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The Determinates of Income Inequality in Urban Ethiopia: The Case of Woldia Town

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Abstract
This study examines the determinants of income inequality in woldia town, one of the zonal town in Amhara region in Ethiopia.. For the successful accomplishment of the study, primary data obtained from surveying the households of the town is applied. The inequality situation in this town is analyzed using both Lorenz curve and gini coefficient and income distribution is proved to be highly unequal even higher than the national average with a Lorenz curve far away from the equality line and the gini coefficient of 0.39. In addition to this, the OLS estimation coefficient declared the existence of direct positive effect of level of education on income but inverse relationship between income and dependency ratio. Moreover income of male headed households is greater than that of female headed and those household heads hired in public sectors earn income less than the private sector employees.
Keywords: Gini coefficient, Income inequality, Lorenz curve, Woldia Town
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1. Background of the study

High levels of income inequality is the manifestation of countries found in the region of Sub-Saharan Africa, and the most dispersed income distributions in the world are found in this region. In addition to being the world's second most varied and unfair region in terms of income, next to Latin America, Sub-Saharan Africa is also the poorest region in the world (UNDESA, 2009).

Much of the income inequality literature focuses on the relationship between income inequality and economic growth, but a fails to consider the causes and determinants of income inequality. In additions to this, many research papers are conducted to analysis cross country income differences and fail to consider determinants of income inequality with in the same country. Over the last decade, a large empirical literature emerged investigating the determinants of the distribution of per-capita incomes across countries. The determinants of income distributions within countries have, by comparison, received less attention. Although much has been written on the subject of income inequality, empirical work in the area has traditionally focused on accounting for trends in household level data within specific countries, rather than addressing deeper questions of the microeconomic determinants from a comparative international perspective. Much of empirical studies show that Income inequality is wide in least developed countries than the advanced countries even though variations are there with respect to the economic policy of the respective nations and countries with highest income inequality giving rise to less level of welfare among the citizens (Anthony et al., 2009).

Ethiopia's experience is a case in point for the complex interaction between inequality and growth. Unlike other rapidly growing economies, the country has not experienced a significant increase in inequality, as measured by the Gini coefficient, even as poverty reduction occurred at a rapid pace. Structural transformation and poverty reduction may require the implementation of reforms that could lead to an increase in income disparities in addition to the growth of economy.

With a Gini coefficient of 33.6, Ethiopia remains among the most egalitarian countries in the world. This is a reflection of a very equal consumption distribution in rural areas, resulted from regulations that prevent farmers from consolidating land (which inhibits the growth of farm size). Given that the majority of the population still lives in the countryside, a low rural Gini contributes to the low national measure. In the cities, on the contrary, after a decline in inequality between 2004 and 2010 (by 6.2 percentage points), most recent developments indicate that the income gap is widening again. The rising skill premia for higher education and the changes in the household characteristics (younger households, living alone, or in couples with no children) are the key factors behind the increasing income disparities. (IMF, rep 2015)

Urban inequality has been given less attention on research and development agenda of Ethiopia particularly for medium towns like Woldia. In Ethiopia, annual urban population growth rate is estimated to be above 4.3 % (PASDEP, 2012). In line with this income inequality in urban areas income inequality is growing up and the incidence of urban poverty in developing country like Ethiopia is very high. Since inequality is a cause for low level and unfair growth rate and widespread poverty for a given country, many papers around the world are conducted to identify the causes behind inequality. The problem of inequality is severe in least developed countries when compared with the advanced one. Barro (2000), in a study of the determinants of income inequality and

growth, was among the first to report a structurally different relationship of inequality to growth in developing countries compared to that of developed countries. By dividing the sample into the two groups, he found the relationship is structurally different. In higher-income developed countries low level of inequality may indeed be associated with higher growth rate while higher income inequality is associated with lower growth in least developed countries.

Accordingly this study tries to investigate the determinants of income inequality in Woldia town which is one of urban town in Ethiopia.

2. Review of Related Literatures

From neo-classical point of view, the earliest type of practical wage circulation hypothesis in its propelled shape is to be found in the work of David Ricardo. In the primary section of the introduction to his authoritative work, Ricardo (1817) illuminates the fundamental extent of his request as "To decide the laws which direct this dissemination wage between rent, profit and wages, is the foremost issue in Political Economy". The entire "create of the earth", Ricardo states, is separated by paying rent to start with, taking after the standard of diminishing negligible profitability of land. The most profitable sections of land of land are placed being used to begin with, says Ricardo, so that through time just less gainful sections of land remain and the best sections of land are the priciest (Oliver, 2010).

