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Ethnic and racial disparities in children's education

Comparative evidence from Ethiopia, India, Peru, and Viet Nam

Mohamed Arouri,[1] Adel Ben-Youssef,[2] and Cuong Nguyen[3]

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Abstract: We investigate whether there are racial and ethnic disparities in children's education in Ethiopia, India, Peru, and Viet Nam. We find that in all the four countries, and especially in Viet Nam, children from small ethnic groups have lower education attainment and cognitive ability. The gap in educational attainment and cognitive ability among ethnic children is larger than the gap in school enrolment, and the gap tends to be wider for older children. Using the Oaxaca-Blinder decomposition, we find that the main contribution to the gap in education between children from small ethnic groups and large ethnic groups in India, Peru, and Viet Nam is the difference in endowments (i.e. characteristics of children and their families) rather than in the coefficients of endowments. However, in Ethiopia, the difference in the coefficients contributes more than the difference in endowments to the gap in education. Child health, parental education, household expenditure, and an urban environment are important variables for explaining the gap in education between children from small and large ethnic groups.

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[1] Université d'Auvergne France, Clermont-Ferrand, France, corresponding author: mohamed.arouri@udamail.fr; [2] Groupe de Recherche en Droit, Économie, Gestion (GREDEG), Institut Supérieur d'Économie et Management (ISEM), and Université de Nice-Sophia Antipolis, Nice, France, adel.ben-youssef@gredeg.cnrs.fr; [3] National Economic University, and Mekong Development Research Institute, Hanoi, Viet Nam, cuuongwur@gmail.com.

1. Introduction

The literature is in agreement that there are significant disparities related to race and ethnicity, in access to health services and the labor market. An important source of income inequality within countries is the gap between ethnic majorities and ethnic minorities which impedes economic growth and poverty reduction (Alesina and Rodrik, 1994; Deininger and Squire, 1998; Levin and Bigsten, 2000). Compared to ethnic majorities, ethnic minorities often have lower income and consumption, and as a result, display higher poverty rates.

To a fair degree of consistency, race and ethnicity have been demonstrated to be among the major determinants of economic behavior. An extensive literature suggests that the economic differences observed among individuals and households may have ethnic and racial origins. For example, there is a large stream of literature demonstrating the differences between ethnicity and race for health outcomes (Satcher et al., 2005), access to the labor market and jobs (Zhu, 1993; Carmichael and Woods, 2000; Bertrand and Mullainathan, 2004; Richardson, 2008), education (Leslie, 2005; Thomas and Richardson, 2012; Fairlie et al., 2014), entrepreneurship and self-employment (Fairlie and Sundstrom, 1999; Fairlie, 2004; Ahn, 2011) and consumption. Several multi-ethnic countries such as the U.S., the U.K, the Netherlands, South Africa and Brazil (Fairlie, 2004; Lam et al., 2011) have been studied in depth.

Many studies provide evidence of racial discrimination in the labor market in both developed and developing countries (e.g., see Becker, 1971; Bertrand and Mullainathan, 2004; Rooth, 2007; Mateos et al., 2007). Bertrand and Mullainathan (2004), based on an experiment, find that differential treatment by race remains prominent in the U.S. labor market. Their findings are in line with those in Darity and Mason (1998) which finds substantial racial disparities in the U.S. labor market. Bertrand and Mullainathan (2004) also argue that racial discrimination is masked and rationalized by the widely held assumption of black inferiority. Elu and Loubert (2013) find that in Tanzania ethnicity and gender matter in the job market, and across the earnings distribution, and that market ethnicity inequality is persistent. One factor which may play a major role in racial disparity in the labor market and in incomes is the racial disparity in education. A large number of studies show that there is an education gap between minority and majority ethnic communities within some countries. For example, in the U.S., there is a large gap in the reading and mathematics scores of black and

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white people (Fryer and Levitt, 2004; Barton and Coley, 2010). Reducing the education gap among ethnic groups can help to reduce the income gap, and to reduce inequality in the long term. Education is a powerful tool for economic development, social progress and reduction of inequalities. Increasing the level of education for 'disadvantaged' ethnic minorities allows them to achieve better life outcomes such as jobs, earnings, health, and offspring's health and achievement. Reducing the education gap could help to reduce intersecting inequalities (Arauco et al., 2014).

Understanding the education gap among children from different ethnic groups is important for both researchers and policy makers. The objective of this paper is to examine whether there is a disparity in children's education performance between ethnic groups in four developing countries on three different continents: Ethiopia, India, Peru and Viet Nam. We believe that these four countries (Ethiopia, India, Peru and Viet Nam) offer interesting cases since all are characterized by significant minority ethnic communities with large inequalities in welfare between ethnic groups. The availability of data on children's education from a Young Lives project allows us to investigate disparity in education attainment and also children's cognitive skills, in the ethnic groups in these countries.

Our paper makes at least three major contributions to the literature. Firstly, despite progress in research on ethnic and racial disparities in children's education, prior studies have paid limited attention to examining test scores and the variation in these scores in relation to ethnic and racial disparities. Consequently, the question of how race and ethnicity affect test scores (as a measure of children's education attainment) has not been examined extensively despite the fact that such comparisons could add to our understanding of how structural forces operate in different social contexts. Secondly, in addition to geographical and cultural differences, we highlight how family structure and the child's environment affect their achievement. We argue that the difference in achievement is mostly explained by the children's endowments and less by their environment. Thirdly, we exploit unique and rich data from the Young Lives project, and employ the Oaxaca-Blinder decomposition technique to assess the gap in children's education between ethnic communities, and identify the associated factors. Specifically, we decompose the education gap between ethnic minority children and ethnic majority children to understand its sources. In contrast to studies which focus on the racial gap in the labor market, we focus on the ethnic gap in children's education.

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The findings from the study should be useful to policy makers designing policies to improve the education of ethnic minority children in developing countries.

The remainder of the paper is organized as follows. Section 2 briefly reviews the literature on racial and ethnic disparities in education. Section 3 describes the data sets used for the study, discusses the percentages in the data sample of children from small ethnic groups, and compares education outcomes for children from small and large ethnic groups. Sections 4 and 5 discuss the method and the results of the decomposition analysis of children's education attainment, and section 6 concludes the paper.

2. Racial and ethnic disparities in education literature

Several studies estimate the effect of ethnicity and race on education achievement. Leslie (2005), in the context of the U.K. finds that students from ethnic minorities have a lower chance of achieving a higher degree. This is due to their lower prior qualifications and the choice of subjects associated with a low probability of degree achievement. Zorlu (2013) studies the Netherlands and finds that ethnic minorities from non-European countries have significantly lower degree performance and a higher risk of dropping out of a degree course. The results are similar for the U.S. (Strayhorn, 2010; Warikoo and Carter, 2009; Kao and Thompson, 2003). Fairlie et al. (2014) use data from large and diverse community college and find racial interactions between students and instructors. Performance gaps in terms of dropout rates and grade performance between white and underrepresented minority students fall by 20 percent to 50 percent if an underrepresented minority student is taught by an underrepresented minority instructor. Arcidiacono and Koedel (2014) make use of micro-data from Missouri in order to explain graduation from four-year courses in public universities. They find that a major explanatory factor is pre-entry skills which explain 65 percent and 86 percent respectively of the gap for women and men.

Since children's education is a key factor in human capital formation and success among ethnic minorities, social science researchers have emphasized the important role of early childhood investment in education and the returns from education (Campbell et al., 2014; Heckman, 2012). In particular, they examine the potential factors influencing children's education (Becker, 1965; Behrman et al., 1999; Filho, 2008). Some of the most common

determinants of children's education according to empirical studies are household income, parental education, care from parents and caregivers, and the demographic characteristics of the child and other household members.

Children's education achievement depends on parental investment. Parents play a pivotal role in a child's education. Currie and Thomas (1995) demonstrate that mother's education level influences her child's cognitive achievement test scores. In addition, children from minority ethical communities may lack social capital. Social capital refers to productive relationships or networks which provide access to opportunities or lead to favorable outcomes (Coleman, 1988). Several authors demonstrate the role of social capital in children's education attainment; it applies particularly to higher education but also plays a role in primary education.

Another important explanation of children's education achievements is the family structure (Becker and Lewis, 1973; and Becker and Tomes, 1976) which can differ substantially from one ethnic group to another. A preference for having more children reduces the amount of money spent on each child's education which decreases their expected productivity and the probability of education success. At the same time in some ethnic or racial groups, lack of resources induce a preference in the family for immediate revenue to help the household and children may be forced to be more involved in working for and helping the family rather than studying or reading. Girls in particular may have little time to do school homework. Some ethnic minorities have high rates of parental divorce or separation which has an impact on the development and education of the children involved. The presence/absence of the mother/ father is important for the child's achievement, while informal education gleaned from elderly household members is also very important and can complement the formal education received at school. The value put on education also can differ from one ethnicity to another. Roland and Levitt (2013) using a nationally representative dataset for the U.S. find that differences in the environment between racial groups can explain gaps in children's intelligence. The child's environment is an important determinant of school achievement. Finally, the health-education nexus needs to be considered; there is a broad consensus that nutrition and health play important roles in children's education (Jackson, 2009). Ethnic minorities may lack the resources to invest in

health and nutrition, and poor health and poor nutrition in early childhood can affect the development of the child and his or her education outcomes.

