

Educational Expansion in Latin American Countries: Has Educational Attainment Inequality Narrowed?

Clarissa G. Rodrigues
Wittgenstein Centre (IIASA, VID/ÖAW, WU)
Vienna University of Economics and Business
cguimara@wu.ac.at

Rachel E. Durham
Wittgenstein Centre (IIASA, VID/ÖAW, WU)
Vienna University of Economics and Business

Bilal F. Barakat
Wittgenstein Centre (IIASA, VID/ÖAW, WU)
Vienna Institute of Demography/Austrian Academy of Sciences

Abstract

Over recent decades, countries in Latin America have made a great deal of progress with respect to educational expansion, with the primary aim of reducing educational inequality. However, equitable distribution of educational attainment in the population does not necessarily follow growth of educational opportunity. Overall reductions in inequality depend upon the extent to which certain segments of the population benefit from increases in opportunity. In this paper, we explore whether educational policies aimed at educational expansion also had a strong impact on the reduction of between-group inequality in children's education, as defined by mother's education. We employ the IPUMS micro data census samples from the 1970s, 1980s, 1990s, and 2000s for five Latin American Countries: Argentina, Brazil, Chile, Colombia and Venezuela. To measure change in inequality over time and across groups, we propose the use of Kullback-Leibler divergence. Then, differences between two distributions – reference and comparison – are synthesized via a single index. We use as reference the distribution of educational attainment among relatively advantaged students aged 8-20: those whose mothers who completed secondary education or more. This distribution is compared to: 1) the attainment distribution of those children aged 8-20 whose mothers completed primary only; 2) the attainment distribution of those children aged 8-20 whose mothers completed less than primary; and 3) the attainment distribution of those children aged 8-20 without information about mother's education (e.g., orphans or those of extreme economic disadvantage). Our findings bring attention to a regular regional trend driven by a reduction of educational inequality over time in all countries considered, for both boys and girls, and especially for groups with the lowest levels of education. Country-specific policy-related reasons for changes in inequalities will be discussed.

Introduction

Over the last century, countries in Latin America (LAC) have made a great deal of progress with respect to the expansion of schooling, especially with regard to the universalization of primary education and expanding enrolment at subsequent levels of schooling. Educational advancement occurred with different timing across countries and was mainly driven by top-down policies, such as the expansion of compulsory schooling. However, these supply-driven policies were not able to provide universal access in some countries (e.g., in Brazil), and as a result the poorest children remained out of the system due to the high opportunity costs of attending school. In order to overcome this impasse, more targeted policies such as Conditional Cash Transfer programs were recently implemented, which has led to an increase in the number of socially disadvantaged children attending school. The recent period has also been characterized by rapid decentralization, which aims to delegate resources and responsibility to local provincial authorities who presumably know best to whom to target resources.

To understand the changes brought about by educational expansion, one of the most important dimensions to be analyzed is educational inequality. The growth of educational opportunities may or may not be followed by an improvement in the distribution of this attribute in the population. Overall reductions in inequality depend on the extent to which certain segments of the population benefit from the increase in opportunity. Reducing inequality in opportunity through the inclusion of disadvantaged groups in formal schooling is a first step towards increasing aggregate formal educational levels in a given population. Policies to increase enrolment can also influence intergenerational transmission of human capital over time. As early cohorts achieve higher educational attainment, one can imagine a scenario of rising educational attainment across future cohorts, as better educated parents have increasingly better educated children. Given the high correlation between education and income, the ultimate consequence of increasing opportunities for education would be a reduction of overall income inequality in these countries.

Summary measures regarding the progress achieved under educational expansion are useful for making comparisons. Usually, educational technical reports make use of traditional indicators, such as intake, literacy, attendance or enrollment ratios to evaluate progress regarding reductions in inequality between groups defined by sex, race/color, socioeconomic status, etc. On the one hand, these measures are able to provide a general picture of the educational progress with respect to the inequality and can be easily performed by a variety of countries due to the availability of data. On the other hand, as they are based on a single measure rather than on a multi-dimensional measure, they do not capture the internal efficiency of the system given by the school flow. For example, suppose two populations A (rich) and B (poor) successfully enrol all children in school. In terms of enrollment ratios, both populations are equal, although the former probably will progress further along the education trajectory than the latter. Thus, an index summarizing inequality in educational attainment shares can be considered more comprehensive than some other process-specific measures.

