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# Measuring education inequality in the Philippines

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This paper measures the degree of education inequality in the Philippines. It generates the average years of schooling (AYS) and education Gini coefficients of the Philippines as a whole, and all its regions and provinces to examine the economically active population's level of educational attainment and the distribution of education. The paper finds that although inequality in educational attainment declined from 1960 to 2000, there are wide discrepancies in the educational performance of regions and provinces. Using decomposition analysis, it finds that poor provinces have greater education inequality than nonpoor provinces. It also finds that at the national level, women are facing a more equitable distribution of education than males. The regional and provincial data show that the education Gini index is negatively associated with the average years of schooling and gross domestic regional product, but positively associated with the income Gini index, poverty incidence, and poverty gap.

*JEL classification:* D63, I21, I32
*Keywords:* Education, education inequality, education Gini coefficient, inequality

## 1. Introduction

The value of education is well known and widely acknowledged. Recognizing it as a crucial instrument in improving welfare and alleviating poverty, countries all over the world have ranked it as a leading global concern. Equal access to education makes possible the social and economic mobility of the poor. By enhancing the skills of the underprivileged groups, education is an important

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factor in putting a stop to poverty's virtuous cycle. Furthermore, education's benefits extend beyond the individual level. Firms, industries, and the economy as a whole also benefit from the improvement in the quality of human capital brought about by education.

Although most, if not all, countries identify education-for-all as an important factor in economic progress, many countries are still far from achieving mass participation. In recent years, especially in the international arena, increasing attention has been paid to equity issues in education. As several of these studies suggest, access to education among various groups in many countries is severely unequal [Thomas, Wang, and Fan 2001]. For a lot of countries, disparities among geographical areas, across social classes, and between sexes exist.

There are substantial differences among the Philippines' regions and provinces in terms of income. Poverty incidence, poverty gaps, and income gaps greatly vary from region to region and from province to province [Monsod and Monsod 2003]. There is also a widely held view that Luzon gets more than its fair share as opposed to Visayas and, especially, Mindanao in terms of development policies [Balisacan and Fuwa 2004]. Given such disparities, there is enough reason to suspect that there may also be inequality in the distribution of education across regions and provinces.

Knowing the extent and nature of education inequality in the Philippines and how it has fared over time is of great interest because an unequal distribution of education opportunities represents large welfare losses for society. As the Philippine Human Development Report [2000] points out, "insufficient or poor education deprives a person of the means of doing and becoming". While education increases productivity and creativity, unequal access to schooling opportunities may create greater inequities [Alonzo 1995]. If only certain groups of people have access to education, those who are unable to improve their productivity and skills will be unfit for better-paying jobs and will be more likely to be economically disadvantaged. Areas where most people have low educational attainment are thus likely to be more economically distressed. A study of between-region, within-region, between-province, and within-province education inequality is useful for exploring inequality issues in the Philippines, given the country's socioeconomic diversity across regions and provinces. It is also useful to explore education inequality within gender categories because although the country has already achieved gender equality in education, and gender statistics show that the Philippines is one of the countries where the little disparity in education generally favors females, the dispersion of education among males and among females has been rarely, if not at all, tackled.

Like studies from abroad (see Goldberg and Pavcnik [2004]; Chen and Fleisher [1996]; Ssewanyana et al. [2004]), Philippine studies on inequality have concentrated mainly on household income (see Balisacan and Piza [2003]; Balisacan and Fuwa [2004]). Studies dealing with disparities among regions and provinces in terms of education performance are not many, and indicators of such disparities have been limited to, among others, enrollment ratios, literacy rates, average years of schooling, cohort survival rates, dropout rates, and test scores of cognitive performance (see Philippine Human Development Report [2000]; Balisacan et al. [1995]). However, as Thomas, Wang, and Fan [2001] point out, these indicators do not fully reflect the characteristics of a country's human capital. In this regard, the paper recognizes the importance of looking beyond averages and investigating the relative dispersion of education.

Studies exploring education inequality, although growing, have been few. It was not until recently that the education Gini coefficient has been used and accepted as a fairly good indicator of education inequality [Thomas, Wang, and Fan 2002]. Most of the few studies have explored the different aspects of education in cross-country analyses (see Thomas, Wang, and Fan [2001]; Zhang and Li [2002]; Sahn and Younger [2005]). However, there is a dearth of studies on education inequality within countries (see Qian and Smyth [2005]). In the Philippines, no study has explored the country's education inequality by using education Gini coefficient. Although other studies (see Lopez, Thomas, and Wang [1998]) have estimated the Philippines' education Gini coefficient at the national level, this paper will be the first one to calculate the country's education Gini coefficients at the regional and provincial levels. The contribution of this paper is to state the extent and nature of the Philippines' education inequality by estimating (a) the economically active population's average level of educational attainment as measured by the average years of schooling (AYS), (b) the extent of inequity in the distribution of education as measured by the education Gini coefficient, and (c) the contributions of between- and within-grouping inequality to overall education inequality by using decomposition analysis. In estimating the average years of schooling, the proportions of the population at different educational attainment levels are also generated. The estimated education Gini coefficients will be used to explore the possible correlation of education inequality with average years of schooling, poverty, income inequality, and per capita gross domestic regional product (GDRP).

At the country level, the author measures the educational disparities between sexes and between the poor and nonpoor provinces. At the regional level, educational disparities among provinces of a region and between sexes within the region are measured. To achieve this, education Gini coefficients of all the

16 regions and 78 provinces in the country are estimated. Gini coefficients of males and females by region are also generated. It is important to note that the quality of education is beyond the scope of this paper. Education inequality, not in terms of quality (e.g., disparity of National Elementary Achievement Test [NEAT] and National Secondary Achievement Test [NSAT] scores across regions and provinces and sexes) but in terms of the distribution of the average years of schooling (educational attainment) of the economically active population, is measured.

Awareness of the distribution of educational attainment is very important in policy making. Since this study aims to show which regions and provinces have the least equitable distributions of education, the results will be of help in making policy recommendations regarding where educational service provision should be improved. Furthermore, the paper hopes to contribute to the growing literature on education inequality.

The paper is divided into five sections. The next section reviews the related literature on the topic. Section 3 outlines the framework, methodology, and data used. Section 4 presents and analyses the results. The last section summarizes the main conclusions and offers policy recommendations.

## 2. Review of related literature

Inequality in terms of household incomes, wealth, or expenditures forms the bulk of the inequality literature. The measurement of these inequities has usually been approached by statistics such as the Gini index and the generalized entropy (GE) indices.[1] Such indices have been widely used that Gini coefficients of almost all (if not all) countries have been generated and are extensively

[1] There are different formulae for calculating the Gini coefficient, and the easiest to manipulate is

$$Gini = 2\frac{Cov(y_i, f_i)}{\frac{1}{N}\sum_{i=1}^{N} y_i}$$

where $y_i$ is the expenditure of household $i$ and $f_i$ is the rank of household $i$ in the distribution ($f$ varies between 0 for the poorest and 1 for the richest).

The GE indices are the Theil index and the mean log deviation index. GE measures vary between 0 and $\infty$, with zero representing an equal distribution and higher value representing a higher level of inequality. The weight given to distances between incomes at different parts of the income distribution is represented by $\alpha$. It can take any real value. The most common values of $\alpha$ used are 0, 1, and 2. The general formula of GE is given by

$$GE(\alpha) = \frac{1}{\alpha(\alpha - 1)}\left[\frac{1}{N}\sum_{i=1}^{N}\left(\frac{y_i}{\overline{y}}\right)^{\alpha} - 1\right]$$

where $\overline{y}$ is the mean income.

available for scholarly research. On the other hand, one could count scant literature on education inequality.

Various indicators are being used to measure the different aspects of education. Among others, enrollment ratios, cohort survival rates, educational attainment, and cognitive test scores are used to show the state of a country's educational system. In terms of looking into the distribution of education, standard deviations have been popularly used.[2]

One such study that used standard deviations of schooling (SDS) is that of Birdsall and Londono [1997]. Their cross-country analysis using a traditional growth model shows that initial levels of land and education inequality (as measured by SDS) have strong negative impacts on economic growth and income growth of the poor. A study on inequality in Latin America by the Inter-American Development Bank [1999] also used standard deviations of schooling. Using regression analysis, their findings on Latin American countries suggest that the standard deviation of schooling is positively correlated to income Gini—the greater the education inequality, the greater the income inequality.

Sahn and Younger [2005] used GE indices to measure world education inequality in math and science knowledge. They decomposed global inequality into within- and between-country components. They used eighth graders' (13-14 years old) scores on math and science achievement tests collected by the 1999 round of Trends in International Mathematics and Science Study (TIMSS) to generate the GE indices. Using decomposition analysis, their findings suggest that while income inequality is mostly between country, education inequality is mostly within country. They found that within-country inequality contributes more than half of the global achievement inequality for math and science. Furthermore, they found that countries with similar average test scores can have different degrees of education inequality.

Sahn and Younger's [2005] country-specific findings suggest that Hong Kong, Finland, Tunisia, and Singapore have little education inequality (as measured by achievement tests). On the other hand, South Africa's level of achievement inequality is very high. Together with Indonesia, Jordan, and Morocco, they found that the Philippines has high achievement inequality as well. The good thing about this study is that it tried to measure global inequality in education in terms of quality of schooling by using test scores of cognitive performance. However, one setback of this study is their use of the TIMSS data. Although the TIMSS test scores are comparable across countries, it includes only 38 countries—most of which are, as the authors themselves described,

[2] The formula for the standard deviation of schooling is as follows:

$$\sigma = SDS = \sqrt{\sum_{i=1}^{n} p_i (y_i - \mu)^2 d}$$

disproportionately rich countries. Furthermore, large countries such as India and China were noticeably not included in the data set. Thus, the TIMSS data set makes comparison among countries limited. Also, since schoolchildren are the population of this study, the global inequality that was measured does not reflect the stock of human capital.

In line with their efforts to develop a good indicator to measure the relative dispersion of education, Thomas, Wang, and Fan [2002] examined the behavior of a few often-used indices in measuring education inequality. They examined the distribution of education in 140 countries from 1960 to 2000. Their findings suggest that both the Gini and Theil indices are well behaved, especially at the lower bound as schooling approaches zero. On the other hand, they found that the standard deviation of schooling is "volatile and sometimes misleading". Furthermore, they contend that besides measuring the dispersion of schooling distribution only in absolute and not in relative terms, it fails to show how the distribution of education fares over time—whether it's improving or not.

