ratio.

The Headcount ratio only reflects the incidence of poverty without capturing the intensity of poverty and therefore India, in collaboration with United Nations Development Programme (UNDP), marched towards a significant journey of addressing this issue by computing Multidimensional Poverty Index (MDP) in 2021.MDP also captures the intensity of poverty by measuring the percentage of deprivations suffered by each person or household on the average along with the percentage of poor population. Computation of MDP in India is considered as a significant step towards addressing the complex and multifaceted challenge of poverty that India faces at the national and regional level. A well formulated public policy based on national MDP can be used as a robust tool to monitor and mitigate poverty as it provides a multi-dimensional perspective on problems and deprivations of poor people. Public policy based on MDP can help India in its pursuit on realizing UNDP's SDGs. Global MDP includes components from three major dimensions of human life – Health, Education, and Standard of living. India's national MDP follows the similar methodology by retaining 10 indicators of Global MDP and adding two new indicators i.e., maternal health and bank accountin the dimension of health and standard of living respectively.

Multidimensional characteristic of poverty requires in-depth understanding of the factors affecting it so as to devise effective tools to address this issue that presents the biggest challenge to the sustainable development efforts at the national and global level. The issue of poverty in India can be addressed effectively only if the factors affecting the size of Multidimensional Poverty Index (MDP) are carefully investigated and the socio-economic policies are designed accordingly. The present study is an attempt to explore and investigate into the possible demographic and socio-economic determinants of poverty across states of India.The study attempts to bring out the relative contribution of each individual factor separately and jointly to help building the targeted policy intervention and directing the state efforts in the most desired direction.

II. LITERATURE REVIEW

World Bank (1995) studied the impact of financial development and resultant economic growth on poverty and reported that the benefits of financial development gradually trickle down to the masses and help to reduce poverty in general.

A study by Jeanneney and Kpodar (2008) on the relationship between economic growth and poverty also reported the trickle-down effect of financial development on economic growth and poverty and reported that financial development can be used as an effective tool in making a dent on poverty.

Spaho (2014) analysed the determinants of poverty by regressing per capita consumption on various socio-economic and demographic variables and also tried to assess the effect of government programmes on poverty. The study found residence and family size to be the most significant variables among others and concluded that positive policy intervention in the field of family welfare along with development of tourism and agricultural sector can help to alleviate poverty.

Chen and Wang (2015) used multilevel logistic regression to examine the determinants of poverty in Taiwan. The study found the presence of statistically significant relationship between poverty, economic growth, education, in equality and dependency ratio.

Cho and Kim (2017) investigated the effect of unemployment, land ownership, dependency ratio, health, education and household assets on poverty in Rwanda. The study concluded that promoting inter-regional equality by focussing on the development of rural regions, family welfare programmes with an aim to reduce birth rate and family size along with proper education of the masses can help to reduce the poverty.

Buba et al. (2018) used binary regression analysis to examine the effect of socio- economic and demographic factors on social exclusion and economic deprivation among households in Nigeria. The study concluded that literacy, age of the head of the family, size of the family, type of employment were the major determinants of poverty in Nigeria.

Felfoul and Jaloul (2019), using Autoregressive Distributed lag Model, examined the impact of population growth on poverty in Algeria. The study revealed statistically significant and direct relationship between population growth and poverty.

Otok et al. (2019) by using structural equation modelling examined the factors affecting poverty in the provinces of Java and found that factors related to health and human resources played the most significant role whereas the economic factors played statistically insignificant role in determining poverty.

Mardiyana's (2020) analysed the impact of population growth and education on poverty in Indonesia and found population to have statistically significant and direct effect on poverty whereas education shared significant negative relationship with poverty.

Dastgir (2021) examined the relationship between poverty and size of population, growth of NNP, gross domestic savings and capital formation on poverty in India. The study found all the determinants to be statistically significant. Gross capital formation shared significantly negative relation with poverty whereas gross domestic savings, size of population and growth of net national income shared significantly positive relationship with poverty which means that in the absence of targeted policy intervention, higher national income may not necessarily result into lower poverty.

