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# Exploring the Interconnection of Agricultural Growth and Poverty Reduction in India

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**Abstract**

Addressing poverty is a pressing issue in developing nations, posing a significant challenge to both economic advancement and societal well-being. While India boasts the title of the world's fastest-growing economy, concerted efforts are imperative to enhance living standards and the overall welfare of its populace. The agricultural sector, serving as a primary source of livelihood, plays a pivotal role in providing employment opportunities and contributing to poverty reduction.

To delve into the impact of agricultural growth on poverty alleviation, this study utilized secondary data from sixteen purposively selected states in India. The objective was to analyze the correlation between poverty levels, Agriculture Gross Domestic Product (GDP) per worker, and Non-Agriculture Gross Domestic Product (GDP) per worker through pooled regression analysis.

The study's findings reveal a noteworthy trend. A one percent increase in Agriculture GDP per worker corresponds to a 0.11 percent reduction in poverty, surpassing the impact of a 0.04 percent reduction associated with Non-Agriculture GDP per worker. This underscores the significance of promoting agricultural growth for more effective poverty reduction, particularly in agrarian economies like India, where a substantial portion of the population relies on agriculture for sustenance.

However, the study also advocates for a balanced and mutually beneficial growth across various sectors of the economy. Such an approach is seen as instrumental in fostering comprehensive poverty alleviation throughout the country.

**Keywords**: Poverty reduction; agriculture GDP per worker; non-agriculture GDP per worker.

## 1. INTRODUCTION

In the realm of rapidly developing and continuously prospering world poverty remains the most elusive social evil to away with. In fact for all underdeveloped and developing countries, poverty is one of the innate threats to derail their economic progress and hard earned social status. For a quite a sometime India remains fastest growing economy in the world and there are multiple efforts to improve the standard of living and social wellbeing of 1.3 billion people.

However, the efforts in the last seven decades have not brought in desired results as lives of more than 20 million people starts in poverty and end in it [1,2]. As estimated 711 million people (10 % global population) are living extreme poverty that is living less than $1.90 a day in 2021. Global Multidimensional Poverty Index **(**MPI) 2020 report indicates that India is 62 among 107 countries with an MPI score of 0.123 and 27.9 per cent population identified as multi-dimensionally poor which accounted for 36.8 per cent of rural and 9.2 per cent of urban. This forms the basis for surmounting poverty as its effects are quite disastrous for rapidly developing country unless they devise alleviation measures.

The key of alleviating poverty levels rest on provisioning basic amenities and most crucial among all is to ensure food and nutritional security as duo turns out to be game changer in reducing poverty levels [3,4].For achieving these foundational securities, continues agriculture development is warranted owning to its strategic position in poverty reduction, sizable economic contribution and growing employment opportunities. Indeed a significant population, about 41.49 per cent of workforce directly depend on agriculture for their livelihood and more than 70 per cent of rural household population professionally engage in agriculture [5]. So, the GDP growth in agriculture surely helps in reduction of poverty by inducing higher income levels in rural poor and it supports for the development of rural economy.

The agriculture sector contribution to country’s economy can’t be interchanged or augmented by any other sectors like industry and service sector. The sector not only provides food, and creates various livelihood opportunities. The contribution to national economy is remarkable and the sector has also greater impact on international trade and hence, agriculture is a strategically important economic sector and a type of economic activity for every country [6,7]in turn, the development of agriculture will play greater role in eradicating the poverty. Thus, concentrating the above, the study was taken up to analyse the nexus between agriculture growth and poverty reduction in India.

## 2. METHODOLOGY

The study is based on secondary data, collected from the different published sources such as National Sample Survey Office reports, Hand book of Statistics on Indian states of RBI, Economic Survey reports and Census, 2011 reports.
The study was conducted by considering country as a whole, where the poverty rates of two time periods i.e. period I (2011-2012) and period II (2019-2020) of all the twenty eight states and six union territories were collected [8,9] and the annual average reduction in poverty rates were calculated. Among all, sixteen states shows the annual average reduction in poverty rates and only those states were selected for the next step of analysis. The study also analyses the relationship between poverty, agriculture GDP per worker and non-agriculture GDP per worker by using pooled regression analysis for panel data as shown below.

