

Education

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Background paper examining the state of the Andean region for the
Andean Competitiveness Project

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INTRODUCTION

Human capital, particularly that attained through education, is a key factor for increasing the long-term competitiveness of an economy. Higher educational attainment means more skilled and productive workers. The abundance of well-educated labor helps also to facilitate the absorption of advanced technologies from developed countries. In addition, changes in the level and distribution of schooling have a strong impact on income distribution. Evidence shows that higher attainment and more equal distribution of education play significant roles in the equalization of incomes. The improvement in income equality, in turn, has a positive effect on the long-term growth rate of the economy.

Education in the five Andean countries showed strong progress since 1970. The average education of the adult population advanced rapidly, reaching six years of schooling in 1995. Moreover, the high school enrollment rates of younger generations predict rapid accumulation of human capital in the future.

Nevertheless, educational progress in the region is problematic on several grounds. First, the distribution of schooling is skewed toward primary and university instruction and against secondary schooling. Although the proportions of the adult population that attained primary schooling or some university schooling are comparable to or higher than those for other developing countries, the proportion with secondary schooling is relatively low. This observation is especially troubling because cross-country empirical evidence indicates that secondary schooling contributes the most to economic growth and investment. In addition, despite strong progress in the average years of school attainment, improvements in the quality of education have lagged far behind other developing countries with similar years of schooling. The available internationally comparable test scores show that academic performance in the Andean countries is well below that for industrial and middle-income countries. Consequently, two priority areas for the Andean governments are improved access to secondary schools, especially for poor families, and enhancement of the quality of schooling.

PROGRESS OF EDUCATIONAL ATTAINMENT

Education levels have increased rapidly in the five Andean countries. Table 1 shows the changes in average years of schooling for the population aged 25 and over for the period 1970 to 1995. The table also contains reference data for Argentina, Chile, the average of 23 Latin American and Caribbean countries, and the United States. For the Andean countries, the population over 25 had, on average, 3.3 years of schooling in 1970. This average rose to 5.4

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years in 1990 and 6.0 years in 1995. This increase—2.7 years—was slightly faster than that—2.0 years—for Latin America as a whole.

Table 1: Changes in Average Years of Schooling, 1970–1995
(Total population aged 25 and over)

<i>Country</i>	<i>Year</i>				<i>Change</i>	<i>Change</i>	<i>Change</i>	<i>Change</i>
	1970	1980	1990	1995	1970-80	1980-90	1990-95	1970-95
Bolivia	3.7	4.0	6.0	6.5	0.3	2.0	0.5	2.8
Colombia	2.7	3.9	4.4	4.7	1.2	0.4	0.3	2.0
Ecuador	3.2	5.4	5.9	6.5	2.2	0.5	0.6	3.4
Peru	3.9	5.4	5.9	6.9	1.6	0.5	1.0	3.0
Venezuela	2.9	4.9	4.9	5.4	2.0	0.0	0.5	2.4
<i>Average (5 countries)</i>	3.3	4.7	5.4	6.0	1.5	0.7	0.6	2.7
Argentina	5.9	6.6	7.8	8.1	0.7	1.2	0.4	2.2
Chile	5.5	6.0	7.3	7.7	0.5	1.3	0.4	2.2
Average LAC(23)*	3.5	4.1	5.0	5.5	0.6	1.0	0.4	2.0
USA	9.8	11.9	12.0	12.2	2.1	0.1	0.2	2.4

* Simple average of 23 Latin America and the Caribbean countries

Source: Barro and Lee (1996) and author's updates.

The regional performance features significant variations among the countries. Bolivia, Ecuador and Peru showed strong gains, with increases from below 4 years of schooling in 1970 to over 6 years in 1995. In Ecuador and Venezuela, the level rose from around 3 years in 1970 to about 5-1/2 years in 1995. In contrast, progress has been relatively slow in Colombia, with an increase from 2.7 years in 1970 to 4.7 years in 1995.

Although the educational progress of the Andean region has been relatively strong from 1970 to 1995, the levels of education in 1995 still lagged far behind those of Argentina and Chile, the two most educated countries in Latin America. Even further ahead was the United States, the most educated country in the world (based on years of schooling). Table 1 shows that in 1995 Argentina, Chile, and the United States had average school attainments of 8.1, 7.7, and 12.2 years, respectively, compared with an average of 6.0 years for the five Andean countries.

