Nexus between agriculture growth and poverty reduction in India

Abstract

Poverty is an issue of concern in developing countries as it remains the most elusive social evil to derail the economic progress of the country and social status of population. 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. Agriculture as primary sector benefits the poor sections of the population by providing employment opportunities and play a key role in reducing poverty. The present study was conducted to assess the impact of agriculture growth on poverty reduction by using secondary data and sixteen states of India were purposively selected. An attempt was made to analyse the relationship between poverty, Agriculture Gross Domestic Product (GDP) per worker and Non-Agriculture Gross Domestic Product (GDP) per worker using pooled regression analysis. The findings of the study shows that, as every one per cent increase in Agriculture GDP per worker found to have reduced poverty by 0.11 per cent as against 0.04 per cent in Non-Agriculture GDP per worker. This shows that increase in Agriculture GDP per worker causes higher poverty reduction as compared to Non- Agriculture GDP per worker. This is true in case of agrarian economy like India as majority of population are dependent on agriculture for their sustenance. However, it suggested that the balanced mutual growth between various sectors of the economy will help to alleviate poverty in the country.

Key words: Poverty reduction, Agriculture GDP per worker, Non- Agriculture GDP per worker

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 (Alok., 2020; Datt *et al*., 2020). 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 (Dah and Baselot, 2021 ; Das and Mohanty, 2020) . 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 (Economic Survey, 2021) 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 (Clement *et al*., 2010 ; Tripati and Prasad, 2010), 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.

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 (National Multidimensional Poverty Index Report, 2021 and Hand Book of Statistics on Indian states, 2021) 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,

$$\ln P_{it} = \beta_0 + \beta_1 \ln AgGDP/Wk_{it} + \beta_2 \ln NonAgGDP/Wk_{it} + \varepsilon_{it} \longrightarrow 1$$

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,

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.

$$\textbf{\textit{Agriculture GDP per worker}} = \frac{\textbf{\textit{Total agriculture GDP}}}{\textbf{\textit{Total agricultural workers}}} \rightarrow \textbf{2}$$

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.

$$\textbf{\textit{Non agriculture GDP per worker}} = \frac{\textbf{\textit{Total GDP}} - \textbf{\textit{Agriculture GDP}}}{\textbf{\textit{Total workers}} - \textbf{\textit{total agricultural workers}}} \rightarrow \textbf{3}$$

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,

$$\text{VIF} = \sqrt{\textbf{1} - \textbf{\textit{R2}}} \rightarrow \textbf{4}$$

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.

Table 1: Average annual reduction in 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	Tamil Nadu	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	

***Period I -2011-2012, Period II – 2019-2020 Source:** www.indiastat.com

The Table.1 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 Satapathy and Jaiswal, (2018) they found that reduced poverty rates over the years.

Table 2: Annual and decadal growth of Agriculture GDP per worker and Non- Agriculture GDP per worker in India

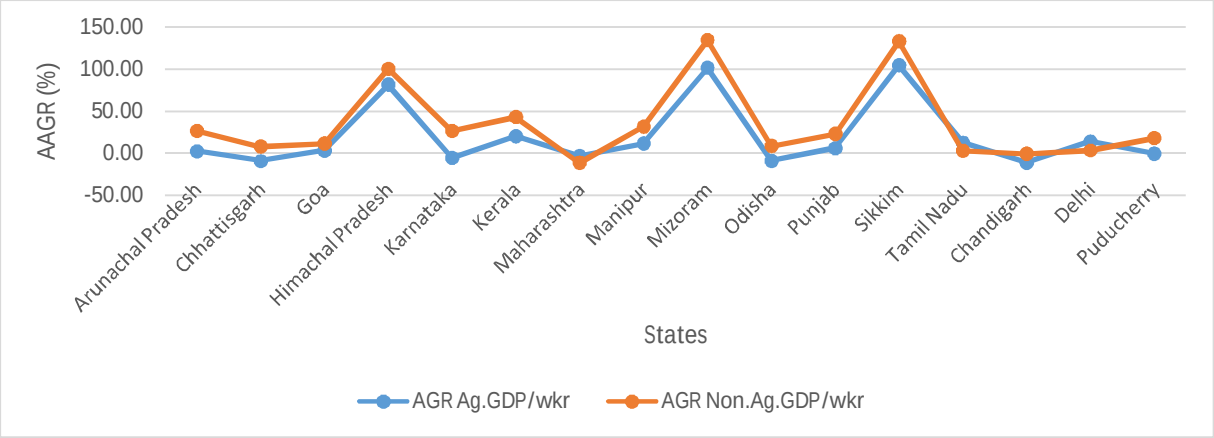
States	Agriculture GDP/Worker				Non-Agriculture GDP/Worker			
	Period I	Period II	AAGR (%)	Decadal Change	Period I	Period II	AAGR (%)	Decadal Change
Arunachal Pradesh	8.023	9.778	2.43	21.87	0.002	0.005	24.33	219.01
Chhattisgarh	4.190	0.751	-9.12	-82.09	0.026	0.064	16.85	151.62
Goa	4.898	6.315	3.22	28.94	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: *Period I -2011-2012 Period II – 2019-2020
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 %).

