Income Inequality and Poverty among Households Gum Arabic Producers in Sheikan Locality

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ABSTRACT:

The aim of this paper was to assess income inequality and poverty situation among household gum Arabic producers in Sheikan locality. Structured questionnaire using stratified random sampling technique was used to gather households' poverty data from 13 villages located in three selected districts (*Taggat*, *Umashira* and *Umsomaima*). A total of 300 households representing 10% of population (3002 households) were interviewed. The Foster-Greer-Thorbecke (FGT) measurement, Gini coefficient and Lorenz curve were used to assess poverty incidence, gap, severity and income inequality. Results showed that the poverty incidence, poverty gap and poverty severity were 46%, 32% and 22%, respectively. Also the result of Gini coefficient of gum Arabic income inequality is estimated as 38.5%. To improve household food security, poverty and income equality in North Kordofan state, the study recommends developing of comprehensive capacity building programs for producers (tapping, collection and processing and gum quality); besides availability of sufficient credit sources and credits in time were required for stability of gum sector in the region.

Keyword: *Poverty, Income in-equality, gum Arabic, Sheikan locality*

1. INTRODUCTION

Poverty is defined as lack of command over basic consumption needs (Shea, 1997); Poverty is a condition of unacceptable material deprivation, according to a particular society's standards of what is or is not acceptable. Poverty is widely acknowledged to be a multi-dimensional concept, but most efforts to measure the extent and severity of poverty among a given population focus on one dimension- income poverty. Income poverty is measured in relation to an official poverty line- a level of income or consumption expenditures designated as the minimum needed by an individual or household to avoid poverty. Poverty lines are generally set by national governments, and used together with household survey data to measure the incidence of poverty

among the population. Because they are social constructs, national poverty lines differ from one country to another. Countries with higher average incomes generally choose higher poverty lines, whereas low-income countries typically set their poverty lines at the estimated cost of physical subsistence: a bare-minimum diet, plus a modest addition for necessities other than food. Some countries set their poverty lines in terms of income, others in terms of expenditure; in either case, both cash and own-production (e.g., output from a family farm) are included.

Sudan GDP per capita at 1722.72 USD, Inflation Rate at 14.31 percent, GDP per capita PPP at 3927.49 USD, GDP at 84.07 USD Billion, Population at 40.24 million, Imports at 739340.00 USD Thousand, GDP Annual Growth Rate at 4.90 percent and Exports at 250330.00 USD Thousand.In Kordofan incidence poverty was estimated to be 58.7%, poverty gap among poor 23.1%, poverty severity 11.7%, percentage of population effected was 20.1 and the poor people's from effected population was 27.1% (Ibnaof, *et al.*, 2011and Hamid *et al.*, 2012).

Gum Arabic belt is one of the most important forest types in the Sudan, which lies within the low-rain savanna zone. It is located in central Sudan roughly between latitudes 10° and 14° North, with two areas outside these borders found in the north east (FAW- Gedaref- Kassala) and in the south east along the Blue Nile/Upper Nile border (Abdel Nour, 1997). It spans the traditional rain-fed agricultural areas of Western and Central Sudan that include Great Kordofan 49.3% (Ibnaof, *et al.* 2013).Gum Arabic production was regarded as a difficult task since the trees are thorny, so in the case of economic surplus labor was hired, thus creating job opportunities for resource-poor households on others' land (Ibnaof, *et al.* 2013).

Thus, Gum Arabic is very important for poorer households since they often have fewer opportunities for seasonal migration (Abdelgadir, 1989; Block and Webb, 2001; Hampshire and Randall, 1999; Reardon, 1997) so that Gum Arabic production can have a significant role in reducing poverty and in risk management. Even though Gum Arabic can be of importance for diversification it can prove a risky strategy since prices vary considerably from year to year (Ibnaof, *et al.* 2013). Also lack of livelihood services; young generations turned to other occupations; mismanagement of natural resources; inefficient marketing chain policies and programs resulting in unstable supplies of food and cash crops, livestock and gum Arabic to the domestic and world market; decline of traditional systems tenure and reciprocity systems for managing pastoralism and agriculture (UNEP, 2012 and Ibnaof, *et al.* 2013).This paper aims to

assess poverty status of households scale in Sheikan locality, North Kordofan State during season 2016.