The marginalist revolution was born on the basis to escape a “mazy” political economy by replacing it with a more sophisticated economic science, characterized by the sound mathematics. Ricardo’s decreasing marginal productivity principle was generalized; all factors of production now had the same (diminishing returns) property and could be put under the umbrella of a unique production function. The most famous of those production functions is that proposed by Cobb and Douglas, $Y = AL^aK^b$, for which one verifies that the labor share W/Y is indeed the parameter a, which is assumed to be constant. The constancy of the labor share implies that workers are being paid real wages set at the level of their own labor productivity.

Three major points are concluded from the analysis presented thus far. The first conclusion of the marginalist school is that everybody will be paid according to his/her contribution to the production process and this idea is acceptable my most economists at the current time. To some extent modern economics is still under the influence of such conclusion. This is certainly a major and reassuring idea that John Bates Clark was right. But what this implied is that the question of inequality was in itself a non-issue: first because it was embodied in a larger theory, that of functional income distribution, and second because such system was characterized by an intrinsic fairness. Much of the literature on inequality as we know it today was indeed not born at that time, only much later (Frankin, 2007). The second conclusion is that the relative factor shares are constant through time. As such this conclusion may appear quite striking as Solow himself expressed “skepticisms” about it (Solow 1958). The third conclusion, shared by both the Ricardian and marginalist tradition is that everything is a matter of a simple universal law a law of Nature. Such a law would be inescapable, only possibly to be disturbed by technology which itself is ascribed to an exogenous factor, as reflected in the “Solow residual”. Much of the later economic research was concerned by providing more details than just a natural law. This body of research was largely under the influence of Keynesian economics and amounted to an important reformulation of the classical factor share theory.

Starting with a model of salary circulation regularly disregarded (it brings bits of knowledge drawn from universal exchange hypothesis). The center of the hypothesis comprises of the models from Ricardo (1817) Heckscher (1919), Ohlin (1933) and Stolper and Samuelson (1941) (as refered to in Oliver, 2010). We talk about this assemblage of work first in light of the fact that plainly it has establishes in neoclassical financial matters every one of the four models lay on the suspicion of impeccable rivalry and full work of assets. However the Stolper and Samuelson hypothesis expresses that exchange factors, imports and fares are request factors impact salary appropriation. The piece comprises of three stages. In the first place, Ricardo predicts that exchange will occurred taking after similar preferences and that exchange evens out the relative costs of exchanged merchandise. Second, Heckscher and Ohlin take note of that nations will send out merchandise that use their copious component of creation on the grounds that those items end up being less expensive a work bounteous nation will trade work concentrated products. Third, Stolper and Samuelson demonstrate that relative value meeting will profit the proprietors of the plenteous component of generation more than the proprietors of the rare variable of creation. Subsequently, Stolper and Samuelson's commended article has pay circulation suggestions: not each monetary gathering benefit similarly from exchange.

There are two lessons most applicable to our investigation into pay circulation. To start with and if Heckscher and Ohlin are correct, we ought to watch meeting of element costs among exchanging countries. Second, more noteworthy exchange openness in more capital-escalated nations ought to prompt a lower wage share. Once more, those are hypothetical assumptions which are testable against the information. However the outcomes ought to be deliberately translated. An adjustment in salary appropriation in nations whose generation structure is generally described by flawed rivalry (Krugman, 1979). Krugman can't depict to a Heckscher-Ohlin-Samuelson impact to the degree that their analysis is based on perfect competition inthe labor market.

Corry (1966), attempts at summarizing the effects of technological change on the relative shares of income in the neoclassical framework. His conclusions indicate that the inclusion of technological progress is certainly a welcome development, but that this did not lead to a major leap forward in economic research:

Simon(2013),conduct a research paper on the main factors behind high level of income inequality in sub-Saharan African countries using up-to-date panel data set from countries for the period between 1990 and 2010. Based on the results from random effect regression, variables such as government expenditure, the level of education and the existence of democracy are investigated to be important variables in reducing income inequality. However, foreign aid is found to increase the level of income dispersion since it does not benefits the poor households.