In the current study, we examine trends in inequality in educational attainment distributions. It takes into account not only access, but the outcome of school flow patterns. Late entry or early withdrawals will cause attainment distributions to be skewed, thereby increasing educational inequality. Educational inequality is analyzed between the 1970's and 2000's in five Latin American Countries: Argentina, Brazil, Chile, Colombia and Venezuela. Our primary research question is whether educational policies aimed at expansion of education also had a strong impact on the reduction of inequality between groups, defined according to mother's education. Each of these countries has taken on a number of educational policy reforms to target underrepresented groups, yet

it is still an empirical question as to whether efforts in some countries have resulted in different patterns of change in the distribution of educational inequality.

Method and Data

Some advances in the literature have been made toward the measurement of inequality on the educational attainment distributions or completed years of schooling (Quinones, 1971; Ram, 1990; Lopez et al., 1998; Thomas et al. 2001; Castello and Domenech, 2001; Lorel, 2008; Frankema, 2008 and 2009). Inequality is often summarized using the Gini index metric, which shows the deviation of the Lorenz curve (cumulative shares of educational attainment to cumulative shares of population) from the absolute equality curve (expressed as a 45° line). A serious drawback of this approach is that one would never realistically expect absolute equality in education. Individuals have different aspirations regarding their future, and the structure of a labour market demands different levels of education. Moreover, if the population under consideration is the school-age population (as in the current study), it is natural to have people with different levels of education, rather than a concentration within one single level, since school trajectories have not yet been completed (for example, one would not expect a student aged 7 to have completed the last grade of primary school).

To deal with these issues, we propose the use of the Kullback-Leibler divergence. The results simplify comparisons between groups, as the differences between them are synthesized through a single index.

Given two probability distributions, p_c and p_r , the index can be expressed as:

$$KL(p_c||p_r) = \sum_{j=1}^{j=5} p_c(j) * \log\left(\frac{p_c(j)}{p_r(j)}\right)$$

Where:

$p_c(j)$ = proportion of population in the comparison group with educational attainment equal to j ;
 $p_r(j)$ = proportion of population in the reference group with educational attainment equal to j .

This measure is always higher than or equal to zero. Zero means equality between distributions whenever p_c equal to p_r for all categories of j . The higher the KL index, the greater the distance between p_c and p_r .

An important consideration when using this method is the choice of the reference and comparison distributions. A justifiable approach is to use as the reference the distribution of educational attainment among relatively advantaged students: those aged 8-20 whose mothers have completed secondary education or more. Given the very high correlation between mother's and children's education, we may assume that this group of children entered formal schooling at the typical age and did not experience unusually high rates of repetition and dropout. We will then compare this reference group's attainment distribution to: 1) *comparison 1*: the attainment distribution of those children aged 8-20 whose mothers completed only primary or lower secondary; 2) *comparison 2*: the attainment distribution of those children aged 8-20 whose mothers completed less than primary; 3) *comparison 3*: the attainment distribution of those children aged 8-20 without information about mother's education (e.g., orphans or those of extreme economic disadvantage).

The time point to use for the reference group's distribution is also an important consideration. One justifiable option is to generate a reference distribution for each time-point of comparison. Another reasonable option is to use the reference group's distribution from the latest time-point for all comparisons across time. Both offer interesting conclusions concerning levels of inequality between reference and comparison groups – the first option providing information about how comparison groups fared relative to the reference group's own changing position over time, and the second regarding how the comparison groups fared according to the reference group's most recent position. Since both methods are useful, we ran the analysis both ways and comment on the different conclusions.

The analysis will be restricted to those aged 8-20, as this population would have been the most affected by policies implemented during recent decades. It is important to note that the age distribution of those four groups could be different either because of fertility differentials by mother's education or the higher probability to live in a household without parents among the oldest. Age composition influences the distribution of educational attainment, as "old" children are more likely to reach high levels of education than "young" children. Therefore, in order to eliminate the effect of different age profiles on the comparison between groups, we apply an age-standardization method, imposing a flat distribution across all groups (i.e., equal shares at each age).¹

Using the International Integrated Public-Use Microdata Series (IPUMS) (Minnesota Population Center, 2011) from the 1970s-2000s for five LAC countries (Argentina, Brazil, Chile, Colombia and Venezuela), we will test whether there was a convergence in educational attainment distributions between comparison and reference groups.

Findings

Figures 1, 2 and 3 show the results for reference vs. comparison 1; reference vs. comparison 2; and reference vs. comparison 3, respectively. For these results, inequality was calculated using the reference distribution for each time-point. Figures 4, 5 and 6 show the results with inequality calculated using the reference group's distribution from the latest time-point for all comparisons across time.