2. MATERIALS AND METHODS

North Kordofan state lies between latitudes 16˚ 38¯ N and 12˚ 14¯ N and longitudes 26˚ 46¯ E and 32˚ 22¯ E. The state total area is 185,302 km² at an altitude of 1,500 feet, divided into five Localities: Shiekan, Um Rowaba .Bara, Sodari and Gebret El Sheikh. Shiekan locality is composed of four Administrative units. These are Kazgail, Abu Haraz , Khor Tagget and Um Ishear. In addition is a non- demarcated rural council for nomads, which represents the nomadic people who move within the previously mentioned demarcated rural council. Shiekan locality lies in the central part of greater Kordofan. Elobeid city is the capital of North Kordofan State and the center of the area councils. It is an important market and business place with the world's largest gum Arabic market.North Kordofan State lies in poor savannah zone. The latitude 13º N is divided the state into two parts, the desert area with annual rainfall 60 mm in north, and semi desert with annual rainfall 240 mm that of the south. At the far southern part of the state, the rain fall reaches 440 mm per year. The vegetation classified into zones based on mean annual rainfall or rain belts and soil types. North Kordofan State is covered by the following three zones: desert (0-74mm) characterized by an association of *Acacia tortilis*, *Acacia raddiana*, and *Capparis deciduas*; semi- desert (74-300 mm), vegetations are *Cappers decidua*, *Salvadora persica*, *Ziziphus spina-chisti*c and low rainfalls (300 – 1000 mm), vegetation are *Acacia senegal*, *Combretum spp*., and *Leptadenia pyrotechnica*. IMany types of soils were found in the study area these are sandy soils (*goz*)with low water holding capacity and poor fertility status, constitute more than 70% of the agricultural land, sandy clay soils (*gardud*), which constitute 20%, clay soils which are characterized with high fertility as Abu habel land, and cracking clay soil. Shiekan locality has a population of 1,430,000 persons, 42.2% were Women (Department of Statistic, 2003). The population is distributed in villages of variable sizes. The number of village population at any time varies according to the agricultural calendar and nomadic season. The household on the average includes 8 members. In the past the family size was considered as a measure of wealth, status and hence, but now a day, and due to the prevailing harsh economic conditions, there is a tendency towards small family sized. There are two types of migration, external and internal .The male migration rate was 18 percent and female migration rate was 0.4 percent. External migration is mainly to the producing Arab countries, while internal migration is