Thomas, Wang, and Fan [2001] found only four previous studies that used Gini coefficients in measuring the distribution of education: Ter Weele [1975], Rosthal [1978], Maas and Criel [1982], and Sheret [1982, 1988]. Maas and Criel [1982] used enrollment data to estimate the education Gini coefficients of 16 East African countries. The results of their study showed that the degree of education inequality greatly varied among the countries under study and that there is a negative correlation between enrollment Gini coefficients and average enrollment rates. All four studies calculated the education Gini coefficient based on enrollment or education financing data. However, as Thomas, Wang, and Fan [2001] point out, the problem with using enrollment data is that it fails to reflect the stock of human capital. Using financial data is also quite problematic since a great quantity of inputs does not necessarily translate to a better quality of educational outcomes.

More recently, the education Gini coefficient has been widely used as a tool in measuring the distribution of education. Thomas, Wang, and Fan [2001] utilized the schooling distribution data of Barro and Lee [1991, 1993, 1997] and the schooling cycle data of Psacharopoulos and Arriagada [1986] to measure the education Gini coefficient based on educational attainment of 85 countries from 1960 to 1990. Their findings suggest that education inequality in most of the countries under study declined from 1960 to 1990. Like Maas and Criel, they found that there is a negative correlation between the education Gini coefficient and the labor force's average years of schooling. In other words, countries with higher educational attainment are more likely to have a more equitable distribution of education. Adding per capita GDP (PPP) into the equation,

they found that average years of schooling is positively related to PPP, while education inequality is negatively related to it. Their education Gini coefficient estimation showed that there has been a rapid decline in Korea, Tunisia, and China's education inequality. From 1960 to 1990, Korea's education inequality as measured by education Gini coefficient tremendously decreased from 0.55 to 0.22. On the other hand, India's education equality slightly improved from 0.79 in 1960 to 0.69 in 1990. Their estimates suggest that Afghanistan and Mali have the greatest education inequality in the 1990s, at approximately 0.90, while Poland and the United States have the most equitable distribution of education with Gini coefficients of less than 0.20. Besides Costa Rica, Columbia, Peru, and Venezuela, where education inequality worsened from 1960 to 1990, all countries under study have made progress in improving the distribution of education.

A study made by Lopez, Thomas, and Wang [1998] estimated Gini coefficients based on educational attainment of 12 countries including Malaysia, Thailand, China, India, Mexico, and the Philippines. They addressed the puzzle of as to why empirical evidence fail to fully support the supposedly strong positive relationship of growth and education. Their findings suggest that the distribution of education plays an important role in the mentioned relationship—an inequitable distribution of education tends to have a negative impact on per capita income. They found that the insignificant and even negative effects of education to growth stems from the failure to control for education distribution. Thus, even if education averages are high, the inequitable distribution of education causes the weak link of education and growth. Of the three Southeast Asian countries included in their study, the Philippines had the greatest improvement in education equity. Its education Gini coefficient in 1990 was 0.309, a 19 percent decrease from its 1970 education Gini coefficient of 0.368. On the other hand, Thailand's education Gini coefficient of 0.378 in 1980 declined only by 8.6 percent in 1990.

Qian and Smyth [2005] used education Gini coefficient to look into China's education inequality. To find the source of the overall inequality, they further estimated the education Gini coefficients of coastal and inland provinces, and rural and urban areas. They used average years of schooling and percentage of graduates of junior secondary schools entering senior secondary schools as proxies for educational attainment. The problem with their second proxy is that like enrollment ratios, it fails to reflect the country's human capital stock. The results of their decomposition analysis suggest that China's rural-urban gap (contribution of rural-urban gap is 84 percent as opposed to the 50 percent contribution of the coastal-inland gap) is the predominant contributor to overall inequality in educational attainment in 2000.

Using education Gini coefficient based on educational attainment, Zhang and Li [2002] examined international education inequality from 1960 to 1990. Like Thomas, Wang, and Fan [2001], they also utilized Barro and Lee's [1993, 1996] dataset. The results of their decomposition analysis show that the development gap (gap between developed and developing countries) and the gender gap were the main determinants of overall world education inequality in 1960 and 1990. Furthermore, they found that although overall educational attainment has increased from 1960 to 1990, the gaps between developed and developing countries and between males and females have increased.

Just as inequality in terms of income and welfare forms the bulk of empirical studies on inequality abroad, Philippine studies on inequality seldom focused on education. Balisacan's papers have dealt much about income inequality. By decomposing the Philippines' overall inequality, he found that the inequality between low- and high-income groups is a greater determinant of the overall income inequality than inequality among geographical areas (among regions and between rural and urban areas). In terms of the distribution of education, his findings suggest that if all household heads have attained at least a high school education, poverty could be substantially reduced.

## 3. Framework, methodology, and data

### *3.1. Levels and years of schooling*

This paper adopts the seven categories of educational attainment as first introduced by Barro and Lee [1991]: no schooling, partial primary, complete primary, partial secondary, complete secondary, partial tertiary, and complete tertiary. Given the available data in 1980 and 2000 census, the different levels of schooling are defined in Table 1.

**Table 1. Educational attainment levels**

| *Level of Schooling* | *Description* | *Years of Schooling* |
|---|---|---|
| No-schooling[3] | did not undergo formal schooling; those who have not reached 1st grade of elementary | 0 |
| Partial primary | those who have completed 1st to 4th grade | 3 |
| Complete primary | those who have completed 5th to 7th grade | 6 |

[3] Economically active household population (15 years old and above) whose highest educational attainment is preschool in the 2000 census are also included in the "no schooling" category.

**Table 1. Educational attainment levels (continued)**

| *Level of Schooling* | *Description* | *Years of Schooling* |
|---|---|---|
| Partial secondary | high school undergraduate | 8 |
| Complete secondary | high school graduate | 10 |
| Partial tertiary[4] | college undergraduate; also includes post-secondary graduates and undergraduates | 12 |
| Complete tertiary | college graduates and post-baccalaureate students and graduates (for 1980 data, includes college undergraduates who have completed 4th year college or higher) | 14 |

The years of schooling shown in Table 1 can also be calculated using the formula adopted from Thomas, Wang, and Fan [2001]:[5]

$$\text{No-schooling:} \quad y_1 = 0 \tag{1}$$

$$\text{Partial-primary:} \quad y_2 = y_1 + 0.5C_p \quad = 0.5C_p \tag{2}$$

$$\text{Complete-primary:} \quad y_3 = y_1 + C_p \quad = C_p \tag{3}$$

$$\text{Partial-secondary:} \quad y_4 = y_3 + 0.5C_S \quad = C_p + 0.5C_S \tag{4}$$

$$\text{Complete-secondary:} \quad y_5 = y_3 + C_S \quad = C_p + C_S \tag{5}$$

$$\text{Partial-tertiary:} \quad y_6 = y_5 + 0.5Ct \quad = C_p + C_S + 0.5C_T \tag{6}$$

$$\text{Complete-tertiary:} \quad y_7 = y_5 + Ct \quad = C_p + C_S + C_T \tag{7}$$

where $y_i$ is the years of schooling at educational attainment level $i$ ($i$ = seven levels of schooling), and $C_P$, $C_S$, and $C_T$ are the cycles of complete primary education (six years), complete secondary education (four years), and complete tertiary education (four years), respectively.

As shown in equations (2), (4), and (6), people who receive partial education are assumed to get half of the complete schooling cycle.

The author uses the following formula to calculate the proportion of population at the seven levels of education:

$$p_i = P_i / P \tag{8}$$

[4] Since the 2000 census lumps all college undergraduates into just one category, for the year 2000, college undergraduates whose highest educational attainment is from first to sixth year of college are included in the "partial tertiary" category. On the other hand, for the 1980 census data, only those who have completed first to third year of college are included in the "partial tertiary" category.

[5] Unless otherwise stated, all formulae used in this paper are adopted from Thomas, Wang, and Fan [2001].

where $p_i$ is the proportion of population with educational attainment level $i$, $P_i$ is the population with educational attainment level $i$, and $P$ is the total population.

### *3.2. Average years of schooling*

This study measures education inequality in terms of the educational attainment of the economically active population. The average years of schooling of the population is used as a proxy for educational attainment while the education Gini coefficient is used as a proxy for education inequality.

Following Thomas, Wang, and Fan [2001], the formula to calculate AYS is as follows:

$$\mu = \sum_{i=1}^{n} p_i y_i \tag{9}$$

where $\mu$ is the average years of schooling for the concerned population, $n$ is the number of levels in attainment data ($n$=7), and $p_i$ and $y_i$ are as defined before.

### *3.3. Education Gini coefficient* [6]

There are two ways to calculate the education Gini coefficient: the direct method and indirect method. The indirect method makes use of the Lorenz curve [Thomas, Wang, and Fan 2001]. For the purposes of this paper, the direct method is used in computing for the education Gini coefficients.

Following Thomas, Wang, and Fan [2001][7], the formula for the direct method is as follows:

$$E_L = (1/\mu) \sum_{i=2}^{n} \sum_{j=1}^{i-1} p_i / y_i - y_j / p_j \tag{10}$$

where $E_L$ is the education Gini coefficient based on educational attainment distribution, $p_i$ and $p_j$, $y_i$ and $y_j$ are the proportions of population and years of schooling with educational attainment levels $i$ and $j$ ($j = i$-1), respectively.

The detailed summation process of the education Gini formula is as follows:

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[6] Thomas, Wang, and Fan [2001] used an additional education Gini coefficient formula for small-sized populations. For their paper, the sensitivity is reflected by a factor of [N/(N-1)]. Multiplying this factor to equation (8) gives what they termed as the "second education Gini formula". However, no such sensitivity became apparent in the computation of all education Gini coefficients in this paper. Thus, for the purposes of this paper, the second formula is not discussed in detail.

[7] Unless otherwise stated, all formulas used in this paper are adopted from Thomas, Wang, and Fan [2001].

$$
\begin{aligned}
E_L = (1/\mu)[&p_2(y_2 - y_1)p_1 \\
&+ p_3(y_3 - y_1)p_1 + p_3(y_3 - y_2)p_2 \\
&+ \ldots\ldots\ldots \\
&+ p_7(y_7 - y_1)p_1 + p_7(y_7 - y_2)p_2 \\
&+ p_7(y_7 - y_3)p_3 + p_7(y_7 - y_4)p_4 \\
&+ p_7(y_7 - y_5)p_5 + p_7(y_7 - y_6)p_6]
\end{aligned} \tag{11}
$$

The education Gini coefficient has a value that varies between 0 (indicating perfect education equality) and 1 (indicating perfect education inequality).