Nguyen's (2021), by using structural equation modelling, studied the impact of various socio-economic variables on poverty alleviation in the ethnic minority areas of Vietnam. The study highlighted the significance of providing quality education and empowering the ethnic minorities by strengthening their identity.

Muhammad et al. (2022),by using structural equation modelling, investigated into the impact of public spending, inflation, expenditure on infrastructure, income inequality and economic growth

on poverty in Indonesia. The results showed statistically insignificant effect of income inequality, inflation and economic growth on poverty in Indonesia. However, Infrastructure spending emerged out to be a significant determinant. Effect of inflation was also found to be relatively weak.

III. OBJECTIVES

The study has been carried out keeping into mind the following objectives:

1. To identify the factors affecting the state of multi-dimensional poverty across states in India.
2. To make an assessment of the relative contribution of each factor individually as well as jointly in the determination of the level of multi-dimensional poverty across states in India.

IV. METHODOLOGY

The study makes use of state as a unit of analysis and twenty-seven states of India (except Telangana) have been included in the study for the aforementioned purpose. The data used in the study pertains to the period between 2019-20 to 2021-22, depending upon its availability in the published sources of statistical information. Primary sources of information used in the study are Economic Survey 2022-23 (Statistical Appendix); Handbook of Urban Statistics, 2019, Ministry of Housing and Urban Affairs, GOI; RBI Handbook of Statistics on Indian States, 2023; National Family Health Survey-5, 2019-20; NSS Report No. 589, Multiple Indicator Survey in India/A3, 2020-21.

It is a well acknowledged fact that a poor person experiences deprivation at various levels and the issue of poverty needs to be addressed at all the levels simultaneously. Policy neglect at any level can potentially reinforce poverty at other levels. Poverty being a complex phenomenon requires multi-dimensional approach with a deeper and holistic insight into the problem. Keeping in mind the multi-dimensional nature of poverty, the present study analyses eleven indictor spertaining to socio-economic and demographic aspects of human life as the possible determinants of multi-dimensional poverty index (MDP) across states of India. The indicators used in the study are as follows:

1. Number of unemployed persons per thousand of population (UEM)
2. Average size of household (AHL)
3. Female work force participation rate (FMW)
4. State expenditure on education per lakh of population (XED)
5. State expenditure on development per lakh of population (XDV)
6. Gross enrolment ratio at elementary level (ERL)
7. Gross enrolment ratio at senior secondary level (ERS)
8. Net state value added in industry at constant prices (VIN)
9. Net state value added in agriculture at constant prices (VAG)
10. Net state value added in services at constant prices (VSR)
11. Percentage of population living in urban areas (LOU)

Techniques of simple regression analysis and multiple regression analysis have been used to examine the relative role of indicators separately as well as collectively in the determination of value of multi-dimensional poverty index across Indian states. In the regression model, multi-dimensional poverty indices (MDP) have been used as a dependent variable whereas Number of unemployed persons per thousand of population (UEM), Average size of household (AHL), Female work force participation rate (FMW), State expenditure on education per lakh of population (XED), State expenditure on development per lakh of population (XDV), Gross enrolment ratio at elementary level (ERL), Gross enrolment ratio at senior secondary level (ERS), Net state value added in industry at constant prices (VIN), Net state value added in agriculture at constant prices (VAG), Net state value added in services at constant prices (VSR) and Percentage of population living in urban areas (LOU) have been used as independent variables. MDP, in the study, has been regressed on all eleven indicators separately as well as jointly using the multiple (step-wise) regression model.

