

# Chapter 5

## Segregation of Indigenous Students in the Chilean School System



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### 5.1 Introduction

School segregation, especially on the basis of socioeconomic, ethnic, or racial characteristics, is one of the fields of greatest interest for the design of public policies in countries with high levels of inequality in educational opportunities and low social mobility, such as Chile (Núñez & Miranda, 2011; OECD, 2010). This trend has been accentuated in a global context of educational reforms aimed at improving academic performance through standards-based quality assurance systems (often built on the results of standardized national tests) and strengthening the links between productive development and the quality of education (ECLAC, 2010). The evidence gathered at the international level conclusively shows the direct negative short-, medium-, and long-term effects of school segregation on these objectives (Gorard & Fitz, 2000; Harker, 2004).

This chapter analyzes the conditions of school segregation experienced by indigenous students in Chile. It outlines the main trends of this phenomenon and shows that the conditions and qualities of school segregation by ethnicity depend to a large extent on the context in which the school is located. Based on the results obtained, we propose hypotheses for future studies that seek to identify whether different patterns of school segregation respond to specific educational purposes (such as, for

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example, grouping indigenous students in a school to implement Intercultural Bilingual Education and/or the Indigenous Language Sector) or whether they are linked to other models of student grouping.

The chapter is divided into five sections, in addition to this introduction. The first consists of a review of the literature. The second section presents the data used in this research. The third includes a presentation of the methodology, while the fourth shows the results of the study. This is followed by a conclusion section.

## 5.2 Literature Review

### 5.2.1 School Segregation

The international evidence on the effects of segregation is increasingly compelling; nearly 60 years of research in the United States and other countries is conclusive: *separate remains extremely unequal* (Orfield et al., 2012). Thus, creating school systems that concentrate groups of students that share certain homogeneous attributes in certain schools leads to the inequalities of origin of children and young people being maintained and even accentuated.

In addition, school segregation limits educational opportunities and performance from a variety of perspectives: less experienced and less qualified teachers are more often found teaching in schools that serve the most vulnerable groups (Clotfelter et al., 2005, 2006); there are higher teacher turnover rates in these types of schools; there is an increase in lower-qualified peer groups, as the concentration of vulnerable students affects educational opportunities far more than individual poverty status; and they have fewer learning materials and resources (Borman & Dowling, 2010). Also, indicators such as repetition rates, expulsion rates, or school disciplinary problems are much higher in segregated and vulnerable schools than among students from the economic elite. Evidence has also shown that students from segregated schools who enter higher education perform less well in their working lives, earn lower incomes, and have poorer health, reflecting both short- and long-term effects of this phenomenon (Orfield et al., 2012).

Conversely, research has shown that being part of a socially integrated school provides benefits to all children, especially in an increasingly global, diverse, and complex society and world. Integration builds skills to develop more fluid communication and make friends from diverse backgrounds, reduces the willingness to generate stereotypes, and produces higher levels of civil and local responsibility, among other effects (McDonnell et al., 2000; Orfield, 2001). It also creates intergenerational benefits in societies, as individuals who studied in integrated schools are more likely to seek out and be placed in more integrated universities, neighborhoods, and workplaces, and they also transmit a greater disposition towards integrated spaces to their own children (Mickelson, 2001).

For its part, international evidence shows that social polarization in school systems, understood as the creation of extreme groups that do not know each other or coexist in school, is more critical than segregation. Thus, the separation of territories, schools, and communities into groups that are increasingly homogeneous and distant in their characteristics from each other generates tensions in terms of social cohesion and deteriorates the quality of citizenship and civic attitude, being a precursor of higher levels of social conflict (Alegre et al., 2008; Carillo & Vásquez, 2005; Crouch et al., 2009; Esteban & Ray, 2011).

### ***5.2.2 Causes, Effects, Magnitude, and Context of School Segregation in Chile***

In Chile, research on school segregation has been scarce, but has increased in recent years (Bellei, 2013). According to this research, it can be concluded that the Chilean school system is highly segregated in socioeconomic terms from the early years of schooling, a situation that remains stable throughout the educational path of children. On the other hand, academic segregation—measured by the tests in the National Education Quality Measurement System (Simce, by the Spanish acronym)—begins in the first years of elementary education at intermediate levels, growing systematically as children progress towards the end of elementary education and then into secondary education. Thus, by 10th grade, academic segregation reaches levels of hypersegregation, similar to those observed when only the socioeconomic attributes of students are considered (Valenzuela et al., 2014; Villalobos & Valenzuela, 2012).

Socioeconomic segregation is much higher among students attending subsidized private schools, at least during the first few years of schooling (Elacqua, 2012; Flores, 2008; Mizala & Torche, 2012; Valenzuela et al., 2009, 2010). The intertemporal evolution of this situation shows that, since 1999, the levels of socioeconomic and academic segregation have systematically increased (Elacqua, 2012; Valenzuela et al., 2010; Villalobos & Valenzuela, 2012). However, since the implementation of the Preferential School Subsidy Law (SEP, by the Spanish acronym) (although with evidence only for fourth-grade students) socioeconomic segregation has been reduced between students from vulnerable groups and students from medium-ranking groups. Despite this progress, segregation between students from medium-high and high socioeconomic groups and the rest of the population persists, because the schools these students attend have not been affected by the implementation of the SEP (Valenzuela et al., 2013a, 2013b).

Meanwhile, international comparisons show that Chile has the highest levels of socioeconomic segregation among countries on which there is information. For example, among the 65 countries that participated in the PISA 2009 test, Chile was ranked second, a scenario that was consistent with the results of the PISA 2006 test (OECD, 2010; Valenzuela et al., 2010). This is consistent both for students from lower and higher socioeconomic levels (SEL).