Abebe (2016), conducting a study using general entropy index with the aim of analyzing the determinants income inequality among sampled households who find themselves at the bottom and top of the income or consumption distribution in urban centers of South Wollo administrative Zone of Ethiopia. Findings of this paper suggests that widening access to education, supporting informal sector, urban agriculture and creation of job opportunities, urban investment to improve access to urban land urban infrastructure, the quality of life and housing development have a significant impact on reducing household's income variation

Tassew (2009), in his study on poverty and inequality analysis in Ethiopia, he found that even if income inequality remained unchanged in rural areas, there was a substantial increase in urban areas income dispersion. More over the results in this paper show, in Ethiopia, income growth reduces poverty and increases in inequality increase poverty; the income-poverty elasticity lies in the range of -1.7 to -2.2. In rural Ethiopia, the increase in consumption has led to a reduction in headcount poverty.

Okidi (2004) wrote a paper entitled "Understanding the determinants of income inequality in Uganda." Their article is interesting because Uganda in the last period of ten years experienced gradual and sustained growth and poverty decline. Benefits of growth, however, are not being distributed equally. This study provides insights into deepening understanding of the determinants of income inequality in Uganda. Decompositions by subgroups revealed that household characteristics are influential components of overall inequality, a finding also supported by the results based on the regression analysis.

Eskindir (2011) shows the important effect of income inequality in poverty reduction using a household level data collected from Bench-Maji zone, SNNP of south west Ethiopia. With the aim of investigating the determinants of income inequality using in equality decomposition analysis approach, uses a data collected from 120 sampled rural households who live in sheko district of this zone. Finally, the result of this paper indicates that the Gini coefficient of the study area is 0.39, which shows that the income distribution in the study area is inequitable. The relative contribution each sources of income to the overall income inequality indicated as: crop production 0.35, livestock 0.01 and nonfarm incomes 0.03. The result shows that much of the income disparity is attributed to income generated from crop production. It was found out that the other income sources have an inequality decreasing effect, that is a raise in income from non-farm income and livestock is favorable for income distribution. Land holding, land allocated for perennial crops and livestock are household variables which have higher inequality weight. Increase in education and livestock variables reduces the income gap whereas land holding, land allocated for perennial crops & annual crops, and household size widen the gap. Concerned institutions in improving rural equity should give high attention on nonfarm income generating activities, and improving the productivity of livestock.

3. Methodology

3.1. Description of the study area

Woldia is the capital town of North Wollo zone which is one of the eleven zones of Amhara region of Ethiopia, which was established around 1788 by Ras Ali the Great and has serve as the administrative and urban center. It is a nodal town connecting four main roads from opposite directions. It is found 520 km north of Addis Ababa, 320 km east of the Amhara National Regional State city of Bahir Dar, 260 km south of Mekelle, 720 km west of Djibouti. It is situated at 2000 meter above sea level with 350 mm average annual rainfall and 22 ^{o}c average daily temperatures (Woldia City Administration (WCA), 2007). The town has hill topography and surrounded by mountains. Although the surrounding areas of the town were covered by forests, nowadays it is dry and stony due to successive deforestation.

3.2. Data types, sources and analysis

The analysis in this paper is mainly based on total monthly household disposable income, defined as the sum of incomes from wages and salaries, formal businesses, female household businesses, children's activities, pensions and remittances, farming and livestock.

The type of data used in this study is a primary data collected from randomly selected 220 sample households who are living in woldia town. Using this data both descriptive and econometric methods of data analysis are applied to study the determinants of income inequality. The Lorenz Curve and Gini coefficient measure of income

inequality are applied to determine the extent of income dispersion in the town and the significance and impact of variables is analyzed through applying the simple OLS estimation coefficients.

3.3. Sample size determination

Selecting too large sample size not recommended due to high cost and shortage of time. Also selecting too little sample size main not truly represent the population character and leads to biased result. In order to determine a representative sample size from selected kebeles, in this paper, finite population correction factor (FPCF) formula developed by Morgan and Krejcie in 1970 is applied.

$$n = \frac{z^2 pqN}{(N-1)e^2 + Z^2 pq}$$

Where, n = required sample size N = total population
Z = z – score (e.g., 95% = 2.005) e = margin error (rate of accuracy)
p = proportion of population q = 1-p

To determine the proportion of the population, this study applied a pilot survey. 30 pilot sample households where selected and asked either they have been negatively affected by inequality or not. Out of the pilot sample 21 households answered as they are negatively affected by the existed income inequality. Then, p = 0.7 and = 0.3. Using 95% confident interval, 5% margin error, total population N= 3428 the sample size is determined as follows.2894, 12.34

$$n = \frac{(2.005)^2(0.7)(0.3)(3428)}{(3427)(0.05)^2 + (2.005)^2(0.7)(0.3)} == 220$$

4. Data analysis results and discussions

4.1. Descriptive analysis

Under this method of data analysis different methods of data analysis such as ratios, figures, percentages, means, variance, standard deviations and graphs are used to analyze the characteristics of the data set. Among these descriptive analyses, more emphasis is given to graphical method to measure Gini coefficients of both income and consumption among households.