Among the four countries studied in this paper, empirical evidence of ethnic inequality is lacking in the case of Ethiopia but is more available for the other three countries. There is agreement that ethnic inequality is persistent in Peru. According to Snyder (2009), the inequalities in the Peruvian educational system are rooted not only in economic inequality but also in the indigenous-non-indigenous divide. The marginalization of indigenous people in Peru is correlated to low allocation of educational resources for the indigenous population. Pasquier-Doumera and Risso-Brandonb (2015) show that in Peru, socio-economic status predicts the level of aspiration which affects progress in language acquisition. Aspiration promotes the persistence of inequality between ethnic groups, exacerbating the effect of socio-economic status on education achievement.

The case of India is more complex and involves disparities based on caste and religion. While the Indian Constitution which came into force in 1947 committed to equalizing opportunities across castes, several authors show that inequalities continue to persist (Deshpande, 2000a, 2000b; Desai and Kulkani, 2008). Deshpande (2000a) shows that in the case of Kerala, an egalitarian state, inter-caste disparity continues to underlie disparity more generally. Desai and Kulkani (2008) show that Indian society continues to suffer from substantial inequalities in education despite positive discrimination policies.

Several studies provide evidence of a wide gap in welfare between ethnic minorities and the ethnic majority (Kinh ethnic group) in Viet Nam (e.g., Baulch et al., 2004, 2012; Pham et al., 2010). Even within the poorer areas where ethnic minorities account for a large proportion of the population, the Kinh majority fares better than the ethnic minorities (Nguyen et al., 2015). Baulch et al. (2004, 2012) show that inequality in education is one of the main factors in inequality of wages and income.

3. Data sets and descriptive analysis

3.1. Data sets

A large number of household surveys provide data on children's education. Comparable data on cognitive ability tests such as vocabulary and mathematic tests across countries are less

common. For the present study, we use data on children from the Young Lives project. The Young Lives study was established to study child poverty. It is coordinated by the Department of International Development at the University of Oxford, and has collected data on nearly 12,000 children and their families in Ethiopia, India, Peru and Viet Nam over 15 years.[2] These countries were selected from a shortlist of 25 countries based on the criterion of a diverse social-economic and political system (Young Lives, 2011). The four countries include low- and middle-income countries, and are on three different continents.

The Young Lives study provides data on two cohorts of children. In each country, the younger cohort includes 2,000 children born in 2001 and 2002, and the older cohort (with the exception of Peru) includes 1,000 children born in 1994 and 1995. In the case of Peru, the older cohort includes only 700 children. In each country, the sampled children were selected randomly from 20 sites in poor areas (sites are equivalent to districts). Within each site, sampling enumeration areas such as communes or villages were also drawn randomly, and the children were similarly sampled randomly from these enumeration areas. The sites were selected from across the whole country in the cases of Ethiopia, Peru and Viet Nam; in India the sites are selected from Andhra Pradesh.[3] Since Andhra Pradesh is not representative of the whole of India, the findings for India should be interpreted with caution.

It should be noted that the Young Lives data are not nationally representative. Thus, the estimates using these data are not comparable with estimates based on other nationally representative surveys. Instead, the estimates based on the Young Lives data should be closer to the estimates of the poor children in the four countries.

The data available so far are from three survey rounds in 2002, 2006/2007 and 2009/2010. Our study uses data on the older cohort from the second and third surveys; the first round of surveys and the younger cohort surveys did not provide data on children's cognitive skills tests. As reported in Table A.1. in Appendix, the total number of observations used in this study is 1,953 for Ethiopia, 1,969 for India, 1,360 for Peru and 1,964 for Viet Nam.

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[2] Detailed information on this study can be found at http://www.younglives.org.uk/

[3] For more details of the sampling design, see Young Lives Project (2011) and related documents cited in this paper.

The Young Lives data sets provide a range of information on the education and health of children. Per capita consumption expenditure on randomly is measured, and the Young Lives surveys ask about parental characteristics including age, education, employment and wages. Household income data are also available. The education tests include mathematics and literature tests which are designed in the same way in all four countries making the education tests comparable.

3.2. Ethnic groups and education system

Ethiopia, India, Peru and Viet Nam are all ethnically diverse. For each country we classify children into small ethnic and large ethnic groups. Ethiopia has more than 80 different ethnic groups the largest being Amhara and Oromo, each accounting for around 30 percent of the total population. Based on the information on ethnic groups from the Young Lives project, we define small ethnic groups as groups including less than 6 percent of the total population. India has more than 2,000 ethnic groups which are defined based on language and religion. In this study, small ethnic groups consist of children from recognized castes and tribes. The largest ethnic groups in Peru are Mestizo and Amerindians / Andean Indian which account respectively for 45 percent and 32 percent of the population of Peru. In this study, Mestizo and Amerindians / / Andean Indian are defined as large ethnic groups. Those large ethic groups account for 77% of the total population and more than 90% of children in our sample. The large ethnic group also includes white children from rich households. Viet Nam has 54 ethnic groups among which the Kinh (Vietnamese) accounts for 85 percent of the total population. Kinh children are defined as belonging to a large ethnic group with the children from the remaining 53 groups defined as the small ethnic group.

The four countries have different primary education systems despite some similarities. They all have an education system of 12 years including primary and secondary education. Stating from 1994, Ethiopia has an 8-2-2 formal education structure where the official entry age is seven in primary school. The students need to pass eight grades. Secondary school is composed of two cycles: lower secondary and upper secondary. The lower secondary is composed of grades 9-10, while the upper secondary consists of grades 11-12. Ethiopian primary education school is compulsory and free. Students need to pass the Primary School Certificate Examination (PSCE) at the end of grade 8. They also pass the General Secondary Education Certificate Examination (GSECE) at the end of grade 10. Finally they need to

obtain their Higher Education Entrance Certificate Examination (HEECE) at the end of grade 12 (UNESCO, 2010).

In India, the primary stage consists of Classes I to V. i.e. of five years duration, in 20 States including Andra Pradesh. Age limit for class I is 5.5 to 6.5 years, for class II is 6.5 to 7.5 years and so on. Normally, the enrolment in primary school starts from 6 years old and continues to 14 years old. Secondary school includes grades IX and X, and Senior Secondary includes grades XI and XII.

Peru has the school system is 12 years in duration. It splits into the following four stages: one year of compulsory pre-school education (*educación inicial*) at age of 5; 6 years of primary school (*educación primaria*), aged 6-11; and 5 years of secondary school (*educación secundaria*) during age 12-16; and 2 years of general secondary education, followed by 3 years of academic secondary (arts or science) or 3 years of technical secondary education.

The education system in Viet Nam also includes 12 years of primary and secondary education. Children in Viet Nam also start primary school at 6 years old and complete secondary school at 18 years old. The secondary education is split into lower-secondary school (grades from 6 to 9), and upper-secondary school (grades from 10 to 12).

3.3. Descriptive statistics

Figure 1 presents the share of children in small and large ethnic groups as understood in this study. The percentage of children in small ethnic groups is 13.7 in Ethiopia, 32.2 in India, 2.9 in Peru and 12.9 in Viet Nam. The sample sizes for Peru are quite small. In the Young Lives data for Peru, the children are classified into three groups including white Peruvian (4.2 percent), Mestizo and Amerindians / Andean Indian (92.9 percent) and native of the Amazon (2.9 percent). The white Peruvian group has the highest income and living standards, and the natives of the Amazon the lowest income and living standards. For the purposes of our study, the ethnic minority group is native of the Amazon. They are not representative of all ethnic minorities in Peru. In addition, since the number of observations for this group is small, the findings should be interpreted with caution.

Figure 1: Share of children in small and large ethnic groups
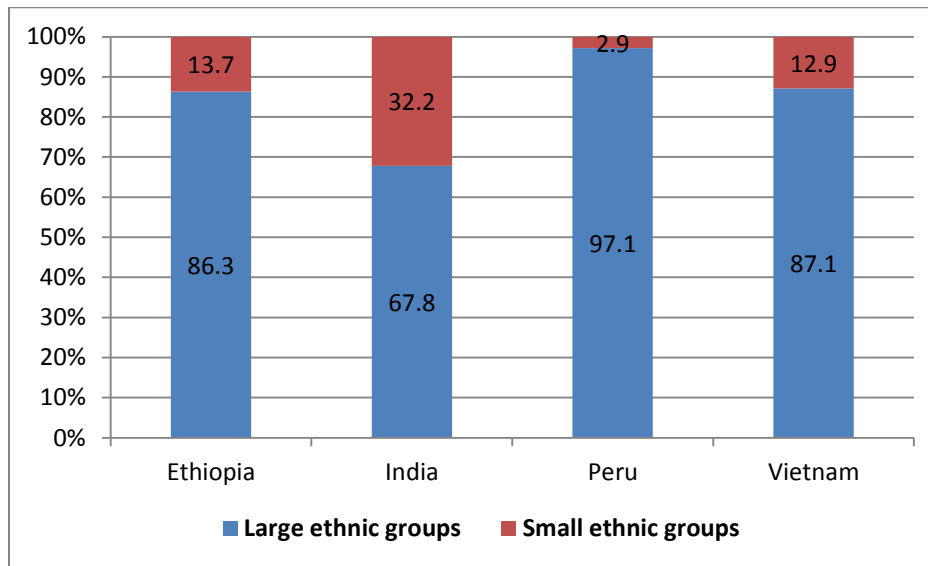
Table 1 presents school enrolment and number of completed grades for children in the four countries in the two survey rounds considered. Several points should be noted. Firstly, in all four countries, the children from the small ethnic groups have lower educational attainment than the children from large ethnic groups. Secondly, the gap in the number of completed grades between small ethnic group and large ethnic group children tends to mirror the gap in school enrolment. Small ethnic group children have more repeated grades than large ethnic group children. Thirdly, the education attainment gap is higher in the third round compared to the second survey round which indicates that children from small ethnic groups are more likely than children from large ethnic groups to drop out overtime.

