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School Resources and the Enrollment of Children with Disabilities in El Salvador

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Abstract We evaluate the educational situation of Salvadoran children with disabilities (CwDs) by employing a panel dataset of schools and municipalities constructed from the Schools Census of El Salvador for the years 2007–2014. We found that students with disabilities experience higher repetition and overage rates at the beginning of primary education, and higher dropout rates through the rest of primary and secondary education. Regression analysis results suggest that improving the coverage and availability of resources of the public education system can greatly contribute to the inclusion of children with disabilities. Future lines of research and areas of improvement for the collection and supply of educational data are proposed.

Key words Children with Disabilities, Education for Handicapped Children, School Resources, Schools Census, El Salvador

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1．Introduction

The interest on the education and labor force participation of persons with disabilities in developing countries has received a great deal of attention in recent years, reflected by the enactment of the United Nations Convention on the Rights of Persons with Disabilities in 2006. According to this Convention, "States Parties recognize the right of persons with disabilities", expressing a compromise towards "an inclusive education system at all levels". El Salvador ratified the Convention on the Rights of Persons with Disabilities in 2007. However, although the Salvadoran Equal Opportunities for Persons with Disabilities Act requires the State to provide appropriate support and accessibility for persons with disabilities to allow their inclusion into the regular education system, the initial report on the implementation of the Convention by the Committee on the Rights of Persons with Disabilities points out several areas that require immediate attention. In the case of education and accessibility, the report concludes that there is "an urgent need to embark on a process of infrastructure adaptation", as less than 10% of schools in the public sector have been adapted to provide some degree of accessibility. It is therefore an important concern whether this lack of infrastructure has an impact on the educational opportunities of persons with disabilities in El Salvador.

While disability is not a new topic in the Economic literature, this increased attention towards assuring the human rights of persons with disabilities (hereafter PwDs) comes together with a new body of research that focuses on developing countries, based on the recognition that PwDs are overrepresented among the poor (Yeo, 2001), that traditional poverty assessments have greatly ignored the situation of families with disabled members (Braithwaite and Mont, 2009) and that it is necessary to provide a better definition of disability (Loeb, Eide and Mont, 2008). Recent improvements in terms of standardization and data availability have allowed researchers to explore the situation of PwDs in developing countries. Recent research shows that PwDs face significant barriers in terms of employment and income (Mitra

and Sambamoorthi, 2008; Mizunoya and Mitra, 2013; Lamichhane and Okubo, 2014). It also shows that a higher level of education is associated with comparatively large income increases for persons with disabilities (Lamichhane and Sawada, 2013). However, due to the small number of PwDs in the population, sample sizes in previous studies remain in the hundreds and are often based on local surveys that rarely present a comprehensive picture of the situation of PwDs to the national level. Sample size limitations become especially important when evaluating the educational opportunities of children with disabilities (hereafter CwDs), since disability rates tend to be low among younger people. Furthermore, limited access to education imposes further restrictions on the sample size of students with disabilities, and make it difficult to evaluate their performance as they advance through the education system.

Research on the educational situation of Salvadoran CwDs is scarce. JICA (2006) employs data from several sources and makes a general assessment of the situation of PwDs in El Salvador in terms of enjoyment of human rights, such as education, work, communication, etc. In the educational dimension, it mentions lack of money and family support as the main barriers to access to education for CwDs, and argues that misconceptions on the nature of disability is a limiting factor in rural areas. It points out the limitations of many sources of data on disability, such as the 1992 Population Census and the Multi-Purpose Household Survey of 2004 (EHPM 2004), and the National Registry of Natural Persons (RNPN).

Sabella (2015) presents a case study of one municipality of El Salvador and evaluates the attitudes of school teachers towards the inclusion of CwDs by surveying all the rural schools of the municipality and by performing interviews with teachers, school directors and government officials. The collected data reflects the general belief that CwDs are less likely to enroll in school, and that the lack of training, personnel and other school resources is an important barrier against the inclusion of CwDs in the education system.

While being important sources of information on the topic of disability in El Salvador, both studies have limitations due to inconsistencies in the data, small sample sizes or the lack of coverage of the data employed. Our research attempts to fill these gaps and contribute towards a better understanding of the educational conditions of Salvadoran CwDs. Chapter 2 introduces the Schools Census of El Salvador as an important resource for researchers interested in this research topic. By employing this dataset, we take a look at the situation of Salvadoran CwDs, bringing light into questions such as: Is there an enrollment gap between CwDs and their peers ? Do CwDs enter the education system under different circumstances than their peers ? How does this affect their educational achievement? Do they tend to drop out of school in a different degree and at a different stage with respect to their peers ? This analysis is presented in Chapter 3.

We analyze the impact of several factors of the educational supply on the enrollment and advancement of Salvadoran CwDs. In Chapter 4, we employ a panel dataset of schools and evaluate the characteristics that are associated with a higher likelihood of enrollment of CwDs at the first cycle of primary education. This analysis yields some clues regarding the importance of educational and infrastructural resources for the enrollment of children with disabilities.

The educational supply in El Salvador varies not only in terms of school resources, but also in terms of the number of schools that offer educational services at several points of the educational ladder. Variations in the educational supply can affect the advancement of children, but is this effect the same regardless of disability status ? Chapter 5 looks in this direction, by evaluating the connection between the availability of schools at the municipal level, and differences in advancement rates of CwDs and their peers through the education system.

Our results show that the characteristics of the educational supply are strongly associated with both the enrollment and advancement of Salvadoran CwDs. In particular, we show that the deficiencies of the public education system in terms of coverage

and availability of school resources can have a detrimental impact on the enrollment and advancement of CwDs. Conclusions, suggestions and proposals for future lines of research are presented in Chapter 6.