Examining Figures 1-3, we find that inequality decreased in all countries from the early 1970s onward, for both male and female children. At the beginning of the historical series, Brazil had the highest levels of inequality. The remaining countries showed lower initial starting levels, but similar declines in inequality over these three decades. There were also sub-regional patterns, i.e., Columbia and Venezuela show similar trends, as do Argentina and Chile.

Figures 4-6 show results revealing higher levels of inequality when the reference distribution for latest time point is used, relative to using each year's reference distribution for comparison. This difference is unsurprising, as schooling has been increasing over time, and the education of those children aged 8-20 in approximately 2000 is better than the education of the same age group in 1970, with mother's education held constant.

¹ The analyses were also performed after standardizing all groups' age distributions to that of the total real age distribution for the population aged 8-20 by sex. The results are quite similar between real age distribution and flat age distribution. Finally, a 'flat' approach was chosen because the standard will be the same for all countries, which is essential for comparison purposes.

For both sets of results, inequality is lower between “reference” and “comparison 1” than between “reference” and “comparison 2 or 3”, as children who belong to comparison 1 are more advantaged than the others. Looking at the results for comparison 2 and 3, the inequality trend and magnitude seem to be very similar. This suggests that children whose mothers completed less than primary are nearly as disadvantaged in terms of their education as orphans or those who don’t live with their mothers. However, there is one appreciable difference: in “comparison 2” there is a greater disparity between male and female children compared to those in “comparison 3,” with male children at a greater disadvantage. We speculate that perhaps in the comparison 2 group, male children were leaving school earlier than female to help support the family in the labor market. In comparison 3, it is possible that *both* male and female children were more likely to enter the labor force early, given their status as having no mother in the household.

In summary, our findings bring attention to a regular regional trend driven by a reduction of educational inequality over time in all countries considered, for both boys and girls, and especially for groups whose mothers had the lowest levels of education. The downward shape of the inequality curves can be considered as evidence of intergenerational educational mobility, since over time, children whose mothers had relatively low educational attainment were closing the gap with children whose mothers had relatively high attainment.

These reductions in inequality were the result of efforts to increase equity in opportunity, i.e., expanding enrollment opportunities for the most socially disadvantaged or geographically remote. The sharpest declines can be seen during the decade between the early 1970s and the early 1980s. Prior to the 1970s, greater emphasis was being placed on quality, technology development, and the expansion of higher education opportunities, as opposed to expanding opportunity. After 1970 however, greater attention was turned towards efforts at universal primary enrollment, expanding enrollment in lower secondary, and to adult education and basic literacy for all (Arnové, Torres, Franz, and Morse, 1996). After that decade, LAC countries were affected by an economic crisis, which may have slowed progress towards educational inequality reduction somewhat, and studies have also shown a slowing of progress toward economic equality during that period as well (Ferreira, Liete, and Litchfield, 2008). This trend is evident in our results.

The 1990-2000 decade was, once again, characterized by a re-focusing of efforts toward improving opportunities for the disadvantaged. In Brazil in particular, a number of well-known efforts were launched: FUNDEF, which more equitably distributed national and municipal funding reserved for education, as well as renewed efforts toward universal primary completion (Rios-Neto and Guimaraes, 2010). Brazil’s efforts were similar to those of other LACs during this time. We find evidence of the success of these efforts in our results, as the figures show a discernible reduction in educational inequality during that decade that was not evident for the prior two.

These results confirm the importance of efforts that not only focus on improving quality, but equality in access, as well. Without full participation in a population, efforts to improve quality for the select few who are able to benefit will have limited impact on overall educational attainment improvement.

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Figure 1. Inequality between children aged 8-20 whose mothers have completed secondary education or more (reference each-time point) and children aged 8-20 whose mothers have completed primary or lower secondary education (comparison 1)

