Measuring regional inequality of education in Turkey: an evaluation by Gini index

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Abstract

This study aims to determine the relationship between inequality in education in Turkey and the average years of schooling. The source of the data was the 2000 General Census of Population: Social and Economic Characteristics of Population. To determine the inequalities in education, the average years of schooling of the population at the age of 25 and over and the education Gini index were calculated. The average years of schooling in Turkey and in all the regions during the period of 1975–2000 increased, and inequality in education decreased. A negative relationship was found between average years of schooling and educational Gini index. A positive relationship was found between the rates of increase in average years of schooling and decrease in the education Gini index.

Keywords: Educational attainment; educational inequality; comparative education; gender gap; distribution; regions.

1. Introduction

Education is one of the most important means of distributing economic well-fare and opportunities to the entire society. Improvement in education is not only related to the increases in the average values, but also to the level of distribution. Providing equal opportunities in education facilitates the vertical mobility, and social and economic movement of the poor sections in the society. Inequalities in education are also another source of social and economic inequalities. Educational level and distribution have an important impact on such social consequences as child death, birth rates, children’s education and distribution of income (Barro and Lee, 2000; Frankema and Bolt, 2004; Loyel and Hewett, 2004; Ram, 1990; Qian and Smyth, 2005). One of the significant issues of development is gender difference in educational distribution (Siddhanta and Nandy, 2003). In developing countries, high level of inequality in access to education between men and women is an important threat to development. Education of women is not only a basic human right, but it is also vital to accelerate human development and economic growth (Klasen, 2002; Siddhanta and Nandy, 2003). Deep-rooted cultural, institutional and political obstacles act as factors to create and perpetuate gender differences in access to education (Shabayya and Konadu-Agyemang, 2004).

Because the role of education in social, political and economic development has been realized, attention has been drawn on the issues of equality of education in recent years (Costell and Domenech, 2002; Mesa, 2005; Qian and Smyth, 2005; Thomas et al., 2001). Indicators that are used in the determination of distribution of level of education to individuals in a society based on gender, residential units and income groups are literacy rates, school enrolment rates, average years of schooling, standard deviation, Generalized Entropy, Gini index and Theil index (Mesa, 2005; Siddhanta and Nanday, 2003; Thomas et al., 2001; Thomas et al., 2002). In the initial studies to determine inequality in education, the technique of standard deviation was used.

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However, it was stated that standard deviation values provide distribution only as a form, and that it does not yield information about the level of inequality. To determine the level of inequality in education, the Gini index has started to be used frequently in recent years. The Gini index of education (Education Gini Index) \((EGI)\) is calculated with the help of data related to school enrollment, financing education or the years of schooling. However, in recent studies, EGI has been calculated mainly based on the average years of schooling (Thomas et al., 2001). The average years of schooling is an important distinguishing indicator of developmental differences in education. However, “education period” denotes an average value. It cannot yield sufficient information about the distribution of level of education to a population (Tomul, 2007).

This study aimed to compare regions and gender by determining inequality in education in Turkey based on geographical regions and gender. In addition, the study also aimed to determine the relationship between average years of schooling and the changes in these average years of schooling and education Gini index, and the changes in education Gini index. Inequality in education was determined though the Gini index. The education Gini index was calculated based on average years of schooling.

2. Data and Methods

2.1 Data

The raw data of this study was obtained from the tables of the census of population pertaining to the period between 1975 and 2000 (population 25 years of age and over) which is within Table 3.9 titled Population by literacy, education level presented in the tables within the source used in this study: 2000 Census of Population -Social and economic characteristics of population by provinces in Turkey. The data in the study were analyzed according to the II. Level statistical regions determined by the State Institute of Statistics (DIE, 2002). The DIE classifies Turkey into 26 second level statistical regions. The AYS and EGI values of those in the population who are at and above the age of 25 were used in the calculation.

2.2 Method

2.2.1 Education Gini Index

In this study, the education Gini index (EGI), developed by Thomas et al. (2001), was used to determine inequalities in education. The education Gini coefficient has a value that varies between 0, indicating perfect education equality and 1, indicating perfect education inequality. Following Thomas et al. (2001), the \(E GI\) formula for the direct method is as follows (1):

\[
E GI = \frac{1}{\mu} \sum_{i=1}^{6} \sum_{j=1}^{6} \left( p_i \left| y_i - y_j \right| p_j \right)
\]

Where;
- \(E GI\) is the education Gini index based on educational attainment distribution;
- \(\mu\) is the average years of schooling for the concerned population;
- \(p_i\) and \(p_j\) stand for the proportions of population with certain levels of schooling;
- \(y_i\) and \(y_j\) are the years of schooling at different educational attainment levels;
- \(n\) is the number of levels/categories in attainment data, and \(n = 6\) in this study.