2. Data

As is the case of many developing countries, data focused on disability is not abundant in El Salvador. However, important information can be obtained indirectly by making use of administrative data routinely collected by the Central Government. The Schools Census of El Salvador is a survey performed by the Ministry of Education of El Salvador (MINED) that covers roughly the totality of public and private schools in the country. It is collected every year and contains students-level and schools-level information. The census data is publicly available from 2006 to 2016.

The students-level dataset includes individual information on the characteristics of close to 1.7 million children enrolled in early-childhood, primary and secondary (general and vocational) education. Characteristics of the students contained in the questionnaires include age, gender, grade of enrollment, labor force participation, health, among others. This dataset identifies children who have disabilities such as: blindness, low vision, hearing impairments, lack of limbs, Down syndrome, etc. The students-level data is collected by school staff (teachers, school directors, etc.)

The schools-level dataset includes information regarding the characteristics of schools, such as the type of administration (public or private), the location of the school (urban/rural and the municipality) and information about the resources of schools such as the availability of electrical facilities, libraries, laboratories, recreation spaces, and other educational infrastructure etc. Other characteristics that are detailed in the census include the type of toilets and water provision method, the availability of computers and internet for administrative and educational purposes and the total number of teachers by gender. Information on the number of teachers

is not available for the year 2014, and data on the resources of schools was not collected during 2010. Furthermore, information on handicap facilities, such as handrails, ramps and toilets, is not available before 2011.

In the next chapter, we employ the Schools Census data to evaluate the situation of CwDs in terms of enrollment and advancement through the education system.

3. Descriptive Statistics

The first issue we address is the existence of enrollment gaps by disability status. A note of caution before proceeding to the analysis to the data must be made regarding the age of the students considered in the analysis. The data of the Schools Census includes many students who are considerably older than the age that is considered normal for primary and secondary education. This includes elderly, especially in the case of persons with disabilities. Although these students are also part of the education system, the determinants of their enrollment and advancement are likely to differ considerably, and are not the focus of this paper. For this reason, the analysis hereafter considers only students who are 20 years old or younger.

Table 1 presents the shares of PwDs on the total population by age groups according to the Salvadoran Population Census of 2007, and the share of students with disabilities with respect to the total enrolled at the beginning of the 2007 school year on the same age groups, according to the Schools Census of the same year.(3) Since the Schools Census only contains information regarding enrolled children, differences in disability rates are suggestive of enrollment gaps. The disability rates according to the Population Census are larger than those observed in the Schools Census. This difference can arise from two sources: the difference in the definitions of disability employed, and from a lower enrollment rate among CwDs.

(3) The definition of disability employed in the population census is based on questions similar to those proposed by the Washington Group on Disability Statistics, and therefore the comparison is not accurate. We believe however that the main patterns obtained through this imperfect measure are still likely to reflect the educational reality of CwDs.

Table 1: Disability Rates in the Total Population and the Population Enrolled in School

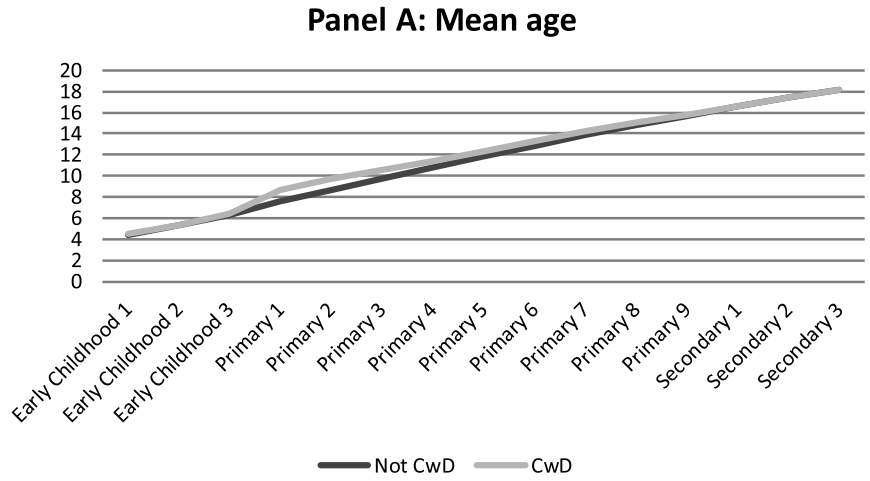
Age Group	Population Census, 2007 (% PwD)	Schools Census, 2007 (%PwD)
5 to 9	1.2	1.0
10 to 14	1.4	1.2
15 to 19	1.6	0.9

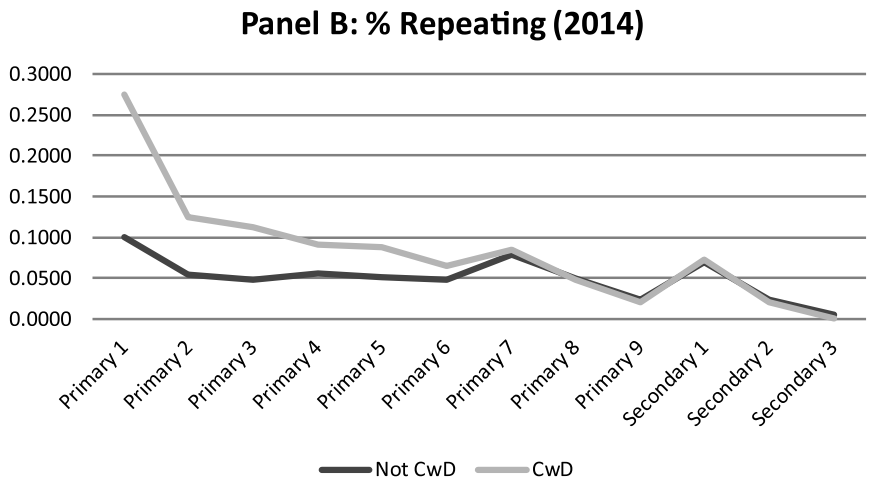
Note that the share of persons with disabilities tends to increase with age according to the population census. In contrast, the share of CwDs among the enrolled population increases at the 10 to 14 years old group and then decreases, diverging considerably from the share in the total population. In fact, first year students with disabilities in 2014 were roughly 8.7 years old on average, compared to 7.6 years for other children. As a result, the overage rate among CwDs is of 23%, compared to only 5.4% of children without disabilities who were considered overage. This phenomenon can be observed whether because CwDs enter the education system at an older age, or because they face greater difficulties to advance to higher grades.

