Current Incidence and Future Prospect of Poverty and Inequality in the Agricultural Sector of Sudan

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ABSTRACT

This paper aims to investigate income poverty and inequality in the agricultural sector of Sudan. Poverty and inequality indicators were computed using both primary and secondary data sources. Secondary data sources include books, periodical reports and journals from relevant institutes, while primary data were collected through direct interviews with farmer's household heads using questionnaire. Two stage stratified simple random sampling techniques was applied. 720 household heads from the three farming systems (traditional, semi-mechanized and irrigated) were interviewed. To establish the poverty line, the study used the calories intake and the cost of basic need approaches. The common food basket consumed by the households was used based on nutritional requirement, adult equivalent and required calories per person per day for sub-Saharan Africa region which is 2300 kilocalories. P-alpha equation of Foster-Greer and Thorbecke (FGT) were used to assess poverty incidence, gap and severity. Lorenz curve and Gini index were used for income inequality analysis. Povstat and SimSip poverty programs were used for forecasting and simulation of poverty based on household survey data and a set of macro variables. The per capita consumption was used as the measure of welfare for poverty using regression and through parameterization of the Lorenz curve using General Quadratic method (GQ). Povstat and Simsip poverty models were used for poverty measurement and simulation. Results showed that more than

90 % of Sudanese farmers living with poverty. Farmers in traditional farming system were the most poor followed by semi-mechanized and irrigated farming. The inequality was high with Gini index of 63 % with large inequality among traditional farmers. The future prospect of poverty among Sudanese farmers revealed that growth would reduce poverty incidence and make no changes in inequality. While the combined effect of growth and food prices increase would reduce poverty. However, the decomposition of this effect into income and distributional effect showed that income effect would reduce poverty incidence and gap and it raised the severity. While the distributional effect reduces moderate poverty indicators and gap and severity of food poverty while it would raise food poverty incidence.

Keywords: Agricultural , Sudan; Poverty and inequality

INTRODUCTION

Sudan holds great economic resources with great diversity. Yet, it faces many challenges to utilize the opportunities of such diversity of resources to attain mitigation of poverty. Despite that and since the 1970s, the country's economic growth has been associated with increasing poverty. The situation has been aggravated by liberalization policies during 1990s which have affected both growth and income distribution. That is, wages and salary earners and producers have suffered fall of their real earnings, while back-market traders and capitalist have gained [World Bank, 2003].

Poverty in Sudan has shown an increasing trend with high spread rate in rural areas over time, but recently with large migration from rural to urban areas it has been transferred to urban areas[Mustafa and Zahir, 2011]. Furthermore, there are wide regional disparities in income poverty and various dimensions of inequality among social and economic groups with a faster rise of inequality between rural and urban areas [World Bank, 2003].

In rural areas agriculture constitutes the main source of livelihood and represents a reservoir of unemployed labor and source of growth by release of labor and resources. However, half of agricultural lands are classified as marginal; yet, agriculture represents the backbone of the country's economy. It contributes 39% of GDP and continues to provide the dynamic for the growth of the economy in the foreseeable future [Hatim, 2005].

Agriculture in Sudan is practiced under three main farming systems; traditional, mechanized rainfed and irrigated with 84 percent of agriculture labor employed in traditional rain-fed farming, 14 percent on irrigated agriculture and only 2 percent on mechanized agriculture[united nation environment programe]. The irrigated subsector contributes, on average, about 27% of the agricultural GDP. All major irrigated agricultural schemes are publicly owned and operated in collaboration with tenants [Nasredin and Elsheikh, 1997]. In recent years, the irrigated sector has accounted for nearly 60 % of the value-added in the agricultural sector [WFP, 2006].

Mechanized rain-fed farming covers about 3.8 million ha. Farms are privately owned and operated. This subsector is characterized by large farm size, with typical holdings of 420 to 630 ha. Principal crops are sorghum and sesame, with sunflower and short-staple cotton [Nasredin and Elsheikh,

1997]. The contribution of mechanized farming to agricultural value-added nearly doubled between 2000 and 2003, rising from slightly more than 5 % to over 10 % [WFP, 2006].