4.1.1 Descriptive statistics on dummy variables

Table 1: summery statistic on dummy variables (own computation using stata)

Explanatory variables	Type of variable with category	Number of obs.	Frequency	Percentage
Gender of households head	Male=1	220	166	75.4%
	Female=0		54	24.6%
Marital status	Married=1	220	167	75.9%
	Divorced=0		53	24.1
Sectorial dummy	Private sector=1	220	151	31.4%
	Public sector=0		69	68.6%
Formality of sectors	Formal sector=1	220	180	81.8%
	Informal sector=0		40	18.2%

The above table shows a descriptive statistics on the categorical dummy variables used as explanatory variables included in the model. According to results on the data set 166 out of 220 sampled household heads are male which accounts for 75.4% of the total sample size. The remaining 54 households are managed and administered by female heads and the numeric figure for female headed households is about 24.6%. With regard to the marital status, 75.9% of the households are married and the remaining 24.1% are living separately due to divorcing, widowed or not married. In addition to this 87.7% of the population is estimated to be engaged at work and 12.2% are retired from work either because of old age or being disable at the time of military workers. When we consider the sectors that household heads are hired, 68.6% are engaging in the private sectors out of which 18.2 % are earning their income from underground economies of contraband and street vending activities. The remaining 31.4% are working on the public sectors of the town.

4.1.2 Descriptive statistics of continues variables

Table 2: summery of continues variables (own computation using stata)

Variables	Type	Mean	Var.	Std.	Min	Max
Age	Continues	48	120.4	10.97	22	100
Level of education	Continues	2.9	2.28	1.5	0	7
Family size	Continues	4.6	3.13	1.77	1	11
Dependency ratio	Continues	60.4	50.58	7.01	0	400

As indicated by the above table, the average age of households is estimated to be 48 with 22 and 100 minimum

and maximum ages respectively. The age of households vary with the variance and standard deviations of 120.4 and 10.97 numerical figures respectively. The household's level of education is ordered starting from the illiterates to those who have a doctorate degree. The average education level of households is either a preparatory or first degree stage.

The family size of the households ranges from 1 to 11with the average household members of five individuals. The family size varies from households to households with the variance of 3.13 out of which 24% of the populations have individuals more than the average numbers of 5members.

Summery on the dependency ratio of the town shows that on average one individual is dependent on two working individuals as measured by a mean dependency ratio of 60.4 even if the dependency ration varies from zero to 400 with a variance and standard deviations of 50.58 and 7.01

4.1.3 Summery statistics on distribution of income

Description on distribution of income

The distribution of income can be analyzed using descriptive summery measure such as mean, standard deviation quartile, percentile and decile ratios in addition to the Lorenz curve and gini indexes. In this part percentile ratio is applied as a major tool of distribution analysis. The based on table presented below distribution of income is summarized by using the percentile ratio of income in Woldia town.

Based on the results of the data form households, 50% of the individual households of woldia town earns an average monthly income of 400 as indicated by the fifty percentile ratio. The mean value of income is 5190 even if individual household's absolute income varies from 550 to 70000 with the standard deviation of 6900.

The income distribution is skewed to the right by 6.99%. This indicates that only six up to seven percent of the population is earning income greater than the mean value. The kurtosis for income measures a value of 62.2 which is greater than three by large amount to indicate the presence of presence of leptokurtic distribution which measures more out layers than the normal distribution.

Table 3: Income distribution of the bottom 25% and top 25%.

	Percentiles	Smallest		
1%	600	550		
5%	770	600		
10%	810	600		
25%	2500	600		
50%	4000			
		Largest	Obs.	220
75%	6000	20000	Mean	5189.632
90%	8000	25000	Std.Dev.	6900.173
95%	10000	65000	Skewness	6.9888
99%	25000	70000	Kurtosis	62.21857

Source: own computation using stata

According to the table 4.1 above, the poorest 1%, 5%, 10% and 25% percent of the population is earning an average monthly income of 600,770,810 and 2500 respectively. This means that the total income share of the bottom 25% of the population is only 6.4% of the total income.