Among the four countries, Viet Nam has the highest education attainment for children. However, there is a large gap in educational attainment between the small ethnic group children and the large ethnic group children. For example, in the third survey round, school enrolment rates for small and large ethnic group children are 50.4 percent and 79.4 percent, respectively, and the respective numbers of completed education grades for small and large ethnic group children are 7.0 and 8.3. The gap in the educational attainment of children from large and small ethnic groups is lower in India and Ethiopia.

Table 1: School enrolment and number of completed grades

Countries	Percentage of children being enrolled in school				The number of completed education grades			
	The second survey round		The third survey Round		The second survey round		The third survey round	
	Small ethnic groups	Large ethnic groups	Small ethnic groups	Large ethnic groups	Small ethnic groups	Large ethnic groups	Small ethnic groups	Large ethnic groups
Ethiopia	92.5	95.1	88.1	89.5	1.9	3.4	4.0	5.7
	(2.1)	(1.2)	(1.7)	(2.2)	(0.3)	(0.2)	(0.3)	(0.2)
India	85.3	90.5	75.5	77.9	5.4	5.7	7.8	8.2
	(2.8)	(1.8)	(4.0)	(2.7)	(0.1)	(0.1)	(0.1)	(0.2)
Peru	100.0	98.9	78.9	92.3	4.5	4.9	5.4	7.3
	(0.0)	(0.3)	(1.6)	(1.3)	(0.0)	(0.1)	(0.2)	(0.2)
Viet Nam	85.2	98.3	50.4	79.4	4.7	5.7	7.0	8.3
	(4.0)	(0.6)	(3.3)	(2.2)	(0.3)	(0.1)	(0.3)	(0.1)

Standard errors in parentheses.
Source: authors' estimation based on Young Lives data sets.

Table 2 presents the results for cognitive ability tests. The math test in the second round and third round surveys included 10 and 30 items, respectively, and the range of math scores is from 0 to 10 in the second round survey, and from 0 to 30 in the third round survey. The test focuses on addition, subtraction, multiplication, division, division and square roots, and mathematical problem solving. It was designed based on items from the Trends in International Mathematics and Science Study developed by the International Evaluation Association in 2003 (see Cueto et al., 2008 and Cueto and Leon, 2012 for detailed information on the test).

The second test is a widely-used test of receptive vocabulary called the Peabody Picture Vocabulary Test (PPVT). For each item, there are four pictures on a page, each of which has a number. The interviewer describes one of the four pictures verbally, and asks the child to point to the corresponding picture. The PPVT has been found to be strongly correlated with commonly used intelligence measures (e.g. Campbell et al., 2001; Campbell, 1998). The PPVT test applied to Ethiopia, India and Viet Nam includes 204 items, and range of scores is from 0 to 204. For Peru, the Latin America PPVT-R was applied; this consists of 125 items with the scores ranging from 0 to 124.

The findings presented in Table 2 reflect the findings in Table 1. Children from small ethnic groups achieve lower math and PPVT test scores than children from large ethnic groups, and the gap between them increased from the second to the third survey round. Vietnamese children tend to achieve the highest math score, followed by Peru. The lowest

math score was for Ethiopian children. The math scores increased between the two survey rounds because the number of questions in the surveys increased from 10 to 20.

Table 2: PPVT test score and math test score

Countries	PPVT test score				Math test score			
	The second survey round		The third survey round		The second survey round		The third survey round	
	Small ethnic groups	Large ethnic groups	Small ethnic groups	Large ethnic groups	Small ethnic groups	Large ethnic groups	Small ethnic groups	Large ethnic groups
Ethiopia	61.8	78.1	137.7	152.4	3.7	5.1	2.8	5.6
	(5.3)	(3.4)	(5.5)	(4.8)	(0.4)	(0.2)	(0.5)	(0.4)
India	89.2	90.8	115.9	128.3	5.5	5.8	7.0	9.5
	(4.4)	(2.6)	(3.3)	(3.4)	(0.3)	(0.2)	(0.4)	(0.6)
Peru	61.0	73.0	87.1	97.0	4.6	5.8	10.4	13.2
	(0.5)	(2.1)	(1.0)	(2.2)	(0.3)	(0.2)	(0.6)	(0.6)
Viet Nam	104.6	142.3	132.4	170.8	5.3	7.8	11.0	18.6
	(12.5)	(2.2)	(9.0)	(2.7)	(0.3)	(0.1)	(1.0)	(0.7)

Standard errors in parentheses.
Source: authors' estimation based on Young Lives data sets.

4. Estimation methodology

To examine whether ethnic minority children have lower education achievement than ethnic majority children, we estimate the following econometric model:

$$Y_{it} = \beta_0 + S_i\beta_1 + X_{it}\beta_2 + T_t\beta_3 + v_{it}, \qquad (1)$$

where Y_{it} is the education performance of child i in the year t. S_i is the variable for the child's ethnicity (small ethnic groups = 1, large ethnic groups = 0). The control variables, X include children's and parents' characteristics, household composition and a dummy for urban. T_t is the time variable, which is equal to 1 for the third survey round and 0 for the second survey round. v_{it} are unobserved variables. The racial gap in educational attainment of children is measured by the coefficient of S_i. We will estimate model (1) separately for each of the four countries.

We use the well-known Oaxaca-Blinder decomposition technique to examine the factors associated with this gap in education between small ethnic group children and large ethnic group children (Blinder, 1973; Oaxaca, 1973). We run separate education test score

regressions for the explanatory variables for small ethnic group and large ethnic group children:

$$Y_s = \alpha_s + X_s \beta_s + \varepsilon_s, \tag{2}$$

$$Y_l = \alpha_l + X_l \beta_l + \varepsilon_l. \tag{3}$$

For simplicity, t subscript i is dropped. Subscripts 's' and 'l' denote small ethnic group children and large ethnic group children, respectively.

The Oaxaca-Blinder decomposition technique is widely used to decompose gaps in the dependent variable between two groups, into a gap due to differences in the explanatory variables, and a gap due to differences in the coefficients of the explanatory variables. The estimator for the gap in education performance is represented as follows:

$$\begin{aligned} \Delta \hat{E}[Y] &= \hat{E}[Y_l] - \hat{E}[Y_s] \\ &= \left(\hat{\alpha}_l + \overline{X}_l \hat{\beta}_l \right) - \left(\hat{\alpha}_s + \overline{X}_s \hat{\beta}_s \right) \\ &= \left(\overline{X}_l - \overline{X}_s \right) \hat{\beta}_s + \left[\left(\hat{\beta}_l - \hat{\beta}_s \right) \overline{X}_s + \left(\hat{\alpha}_l - \hat{\alpha}_s \right) \right] + \left(\overline{X}_l - \overline{X}_s \right) \left(\hat{\beta}_l - \hat{\beta}_s \right), \end{aligned} \tag{4}$$

where $\hat{\alpha}$ and $\hat{\beta}$ are estimators of the parameters in regressions (2) and (3). $\overline{X}_l$ and $\overline{X}_s$ are the average of the explanatory variables for large ethnic group children and small ethnic group children, respectively.

The first term in equation (4) is the gap in education attainment between small ethnic group children and large ethnic group children, resulting from the difference in children's and families' characteristics. This is described as the endowment effect. The second term is the difference in educational attainment due to differences in the coefficients of the explanatory variables in the regression models. It can be explained as the difference from the gap in the effect of family characteristics on children's educational attainment between small ethnic group children and large ethnic group children. The third term is an interaction term accounting for the simultaneous existence of differences in endowments and the coefficients of the two groups.

Note that the decomposition in (4) is from the perspective of small ethnic group children (Jann and Zurich, 2008). The endowment effect is the difference in the mean explanatory variables weighted by the coefficients of the small ethnic group children, and the

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effect of 'coefficient differences' is weighted by the mean explanatory variables for the small ethnic group children.