**Pooled Regression Analysis**
The mathematical form of equation is,
$\ln Pit = \beta 0+\beta 1\ \ln AgGDP/Wkit+\beta 2\ \ln NonAgGDP/Wkit + \varepsilon it$ (1)
where,
P = poverty rate
lnAgGDP/Wk = Agriculture GDP per worker
lnNonAgGDP/Wk = Non-Agriculture GDP per worker
ε is the error term
i is the panels (states)
t is the time (years)
The Agriculture GDP per worker and Non- Agriculture GDP per worker were calculated as,
The Agriculture GDP per worker and Non-Agriculture GDP per worker were calculated as,
Agriculture GDP per worker, as the name implies, it is the ratio of total GDP for the sector divided by the number of economically active workers claiming agriculture as their main source of income.

$$Agriculture\ GDP\ per\ worker = \frac{Total\ agriculture\ GDP}{Total\ agricultural\ workers} \quad (2)$$

Non-Agriculture GDP per worker is defined as the difference between total national and agricultural GDP divided by the difference between total national and agricultural employment.

Non agriculture GDP per worker=(Total GDP-Agriculture GDP)/(Total workers-total agricultural workers) (3)

The high correlation between the variables, agriculture GDP per worker and non-agriculture GDP per worker stimulated the problems of multicollinearity. Hence, to test the presence of multicollinearity problems and to verify the presence of heteroscedasticity, Variance Inflation Factor (VIF) and the Breusch Pagan test were conducted.

Where, VIF was calculated using the formulae, $VIF=\sqrt{1 - R2}$ (4)

## 3. RESULTS AND DISCUSSION

The average annual reduction achieved in poverty rates from period I to period II were calculated by considering country as a whole (twenty states and eight union territories) and then the states which shows the reduction in poverty rates were only selected for the next step of analysis and hence in total sixteen states were selected as shown in Table 1.

The Table1 shows the average annual reduction in poverty rates among selected states where Manipur shows the highest poverty reduction with 2.11 per cent followed by Chandigarh (1.75%). Particularly in northern parts of states

Chandigarh stood first followed by Delhi (0.57%) and same in southern states the union territory Pondicherry (0.89%) shows the higher levels of poverty reduction followed by Karnataka (0.86%) and Goa (0.14%) has registered with very lesser percentage of poverty reduction among southern states and the selected states of the country as well. The Manipur state shows the highest reduction in poverty levels followed by Mizoram with 2.11 and 1.18 per cent respectively in eastern parts of states where as in western parts of the country Maharashtra shows the 0.28 per cent of poverty reduction. It must noted from the table that variability in poverty reduction over the years has been increased by 21.13 per cent. The results are in line with the studies of [11] they found that reduced poverty rates over the years.

**AAGR-Average Annual Growth Rate**

The Table 2 shows the average annual growth and decadal growth in Agriculture GDP per worker from the period I to period II was observed to be 20.15 per cent whereas Non- Agriculture GDP per worker was 14.79 with the variation of 193.47 and 93.68 per cent respectively where Agriculture GDP per worker has registered the highest variability than that of Non -Agriculture GDP per worker. The states Chhattisgarh, Karnataka, Odisha and Chandigarh shows the negative average annual growth in Agriculture GDP per worker and the states Tamil Nadu and Delhi shows negative growth in Non- Agriculture GDP per worker whereas the state Maharashtra shows the negative growth in both Agriculture GDP per worker and Non- Agriculture GDP per worker which might be due to the slow trickle down in economic growth in rural economy and the highest population (second largest populous state in country). It was worth to mark that the variation has been increased in agriculture GDP per worker (87.56% to 88.01%) from period I to period II whereas it shows the decreased pattern in non- agriculture GDP per worker(285.359 to 171.145%).

The Fig. 1 shows the growth rates of both Agriculture GDP per worker and Non-Agriculture GDP per workers of the selected states where Chhattisgarh, Karnataka, Maharashtra, Odisha and Chandigarh shows negative growth rates in agriculture whereas Maharashtra, Tamil Nadu and Delhi shows negative growth rates in Non- agriculture sector. For most of the states Agriculture GDP per worker shows the stationary variations than non -agriculture GDP per worker.