*3.4. Decomposition of the education Gini coefficient*

Decomposition of the education Gini coefficient is key to discovering the contributions of between and within groupings to overall education inequality. The formula for decomposition of the Gini coefficient, adopted from Zhang and Li [2002], is given as follows:

$$E_L = G_1^2(\mu_1/\mu)E_1 + G_2^2(\mu_2/\mu)E_2 + E_B \tag{12}$$

where $G_k$, $\mu_k$, and $E_k$ represent the proportion of the population, average years of schooling, and education Gini coefficients of subgroup $k$ ($k$=2), respectively. $E_B$ is the residual and is defined as the between-group contribution to total inequality in absolute terms. $\{G_1^2(\mu_1/\mu)E_1\}$ is the contribution of subgroup 1 to total education inequality in absolute terms while $\{G_2^2(\mu_2/\mu)E_2\}$ is the contribution of subgroup 2 to total education inequality in absolute terms.

In percentage terms, the contribution of each subgroup to overall inequality is as follows:

$$100 = \left(\frac{G_1^2(\mu_1/\mu)E_1}{E_L} * 100\right) + \left(\frac{G_2^2(\mu_2/\mu)E_1}{E_L} * 100\right) + \left(\frac{E_B}{E_L} * 100\right) \tag{13}$$

Note that in decomposing the country's overall education Gini coefficient, subgroup $k$ refers to male and female to measure gender gap; and poor and nonpoor provinces to measure development gap between the 44 poorest provinces and the country's nonpoor provinces.

### *3.5. The data*

The provincial, regional, and national data on the highest educational attainment of the economically active population (15 years old and above) for the years 1980 and 2000 were taken from the 1980 and 2000 Census of Population and Housing. The data were used to compute for the average years of schooling and the education Gini coefficients of the Philippines and all its provinces and regions.

In decomposing the country's education Gini coefficients between poor and nonpoor provinces, the author uses the "44 Poorest Provinces in 2000" list of the National Statistical Coordination Board (NSCB). Poor provinces refer to the 44 poorest provinces in the Philippines in 2000 as named by Social Sectors B Division of the NSCB. Nonpoor provinces refer to the provinces not included in the 44 Poorest Provinces list (see www.nscb.gov.ph).

Because the categories of educational attainment in the 1980 census and the 2000 census are different, there is a tendency for the population who had partial tertiary attainment in 2000 to be overvalued. Unlike in the 1980 census, in which the college category has subcategories (first to third year, and fourth year or higher) the 2000 census lumps all college undergraduates into just one category, thereby allowing for limited categorization. Thus, all of those included in the college undergraduate category of the 2000 census were given 12 years of schooling. This is different from the 1980 census in which those who completed fourth year of college or higher (though not academic degree holders) were given 14 years of schooling.

The author did not give extra years of schooling to those who have reached the postbaccalaureate level since there is no such category in the 1980 census. Thus the average years of schooling may be slightly undervalued since those who are postbaccalaureate students and graduates were appropriated with only 14 years of schooling.

It is also important to note that the list of provinces belonging to specific regions that is used in the 2000 census is different from the official list of provinces by region released by the NSCB. For instance, in the 2000 Census of Population and Housing, Basilan is part of Region 9 (Western Mindanao); however, according to the "Standard Geographic Codes as of September 2006", Basilan is part of the Autonomous Region in Muslim Mindanao (ARMM). For the purposes of this paper, the author did not deviate from the list of provinces and regions used by the 2000 census. It is just important to note that when the paper looks into ARMM, it does not include Basilan (the same goes for the other regions composed of provinces different from the official list). Also, the regions in 1980 and the provinces that comprise them are not exactly the same as the

regions in 2000. For instance, the provinces of the Cordillera Administrative Region (CAR) in 1980 were integrated in Region 1 (Ilocos Region) and Region 2 (Cagayan Valley). Thus the regional data in 1980 and 2000, except those for Regions 3-8, cannot be compared. The reason is that in 1980, ARMM, CAR, and Region 13 (CARAGA) were not yet separate regions.

## 4. Presentation of results and analysis

### *4.1. Proportions of population with certain levels of schooling*

#### *4.1.1. Regional level*

The improvement in the Philippines' education performance is evident in Figure 2. The proportion of population with no schooling in all of the Philippines' regions has greatly declined from 1980 to 2000. Furthermore, for all the regions, the proportion of population with more than six years of schooling has increased (Figure 2B).

The proportions of the population with complete secondary, partial tertiary, and complete tertiary education are highest in the National Capital Region (NCR) in 2000. NCR is also the region with the lowest proportion of illiterates. Next to NCR, Regions 1, 3, and 4 have high proportions of population with ten or more years of schooling (those who have completed secondary education or higher). These three regions' proportions of illiterates are also very low at 2 percent or less. On the other hand, the ARMM has the highest rate of illiteracy. An alarming 25 percent of ARMM's population had zero years of schooling in 2000. Next to ARMM, Regions 9 and 12 also have high proportions of population with no schooling. The great education disparity between the two extreme regions, NCR and ARMM, is also evident in Figure 2B. While 84 percent of NCR's population has reached secondary education, the comparable figure for ARMM is only 45 percent.

#### *4.1.2. Provincial level: selected provinces*

Figure 3A shows the good educational performance of Batanes from 1980 to 2000. The proportion of the economically active population who were illiterates and whose highest grade completed were partial primary and complete primary drastically declined after two decades. On the other hand, the proportion of the population with more than 12 years of schooling (partial and complete tertiary) dramatically increased in 2000.

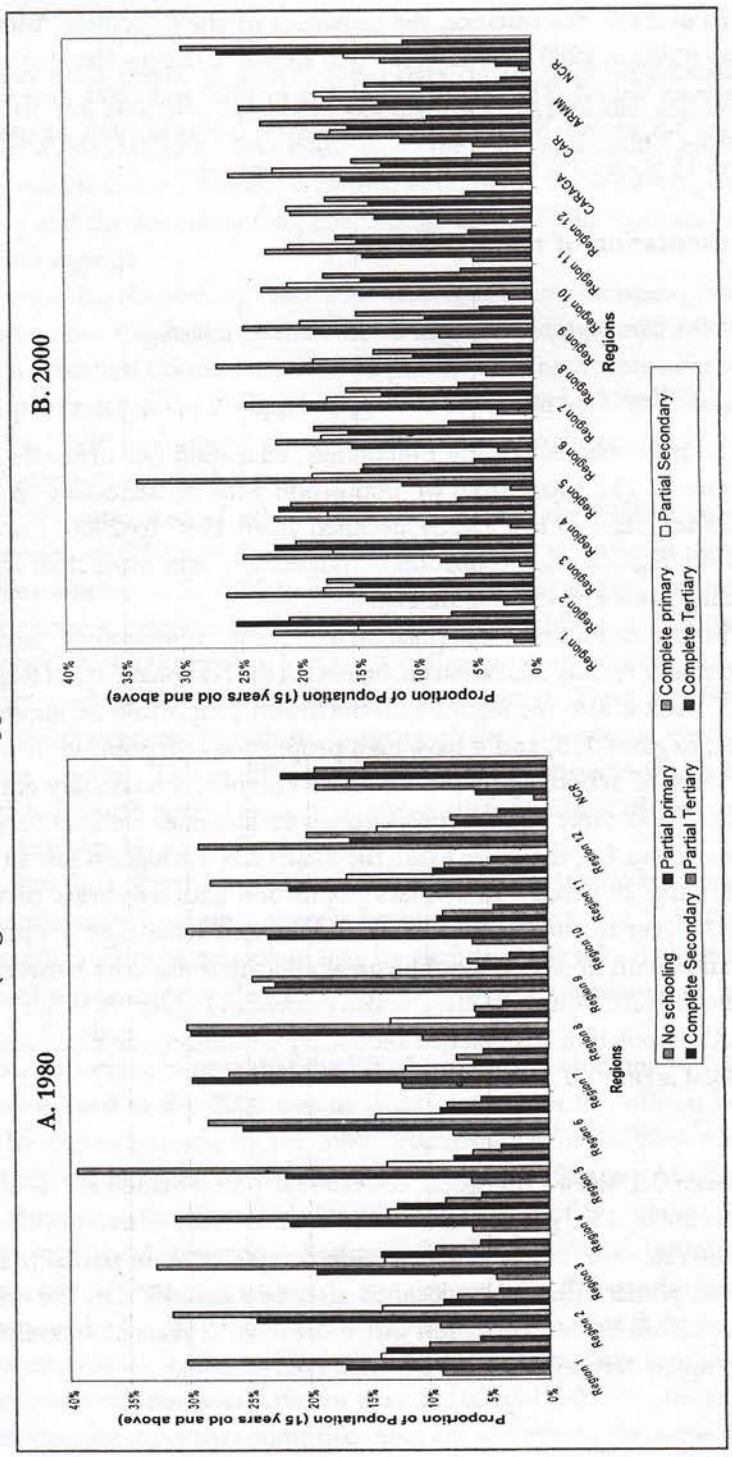


**Figure 2. Proportion of population at different educational attainment levels (Regions of the Philippines, 1980 and 2000)**

While majority of Batanes' population had ten or more years of schooling in 2000, more than half of Davao del Sur's population remains to have six years of schooling or less in 2000. This little improvement is evident in Figure 3B. Although the proportion of illiterates decreased from 1980 to 2000, Figure 3B shows that the proportion of the population who were college graduates decreased to less than 5 percent.

Figure 4 shows two comparisons of provinces located in the same region: Region 4's Cavite and Batangas, and Region 10's Camiguin and Bukidnon. Although both are CALABARZON provinces, there is a great disparity between the education performance of Batangas and that of Cavite. Figure 4A shows that in contrast to Cavite, a large proportion of Batangas' population has only completed primary school in 2000. Also, the proportion of illiterates (no schooling) and those who had partial primary schooling are much larger in Batangas than in Cavite.

Bukidnon and Camiguin are the best and worst provinces in Region 10 in terms of education performance. As shown in Figure 4B, the proportion of population with 10 or more years of schooling is much larger in Camiguin than in Bukidnon. Also, while more than 25 percent of Bukidnon's population has three or less years of schooling, only less than 10 percent of Camiguin's population has not completed primary school.

### *4.2. Average years of schooling and education Gini coefficient*

We estimate the average years of schooling and education Gini coefficient of all the provinces, all the regions, and the Philippines as a whole for the years 1980 and 2000.

#### *4.2.1. National and regional levels*

Although not fully comparable,[8] Figure 5 shows the general trend in the country's education inequality from 1980 to 2000. The figure shows that for the period under study, there has been an improvement in the population's educational attainment and the country's education equality. For all the regions and for the Philippines as a whole, the average years of schooling of the economically active population has increased and the education Gini coefficient has decreased.