We estimate models (1), (2) and (3) using ordinary least squares (OLS). A problem which arises with OLS is endogeneity of the explanatory variables such as education and household composition. A method commonly adopted to address this endogeneity bias is instrumental variable regression. This method requires an instrument which is strongly correlated to an endogenous explanatory variable but not with the error terms in the equation including the dependent variables. Identifying appropriate instruments can be difficult and we were not able to find the right ones. Thus, in the case of the endogenous explanatory variables, the regression findings and the results of the decomposition analysis should be interpreted as an association between the endogenous explanatory variables and the dependent variables rather than causal effects.

5. Empirical results

5.1. The effect of ethnicity on children's education

Tables 3 to 6 present the regressions for children's educational attainment and cognitive ability tests, on ethnicity and the other control variables for Ethiopia, India, Peru and Viet Nam. We test two models for each dependent variable. The smaller model includes three independent variables for age, gender and an urban environment, and a dummy indicating belonging to a small ethnic group. This model simply compares the education variables for small ethnic group and large ethnic group children. The larger model includes additional control variables for parents' socio-economic characteristics, family structure, children's health and nutrition, the log of per capita expenditure and a dummy for urban.[4] Children's health is measured by a height-for-age z-score and a BMI-for-age z-score.

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[4] Due to data unavailability, two explanatory factors generally considered in the literature are not discussed here. These are the characteristics of teachers, and the resources devoted to the education (school characteristics, school equipment, school environment). Teachers' attitudes, education and investment in the education experience affect children's achievement. At the same time, the resources invested by the school in the education experience, such as multimedia resources, pedagogical resources, and classroom size, play a prominent role in education outcomes.

The PPVT and math score ranges differ across survey rounds and countries. To compare the country results, we standardize the test scores to the 0 to 100 scale using the following simple formula:

$$Score100_i = 99*(score_i\text{-}score_{min})/(\ score_{max}\text{ - }score_{min})+1,$$

where $score100_i$ is the standardized score of child i; $score_i$ is the original score of child i; and $score_{min}$ and $scora_{max}$ are the min and max of the scores in the sample. In this section, the standardized scores of the PPVT and math tests are used in all the regressions.

Table 3 shows that Ethiopian children from small ethnic groups have fewer completed grades and score lower for the cognitive ability tests. The small and large models are quite similar which implies that the additional control variables do not explain much of the difference in education achievement between small ethnic group children and large ethnic group children.

Table 3: OLS regressions of children's education in Ethiopia

Explanatory variables	Enrolled in school		Number of grades		PPVT test score		Math test score	
	Small model	Large model	Small model	Large model	Small model	Large model	Small model	Large model
Small ethnic groups' children	0.007	-0.000	-1.207***	-1.168***	-5.02***	-4.65***	-9.47***	-9.30***
	(0.020)	(0.020)	(0.118)	(0.108)	(1.317)	(1.303)	(1.538)	(1.499)
Gender (male=1, female=0)	-0.028**	-0.023*	-0.207***	-0.044	1.97**	2.61***	3.78***	4.46***
	(0.012)	(0.012)	(0.078)	(0.074)	(0.882)	(0.883)	(1.020)	(1.050)
Age in months	-0.007***	-0.006***	0.006	0.015	0.28**	0.34***	-0.01	0.03
	(0.002)	(0.002)	(0.011)	(0.010)	(0.119)	(0.118)	(0.143)	(0.142)
Height-for-age z-score		0.009*		0.352***		1.31***		1.79***
		(0.005)		(0.033)		(0.337)		(0.404)
BMI-for-age z-score		-0.007		0.081**		0.82**		0.81*
		(0.005)		(0.035)		(0.365)		(0.445)
Living with mother (yes=1)		0.058**		0.206		1.43		2.69
		(0.028)		(0.177)		(1.807)		(2.136)
Mother's age		-0.000		0.006		0.04		0.01
		(0.001)		(0.005)		(0.047)		(0.053)
Mother's education years		-0.001		-0.005		0.12		0.06
		(0.002)		(0.012)		(0.136)		(0.168)
Living with father (yes=1)		0.080***		0.051		-2.97		-2.20
		(0.030)		(0.162)		(1.827)		(1.947)
Father's age		-0.001**		-0.002		0.01		0.03
		(0.001)		(0.003)		(0.033)		(0.036)
Father's education years		-0.001		0.040***		0.40***		0.49***
		(0.002)		(0.012)		(0.139)		(0.165)
Household size		0.003		-0.055**		0.13		0.02
		(0.004)		(0.022)		(0.256)		(0.292)
Proportion of boys in hh.		-0.020		-0.224		-5.41*		-2.28
		(0.047)		(0.261)		(2.934)		(3.328)
Proportion of girls in hh.		-0.058		0.064		-2.23		3.61

Explanatory variables	Enrolled in school		Number of grades		PPVT test score		Math test score	
	Small model	Large model	Small model	Large model	Small model	Large model	Small model	Large model
		(0.047)		(0.271)		(3.058)		(3.454)
Proportion of elderly in hh.		-0.007		-0.060		1.91		2.13
		(0.074)		(0.398)		(4.199)		(4.715)
Log of per capita expenditure		0.017		0.318***		5.50***		5.02***
		(0.013)		(0.077)		(0.843)		(1.020)
Urban (urban=1, rural=0)	0.084***	0.084***	1.249***	0.946***	19.42***	15.68***	12.42***	9.47***
	(0.012)	(0.014)	(0.082)	(0.091)	(0.921)	(1.043)	(1.077)	(1.181)
Dummy for third round survey	0.178***	0.158**	2.091***	1.788***	2.89	0.52	-31.99***	-33.92***
	(0.064)	(0.064)	(0.393)	(0.376)	(4.249)	(4.219)	(5.130)	(5.087)
Constant	1.891***	1.646***	2.045	-0.073	7.17	-24.15	51.11**	21.90
	(0.259)	(0.268)	(1.589)	(1.574)	(17.335)	(17.841)	(20.671)	(21.271)
Observations	1,953	1,946	1,953	1,946	1,915	1,910	1,923	1,916
R-squared	0.042	0.057	0.403	0.478	0.283	0.324	0.394	0.422

Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1.
Source: authors' estimation based on Young Lives data sets.

In India, there are no differences in the enrolment rates of small and large ethnic group children. However, small ethnic group children have fewer completed grades and lower cognitive ability test scores. Unlike Ethiopia, when explanatory variables are controlled for in the regression, the differences in the education variables between small ethnic group children and large ethnic group children are smaller and not statistically significant. This suggests that the difference in education between ethnic groups can be explained by differences in other explanatory variables.

Table 4: OLS regressions of children's education in India

Explanatory variables	Enrolled in school		Number of grades		PPVT test score		Math test score	
	Small model	Large model	Small model	Large model	Small model	Large model	Small model	Large model
Small ethnic groups' children	-0.025	0.019	-0.344***	-0.107	-2.36**	-0.36	-4.83***	-1.69
	(0.019)	(0.019)	(0.082)	(0.085)	(1.079)	(1.074)	(1.257)	(1.238)
Gender (male=1, female=0)	0.042**	0.042***	0.034	-0.016	5.38***	5.31***	5.24***	5.46***
	(0.016)	(0.016)	(0.072)	(0.070)	(0.962)	(0.922)	(1.121)	(1.060)
Age in months	-0.011***	-0.009***	0.029***	0.037***	-0.30**	-0.16	-0.35**	-0.15
	(0.002)	(0.002)	(0.009)	(0.008)	(0.118)	(0.116)	(0.137)	(0.134)
Height-for-age z-score		-0.005		0.187***		1.93***		1.35***
		(0.008)		(0.033)		(0.433)		(0.506)
BMI-for-age z-score		0.000		0.011***		0.10***		0.12***
		(0.000)		(0.002)		(0.026)		(0.029)
Living with mother (yes=1)		0.066		0.303		-5.61**		0.19
		(0.049)		(0.227)		(2.650)		(3.068)
Mother's age		-0.001		-0.013*		0.13		-0.08
		(0.002)		(0.007)		(0.079)		(0.088)
Mother's education years		0.006***		0.038***		1.20***		1.38***
		(0.002)		(0.010)		(0.147)		(0.171)
Living with father (yes=1)		0.153***		0.748***		5.17**		7.96***

Explanatory variables	Enrolled in school		Number of grades		PPVT test score		Math test score	
	Small model	Large model	Small model	Large model	Small model	Large model	Small model	Large model
		(0.041)		(0.183)		(2.097)		(2.396)
Father's age		-0.003***		-0.009*		-0.19***		-0.23***
		(0.001)		(0.005)		(0.058)		(0.067)
Father's education years		0.010***		0.013		0.46***		0.63***
		(0.002)		(0.008)		(0.123)		(0.143)
Household size		-0.002		-0.014		-0.19		-0.47
		(0.004)		(0.021)		(0.277)		(0.294)
Proportion of boys in hh.		-0.140**		-1.085***		-4.67		0.79
		(0.069)		(0.322)		(4.202)		(4.472)
Proportion of girls in hh.		-0.143*		-0.659**		0.72		3.26
		(0.078)		(0.329)		(4.206)		(4.943)
Proportion of elderly in hh.		0.155**		1.372***		5.20		5.88
		(0.076)		(0.314)		(4.527)		(4.847)
Log of per capita expenditure		0.031*		0.068		-1.04		1.03
		(0.016)		(0.066)		(0.894)		(0.975)
Urban (urban=1, rural=0)	0.086***	0.029	0.106	-0.130	9.04***	2.49**	7.74***	0.09
	(0.017)	(0.018)	(0.083)	(0.084)	(1.052)	(1.121)	(1.284)	(1.324)
Dummy for third round survey	0.237***	0.175***	1.557***	1.311***	-3.50	-7.67**	-30.33***	-35.55***
	(0.065)	(0.064)	(0.274)	(0.264)	(3.808)	(3.719)	(4.522)	(4.355)
Constant	2.539***	1.970***	1.422	-0.120	111.2***	102.5***	121.0***	88.85***
	(0.300)	(0.316)	(1.289)	(1.325)	(17.550)	(18.295)	(20.388)	(20.881)
Observations	1,969	1,959	1,969	1,959	1,914	1,904	1,955	1,945
R-squared	0.056	0.116	0.375	0.431	0.136	0.221	0.427	0.491

Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1.
Source: authors' estimation based on Young Lives data sets.