Another dimension of the improvement of educational attainment in the Andean region is shown in Table 2, which reports the average years of attainment of cohorts born in 1930 (65 years old in 1995), 1940, 1950, 1960, and 1970. These figures are compiled from household survey data in 1995. For the five Andean countries as a whole, the school attainment of the 1970 cohort exceeded that of the 1930 cohort by 4.9 years. These data also show that the Andean region had slightly faster educational progress than Latin America in general. Despite this progress over generations, the average educational attainment of the 1970 cohort in 1995 for the Andean countries still lagged far behind those in Argentina, Chile, and the United States. The

figure in the Andean region was 9.0 years, compared with about 11 years in Argentina and Chile and over 13 years in the United States.

**Table 2. Average Years of Schooling by Birth Cohort
Born between 1930 and 1970**

<i>Country</i>	<i>Year of Birth</i>					<i>Change</i>	<i>Change</i>	<i>Change</i>
	1930	1940	1950	1960	1970	1930-50	1950-70	1930-70
Bolivia	3.3	4.5	6.3	7	8.6	2.9	2.3	5.2
Colombia	3.9	4.4	6.2	7.7	8.4	2.3	2.2	4.4
Ecuador	3.9	4.5	6.5	8.5	9.5	2.6	3	5.6
Peru	6	6.3	7.4	9.4	10	1.4	2.6	4
Venezuela	3.2	5.1	6.9	7.9	8.3	3.7	1.4	5.1
Average (5)	4.1	5	6.7	8.1	9	2.6	2.3	4.9
Argentina*	7.5	8.3	10	11	11.3	2.5	1.3	3.8
Chile	5.2	7.1	8.9	10.1	11.1	3.7	2.1	5.8
Average LAC(18)**	4.1	5.3	6.9	8.2	8.8	2.7	1.9	4.6
USA	12.3	12.9	13.6	13.3	13.4	1.3	-0.2	1.1

* The survey for Argentina includes only greater Buenos Aires.

** Simple average of 18 Latin America and the Caribbean countries

Source: Behrman, Duryea, and Szekely (1999) based on recent household survey data.

Currently available data suggests that educational progress will remain strong in the Andean region. However, the increases in the rates of school attainment slowed down during the 1980s, compared with the 1970s. High macroeconomic instability and low economic growth may have caused this slowdown. Recent studies suggest that the macroeconomic crises of the 1980s in Latin America had long-term adverse effects on human capital accumulation through the lowering of educational investment (Behrman, Duryea, and Szekely, 1999). The governments of the region should be cautious about creating a vicious cycle between education and economic performance. Lower economic growth and higher macroeconomic instability could force families and governments to devote fewer resources to the education of children. Then the smaller accumulation of human capital would, in turn, diminish long-run economic growth.

THE DISTRIBUTION OF EDUCATION

One notable feature of educational attainment in the Andean region, and for Latin America in general, is that the distribution of schooling is skewed toward the primary and university levels. Table 3 shows that a relatively small fraction of the population had attained secondary schooling (as the highest level of instruction), whereas many people had some primary schooling or some university training. In 1995, about 44 percent of the adult population had some primary schooling (as the highest level attained), whereas only 21 percent had some secondary schooling. Ecuador and Venezuela had particularly low shares with some secondary schooling—16 and 12

percent, respectively. In contrast, Peru and Bolivia were at 27 percent. The comparable figures were much higher in Chile—35 percent—and the United States—45 percent. In most developing countries with levels of overall schooling similar to those in the Andean countries, the shares of the adult population with secondary schooling as their highest level were above 30 percent (see the data set of Barro and Lee, 1996).

Table 3. Educational Attainment of the Total Population Aged 25 and Over, 1995
Percentage of the population aged 25 and over with the highest level of attainment indicated

<i>Country</i>	<i>No Schooling</i>	<i>Primary Level</i>	<i>Secondary Level</i>	<i>Tertiary Level</i>
Bolivia	22.5	37.7	27.4	12.3
Colombia	23.1	48	20.4	8.5
Ecuador	18.8	47.1	16.1	17.9
Peru	16.3	34.7	27.2	20.4
Venezuela	18.4	54.4	12.2	15.1
Average (5)	19.8	44.4	20.7	14.8
Argentina	6.3	52.7	24.9	16.2
Chile	5.2	45.8	35.4	13.7
Average LAC (23)	19.0	51.8	18.6	10.5
United States	0.6	8.2	44.6	46.5

Source: Barro and Lee (1996) and author's updates.