represented by casual labour for many agricultural areas of Sudan, this type of migration also constitutes as sources of marginal labour to the main urban centers and inter-rural migration, which takes many forms: the regular migration of the nomads, the farmers' movements to area of rich resources, and the drought displaced sufferers.
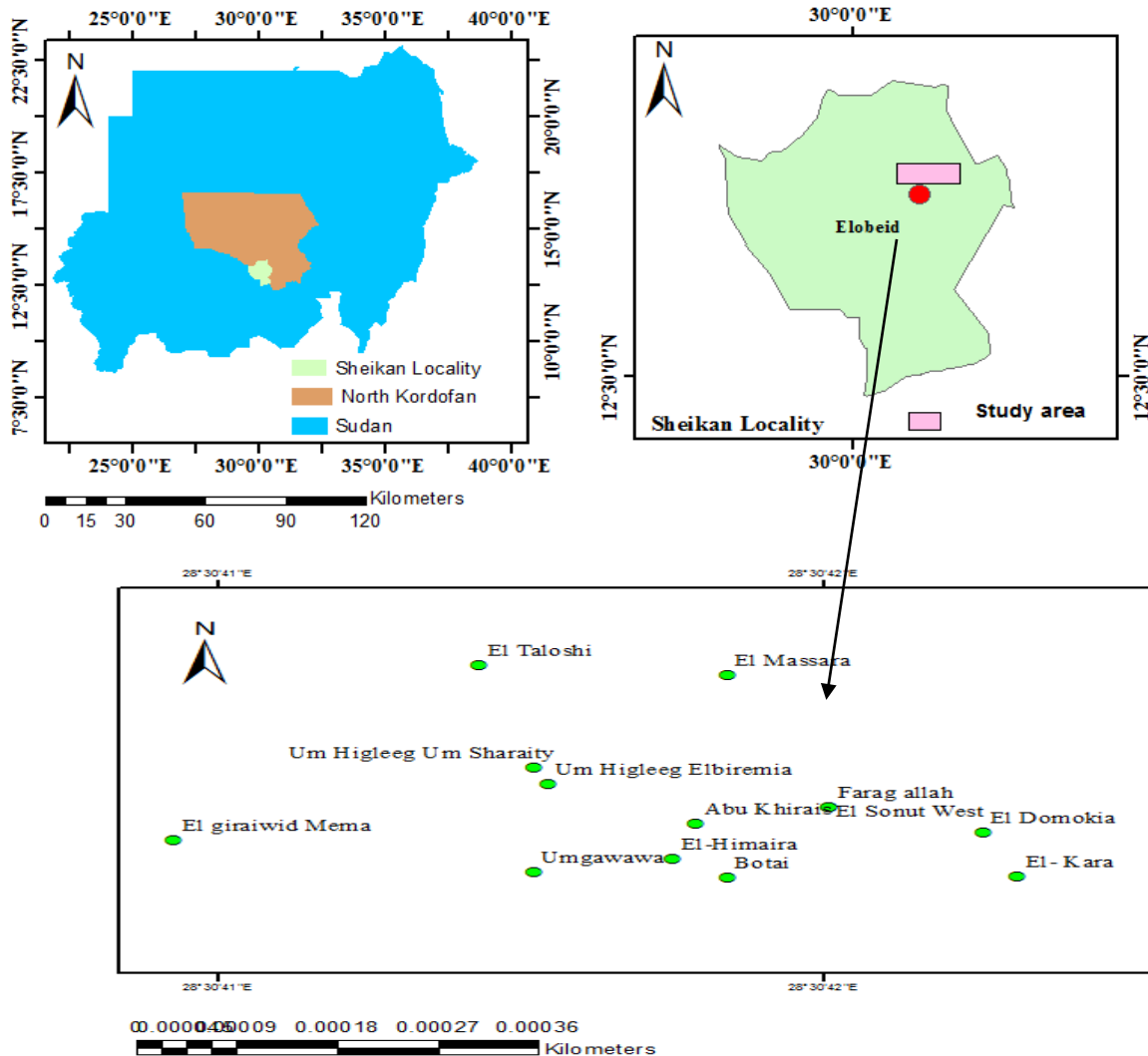
Figure 1: Maps of Skeikan locality, North State, Sudan 2017.

Sampling Technique:

A three multistage sampling technique were used for the study. The first stage involved a purposive selection of three districts areas from namely (Khor Taggat, Umashira and Umsomaima) 5 districts of Sheikan locality based on the general population census in 2008. The second stage were a specific selection of 5 villages from each three districts making a total of 13 villages that were purposely selected because the villages are among the leading Gum Arabic

producing areas and including Union for Arabic Gum producers in Skeikan locality. The final stage involved the selection of fifty two households from each of the 2 villages making a total of 300 households. Sampling frame was concentrated on Gum Arabic stakeholders from the three selected districts (Table 1). Questionnaire was developed for the collection of primary data from the field, keeping in mind the indicators and different aspects of the research study. The questionnaire for the survey was pre-tested in El Sonut West village to assess the appropriateness of the questions in order to collect the required information.

Pre-testing was performed on form of questionnaire with different interviewees. Enumerators were supervised during the pre-testing of the questionnaire. Different comments from the enumerators were responded to avoid any sort of misinterpretation (Table 1).