In Peru, the differences in education between small ethnic group children and large ethnic group children are small and not statistically significant in both the smaller and the larger models (Table 5). It should be noted that in the descriptive analysis presented in Tables 1 and 2, the education variables are smaller for children from small ethnic groups compared to those from large ethnic groups. However, if we control for urban, gender and age in the smaller model, the differences between ethnic groups are no longer significant. This means that the gap in education between the two ethnic groups can be explained by these control variables.

Table 5: OLS regressions of children's education in Peru

Explanatory variables	Enrolled in school		Number of grades		PPVT test score		Math test score	
	Small model	Large model	Small model	Large model	Small model	Large model	Small model	Large model
Small ethnic groups' children	-0.043	-0.039	-0.562	-0.546	1.24	0.28	0.21	-1.13
	(0.048)	(0.048)	(0.410)	(0.410)	(2.339)	(2.181)	(4.170)	(3.954)
Gender (male=1, female=0)	-0.019*	-0.017	-0.255***	-0.272***	1.67***	1.52***	1.01	0.95
	(0.011)	(0.010)	(0.094)	(0.089)	(0.618)	(0.568)	(1.060)	(0.989)
Age in months	-0.002*	-0.002*	0.056***	0.055***	0.23***	0.19***	0.40***	0.37***
	(0.001)	(0.001)	(0.009)	(0.009)	(0.060)	(0.059)	(0.119)	(0.111)
Height-for-age z-score		0.005		0.151***		1.53***		2.58***
		(0.004)		(0.043)		(0.304)		(0.516)
BMI-for-age z-score		-0.012**		-0.071		0.42		0.28
		(0.005)		(0.047)		(0.349)		(0.487)
Living with mother (yes=1)		-0.045		0.422		2.45		-1.88
		(0.061)		(0.513)		(2.935)		(5.194)
Mother's age		0.001		-0.012		-0.06		-0.05
		(0.001)		(0.011)		(0.061)		(0.114)
Mother's education years		0.003*		0.054***		0.41***		0.70***
		(0.002)		(0.014)		(0.085)		(0.151)
Living with father (yes=1)		0.086		0.075		-2.81		-2.28
		(0.057)		(0.449)		(2.581)		(4.653)
Father's age		-0.001		-0.002		-0.04		-0.11
		(0.001)		(0.009)		(0.052)		(0.099)
Father's education years		0.001		0.036**		0.41***		0.88***
		(0.002)		(0.015)		(0.103)		(0.162)
Household size		-0.002		-0.043		-0.09		-0.25
		(0.003)		(0.027)		(0.181)		(0.319)
Proportion of boys in hh.		-0.029		-0.411		-1.55		5.19
		(0.039)		(0.333)		(2.301)		(4.147)
Proportion of girls in hh.		-0.041		-0.804**		-0.49		1.44
		(0.048)		(0.396)		(2.383)		(4.238)
Proportion of elderly in hh.		0.060		0.586		1.69		3.19
		(0.045)		(0.372)		(2.481)		(4.584)
Log of per capita expenditure		0.022**		0.152*		2.07***		2.27**
		(0.010)		(0.088)		(0.534)		(0.958)
Urban (urban=1, rural=0)	0.042***	0.020	0.831***	0.327**	11.22***	6.25***	16.88***	8.81***
	(0.016)	(0.019)	(0.130)	(0.149)	(0.805)	(0.878)	(1.350)	(1.456)
Dummy for third round survey	-0.010	-0.005	0.609**	0.679**	-15.28***	-13.80***	-38.98***	-37.37***
	(0.034)	(0.032)	(0.286)	(0.284)	(1.945)	(1.868)	(3.757)	(3.502)
Constant	1.268***	1.163***	-3.884***	-4.119***	38.72***	39.91***	-0.89	0.50
	(0.158)	(0.156)	(1.380)	(1.463)	(8.851)	(9.083)	(17.654)	(17.592)
Observations	1,360	1,354	1,360	1,354	1,322	1,321	1,344	1,340
R-squared	0.041	0.065	0.353	0.413	0.253	0.359	0.388	0.467

Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1.
Source: authors' estimation based on Young Lives data sets.

Compared with other countries, the gap in education between small ethnic group children and large ethnic group children in Viet Nam is larger. The dummy for small ethnic groups has a larger magnitude and is statistically significant in all the models (Table 6).

Controlling for a large set of the explanatory variables reduces the gap in education between small ethnic group children and large ethnic group children although it remains very large and significant.

Table 6: OLS regressions of children's education in Viet Nam

Explanatory variables	Enrolled in school		Number of grades		PPVT test score		Math test score	
	Small model	Large model	Small model	Large model	Small model	Large model	Small model	Large model
Small ethnic groups' children	-0.197***	-0.062*	-1.137***	-0.509***	-22.27***	-12.75***	-24.25***	-9.03***
	(0.029)	(0.033)	(0.129)	(0.132)	(1.651)	(1.600)	(1.793)	(1.905)
Gender (male=1, female=0)	-0.036**	-0.042***	-0.109*	-0.134**	-0.46	-0.44	-3.89***	-3.82***
	(0.014)	(0.014)	(0.059)	(0.057)	(0.687)	(0.646)	(0.972)	(0.917)
Age in months	-0.006***	-0.007***	0.052***	0.049***	0.44***	0.40***	0.23*	0.18
	(0.002)	(0.002)	(0.008)	(0.009)	(0.102)	(0.099)	(0.130)	(0.123)
Height-for-age z-score		0.007		0.122***		2.27***		3.22***
		(0.008)		(0.032)		(0.387)		(0.505)
BMI-for-age z-score		-0.018***		-0.028		-0.36		-1.01**
		(0.007)		(0.028)		(0.320)		(0.469)
Living with mother (yes=1)		0.009		0.148		-0.96		-3.32
		(0.055)		(0.228)		(2.345)		(3.192)
Mother's age		-0.001		-0.013***		-0.16**		-0.14
		(0.001)		(0.005)		(0.064)		(0.083)
Mother's education years		0.008***		0.032***		0.44***		0.86***
		(0.002)		(0.009)		(0.104)		(0.147)
Living with father (yes=1)		0.020		-0.086		0.59		-1.09
		(0.046)		(0.179)		(2.074)		(2.766)
Father's age		0.000		-0.005		-0.08*		-0.04
		(0.001)		(0.004)		(0.047)		(0.063)
Father's education years		0.008***		0.040***		0.44***		0.72***
		(0.003)		(0.010)		(0.121)		(0.163)
Household size		-0.014**		-0.012		-0.11		-0.60
		(0.007)		(0.028)		(0.313)		(0.406)
Proportion of boys in hh.		-0.183**		-0.956***		-8.68**		-9.86**
		(0.077)		(0.305)		(3.449)		(4.376)
Proportion of girls in hh.		0.017		-0.948***		-6.83**		-9.96**
		(0.068)		(0.350)		(3.298)		(4.427)
Proportion of elderly in hh.		0.124**		0.133		7.04**		11.38***
		(0.063)		(0.323)		(2.899)		(4.037)
Log of per capita expenditure		0.052***		0.107		5.14***		5.86***
		(0.017)		(0.095)		(0.748)		(1.090)
Urban (urban=1, rural=0)	0.074***	0.046**	0.016	-0.131	6.87***	3.10***	7.41***	2.82**
	(0.015)	(0.018)	(0.075)	(0.084)	(0.642)	(0.757)	(1.191)	(1.286)
Dummy for third round survey	-0.015	0.017	0.819***	0.964***	-19.06***	-18.37***	-31.31***	-30.39***
	(0.067)	(0.067)	(0.275)	(0.296)	(3.428)	(3.381)	(4.456)	(4.271)
Constant	1.847***	1.657***	-1.941	-1.667	20.36	4.23	52.21***	33.51*
	(0.289)	(0.308)	(1.235)	(1.484)	(15.116)	(15.867)	(19.230)	(20.072)
Observations	1,964	1,953	1,964	1,953	1,892	1,886	1,953	1,944
R-squared	0.145	0.194	0.522	0.573	0.261	0.355	0.333	0.423

Robust standard errors in parentheses.