The traditional rainfed subsector covers about 4.6 million ha. Farm size in general is small [Nasredin and Elsheikh, 1997]. In the recent years the subsector has accounted for 30 to 36 % of agricultural value-added.

Over many years, considerable public resources as well as the bulk of bank credit and financing, research, extension and pest control have benefited the irrigated and mechanized sub-sectors, however, little finance has been oriented to the traditional rain-fed and livestock sectors where the vast majority of the population lives and where poverty is most prevalent. However recently, and in the context of pro-poor policies the public sector emphasis targeted the rain-fed traditional and livestock sectors. The government has started to disengage from active involvement in the management and financing of these schemes and concentrate its efforts on research, extension, pest control and other support services. The removal of government involvement from irrigated sub-sectors pave the way for a major shift in policy and the flow public resources towards the traditional rain-fed and livestock sectors.

Recently the government has developed many strategic plans that link Millennium Development Goals (MDGs) to agriculture, to stimulate sectoral growth, to reduce food insecurity and to alleviate poverty among programs is the Agricultural Revolution Program (ARP).

Since 2000 the average growth rate of the Agriculture sector has been 3.6%, down from 10.8% growth during the previous decade. As a result agriculture's share of GDP in the economy has declined, rural incomes have decreased and poverty in rural areas may have intensified [World Bank, 2007].

Despite the announcement of ARP and the recent recorded high rate of growth in GDP of Sudan (8.5% with per capita GDP of $960) the agricultural sector is losing its position with respect to imported commodities and poverty still covers a large segment (60%) of the Sudan total population [WFP, 2006; Fareed, 2004]. The general poverty indicators in North Sudan were less than the similar countries, with adult illiteracy rate of 47%, life expectancy of 53 years; infant mortality of 71 per 1000 live births, with degradation in basic social services [UNDP, 2006]. In South Sudan, the bulk of the population depends on food aid from NGOs, UN agencies and bilateral donors [UNDP, 2006] .Also the recent global crisis highlight the vulnerability of the economy to external instability

1. RESEARCH OBJECTIVES

The overall objective of this paper is to assess, project and simulate poverty in the agricultural sector, while the specific objectives are to:

`1.1 Assess the incidence, depth and severity of income poverty in the agriculture sector.

1.2 Simulate income poverty and inequality with respect to sectoral growth and food prices increases.

2. RESEARCH QUESTIONS

In order to achieve the research objectives the study attempts to answer the following questions:

2.1 What is the situation of income poverty and inequality in agriculture?

2.2 What is the future prospect of income poverty and inequality in agriculture?

3. RESEARCH METHODOLOGY

3.1 DATA SOURCES

The study used both primary and secondary data sources. Secondary data sources include books, periodical reports and journals from relevant institutes, while primary data were collected through direct interviews with farm household heads using a questionnaire. Two stage stratified simple random sampling techniques was applied. First, the agriculture sector was divided in to three strata according to the farming systems (irrigated, semi-mechanized and traditional). Then from each farming system a representative state was randomly selected (Gazera, north Kordofan and Blue Nile). Finally, from each selected farming system, 240 farm household head was interviewed with total sample of 720 household heads.

3.2 DATA ANALYSIS

To establish the poverty line, the study used the calories intake and the cost of basic need approaches. The common food basket consumed by the household was used based on nutritional requirement, adult equivalent and required calories per person per day for sub-Saharan Africa region which is 2300 kilocalories according to WHO [Mukhebi and K Matungulu, 2010]. The study used the P-alpha equation of Foster-Greer and Thorbecke (FGT) which use poverty aversion (α) to measure poverty incidence (headcount index) or the share of the population whose income or consumption is below the poverty line, poverty gap or depth of poverty provides information regarding how far off households from the poverty line. Poverty severity takes into account the distance separating the poor income from the poverty line and inequality among the poor.

$$P_\alpha = \frac{1}{N}\sum_{i=1}^{q}\left(\frac{z-y_i}{z}\right)^\alpha$$

Where:

N = is the sample size

Z = poverty line

Y= average income

α= is poverty aversion which has the value of 0, 1 and 2

Lorenz curve and Gini index were used for income inequality analysis. Povstat and SimSip poverty programs were used for forecasting and simulation of poverty based on household survey data and a set of macro variables.

$$G = \frac{\sum_{i=1}^{n} (2i - n - 1) x'_i}{n^2 \mu}$$

Where:

I = is the individual's rank order number,

n = is the number of total individuals,

X_i= is the individual's variable value,

μ = is the population average. The per capita consumption was used as the measure of welfare for poverty using regression and through parameterization of the Lorenz curve using General Quadratic method (GQ) of poverty estimation from group.

$$L(1-L) = a(P^2 - L) + bL(p-1) + c(p-L)$$

Where:

L =Lorenz curve

P = total number of individuals in the distribution

a ,b ,and c = Lorenz curve parameters

$$e = -(a+b+c+1)$$

$$m = b^2 - 4a$$

$$n = 2be - 4c$$

$$r = \left(n^2 - 4me^2\right)^{\frac{1}{2}}$$

$$s_1 = \left(r - n\right)/\left(2m\right)$$

$$s_2 = -\left(r + n\right)/\left(2m\right)$$

4. RESULTS

4.1 Socio-economic characteristics of farmers

Farmers socioeconomics as portrayed in tables (1,2,3,4,5, and 6) shows that the average of land holding by the household was 195 hectares in mechanized farming, 15 hectares for traditional and 5 hectares for irrigated farming. For the rainfed subsectors (mechanized and traditional) the land holding is distributed among three soil types while irrigated farming is practice only under clay soil. In the mechanized farming the block of the land holding is falling within the clay soil and mainly being cultivated by sorghum and sesame as major crops in addition to groundnut and millet as minor crops. In the traditional farming crops are practice in the three types of soil, with large area found in sand and clay lands. Sesame is given a large area followed by sorghum in clay soil while millet is dominated in sand followed by sesame and watermelon. In addition to that farm household in both mechanized and traditional rainfed subsector cultivate other minor crops such as cowpea, okra, roselle and vegetables. Most of farmers were illiterate 75%, 84 and 92% of farmers in mechanized, irrigated and traditional farming their education is bellow intermediate school. The high illiteracy among farmers is among the factors that make them unable to develop and adopt strategies enable them to escape from hardship life they face. Average age of household head range between 45-51 years which is fall productive age, the family sizes of the farm household range 6-7 person this will grantee a reasonable supply of labor specially for traditional farming which is labor intensive subsector. Also the large family size with limited and vulnerable farm income will affect the household standard of living, especially for those families who depend mainly on seasonal crops production. The average annual farm household income from the various sources was 10.82 million Sudanese pounds (SDG) in mechanized farming; 17 million SDG in irrigated and 8.99 millions in traditional farming, the daily personal income were 4.3, 6.7 and 3.6 SDG for mechanized, irrigated and traditional farming respectively.

4.2 Poverty and inequality in agriculture

Poverty indicators in agriculture are summarized in Table1. According to the results presented in this table, poverty incidence among farmers was high. The majority (91 %) living with average income not maintaining the daily requirements, with large gap between poor average income and poverty line, the poor income maintain only 29 % of daily requirements cost. The severity of poverty among poor farmers was also high, reflecting large disparities among them.

Poverty indicators within agriculture subsectors reveal that poverty incidence in mechanized farming was (96%) with large gap between the poverty line and average poor income (70%). The severity of poverty among poor farmers in mechanized farming was also high reaching 56%. Poverty incidence among traditional farm households was extremely high (98 %) with average gap between poor income and poverty reached 85 % and severity and variation among poor income reached 76 % . Poverty among farmers in irrigated farming system was high (76%) with gap of 52 % and poverty severity reached 41%. Income inequality analysis in agriculture sector (Table7) and (Fig.1A, B, C and D) revealed high existence of inequality among farmers (0.63). Inequality among famers in the agriculture subsectors showed that in mechanized farming was 46 , 64 among traditional farmers and 60 among farmers in irrigated farming system. The future prospect of income inequality in agriculture sector had shown almost high constant trend of 60 % for the period of 2008-2012.