Table (1): Number of respondents by village and administration.

Village Name	Administration name			Total
	Khor Taggat	Umashira	Umsomaima	
El Sonut West	45			45
Farag allah	16			16
Abu Khirais	16			16
El Domokia	50			50
El- Kara	30			30
El-Himaira		4		4
Om Higleeg Elbiremia		7		7
Om Higleeg Um Sharaity		12		12
Omgawawa		37		37
El Taloshi		15		15
El Massara		7		7
Elta damon Botai			28	28
El giraiwid Mema			33	33
Total	157	82	61	300

Data analysis

Data analysis was performed using Excel 2007 and SPSS version 20 software. Descriptive statistics such as means for continuous and proportion for categorical variables were calculated to check for any missing information and the distribution of key indicators. To assess the differences in different indicators stratified analysis was performed based on area, and other related variables. Partial budget, income statement and distribution were analyzed using Gini

index methods following Pyatt, et al. (1980) and Lerman and Yitzhaki (1985). Also Quintile method; linear regression models were used for correlation between factors and income sources (Greene, 1993; Fadipe, et al. 2014 and Haliru and Anegheh, 2014).

Poverty Measurement Theoretical Framework

The Foster-Greer-Thorbecke (FGT, 1984) is a generalized measure of poverty within an economy. It combines information on the extent of poverty (as measured by the Headcount ratio), the intensity of poverty (as measured by the Total Poverty Gap) and inequality among the poor (as measured by the Gini and the coefficient of variation for the poor).

The formula for the FGT is given by:

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

Where

N = the total number of population under consideration,

H = the number of poor (those with incomes at or below z),

yi = the individual income of the i-th poor,

Z = the poverty line, and α is a parameter characterizing the degree of poverty aversion i.e. the parameter α determines the precise measure of poverty to be used.

When the parameter α equal zero the headcount ratio (H) is generated, when parameter α equal one the poverty gap ratio (PG) is generated, which is often considered as representing the depth of poverty. And when the parameter α equal two the poverty severity (PS) is obtained.

The higher the FGT statistic, the more poverty there is in an economy

Headcount Ratio

The FGT measure corresponds to other measures of poverty for particular values of α. For α = 0, the formula reduces to

$$P_0 = \frac{H}{N} \qquad (2)$$

This is the headcount ratio, or incidence of poverty. This is the proportion of population for whom consumption expenditure is less than the poverty line. The poverty aversion parameter equal zero. If the degree of aversion to poverty α = 1 then index will be is:

Poverty Gap

$$P_1 = \frac{1}{N}\sum_{i=1}^{H}\left(\frac{z-y_i}{z}\right) \qquad\qquad (3)$$

This is the average poverty gap, or the amount of income necessary to bring everyone in poverty line up to the poverty line. This can be thought of as the amount that an average person in the economy would have to contribute in order for poverty to be just barely eliminated.

While the two above versions are widely reported, a good deal of technical literature on poverty uses α = 2.

Squared Poverty Gap (Poverty Severity) Index:

$$P_2 = \frac{1}{N}\sum_{j=1}^{H}\left(\frac{z-yi}{z}\right)^2 \qquad\qquad (4)$$

As in this form, the index combines information on both poverty and income inequality among the poor. Then **Gini Coefficient of Inequality** is the most commonly used measure of inequality. The coefficient varies between 0, which reflects complete equality and 1, which indicates complete inequality (one person has all the income or consumption, all others have none). Graphically, the Gini coefficient can be easily represented by the area between the Lorenz curve and the line of equality.

$$G = 1 - \sum_{i=1}^{n}(P_i - P_{i-1})(L_i + L_{i-1}) \qquad\qquad (5)$$

Where:

G is the Gini coefficient,

P, is the cumulated proportion of the population variable, for i = 0,...,n, with $P_0 = 0$, $P_n = 1$.

L, the cumulated proportion of the income variable, for i = 0,...,n,

With $L_0 = 0$, $L_n = 1$.