**Relationship between Poverty, Agri.GDP per Worker and Non- Agri.GDP per Worker**

The study analyses the relationship between poverty, agriculture GDP per worker and non- agriculture GDP per worker using pooled regression analysis, the results shows the statistically significant and inverse relationship between poverty and with both Agriculture GDP per worker and Non- Agriculture GDP per worker.

The estimated coefficient of agricultural GDP per worker was found to be significantly higher than that of non-agriculture GDP per worker and determines that as every one per cent increase in agricultural GDP per worker, there found to be larger decline in poverty as compared to the non- agricultural GDP per worker. The slope coefficient ($\beta 1$) of about (-0.11) means that, as one per cent increase in agriculture GDP per worker on an average, leads to about 0.11per cent decline in the poverty rate in Indian states. On the other hand, as one per cent increase in non- agriculture GDP per worker it observed that 0.08 per cent of reduction in poverty. From the results it can also be found that 75 per cent of the variation in dependent variable (poverty) can be explained by independent variables (Agriculture GDP per worker and Non- agriculture GDP per worker) included in model. There is no doubt in noting that the sector agriculture contributes more to decreasing poverty than the non-agricultural sector.

**Table1.**Average annual reductionin poverty rates of selected states

| Sl. No. | State/UT | Poverty rates(%) | | |
|---|---|---|---|---|
| | | **Period I** | **Period II** | **Average annual reduction achieved** |
| **Northern States** | | | | |
| 1 | Himachal pradesh | 8.10 | 7.60 | -0.06 |
| 2 | Punjab | 8.30 | 5.60 | -0.30 |
| 3 | Chandigarh | 21.80 | 5.97 | -1.76 |
| 4 | Delhi | 9.90 | 4.79 | -0.57 |
| **Southern States** | | | | |
| 5 | Karnataka | 20.90 | 13.20 | -0.86 |
| 6 | Kerala | 7.10 | 0.70 | -0.71 |
| 7 | TamilNadu | 11.30 | 4.90 | -0.71 |
| 8 | Pondicherry | 9.70 | 1.72 | -0.89 |
| 9 | Goa | 5.10 | 3.80 | -0.14 |
| **Eastern States** | | | | |
| 10 | Odisha | 32.60 | 29.40 | -0.36 |
| 11 | Sikkim | 8.20 | 3.80 | -0.49 |
| 12 | Arunachal pradesh | 34.70 | 24.27 | -1.16 |

| | | | | |
|---|---|---|---|---|
| 13 | Chhattisgarh | 39.90 | 29.90 | -1.11 |
| 14 | Manipur | 36.90 | 17.90 | -2.11 |
| 15 | Mizoram | 20.40 | 9.80 | -1.18 |
| **Western States** | | | | |
| 16 | Maharashtra | 17.40 | 14.90 | -0.28 |
| Average | | 18.27 | 11.14 | |
| S.D. | | 11.86 | 9.59 | |
| C.V.(%) | | 64.91 | 86.04 | |

**PeriodI-2011-2012,PeriodII–2019-2020Source: [10]*

The higher correlation between the variables agriculture GDP per worker and non- agriculture GDP per worker awakened worries of multicollinearity problems, therefore Variance Inflation Factors (VIF) was calculated. Generally, VIF values varies from one to infinity and the VIF value greater than ten normally indicates problem of multicollinearity. In present study VIF value found to be 4.01, which indicate the no problem of multicollinearity. Study also tests for the Breusch Pagantestto recognize the presence of heteroscedasticity and fails to discern the presence of heteroscedasticity. The results are in consistent with Anjum and Tarique [12], they also opined the role of importance of agriculture sector in reducing poverty is higher than non- agriculture sector. Chritiaensen and Matin [13] also concluded with same results as compared to growth outside of agriculture, growth in agriculture generally tends to reduce poverty to the larger extent