The future trend of poverty incidence in agriculture (Table8) and (Table9) and (Fig.2) shows that the anticipated future growth would lead to a mild decrease the incidence of moderate poverty and make no changes on poverty gap with a slight increase in moderate poverty severity among famers. Also future growth will not have a significant impact on all extreme (food poverty) indicators during the forecast period between 2008-2012.

4.3 Inequality in Agriculture sector

The decomposition of growth impact on poverty into income and distributional impacts on future incidence of poverty in agriculture shows that income growth in the four coming years would reduce both moderate and extreme poverty indicators. However, the distributional impact would reduce both moderate and extreme poverty incidence while it raised poverty gap and severity on both moderate and extreme poverty. The elasticity's analysis of poverty with respect to agricultural growth showed that 1 % increase in growth of sectoral GDP would cause income effect to reduce poverty indicators by 19.2%, 28.3% and 15.4% for incidence, gap and severity respectively. However, 1 % increases in sector growth would cause the distribution effect to reduce incidence by 12.2 %and raise the gap and severity by 18.2% and 62.7 % respectively. The combined impact of growth and food prices increases in the future trend of poverty in agriculture (Table10 and Fig.3) shows that the combined effect would have great impact on moderate poverty indicators. That is, it would reduce poverty incidence from 91.6 % to 53.6 %, poverty gap from 71 %to 33.4 % and poverty severity from 66 % to 25.5 %. Also the combined impact on extreme poverty was great. It would reduce poverty incidence from 86.4% to 47.8%, poverty gap from 66.5% to 29.4 % and poverty severity from 64.3% to 22.4%.

The decomposition of the combined impact into income and distributional shows that the income impact would reduce both moderate and extreme poverty incidence and gap by 46.8% and 46.7 % and 13.4% and 4.96 % respectively. However, it would increase the poverty severity for both moderate and extreme poverty by 48.72% and 81.9% respectively. Distributional impact would have very miner effect on moderate poverty reduction. It reduced incidence, gap and severity by 0.12%, 1.5% and 7.8 % respectively. While it would increase extreme poverty incidence by 1.4 %, it also reduce the poverty gap and severity by 1.6 and 10.9 % respectively.

5. DISCUSSION

It is apparent from the result there is a high incidence of poverty in agriculture sector. This can be attributed to decline in the sector share in GDP from about 50 % in 1960s to 39 % in recent years. However, even in years where the agriculture growth is high this growth is not favoring the poor farmers it favored the capital and land owners. This is line with UNDP (2003) in spite of 20 % growth in agriculture GDP poverty rises, especially in the rainfed sector.

Also the development of the oil sector in the late 90s has decreased the importance of the agricultural sector. And the appreciation of the Sudanese currency exchange rate due to growing demand for oil negatively affected agricultural exports due to their high cost at export. And the sudden shift of the structure of Sudanese economy from purely agriculture to oil sector has led to degradation of the livelihood of the majority of farmers (Yasin and Narimah, 2012). Also oil exploration has led to expansion of war and conflict which results in massive displacement of rural farmers and has not contributed to the development of the other sectors but it facilitated the neglect of the productive sectors agriculture and manufacturing. (Jason Switzer, 2002 and Ottaway and el-Sadany, 2012 and Siddig,2012). On the other hand war produces social disequilibria, for more than 20 years the rural communities in Sudan have experienced social disorder, extreme violence and displacement in the theatre of war and have been struggle for subsistence. Massive rural urban migration has created various problems including inequality in provision of social services, decline in farming activities, and increase number of urban poor. And consequently the insecurity and civil unrest has negative impact on rural household livelihood and led to ecological degradation and threaten human habitat due to large population displacement and increased population pressure on available resources (Olagunju,2008 and Samer and Oana, 2009).
In addition to the growing, conflict with the South, there are conflicts in Darfur , blue Nile , South Kordofan and the east which led many farmers fled their villages and settled in IDP camps unable to access land in their villages of origin (Joakim Daun,2011 and Ottaway and El-Sadany, 2012)

Also the effect of climate change, Sudan consequently has been exposed to series of recurring dry years and drought has become a normal phenomenon that affects many of its regions. Flood also threatening Sudan Similar to drought, and they resulted in a number of problems such as soil degradation, soil compacting and deforestation and sand dune movements. Consequently the majority of land is quite sensitive to changes in and the fragile farming systems are quite vulnerable.