L_k should be indexed in non-decreasing order ($L_i > L_{i-1}$)

3. RESULTS AND DISCUSSION:

3.1 Poverty measurement indicators

The Foster-Greer-Thorbecke (FGT) indices adopted as a measure of poverty to measure the incidence of poverty, depth of poverty and severity of poverty based on poverty line (2 USD) for per-capita income per day.

The results of poverty indicators in the study area are summarized in table (2). In total sample households, the incidence of poverty, poverty gap and poverty severity are found to be 46%, 32% and 22%, respectively. This result implies that about 46% of populations in study area live below poverty line and not maintaining their basic needs. Which means that, they living in poor situation with their consumption expenditure falls below poverty line (2 USD= 12 SDG) per day. The poverty gap was found 32% which referred to the amount of income necessary to bring everyone in poverty line up to the poverty line or from below the poverty line up to the poverty line. While poverty severity represents 22% and measures the extent of the disparity in levels of poverty among the poor themselves, at the same time it measures the poverty gap between household. These findings of poverty incidence activities are due to lack of health services, drinking water, access to credit and infrastructure. Regarding this indicators, intervention is required from policy-makers and decision makers through food aids, credit access, development of health services and clean water to encourage their ability to raise income for enhancing the livelihoods conditions.

Table (2) Poverty incidence, gap and severity

Poverty indicators	Poverty line (2 USD) %
Headcount ratio (P_0)	46
Poverty gap (P_1)	32
Poverty severity (P_2)	22

3.2 Income distribution among households

As shown in table (3) and table (4), the results revealed that 45.3% of the respondents in study area their total annual income ranged between (2000-4000) SDG, which represents 33.9% of

total annual income. While, 51.6% of gum Arabic producers their annual income from gum Arabic production exceed 18000 SDG and represents 96% of their annual total income.

Table (3) Income distribution among household in study area

Income distribution	Total income		Gum Arabic income	
	% of population	% of Income	% of population	% of Income
Less than 2000	20.66	7.50	7.76	0.12
2000-4000	45.33	33.89	8.22	0.34
4000-6000	21	25.81	6.39	0.43
6000-8000	8	13.96	5.94	0.57
8000-10000	2.33	5.21	6.85	0.78
10000-12000	1.33	3.61	3.2	0.47
12000-14000	0.33	1.11	3.2	0.56
14000-16000	0.33	1.23	6.8	0.59
16000-18000	-	-	-	-
18000 and above	0.66	7.65	51.6	96.1
Total	100	100	100	100

5.4.4.1 Gini coefficient measurement

Gini coefficient is most commonly used to measure the degree of inequality of income distribution. The coefficient varies between 0, which reflects complete equality, to 1, which indicates complete inequality. Graphically, the Gini coefficient can be easily represented by the area between the Lorenz curve and the line of equality. Lorenz curve and Gini index were used to measure income inequality in a study area, which indicates inequality of income distribution (Figure 2 and Figure 3).

Table (4) and table (5) illustrate the Gini coefficient for household income which explaining the disparities of annual income distribution between respondents in study area. The results showed that the Gini coefficient of household income from gum Arabic recorded high score (0.385) compared to total household annual income which reported (0.18) as Gini coefficient of inequality.

Table (4) Gini coefficient measurement for total income distribution among household

Income distribution	Cumulative percentage of population	Cumulative percentage of Income	$(P_i - P_{i-1})$	$(L_i + L_{i-1})$	$(P_i - P_{i-1})*(L_i + L_{i-1})$
Less than 2000	0.206667	0.075	0.206	0.075	0.0155
2000-4000	0.66	0.41	0.45	0.488	0.2216
4000-6000	0.87	0.67	0.21	1.1611	0.243
6000-8000	0.95	0.81	0.08	1.97	0.157
8000-10000	0.973	0.86	0.023	2.83	0.066
10000-12000	0.986	0.89	0.013	3.73	0.0498