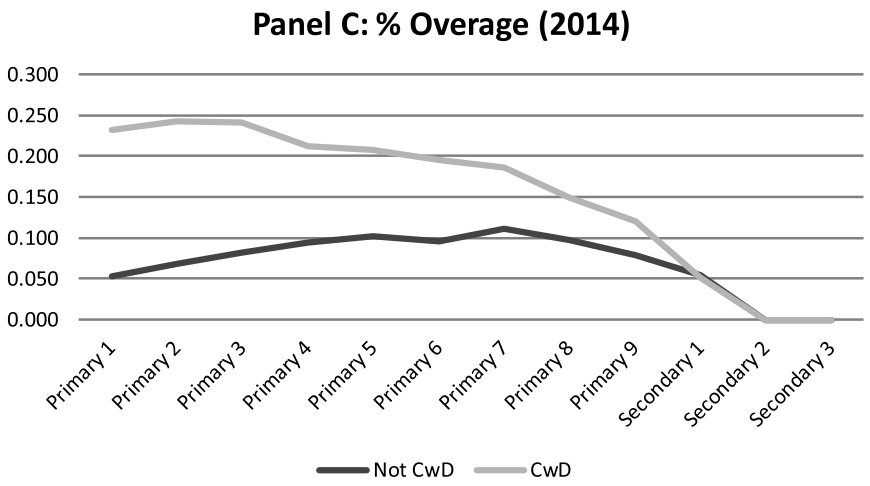
Figure 1 shows the characteristics of students by disability status in several grades according to the Schools Census of 2014. Panel A shows that the mean age of students with disabilities is similar to that of their peers during early-childhood education, but diverges considerably at the first year of primary education, and stays above all the way to the highest grades. This means that CwDs enter the education system at the same age as their peers, but get stuck in first grade. This is clearly visible in Panel B: although repetition rates increase at the first grade for both groups of students, it is considerably higher and tends to decay more slowly for CwDs. As a result, overage rates among students with disabilities remain high during primary and secondary education, as shown in Panel C. These patterns are observed regardless of the census year.

Figure 2 makes a comparison of the evolution of a single cohort of students who entered the first grade of primary education in 2007, by disability status. 981 children with disabilities are observed in seventh grade (at the beginning of

Figure 1: Characteristics of Students by Disability Status and Grade（2014）

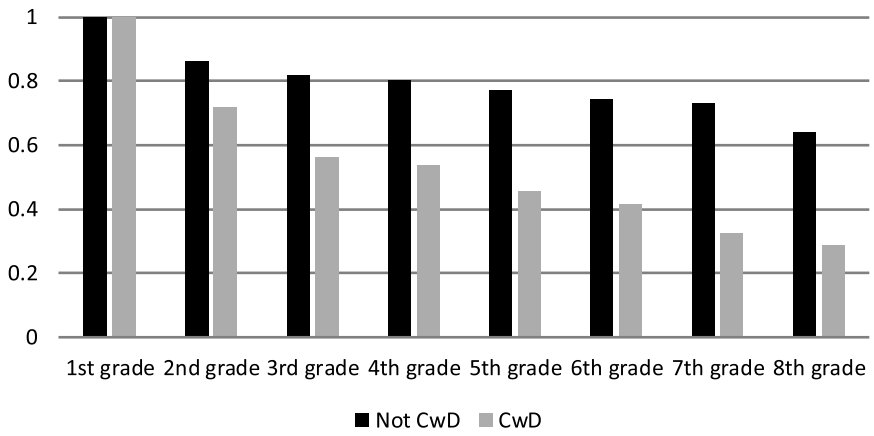






the third cycle of primary education) in 2013, which represents a 32% of the number observed during 2007 at the first grade of primary education. In comparison, the same share for students not classified as CwDs ascends to a 73%. The large drop at the second grade is mostly explained by the peak in the share of repeating students at the first grade, as observed in Figure 1, while the relatively large decrease in the advancement rate of CwDs is also attributed to the relatively higher repetition rates. In general, the Schools Census data shows that overage and repetition are important factors that limit the advancement of children with disabilities. Incentives to participate in the labor market, safety concerns and limitations in the educational supply are also important factors to consider when explaining disability-based differences in advancement rates.

Figure 2: Students by Disability Status: 2007 Cohort (1st grade of 2007=1)



4. School resources and the choice of schools for CwDs

This Chapter evaluates the relationship between school resources and the enrollment of CwDs. It is however necessary to consider several limitations related with sample selection in the data. The Schools Census contains only information about children who are enrolled in school, which makes it impossible to analyze the determinants of the choice of attending school. We take a different approach, by evaluating the relationship between the characteristics of schools and the probability of being

attended by students with disabilities, conditional on school attendance.

We identify two types of schools: those attended by at least one child with disabilities at a given grade and census year (excluding adult's education) and those that are not attended by any child with disabilities. Our analysis in this chapter focuses on the first three years of primary education, as it is there where most gaps appear, according to our analysis in Chapter 2.