In contrast to the relatively low portion of the population with secondary schooling, the fraction with some university training was relatively high in the Andean countries. In 1995, Peru was highest at 20 percent, followed by Ecuador with 18 percent, Venezuela with 15 percent, Bolivia with 12 percent, and Colombia with 9 percent. In contrast, a relatively high portion of the population in 1995—about 20 percent—still had no formal education. This fraction was only about 5 to 6 percent in Argentina and Chile.

The skewness in years of education likely reflects the pattern of returns to education and social stratification. In Latin America, the returns to schooling are relatively low at the secondary level but relatively high at the university level. The available studies show that the rate of return to secondary schooling was less than 16 percent in Latin America, compared with over 30 percent in other developing regions (Inter-American Development Bank, 1999, p. 51). The low return and high opportunity cost likely caused many families, especially poor ones, not to send their children to secondary schools. The reasons for the relatively low returns at the secondary level are unclear. This pattern may reflect the industrial structure, which apparently generates relatively high demand for primary-educated and university-educated workers. Another factor may be the poor quality of secondary schooling, public schools in particular. At the university level, an important element is that access to this training is relatively easy in Latin America, once a student completes secondary school. Nevertheless, the children of lower strata families typically do not reach this point, because they tend to drop out of school during or just after their

primary instruction. In contrast, the children of wealthy families tend to get secondary schooling and then continue on to the tertiary level.

The inequality of education tends to be reflected in a society's inequality of income. De Gregorio and Lee (1999) show that a major portion of cross-national differences in income distribution can be explained by differences in the level and distribution of schooling.

Some of the Andean countries will likely have more equal distribution of education in the future because of recent increases in enrollment at the secondary level (see Table 4). For example, in Colombia, secondary school enrollment rates rose from 44 percent in 1980 to 55 percent in 1990 and 67 percent in 1995. Peru maintained high enrollment rates of around 70 percent during the 1990s. In contrast, in Bolivia and Venezuela, secondary school enrollment rates remained below 40 percent since 1980.

Table 4: Trend of Educational Indicators, 1980, 1990, and 1995

Country	Year	School enrollment rate			Teacher-pupil ratio		Public expenditure on education	
		Primary	Secondary	Higher	Primary	Secondary	% in GDP	% in total budget
Bolivia	1980	84	36	13	20	22	4.4	25.3
	1990	85	34	22	25	18	2.7	18.5
	1995	104	39	23	25	18	6.6	19.6
Colombia	1980	112	44	11	31	20	2.4	19.2
	1990	110	55	15	30	20	2.6	10.4
	1995	114	67	17	25	22	4	18.6
Ecuador	1980	115	52	37	36	17	5.6	33.3
	1990	118	56	20	29	13	3.1	17.2
	1995	109	54	22	26	13	3.4	15.2
Peru	1980	114	59	19	38	25	3.1	15.2
	1990	119	70	36	29	20	--	--
	1995	123	70	31	28	19	2.9	19.2
Venezuela	1980	105	39	21	34	17	4.4	14.7
	1990	97	34	29	23	9	3.1	12
	1995	90	35	32	23	9	5.2	22.4
Average (5)	1980	106	46	20	32	20	4	21.5
	1990	106	50	24	27	16	2.9	14.5
	1995	108	53	25	25	16	4.4	19
Argentina	1980	106	.	22	20	7	2.7	15.1
	1990	111	71	43	18	8	1.1	10.9
	1995	113	77	42	18	10	3.3	11.6
Chile	1980	117	55	13	34	20	4.6	11.9
	1990	100	74	21	27	14	2.7	10.4
	1995	99	69	28	27	13	3	14
Average LAC (23)	1980	102	46	13	31	21	3.8	--
	1990	102	51	17	28	19	3.1	--
	1995	106	57	19	27	18	3.5	--
United States	1980	98	90	56	20	14	6.7	--
	1990	104	93	75	19	14	5.2	12.3
	1995	102	97	81	16	15	5.4	--

-- Unavailable.