12000-14000	0.99	0.91	0.0033	4.64	0.0154
14000-16000	0.99	0.92	0.0033	5.57	0.0185
18000 and above	1	1	0.0066	6.57	0.043
					0.82
Gini = 1-0.82= 0.18			18%		

Table (5) Gini coefficient measurement for Gum Arabic income distribution among household

Income distribution	Cumulative percentage of population	Cumulative percentage of Income	$(P_i - P_{i-1})$	$(L_i + L_{i-1})$	$(P_i - P_{i-1})(L_i + L_{i-1})$
Less than 2000	0.077626	0.001172	0.077626	0.001172	0.0000909777
2000-4000	0.159817	0.004344	0.082192	0.005516	0.000453371
4000-6000	0.223744	0.008691	0.063927	0.014207	0.000908211
6000-8000	0.283105	0.014412	0.059361	0.028619	0.001698852
8000-10000	0.351598	0.022258	0.068493	0.050877	0.003484718
10000-12000	0.383562	0.026943	0.031963	0.07782	0.002487361
12000-14000	0.415525	0.032528	0.031963	0.110348	0.003527053
14000-16000	0.484018	0.038113	0.068493	0.148461	0.010168539
18000 and above	1	1	0.515982	1.148461	0.592585204
					0.615404287
Gini = 1-0615 =			0.385= 38.5%		

Quintile distribution of income

In measuring the quintile percentage of income distribution, some steps were following; firstly the households in a study area were ranked by their income level, from the poorest to the richest. Then the households were divided into five groups (20% for each).

Table (6), figure (2) and figure (3) illustrated the first poorest (20%) of the population earn 7% of the total income of the respondents compared to the first poorest (20%) of the respondents earn 0.7% of the total income from gum Arabic. While the richest (20%) of the population earn 42% of the total income of the respondents compared to the first richest (20%) of population that earn 80% of total income from gum Arabic production.

The second poorest (20%) of the population earn 13% of the total income of the respondents compared to the second poorest (20%) of the population earn 2.4% of the total income of the respondents from gum Arabic. While the second richest (20%) of the population would earn 22% of the total income compared to the second richest (20%) of the population earn 11.5% of the

total income from gum Arabic. The quintile results of income distribution showed inequality of income distribution between the poorest and richest segments of household in the study area. The variability of income distribution and income inequality between households in the study area due to the difference of income sources, farm lands and *hashab* garden areas and ownership, livestock owners, and assets values.