The government policies were not in favor of agriculture since the adoption of the structural adjustment program (SAP) which resulted in among other things to more scarcity, economic stagnation and poverty. During the 20th century, the government on several occasions seized land of rural populations to implement vast development projects, such as mechanized-agriculture in central and eastern Sudan and dam construction. Small farmers and nomads lost their land rights and were pushed out of rural areas and more recently, the forced depopulation of oil-rich areas. The situation was further aggravated by further economic liberalization and privatization in which most policies are made to serve the wealthy and powerful people. And consequently the national policy adopted in agriculture has led to the poverty of the majority of rural people (Yasin and Narimah,2012). Furthermore, Despite of liberalization and privatization policies adopted by the government and the declaration of supporting agricultural sector, heavy taxes are still imposed on agricultural production and export in different kind (Elgali et al,2010). the recent improvement of

the agricultural sub-sectors as reflected in its growth rates has not been an outcome of technological transformation or price increases, rather it is mostly due to favorable weather conditions that allowed increases in area cultivated, and size of livestock.
The variations among farmers by farming systems and locations make remote farmer without good road facilities face high prices for the same commodity and consequently high food cost. Traditional farmer who lives in remote areas with poor roads faces high prices of food commodities compared to other sectors. As stated by [WFP,2006] that poor storage and infrastructure facilities have led to food insecurity in some areas

The subsector analysis indicated that traditional farmers were the most poor followed by farmers in mechanized and irrigated subsector. This support the idea of inefficient allocation of government resource within agriculture which was historically favoring the irrigated farming and mechanized subsectors, even after the announcement of agriculture revitalization program the evaluation carried by WFP Sudan confirm that the irrigated sector account for 60 %of added agriculture and mechanized value added increased from 5 % to 10 %[WFP ,2006]. While the traditional subsector which employ 80 % of rural population it value added remain between 30-36 %. Furthermore, the environmental degradation of marginal soils has contributed in reduction of farm output and household income.

Inequality among famers was also high indicating the variation in income which resulted from differences in farm output due to inefficient distributional policies, the environmental factors such as rainfall and degradation of soil and productivity of crops.

However, within subsector inequality analysis showed that traditional farmer has larger income inequality while farmers in mechanized and irrigated subsector show less disparity in income among poor households. The results reflect that most of households in the last two subsectors have similar livelihood/or income sources and similarity in farm size, while some households in the traditional farming have other sources such as livestock and Gum Arabic production which leads to income variations among them.

The analysis of future poverty in agricultural, indicated that sector growth will slightly reduce poverty. However, while income effect of growth will reduce poverty the distributional effect of that growth will increase poverty. This result confirmed that the existed inequality among farmers will continue to constraint any effort for poverty reduction in this sector not considering the disparities among famers in the different farming system. The combined effect of growth and food prices increase would also reduce poverty, yet, the income effect would reduce poverty but it would raise the severity, while the distributional effect would raise food poverty incidence. This confirms what mentioned by [World Bank, 2009], increasing returns to the agriculture sector as the highest potential engine of growth and poverty reduction over the medium-term.

6. CONCLUSION

In conclusion, the high poverty and inequality among farmers is due to many economical, social and environmental factors; among which the recent neglect of the government to agriculture is the main factor that make agriculture performing below its potential in recent years.

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Farmers in the rainfed sector were found to be the most poor due to many reason such as unstable weather conditions led the majority of farmers depend on fluctuated rainfall for crop cultivation.

the growing, conflict with in the different parts of the country has led displacement of farmers from rural areas and make them IDPs in camps unable to access resources in their respective villages.

