# A STUDY OF THE INCOME DISTRIBUTION AND INEQUALITY AMONG RESIDENTS OF BATANG SADONG, SAMARAHAN DIVISION, SARAWAK, IN 2007[#]

by

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**Abstract**

The Gini coefficient is one of the socio-economic tools used in measuring inequality of income distribution. The Gini coefficient is defined as a ratio with value between 0 and 1, with 0 corresponding to perfect income equality, which means everyone has the same income, and 1 corresponding to perfect income inequality, which means that one person has all the income, while everyone else has zero income. This paper attempts to study the income distribution for Batang Sadong, Samarahan Division, using census data collected by the Samarahan Division Office in 2007. The data show that the monthly household income for the farmers in Batang Sadong ranges from RM40 per month to RM3,550 per month. The average monthly income is estimated at about RM361.11 per month, which is below the hardcore poverty level of RM482 per month for Sarawak. The Gini coefficient for Batang Sadong has the overall value of 0.3161 and ranges from 0.18748 to 0.41354. This study has proven that the income gap between the rich and the poor for Batang Sadong is not large. However, as the average household income is very low, this area requires an intensive development programme to improve the standard of living of the residents.

**Keywords**: Gini coefficient, Income distribution, Hardcore poverty

[#] Paper presented at the International Economic Conference on Trade and Industry at Bayview Hotel, Georgetown, Penang, Malaysia, 3-5 December 2007, organized by the Faculty of Economics, Universiti Utara Malaysia, Sintok, Kedah, Malaysia.

## 1. Introduction

The relationship between the distribution of income and the process of development is one of the oldest subjects of economic enquiry. The local development process for a certain area will generate output, income and employment for the related sectors in the economy. The development strategy is very important to include all the necessary elements in the implementation plan so that it could benefit all of the population in the development area. The Gini coefficient, developed by an Italian statistician Corrado Gini in early 1910s is often used to measure inequality or disparity of income distribution. Analyses of the effect of distribution indicate a number of pathways by which growth and development are affected (Stephanie, 2005), which is an important factor to incorporate in the development planning. It should not be surprising that growth and development certainly have effect on the household structure, pattern of job segregation and resource access as well as possibilities for political participation. They also vary, depending on economic structure, as the next sections on ethnicity and gender suggest.

This paper attempts to examine the income distribution in Batang Sadong District, Samarahan Division, Sarawak, Malaysia using the Gini Coefficient as method of analysis. The result of this study would be useful as a guide for the central and implementing agency in formulating its regional planning. This paper consists of five sections, Background of the Study, Literature Reviews, Methodology of the Study, Result of Analysis, and last but not least Summary and Conclusion.

## 2. Background of the study

Based on the census by the Samarahan Division Office, Sarawak, the head of household of Batang Sadong, Samarahan Division is only 673 people. Out of this, 596 people are male and the balance of 77 people of the households head are female. The average age for females (55.5 years) is higher than males (50.49 years). The distribution of head of households according to age is shown in Figure 1, which has the characteristic bell shape. It implies that it is a normal age distribution.

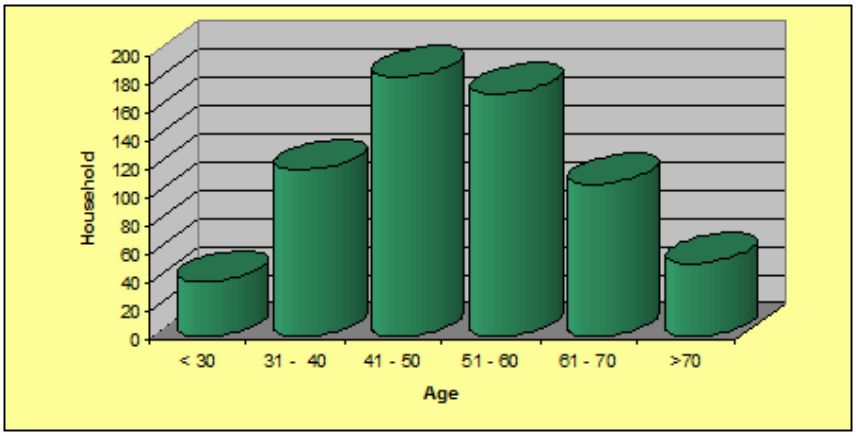



**Figure 1: Household distribution according to age**

However, the income distribution of household is not in the form of a bell shape as depicted in Figure 2 and Table 1. This shape has created further concerns for the planners over the income gaps among the Batang Sadong residents. There are about 19 head of household with their average income greater than RM980 and 21 head of household between RM681 - RM980, 600 households between RM81-RM680 and 33 head of household less than RM80. In addition, the minimum monthly income is only RM40 while the highest salary is more than RM3000.