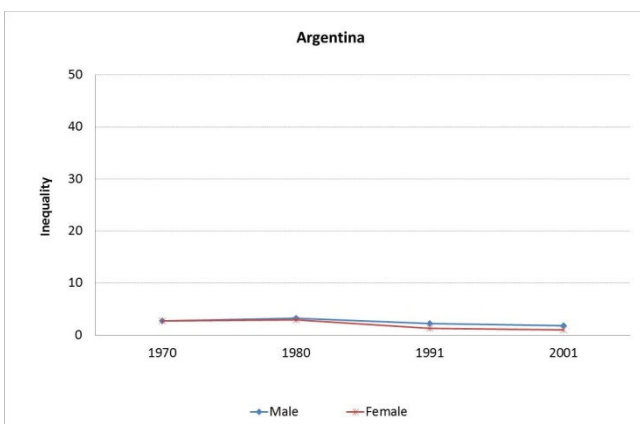
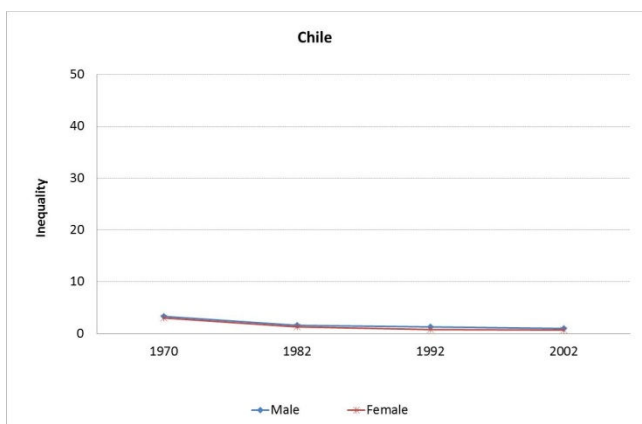
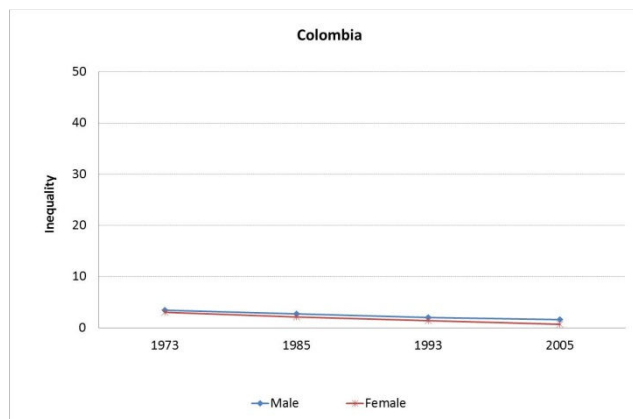
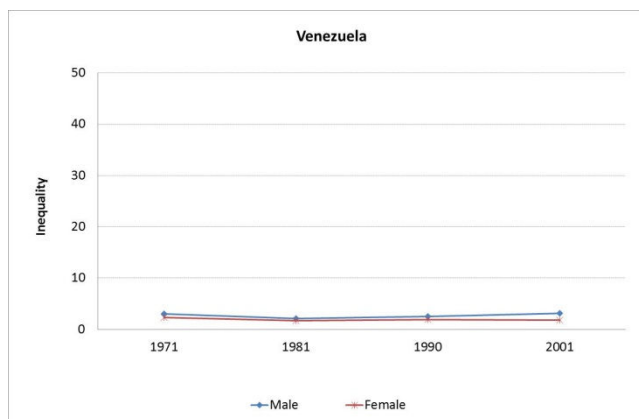
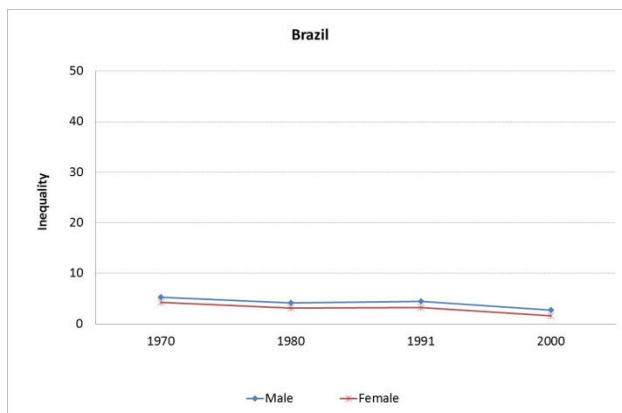


Figure 2. Inequality between children aged 8-20 whose mothers have completed secondary education or more (reference each-time point) and children aged 8-20 whose mothers have less than primary completed (comparison 2)