In opposite to this small proportion of the top income earners are earning highest proportion of the total income. The richest 1%, 5%, 10% and 25% of the total population are earning average income of 25000, 10000, 8000 and 6000 respectively and this shows that there is a high level of income inequality in woldia town where few top income earners are exploiting the income of majority poor (top 25% rich households are earning 54% of the total income).

In addition to the above distribution measurements, Lorenz curve and gini index measures of inequality are applied which do not depend on the mean of the distribution instead, inequality is concerned with distribution. In order to measure income and consumption expenditure of households' inequality in the study area, the Lorenz curve and Gini index/coefficient are used.

The Lorenz curve and gini index of income

The Lorenz curve is one measure of income inequality through indicating by how much amount the distribution is far away from the equality line. Any distribution of income with a Lorenz curve near to the equality line represents relatively equal income distribution and if the Lorenz curve for a given distribution is far away the line of equality the distribution is highly unequal. As indicate in the Lorenz curve graph (fig 4.1) the distribution of income in this study area is high as indicated by the down ward bending curve.

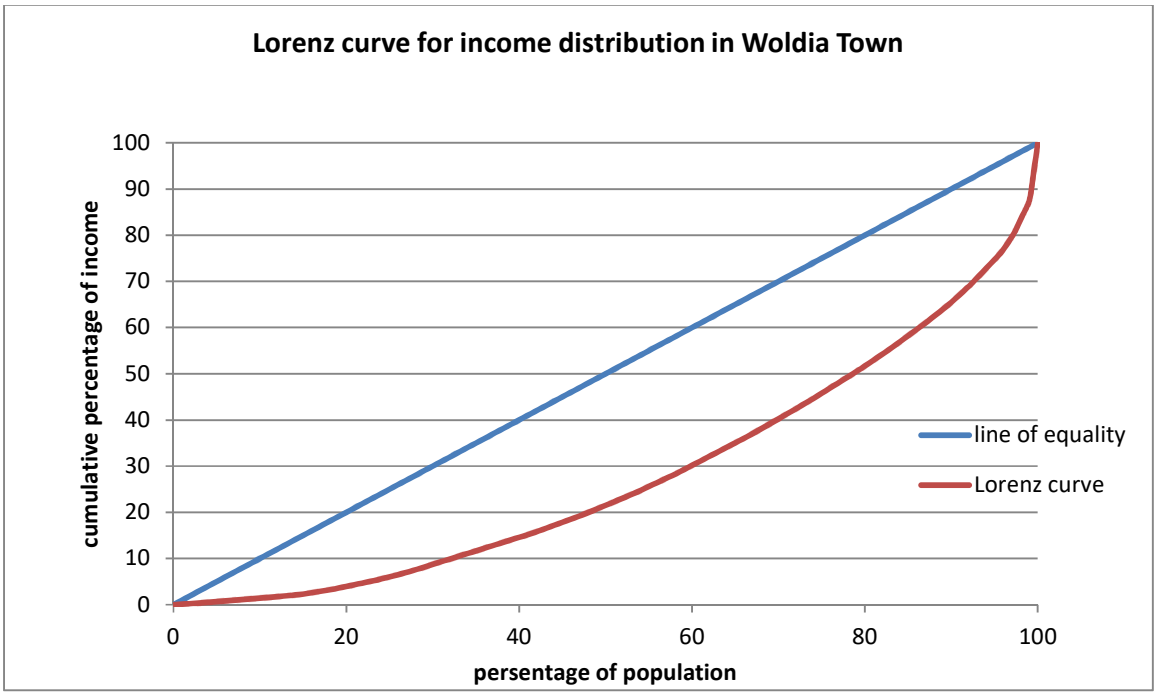

Figure 2: Lorenz curve for income distribution in Woldia.

Even if Lorenz can serve as a measure of inequality, it can't indicate the exact quantitative value of the distribution's dispersion. So gini coefficient is the best measure of inequality with the exact number to indicate the level of inequality. It always measures a value between zero and one (between 0 and 100 when calculated as percentage). Gini index is zero when there is equal distribution indicating all individuals under consideration are earning equal income level and it is one in special case when one individual is earning all the income while others are earning nothing.