Explanatory variables	Enrolled in school		Number of grades		PPVT test score		Math test score	
	Small model	Large model	Small model	Large model	Small model	Large model	Small model	Large model

*** p<0.01, ** p<0.05, * p<0.1.
Source: auhtors' estimation based on Young Lives data sets.

The above regression reveals some interesting findings on the determinants of children's education. Firstly, there are education differences between girls and boys, and these differences vary across countries. In Ethiopia and Peru, boys display lower enrolment rates and fewer completed grades than girls. However, boys achieve higher scores than girls for the cognitive ability test. In India, boys have better education attainment and score better for the cognitive ability tests than girls but in Viet Nam the situation is reversed. Overall, health is positively correlated to children's education attainment. Healthier children have higher educational attainment and score higher for cognitive ability tests compared to less healthy children, especially in Ethiopia and India.

Parents' age is not strongly correlated to children's education. However, parental education plays an important role. In India, Peru and Viet Nam, children with higher-educated fathers and mothers show better education attainment than children with less educated parents. In Ethiopia, father's education is more important than mother's education level for the child's education attainment.

Household composition is correlated to children's education in India and Viet Nam. Children in large households which include numerous children tend to have lower education achievement. This might be due to a trade-off between the quantity and quality of the children (Becker, 1965; Becker and Lewis, 1973; Becker and Tomes, 1976). With given resources, parents will invest less in each child as the number of children increases. The proportion of elderly household members is correlated positively to children's education. It is possible that grandparents care for the child when its parents are working.

In all four countries, urban children show better educational attainment and cognitive ability test scores than rural children. In Ethiopia, Peru and Viet Nam, children from high-expenditure households achieve a higher level of education than those from low-expenditure households. However, in India, per capita expenditure is correlated negligibly to children's education.

5.2. Decomposition analysis

Tables 7 to 10 present the decomposition of education gaps between small ethnic group children and large ethnic group children. For reasons of space, we do not decompose all four education variables. We focus on the number of education grades completed as our measure of education attainment, and the math score as our measure of cognitive ability. In each of the tables, the absolute gap in the dependent variable (children's education) is decomposed into three components: endowments, coefficient, and interaction of each explanatory variable. The sum of the three components across the explanatory variables is presented in the lower panels of the tables.

Table 7 presents the decomposition analysis for Ethiopia. The number of completed grades for children from large ethnic groups is 1.622 higher than the number for children from small ethnic groups. The difference due to endowments is 0.471, accounting for 30 percent of the gap in the number of completed grades between small ethnic group children and large ethnic group children. The difference due to coefficients is 1.172, accounting for around 72 percent of the gap. The remaining component, interaction, accounts for just 2 percent of the gap. The findings for the math score gap are rather similar. The difference due to coefficients contributes more to the gap than the difference due to endowments. So the return to endowments is more important than the value of the endowments for explaining the gap in education between small ethnic group children and large ethnic group children. The difference due to interactions is also very high. This implies that unobservable factors such as education facilities, school and teacher quality or racial discrimination, are important contributors to the education gap.

Only three variables are significant: health, log of expenditure and the urban dummy. Health and education are strongly correlated, while expenditure (or income) is an important determinant of children's education. Difference in education between small ethnic group children and large ethnic group children can be partly explained by differences in health of children and in household expenditure. The variable for urban areas contributes much to the education gap, reflecting both the culture and infrastructure in the area.

Table 7: Oaxaca-Blinder decomposition of children's education in Ethiopia

Explanatory variables	Dependent variable is the number of completed education grades			Dependent variable is math test score		
	Endowments	Coefficients	Interaction	Endowments	Coefficients	Interaction
Gender (male=1, female=0)	-0.009	-0.196*	0.012	-0.184	-0.831	0.050
	(0.011)	(0.112)	(0.014)	(0.211)	(1.567)	(0.107)
Age in months	-0.003	-4.412	0.002	-0.298	-80.475	0.307
	(0.043)	(4.346)	(0.032)	(0.601)	(61.793)	(0.624)
Height-for-age z-score	0.112***	0.162	-0.026	0.575*	1.153	-0.180
	(0.043)	(0.129)	(0.022)	(0.333)	(1.804)	(0.289)
BMI-for-age z-score	0.015	0.357**	-0.012	0.111	3.151	-0.082
	(0.021)	(0.170)	(0.016)	(0.198)	(2.378)	(0.153)
Living with mother (yes=1)	-0.011	0.062	-0.004	-0.179	0.114	-0.007
	(0.030)	(0.452)	(0.031)	(0.396)	(6.296)	(0.413)
Mother's age	-0.019	-0.428	0.013	-0.194	-7.041	0.211
	(0.019)	(0.467)	(0.017)	(0.231)	(6.533)	(0.247)
Mother's education years	0.001	-0.024	-0.003	0.247	-2.080	-0.266
	(0.010)	(0.091)	(0.010)	(0.240)	(1.300)	(0.257)
Living with father (yes=1)	-0.137	-0.536	0.141	-0.151	-2.303	0.610
	(0.097)	(0.392)	(0.104)	(1.387)	(5.583)	(1.481)
Father's age	0.025	0.100	-0.018	-0.328	-0.806	0.148
	(0.068)	(0.391)	(0.072)	(0.955)	(5.488)	(1.007)
Father's education years	-0.029	-0.154	0.016	-0.117	0.792	-0.080
	(0.023)	(0.133)	(0.017)	(0.192)	(1.879)	(0.197)
Household size	0.057	0.130	-0.015	0.612	6.538	-0.761
	(0.046)	(0.428)	(0.049)	(0.664)	(6.068)	(0.716)
Proportion of boys in hh.	-0.002	0.074	0.002	-0.012	0.397	0.007
	(0.007)	(0.106)	(0.006)	(0.053)	(1.487)	(0.040)
Proportion of girls in hh.	0.007	0.061	-0.011	-0.008	0.699	-0.124
	(0.020)	(0.120)	(0.021)	(0.279)	(1.699)	(0.305)
Proportion of elderly in hh.	-0.013	0.030	0.013	0.058	-0.066	-0.027
	(0.018)	(0.043)	(0.019)	(0.243)	(0.619)	(0.255)
Log of per capita expenditure	-0.006	1.933**	0.067*	0.886*	-0.325	-0.012
	(0.031)	(0.975)	(0.037)	(0.527)	(13.843)	(0.524)
Urban (urban=1, rural=0)	0.486***	-0.079*	-0.195*	6.715***	-1.611**	-3.850**
	(0.114)	(0.047)	(0.114)	(1.616)	(0.710)	(1.612)
Dummy for third round survey	-0.003	0.554	-0.003	0.664	6.407	-0.182
	(0.029)	(0.473)	(0.037)	(1.526)	(6.874)	(0.458)
Constant		3.536			85.993	
		(4.275)			(60.367)	
Summary						
Children from large ethnic	4.562***			40.351***		
	(0.053)			(0.699)		
Children from small ethnic	2.940***			26.488***		
	(0.129)			(1.756)		
Total absolute difference	1.622***			13.863***		
	(0.140)			(1.890)		
Difference due to endowments	0.471***			8.397***		
	(0.150)			(2.042)		
Difference due to coefficients	1.172***			9.705***		
	(0.110)			(1.549)		
Difference due to interaction	-0.021			-4.239**		
	(0.123)			(1.729)		
Observations	1,946			1,916		

Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1.
Source: authors' estimation based on Young Lives data sets.

Unlike the case of Ethiopia, in India the difference due to endowments contributes much more to the gap in education between small ethnic group children and large ethnic group children than the difference due to coefficients. More specifically, the difference due to endowments accounts for around 93 percent of the gap in the number of completed grades and 79 percent of the gap in math scores. Health, mother's education, expenditure and urban dummy are significant for explaining the difference in education between children from the different ethnic groups.