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[8] As pointed out in the Data Limitations section, the 1980 and 2000 census data are not fully comparable since the regions in 1980 and the provinces that comprise them are not exactly the same as the regions in 2000. The CAR provinces of Abra, Benguet, and Mountain Provice were part of Region 1 in 1980. Meanwhile, Ifugao and Kalinga-Apayao were part of Region 2 in 1980. ARMM provinces of Sulu and Tawi-Tawi used to be part of Region 9 in 1980. On the other hand, Lanao del Sur and Maguindanao were part of Region 12. Prior to the establishment of Region 13 (CARAGA), Agusan del Norte, Agusan del Sur, and Surigao del Norte were part of Region 10 while Surigao del Sur was part of Region 11.

**Figure 3. Proportion of population at different educational attainment levels of Batanes and Davao del Sur (1980 and 2000)**

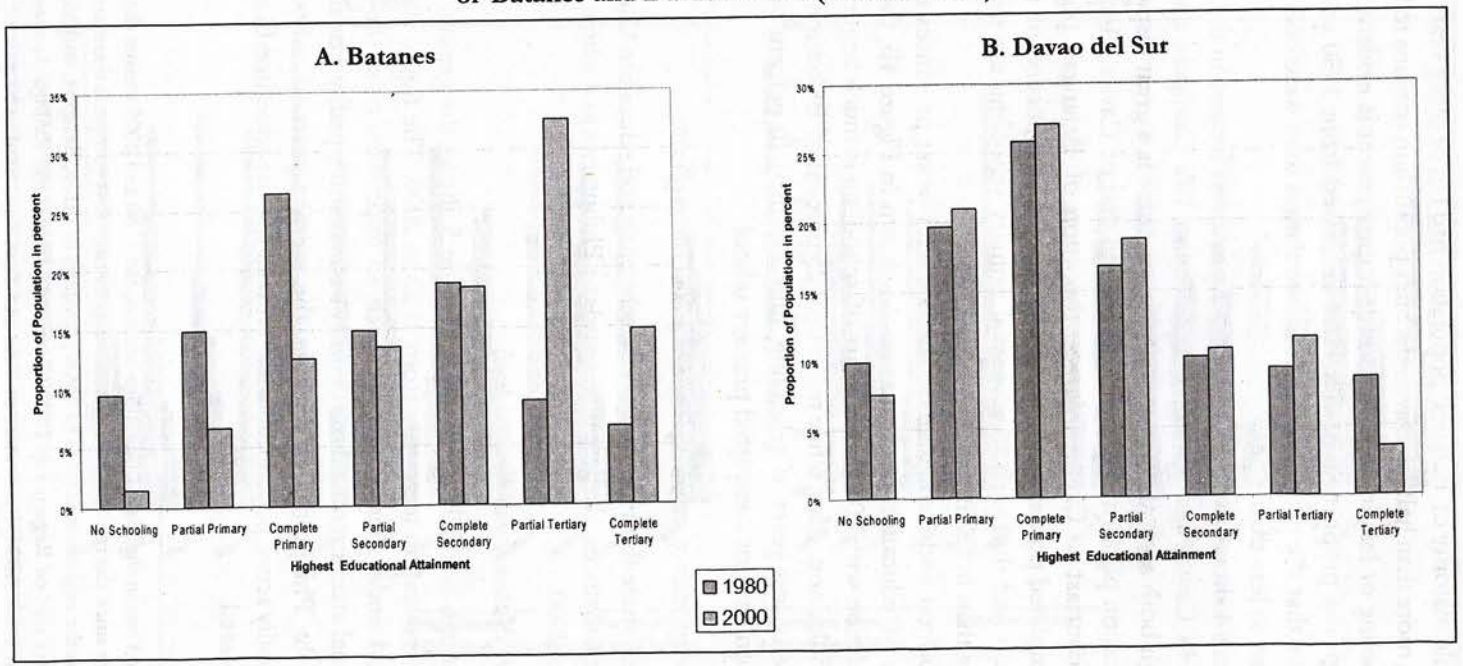
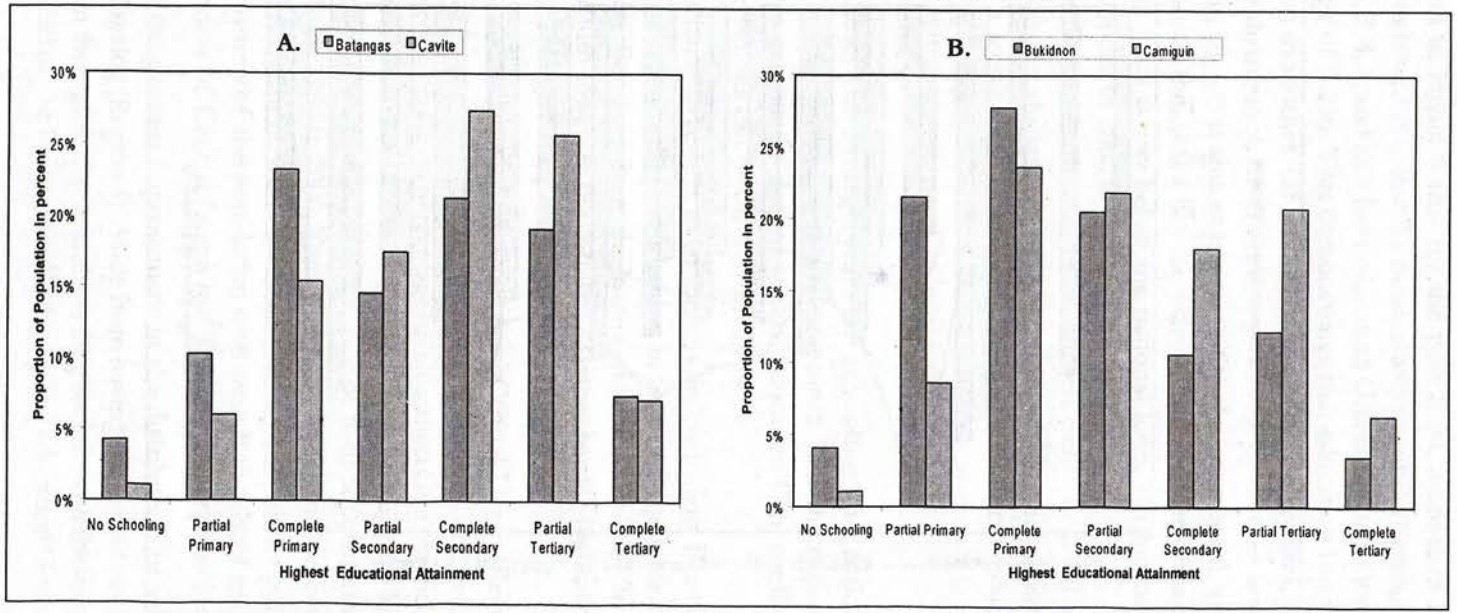


**Figure 4. Proportion of population at different educational attainment levels (Batangas and Cavite, Bukidnon and Camiguin, 2000)**



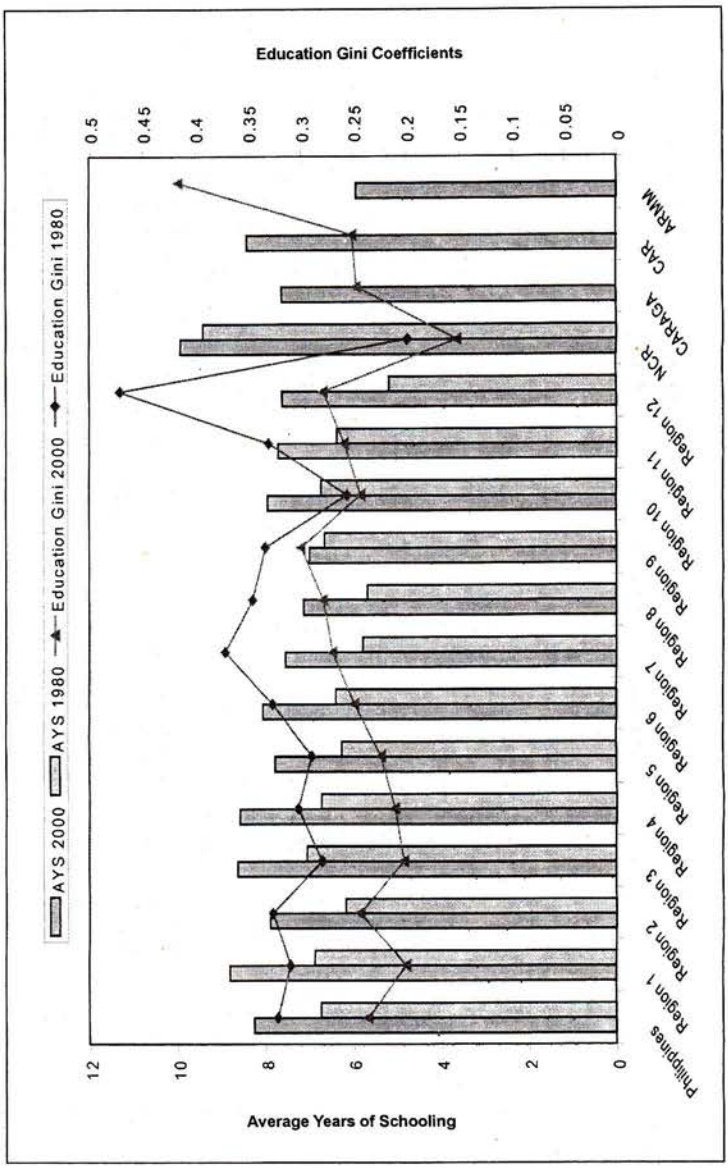



**Figure 5. Average years of schooling and education Gini coefficient of Philippine regions (1980 and 2000)**

It is evident in Figure 5 that for the year 2000, more than half of the country's regions have AYS below the national average of 8.27 years. Meanwhile, only Regions 1, 3, 4, 5, and NCR have education Gini coefficients lower than the national average of 0.236. This demonstrates that education inequality varies from one region to another. Of all the regions in the Philippines, NCR has the most equitable distribution of education as shown by its very low education Gini coefficient. Its AYS is almost ten years. On the other hand, as with other education statistics, the ARMM has the worst education performance. Its AYS of less than six years is way below the national level. Furthermore, ARMM's education Gini index in 2000 is very high at 0.416.

As seen in Figure 5, the lower Gini coefficients in 2000 indicate an improvement in the dispersion of education within the regions and the Philippines as a whole. The overall change in the country's education Gini coefficient is -26 percent.