The sector future growth will reduce poverty in agricultural if it have been enhanced with distributional policies.

7. Recommendations

Agriculture can contribute to poverty reduction three times or more than any other sectors do. Thus, combating overall poverty in general and farmer poverty in particular, requires policy interventions that consider the variation among farmers for eliminating the existing inequalities and boost farm output.

Table 1: Demographic characteristics of farm household by farming system

	Mechanized	Irrigated	Traditional farming
Age	45	51	46
family size	7	6	7
number male	4	3	3
number of female	3	3	4

Table 2: Farm household average land holding by soil type (Ha)

	Mechanized	Irrigated	Traditional farming
clay	41	4.998	3
Sand	62		6
Gum	84		4

gardud	8		2
Total	195	4.998	15

Table 3: Farm household Average cultivated crops area by farming system and soil type(ha)

	Mechanized			Irrigated	Traditional farming		
	Clay	Sand	Gardud	Clay	Clay	Sand	Gardud
Sorghum	16.0	0.8	4.4	1.7	1.0	1.1	0.8
Millet	1.6	0.0	0.2	0.0	0.4	1.8	0.4
Groundnut	1.3	0.8	0.0	1.5	0.4	0.5	0.3
Sesame	9.0	1.7	2.0	0.0	2.6	1.6	0.4
Cotton				1.6			
Cowpea	0.8	0.2		1.6	2.1	0.5	
Roselle		0.4		0.0	0.8	0.6	
Okra		0.0		0.8	0.2	0.4	
Melon		0.2		0.0	1.4	1.3	
Vegetable				1.76		0.84	

Table 4: Farm household average crop yields by farming system and soil type

	Mechanized			Irrigated			Traditional		
	Clay	Sand	Gardud	clay	Sand	Gardud	clay	Sand	Gardud
Sorghum	5.5	3.0	3.8	7.3			2.9	3.2	2.9
Millet	3.5						1.5	3.1	5.5
Groundnut	1474	12.0	10.0	20.3			3.0	5.5	3.0
Sesame	2.6		1.8				500	5.4	2.2
Cotton				5.4					
Cowpea	1.5			6.8			.50	2.4	.0
Roselle	2.0						5.5	3.7	1.1
Okra				2.2	3.7			2.0	
Water melon							6.5	3.6	
Vegetable				73.7					

Table 5: farmer distribution by educational level

	Mechanized	Irrigated	Traditional
Illiterate	27.4	60.8	60.4
Khalwa	24.3	3.8	7.0
Primary	23.5	19.6	24.3
Intermediate	7.1	5.8	2.2
Secondary	14.2	9.6	5.2
University	3.5	.4	.9
Total	100.0	100.0	100

Table 6 : Household annul income sources in million SDG

Income source	Mechanized	Irrigated	Traditional
crops selling	1.53	2.1	0.54
livestock selling	0.40	0.5	0.67
off farm	0.71	0.7	0.30
Trade	1.42	2.2	0.59
town work	0.83	1.4	1.97
occupation	3.10	2.4	3.29
Gift	0.23	1.1	0.58
social support	0.27	0.7	0.11
remittances transfers	1.87	2.0	0.72
other income	0.46	3.9	0.22
Total	10.82	17	8.99

Table7: Poverty in agriculture sector of Sudan

Sector	Poverty line	Poverty Incidence	Poverty gap	Poverty severity	Gini-Index
Agriculture	3.61	91.3	71	60	0.63
Mechani	2.72	96	70	56	0.46
Tradition	5.28	98.3	85	76	0.64
Irrigated	2.83	76.2	51.4	41	0.60

Source: survey data 2008

Table 8: inequality projection in agriculture sector Sudan during 2008-2012

inequality measures	2008	2009	2010	2011	2012
Agriculture Gini index	0.62	0.60	0.60	0.60	0.60