**Table 1: Income distribution**

| Intervel (RM) | No of Household |
|---|---|
| < 80 | 33 |
| 81 - 180 | 69 |
| 181 - 280 | 137 |
| 281 - 380 | 203 |
| 381 - 480 | 130 |
| 481 - 580 | 35 |
| 581 - 680 | 26 |
| 681 - 780 | 9 |
| 781 - 880 | 9 |
| 881 - 980 | 3 |
| > 980 | 19 |

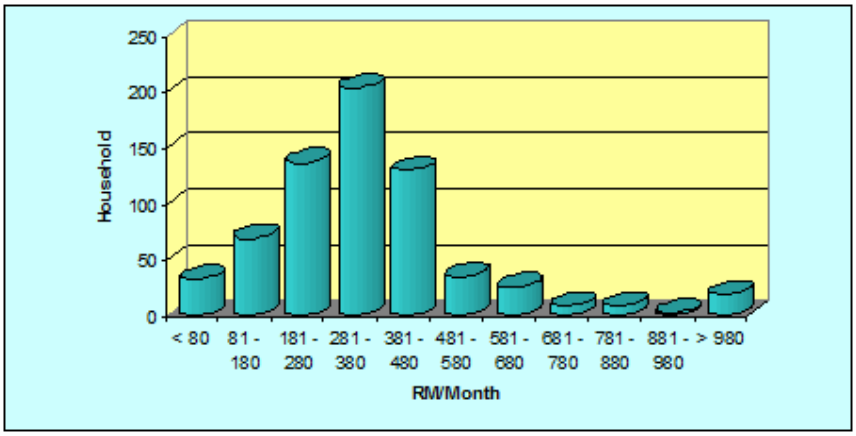



**Figure 2: The household income distribution**

From this information, it is anticipated that there is income inequality in Batang Sadong, Samarahan. Therefore the intention of this study is to examine the income inequality or disparity for the Batang Sadong, Samarahan Division, area.

## 3. Literature Review

There are many studies of income distribution because it is closely related to poverty, those of development and growth of a nation such as Ansley and Hoover (1958), Dutt (1990), Taylor (1991), Deininger and Squire (1998), Knell (1999) and Cunningham and Joyce (2003).

Recently, Stephanie (2005) showed that all types of inequality are not created equal because of divergent impacts of inequality on economic growth. The findings of this research are contradictory and inclusive. One cause for these divergent results is that researchers rely on different group measures of inequality. Another study by Frederick and Peter (2005) focused on the power-based technological change and the rise in earning inequality. An efficiency wage model shows that power-based technical change in this sense may generate rising wage inequality accompanied by an increase in both the effort and unemployment of low-skill workers.

Frank (2005) basing his study on the work of Theil (1967) provided a landmark in the development of the analysis of inequality measurement. The significance of this landmark was perhaps not fully realised for some time, although Theil's influence is now recognised in standard references on the analysis of income distribution. Theil's approach to the measurement of inequality is set in the context of subsequent developments over recent decades. It is shown that Theil's initial insight leads naturally to a very general class of decomposable inequality measures. It is thus closely related to a number of other commonly used families of inequality measures.

The development project injected by a government could reduce the household income inequality for certain. Margarite and Thomas (2006) have highlighted in their study the role of monopoly, inequality and redistribution via the public provision of public goods. The relationship between inequality and redistribution is usually studied under the assumption that the government collects different amounts of taxes from each citizen but gives back the same amount in cash or in kind to everyone. This actually happens when the government distributes through both sides of its budget (revenue and expenditure). Margarite and Thomas (2006) studies the effects of inequality on the size (and structure) of redistributive programmes in both perfectly competitive and monopolistic settings. They found that the presence of monopoly results in a higher tax rate than in the competitive case and that in the latter case increase in inequality can be associated with a fall in the tax rate.