Children with disabilities are consistently less likely to be enrolled in public schools. The percentage of public schools among schools that have at least one student with disabilities is roughly 77% during the first three years of primary education, compared to an 87% for schools without any CwDs. Differences in socioeconomic status can play an important role at explaining this difference, as it is possible that children with disabilities from lower income households are significantly less likely to get enrolled.

Table 2 presents a simple comparison of the characteristics of private schools where students with disabilities are enrolled in the first year of primary education and those where they are not. Children with disabilities are more likely to attend schools in urban areas with better provision of basic services, although no differences are observed with respect to handicap facilities. They are also more likely to attend schools where resources such as toilets and teachers are significantly less crowded. Higher overage and repetition rates respond to the presence itself of children with disabilities and is consistent with the observations in the previous chapter.

Table 3 makes a similar comparison for public schools, presenting wider gaps than those observed in Table 2. Public schools where at least some students with disabilities are enrolled are 36% less likely to be found in rural areas. Significant differences in resources, such as the provision of clean water, electrical and handicap facilities are observed. Students with disabilities are more likely to be enrolled in schools where resources are more crowded, and located in more densely populated

Table 2: Comparison of Characteristics of Private Schools by Enrollment of Students with Disabilities

	No Students with Disabilities Enrolled		Some Students with Disabilities Enrolled		
	Obs	Mean	Obs	Mean	Difference in Means※
% Rural Area	535	13.3%	353	6.5%	−6.75%***
% With Access to Pipe Water	535	94.2%	353	96.9%	2.67%*
% With Working Electrical Facilities	535	98.3%	353	99.7%	1.39%*
% With Library Available	535	84.3%	353	76.2%	−8.09%***
% With Handicap Ramps	535	23.9%	353	20.4%	−3.52%
% With Handicap Rails	535	25.6%	353	23.2%	−2.37%
% With Handicap Toilets	535	3.6%	353	3.4%	−0.15%
Students per Toilet	530	24.9	351	19.1	−5.80***
Students per Teacher	535	17.7	353	14.9	−2.79***
% of Female Teachers	535	76.4%	353	79.3%	2.95%**
% of Repeating Students (1st grade)	535	2.9%	147	4.1%	1.24%
% of Overage Students (1st grade)	535	1.5%	147	4.2%	2.71%***
Municipal Population Density	535	2.96	353	2.71	−0.24

※ A positive difference represents a higher value for schools with at least one CwD.
*p＜.1; **＜.05; ***p＜.01.

Table 3: Comparison of Characteristics of Public Schools by Enrollment of Students with Disabilities

	No Students with Disabilities Enrolled		Some Students with Disabilities Enrolled		
	Obs	Mean	Obs	Mean	Difference in Means※
% Rural Area	3,610	86.6%	1,562	50.6%	−35.98%***
% With Access to Pipe Water	3,610	72.0%	1,562	85.8%	13.73%***
% With Working Electrical Facilities	3,610	92.3%	1,562	96.9%	4.53%***
% With Library Available	3,610	17.4%	1,562	29.6%	12.24%***
% With Handicap Ramps	3,610	9.4%	1,562	16.5%	7.12%***
% With Handicap Rails	3,610	4.5%	1,562	9.7%	5.24%***
% With Handicap Toilets	3,610	1.3%	1,562	2.4%	1.03%***
Students per Toilet	3,527	40.3	1,532	50.8	10.48***
Students per Teacher	3,610	29.7	1,562	29.4	−0.25
% of Female Teachers	3,610	69.8%	1,562	71.0%	1.13%
% of Repeating Students (1st grade)	3,610	13.0%	987	15.6%	2.58%***
% of Overage Students (1st grade)	3,610	6.7%	987	8.6%	1.91%***
Municipal Population Density	3,610	0.56	1,562	1.07	0.51 ***

※ A positive difference represents a higher value for schools with at least one CwD.
*p＜.1; **＜.05; ***p＜.01.

areas.　As expected, larger overage and repetition rates are observed in schools with CwDs.

The summary statistics presented above suggest that the distribution of CwDs is not random.　However, the causes of these patterns are less clear.　As mentioned above, children with disabilities are more likely to be found in schools with better infrastructure and more resources just because students who are capable of paying for them are the ones who get enrolled.　Even for freely provided public education, it is possible that better equipped schools are also found in urban areas, so that the differences observed in Table 3 correspond again to the trend that mostly children in higher income urban areas get enrolled, rendering the relationship between school resources and the enrollment of children with disabilities spurious.　In the next stage of our analysis, we perform a regression analysis to bring light into the relationship between school resources and the choice of schools of CwDs.

We employ the Schools Census data and create a panel dataset of schools for the years 2007–2013, composed of roughly 13,000 to 18,000 observations depending on the specification and grade analyzed.　We evaluate the determinants of the probability of schools of having at least one CwD enrolled in a given grade g, for the first three grades of primary education by estimating the following econometric model:

$$\Phi^{-1}\left(\Pr(E=1)_{s,t,g}\right) = \beta_{0,g} + \beta_{1,g}Public_{s,g} + \beta_{2,g}Rural_{s,g} + \gamma^{1}_{t,g}H_{s,t,g} + \gamma^{2}_{t,g}R_{s,t,g} + \beta_{3,g}X_{m,g} + \tau_{m,g} + \mu_{t,g} + u_{s,t,g}$$

Where E takes the value of 1 if at least one CwD was enrolled in school s at time t in grade g, and zero otherwise.　m represents the municipality where the school is located.　Public and Rural are binary variables representing the type of administration and area of localization of the school respectively.　H is a set of variables that control for the availability of handicap facilities in the school, including dummy variables for the availability of handicap ramps, handrails and toilets.　R represents a set of controls for other types of general resources, including dummy variables for the availability of pipe water, working electrical infrastructure, a li-

brary, basketball and football courts, the number of flush toilets per student, the number of students per teacher and the percentage of female teachers in all grades. X includes year fixed effects and regional controls. We estimate two specifications of the basic model: For Specification (1), the regional controls consist of municipality fixed effects. Specification (2) employs instead the disability rate, obtained from the 2007 population census data, as a regional control. Additionally, all regressions for second and third grade control for the percentage of students with any disability in the grade $g\text{-}1$ in $t\text{-}1$, in order to account for cohort composition differences.