In order to effectively deal with the problem of multi-co linearity, explanatory variables have been entered into the regression model step by step in accordance with their relative importance in determining the level of multi-dimensional poverty as reflected by their t-values in the simple regression model.The variable (s), which reduced the explanatory power of the multiple (step-wise) regression model when entered into the model, have been dropped out of the model to develop the best possible model, given the various limitations of the study.The statistical significance of regression coefficients (β'_s) has been examined by applying t-test. R^2 has been used to see the percentage variation in the dependent variable explained by a particular independent variable or various independent variables together in step-wise multiple regression analysis. To compare the different sets of multiple regression equations, adjusted R^2 has been used. Adjusted R^2 is a modification of R^2 that adjusts for the number of explanatory variables in the regression model. Unlike R^2, the adjusted R^2 increases only if the newly added variable improves the explanatory power of the model more than what would be normally expected by chance.F-test has been conducted to test for the significance of the whole regression equation.

V. RESULTS AND DISCUSSION

Poverty is a complex socio-economic phenomenon and therefore it is assumed that the variables chosen for the purpose of study may share some statistical relationship with each other. With a view to understand the correlation among various indicators, correlation coefficients have been calculated between multi-dimensional poverty index and each independent variable and also between the independent variables among themselves. A correlation matrix has been prepared and the results are reported in table 1.

TABLE 1: CORRELATION MATRIX

	MDP	UEM	AHL	FMW	XED	XDV	ERL	ERS	VIN	VAG	VSR	LOU
MDP	1											
UEM	-0.06 (-0.30) p>0.05	1										
AHL	0.64* (4.16) P<0.05	0.06 (0.30) p>0.05	1									
FMW	-0.24 (-1.24) p>0.05	0.04 (0.20) p>0.05	-0.27 (-1.40) p>0.05	1								
XED	-0.53* (-3.13) P<0.05	0.28 (1.46) p>0.05	-0.19 (-0.97) p>0.05	0.32 (1.69) p>0.05	1							
XDV	-0.16 (-0.81) p>0.05	-0.05 (-0.25) p>0.05	-0.15 (-0.76) p>0.05	-0.04 (-0.20) p>0.05	0.40* (2.18) P<0.05	1						
ERL	0.10 (0.50) p>0.05	0.15 (0.76) p>0.05	0.36 (1.92) p>0.05	0.04 (0.20) p>0.05	0.08 (0.40) p>0.05	0.16 (0.81) p>0.05	1					
ERS	-0.73* (-5.34) P<0.05	0.39* (2.12) P<0.05	-0.38* (-2.05) P<0.05	0.32 (1.69) p>0.05	0.31 (1.63) p>0.05	0.09 (0.45) p>0.05	0.05 (0.25) p>0.05	1				
VIN	-0.52* (-3.04) P<0.05	0.15 (0.76) p>0.05	-0.34 (-1.81) p>0.05	0.34 (1.81) p>0.05	0.77* (6.03) P<0.05	0.23 (1.18) p>0.05	-0.26 (-1.35) p>0.05	0.37 (1.99) p>0.05	1			
VAG	-0.32 (-1.69) p>0.05	-0.33 (-1.75) p>0.05	-0.03 (-0.15) p>0.05	0.11 (0.55) p>0.05	0.14 (0.71) p>0.05	0.11 (0.55) p>0.05	-0.12 (-0.60) p>0.05	0.09 (0.45) p>0.05	0.13 (0.66) p>0.05	1		
VSR	-0.75* (-5.59) P<0.05	0.21 (1.07) p>0.05	-0.35 (-1.87) p>0.05	0.07 (0.35) p>0.05	0.61* (3.85) P<0.05	0.12 (0.60) p>0.05	0.04 (0.20) p>0.05	0.51* (2.96) P<0.05	0.61* (3.85) P<0.05	0.12 (0.60) p>0.05	1	
LOU	-0.64* (-4.16) P<0.05	-0.04 (0.20) p>0.05	-0.36 (-1.92) p>0.05	-0.08 (-0.40) p>0.05	0.35 (1.87) p>0.05	-0.02 (-0.10) p>0.05	-0.02 (-0.10) p>0.05	0.40* (2.18) P<0.05	0.38 (2.05) P>0.05	0.10 (0.50) p>0.05	0.79* (6.44) P<0.05	1