There was another interesting study by Leonardo *et. al*. (2006) with respect to consumer-driven market mechanisms to fight inequality using product differentiation models with asymmetric information. This study actually examined the bottom-up pressure of concerned consumers and the rise of socially responsible products to represent a new market mechanism to fight inequality and promote social inclusion. They found equilibrium of the pure location and of the price-location games and show what changes when we move from a duopoly of profit maximizing producers to a mixed duopoly. A nonzero degree of corporate social responsibility was found to be the optimal choice of profit maximizing corporation under reasonable parametric interval of consumers cost of ethical distance corporate cost of corporate social responsibility and uncertainly about consumer tastes.

## 4. Methodology

This study employed the method developed by Corrado Gini 1910s, which is very popular economic tool to measure income inequality in a society. Gini coefficient is a number which has a value between zero and one. As the value of the coefficient rises, the higher the degree of income inequality in a society becomes. It can be explained graphically as in Figure 3.

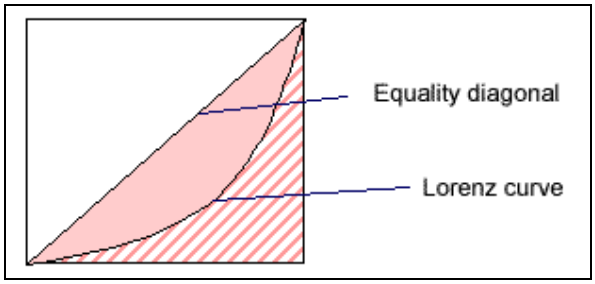



**Figure 3: Lorenz curve and Gini coefficient**

The Gini coefficient is based on the Lorenz curve, a cumulative frequency curve that compares the distribution of a specific variable with the uniform distribution that represents equality (Figure 3). This equality distribution is represented by a diagonal line, the greater the deviations of the Lorenz curve from this line, the greater the inequality.

The income and population data should be tabulated according to a suitable interval. Then these data should be arranged in a cumulative manner. The cumulative proportion of the household members is generally shown on the X-axis, and the cumulative proportion of income variable on the Y-axis. The greater the distance from the diagonal line, the greater the inequality. The curve can be below or above the diagonal depending on the variable used.

This method of calculation for Gini coefficient has been adopted from the Department of Economic SOAS (2007). Suppose we have the cumulative relative frequencies of income and household members as in Table 2.

**Table 2: Cumulative income and household members**

| Cumulative relative frequency of income (Y) | Cumulative relative frequency of household members (X) |
|---|---|
| $y_1$ | $x_1$ |
| $y_2$ | $x_2$ |
| $y_3$ | $x_3$ |
| $y_4$ | $x_4$ |
| $y_5$ | $x_5$ |
| $y_6$ | $x_6$ |
| $y_7$ | $x_7$ |
| $y_8$ | $x_8$ |

Taking the cumulative percentage of income on the vertical axis and the proportion of household members on the horizontal axis, we may plot the two cumulative frequencies to obtain the Lorentz curve.

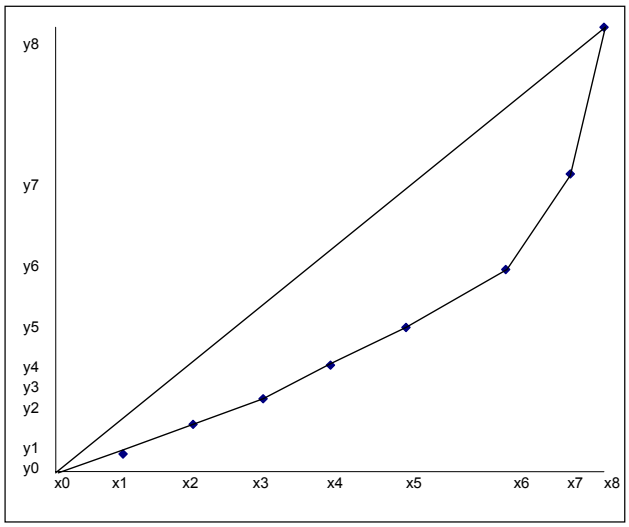



**Figure 4: Lorenz curve**

Knowing the Lorenz curve shape as in Figure 4, a numerical measure of inequality knowns as the Gini coefficient can be further developed. It can be derived directly from the Lorentz curve as illustrated below.