To derive the value of gini coefficient the excel method of calculating income inequality at households level with the following formula (American Statistical Association, 2014) is applied in this study.

$$\mathbf{gini} = \frac{\sum(2i-n-1)xi}{\mu n^2}$$

Where;

i = individual household μ = mean value of income
n = total sample size xi = income of household i

Using this formula the gini coefficient of woldia town is estimated to be 0.439 to indicate the presence of high level of income inequality. So this gini figure of .44 is greater than the 0.33 national average gini coefficient of Ethiopia as measured by World Bank (WB, 2015). The reason for this result is, there is high level of income inequality in urban areas of Ethiopia and relatively low level of income inequality in rural counter parts due to annually earned equal agricultural income. So, high level of income inequality in urban areas will exist when compared with the national average since the average is taken from low inequality rural areas as well.

4.2.2 The OLS estimation results

Table 9: Results of multiple regression models

Lny	Coef.	Std. Err.	T	P>|t|	[95% Conf. Interval]	
Gen	.2427707	.1326499	1.83	0.069***	-.0187111	.5042525
Fs	.065231	.0308012	2.12	0.035**	.0045151	.1259469
Ms	-.0515682	.1321949	-0.39	0.697	-.3121531	.2090167
Edu	.17555	.0346359	5.07	0.000*	.1072751	.2438248
Sec	.2389989	.1183845	2.02	0.045**	.0056373	.4723605
For	.0371035	.142929	0.26	0.795	-.2446406	.3188477
Dr	-.0013392	.000742	-1.80	0.073***	-.0028019	.0001235
Cons	7.12518	.2574488	27.68	0.000	6.617692	7.632667

Note *, **and*** indicates the significance of variables at 1%, 5% and 10% significance levels

Number of obs. = 220 F(9, 212) = 7.11
Prob > F = 0.000 R-squared = 0.9101

The value of the overall significance F test indicates explanatory variables are significance in their joint effect

on the model. The calculated F value of 7.11 at 95% critical value indicates that null hypothesis (H_0 : all coefficients are zero) is rejected since p value 0.000 which is less than 5% to reject the model's incorrect specification. The R2 value of 0.91 indicates thatvout of the total change in the dependent variable o91% is jointly explained with in the model.

According to the OLS estimation result of the data set, some of the continuous variables have a positive relationship with household's income level and some others have inverse relationship. As the level of education and family size increase by one unit, household's monthly income increases 18% and 6% respectively. The level of education is the significance determinant of income inequality in this town as the level of income will increases by large amount as a level of education increases by one unit. This result is supported by those individuals with low level of education are investigated to be low income earners in United States and in general countries that provide higher-quality education across the economic spectrum, there is much less income disparity (WB, 2013).

On the other hand, dependency ratio does in opposite direction with monthly income. The reason behind it is high number of dependent members with in a household contribute nothing and consuming the income of few independent individuals. In Woldia town, the monthly income of household's monthly income decreases by 0.13 when dependency ratio increases by one percent.

With regards to the effects of dummy variables included in the model, more male headed households earn higher income than the female headed once and the figure shows that the income of male headed is greater than that of female headed by 24%. Furthermore, private sector employees earn more income than the public employees by the respective probability of 23.8%.

Conclusion and policy recommendation

Under this study, determinants of income inequality had been identified. To do so, the widely used measures of income inequality like the Lorenz curve and gini index are applied. The relatively more concave Lorenz curve of income distribution to the origin is obtained to indicate the presence of relatively high income inequality. This distribution is summarized using a quantitative value indicator inequality measure of gini coefficient and the gini index is given to be 0.439. This town's gini index is greater than the national average index of 0.33 because of high level of income inequality in urban areas than rural areas of the country.

In addition to this, The OLS estimation coefficients declared the existence of direct positive effect of level of education on income level but inverse relationship between income and dependency ratio. Income will increase by 17.6% due to a unit change in education level and it will decrease by 0.13% when the dependency ratio increases by one unit. The dummy variables coefficients also shows that the income of male headed households is greater than that of female headed by 24.3% and those household heads hired in public sectors earn income less than the private sector employees by large amount of 23.8%.

High level of education accounts a lot for households to get themselves in high income groups. So household heads of Woldia town has to give emphasis for education, to spend more for schooling for their children and themselves and the government is also required to increase its expenditure on education. When the income of private sector employees is compared with that of public employees, private sectors are paying higher income for their workers. To reduce the level of inequality the governmental public sectors are recommended to pay more than what they are paying now and giving insurance in different forms like health insurance and pension. Additionally, there is male-female income difference and females are earning less than male. To make the balance, gender offices governmental and non-government institutions will give more emphasis for females through training and self-confidence creating activities.

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