A study on the polarization of the school system (Villalobos & Valenzuela, 2012) shows that the conditions of separation between vulnerable students (the 30% from the lowest socioeconomic levels) and better social conditions (the 30% from the highest socioeconomic levels) are extreme and increase over time. This means that it is almost impossible to find students from these two social groups in the same school throughout their entire school lives, a situation that is repeated when analyzing the middle and upper social groups. It is only possible to identify schools where social integration occurs between families of vulnerable groups and families of medium groups (Valenzuela et al., 2013a).

In addition, school segregation in Chile exceeds residential segregation in most districts in the Metropolitan Region of Santiago and at national level (Elacqua & Santos, 2013; Valenzuela et al., 2009). This means that the school system *adds* segregation to the segregated geographic location of households according to the socioeconomic level. There are three factors associated with this higher segregation. First, the characteristics of demand or the preferences of parents are relevant, since they seek a specific type of school for their children, where they share similar socioeconomic or academic characteristics with other children, based on fear and/or rejection of the “other” (Wormald et al., 2012). Secondly, the institutional design and the educational offer also contribute to segregation, since schools with different types of funding are usually established in communities according to the socioeconomic level of the population. Thus, schools with shared financing or co-payment reinforce segregation based on families’ ability to pay (Mizala & Torche, 2012), along with school selection and retention policies and the existence of Liceos Emblemáticos and Liceos Bicentenario (Emblematic High Schools and High Schools of Excellence, respectively), which also exacerbate school segregation. Finally, residential segregation also makes an important contribution, and, in the specific case of indigenous populations, the distribution of these groups in national territory decisively defines the patterns of segregation, since it reproduces territorial, productive, and historical distributions of the population.

### 5.2.3 *Data on Indigenous Segregation in Chile*

In Chile, there is little recent research on the school segregation of indigenous students. A study by Elacqua (2012) analyzes the level and evolution of the segregation of indigenous students between 1999 and 2010, considering only public and subsidized private schools, that is, excluding students who attend paid private schools.<sup>1</sup> The results of that research show that, using the Dissimilarity Index or Duncan Index,<sup>2</sup> the segregation of indigenous students is lower in public schools, while higher degrees of segregation can be seen in subsidized private schools that are run for profit and do not belong to a network, as well as non-profit Catholic schools.

<sup>1</sup> These schools represent about 7% of the country’s total school enrollment.

<sup>2</sup> Methodological details regarding this are outlined in the “Method” section.

Meanwhile, the intertemporal evolution shows an increase between 1999 and 2007, although a slight decrease was observed in 2008, which is consistent with what has been seen regarding the effects of the implementation of the SEP Law in the Chilean school system.

McEwan's (2004) work, while not analyzing the level of segregation of indigenous students, does allow an examination of the link between indigenous segregation and the socioeconomic segregation of students, indicating that indigenous people, by being concentrated among the most vulnerable students, could show a higher degree of school segregation that was solely a reflection of their socioeconomic status.

McEwan attempts to explain the gap in educational performance between indigenous and non-indigenous children in fourth grade (1999) and eighth grade (1997) in Chilean schools through a methodology that breaks down the individual and school levels. When considering the results of the standardized test in mathematics (Simce), we find that non-indigenous students achieve scores about 0.40 standard deviations higher than indigenous students in both years, while in Reading this gap is similar in fourth grade, but somewhat greater for eighth-grade students. Likewise, the econometric analysis shows that between 50 and 60% of the performance gap between non-indigenous and indigenous students is explained by differences in the quality of the schools; another 30% to 40% of the differences are due to family attributes, such as their levels of schooling; and only between 10 and 15% is due to non-observable factors (which is close to 2–3 points on the Simce test) (McEwan, 2004).

This result is relatively similar in both Reading and Mathematics, which could be associated with multiple explanations, such as the development of a form of classroom teaching that discriminates against indigenous students, or factors not observable in families or schools. Therefore, it is not possible to conclude that this gap is explained by an education that specifically and additionally harms indigenous students, at least during basic education.

### 5.3 Data

The research was carried out using two data sources; on the one hand, the results on the standardized Simce tests between 1999 and 2011 for students in fourth, eighth, and 10th grade. In addition to the above, surveys applied to families and parents/guardians were used during the implementation of this test, the coverage of which exceeds 90% of the students participating in the test annually, allowing valuable information on the student and his or her family to be included in the analyses to be conducted.

Three main variables were used for the segregation analysis. First, a dichotomous variable was generated to indicate whether or not the student belonged to an ethnic group, using questions regarding whether the student's father or mother belonged to an indigenous group, and where students whose father or mother did state that this was

**Table 5.1** Descriptive analysis of the variables used in the segregation analysis

Year	Variable	Obs	Mean	SD	Min	Max
4th Grade 2011	Belongs to ethnic group	182,095	0.0980	0.2973	0.0000	1.0000
	SEL Index	198,373	0.0000	1.0000	-2.8966	4.5934
	Simce Mathematics	197,664	259.51	50.399	106.51	382.25
8th Grade 2011	Belongs to ethnic group	174,137	0.0903	0.2867	0.0000	1.0000
	SEL Index	189,890	0.002	1.0000	-2.7897	4.8882
	Simce Mathematics	189,318	259.02	48.724	135.35	395.66
10th Grade 2010	Belongs to ethnic group	177,445	0.0791	0.2700	0.0000	1.0000
	SEL Index	191,452	0.0002	1.0000	-2.8190	5.3034
	Simce Mathematics	191,452	259.36	61.770	106.00	417.00

Source Prepared by the authors based on Simce data

the case they categorized with a 1.<sup>3</sup> For the analysis of the student's socioeconomic level, an SEL index was created using the principal component methodology, based on the combined analysis of three available variables: the mother's education, the father's education, and the per capita income of the student's household. Finally, the student's Simce score on the Mathematics test was used for the analysis of the academic order. The descriptive statistics of these variables for the last year available (2010 or 2011) for each level are shown in Table 5.1.