*4.2.2. Provincial level*

Table 2 shows the average years of schooling and education Gini coefficients of all the provinces in the Philippines. Like the regional data, all of the provinces exhibited a decline in their education Gini coefficients. The following observations can be made from Table 2:

- With a 40 percent decrease in its education Gini coefficient, Batanes is leaving the other provinces in Region 2 behind in terms of equitable distribution of education. Besides having the lowest education Gini coefficient within the region (third-lowest in the country), Batanes has the highest educational attainment among all the provinces in the Philippines.
- Other than Zambales, all the provinces of Central Luzon (Region 3) have done well in lessening education inequality. Zambales, on the other hand, had the lowest decrease (in percentage) in education Gini coefficient and the lowest increase in AYS. While the other provinces of Region 3 had a 2.0-3.5 percentage point decrease in the proportion of their population who had no schooling from 1980 to 2000, Zambales had a less than 1 percentage point decrease. Furthermore, while Zambales had a 4 percentage point increase in the proportion of the population who were high school graduates, the other provinces of Central Luzon had 7-9 percentage point increase.
- Cavite had the greatest improvement in the distribution of education in Southern Tagalog (Region 4). Aside from having the lowest education Gini coefficient in the region, Cavite ranks as the province with the least education inequality in all of the Philippines. With very low education Gini coefficients

of 0.175, 0.176, and 0.184, respectively, the CALABARZON provinces of Cavite, Rizal, and Laguna belong to the top-five provinces with the most equitable distributions. Compared to these three provinces, Batangas and Quezon have worse education inequality. This may be attributed to their high poverty incidences of 0.334 and 0.419,[9] respectively.

- Of all the provinces in Region 5, only Masbate belongs to the lower half of the education Gini coefficient ranking. It is also the ninth province with the lowest average years of schooling. Only 21 percent of its economically active population has ten or more years of schooling. This is a low figure compared to Camarines Sur and Catanduanes where 36 percent and 41 percent of their population, respectively, have graduated from high school. The education performance of Masbate may be attributed to its very high poverty incidence of 0.643.
- All three provinces of Western Mindanao are included in the lower end of the education Gini coefficient ranking. Although Basilan had a more than 50 percent improvement on its average years of schooling, it remained as one of the provinces with the greatest education inequality in 2000 (ranks third-worst in the country).
- Bukidnon is way behind the other provinces of Northern Mindanao. While the provinces of Region 10 are included in the upper half of AYS and education Gini coefficient rankings, Bukidnon is ranked as the third province with the lowest AYS and the fourth province with the greatest education inequality. On the other hand, Camiguin has a very good education performance. Although it is named as the ninth-poorest province in 2000 [NSCB], it has an average years of schooling of 8.58 years and a low education Gini coefficient of 0.203.
- In all of the Philippines, Davao del Sur displayed the least improvement in education equality for the two decades under study. In 1980, it had the highest AYS in Southern Mindanao. However, besides Sarangani, which was not yet a province in 1980, Davao del Sur has the lowest AYS in 2000. Its AYS even decreased from 6.8 years in 1980 to 6.7 years in 2000.
- All four provinces of Region 13 (CARAGA) did not display much improvement in education equality. Although Agusan del Norte, Surigao del Norte, and Surigao del Sur belong to the upper half of the education Gini coefficient ranking in 2000, the decrease in their education Gini coefficients were not as much as the other provinces in the upper half.

[9] All provincial poverty incidences mentioned in this paper are taken from "Estimating Local Poverty in the Philippines" [NSCB 2005].

- All four provinces of ARMM belong to the top-ten least equitable provinces in the Philippines (in terms of education equality). Overall, Sulu is the worst province, with very high education Gini coefficient of 0.483. Although the AYS of Sulu almost doubled from 1980 to 2000, it still has a long way to go since its AYS is more than two years below the national average.

The situation of Bukidnon and Camiguin in Region 10 illustrates the importance of analysis at lower or disaggregated units. If we look at the education Gini coefficient of Region 10 alone, we can say that it is doing fairly well as it ranks as the sixth region with the most equitable distribution of education. However, looking at the provincial level, we find that great inequality exists among its four provinces (Table 2). While Camiguin has a low education Gini coefficient of 0.203 and a high average years of schooling of 8.6 years, Bukidnon has a high education Gini coefficient of 0.360 and a very low average years of schooling of 5.3 years.

*4.2.3. Relationship of average years of schooling and education Gini coefficient*

Like the findings of Thomas, Wang, and Fan [2001] on cross-country data, the Philippines' regional and provincial data suggest that the average years of schooling and education Gini coefficient are negatively related. Plotting the two variables shows downward-sloping curves with correlation coefficients of -0.94 for regional data and -0.90 for provincial data (Figure 6). This high negative association suggests that provinces with higher average years of schooling are more likely to achieve more equitable distributions of education.

Having a negative association between education Gini coefficient and average years of schooling, as Thomas, Wang, and Fan [2001] point out, has a strong policy implication. It means that moving any person out of illiteracy should be a prime objective since doing so improves a province's distribution of education while improving its level of educational attainment.

However, this does not mean that if a region (or province) has a higher AYS compared to another region (or province), it will naturally have a lower education Gini coefficient compared to that region (or province). Bicol region (Region 5) and Western Visayas (Region 6) illustrate this point. Region 6 has 8.1 average years of schooling while Region 5 has 7.8, but Region 6's education Gini coefficient is 11 percent higher than that of Region 5 (Figure 5). This shows that measuring education inequality in absolute terms (by using measurements such as AYS) does not capture the full extent of inequality.

**Figure 6. Plot of average years of schooling and education Gini coefficient (Philippines, 2000)**

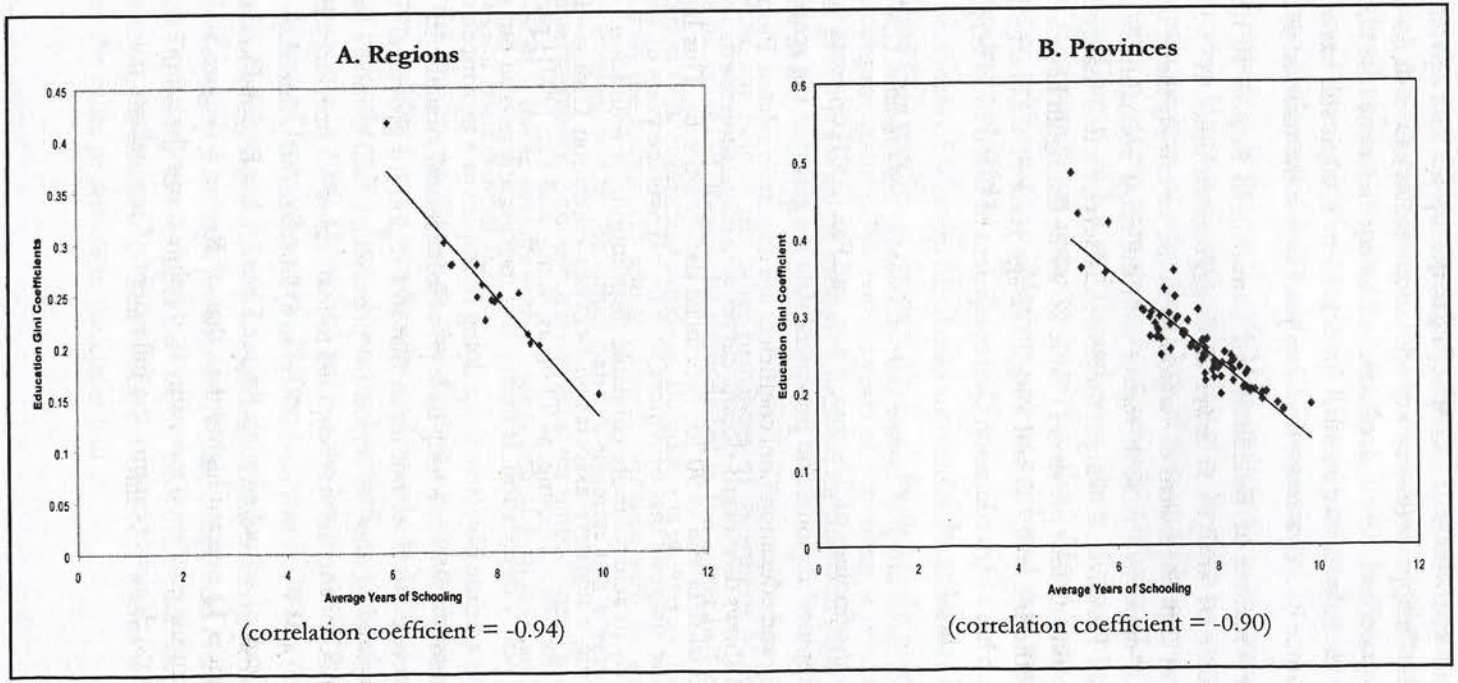


**Table 2. Average years of schooling and education Gini coefficient of Philippine provinces, 1980 and 2000**

| Province | AYS 1980 | Educ. Gini 1980 | AYS 2000 | | | Education Gini 2000 | | |
|---|---|---|---|---|---|---|---|---|
| *Region 1* | | | | | | | | |
| Ilocos Sur | 6.43 | 0.332 | 8.55 | (-0.33%) | [13] | 0.221 | (-33%) | [18] |
| Ilocos Norte | 6.52 | 0.343 | 8.59 | (-0.32%) | [11] | 0.225 | (-35%) | [20] |
| La Union | 7.20 | 0.285 | 8.97 | (-0.25%) | [5] | 0.198 | (-31%) | [8] |
| Pangasinan | 7.02 | 0.287 | 8.89 | (-0.27%) | [6] | 0.189 | (-34%) | [5] |
| *Region 2* | | | | | | | | |
| Batanes | 7.09 | 0.303 | 9.86 | (-0.39%) | [1] | 0.182 | (-40%) | [3] |
| Cagayan | 6.08 | 0.323 | 7.76 | (-0.28%) | [34] | 0.254 | (-21%) | [42] |
| Isabela | 6.52 | 0.296 | 7.98 | (-0.23%) | [27] | 0.233 | (-21%) | [27] |
| Nueva Vizcaya | 6.50 | 0.335 | 8.14 | (-0.25%) | [21] | 0.249 | (-25%) | [38] |
| Quirino | 5.94 | 0.322 | 7.13 | (-0.2%) | [58] | 0.266 | (-17%) | [47] |
| *Region 3* | | | | | | | | |
| Bataan | 7.34 | 0.273 | 8.89 | (-0.21%) | [6] | 0.197 | (-28%) | [7] |
| Bulacan | 7.01 | 0.281 | 8.74 | (-0.25%) | [8] | 0.201 | (-29%) | [11] |
| Nueva Ecija | 6.75 | 0.296 | 8.31 | (-0.23%) | [17] | 0.212 | (-28%) | [14] |
| Pampanga | 7.15 | 0.276 | 8.64 | (-0.21%) | [10] | 0.199 | (-28%) | [9] |
| Tarlac | 6.87 | 0.289 | 8.51 | (-0.24%) | [14] | 0.204 | (-29%) | [13] |
| Zambales | 7.70 | 0.238 | 8.67 | (-0.11%) | [9] | 0.200 | (-16%) | [10] |
| *Region 4* | | | | | | | | |
| Aurora | 6.44 | 0.271 | 7.93 | (-0.23%) | [30] | 0.216 | (-20%) | [16] |
| Batangas | 6.32 | 0.343 | 8.32 | (-0.32%) | [16] | 0.239 | (-30%) | [31] |
| Cavite | 7.54 | 0.276 | 9.31 | (-0.23%) | [2] | 0.175 | (-37%) | [1] |
| Laguna | 7.43 | 0.275 | 9.19 | (-0.24%) | [4] | 0.184 | (-33%) | [4] |
| Quezon* | 6.45 | 0.287 | 7.74 | (-0.2%) | [37] | 0.221 | (-23%) | [18] |
| Rizal | 7.72 | 0.263 | 9.31 | (-0.21%) | [2] | 0.176 | (-33%) | [2] |
| Marinduque | 6.39 | 0.277 | 7.94 | (-0.24%) | [28] | 0.229 | (-18%) | [24] |
| Occidental Mindoro | 6.03 | 0.333 | 7.30 | (-0.21%) | [53] | 0.273 | (-18%) | [54] |
| Oriental Mindoro | 5.96 | 0.325 | 7.46 | (-0.25%) | [47] | 0.256 | (-21%) | [43] |
| Palawan | 5.82 | 0.335 | 7.33 | (-0.26%) | [50] | 0.271 | (-19 %) | [53] |
| Romblon | 6.03 | 0.304 | 7.69 | (-0.27%) | [41] | 0.239 | (-21%) | [31] |