Source: Author's own calculations

Table 1 shows that the average size of household (AHL), expenditure on education (XED), gross enrolment ratio at senior secondary level (ERS), net state value added in industry (VIN), net state value added in services and level of urbanisation (LOU) share statistically significant relationship with multi-dimensional poverty index (MDP) at the state level. In all these cases, the value of $p<0.05$ at 95% confidence level showing that the coefficients of correlation between these variables are statistically significant.

Average size of household (AHL) and gross enrolment ratio at senior secondary level (ERS) share statistically significant and negative relationship. State expenditure on education (XED) and net state value added in industry (VIN) also share significantly positive relationship and a similar relationship emerged between the State expenditure on education (XED) and net state value added in services (VSR).

In order to analyse the role of each individual variable in determination of the level of multi-dimensional poverty across states, simple regression analysis has been carried out and the results are reported in table 2.

TABLE 2: RESULTS OF SIMPLE REGRESSION OF MDP ON EACH INDIVIDUAL EXPLANATORY VARIABLE

Variable	Constant	Reg. Coeff	R-square	Adjusted R-square	F-value	p-value
UEM	0.0599	-0.0000005 (-0.2894)	0.0033	-0.0366^	0.0838	0.7747
AHL	-0.1863	0.0554* (4.1223)	0.4047	0.3809	16.9932	0.00036
FMW	0.0793	-0.0008* (-3.0068)	0.0585	0.0208	1.5545	0.2240
XED	0.0914	-0.00001* (-3.0331)	0.2690	0.2398	9.1996	0.0056
XDV	0.0598	-0.00000011 (-0.7953)	0.0247	-0.0143^	0.6325	0.4339
ERL	0.0249	0.0003 (0.5009)	0.0099	-0.0297^	0.2509	0.6208
ERS	0.1722	-0.0019* (-5.3827)	0.5368	0.5183	28.9739	0.000014
VIN	0.0766	-0.0000005* (-3.0228)	0.2677	0.2384	9.1373	0.0057
VAG	0.0846	-0.000003 (-1.7005)	0.1037	0.0678	2.8916	0.1015
VSR	0.1183	-0.0000012* (-5.6000)	0.5564	0.5387	31.3603	0.000008
LOU	0.1184	-0.0021* (-4.2057)	0.4144	0.3909	17.6878	0.0003

Source: Author's own calculations

Note:*The variable shares statistically significant relationship as $p<0.05$ at 95% confidence level and null hypothesis of regression coefficient=0 is rejected and ^ variables with negative adjusted r squared indicate that the model has statistically no predictive value. Figures in brackets are the t-values of regression coefficients.

Table 2 clearly shows that average size of household, expenditure on education, gross enrolment ratio at senior secondary level, value added in industry, value-added in services and level of urbanization merged as statistically significant variables when regressed individually on the multi-dimensional poverty index. Rate of unemployment, expenditure on overall development, gross enrolment ratio at elementary level of education, value-added in agriculture and level of urbanization have been statistically insignificant in terms of their effect on multi-dimensional poverty index in states of India whereas India being largely a rural economy, average size of landholding has emerged as a statistically significant variable affecting the level of multi-dimensional poverty, when considered alone.

Similarly, Female Work Force Participation Rate has also emerged as a significant variable as females, with their scientifically proven higher nurturing abilities, may have been providing better care and nurturing to their children and families out of their earned income. Enrolment Ratio at Secondary Level is significant because of its obvious effect on the overall confidence and understanding of the individuals. Value Added in Industry, Value Added in Services and Level of Urbanisation, if favourable, certainly have positive and deep spiral effect on all other aspects of life of the people across states and the nation. However, in order to analyse the effect of all these variables in determining the overall level of multi-dimensional poverty across states, it's important to eliminate the effect of multi-collinearity.