## 5.4 Method

This study analyses the school segregation experienced by indigenous students in Chile. In order to study this phenomenon, we used Duncan's Segregation Index or dissimilarity index (Duncan & Duncan, 1955), which has several positive attributes for the objective set out in this study, including its intertemporal comparability and composition invariance (Reardon & Firebaugh, 2002) and which has been used in various educational studies (Allen & Vignoles, 2005; Söderströma & Uusitalo, 2004). One potential limitation of this index is that it is not suitable for spatiality (it is an aspatial index), which has been pointed out in previous research (Reardon & Firebaugh, 2002).

<sup>3</sup> Unlike other Latin American countries, in Chile the assignment of a student to an ethnic group is done through cultural self-identification, and not on the basis of knowledge (or not) of a specific language (McEwan, 2004, 2007).

The index is defined as:

$$DA = \frac{1}{2} \sum_{i=1}^I \left| \frac{ES_i}{EST} - \frac{EI_i}{EIT} \right| \quad (5.1)$$

where  $i$  represents an educational establishment within the territory to be analyzed,  $ES$  are the students who present the attribute to be analyzed, and  $EI$  are the students who do not possess the attribute of analysis in school  $i$ ; while  $EST$  corresponds to the total number of students with the attribute in the territory of analysis and  $EIT$  to the total number of students who do not possess the characteristics of analysis in the same territory. Duncan's index varies between 0 and 1, where 0 indicates that the distribution of students with and without the attribute of analysis is similar across schools in the territory of analysis, and 1 implies that students with the attribute are extremely concentrated.

In terms of interpretation, Duncan's index represents the percentage of indigenous students that should be transferred to other schools in order to achieve unsegregated distribution throughout the school system. In addition, the index's levels of segregation can be classified into three categories according to their values: (a) low segregation, between 0 and 0.3; (b) moderate segregation, between 0.3 and 0.45; (c) high segregation, between 0.45 and 0.6; and (d) hypersegregation, above 0.6 (Glaeser & Vigdor, 2001). As a condition, this index requires that the attribute under analysis be dichotomous in order to carry out the analyses (MINEDUC, 2012). Finally, it is important to note that the analysis using Duncan's index is sensitive to the number of students per school. For this reason, the number of students of schools in the territories under analysis should be considered in the interpretation of the results.

## 5.5 Results

Indigenous students in fourth grade in 2011 represented 9.8% of the country's school population. However, when analyzing the data by decile of socioeconomic level, it can be seen that indigenous students make up more than 21% of students in the first decile, representing the poorest sector of the population. In fact, more than half of indigenous students are in the first three deciles of the socioeconomic level, as can be seen in Table 5.2. This implies that the indigenous population in Chile concentrates high levels of vulnerability, being less likely to belong to the 8th, 9th, or 10th deciles.

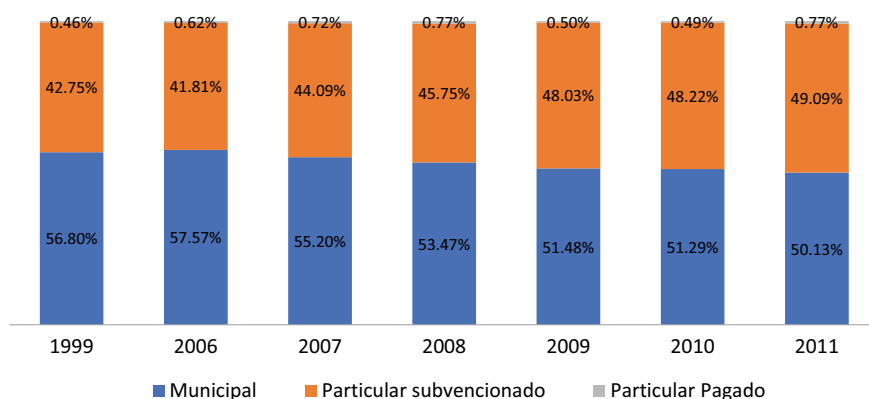
In addition, the distribution of indigenous students by school funding type is not homogeneous. Currently, indigenous students are mostly served in municipal schools, followed by subsidized private schools. Likewise, over time there has been a decline in the percentage of indigenous students in public schools and an increase in subsidized private schools (Fig. 5.1), which follows the general trend of transfer of students from public schools to private subsidized schools that the country has experienced over the past few decades (Elacqua, 2012).

**Table 5.2** Distribution by socioeconomic decile of students belonging and not belonging to an ethnic group

Decile	Non-ethnic	Ethnic	Ethnic (%)	Non-ethnic (%)
1	13,478	3598	21.07	78.93
2	14,614	2957	16.83	83.17
3	15,544	2326	13.02	86.98
4	15,944	2042	11.35	88.65
5	16,173	1845	10.24	89.76
6	16,843	1493	8.14	91.86
7	17,190	1387	7.47	92.53
8	17,487	1111	5.97	94.03
9	18,140	771	4.08	95.92
10	18,834	318	1.66	98.34
Total	164,247	17,848	9.80	90.20

Source Prepared by the authors based on Simce information

**Distribution of Students by ethnicity and type of school in 4th grade (1999 - 2011)**



**Fig. 5.1** Distribution of fourth-grade students by ethnicity and school funding type, 2011 (Source Prepared by the authors based on Simce results)

From the data presented, it is possible to observe that indigenous students are over-represented among the poorest groups and that they mainly attend municipal schools. We should now look at how these students are grouped between the schools.