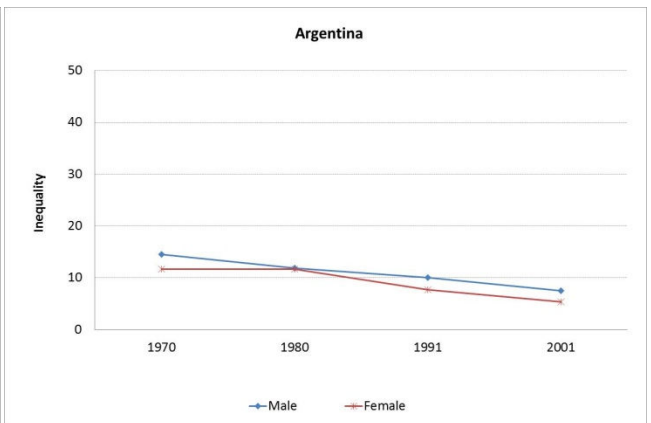
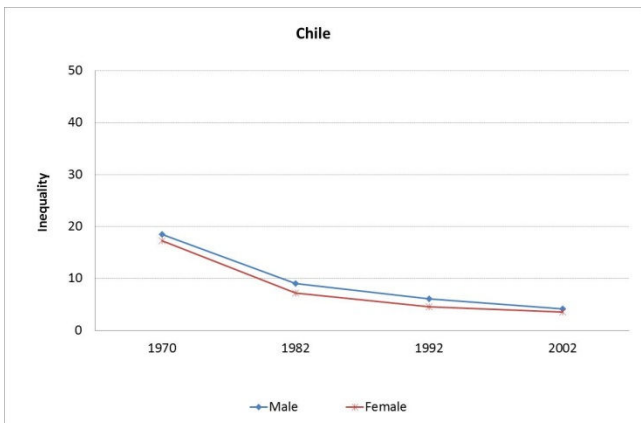
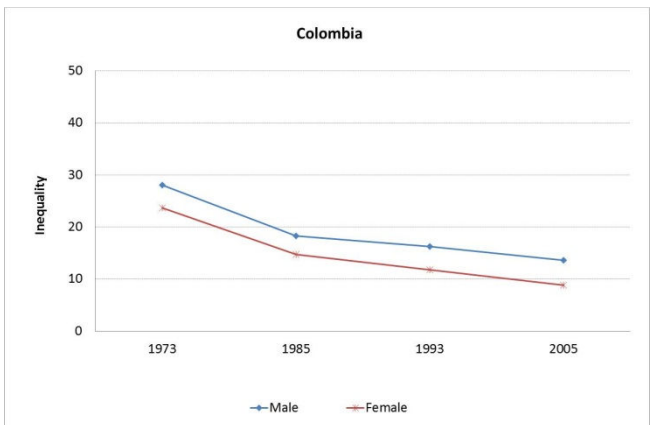
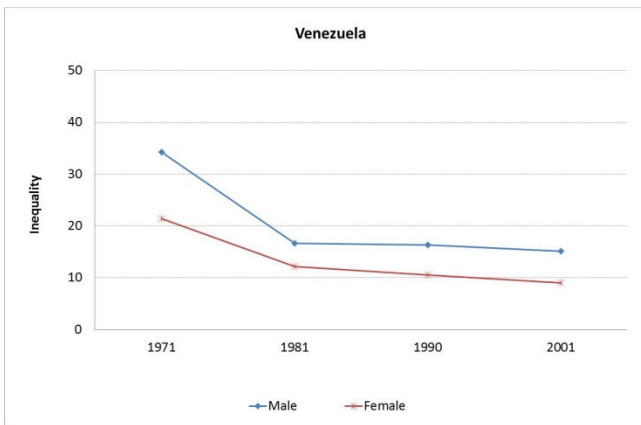
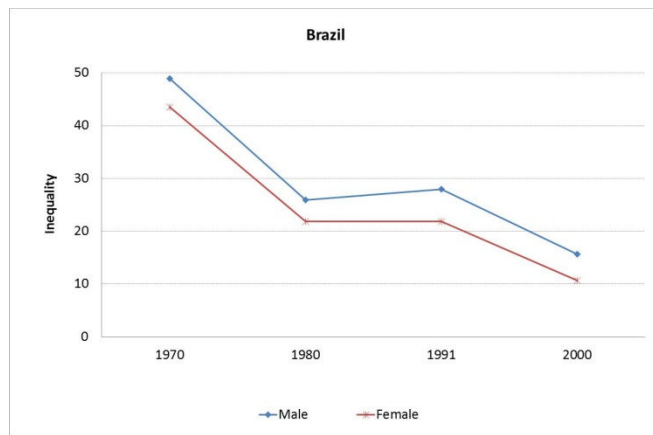


Figure 3. Inequality between children aged 8-20 whose mothers have completed secondary education or more (reference each-time point) and the most disadvantaged children aged 8-20 (comparison 3)