Therefore, in order to collectively analyse the impact of independent variables together on the multi-dimensional poverty index in India, step-wise regression technique has been used. All the individually significant explanatory variables have been included in the step-wise regression analysis in the descending order of their t-values obtained in the simple regression analysis in table 2 i.e., VSR, ERS, LOU, AHL, XED, VIN, FMW. The results have been reported in the form of Regression Models I to IV.

Regression Model I: Regressing MDP onVSR

Regression Model	0.1183 – 0.0000012 (VSR)
R-squared	0.5564
Adjusted R-squared	0.5387
F-statistic (df 2,24)	31.3603
Overall p-value	0.000008

As overall p-value is <0.05, the result is significant at $\alpha = 0.05$ and the regression model fits the data better than the model with no independent variables.

Regression Model II: Regressing MDPonVSR and ERS

Regression Model	0.1741 + 0.000001 (VSR) – 0.0012 (ERS)
R-squared	0.7245
Adjusted R-squared	0.7015
F-statistic (df 2,24)	31.5553
Overall p-value	0.0000002

As overall p-value is <0.05, the result is significant at α =0.05 and the regression model fits the data better than the model with no independent variables.

Regression Model III: Regressing MDP on VSR, ERS and AHL

Regression Model	0.0231 – 0000007 (VSR) − 0.0010 (ERS) + 0.0300 (AHL)
R-squared	0.8229
Adjusted R-squared	0.7999
F-statistic (df 4,22)	35.6408
Overall p-value	0.000000008

As overall p-value is <0.05, the result is significant at α =0.05 and the regression model fits the data better than the model with no independent variables.

Regression Model IV: Regressing MDP on VSR, ERS, AHL and XED

Regression Model	0.023801952 −0.0000006 (VSR) − 0.0010 (ERS) + 0.0303 (AHL) − 0.000001 (XED)
R-squared	0.8313
Adjusted R-squared	0.8006
F-statistic (df 5,21)	27.1009
Overall p-value	0.00000003

As overall p-value is <0.05, the result is significant at α =0.05 and the regression model fits the data better than the model with no independent variables.

The results suggest that value added in services alone can explain 53.87% of variations in the level of multi-dimensional poverty across states whereas together with gross enrolment ratio at secondary level, the explanatory power of the model increases to 70.15% which further rises to 79.99% with the entry of average size of land holding and finally to80.06% when expenditure on education in entered into the regression analysis. Therefore, value added in services, gross enrolment ratio at secondary level, average size of land holding and expenditure on education together can explain more than 80% of variations in the level of multi-dimensional poverty across the states of India. Entry of LOU in step III and VIN and FMW in step V and VI reduced the explanatory power of the regression model and therefore, have been dropped from the step-wise regression analysis.

CONCLUSION

GDP Per Capita alone is incapable of capturing the true reality of poverty in India or elsewhere. Along with the incidence of poverty, it's equally important to assess the intensity of poverty

experienced by peoplein a more comprehensive manner by capturing the parallel effects of other socio-economic aspects of life, which create a deep spiral effect not only on the present life of the people but also on their future possibilities and opportunities of life too. The study shows that average size of landholding, Female Work Force Participation Rate, Enrolment Ratio at Secondary Level, Value Added in Industry, Value Added in Services and Level of Urbanisation have statistically significant effect on the level of multi-dimensional poverty across states of India and therefore its important for the nation to prioritise in the desired direction and make greater budgetary allocation to improve these socio-economic aspects of people's lives. The analysis suggests that value added in services, gross enrolment ratio at secondary level, average size of land holding and expenditure on education together can explain more than 80% of variations in the level of multi-dimensional poverty across the states of India. Therefore, prevention of further fragmentation of land holdings, greater expenditure on education and growth of service sector should be the major thrust areas in the national policy formulation.

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