**Table 2. Average years of schooling and education Gini coefficient of Philippine provinces, 1980 and 2000 (continued)**

| Province | AYS 1980 | Educ. Gini 1980 | AYS 2000 | | | Education Gini 2000 | | |
|---|---|---|---|---|---|---|---|---|
| *Region 5* | | | | | | | | |
| Albay | 6.39 | 0.287 | 7.89 | (-0.24%) | [32] | 0.226 | (-21%) | [21] |
| Camarines Norte | 6.88 | 0.242 | 8.07 | (-0.17%) | [24] | 0.195 | (-19%) | [5] |
| Camarines Sur | 6.44 | 0.285 | 7.98 | (-0.24%) | [27] | 0.217 | (-24%) | [17] |
| Catanduanes | 6.51 | 0.297 | 8.31 | (-0.28%) | [17] | 0.226 | (-24%) | [21] |
| Masbate | 5.34 | 0.337 | 6.66 | (-0.25%) | [70] | 0.270 | (-20%) | [52] |
| Sorsogon | 6.27 | 0.268 | 7.76 | (-0.24%) | [34] | 0.212 | (-21%) | [14] |
| *Region 6* | | | | | | | | |
| Aklan | 6.31 | 0.333 | 8.13 | (-0.29%) | [22] | 0.250 | (-25%) | [39] |
| Antique | 5.79 | 0.352 | 7.41 | (-0.28%) | [48] | 0.290 | (-17%) | [62] |
| Capiz | 5.75 | 0.356 | 7.69 | (-0.34%) | [41] | 0.264 | (-26%) | [45] |
| Iloilo | 6.81 | 0.310 | 8.24 | (-0.21%) | [20] | 0.234 | (-25%) | [28] |
| Guimaras | -- | -- | 7.94 | | [28] | 0.232 | | [26] |
| Negros Occidental | 6.36 | 0.325 | 7.06 | (-0.11%) | [60] | 0.285 | (-12%) | [60] |
| *Region 7* | | | | | | | | |
| Bohol | 5.58 | 0.349 | 7.71 | (-0.34%) | [38] | 0.264 | (-24%) | [44] |
| Cebu | 6.14 | 0.369 | 7.31 | (-0.19%) | [51] | 0.274 | (-26%) | [55] |
| Negros Oriental | 5.08 | 0.389 | 6.54 | (-0.29%) | [72] | 0.304 | (-27%) | [68] |
| Siquijor | 5.81 | 0.348 | 7.71 | (-0.33%) | [38] | 0.246 | (-29%) | [36] |
| *Region 8* | | | | | | | | |
| Biliran | -- | -- | 6.65 | | [71] | 0.295 | | [63] |
| Eastern Samar | 6.17 | 0.309 | 7.50 | (-0.22%) | [46] | 0.261 | (-16%) | [44] |
| Leyte | 5.71 | 0.355 | 7.31 | (-0.28%) | [51] | 0.276 | (-23%) | [57] |
| Northern Samar | 5.53 | 0.337 | 6.81 | (-0.23%) | [66] | 0.279 | (-17%) | [58] |
| Samar | 5.22 | 0.363 | 6.50 | (-0.25%) | [73] | 0.306 | (-16%) | [70] |
| Southern Leyte | 5.94 | 0.325 | 7.59 | (-0.28%) | [45] | 0.253 | (-22%) | [40] |
| *Region 9* | | | | | | | | |
| Basilan | 3.85 | 0.582 | 5.84 | (-0.51%) | [74] | 0.418 | (-28%) | [76] |
| Zamboanga del Norte | 5.54 | 0.373 | 6.85 | (-0.24%) | [65] | 0.296 | (-21%) | [65] |
| Zamboanga del Sur | 5.75 | 0.368 | 6.76 | (-0.18%) | [68] | 0.287 | (-22%) | [61] |

**Table 2. Average years of schooling and education Gini coefficient of Philippine provinces, 1980 and 2000 (continued)**

| Province | AYS 1980 | Educ. Gini 1980 | AYS 2000 | | | Education Gini 2000 | | |
|---|---|---|---|---|---|---|---|---|
| *Region 10* | | | | | | | | |
| Bukidnon | 3.88 | 0.492 | 5.29 | (-0.36%) | [76] | 0.36 | (-27%) | [75] |
| Camiguin | 7.15 | 0.273 | 8.58 | (-0.2%) | [12] | 0.203 | (-26%) | [12] |
| Misamis Occidental | 6.75 | 0.301 | 8.09 | (-0.2%) | [23] | 0.235 | (-22%) | [29] |
| Misamis Oriental | 7.25 | 0.278 | 8.01 | (-0.1%) | [26] | 0.228 | (-18%) | [23] |
| *Region 11* | | | | | | | | |
| Davao del Norte | 6.22 | 0.304 | 7.92 | (-0.27%) | [31] | 0.237 | (-22%) | [30] |
| Davao del Sur | 6.79 | 0.329 | 6.69 | | [69] | 0.302 | (-8%) | [67] |
| Davao Oriental | 5.68 | 0.328 | 6.79 | (-0.2%) | [67] | 0.269 | (-18%) | [50] |
| Compostela | -- | -- | 7.07 | | [59] | 0.253 | | [40] |
| South Cotabato | 6.13 | 0.367 | 7.79 | (-0.27%) | [33] | 0.266 | (-28%) | [47] |
| Sarangani | -- | -- | 5.77 | | [75] | 0.353 | | [73] |
| *Region 12* | | | | | | | | |
| Lanao del Norte | 6.27 | 0.380 | 7.04 | (-0.12%) | [61] | 0.300 | (-21%) | [66] |
| Cotabato | 5.84 | 0.371 | 7.35 | (-0.26%) | [49] | 0.275 | (-26%) | [56] |
| Sultan Kudarat | 5.84 | 0.383 | 7.21 | (-0.23%) | [55] | 0.295 | (-23%) | [63] |
| *Region 13* | | | | | | | | |
| Agusan del Norte | 7.03 | 0.281 | 7.75 | (-0.1%) | [36] | 0.244 | (-13%) | [34] |
| Agusan del Sur | 5.88 | 0.303 | 6.88 | (-0.17%) | [63] | 0.267 | (-12%) | [49] |
| Surigao del Norte | 6.36 | 0.292 | 7.70 | (-0.21%) | [40] | 0.241 | (-17%) | [33] |
| Surigao del Sur | 6.49 | 0.297 | 7.66 | (-0.18%) | [63] | 0.246 | (-17%) | [36] |
| *CAR* | | | | | | | | |
| Abra | 6.38 | 0.342 | 8.44 | (-0.32%) | [15] | 0.231 | (-32%) | [25] |
| Apayao | -- | -- | 7.23 | | [54] | 0.269 | | [50] |
| Benguet | 7.70 | 0.302 | 8.27 | (-0.07%) | [19] | 0.244 | (-19%) | [34] |
| Ifugao | 4.40 | 0.517 | 7.16 | (-0.63%) | [56] | 0.322 | (-38%) | [71] |
| Kalinga | -- | -- | 7.67 | | [43] | 0.281 | | [59] |
| Mountain Province | 5.02 | 0.483 | 7.61 | (-0.51%) | [44] | 0.305 | (-37%) | [69] |
| Kalinga-Apayao | 5.70 | 0.360 | -- | | | -- | | |

**Table 2. Average years of schooling and education Gini coefficient of Philippine provinces, 1980 and 2000 (continued)**

| Province | AYS 1980 | Educ. Gini 1980 | AYS 2000 | | | Education Gini 2000 | | |
|---|---|---|---|---|---|---|---|---|
| *ARMM* | | | | | | | | |
| Lanao del Sur | 4.19 | 0.624 | 7.14 | (-0.7%) | [57] | 0.356 | (-43%) | [74] |
| Maguindanao | 3.83 | 0.601 | 5.23 | (-0.37%) | [77] | 0.43 | (-29%) | [77] |
| Sulu | 2.63 | 0.727 | 5.10 | (-0.94%) | [78] | 0.483 | (-34%) | [78] |
| Tawi-Tawi | 5.00 | 0.423 | 6.95 | (-0.39%) | [62] | 0.332 | (-21%) | [72] |

Notes: *Quezon AYS and Education Gini coefficient for 2000 computed using Highest Educational Attainment of Household Population 10 Years Old and Above.
-- Division of provinces by region based on Census 2000.
-- Values in parentheses represent percentage growth from 1980 to 2000.
-- Numbers in brackets represent AYS and Education Gini coefficients rankings in 2000.
-- Biliran, Compostela and Sarangani were not yet provinces in 1980.
-- Kalinga and Apayao were not yet separate provinces in 1980.

### *4.3. Decomposition analysis*

We used equations (12) and (13) to decompose the education inequality of the Philippines as a whole using the following groupings: male-female, poor-nonpoor provinces. We decomposed the education inequality of the regions using the gender grouping only.

#### *4.3.1. Gender education inequality*

All the regions in the Philippines are doing well in terms of gender equality in education. In most regions, females are doing better than males—the education inequality within females is less than that within males.