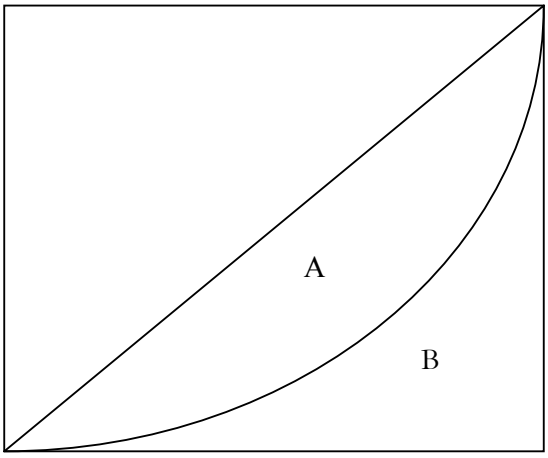



**Figure 5: Area of Lorenz curve**

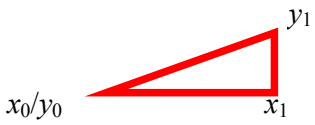
Denoting the Gini coefficient by $G$, we have

$$G = \frac{A}{A + B}$$

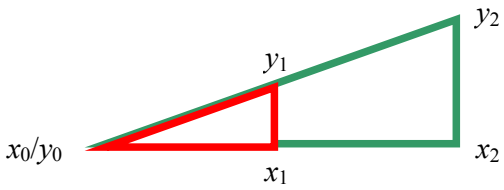
This must lie between 0 and 1. When there is total equality the Lorentz curve coincides with the 45º line, area $A$ then disappears and $G$ = 0. With total inequality (one household having all the income), area $B$ disappears and $G$= 1 (Lui, 1997; Wikipedia, 2004)

So the first task is to find the area B. This involves calculating the area for the triangles that can be drawn by joining the plotted points, the cumulative frequency of households associated with it, and the point of origin.

Let us focus on the first triangle.




The area of the first triangle can be calculated as $\frac{1}{2}\times(x_1-x_0)\times(y_1-y_0)$.
The next triangle is




For the second triangle the area is $\frac{1}{2}\times(x_2-x_0)\times(y_2-y_0)$. But we have already calculated the first triangle. So the area we want in addition is $\left[\frac{1}{2}\times(x_2-x_0)\times(y_2-y_0)\right]-\left[\frac{1}{2}\times(x_1-x_0)\times(y_1-y_0)\right]$ or if we focus on the trapezoid $\frac{1}{2}\times(y_1+y_2)\times(x_2-x_1)$.

In general, the Gini coefficient may be calculated from the following formula for area *B*:

$$B=\frac{1}{2}\{(x_1-x_0)\times(y_1+y_0)+(x_2-x_1)\times(y_2+y_1)+\cdots+(x_k-x_{k-1})\times(y_k+y_{k-1})\}$$

where $x_i$ and $y_i$ are the two cumulative relative frequencies on the *X* and *Y* axes. $x_0 = y_0 = 0$ and $x_k = y_k = 100$ (or 1).

Alternatively, the Gini coefficient can be expressed as

$$G=\frac{A}{A+B}=\frac{A+B}{A+B}-\frac{B}{A+B}=1-\frac{B}{A+B}$$

In the case where $x_k = y_k = 100$, the area $A+B=\frac{10000}{2}$. Hence

$$G=1-\frac{2B}{10000}$$

It is clear that Gini coefficient (G) is one minus the product of 2B divided by 10000. In a society where income is evenly distributed and the Lorenz curve coincides with the line of perfect equality, Gini coefficient is zero. On the other hand, in a society where income is held by one household members and Lorenz Curve coincides with the line of perfect inequality, Gini coefficient is one. In real life, the Lorenz curve of a society lies somewhere between the lines of perfect equality and inequality, making the corresponding Gini coefficient somewhere between zero and one.