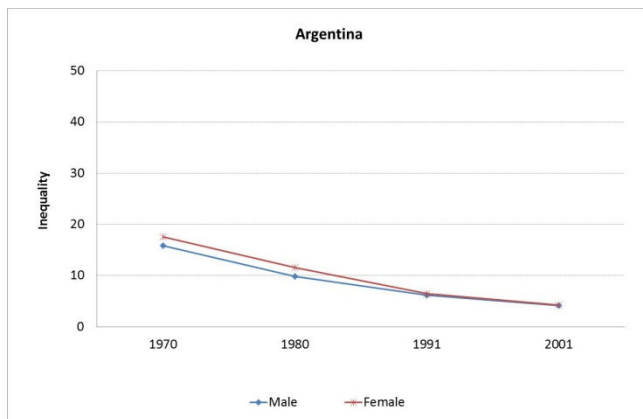
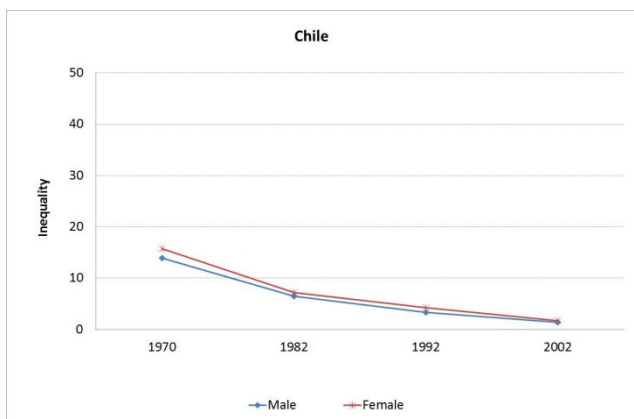
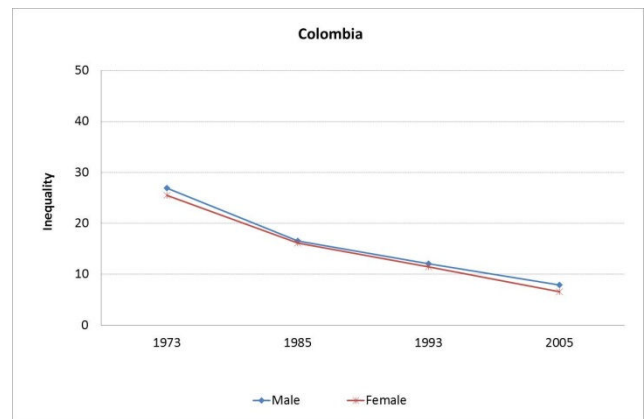
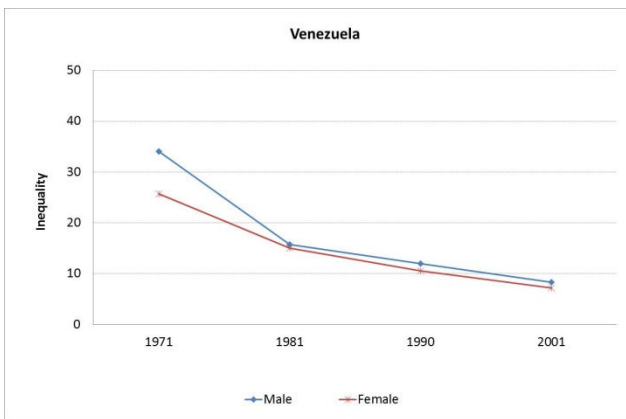
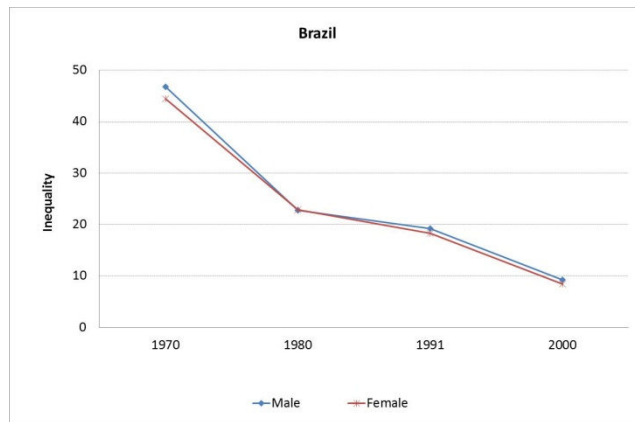


Figure 4. Inequality between children aged 8-20 whose mothers have completed secondary education or more (reference last-time point) and children aged 8-20 whose mothers have completed primary or lower secondary education (comparison 1)