As seen in Table 3, education inequality as measured by education Gini coefficient within females is greater than that within males in 1980. However, two decades later, the distribution of education within females became slightly more equitable than that within males. Thus, at the national level, males face a slightly greater education inequality within themselves than females in 2000.

For six regions—Region 6 (Western Visayas), Region 7 (Central Visayas), Region 8 (Eastern Visayas), Region 10 (Northern Mindanao), Region 11 (Southern Mindanao), and Region 13 (CARAGA)—females noticeably face a more equitable distribution of education than males. For the rest of the regions, males have lower education Gini coefficients than females. However, for Regions 4, 5, 9, and 12, differences in education Gini coefficients between males and females are very small.

**Table 3. Average years of schooling, education Gini coefficient by gender, 2000**

| | *Education Gini Index* | | | *Average years of schooling* | | |
|---|---|---|---|---|---|---|
| | *All* | *Males* | *Females* | *All* | *Males* | *Females* |
| Philippines 1980 | 0.322 | 0.313 | 0.331 | 6.75 | 6.80 | 6.69 |
| Philippines 2000 | 0.236 | 0.237 | 0.234 | 8.27 | 8.15 | 8.39 |
| Region 1 | 0.200 | 0.194 | 0.206 | 8.82 | 8.80 | 8.83 |
| Region 2 | 0.244 | 0.245 | 0.243 | 7.91 | 7.76 | 8.07 |
| Region 3 | 0.202 | 0.197 | 0.206 | 8.64 | 8.64 | 8.65 |
| Region 4 | 0.211 | 0.210 | 0.211 | 8.60 | 8.53 | 8.68 |
| Region 5 | 0.224 | 0.223 | 0.225 | 7.80 | 7.66 | 7.94 |
| Region 6 | 0.249 | 0.255 | 0.243 | 8.07 | 7.83 | 8.30 |
| Region 7 | 0.270 | 0.274 | 0.266 | 7.56 | 7.44 | 7.68 |
| Region 8 | 0.278 | 0.289 | 0.266 | 7.15 | 6.85 | 7.46 |
| Region 9 | 0.300 | 0.299 | 0.301 | 7.01 | 6.88 | 7.15 |
| Region 10 | 0.243 | 0.251 | 0.233 | 7.97 | 7.73 | 8.23 |
| Region 11 | 0.259 | 0.264 | 0.253 | 7.73 | 7.52 | 7.95 |
| Region 12 | 0.279 | 0.277 | 0.279 | 7.63 | 7.49 | 7.78 |
| CARAGA | 0.247 | 0.255 | 0.238 | 7.64 | 7.38 | 7.91 |
| CAR | 0.251 | 0.247 | 0.253 | 8.43 | 8.24 | 8.62 |
| ARMM | 0.416 | 0.406 | 0.426 | 5.94 | 6.00 | 5.87 |
| NCR | 0.152 | 0.149 | 0.154 | 9.94 | 9.96 | 9.91 |

For the entire Philippines, and for all the regions in the Philippines, decomposition of Gini coefficients by gender shows that the contribution of the gender gap to overall inequality (overall inequality in the Philippines and overall inequality in every region, respectively) is around 50 percent (Table 4). For all the regions, the contribution of within-males inequality and within-females inequality to overall education inequality is almost the same—averaging at around 25 percent. Only in Region 1, ARMM, and NCR are the contributions of within-males inequality noticeably lower than the contributions of within-females inequality. On the other hand, the contribution of within-males inequality is only noticeable in CARAGA.

The good education performance of females has a positive implication on society. As an African proverb says, "If you educate a man you educate an individual, but if you educate a woman you educate a family (nation)". This is because women are the primary caregivers for children. Since educated women are well informed and are more efficient and productive, they raise healthier and better-educated children. Furthermore, since women—from the paid nanny to the elder sister, aunt, grandmother, and mother—are usually responsible for child care, their knowledge and productivity are passed on to children.

*4.3.2. Poor-nonpoor education inequality*

Education Gini coefficients of poor provinces and nonpoor provinces show that there is greater education inequality in poor provinces (Table 5). Nonpoor provinces have higher AYS and lower education Gini coefficients. While more than half of the economically active population in nonpoor provinces has ten or more years of schooling, the comparable figure for poor provinces is only about 30 percent.

Although there is greater inequality within poor provinces as indicated by the grouping's higher education Gini coefficient (Table 5), nonpoor provinces are contributing more to the overall education inequality (Table 6). This is mainly because of the much higher proportion of population of nonpoor provinces compared to poor provinces. Only 38 percent of the Philippines' total economically active population belongs to the 44 poorest provinces while 62 percent of the total population belongs to the nonpoor provinces. Thus, because of the effect of the proportion of subgroup population (Gi2) to the subgroup contribution to overall education inequality (Gi2 ($\mu i/\mu$) Ei), the decomposition analysis shows that nonpoor provinces are contributing more to overall education inequality than poor provinces (Table 6). Using this grouping, the poor-nonpoor gap is the main contributor to overall inequality.

**Table 4. Decomposition of education Gini coefficient by gender, 2000**

| | *Within Males %* $\left(\frac{G_1^2(\mu_1/\mu)E_1}{E_L}*100\right)$ | *Within Females %* $\left(\frac{G_2^2(\mu_2/\mu)E_2}{E_L}*100\right)$ | *Gender Gap %* $\left(\frac{E_B}{E_L}*100\right)$ | *Total %* |
|---|---|---|---|---|
| Philippines 2000 | 24.8 | 25.2 | 50.0 | 100 |
| Philippines 1980 | 24.0 | 26.0 | 50.0 | 100 |
| Region 1 | 23.8 | 26.2 | 50.0 | 100 |
| Region 2 | 25.6 | 24.4 | 50.0 | 100 |
| Region 3 | 24.3 | 25.7 | 50.0 | 100 |
| Region 4 | 24.5 | 25.5 | 50.0 | 100 |
| Region 5 | 25.2 | 24.7 | 50.1 | 100 |
| Region 6 | 24.8 | 25.1 | 50.1 | 100 |
| Region 7 | 24.6 | 25.4 | 50.0 | 100 |
| Region 8 | 25.8 | 24.0 | 50.2 | 100 |
| Region 9 | 25.0 | 25.0 | 50.0 | 100 |
| Region 10 | 25.8 | 24.1 | 50.1 | 100 |
| Region 11 | 25.9 | 24.0 | 50.1 | 100 |
| Region 12 | 24.9 | 25.0 | 50.1 | 100 |
| CARAGA | 26 | 23.8 | 50.2 | 100 |
| CAR | 24.7 | 25.1 | 50.2 | 100 |
| ARMM | 24.0 | 26.0 | 50.0 | 100 |
| NCR | 22.8 | 27.2 | 50.0 | 100 |

The problem with the decomposition analysis that this paper adopted from Zhang and Li [2002] is that it is misleading if not properly interpreted. If we look at the Philippines as a whole in 2000 (Table 5), females are contributing more to overall education inequality than males. If interpreted improperly, this may seem to suggest that there is greater education inequality among females. This is contrary to this paper's other finding in which the education Gini coefficient of females is lower than that of males. The same is true for the nonpoor-poor provinces grouping. Decomposition of the overall education Gini coefficient using this grouping suggests that nonpoor provinces are contributing a lot more to education inequality than poor provinces (Table 6). Again, such finding sounds like there is greater education equality in poor provinces than in nonpoor provinces. This is very different from the education Gini coefficient results in which the nonpoor provinces subgroup has a much lower education Gini coefficient than the poor provinces subgroup. These misleading (if not properly interpreted) results are due to the nature of the decomposition formula. The proportion of population of each subgroup has a great effect on the subgroup's contribution to overall education inequality (see equations [12] and [13]). Since there are more females than males in the Philippines in 2000, the decomposition results show that, overall, females are contributing more to education inequality. The same is true for nonpoor provinces using the poor-nonpoor grouping. Thus, although decomposition analysis is helpful in finding the contributions of within-subgroup and between-subgroup inequality to overall inequality, care should be given in interpreting the results. Looking at the subgroups' individual education, Gini coefficients are still very important.

### *4.4. Some application of education Gini coefficient on other aspects of development*

In education inequality literature, the education Gini coefficient has been correlated with indices of poverty and income. In this paper, poverty incidence, poverty gap, per capita GDRP, and income Gini coefficient are used to examine the relationship of education inequality as measured by the education Gini coefficient with other aspects of development.[10]

#### *4.4.1. Correlation with poverty*

The scatter diagrams in Figure 8 shows the positive correlation of education inequality as measured by the education Gini coefficient and poverty as measured by poverty incidence and poverty gap. This is evident in the two upward-sloping curves.

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[10] Data on poverty gap, per capita GDRP, and income Gini coefficient are taken from the NSCB website (www.nscb.gov.ph). Poverty incidence data are taken from "Estimating Local Poverty in the Philippines" [NSCB 2005].

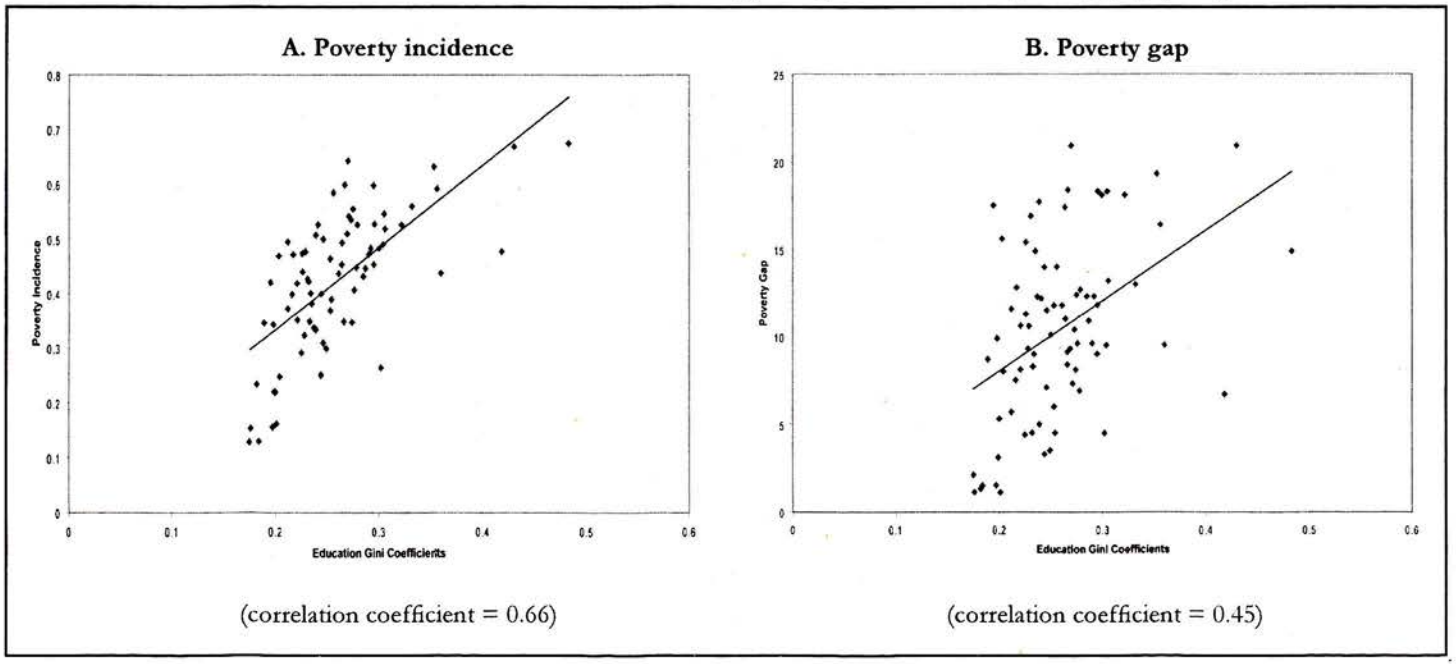
**Table 5. Average years of schooling and education Gini coefficient of poor and non-poor provinces, 2000**

| | *AYS 2000* | *Education Gini 2000* |
|---|---|---|
| Philippines | 8.27 | 0.236 |
| Poor Provinces | 7.27 | 0.276 |
| Non-Poor Prvinces | 8.71 | 0.212 |