## 5. Results of Analysis

The Gini coefficient was found to range from 0.18748 to 0.41354 with the average for Batang Sadong at 0.31610 (Table 3). There are two villages equivalent to 8% of the total household with Gini coefficient of under 0.2. It implies that these two villages have the best income distribution among the villages. The income gap between the rich and the poor is small. Twelve villages or 55% of the Gini coefficient of under 0.3, six villages or 30% of the total household has Gini Coefficient of under 0.4 and one village or 7% of the total household has greater than 0.4. Thus most of the villages have values in the range of 0.2 to 0.3 in Gini coefficient.

Generally, the analysis showed no obvious income inequality for the Batang Sadong, Samarahan Division, society. The average income for all villages is below the hardcore poverty line, which is RM482 per month for Sarawak State. Tegelam and Sabang villages have good income distribution because the Gini coefficient is less than 0.2. On the other extreme Sg Apin has the largest income inequality. The total income for the whole population of Batang Sadong is estimated at about RM243,027 per month or equivalent to RM2,916,324 per year. This is the purchasing power for the Batang Sadong community, which is considered low with an average of RM361.11 per month per person. At below the poverty line this amount could hardly cover the basic needs of the people Batang Sadong. Therefore requires immediate mass development for the whole area because of the hardcore poor poverty. It requires at least one new satelite town in order to provide all the necessary services to the community. Concurrently, the plan should also create income generating projects for Batang Sadong such as oil palm plantation or any other high technology agriculture project which can give quick hard cash to the community to improve their economy. Emphasis on agriculture is a must for this area's development because this is the only skill available to be capitalised within a short period. Certainly, education cannot at the same time be neglected because through education comes an improved standard of living (Lagerlof, 2003).

**Table 3 : Gini coefficients and household incomes according to villages**

| Village | Gini coefficient | N | Income per month | | | | % of Household members |
|---|---|---|---|---|---|---|---|
| | | | Mean | Minimum | Maximum | Sum | |
| Tegelam | 0.18748 | 40 | 256.75 | 40 | 600 | 10270 | 8% |
| Sabang | 0.19216 | 16 | 209.38 | 100 | 450 | 3350 | |
| Tg. Harapan | 0.23417 | 36 | 341.11 | 50 | 850 | 12280 | 55% |
| Benat Hilir | 0.23638 | 13 | 432.62 | 150 | 870 | 5624 | |
| Sg. Labi | 0.25091 | 14 | 266.79 | 100 | 500 | 3735 | |
| Seruyuk | 0.25278 | 53 | 403.40 | 100 | 1500 | 21380 | |
| Benat Hulu | 0.25658 | 16 | 356.25 | 50 | 800 | 5700 | |
| Tg. Pisang | 0.25900 | 45 | 345.22 | 50 | 1420 | 15535 | |
| Tg. Sap | 0.26122 | 7 | 250.00 | 50 | 450 | 1750 | |
| Pantong Iban | 0.26870 | 5 | 262.00 | 110 | 500 | 1310 | |
| Lubok Samsu | 0.27859 | 12 | 313.33 | 50 | 550 | 3760 | |
| Lubok Buntin | 0.28519 | 60 | 352.20 | 50 | 1540 | 21132 | |
| Ensengei Melayu | 0.28618 | 50 | 399.14 | 50 | 1690 | 19957 | |
| Ensengei Iban | 0.28796 | 59 | 349.54 | 50 | 1550 | 20623 | |
| Lubok Punggur | 0.30874 | 84 | 351.07 | 50 | 2090 | 29490 | 30% |
| Sg. Alit | 0.31558 | 13 | 150.00 | 50 | 450 | 1950 | |
| Selangking | 0.32904 | 27 | 454.74 | 80 | 1480 | 12278 | |
| Sateman | 0.34891 | 15 | 373.40 | 50 | 1200 | 5601 | |
| Pantong Melayu | 0.36136 | 36 | 406.06 | 140 | 3550 | 14618 | |
| Sg. Ba | 0.36556 | 25 | 454.80 | 60 | 2000 | 11370 | |
| Sg. Apin | 0.41354 | 47 | 453.43 | 40 | 2084 | 21311 | 7% |
| Total | 0.31610 | 673 | 361.11 | 40 | 3550 | 243024 | 100% |