Source: calculated using survey data 2008 and some macro variables

Table9: Growth effect on poverty and inequality in agriculture sector Sudan

Moderate Poverty	2008	average 2009-2012
Headcount	91.16%	90.93%
Poverty gap	71.05%	71.04%
Poverty severity	65.97%	66.24%
Extreme Poverty		
Headcount	86.43%	86.13%
Poverty gap	66.51%	66.57%
Poverty severity	64.27%	64.68%
Growth Impact	Moderate poverty	Extreme poverty
Headcount	-0.13%	-0.19%
Poverty gap	-0.15%	-0.15%
Poverty severity	-0.08%	-0.03%
	Moderate poverty	Extreme poverty
Headcount	-0.10%	-0.11%
Poverty gap	0.14%	0.21%
Poverty severity	0.34%	0.44%
Residual	Moderate poverty	Extreme poverty
Headcount	0.00%	0.00%
Poverty gap	0.00%	0.00%
Poverty severity	0.00%	0.00%

Source: calculated using survey data 2008 and some macro variables

Table10: combined effect of growth and food prices increase on poverty and inequality in agriculture sector Sudan

moderate poverty	2008	Average (2009-2012)
Headcount	91.16%	53.61%
Poverty gap	71.05%	33.37%
Poverty severity	65.97%	25.47%
Extreme Poverty		
Headcount	86.43%	47.79%
Poverty gap	66.51%	29.38%
Poverty severity	64.27%	22.40%
growth impact	Moderate poverty	Extreme poverty
Headcount	-46.82%	-46.56
Poverty gap	-13.42%	-4.96%
Poverty severity	48.72%	81.93%
Inequality Impact	Moderate poverty	Extreme poverty
Headcount	-0.12%	1.36%
Poverty gap	-1.55%	-1.61%
Poverty severity	-7.86%	-10.92
Residual	Moderate poverty	Extreme poverty
Headcount	-9.39%	-6.57%
Poverty gap	22.71%	30.57%
Poverty severity	-0.37%	-29.14