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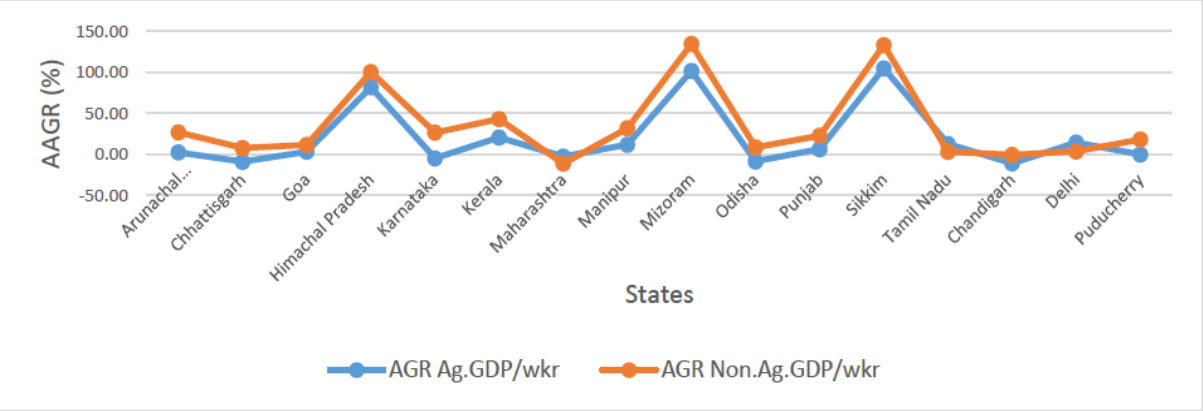


**Fig.1.**Growth rates of agriculture GDP per worker and non–agriculture GDP per worker

**Table2.** Annual and decadal growth of agriculture GDP per worker and non-agriculture GDP per worker in India

| States | Agriculture GDP/worker | | | | Non-agriculture GDP/worker | | | |
|---|---|---|---|---|---|---|---|---|
| | Period I | Period II | AAGR (%) | Decadal change | Period I | Period II | AAGR (%) | Decadal change |
| Arunachal pradesh | 8.023 | 9.778 | 2.43 | 21.87 | 0.002 | 0.005 | 24.33 | 219.01 |
| Chhattisgarh | 4.190 | 0.751 | -9.12 | -82.09 | 0.026 | 0.064 | 16.85 | 151.62 |
| Goa | 4.898 | 6.315 | 3.22 | 28.94 | 0.009 | 0.015 | 8.18 | 73.66 |
| Himachal pradesh | 0.866 | 7.239 | 81.80 | 736.23 | 0.012 | 0.031 | 18.53 | 166.80 |
| Karnataka | 3.059 | 1.693 | -4.96 | -44.65 | 0.083 | 0.318 | 31.49 | 283.42 |
| Kerala | 0.803 | 2.284 | 20.48 | 184.33 | 0.057 | 0.172 | 22.53 | 202.81 |
| Maharashtra | 1.676 | 1.252 | -2.81 | -25.32 | 2.475 | 0.566 | -8.57 | -77.14 |
| Manipur | 2.551 | 5.225 | 11.65 | 104.82 | 0.002 | 0.005 | 20.21 | 181.87 |
| Mizoram | 0.461 | 4.677 | 101.67 | 915.01 | 0.001 | 0.005 | 32.96 | 296.60 |
| Odisha | 4.415 | 0.940 | -8.74 | -78.70 | 0.040 | 0.102 | 17.30 | 155.67 |
| Punjab | 3.137 | 4.919 | 6.31 | 56.83 | 0.039 | 0.096 | 16.43 | 147.86 |
| Sikkim | 0.809 | 8.440 | 104.75 | 942.72 | 0.002 | 0.006 | 28.33 | 254.99 |
| Tamil Nadu | 0.462 | 0.982 | 12.52 | 112.67 | 0.125 | 0.018 | -9.51 | -85.61 |
| Chandigarh | 6.666 | 0.085 | -10.97 | -98.72 | 0.005 | 0.009 | 10.23 | 92.04 |
| Delhi | 0.658 | 1.508 | 14.34 | 129.06 | 0.595 | 0.006 | -10.99 | -98.94 |
| Pondicherry | 0.658 | 0.646 | -0.20 | -1.78 | 0.003 | 0.008 | 18.27 | 164.43 |
| Average | 2.71 | 3.55 | 20.15 | 181.33 | 0.22 | 0.09 | 14.79 | 133.07 |
| SD | 2.37 | 3.12 | 38.98 | 350.82 | 0.62 | 0.15 | 13.85 | 124.66 |
| CV(%) | 87.56 | 88.01 | 193.47 | 193.47 | 285.36 | 171.15 | 93.68 | 93.68 |