Source: Calculated from the Census Samarahan Office 2007 Data

## 6. Summary and Conclusion

The proposition that increasing urbanisation may raise the income shares of the lowest income groups is consistent with a priori expectation. Given the dualistic nature of development process, a higher rate of urbanization, other things being the same, reflects a wider access to productive employment opportunity in the expanding non-traditional sector and a correspondingly lower pressure of population in rural areas. Both forces can be expected to operate in favour of the lower income group, which has been voiced out by Enke (1960).

In addition to the technological assumption about factor productivity, there is also the argument that skills intensive to the development patterns are less prone to income concentration than capital intensive patterns. This is because of a peculiar characteristic of human capital, unlike physical capital, that expansion in the stock of human capital in the economy necessarily involves dispersion across a wider population. There is a limit beyond which human

capital cannot be accumulated in a single person, and at any rate it cannot be bequeathed across generation in the same manner as physical capital. Both factors, it is argued, combine to generate strong pressures towards equality in income distribution as the human resource endowment expands with development.

**References**


Ansley, J.C. and Hoover, E.M. (1958). *Population Growth and Economic Development in Low-Income Countries*, Princeton University Press, p 12-13.

Cunningham, W. and Joyce, J. (2003). Earnings inequality within and across gender, racial and ethnic groups in Latin America, Background paper for World Bank LAC Report *Inequality and the State in Latin American and the Caribbean.*

Deiningger, K. and Squire, L. (1998). New ways of looking at old issues: inequality and growth, *Journal of Development Economic*, 57:259-87.

Department of Economics SOAS. (2007). How to Calculate Gini Coefficient from web site http://mercury.soas.ac.uk/user/sm97/teching_intro_qm_notes_gini_ coefficient .htm

Dutt, A. (1990). *Growth, Distribution and Uneven Development*, Cambridge, UK: Cambridge University Press.

Enke, S. (1960). The Economics of government payments to limit population, *Economic Development and Cultural Change*, Vol. VIII, no.2.

Frank, C. (2005). *Theil, Inequality Indices and Decomposition*, Working Paper Series, Society for the Study of Economic Inequality, ECINEQ WP 2005-1.

Frederick, G. and Peter, S. (2005). *Power-Based Technological Change and the Rise in Earning Inequality,* Working Paper Series, Society for the Study of Economic Inequality, ECINEQ WP 2005-6.

Knell, M. (1999). Social comparisons, inequality and growth, *Journal of Institutional and Theoretical Economics*, 155:645-95.

Lagerlof, N. P.(2003). Gender equality and long run growth, *Journal of Economic Growth* 8:403-26.

Leonardo, B., Luisa, G. and Elisabetta, T. (2006). *Consumer Driven Market Mechanisms to Fight Inequality: the Case of Corporate Social Responsibility/ Product Differenctiation Models with Asymmetric*

*Information*. Working Paper Series. Society for the Study of Economic Inequality, ECINEQ WP 2005-50.

Lui, H.K. (1997). *Income Inequality and Economic Development*. Hongkong, City University of Hong Kong Press.

Margarite, K. and Thomas, M. (2006). *Monopoly, Inequality and Redistribution via the Public Provision of Private Goods*. Working Paper Series, Society for the Study of Economic Inequality, ECINEQ WP 2005-29.

Stephanie, S. (2005). *All Type of Inequality are Not Created Equal: Divergent Impacts of Inequality on Economic Growth*, Working Paper Series, Society for the Study of Economic Inequality, ECINEQ WP 2005-10.

Taylor, L. (1991). *Income Distribution, Inflation and Growth: Lectures on Structuralist Macroeconomic Theory*, Cambridge, MA:MIT Press.

Theil, H. (1967). *Economics of Information Theory*, Amsterdam: North Holland.

Wikipedia. (2004). Lorenz. Available from: http://en.wikipedia.org/wiki/Lorenz_curve