Results by grade for both specifications are presented in Table 4. The first important insight found in Table 4 is that, at all grades in the first cycle of primary education, CwDs are more likely to attend public schools, even when the exact opposite was said at the beginning of this chapter. A possible explanation is the following: First, note in Tables 2 and 3 that schools attended by CwDs are less likely to be located in rural areas. If most students attend schools close to their homes, this pattern can arise if children with disabilities living in rural areas are significantly less likely to be enrolled in any school at all. The share of public schools is considerably higher in rural than in urban areas (97.7% of schools in rural areas is public, compared to a 60% in urban areas in 2014). As a result of this selection mechanism, the prevalence of private schools among those attended by CwDs is spuriously higher when only looking at the mean. Including the rural dummy as a control serves as a proxy that captures this mechanism, cleaning part of the bias arising from the fact that the Schools Census does not include information about children who are not enrolled in school.

As for why public schools are more attended by CwDs, many explanations can be given. One important factor, is the difference in the direct cost of education between both types of institutions, since public schools provide not only free education, but also provide free uniforms and stationary thanks to the "Paquetes Escolares" Program since 2010. It is reasonable to expect that households of CwDs tend to be more sensitive to the direct costs of education, as they face budgetary constraints due to the

higher medical expenditures and the impact of the child's health condition on the labor supply of the parents. Directly testing this hypothesis would require information on the school fees of private schools. While this information is provided by MINED, an identifier that allows to reliably match it with the data from the Schools Census has not been made available.

The effect of the availability of pipe water and working electrical infrastructure, as well as an increase in the number of flush toilets per student are positive and significantly associated with a higher probability of enrollment of CwDs. This is an important observation, since it suggests that even investments in basic infrastructure can improve the attendance of children with disabilities. In other words, the Central Government counts with a wider range of investment options in order to improve school attendance among CwDs than just investment in handicap facilities. We showed in Tables 2 and 3 that an important share of public schools still lacks this kind of basic infrastructure, especially access to clean water. Regarding handicap facilities, we find that the availability of ramps is the characteristic that is most associated with a higher probability of attendance of CwDs.

Table 5 shows marginal effects of Probit regressions when including only public schools. This allows us to further reduce the effect of sample selection due to income differences. The conclusions are similar to those obtained from Table 4, showing a lower probability of attendance among schools in rural areas, and a positive effect of basic infrastructure such as pipe water provision and working electrical facilities. In terms of handicap facilities, handrails and ramps are both significantly associated with a higher attendance of CwDs. Finally, note that the inclusion of the municipality disability prevalence rate instead of municipality fixed effects does not alter our conclusions.

While suggestive, the results presented in both tables must be taken with caution. As mentioned before, we cannot completely discard the impact of bias due to differences in enrollment rates, despite our efforts to limit the effect of selection on unobservables.

For example, it is not clear why a school with a library or a basketball court, and with a higher rate of students to teachers is more likely to enroll CwDs. These effects are likely to come from higher enrollment rates of CwDs in higher income areas, although this effect should be captured at least partially by the municipality-level controls. Another possible source of bias comes from the admissions procedures of schools, with some institutions being more eager to admit children with disabilities than others. For example, schools that give a higher priority to performance at

Table 4: Probit Regression Marginal Effects of the Characteristics of Schools on the Probability of CwD Enrollment (All Schools)

	First Grade		Second Grade		Third Grade	
	(1)	(2)	(1)	(2)	(1)	(2)
Public School	0.163***	0.137***	0.106***	0.100***	0.117***	0.107***
	(0.012)	(0.011)	(0.012)	(0.011)	(0.011)	(0.011)
Rural Area	−0.314***	−0.320***	−0.117***	−0.119***	−0.129***	−0.129***
	(0.008)	(0.008)	(0.009)	(0.008)	(0.008)	(0.008)
Pipe Water Provision	0.050***	0.054***	0.044***	0.042***	0.026***	0.030***
	(0.009)	(0.009)	(0.009)	(0.008)	(0.008)	(0.008)
Has Working Electrical Facilities	0.058***	0.067***	0.031**	0.028**	−0.003	−0.005
	(0.015)	(0.015)	(0.014)	(0.013)	(0.013)	(0.013)
Has a Library	0.006	0.015*	0.013*	0.019**	0.043***	0.047***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.007)	(0.007)
Has a Basketball Court	−0.012	−0.007	0.046***	0.047***	0.027***	0.031***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.007)
Has a Football Court	−0.030***	−0.027***	−0.011	−0.007	−0.021**	−0.021**
	(0.010)	(0.010)	(0.009)	(0.009)	(0.009)	(0.009)
Flush Toilets per Students	0.177***	0.179***	0.052	0.057	0.054	0.065
	(0.038)	(0.037)	(0.041)	(0.041)	(0.042)	(0.041)
Students per Teacher	0.001**	0.001***	0.001**	0.001**	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
% of Female Teachers	−0.000	0.015	0.004	0.016	0.010	0.023*
	(0.015)	(0.014)	(0.015)	(0.014)	(0.014)	(0.014)
Handicap Ramps	0.036***	0.042***	0.050***	0.055***	0.041***	0.044***
	(0.011)	(0.011)	(0.010)	(0.010)	(0.010)	(0.009)
Handicap Handrails	0.002	−0.000	0.015	0.008	0.031***	0.036***
	(0.013)	(0.013)	(0.012)	(0.012)	(0.012)	(0.011)
Handicap Toilets	−0.017	−0.014	−0.026	−0.022	−0.007	−0.007
	(0.025)	(0.025)	(0.024)	(0.023)	(0.023)	(0.022)
Municipality Controls	FE	DR	FE	DR	FE	DR
N	18,197	18,220	15,834	15,878	15,590	15,759
Pseudo R-sq	0.1281	0.101	0.0859	0.0619	0.0934	0.0647