In general terms, and as can be seen in Table 5.3, the segregation of indigenous students at the national level reaches moderate and high levels. The Duncan index has thus hovered around values from 0.40 to 0.51 at different school levels over the last 13 years. Although the levels of segregation are lower than the levels of



**Table 5.3** Duncan index for indigenous students in fourth, eighth, and 10th grade for 1999–2011

Level	1999	2000	2006	2007	2008	2009	2010	2011
4th Grade	0.453		0.455	0.478	0.447	0.479	0.475	0.479
8th Grade				0.459		0.483		0.475
10th Grade		0.514	0.443		0.404		0.429	

*Source* Prepared by the authors based on Simce results

socioeconomic segregation (Valenzuela et al., 2014), it should be noted that the indigenous population is not distributed homogeneously throughout the national territory, but is instead concentrated in specific regions (as shown in the annexes), so an analysis disaggregated by geographical zones is needed to better understand this phenomenon.

This analysis demonstrates that school segregation varies significantly between regions of the country (see Table 5.4). Thus, ethnic segregation is greater in Region II, from regions IV to IX, and also in Region XIV, although it is within the margins qualified as moderate, which suggests that the segregation of indigenous students is a widespread phenomenon at the national level. There are also significant differences in the levels of segregation when comparing elementary education with secondary education (10th grade). This may be partly due to there being fewer secondary schools in the country, as enrolment that is dispersed and segregated in elementary education tends to be concentrated when moving on to the secondary level. Another possible explanation for this difference is related to the increase in dropout rates in secondary education shown by various studies (Espínola et al., 2011; Santos, 2009), where a larger proportion of indigenous students than non-indigenous students may be expelled from the system.

It can also be seen that in elementary education, socioeconomic segregation is the highest in the school system, followed by ethnic segregation, and finally academic segregation; while for students in 10th grade, ethnic segregation is lower than socioeconomic and academic segregation. According to Table 4.5, this condition is seen in most regions.

This data show that there is significant variation in segregation by region, although levels of ethnic, socioeconomic, and academic segregation remain within moderate ranges in most regions.

However, when the analysis is extended to the lower territorial level, that of the province, the levels of segregation remain within the moderate range and are low in some cases (Table 5.5), with the exception of the province of Parinacota in the Region I Arica y Parinacota (0.615), the provinces of Los Andes and San Felipe in Region V Valparaíso and Linares in Region VII Maule (0.565), where they reach high or hypersegregation levels. On the other hand, it can be seen that segregation at the provincial level decreases as progress is made in the educational system. Thus, in 10th grade, all of the provinces show low levels of segregation (or very close to this level, with an upper limit of 0.3), with Cardenal Caro province in Region VI O'Higgins being the only outlier, with a Duncan index of 0.518.

**Table 5.4** Duncan index for ethnic, socioeconomic, and academic segregation for students in fourth, eighth, and 10th grade with information from 2010–2011

Region	Ethnic			Socioeconomic (30% most vulnerable)			Academic (30% lowest performance)		
	4th Grade 2011	8th Grade 2011	10th Grade 2010	4th Grade 2011	8th Grade 2011	10th Grade 2010	4th Grade 2011	8th Grade 2011	10th Grade 2010
1	0.323	0.313	0.322	0.479	0.429	0.474	0.430	0.428	0.486
2	0.432	0.431	0.427	0.464	0.445	0.412	0.353	0.370	0.481
3	0.321	0.273	0.271	0.421	0.447	0.358	0.373	0.365	0.487
4	0.401	0.373	0.249	0.483	0.498	0.489	0.383	0.372	0.455
5	0.459	0.428	0.362	0.496	0.485	0.450	0.388	0.398	0.487
6	0.420	0.426	0.299	0.500	0.487	0.443	0.371	0.360	0.512
7	0.484	0.522	0.312	0.506	0.507	0.437	0.410	0.367	0.419
8	0.458	0.475	0.362	0.520	0.518	0.478	0.372	0.383	0.451
9	0.466	0.427	0.340	0.492	0.509	0.465	0.415	0.381	0.422
10	0.366	0.320	0.266	0.509	0.490	0.448	0.403	0.359	0.451
11	0.267	0.300	0.277	0.418	0.466	0.479	0.309	0.378	0.397
12	0.359	0.321	0.312	0.481	0.470	0.471	0.396	0.415	0.495
13	0.367	0.366	0.310	0.515	0.503	0.490	0.417	0.410	0.521
14	0.402	0.322	0.296	0.495	0.475	0.460	0.368	0.363	0.439
15	0.322	0.305	0.236	0.423	0.466	0.428	0.351	0.435	0.572