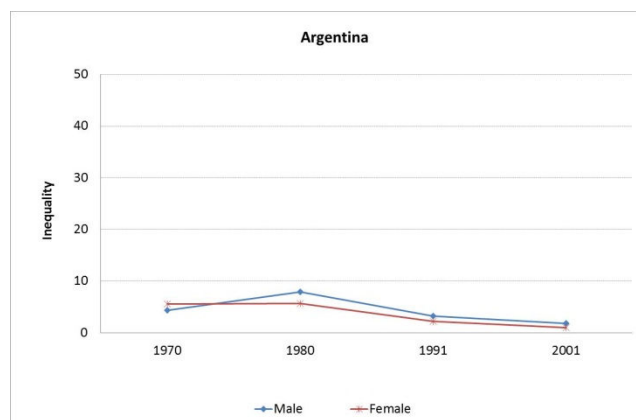
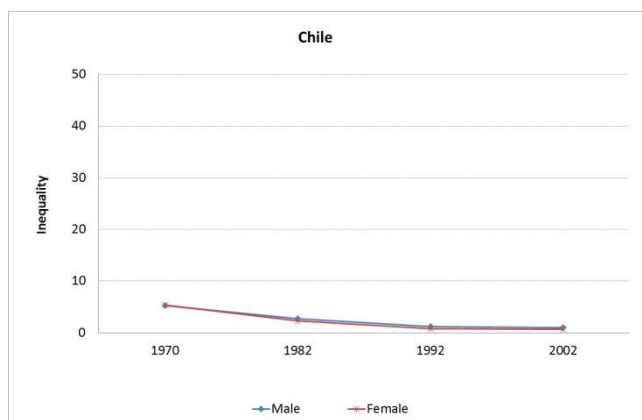
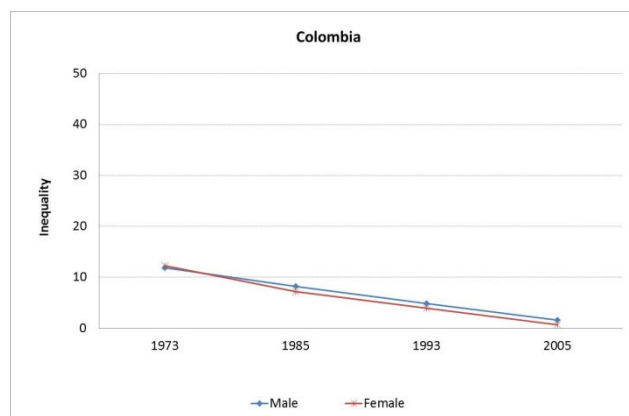
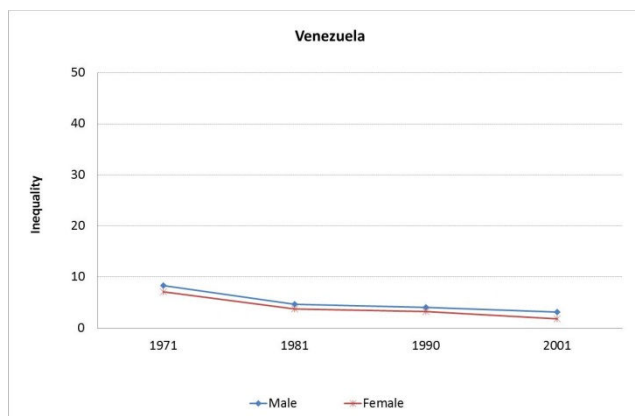
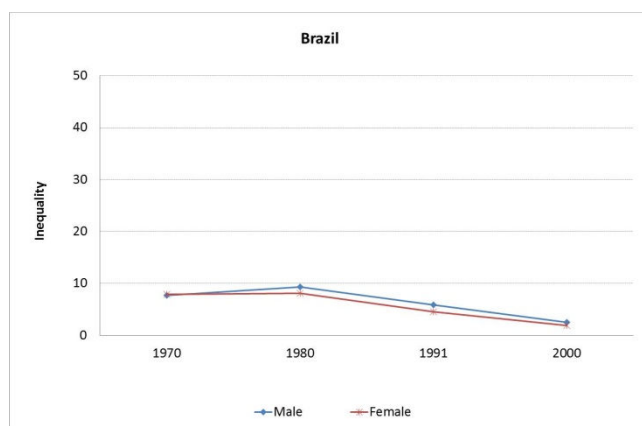


Figure 5. Inequality between children aged 8-20 whose mothers have completed secondary education or more (reference last-time point) and children aged 8-20 whose mothers have less than primary completed (comparison 2)

