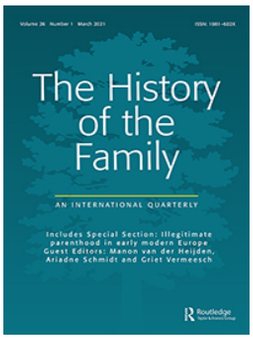

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Class, literacy and social mobility: Madrid, 1880–1905

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ABSTRACT

Relying on an extremely rich data set of individuals living in Madrid in 1880 and 1905, this article explores the relationship between class, literacy and social mobility. Focusing on children, we find that the probability of being literate varied significantly according to parents' socio-economic status. Although this social gap declined during the period under study, it was still substantial in 1905. We also show that, although the expansion of the supply of schools improved the literacy rates of children from disadvantaged backgrounds, the public effort was clearly insufficient to overcome the challenges these families faced. Lastly, matching the children existing in our sample in 1880 with their corresponding adult-selves in 1905, our analysis shows that getting literate enhanced their chances of moving up the social ladder.

KEYWORDS

Inequality; schooling; education; social mobility

1. Introduction

The expansion of schooling and educational levels during the 19th and early-20th centuries continues to attract considerable scholarly attention (Beltrán Tapia et al., 2019; Ciccarelli & Weisdorf, 2019; Cappelli, 2016; Cappelli & Vasta, 2020; Goldin & Katz, 2009; Mitch, 1992; Westberg, 2017). As with many other dimensions, the spread of education was highly unequal, both across regions but also between socio-economic groups. However, a deeper understanding of the relationship between education and socioeconomic status requires information at the individual level and there are very few studies that have adopted that level of analysis. Linking school-aged males in the English 1851 and 1881 Population Censuses, Long (2006) finds that, although schooling had a positive impact on adult occupational class, this effect paled in comparison to the influence of father's occupation. Relying on individual data from England in 1831, Clark and Gray (2014) also find that father's occupation is a powerful predictor of literacy. Similarly, (Álvarez & Ramos-Palencia, 2018) show that higher literacy was associated with higher earnings in mid-18th century Castile but this link was likely driven by unobservables such as ability or family background.

In order to contribute to this debate, this article explores the relationship between class, literacy and social mobility relying on an extremely rich data set of individuals living in Madrid in 1880 and 1905. Focusing on children of both sexes, we first assess the probability of being literate according to their parents' socio-economic status. We find

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Supplemental data for this article can be accessed here.

an extremely wide educational gap in 1880: compared to children raised by well-off families, the probability that a child from a family of unskilled workers became literate was 54 and 60 percentile points lower for boys and girls, respectively. Although this difference declined over time, it was still considerable in 1905 (around 42 and 47 percentile points). Given that we have information on where these children lived and the location of schools, we explore how the expansion of the supply of public schools during this period may have improved access to education of children from disadvantaged backgrounds. Although our analysis indicates that the expansion of schools probably helped to raise literacy levels among the poor, this public effort was insufficient to overcome the challenges that these children faced.

Lastly, we analyse the returns to education by studying social mobility. In order to do so, we have matched the children existing in our sample in 1880 with their corresponding adult-selves in 1905, 25 years later, using record linkage techniques. We show that getting literate enhanced children's chances of moving up the social ladder: those children than managed to overcome their social background and got literate were more likely to end up in a higher social class than that of his or her parents.

Our results provide strong evidence that socioeconomic status is the most important factor shaping children's educational attainments, at least during the 19th and early 20th century (Clark & Gray, 2014; Long, 2006). A higher fraction of landless labourers also significantly reduced educational levels in rural areas in 19th-century Spain (Beltrán Tapia & Martínez-Galarraga, 2018), so the findings here extend to the urban content the important role that inequality played on the ability to invest in education. In addition, by showing that getting literate improved the job prospects of the bottom part of the population, our findings indirectly support the view that education was therefore rewarded economically (Álvarez & Ramos-Palencia, 2018; Baten & Van Zanden, 2008; Long, 2006; De Pleijt & Van Zanden, 2017; Reis, 2005). Our study, however, also evidence that the expansion of public schooling did not significantly alter the social gap during the period of analysis. A high degree of inequality, together with an inadequate schooling system, prevented a significant fraction of the schooling-age population to access education, thus limiting the economic prospects of a whole generation.

We should bear in mind, however, that our sample is not completely random but includes all the individuals living in three different areas of Madrid, thus potentially biasing our findings. However, families from all backgrounds lived together in the same streets and in the same buildings, thus ensuring an extremely high degree of socioeconomic diversity in our sample. Our results, therefore, not only rely on the differences between individuals living in different neighbourhoods but also between those living in the same areas, thus mitigating potential concerns about the representativeness of the individuals studied here.