Source Prepared by the authors based on Simce results

**Table 5.5** Duncan ethnic index for students in fourth, eighth, and 10th grade by province, 2010–2011

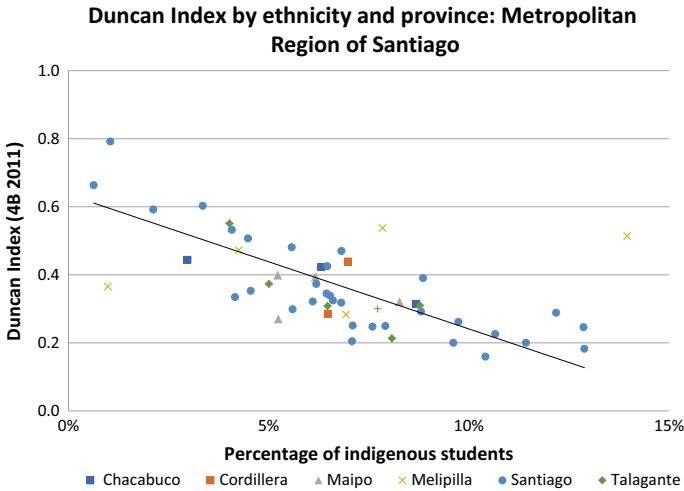
Grade/Province (Provincial Capital)	4th Grade 2011	8th Grade 2011	10th Grade 2010
<i>Arica y Parinacota Region</i>			
Arica (Arica)	0.315	0.301	0.234
Parinacota (Putre)	0.615	0.564	–
<i>Tarapacá Region</i>			
Iquique (Iquique)	0.295	0.272	0.290
Tamarugal (Pozo Almonte)	0.459	0.378	0.266
<i>Antofagasta Region</i>			
Tocopilla (Tocopilla)	0.297	0.315	0.193
El Loa (Calama)	0.244	0.247	0.150
Antofagasta (Antofagasta)	0.289	0.273	0.194
<i>Atacama Region</i>			
Chañaral (Chañaral)	0.377	0.450	0.147
Copiapó (Copiapó)	0.281	0.217	0.280
Huasco (Vallenar)	0.286	0.296	0.197
<i>Coquimbo Region</i>			
Elqui (Coquimbo)	0.368	0.377	0.263
Limarí (Ovalle)	0.403	0.355	0.159
Choapa (Illapel)	0.512	0.414	0.333
<i>Valparaíso Region</i>			
Petorca (La Ligua)	0.483	0.223	0.336
Los Andes (Los Andes)	0.518	0.398	0.302
San Felipe (San Felipe)	0.524	0.448	0.336
Quillota (Quillota)	0.476	0.342	0.320
Valparaíso (Valparaíso)	0.446	0.438	0.363
San Antonio (San Antonio)	0.297	0.336	0.272
Isla de Pascua (Hanga Roa)	0.102	0.311	0.154
<i>Metropolitan Region</i>			
Chacabuco (Hill)	0.392	0.330	0.307
Santiago (Santiago)	0.374	0.324	0.318
Cordillera (Puente Alto)	0.303	0.376	0.264
Maipo (San Bernardo)	0.333	0.314	0.311
Melipilla (Melipilla)	0.386	0.395	0.258
Talagante (Talagante)	0.395	0.341	0.282
<i>O'Higgins Region</i>			
Cachapoal (Rancagua)	0.400	0.399	0.303

(continued)

**Table 5.5** (continued)

Grade/Province (Provincial Capital)	4th Grade 2011	8th Grade 2011	10th Grade 2010
Colchagua (San Fernando)	0.469	0.505	0.241
Cardinal Caro (Pichilemu)	0.499	0.420	0.518
<i>Maule Region</i>			
Curicó (Curicó)	0.438	0.431	0.286
Talca (Talca)	0.459	0.526	0.292
Linares (Linares)	0.565	0.597	0.296
Cauquenes (Cauquenes)	0.491	0.479	0.244
<i>Biobío Region</i>			
Ñuble (Chillán)	0.513	0.516	0.287
Biobío (Los Ángeles)	0.455	0.419	0.322
Concepción (Concepción)	0.377	0.397	0.296
Arauco (Lebu)	0.374	0.347	0.315
<i>Araucanía Region</i>			
Malleco (Angol)	0.483	0.412	0.325
Cautín (Temuco)	0.453	0.422	0.315
<i>Los Ríos Region</i>			
Valdivia (Valdivia)	0.400	0.318	0.285
Ranco (La Unión)	0.378	0.315	0.236
<i>Los Lagos Region</i>			
Osorno (Osorno)	0.374	0.319	0.263
Llanquihue (Puerto Montt)	0.320	0.291	0.237
Chilíoé (Casto)	0.384	0.328	0.202
Palena (Futaleufú)	0.398	0.357	0.143
<i>Aysén Region</i>			
Coyhaique (Coyhaique)	0.216	0.299	0.301
Aysén (Puerto Aysén)	0.252	0.274	0.246
General Carrera (Chile Chico)	0.223	0.292	
Capitán Prat (Cochrane)	0.144	0.113	
<i>Magallanes Region</i>			
Última Esperanza (Puerto Natales)	0.194	0.259	0.203
Magallanes (Punta Arenas)	0.379	0.316	0.327
Tierra del Fuego (Future)	0.242	0.291	–
Antártida (Puerto Williams)	–	–	–

Source Prepared by the authors based on Simce results



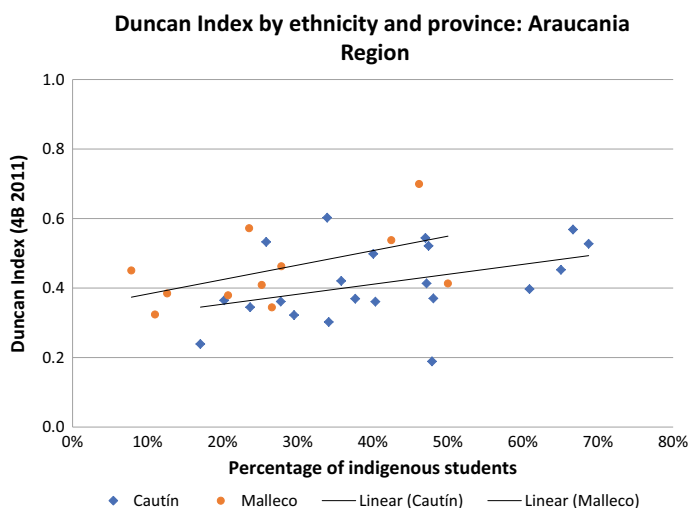
**Fig. 5.2** Duncan index according to ethnicity for fourth grade, by district in each province of the Metropolitan Region, 2011 (*Source* Prepared by the authors based on Simce results)

Finally, when we reach the districts, the lowest level of Chile’s political organization, there are significant differences between the districts that make up the different provinces. In this case, the analysis concentrates on the districts in the Metropolitan Region and the La Araucanía Region, which show the most striking patterns regarding the concentration and number of indigenous students, allowing a more refined analysis of ethnic segregation, separating it from territorial processes and geographical distribution.