Each observation represents a school and year pair. The dependent variable is a binary variable that takes the variable of 1 if at least one CwD has enrolled in a given school in a particular year. All regressions control for the municipal level population density and year fixed effects. Equations 4 to 9 also control for the share of students with disabilities in (g-1, t-1). Standard errors in parentheses. *p<.1; **p<.05; ***p<.01.

sports might select students according to their physical fitness. Such a mechanism could explain why we observe a negative association between the availability of a football court and the enrollment of CwDs. We hope that future research can extend our findings in these important topics.

Table 5: Probit Regression Marginal Effects of the Characteristics of Schools on the Probability of CwD Enrollment (Public Schools)

	First Grade		Second Grade		Third Grade	
	(1)	(2)	(1)	(2)	(1)	(2)
Rural Area	−0.312***	−0.313***	−0.124***	−0.124***	−0.129***	−0.126***
	(0.008)	(0.008)	(0.009)	(0.009)	(0.009)	(0.008)
Pipe Water Provision	0.042***	0.046***	0.043***	0.040***	0.023***	0.027***
	(0.009)	(0.009)	(0.009)	(0.008)	(0.008)	(0.008)
Has Working Electrical Facilities	0.046***	0.054***	0.031**	0.030**	−0.001	−0.004
	(0.014)	(0.014)	(0.014)	(0.013)	(0.013)	(0.012)
Has a Library	0.020**	0.027***	0.015*	0.021***	0.045***	0.049***
	(0.009)	(0.008)	(0.008)	(0.008)	(0.008)	(0.007)
Has a Basketball Court	0.005	0.008	0.042***	0.046***	0.030***	0.034***
	(0.009)	(0.009)	(0.008)	(0.008)	(0.008)	(0.008)
Has a Football Court	−0.028**	−0.024**	−0.023**	−0.017*	−0.019*	−0.017*
	(0.011)	(0.011)	(0.010)	(0.010)	(0.010)	(0.010)
Flush Toilets per Students	0.006	0.013	0.032	0.049	0.031	0.052
	(0.045)	(0.044)	(0.042)	(0.041)	(0.043)	(0.041)
Students per Teacher	0.001***	0.002***	0.001**	0.001**	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
% of Female Teachers	0.003	0.013	−0.005	0.009	0.000	0.012
	(0.015)	(0.014)	(0.015)	(0.014)	(0.014)	(0.014)
Handicap Ramps	0.034***	0.039***	0.044***	0.050***	0.041***	0.045***
	(0.012)	(0.012)	(0.011)	(0.011)	(0.011)	(0.010)
Handicap Handrails	0.033**	0.026*	0.033**	0.024	0.051***	0.054***
	(0.016)	(0.016)	(0.015)	(0.015)	(0.014)	(0.014)
Handicap Toilets	−0.020	−0.018	−0.040	−0.031	0.003	0.006
	(0.029)	(0.029)	(0.027)	(0.027)	(0.026)	(0.025)
Municipality Controls	FE	DR	FE	DR	FE	DR
N	15,492	15,515	13,766	13,810	13,565	13,734
Pseudo R-sq	0.1479	0.1185	0.0967	0.0672	0.1048	0.0713

Each observation represents a school and year pair. The dependent variable is a binary variable that takes the variable of 1 if at least one CwD has enrolled in a given school in a particular year. All regressions control for the municipal level population density and year fixed effects. Equations 4 to 9 also control for the share of students with disabilities in (g-1, t-1). Standard errors in parentheses. *p＜.1; **p＜.05; ***p＜.01.

5. The effect of the educational supply on school attendance of children with disabilities

The coverage of El Salvador's education system is heterogeneous across its different stages. Figure 3 employs data from the 2014 Schools Census and shows the number of students enrolled in each grade and the number of public and private schools with at least one student enrolled in that grade. The number of students is relatively stable until grade 7, and decreases consistently from there on, as students reach working age. On the other hand, the number of schools decreases at grade 7 and at the first year of secondary education. This phenomenon can have two effects on the students' educational environment: a reduction in the available school resources per student, and an increase in the average commute time to school. Figure 4 shows the number of students per school and the school density for each grade. Clearly, the rate of students per school increases markedly both at the beginning of the third cycle of primary education and at the beginning of secondary education, while the school density decreases at those same points.