2. Historical background

At the end of the 19th century, literacy rates in Madrid were relatively high, especially compared to the rest of the country: while 76% of the adult population in the Spanish capital was able to read and write, this figure only reached 55% in the rest of the country.[1] This situation was the result of an increasing demand for education arising from the dynamism of a booming city that required a relatively educated labour force, together

with the increasing awareness of the value of education as a sign of social status and the growing popularity of written media. Madrid's wealth was primarily based on its capital condition, which fostered the bureaucratic, financial and service sectors (Juliá et al., 2008; Otero & Pallol, 2009; Ringrose, 1985). Although not a big industrial center, Madrid was growing rapidly, attracting migrants from all over the country (Beltrán Tapia and De Miguel, 2016). In this regard, Madrid offered many possibilities for women, especially in the domestic sector, what made female immigration especially attractive (Carballo et al., 2016).[2] The growing participation of women in the labour market surely contributed to reduce the gender literacy gap (Otero, 2018).

However, and as in most large cities at the time, economic prosperity coexisted with poverty and destitution, a contrast that plagues the contemporary literary accounts of Madrid by Benito Pérez Galdós, Pío Baroja or Vicente Blasco Ibáñez, among others.[3] Apart from the growth of trade and public services during the last decades of the 19th century, Madrid's labour market witnessed a process of artisan proletarianization that made the opportunities of social progress difficult for those who came from other provinces without skills or qualifications. Over the years, the so-called *jornaleros* (casual workers or day labourers) became the most representative professional figure in the city. Subjected to the vagaries of the labour market, especially from public works, they were prone to unemployment, which led them to temporarily resort to public charity or even begging practices. The city's inability to absorb flows of immigrants under favourable working conditions was also manifested in residential terms. The increase in the housing demand by the former exceeded the expectations of those engineers who planned the extension of Madrid since the mid-19th century. The city's sharp demographic growth, which rose from 221.000 to 575.675 inhabitants, was not matched by spatially uniform improvements in terms of public health, hygiene practices and provision of services and infrastructures, thus fostering spatial social segregation, a process which was fully visible in mortality rates (Casado & Ramiro Fariñas, 2018; Fernández García, 2001; Gómez Redondo, 1985; Huertas, 2002; Porras Gallo, 2002). Mortality rates were far higher than in other European cities, especially for children, due to the exposure of the poorest neighbourhoods to epidemics and infectious diseases.[4] High levels of inequality in health and hygiene patterns, in price and quality of housing and in the services and infrastructures of each urban area also translated in large disparities in educational attainments, despite the relatively high literacy rates that the city enjoyed.

This situation is also reflected in the deficient supply of public schools. Municipalities were in charge of providing public primary education.[5] However, the funds devoted to schooling were always insufficient. In the specific case of Madrid, its local government was one of the least financially focused on public education at the end of the 19th century, reserving only 4% of its annual budget to this function.[6] Although education was theoretically compulsory for children aged 6 to 9 since the Moyano Act (1857), the lack of public schools and school teachers to meet the increasing demand led authorities not to enforce the law.[7] Demographic growth, especially fueled by immigration, expanded the schooling-age population, thus exerting more pressure to the limited existing resources. In Madrid, despite the efforts to increase schooling enrollment and the high average literacy rates, around 35% of school-age children were out of school at the turn of the 20th century (Tiana Ferrer, 1987, p. 45).[8] Contemporaries complained that there were many children waiting to find a place in the public schools (Altamira, 1912; Bello, 1926;

Cossio, 1897; Dicenta, 1910; Luzuriaga, 1926), a shortcoming that was the logical result of the way in which the authorities failed to fulfil the legislative recommendations on the number of schools per inhabitants.[9]

The quality of schooling was also deficient. Contemporary reports constantly denounced that most schools were overcrowded, lacked basic equipment and supplies and suffered deficient hygienic conditions.[10] A significant quantity of the premises where the schools were set up were very old or even on the verge of ruin, lacking washing facilities, natural light and regular health checks, which explained the correlation between school deficiencies and child mortality identified by some municipal authorities and the problems of myopia subsequently detailed by the medical-school inspectors from 1909.[11] Although primary schooling was theoretically divided into two grades (elementary and superior for children aged 6 to 9 and 9 to 12, respectively), this distinction hardly existed in practice due to lack of resources and children of all ages shared the same class.[12] Around 1900, the average student–teacher ratio in Madrid was 90 pupils (Tiana Ferrer, 1992, p. 142),[13] a proportion that would only be reduced from 1909 onwards, when closer monitoring of municipal education started with the launch of a medical-school inspection service (Pozo Andrés, 1999, p. 96). School teachers thus had to attend very large class sizes, further complicating the teaching-learning process, which basically involved reading, writing and numeric skills, as well as the Catholic doctrine and, if possible, some notions of history and geography. In addition, teachers usually did not receive any formal teachers' education, so teaching quality was relatively low. Rote learning was the most common teaching methodology and physical punishments seem to have been widespread. It should also be stressed that schooling was segregated by sex: boys and girls attended different schools. Moreover, girls were taught domestic skills (such as sewing, embroidery and knitting), thus reducing the time available for other subjects.