Fig.1: Growth rates of Agriculture GDP per worker and Non – Agriculture GDP per worker



The above figure 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.

Table 3: 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)	2.54			
Prob. F statistic	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	χ^2	0.09		
	p-value	0.045**		

Note: ** indicates the five per cent level of significance

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 (β1) of about (-0.11) means that, as one per cent increase in agriculture GDP per worker on an average, leads to about 0.11 per 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.

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 Pagan test to recognize the presence of heteroscedasticity and fails to discern the presence of heteroscedasticity. The results are in consistent with Anjum and Tarique (2017), they also opined the role of importance of agriculture sector in reducing poverty is higher than non- agriculture sector. Chritiaensen and Matin (2018) also concluded with same results as compared to growth outside of agriculture, growth in agriculture generally tends to reduce poverty to the larger extent.

Conclusion

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.

Future prospect

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.

References

Alok, A., Problem of Poverty in India. *International Journal of Research and Review*. 2020; 7(1):174-181.

Anjum. S., Tarique. M., Agriculture and poverty reduction in India: An empirical study. *Asian Journal of Research in Social Sciences and Humanities*.2017; 7(9):35-48.

Christiaensen L, Martin W. Agriculture, structural transformation and poverty reduction: Eight new insights. *World Development*. 2018;109(6): 413.

Clement F, Haileslassie A, Ishaq S, Samad M, Mit R, Shindey D N, Dey A, Khan M A, Blümmel M, Acharya N S, Radha A V., Improving water productivity, reducing poverty and enhancing equity in mixed crop-livestock systems in the Indo-Gangetic Basin. *CPWF Project. CGI AR Challenge Program on Water and Food (CPWF). International Water Management Institute, Colombo, Sri Lanka*. 2010; 68, (103).

Dah O, Bassolet T B., Agricultural infrastructure public financing towards rural poverty alleviation: evidence from West African Economic and Monetary Union (WAEMU) States. *SN Business & Economics*. 2021 Feb; 1(2):1-20.

Das and Mohanty, Poverty eradication in India: Successes and shortcomings of social protection, *International Growth Centre*. 2020.

Datt G, Ravallion M. and Murgai R, Poverty and growth in India over six decades. *American Journal of Agricultural Economics*, 2020; *102*(1): 4-27.

Economic Survey. Social infrastructure and Employment, Ministry of Finance, GoI, 2021; 344-361.

Multidimensional poverty in Karnataka. National Multidimensional Poverty Index Report, *NITI Ayog Baseline Report*. 2021; 65- 70.

Satapathy S S and Jaiswal K K., A Study on Poverty Estimation and Current State of Poverty in India. *International Journal of Advanced Scientific Research and Management*, 2018;3(6).

State wise poverty rates. *Hand book of statistics on Indian states. Reserve Bank of India*. 2021; 30-35.

Tripathi, A. and Prasad, A.R., Agricultural development in India since independence: A study on progress, performance, and determinants. *Journal of emerging knowledge on emerging markets*, 2010;*1*(1):8.

www.indiastat.com