For a better understanding of the results of ethnic segregation by district in these regions, these figures are shown in Figs. 5.2 and 5.3. In these figures, each point represents a district in the respective region, showing the relationship between the segregation index and the percentage of indigenous students at the district level.

The data show that in the Metropolitan Region there is an inverse relationship between the index of dissimilarity and the percentage of indigenous children in the fourth grade in schools in each district (Fig. 5.2). We can thus see the existence of districts with high levels of segregation, close to or above 0.6 on the dissimilarity index, these being districts with a percentage of indigenous population below 3.4% in their schools. In addition, the districts with high levels of segregation are those that concentrate the population with the greatest resources in the region and the country, such as Las Condes (with a Duncan index of 0.79 and an indigenous population of 1%), Vitacura (0.66 on the Duncan index and 0.6% indigenous population), Lo Barnechea (0.60 on the Duncan index and 3.4% indigenous population), and Providencia (0.59 on the Duncan index and 2% indigenous population).

In contrast, in the Araucanía Region there is a positive relationship between the Duncan index and the percentage of indigenous children (Fig. 5.3). It therefore seems that the higher the percentage of indigenous children in the district, the greater



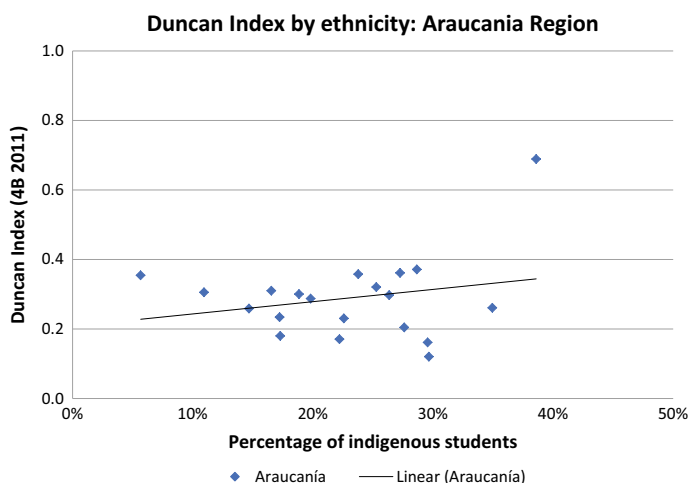
**Fig. 5.3** Duncan index by ethnicity for fourth grade, by municipality of each province in the Araucanía Region, 2011 (*Source* Prepared by the authors based on Simce results)

the school segregation of these children. In fact, two districts appear (Vilcún and Lonquimay) with a very high dissimilarity (greater than 0.6), these being host to high populations of indigenous groups. It can also be observed that there are six districts where the Duncan index is high, with values greater than 0.5 and lower than 0.6. These districts are Cunco, Galvarino, Padre Las Casas, Puerto Saavedra, Los Sauces, and Lumaco.

Segregation data for the Araucanía Region, however, should be treated with caution, as the perceived high segregation is due to the combination of a concentration of indigenous population in territories with low population density and few schools. It is therefore possible that a large percentage of the children in some districts are indigenous and attend the nearest school, and this does not indicate the existence of a process of educational segregation, but instead reflects only the residential and territorial segregation of the indigenous communities in these districts. Therefore, in these cases, the segregation would not be the result of any mechanism in the school system, but rather the unequal distribution of the population in the different territories.

Considering the above, and in order to obtain a more accurate picture of ethnic school segregation in the Araucanía region, only those districts with more than five schools in urban areas were selected. In this way, we sought to discard from the analysis the schools and rural territories where there is low population density and, therefore, the locations where the educational offer is limited.

The results of this show relevant changes in the segregation index (Fig. 5.4). First, the district of Teodoro Schmidt changes from a situation of moderate segregation in the previous analysis (0.37) to one of high segregation (0.69), mainly as a result of the elimination of rural schools, where indigenous and non-indigenous students may



**Fig. 5.4** Duncan Index according to ethnic status of urban students in fourth grade, by district with more than five schools in each province of the Araucanía Region, 2011 (*Source* Prepared by the authors)

have coexisted. However, in the rest of the districts, the levels of ethnic segregation decrease, falling to the low to moderate ranges, with the Duncan index varying between 0.12 and 0.37. Finally, although the regression line in the graph suggests a direct relationship between the Duncan index and the percentage of indigenous students, it would not be correct to establish that correlation, since the gradient represented by the line is biased by the extreme data mentioned above and there is only weak evidence for this assertion.

## 5.6 Conclusions

School segregation can have detrimental effects on children's learning and socialization process in the short, medium, and long term. It can also affect the processes of integration of different groups in society with each other and with society as a whole.

The research carried out shows that ethnic segregation in Chile is a complex phenomenon that is present in different territorial areas, linked to patterns of population settlement and not necessarily implying that the school system creates additional segregation of indigenous students. This makes it possible to add relevant information to previous studies on the subject, since they show that the segregation of indigenous students does not follow the same patterns as socioeconomic segregation, nor to the degrees found in terms of academic segregation. Likewise, we explore the differences in segregation existing at the different territorial levels of analysis (national, regional,

provincial, and by district), showing how the segregation of indigenous students is problematic in certain areas of national territory.