Source: calculated using survey data 2008 and some macro variables

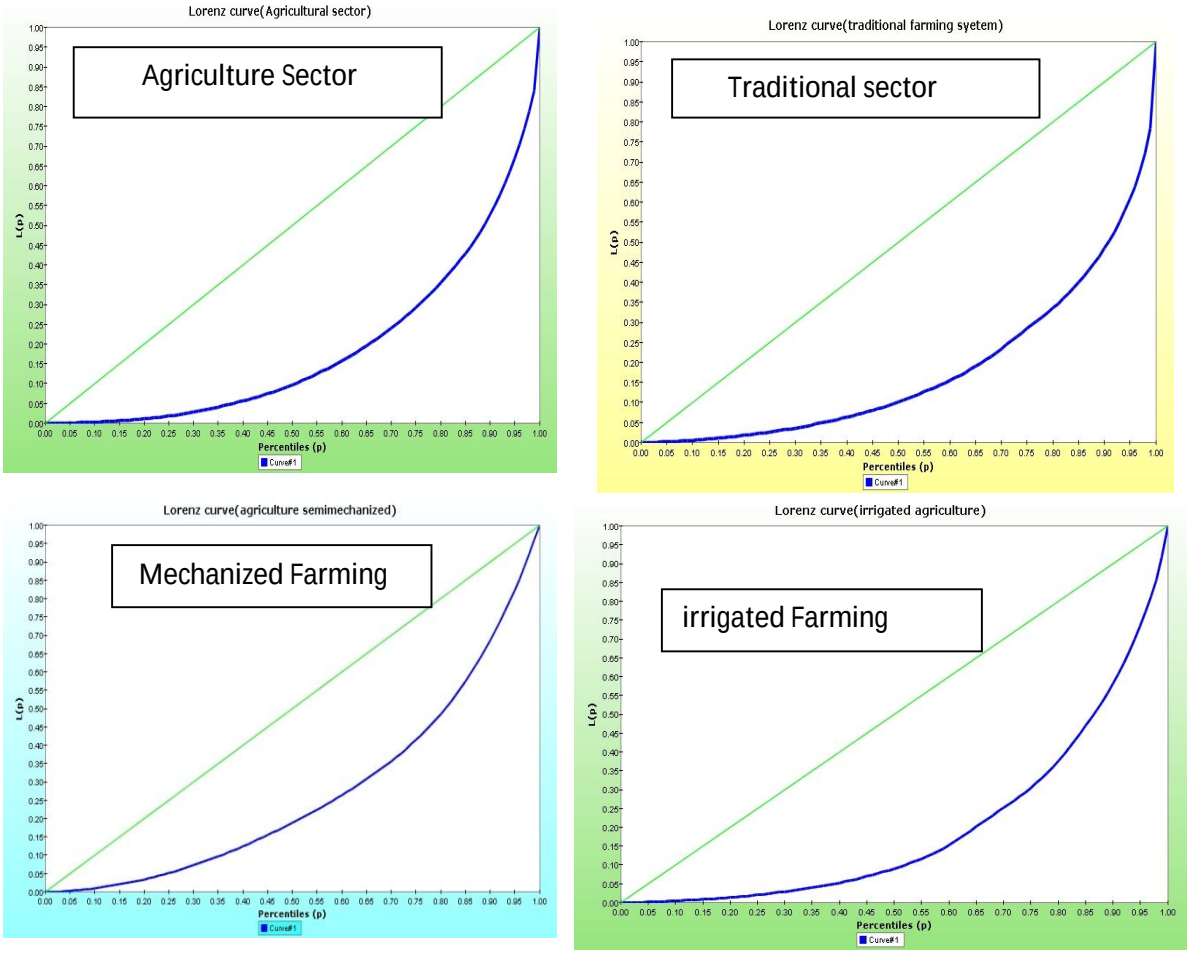

Figure1: Lorenz Curve for income distribution among farmers and farming systems

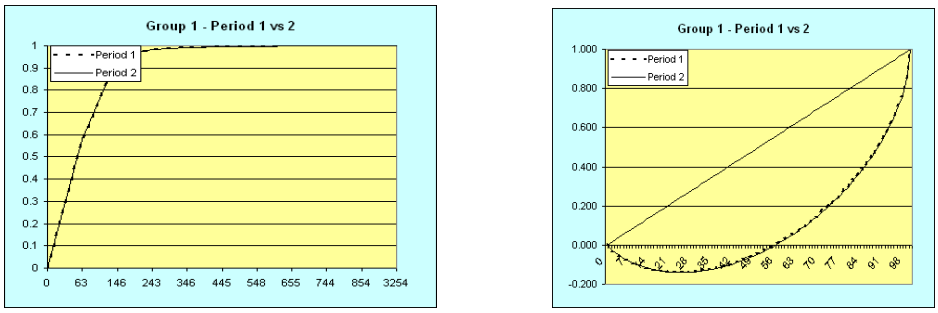

Figure2: Combined effect of growth and food prices rise on poverty and inequality for Period1 (2008) Period2 (average 2009-2012)

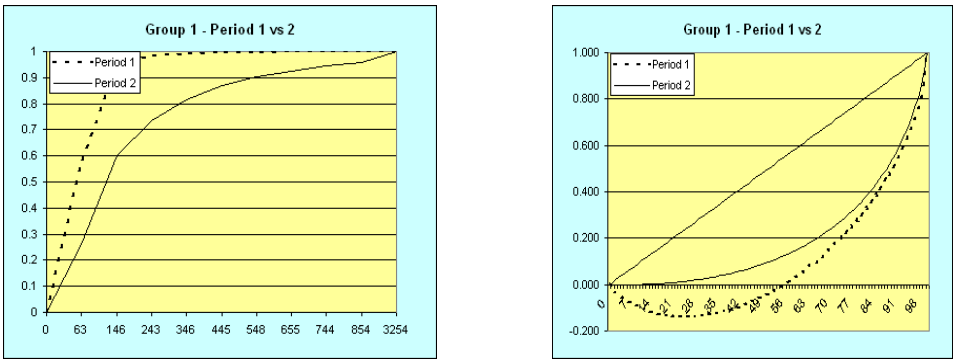

Figure 3: Combined effect of growth and food prices rise on poverty and inequality for Period1 (2008) Period2 (average 2009-2012)

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