Source: UNESCO, Statistical Yearbook.

THE QUALITY OF EDUCATION

The average years of attainment measure only the quantity of schooling, not the quality. One common measure of the quality of schooling—based on outcomes, rather than inputs—is the performance on standardized tests. Unfortunately, however, data on internationally comparable examinations are limited. Nevertheless, the available information indicates that the achievement of students in the Andean countries is well below that for industrial and other middle-income countries. In a worldwide test of reading ability of nine-year-olds in 1991, Venezuela—the only participating Latin American country—showed the poorest results among all the 31 countries. The most recent tests of science and mathematics—conducted for 13-year-olds in over 50 countries between 1993 and 1998—showed Colombia with the second to worst results (see the Appendix of Lee and Barro, 1998).

Schooling quality is also often gauged by quantities of school inputs. Empirical studies tend to find a significantly positive relation between inputs and outcomes, although the outcome measures are more revealing when they are available. In particular, some studies show that more school resources, including smaller class sizes, enhance educational results (Lee and Barro, 1998). Table 4 contains data on pupil-teacher ratios at the primary and secondary levels for the five Andean countries for 1980, 1990, and 1995. Comparative data are also included for Argentina, Chile, and the United States. At the primary level, the pupil-teacher ratios in the Andean countries declined over time (thus suggesting improved educational quality). In most of the countries, the ratio dropped from about 35 in 1980 to about 25 in 1995. An exception is Bolivia, in which the ratio rose from 20 in 1980 to 25 in 1990. The average pupil-teacher ratio in the Andean region was about 25 in 1995, a figure close to that of 27 in Chile but above those of 18 in Argentina and 16 in the United States.

Secondary school pupil-teacher ratios also fell from 1980 to 1990, but changed little from 1990 to 1995. In 1995, the average ratios for the Andean countries were similar to those in Chile and the United States. However, there was significant variation across the Andean countries: in 1995, the secondary school pupil-teacher ratios were about 20 in Bolivia, Colombia, and Peru, but only 13 in Ecuador and 9 in Venezuela.

Table 4 also includes figures on the ratios of public expenditures on education to GDP. For the five Andean countries, the average of the ratios fell from 4.2 percent in 1980 to 2.3 percent in 1990, then rose to 4.2 percent in 1995. This anomaly results from the lack of data for Peru in 1990. Government spending on education as a share of the total budget showed similar changes over time. In 1995, educational outlays were about 20 percent of total government spending in the Andean countries.

In some of the Andean countries, the ratios of educational spending to GDP were higher than those in other Latin American countries. However, it is often argued that the educational outlays have been poorly allocated throughout Latin America. For one thing, this spending was biased toward primary and tertiary levels of education, with a relative neglect of secondary schooling (Inter-American Development Bank, 1999, p. 130). Furthermore, the resources have been allocated excessively to administrative areas, rather than to teaching personnel or equipment. Some argue that the school system in the Andean countries or Latin America in general operates quite inefficiently because of weak management capabilities and strong teachers unions. It may therefore be a good time to review the entire educational systems in these Andean countries.

CONCLUSIONS

Education is essential to the future competitiveness of the region. The Andean countries have made significant progress in the number of school years per pupil. The focus now needs to be on two main areas- improvement in access to secondary school and enhancement of the quality of education at all levels of schooling. Particular attention needs to be paid to secondary education that will help to produce the human capital stock needed for a transition of the region from dependence on natural resources to a manufacturing-oriented economy. More efforts should be given to the instruction of science, math, and technology subjects at the primary and secondary levels. This is a prerequisite for increasing the necessary human resource base for competitiveness. For the improvement of the educational quality, the level and effectiveness of educational inputs should be increased. Strengthening managerial and institutional capabilities throughout the educational system will be essential to the success of these efforts. At the university level, establishing research and development programs, for instance by building networks with the United States institutions of higher education and research, will be important. This base will permit the Andean countries to establish their own centers of research and development. These centers will create job opportunities in the countries and encourage educated individuals to invest in their human capital in the country.