Table (6) Quintile percentage distribution of   income in study area

Items	% of total income	% of gum Arabic income
First poorest 20%	07	0.7
Second poor 20%	13	2.4
Third 20%	16	4.9
Second rich 20%	22	11.5
First richest 20%	42	80.5
Total income	100	100
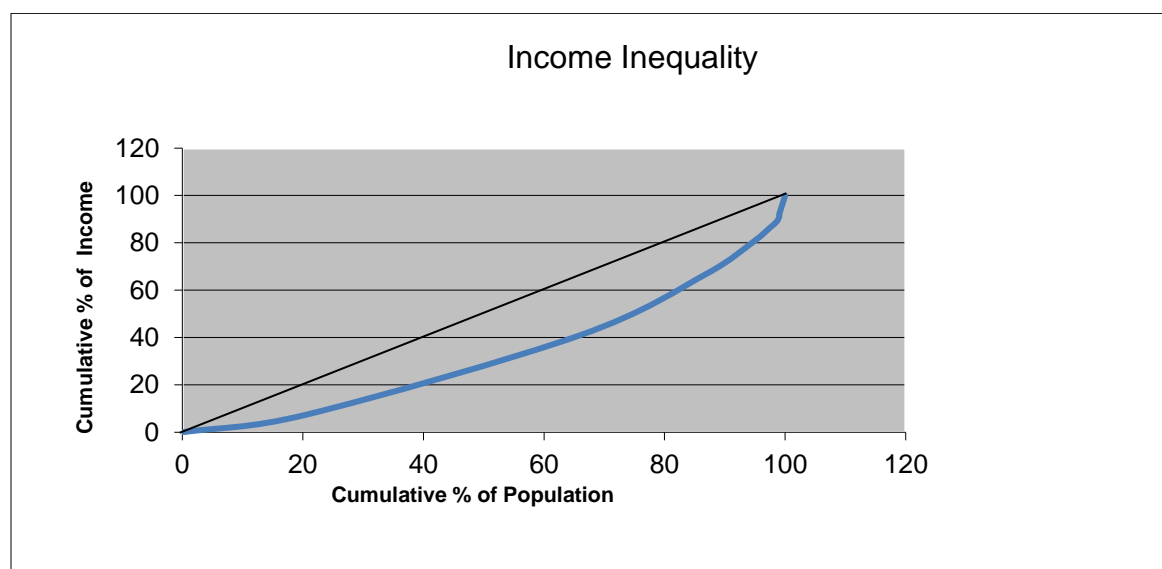
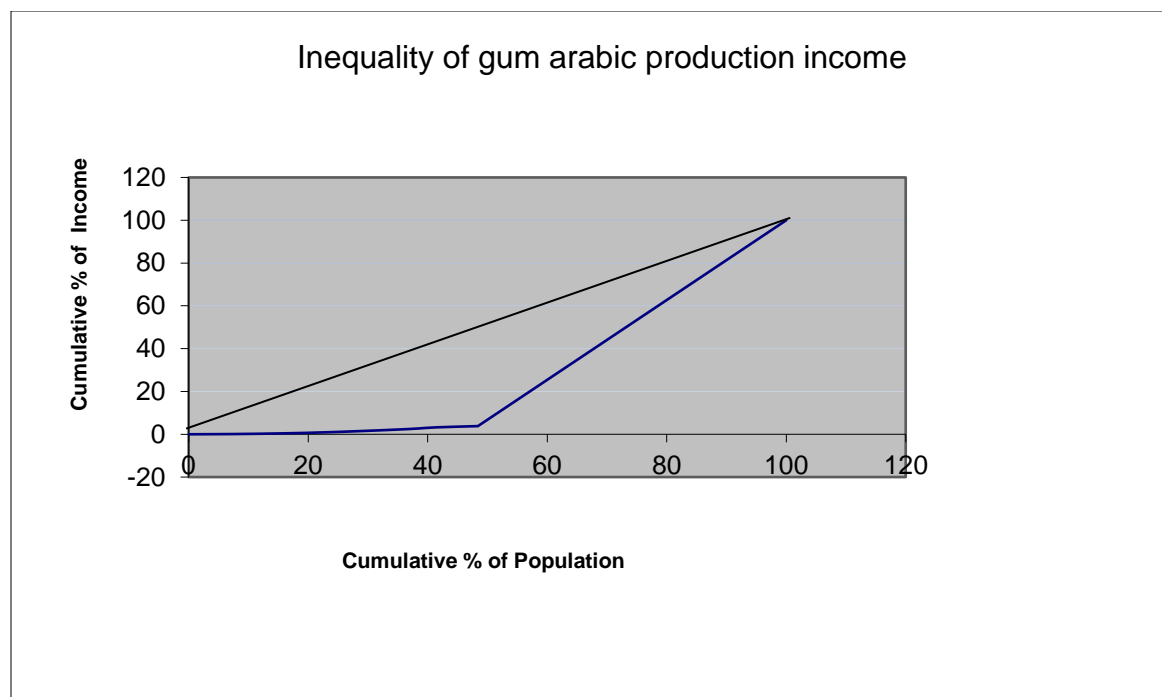Figure 2. (33) Lorenz curve of Household total annual income

Figure (3) Lorenz curve of Household gum Arabic income

CONCLUSION

The conclusions of this study based on the results of FGT, Gini index and Lorenz curve can be drawn: The poverty incidence is found to be 46%, poverty gap as 32%, while poverty severity was found to be 22%, the Gini coefficient showed inequality in income distribution among the population in the study area.

Acknowledgement

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