The data analyzed suggest that the elements that may explain ethnic segregation include the concentration of the indigenous population in rural areas, the low population density in those areas, their high level of vulnerability, and their high level of differentiation from non-indigenous sectors of the population. Some authors have pointed to the existence of positive correlations between the polarization of indigenous groups (specifically, *Mapuches*) and social conflicts (Modrego et al., 2008), thus showing the extent of territorial organization in the indigenous population. Clearly, this poses a challenge for territorial policies, which should generate actions, programs, and policies that enable students to coexist with others of different ethnic and socioeconomic characteristics. In addition, it is clear that ethnic segregation in the Metropolitan Region is greater in the districts with the lowest percentage of indigenous students, which also have the highest levels of wealth, which could indicate the existence of a pattern in the relationship between socioeconomic level, membership of indigenous groups, and territorial distribution.

Logically, this implies designing educational policies with regard to territorial and socioeconomic policies. As studies have shown (ECLAC, 2007; Wormald et al., 2013), territorial cohesion and segregation are a problem that generates effects in the economic, social, and educational spheres. For this reason, territorial desegregation policies (Sabatini et al., 2013) should incorporate an educational perspective, making it possible to design and connect these policies with the problems of indigenous school segregation through the promotion of intercultural education policies, the generation of policies with a positive focus, or other types of measures.

However, the study carried out should be considered a first approach to discovering more about the problem of indigenous segregation in Chile. There is still a need for further research to provide methodological and analytical robustness to the proposals. In methodological terms, the application of new indices (such as the isolation index or Morán's autocorrelation index) are elements that would make it possible to contrast the data provided and complement the information generated. Similarly, and in analytical terms, it appears necessary to look more deeply at the causes of indigenous segregation. For this reason, it is necessary to carry out quantitative and qualitative studies that will make it possible to analyze whether ethnic segregation in the districts of these regions is a consequence of the way in which the indigenous populations are established, an express policy of segregation by the schools, or the need to bring together pupils of indigenous origin in a school to offer intercultural bilingual education, while also analyzing the consequences of each of these types of grouping. Obviously, segregation can be due to a combination of the factors mentioned above, but the results can be differentiated depending on the characteristics of the population and the school systems, which is an essential element for the Chilean school system.

Finally, this study raises new questions for studies of segregation in Chile, including two in particular. On the one hand, it is essential to expand discussion about the scale and levels of social research (Revel, 2005) at which segregation is studied. As we have observed, the magnitudes and dimensions of segregation vary



significantly according to the scale on which the phenomenon is studied, so gaining a deeper understanding of the relationships between the different levels and their relations is a challenge for future research in the area. Lastly, it appears to be necessary to conduct further study of the effects and impacts of targeted programs of support for indigenous students and schools (for example, the PEIB) on the segregation and distribution of students, in order to gain a more comprehensive understand of the changes in the education system, thus allowing the projection of new societal and educational challenges for the country, which will make it possible to improve the levels of inclusion, quality, and equity in education.

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## Annexes

See Tables 5.6, 5.7, 5.8 and 5.9.

**Table 5.6** Distribution of indigenous and non-indigenous students by region for fourth grade, eighth grade and 10th grade

Grade	4th Grade 2011			8th Grade 2011			10th Grade 2011		
	Ethnic	Non-ethnic	%	Ethnic	Non-ethnic	%	Ethnic	Non-ethnic	%
1	761	2998	20.24	696	2775	20.05	533	2242	19.21
2	786	5882	11.79	753	6021	11.12	683	5395	11.24
3	507	2908	14.85	437	2692	13.97	361	2598	12.20
4	395	7637	4.92	354	7451	4.54	377	7238	4.95
5	773	17,790	4.16	755	18,167	3.99	646	17,457	3.57
6	431	9618	4.29	393	9952	3.80	325	9564	3.29
7	385	10,714	3.47	268	11,191	2.34	313	11,041	2.76
8	1400	20,172	6.49	1207	21,006	5.43	1075	21,026	4.86
9	3192	7327	30.35	2975	8014	27.07	2448	7581	24.41
10	2301	7045	24.62	1994	7046	22.06	1677	6868	19.63
11	339	948	26.34	214	902	19.18	218	783	21.78
12	367	1476	19.91	347	1451	19.30	319	1440	18.14
13	4849	66,716	6.78	4211	59,783	6.58	4281	69,881	5.77
14	915	3263	21.90	839	3338	20.09	679	3205	17.48
15	687	1566	30.49	682	1594	29.96	677	1601	29.72
Total	18,088	1,66,060	9.82	16,125	1,61,383	9.08	14,612	1,67,920	8.01

Source Prepared by the authors

**Table 5.7** Duncan index, number of indigenous children and number of non-indigenous children. Metropolitan Region (fourth grade 2011)

Metropolitan Region	District	Duncan index 4th Grade 2011	<i>N</i> ethnic	<i>N</i> non-ethnic	Ethnic (%)
Chacabuco	Colina	0.423	100	1483	6.32
	Lampa	0.315	64	674	8.67
	Til-Til	0.444	6	196	2.97
Cordillera	Pirque	0.285	9	130	6.47
	Puente Alto	0.300	443	5296	7.72
	San José de Maipo	0.439	9	120	6.89
Maipo	Buín	0.269	51	922	5.24
	Calera de Tango	0.398	15	272	5.23
	Paine	0.393	46	700	6.17
	San Bernardo	0.320	272	3018	8.27
Melipilla	Alhué	0.537	4	47	7.84
	Curacaví	0.283	21	282	6.93
	Maria Pinto	0.472	4	90	4.26
	Melipilla	0.365	13	1311	0.98
	San Pedro	0.514	12	74	13.95
Santiago	Cerrillos	0.325	50	707	6.61
	Cerro Navia	0.246	157	1064	12.86
	Conchalí	0.299	78	1316	5.60
	El Bosque	0.200	187	1759	9.61
	Estación Central	0.251	110	1440	7.10
	Huechuraba	0.470	61	834	6.82
	Independencia	0.353	45	944	4.55
	La Cisterna	0.345	77	1118	6.44
	La Granja	0.292	108	1119	8.80
	Florida	0.373	275	4169	6.19
	La Pintana	0.183	279	1887	12.88
	La Reina	0.532	54	1270	4.08
	Las Condes	0.792	23	2181	1.04
	Lo Barnechea	0.603	36	1038	3.35
	Lo Espejo	0.226	83	696	10.65
	Lo Prado	0.289	80	577	12.18
Macul	0.248	74	901	7.59	
Maipú	0.322	351	5403	6.10	