2.2.2 Average Years of Shooling (AYS)

In this study, AYS was calculated based on 6 categories considering the stages of education in Turkey \((n=6)\). Since there is no sufficient data related to drop-outs from a certain stage of education, the AYS calculations were made based on the most recent stage of education that was completed.

Following Thomas et al. (2001), the formula to calculate AYS is as follows: (2).

\[
\mu = AYS = \sum_{i=1}^{6} \left( p_i \cdot y_i \right)
\]

The formula for calculating the years of schooling at the six levels of education:
- Illiterate \(y_1 = 0\)
- Literate non-graduate \(y_2 = y_1 + y_2 + C_p = C_p\) : 1 years
- Complete-Primary school \(y_3 = y_2 + C_p + C_p\) : 5 years
- Complete- Junior high school \(y_4 = y_3 + C_r + C_p + C_p\) : 3 years
- Complete-High school \(y_5 = y_4 + C_r + C_r + C_p + C_p\) : 3 years
- Complete-Higher education \(y_6 = y_5 + C_r + C_r + C_r\) : 4 years

3. Results

3.1 Changes in the AYS and EGI in Turkey

The AYS and EGI values calculated for the population at 25 years and above in regions in Turkey have been presented in Table 1. According to Table 1, in the period between 1975 and 2000, the AYS values of both women and men in all regions
increased, and the EGI values decreased. In 1975, in the regions with low AYS, the increase in EGI over the year 2000 was higher. In general, the EGI is low in the regions where AYS is high. In 1975 and 2000, the AYS values of men were higher than those of women. In the regions with low average AYS values, the difference between women’s and men’s AYS and EGI values is higher.

Table 1. Average years of schooling, education Gini index by regions and gender in Turkey, 1975–2000

<table>
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</table>

Source: The values were calculated based on the raw data obtained from the Tables 3. 9. on Population by Literacy, education level, 1975–2000 (population 25 years of age and over), which are presented in the source Census of Population 2000-Social and Economic Characteristics of Population by provinces in Turkey.

When examined regarding gender, the average years of schooling in men was higher than that of AYS in women between 1975 and 2000. The difference between men and women did not increase in this period. The differences between men and women between 1975 and 2000 in general in Turkey increased by 0.2 years. However, the difference between the AYS of men and that of women in the regions of Ankara (-0.51 years), Istanbul (-0.32 years), Antalya (-0.23 years), Aydin (-0.2 years), Adana (-0.12 years) and İzmir (-0.11 years) decreased. The difference between the AYS of men and that of women increased the most in Mardin (2.25 years), Van (2.02 years), Şanlıurfa (1.79 years), Ağrı (1.2 years) and Malatya (1.17 years) regions.

In general, EGI decreased in the period between 1975 and 2000. The decrease in EGI was the least proportionally in İstanbul (-0.21%), Ağrı (-0.24%), İzmir (-0.26%), Şanlıurfa (-0.26%) and Mardin (-0.26%) regions. In this period, EGI increased proportionally the most in Konya (-0.41%), Manisa (-0.41%), Niğde (-0.40%), Samsun (-0.39%), Kastamonu (-0.39%) regions.

3.2 The relationship between AYS and EGI

The relationship between the AYS values of the population at or over the age of 25 in Turkey and EGI is presented in Figure 1. According to Figure 1, there is a negative relationship between AYS and EGI. This negative relationship stops approximately when the AYS value reaches 6 years, the decrease in EGI stops, and follows a horizontal progress.
According to Table 1, there is a positive relationship between the amount of the increase in AYS and the rate of the decrease in EGI. However, the decrease in inequality rates stops as the increase in AYS approaches 3 years hence the positive relationship stops. Increases in AYS beyond 3 years do not change the decrease rates in EGI.

4. Conclusions

The level of education of the population at and over the age of 25 in Turkey in general and in all the regions in Turkey between 1975 and 2000 increased. In this period, the average years of schooling in Turkey were below the world average and the increase in the years of schooling was above the world average. In all the regions, the level of education of men was higher than that of women. The existing disadvantage of inequality in 1975 to women increased further in 2000. There is a negative relationship between average years of schooling and educational inequality. However, this negative relationship stops when the years of schooling approaches about 6 years. Again, there is a positive relationship between the amount of increase in the years of schooling and the amount of decrease in inequality in education. When an increase of about 1.5 and 3 years occurs in average years of schooling, the decrease rates in inequality in education increase. However, when there is an increase of 3 years and over in the average years of schooling, a change does not occur in the decrease rates in inequality in education. When there is an increase of 3 years in the level of education on average, this causes the inequality in education to decrease by 40–45%.

References


Tomul, E. (2007). The change in educational inequality in Turkey, a comparison by regional. *Educational Planning*, 16(3), 16-24