Table 8: Oaxaca-Blinder decomposition of children's education in India

Explanatory variables	Dependent variable is the number of completed education grades			Dependent variable is math test score		
	Endowments	Coefficients	Interaction	Endowments	Coefficients	Interaction
Gender (male=1, female=0)	0.003	-0.159**	-0.005	0.082	-1.049	-0.024
	(0.006)	(0.077)	(0.008)	(0.184)	(1.165)	(0.058)
Age in months	0.008	3.513	0.007	-0.086	42.168	0.072
	(0.020)	(3.131)	(0.018)	(0.248)	(46.907)	(0.217)
Height-for-age z-score	0.013	-0.288**	0.034*	-0.046	-3.449*	0.404
	(0.014)	(0.137)	(0.019)	(0.207)	(2.052)	(0.265)
BMI-for-age z-score	0.112	0.107	-0.098	1.774	1.772*	-1.621
	(0.085)	(0.071)	(0.081)	(1.303)	(1.054)	(1.254)
Living with mother (yes=1)	-0.004	0.613*	0.023	0.129	-5.633	-0.218
	(0.010)	(0.359)	(0.015)	(0.164)	(5.408)	(0.221)
Mother's age	0.000	-1.286***	-0.001	0.002	-6.917	-0.014
	(0.004)	(0.429)	(0.014)	(0.017)	(6.446)	(0.078)
Mother's education years	0.092*	-0.023	-0.036	3.597***	-1.133**	-1.764**
	(0.049)	(0.034)	(0.054)	(0.784)	(0.527)	(0.817)
Living with father (yes=1)	0.093***	-0.643***	-0.059**	0.985***	-7.688**	-0.692*
	(0.028)	(0.249)	(0.026)	(0.354)	(3.812)	(0.378)
Father's age	-0.048**	0.410	0.031	-0.845**	2.261	0.170
	(0.021)	(0.314)	(0.024)	(0.334)	(4.765)	(0.360)
Father's education years	0.004	0.038	0.044	1.488**	0.085	0.097
	(0.047)	(0.047)	(0.054)	(0.707)	(0.703)	(0.804)
Household size	-0.001	0.314	0.001	-0.002	-1.870	-0.007
	(0.005)	(0.230)	(0.005)	(0.014)	(3.458)	(0.035)
Proportion of boys in hh.	0.018*	0.022	-0.004	0.007	-0.047	0.008
	(0.011)	(0.057)	(0.010)	(0.122)	(0.857)	(0.146)
Proportion of girls in hh.	0.012	0.004	-0.001	-0.107	-0.440	0.092
	(0.010)	(0.054)	(0.011)	(0.142)	(0.802)	(0.171)
Proportion of elderly in hh.	0.024	0.030	0.019	0.214	-0.045	-0.027
	(0.021)	(0.037)	(0.023)	(0.303)	(0.552)	(0.339)
Log of per capita expenditure	0.009	0.376	0.016	-0.530	29.136**	1.291**
	(0.034)	(0.943)	(0.041)	(0.515)	(14.110)	(0.637)
Urban (urban=1, rural=0)	0.007	-0.026	-0.040	-1.686***	1.451***	2.233***
	(0.038)	(0.027)	(0.043)	(0.582)	(0.439)	(0.667)
Dummy for third round survey	0.003	-0.251	-0.001	0.042	-1.701	0.004
	(0.038)	(0.305)	(0.012)	(0.833)	(4.612)	(0.083)
Constant		-2.656			-45.565	
		(3.055)			(45.733)	

Summary

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Explanatory variables	Dependent variable is the number of completed education grades			Dependent variable is math test score		
	Endowments	Coefficients	Interaction	Endowments	Coefficients	Interaction
Children from large ethnic	6.950***			53.493***		
	(0.055)			(0.883)		
Children from small ethnic	6.578***			47.136***		
	(0.082)			(1.350)		
Total absolute difference	0.371***			6.357***		
	(0.098)			(1.613)		
Difference due to endowments	0.344***			5.019**		
	(0.119)			(1.983)		
Difference due to coefficients	0.096			1.335		
	(0.085)			(1.290)		
Difference due to interaction	-0.069			0.003		
	(0.109)			(1.685)		
Observations	1,959			1,945		

Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1.
Source:auhtors' estimation based on Young Lives data sets.

Table 9 presents the decomposition for Peru. The results differ widely for number of completed grades and math scores. For number of completed grades, the component estimates are not significant. For the math scores, the difference due to endowments contributes hugely to the gap between small and large ethnic group children by more than 300 percent. The contribution of the difference due to coefficients is negligible. Since the number of observations of ethnic minority children is small, only a few explanatory variables in the regressions of education using this sample are significant. As a result, most coefficients on gaps between small and large ethnic group children are not significant. Among the explanatory variables, the urban dummy is significant and makes a large contribution to the gap.

Table 9: Oaxaca-Blinder decomposition of children's education in Peru

Explanatory variables	Dependent variable is the number of completed education grades			Dependent variable is math test score		
	Endowments	Coefficients	Interaction	Endowments	Coefficients	Interaction
Gender (male=1, female=0)	-0.790	0.424	0.701	7.587	-3.757	-7.349
	(0.779)	(0.482)	(0.777)	(6.471)	(3.489)	(6.472)
Age in months	-0.591	49.048	0.741	3.249	-205.428	-2.541
	(0.844)	(29.827)	(1.002)	(5.641)	(235.930)	(4.776)
Height-for-age z-score	0.541	2.040	-0.476	2.208	4.521	-1.073
	(0.440)	(1.793)	(0.436)	(3.340)	(13.899)	(3.310)
BMI-for-age z-score	-0.009	0.389	0.009	0.070	-1.633	-0.067
	(0.155)	(0.364)	(0.149)	(0.681)	(2.704)	(0.649)
Living with mother (yes=1)	0.104	-1.346	-0.083	1.005	-17.526	-1.136
	(0.317)	(4.864)	(0.311)	(2.665)	(38.353)	(2.731)
Mother's age	-0.047	0.419	0.025	-1.830	25.604	1.749
	(0.270)	(4.427)	(0.267)	(3.116)	(35.523)	(3.071)
Mother's education years	0.181	-0.099	-0.052	8.335	-12.275	-6.701
	(0.662)	(1.248)	(0.661)	(5.851)	(10.275)	(5.754)
Living with father (yes=1)	0.238	-3.599	-0.235	1.362	-20.258	-1.547

Explanatory variables	Dependent variable is the number of completed education grades			Dependent variable is math test score		
	Endowments	Coefficients	Interaction	Endowments	Coefficients	Interaction
	(0.482)	(3.569)	(0.478)	(2.987)	(27.547)	(3.211)
Father's age	-0.117	2.701	0.117	-0.866	11.980	0.727
	(0.367)	(3.962)	(0.367)	(2.601)	(31.561)	(2.422)
Father's education years	-0.163	0.875	0.201	0.394	2.728	0.572
	(0.332)	(1.366)	(0.343)	(2.405)	(11.422)	(2.433)
Household size	-0.447	-2.507	0.541	-5.882*	-29.875**	6.472*
	(0.361)	(1.537)	(0.378)	(3.313)	(12.373)	(3.478)
Proportion of boys in hh.	-0.000	-0.044	0.003	-0.161	-1.172	0.111
	(0.037)	(0.515)	(0.038)	(0.488)	(4.168)	(0.443)
Proportion of girls in hh.	-0.029	-0.353	0.042	-0.034	-0.098	0.014
	(0.089)	(0.631)	(0.103)	(0.729)	(5.146)	(0.732)
Proportion of elderly in hh.	0.009	0.006	0.006	4.789*	-3.809	-4.729*
	(0.196)	(0.203)	(0.196)	(2.724)	(2.435)	(2.707)
Log of per capita expenditure	0.415	-9.393	-0.387	3.833	-84.320	-3.440
	(0.402)	(8.077)	(0.394)	(3.513)	(68.079)	(3.387)
Urban (urban=1, rural=0)	0.343	-0.029	-0.147	16.474*	-2.238	-10.996
	(1.110)	(0.220)	(1.113)	(8.712)	(1.996)	(8.692)
Dummy for third round survey	0.068	-4.378	-0.064	0.396	24.530	-0.226
	(0.784)	(3.110)	(0.740)	(7.169)	(24.504)	(4.096)
Constant		-33.634			314.453*	
		(23.007)			(179.120)	
Summary						
Children from large ethnic	6.113***			59.638***		
	(0.059)			(0.673)		
Children from small ethnic	4.949***			47.446***		
	(0.468)			(5.254)		
Total absolute difference	1.165**			12.193**		
	(0.472)			(5.297)		
Difference due to endowments	-0.296			40.928***		
	(1.416)			(11.707)		
Difference due to coefficients	0.520			1.426		
	(0.501)			(4.544)		
Difference due to interaction	0.940			-30.162***		
	(1.426)			(11.365)		
Observations	1,354			1,340		

Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1.
Source: authors' estimation based on Young Lives data sets.

Finally, Table 10 presents the decomposition analysis for Viet Nam. The difference in education between small ethnic group children and large ethnic group children can be explained largely by the difference in endowments between the two groups (around 110 percent). The difference in coefficients also contributes to the gap but at a smaller magnitude than the difference in endowments. This finding is similar to findings from studies such as Baulch et al. (2012) and Pham et al. (2010) that decompose the gap in per capita expenditure between Kinh majority and ethnic minorities in Viet Nam. They also find that the gap in per capita expenditure is mainly explained by the gap in endowments between Kinh majority and

ethnic minorities in Viet Nam. There are a large gap in living standards as well as access to social services between Kinh majority and ethnic minorities.

Among explanatory variables, children's health, mother's education, log of expenditure, and household composition are important contributors to the education gap between small ethnic group children and large ethnic group children in Viet Nam. Difference in mother's education also explains largely the gap in education between small ethnic group children and large ethnic group ones. This finding is similar to the case of India. It indicates the important role of mothers in increasing education for children, especially in developing countries where women are more responsible for housework and childcare.