Figure 3: Country-wide school enrollment and number of schools per grade

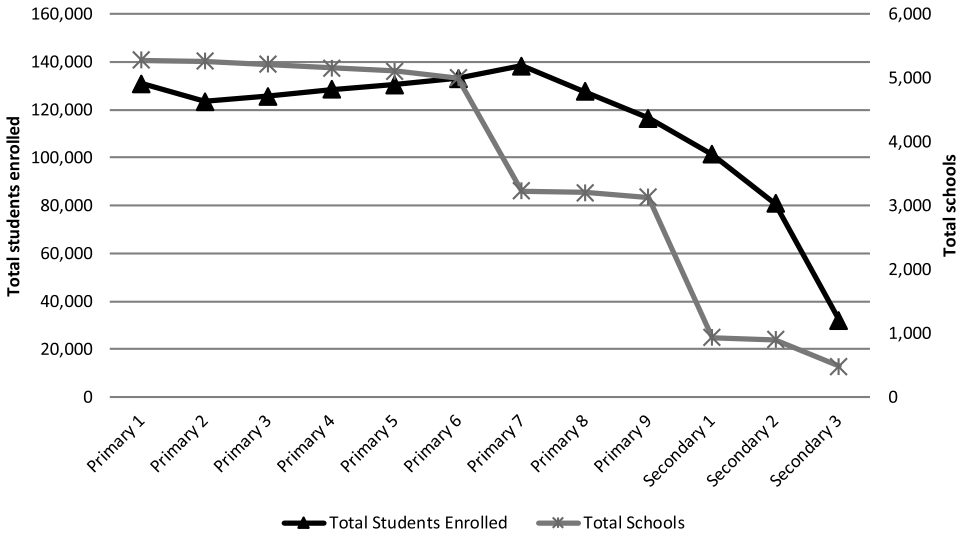
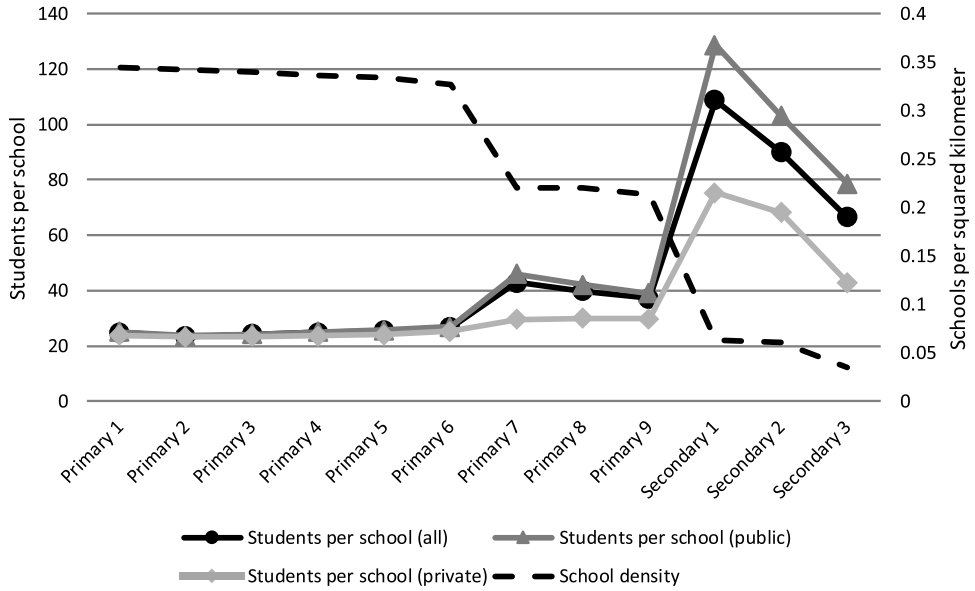


Figure 4: School density and number of students per school by grade and type of school



These changes are associated with a lower educational supply.　A reduction in relative school resources, such as a lower teachers-per-student ratio, and an increased commute time, is likely to have a stronger negative impact on the enrollment and advancement of CwDs.　In this chapter, we search for such a differential effect. We aggregate the Schools Census data into a panel of the 262 municipalities of El Salvador and construct a measure of the Schools Per Student ratio（SPS）in the following way:

$$SPS_{g,t,m} = \frac{100 * (Number\ of\ Schools)_{g,t,m}}{(Number\ of\ Students)_{g,t,m}}$$

The SPS ratio compares the number of schools(4) located in municipality m and year t with the number of children enrolled in those schools in grade g for that same year.　A higher SPS is associated with a higher relative educational supply.(5) We also define the following measure of the change of the SPS ratio:

$$\Delta SPS_{g,t,m} = SPS_{g,t,m} - SPS_{g-1,t-1,m}$$

Additionally, we obtain a measure of the change in the density of schools per squared kilometer $\Delta Dens_{g,t,m}$. A higher density means that the average student has to travel a shorter distance to attend school. Finally, we define the advancement rate for students with and without disabilities as:

$$AR_{d,g,t,m} = \frac{\text{Number of Students}_{d,g,t,m}}{\text{Number of Students}_{d,g-1,t-1,m}}$$

Where $Number\ of\ Students_{d=1,g,t,m}$ denotes the total number of students with at least one type of disability enrolled in grade g and year t in municipality m. Similarly, the same measure is obtained for students without any type of disabilities ($d=0$). With these measures, we estimate the following equation:

$$\Delta AR_{d=1,g,t,m} = \alpha \Delta SPS_{g,t,m} + \beta \Delta Dens_{g,t,m} + \varphi_g + \tau_m + \mu_t + u_{s,t}$$

Where $\Delta AR_{d=1,g,t,m} = AR_{d=1,g,t,m} - AR_{d=0,g-1,t-1,m}$. φ_g, τ_m and μ_t represent the grade, municipality and time fixed effects respectively. α and β are regression coefficients that capture the effect of changes in different dimensions of the educational supply on the relative advancement of children with disabilities with respect to their peers. We expect to observe positive coefficients in both cases if CwDs are more likely to be affected by the shortness of resources and by the average distance to schools.

Results are presented in Table 6. Regressions are estimated employing median regression to avoid any effect from outliers. Columns (1) and (2) include measures obtained by aggregating all schools. The results in these columns show that, even after including the full set of fixed effects, an increase in the number of schools relative to students does have a positive impact on the advancement rate of CwDs

(4) Schools with at least one student enrolled in grade g.