*Note:*PeriodI-2011-2012PeriodII– 2019-2020*

**Table3.**Relationship between poverty, agriculture GDP per worker and non-agriculture GDP per worker in India

| **Variable** | **Coefficient** | **Std. error** | **t-Statistic** | **p-value** |
|---|---|---|---|---|
| Constant | 1.94 | 0.70 | 2.77 | 0.02 |
| Agriculture GDP per worker | -0.11 | 0.18 | -0.65 | 0.03** |
| Non-Agriculture GDP per worker | -0.08 | 0.17 | -0.21 | 0.03** |
| No.of panel observations | 32 | | | |
| F Statistic(2,32) Prob. F statistic | 2.54 | | | |
| | 0.04 | | | |
| R-squared | 0.75 | | | |
| Adjusted R-Squared | 0.45 | | | |
| **Tests conducted before pooled regression analysis** | | | | |
| Variance Inflation factors(VIF) | 4.09 | | | |
| Breusch-pagan test | $\chi^2$ | 0.09 | | |
| | p-value | 0.045** | | |

*Note:**indicates the five percent level of significance*

## 3. CONCLUSION

India may hold the title of the world's fastest-growing economy, but the persistent challenge of poverty demands continuous efforts to enhance living standards and social well-being. Poverty, often deemed an elusive social evil, has the potential to impede both economic progress and the societal status of the population. Recognizing the strategic importance of agriculture, a vital economic sector, becomes imperative in this context, given its role in providing employment opportunities and contributing significantly to poverty reduction.

In a comparative analysis between agriculture and non-agriculture sectors, the study delved into the substantial contributions each made to poverty reduction. This assessment considered the GDP growth of both sectors and the corresponding employment opportunities they offered. The findings underscored the pivotal role of agriculture, revealing that a one percent increase in Agriculture GDP per worker resulted in a more significant reduction in poverty rates compared to Non-Agriculture GDP per worker. Notably, growth in the primary sector, including agriculture, exhibited a greater potential for poverty reduction compared to other sectors.

In light of this evidence, the study concludes that fostering balanced growth across various sectors within the Indian economy is crucial. Such an approach is seen as instrumental in lifting people out of chronic poverty and reducing socio-economic disparities. The recommendation emphasizes the need for increased policy focus on agriculture and allied sectors to generate a substantial number of employment opportunities. This, in turn, can curb rural-urban migration and associated distress, given that agriculture remains the primary source of livelihood for the majority of the rural population in India.

## 4. FUTURE PROSPECT

India remains fastest growing economy in the world, however efforts have to be made to improve the standard of living and social wellbeing of people because poverty remains the most elusive social evil to derail the economic progress of the country and social status of population. And therefore agriculture being strategically important economic sector and a type of economic activity for every country benefits the poor sections of the population by providing employment opportunities and play a key role in reducing poverty. By comparing both agriculture and non- agriculture sectors, the significant contributions to poverty reduction were analysed with help of both the sectors GDP growth and the available employment in each sector. The study concludes that as increase one per cent Agriculture GDP per worker, there is a significant reduction in poverty rate as compared to Non- Agriculture GDP per worker. It worth noting that as compared with growth in other sectors, growth in primary sector tends to reduce poverty in larger extent. Thus, with the above evidence the examination suggested for the balanced growth across the sectors of an Indian economy is essential to bring or move people out of chronic poverty and reduce inequities. Thus, it could be recommended for encouraging agriculture and allied sectors with increased policy focus to generate adequate quantum of employment opportunities for growing rural population which limit rural-urban migration and related distress as agriculture being a main source of livelihood for majority of rural population in India.
Similar studies can be carried out at district level as the present study considers state as a whole for the analysis and which in turn gives the deep insight to understand the impact and importance of agriculture sector in reducing poverty at the root level and helps to identify the root causes of the poverty among rural poor.

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