(continued)

**Table 5.7** (continued)

Metropolitan Region	District	Duncan index 4th Grade 2011	<i>N</i> ethnic	<i>N</i> non-ethnic	Ethnic (%)
	Ñuñoa	0.481	69	1169	5.57
	Pedro Aguirre Cerda	0.249	80	931	7.91
	Peñalolén	0.390	190	1956	8.85
	Providencia	0.592	31	1433	2.12
	Pudahuel	0.262	192	1780	9.74
	Quilicura	0.205	168	2205	7.08
	Quinta Normal	0.318	89	1218	6.81
	Recoleta	0.339	111	1589	6.53
	Renca	0.200	134	1039	11.42
	San Miguel	0.507	52	1108	4.48
	San Joaquín	0.425	40	579	6.46
	San Ramón	0.160	104	895	10.41
	Santiago	0.335	124	2858	4.16
Vitacura	0.664	8	1266	0.63	
Talagante	El Monte	0.213	29	330	8.08
	Isla de Maipo	0.308	22	318	6.47
	Padre Hurtado	0.310	61	634	8.78
	Peñaflor	0.373	49	930	5.01
	Talagante	0.551	38	907	4.02

**Table 5.8** Duncan index, number of indigenous children and number of non-indigenous children. La Araucanía Region (fourth grade 2011)

Province	District	Duncan index 4th Grade 2011	<i>N</i> ethnic	<i>N</i> non-ethnic	Ethnic (%)
Cautín	Carahue	0.369	107	177	37.68
	Cholchol	0.452	95	51	65.07
	Cunco	0.533	48	138	25.81
	Curarrehue	0.397	56	36	60.87
	Freire	0.498	117	175	40.07
	Galvarino	0.527	99	45	68.75
	Gorbea	0.239	23	112	17.04
	Lautaro	0.420	165	296	35.79
Loncoche	0.302	85	164	34.14	

(continued)

**Table 5.8** (continued)

Province	District	Duncan index 4th Grade 2011	<i>N</i> ethnic	<i>N</i> non-ethnic	Ethnic (%)
	Melipeuco	0.361	23	34	40.35
	Nueva Imperial	0.413	200	224	47.17
	Padre Las Casas	0.521	360	399	47.43
	Perquenco	0.189	34	37	47.89
	Pitrufuquén	0.322	80	191	29.52
	Pucón	0.345	62	200	23.66
	Puerto Saavedra	0.568	88	44	66.67
	Temuco	0.365	610	2407	20.22
	Theodore Schmidt	0.370	75	81	48.08
	Toltén	0.544	55	62	47.01
	Vilcun	0.602	114	222	33.93
	Villarica	0.361	192	500	27.75
Malleco	Angol	0.324	62	502	10.99
	Colipulli	0.344	81	224	26.56
	Curacautín	0.450	13	153	7.83
	Ercilla	0.413	46	46	50.00
	Lonquimay	0.699	48	56	46.15
	Los Sauces	0.572	16	52	23.53
	Lumaco	0.538	45	61	42.45
	Pureen	0.379	29	111	20.71
	Reinaco	0.384	14	97	12.61
	Traiguén	0.463	57	148	27.80
Victoria	0.409	95	282	25.20	

Source Prepared by the authors

**Table 5.9** Duncan index, number of indigenous children and number of non-indigenous children. La Araucanía Region (fourth grade 2011), only for urban schools where there are more than five schools per district

Province	District	Duncan index 4th grade 2011	<i>N</i> ethnic	<i>N</i> non-ethnicS	Ethnic (%)
Cautín	Carahue	0.120	54	128	29.67
	Cholchol				
	Cunco	0.310	24	121	16.55
	Curarrehue				

(continued)

**Table 5.9** (continued)

Province	District	Duncan index 4th grade 2011	<i>N</i> ethnic	<i>N</i> non-ethnicS	Ethnic (%)
	Freire	0.371	43	107	28.67
	Galvarino				
	Gorbea	0.180	23	110	17.29
	Lautaro	0.230	75	257	22.59
	Loncoche	0.161	68	162	29.57
	Melipeuco				
	Nueva Imperial	0.261	108	201	34.95
	Padre Las Casas	0.204	129	338	27.62
	Perquenco				
	Pitrufoquén	0.297	58	162	26.36
	Pucón	0.287	46	186	19.83
	Puerto Saavedra				
	Temuco	0.300	559	2406	18.85
	Theodore Schmidt	0.689	44	70	38.60
	Toltén	0.361	18	48	27.27
	Vilcun	0.259	31	180	14.69
	Villarica	0.321	151	446	25.29
Malleco	Angol	0.305	68	553	10.95
	Colipulli	0.171	62	217	22.22
	Curacautín	0.354	8	133	5.67
	Ercilla				
	Lonquimay				
	Los Sauces				
	Lumaco				
	Pureen				
	Reinaco				
	Traiguén	0.358	49	157	23.79
	Victoria	0.234	55	264	17.24

Source Prepared by the authors

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