(5) Ideally, measures of school resources such as the class-size should be employed for the analysis; however, the data on teachers was not provided by grade, so we cannot include it in this research.

relative to that of their peers.　Columns (3) and (4) include measures of SPS and schools density obtained separately for public and private schools.　Column (3) shows a significant coefficient to a level of 5% for changes in the density of public schools, although its effect becomes insignificant when adding municipality fixed effects in Column (4).　Instead, the change in public SPS is again the most relevant factor explaining the relative advancement of students with disabilities.

The results in Table 6 lead us to conclude that lower schools-per-student ratios, especially of public schools, are the main factor leading to lower advancement rates of CwDs.　It is surprising however that we fail to observe any significant effect of the schools density on the relative advancement rate, since mobility issues are likely to reduce the incentives to attend schools, especially in areas where public transportation and roads are less developed.　This is a topic that should be studied in further detail.

Table 6: Effect of Changes in Education Supply on the Relative Advancement of CwDs

	(1)	(2)	(3)	(4)
ΔSchool Per Student ratio (SPS)	0.004*	0.070***		
	(0.002)	(0.008)		
ΔSPS (public)			−0.013	0.088***
			(0.009)	(0.014)
ΔSPS (private)			−0.002*	0.000
			(0.001)	(0.001)
ΔSchool density	−0.003	0.103		
	(0.065)	(0.078)		
ΔSchool density (public)			0.165	−0.002
			(0.114)	(0.136)
ΔSchool density (private)			0.010	0.232
			(0.134)	(0.146)
Constant	−0.195***	−0.241*	−0.042***	−0.052
	(0.009)	(0.126)	(0.013)	(0.138)
Fixed Effects		Yes		Yes
N	17,646	17,559	7,722	7,722
Pseudo R-sq	0.0006	0.0688	0.0008	0.0727

The dependent variable is $\Delta AR_{d=1,g,t,m}$. Results obtained by median regression. Columns (2) and (4) include grade, year and municipality fixed effects. * p<.1; ** p<.05; *** p<.01.

6. Conclusions and recommendations

Our analysis so far has yielded many observations that we believe can become an important input for policy-makers and for future research in this area. This chapter summarizes our main findings, presents some recommendations and suggests some future lines of research.

6.1 Conclusions

Our analysis showed that students with disabilities tend to be overage in a greater extent than their peers, and that this trend is associated with higher repetition rates at the very first levels of primary education. CwDs are likely to experience higher dropout rates than their healthier peers if schools are not capable of adapting to their needs. It is important to understand in more detail the mechanism that links factors such as the school curriculum, infrastructure and the availability of a sufficient number of qualified teachers, with the relative performance of CwDs in the classroom. Collecting more detailed data on these factors is an important step in this direction.

A descriptive analysis of the data showed that CwDs enroll mostly in private schools at the beginning of primary education. In contrast, regression analysis shows that, other factors held constant, public schools are associated with a higher probability of enrollment of any CwD. We interpret this pattern as arising from lower enrollment rates among CwDs in rural areas, possibly due to the effect of household income. The Schools Census does not provide information on children who are not enrolled in school, and therefore differences in enrollment rates by disability status is a topic that has to be addressed by future research in more detail.

Rural areas and low-income groups are mostly served by the public education system, which also happens to exhibit the biggest deficiencies in terms of school resources and infrastructure. Many public schools still lack basic infrastructure

such as electrical facilities and access to clean water, and just a small share has invested in providing adequate facilities for children with disabilities. Our regression analysis suggests that these limitations can negatively affect the enrollment of CwDs. In fact, although we find that handicap facilities are positively associated with a higher enrollment of CwDs, we also show that investment in basic infrastructure also benefits their enrollment. In other words, we find that the Ministry of Education can go a long way towards improving the inclusion of children with disabilities by making investments that benefit *all* students.

This research evaluated the relationship between the educational supply and the advancement of CwDs. The Salvadoran education system experienced an important geographic expansion during the decade of 1990 with the end of the civil war. However, as the mean educational attainment of Salvadoran children has increased in the last two decades, more and more students are left with few options at the top levels, which affects their choice to continue their studies. Our regression analysis in chapter 5 showed that CwDs are especially sensitive to fluctuations in the number of schools relative to students. The Ministry of Education can achieve important gains in terms of the inclusion of CwDs while benefiting all students, by improving the access to higher education in areas where schools are scarcer.

Our analysis fails to find evidence of a relationship between the geographical dispersion of schools and the relative advancement rate of CwDs. This is puzzling, since we expect mobility to be a key factor influencing the educational outcomes of less healthy students. Future research should verify our conclusions by employing more detailed data on the location of schools relative to the place of residence of students.

6.2 Recommendations

The Schools Census, yearly collected by the MINED, is an important tool for the study of the educational conditions of CwDs in El Salvador. A few areas of improvement can be mentioned, in order to improve the usage of this dataset in this research

topic.

The definition of disability employed by the Schools Census is different from the one employed by the Population Census, which prevents researchers from making an accurate measurement of the educational conditions of CwDs. Employing a single definition (preferably the one used in the Population Census) is desirable, although it would require a higher degree of participation by the student on the collection of the Schools Census data, which can be costly. However, we encourage the Government of El Salvador to pursue the standardization of this definition in the measure of its capabilities.

Besides the Schools Census the Ministry of Education of El Salvador produces rich datasets that can be employed to gain a broader vision of the Salvadoran education system. This additional data includes datasets containing information about the fees charged by private educational institutions and the grades obtained by secondary school students in the Aptitude Test for High School Students (PAES). However, due to the lack of a publicly available school ID, it is not possible to create a panel dataset of schools with information on the main determinants of the education production function. Such a dataset could become an important tool for the evaluation of the impact of educational policies implemented through the whole country. In general, the Government of El Salvador can improve the quality and quantity of the analysis produced with these administrative datasets by incorporating the necessities of researchers and analysts in the process of collection and provision of data, even if its primary purpose is administrative.

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