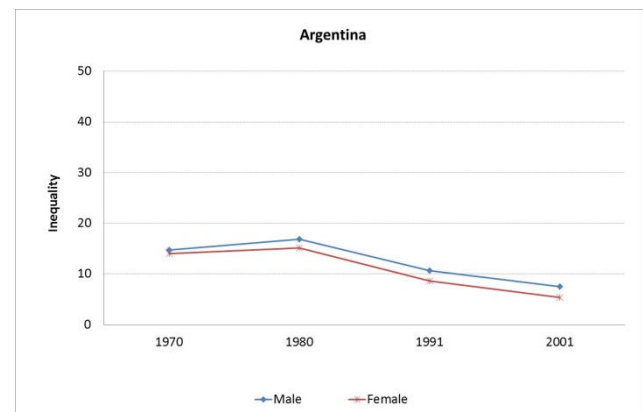
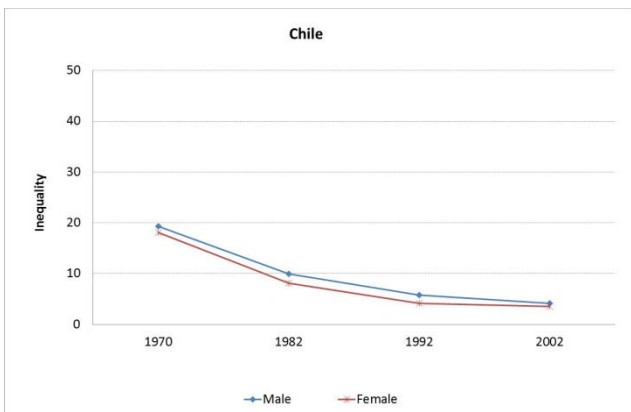
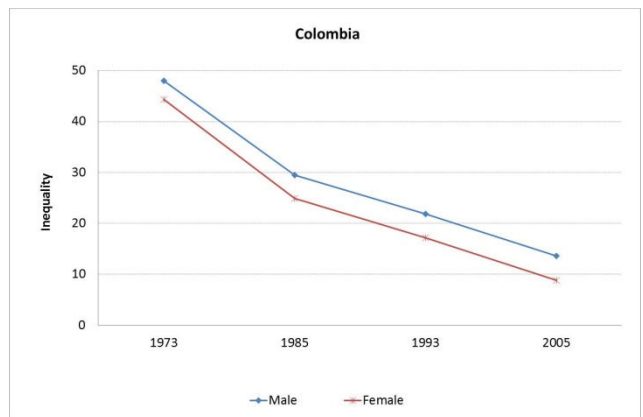
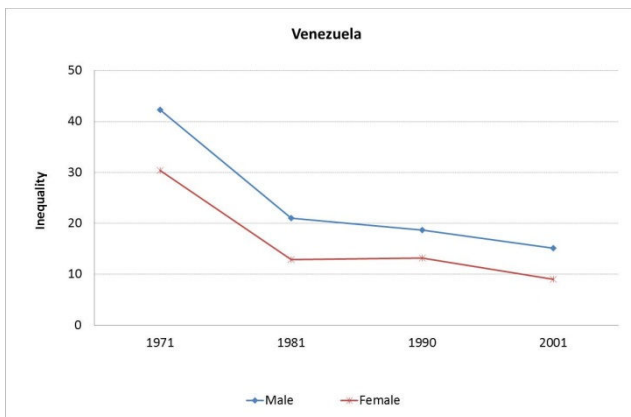
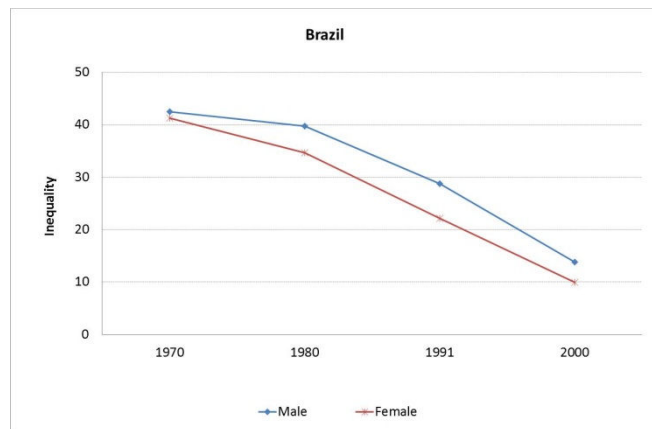


Figure 6. Inequality between children aged 8-20 whose mothers have completed secondary education or more (reference last-time point) and the most disadvantaged children aged 8-20 (comparison 3)