**Table 6. Decomposition of education Gini coefficient by poor and non-poor provinces, 2000**

| | *Within Poor Provinces %* $\left(\frac{G_1^2(\mu_1/\mu)E_1}{E_L}*100\right)$ | *Within Non-Poor Provinces %* $\left(\frac{G_2^2(\mu_2/\mu)E_2}{E_L}*100\right)$ | *Poor- Non-Poor Gap %* $\left(\frac{E_B}{E_L}*100\right)$ | *Total %* |
|---|---|---|---|---|
| Philippines 2000 | 14.9 | 36.2 | 48.9 | 100 |

**Figure 8. Plot of education Gini coefficient, poverty incidence and poverty gap (2000)**




(correlation coefficient = 0.66)

(correlation coefficient = 0.45)

The correlation coefficients of education Gini coefficient with poverty incidence and that with poverty gap, using provincial data, are 0.66 and 0.45, respectively. This suggests that provinces with higher poverty incidence are more likely to have greater education inequality.

This finding has important implications on poverty reduction and education inequality alleviation. Getting people out of poverty may result in improvement in education equality. Since the relationship between education and poverty may be mutually reinforcing (i.e., poverty affects education outcomes and education affects poverty), improving education inequality may lead to less poverty. Either way, society is better off with lesser poverty and greater education equality.

*4.4.2. Correlation with development*

This paper uses per capita GDRP to examine the relationship of education inequality with development.

The downward-sloping curve in the scatter diagram in Figure 9A shows a negative association between per capita GDRP (in purchasing power parity terms) and education Gini coefficient. The -0.59 correlation coefficient supports this negative association. In other words, regions with higher levels of per capita GDRP are more likely to have lesser education inequality.

*4.4.3. Correlation with income inequality*

Figure 9B plots income and education Gini coefficients using regional data. Because of the extreme coefficients of ARMM (it ranks as the region with the highest education inequality but the lowest income inequality), the correlation coefficient of education and income Gini coefficients is negative. However, considering ARMM as an outlier—and not including it in the equation—yields a positive association between income and education Gini coefficients. With a correlation coefficient of 0.56, this finding suggests that the greater the income inequality, the greater the likelihood of having inequitable distributions of education.

## 5. Concluding remarks

By calculating the education Gini coefficient, the average years of schooling and the proportions of population at different educational attainment levels of the Philippines as a whole, its 16 regions and 78 provinces, this paper showed the extent of education inequality in the country from 1980 to 2000. The findings of this paper suggest that for the two decades under study, the education Gini coefficients of all the regions and provinces decreased. In other words, in the Philippines as a whole, there is greater education equality in 2000. Also, for all

of the regions, the average number of years of schooling increased and the proportion of population with no schooling decreased. However, there are wide disparities among regions and among provinces in terms of education-distribution equity.

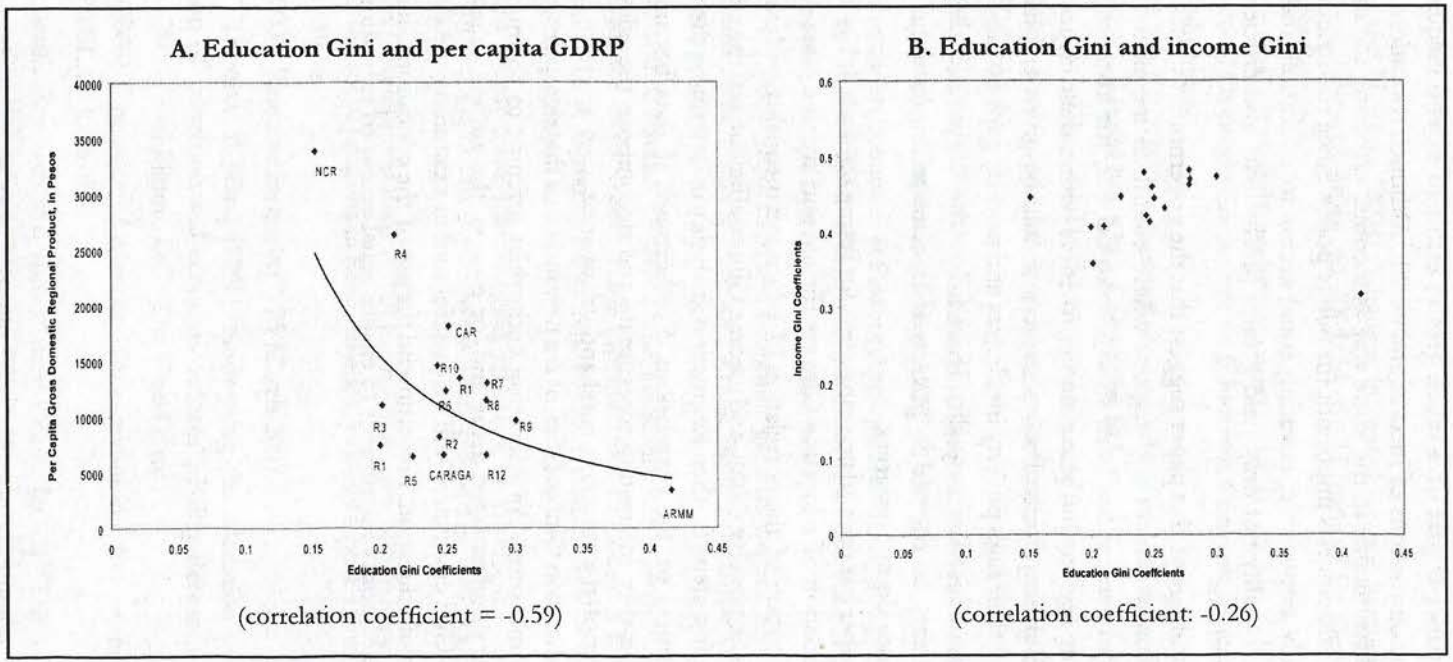
Although there are wide disparities among provinces in different regions, this paper finds that there are also wide discrepancies on the education performance of provinces within the same region. Some are doing better and have greater improvements than others. It can be observed that education inequality becomes more visible at lower levels of analysis than at higher levels. This is evident through the analysis of the increasing range of education Gini coefficients at lower levels. For instance, at the regional level, the average years of schooling goes as high as 9.9 years and as low as 5.9 years, and the education Gini coefficient goes as low as 0.152 to as high as 0.416. On the other hand, the average years of schooling in a province goes as high as 9.3 years and as low as just a little over 2.5 years, while the distribution of education goes as equitable as having an education Gini coefficient of 0.175 and as inequitable as having a coefficient of 0.483.

Consistent with cross-country studies [Thomas, Wang, and Fan 2001] on education inequality, this paper finds that, using both provincial and regional data, the average years of schooling of the economically active population is negatively associated with education inequality as measured by the education Gini coefficient. Thus, strengthening basic education and moving people out of illiteracy have positive effects not only on the average years of schooling but also on the improvement of the country's education equality.

The findings of this paper suggest that the education Gini coefficient is negatively associated with per capita GDRP and positively associated with the two measures of poverty that were used—poverty incidence and poverty gap. The education equality in high-income regions is likely to be better than that in low-income regions. Furthermore, the education Gini coefficients of provinces show that the distributions of education are more likely to be worse in poor provinces. The regional data on education and income Gini coefficients show that education inequality and income inequality are positively related.

The positive correlation of poverty incidence and education inequality among the Philippines' provinces also has important policy implications. Reducing poverty may improve education inequality, or distributing education more equitably may lessen poverty incidence. Future studies may explore this relationship using the education Gini coefficient dataset generated in this paper.

**Figure 9. Plot of education Gini coefficient, per capita GDRP, and income Gini coefficient (Regions of the Philippines, 2000)**




Note: 2004 per capita GDRP was used in this graph.

This paper is part of a much greater effort to extend inequality analysis beyond the dimensions of income and wealth. Although educational attainment is not redistributable in the same way as income, exploring the distributional aspect of education is important for public policy. Since redistributing income is politically impossible, ensuring equal access to education and improving education equality not only yield greater productivity and efficiency but also improve welfare.

The findings of this paper suggest that the government should put greater emphasis on provinces and regions where education inequality is high and where improvement has been slow (Davao del Sur, for instance.). Gaps not only among regions but also among provinces within their respective regions should be given priority. Poor provinces should be given emphasis not just because of their high poverty incidences and poverty gaps but also because of their greater education inequality. If we follow the "virtuous cycle" idea, these provinces may be trapped in poverty if policies to improve their education performance do not progress.

The paper has opened up many areas for future research. It has limited itself to the estimation of education Gini coefficient and average years of schooling and examination of the correlation of education inequality with average years of schooling, poverty, GDRP, and income Gini coefficient, but the analysis could be taken a few steps further. Regression analysis can determine the significance and robustness of the correlations. Furthermore, if data become available, it would be very interesting to estimate and decompose the education Gini coefficients of the country's rural and urban areas.

The education Gini coefficient is a new indicator that complements absolute education measures. As education authorities attempt to formulate policies targeted at disadvantaged areas and/or groups, the author believes that the education Gini coefficient will be a useful tool in examining the distributional dimension of education. I recommend the use of the education Gini coefficient as a standard policy instrument to ensure equal access to education.

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