Table 10: Oaxaca-Blinder decomposition of children's education in Viet Nam

Explanatory variables	Dependent variable is the number of completed education grades			Dependent variable is math test score		
	Endowments	Coefficients	Interaction	Endowments	Coefficients	Interaction
Gender (male=1, female=0)	0.001	-0.444***	-0.002	-0.016	1.523	0.008
	(0.024)	(0.119)	(0.030)	(0.205)	(1.680)	(0.104)
Age in months	-0.032	17.296***	0.078	-0.174	77.498	0.355
	(0.054)	(4.073)	(0.125)	(0.373)	(59.765)	(0.617)
Height-for-age z-score	0.232**	0.374	-0.152	6.030***	8.702**	-3.568**
	(0.104)	(0.260)	(0.107)	(1.570)	(3.852)	(1.598)
BMI-for-age z-score	0.010	-0.069	-0.010	0.876*	-5.589***	-0.823*
	(0.017)	(0.114)	(0.017)	(0.498)	(1.693)	(0.479)
Living with mother (yes=1)	-0.001	-0.223	0.001	0.037	4.858	-0.023
	(0.005)	(0.648)	(0.004)	(0.110)	(9.465)	(0.078)
Mother's age	0.005	0.898	-0.003	0.001	-4.931	0.018
	(0.018)	(0.859)	(0.013)	(0.044)	(12.479)	(0.081)
Mother's education years	0.857***	-0.168***	-0.742***	7.831**	-0.887	-3.894
	(0.247)	(0.061)	(0.251)	(3.532)	(0.830)	(3.610)
Living with father (yes=1)	-0.051	-2.081***	0.063	-0.144	-8.334	0.250
	(0.033)	(0.635)	(0.039)	(0.277)	(9.225)	(0.308)
Father's age	0.008	1.013	-0.008	0.116	14.433	-0.122
	(0.019)	(0.679)	(0.018)	(0.252)	(9.880)	(0.266)
Father's education years	0.001	0.126	0.258	1.304	1.402	2.858
	(0.159)	(0.082)	(0.166)	(2.289)	(1.202)	(2.439)
Household size	0.066	0.335	-0.064	2.601**	12.846**	-2.448**
	(0.076)	(0.420)	(0.081)	(1.117)	(6.187)	(1.209)
Proportion of boys in hh.	0.138**	0.227**	-0.115**	1.776**	3.007*	-1.509*
	(0.055)	(0.108)	(0.057)	(0.775)	(1.590)	(0.821)
Proportion of girls in hh.	0.074*	0.111	-0.053	1.889***	3.774***	-1.804**
	(0.044)	(0.093)	(0.045)	(0.689)	(1.392)	(0.725)
Proportion of elderly in hh.	-0.023	-0.339***	0.025	-0.132	-1.172	0.087
	(0.038)	(0.074)	(0.041)	(0.223)	(0.949)	(0.156)
Log of per capita expenditure	0.310*	-2.786*	-0.292*	-1.850	51.654**	5.395**
	(0.173)	(1.676)	(0.176)	(2.469)	(24.357)	(2.563)
Urban (urban=1, rural=0)	-0.233	0.007	0.205	8.112*	-0.274	-7.632*
	(0.296)	(0.012)	(0.297)	(4.271)	(0.246)	(4.278)
Dummy of third round survey	-0.012	-1.491***	0.010	0.044	-9.150	0.056
	(0.121)	(0.437)	(0.101)	(0.487)	(6.313)	(0.622)
Constant		-12.148***			-138.534**	

Explanatory variables	Dependent variable is the number of completed education grades			Dependent variable is math test score		
	Endowments	Coefficients	Interaction	Endowments	Coefficients	Interaction
		(4.099)			(60.070)	
Summary						
Children from large ethnic	6.993***			74.677***		
	(0.042)			(0.578)		
Children from small ethnic	5.803***			48.343***		
	(0.145)			(1.895)		
Total absolute difference	1.190***			26.333***		
	(0.151)			(1.981)		
Difference due to endowments	1.350***			28.301***		
	(0.348)			(4.919)		
Difference due to coefficients	0.639***			10.828***		
	(0.142)			(2.017)		
Difference due to interaction	-0.799**			-12.796***		
	(0.345)			(4.930)		
Observations	1,953	1,953	1,953	1,944	1,944	1,944

Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1.
Source: authors' estimation bades on Young Lives data sets.

6. Conclusions

In this study, we examined the difference in education between children from small ethnic groups and children from large ethnic groups in Ethiopia, India, Peru and Viet Nam using data from the Young Lives study. The results show that in all the four countries children from small ethnic groups have lower educational attainment (measured by school enrolment and number of completed grades) and lower cognitive ability (measured by the PPVT and math test scores). The gap in education between ethnic groups is highest in Viet Nam. The gap in the number of completed grades and cognitive ability test scores between ethnic children tends to be larger than the gap in school enrolment. The gap in educational attainment between ethnic children is higher for older cohorts indicating that children from small ethnic groups are more likely than those of large ethnic groups to drop out overtime.

In India, Peru and Viet Nam, the main contribution to the gap in education between children from small ethnic groups and children from large ethnic groups is the difference in endowments rather than the difference in coefficients. However, in Ethiopia, the coefficient differences contribute more to the education gap than the difference in endowments. This means that in Ethiopia the return to endowments is more important than the value of the endowments for explaining the gap in education between small ethnic group children and large ethnic group children.

Among the explanatory variables used for the decomposition analysis, child health, mother's education, log of expenditure and the dummy for urban areas are important for explaining the gap in education attainment between small ethnic group children and large ethnic group children. In India and Viet Nam, mother's education plays an important role in increasing children's education, and the gap in mother's education explains largely the gap in education between small ethnic group children and large ethnic group children. Living in an urban area contributes a great deal to the education gap and is reflective of both the culture and the infrastructure in the area.

Our findings have several implications for policy. Firstly, children from ethnic minorities tend to have lower education attainment in most countries, and should be the focus of governments and international agencies. Secondly, household expenditure, parental education, especially mother's education, and health status are strongly correlated to children's education attainment, and account for much of the gap between children from small and large ethnic groups. This suggests that health improvements increase both incomes and children's education which in turn improves the quality of the next generation. Policies and programs to support income and nutrition for ethnic minorities will have a positive impact on education. Thirdly, the difference in the returns to endowments, especially in Ethiopia, suggests differences in unobserved characteristics possibly including discrimination between children from small and large ethnic groups. Policies and programs to increase access to education for ethnic minorities and to create equal opportunities would improve education and employment for ethnic minorities.

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Appendix

Table A.1. Summary statistics of variables

Variables	Ethiopia	India	Peru	Viet Nam
Currently enrolled in school	0.92	0.83	0.95	0.86
	(0.01)	(0.01)	(0.01)	(0.01)
The number of completed education grades	4.33	6.81	6.07	6.80
	(0.05)	(0.05)	(0.06)	(0.04)
PPVT test score	62.89	64.29	78.99	80.87
	(0.52)	(0.52)	(0.35)	(0.40)
Math test score	38.43	51.45	59.08	71.05
	(0.65)	(0.74)	(0.67)	(0.59)
Children from small ethnic groups	0.29	0.32	0.08	0.13
	(0.01)	(0.01)	(0.01)	(0.01)
Child's gender (male=1, female=0)	0.51	0.49	0.54	0.50
	(0.01)	(0.01)	(0.01)	(0.01)
Child's age - in months	162.75	163.98	163.61	164.25
	(0.41)	(0.36)	(0.44)	(0.39)
Height-for-age z-score	-1.41	-1.65	-1.50	-1.44
	(0.03)	(0.03)	(0.03)	(0.02)
BMI-for-age z-score	-1.67	-0.49	0.27	-0.94
	(0.03)	(0.39)	(0.03)	(0.02)
Living with mother (yes=1)	0.85	0.95	0.92	0.96
	(0.01)	(0.00)	(0.01)	(0.00)
Mother's age	36.03	35.49	36.64	39.18
	(0.30)	(0.17)	(0.34)	(0.18)
Mother's education years	2.71	2.28	6.69	5.84
	(0.08)	(0.09)	(0.13)	(0.09)
Living with father (yes=1)	0.66	0.88	0.71	0.92
	(0.01)	(0.01)	(0.01)	(0.01)
Father's age	36.21	39.79	30.89	40.57
	(0.53)	(0.26)	(0.57)	(0.23)
Father's education years	3.72	3.58	5.98	6.86
	(0.10)	(0.11)	(0.14)	(0.10)
Household size	6.43	5.12	5.48	4.72
	(0.05)	(0.04)	(0.05)	(0.03)
Proportion of boys in hh.	0.14	0.08	0.11	0.07
	(0.00)	(0.00)	(0.00)	(0.00)
Proportion of girls in hh.	0.14	0.07	0.10	0.06
	(0.00)	(0.00)	(0.00)	(0.00)
Proportion of elderly in hh.	0.05	0.07	0.05	0.06
	(0.00)	(0.00)	(0.00)	(0.00)
Log of per capita expenditure	4.62	6.70	5.14	5.90
	(0.01)	(0.01)	(0.02)	(0.01)
Urban (urban=1, rural=0)	0.41	0.25	0.76	0.20
	(0.01)	(0.01)	(0.01)	(0.01)
Number of observations	1,953	1,971	1,363	1,976

Standard errors in parentheses.
Source: authors' estimation based on Young Lives data sets.