Moreover, schooling was only free for those coming from very poor families. Parents had otherwise to pay a school fee although information on how large those fees were is scarce.[14] Although the fee was not very high, it could nonetheless affect attendance, especially for those families subject to the vagaries of the labour market. Apart from the direct cost of schooling, low-income families faced high opportunity costs. Child labour was indeed widespread (Tiana Ferrer, 1987). Despite legislative attempts to prevent children's work,[15] many children either did not attend school or left school at an early age, mostly to start working.[16] These children worked in factories and workshops all around Madrid, earning around one-third of an adult salary. The service sector also employed many children, either as servants or shopkeepers. It is also common to read complaints about children's boredom due to inadequate teaching practices and large class sizes: many of them saw school as a torture and were eager to abandon it at the first opportunity (Dicenta, 1910, p. 6; Tiana Ferrer, 1992, p. 165). Likewise, the incentives to acquire education were limited. Being employed as an artisan or factory workers did not require literacy skills. Only jobs in the service sector demanded certain educational levels (Tiana Ferrer, 1987, p. 46). It is thus no wonder the lack of interest shown by many working-class families in sending their children to school, especially if we consider the deficient conditions of many of those schools stressed above.

The inability of public schooling to meet the educational needs of Madrid was evident: only 20.9% of school-age children attended these schools in 1900 (Tiana Ferrer, 1987, p. 45). Private schools partly filled this demand, especially that of the middle and upper classes. In

contrast to rural areas where private schooling was almost nonexistent, private provision of primary education was common in urban areas. The importance of private schools in Madrid was extraordinary: 43.8% of children attended private institutions in 1900. These figures precisely mimic the difference in the number of primary schools: 368 private versus 144 public (Tiana Ferrer, 1992, p. 138).[17] The latter were actually despised as 'schools for the poor' and, accordingly, the middle and upper urban classes sent their children to respected private institutions, which were mostly rung by religious institutions (Liébana Collado, 2009, p. 6). It is true however that a significant number of charitable and philanthropic institutions also catered poor children (Tiana Ferrer, 1992, pp. 161–163, 301–302).[18]

But, how did this context translate into the actual educational achievements of children from different backgrounds? Did the supply of public schools facilitate that poor children got literate? And, lastly, did education have any effect on the economic prospects of those children? Next sections address these issues separately.

3. Data

This study relies on a large data set of individuals taken from the *Padron Municipal de Habitantes* of Madrid (Municipal Register of Inhabitants) in 1880 and 1905. Each resident in Madrid was scrupulously audited by municipal surveyors who filled out registration cards collecting data for every single person in each household (for an image of this source). As a result, the *Padron* gathered detailed individual-level data on demographic characteristics (birthplace, birthdate, marital status and family or professional relationship between the members of a household) and occupation (sometimes also indicating wages) and housing (full address and the rent that each head of household paid for a room). Crucially for this article, the *Padron* also reported their ability to read and write.

A large sample of these records have been recently digitalised, containing more than 350,000 observations for 1880 and 1905.[19] This data set comprises 40 and 35% of the total inhabitants of Madrid for both years, respectively. Given that the source provides the address of each household (street name and the number of the building), the location of all individuals has been geo-referenced using the map drawn by Facundo Cañada in 1900.[20] As Map 1 illustrates, the sample does not cover the entire city but includes all individuals residing in the central and southern neighbourhoods of the historical old town (or *Casco Antiguo*, as it is known in Spanish) and in one of the three sections of the so-called *Ensanche de Madrid*, that is, the urban areas resulting from the expansion project drawn up for the city in 1860 by the engineer Carlos María de Castro (Carballo, 2015; Pallol, 2015; Vicente, 2015).[21] This project expanded the city in three directions – northward (*Ensanche Norte*), eastward (*Ensanche Este*), and southward (*Ensanche Sur*) – at varying speeds and with distinctive horizontal patterns of class segregation.[22]

Our data set only captures the first direction of urban expansion, thus potentially introducing some biases in our samples. Nevertheless, the literacy levels deduced from our sample (*Padron*, 1880 and 1905) and those presented as an aggregate in the Spanish population census for the case of Madrid on approximate years (1877 and 1900) show similar literacy levels, being practically identical at the beginning of the 20th century (Figure 2). Likewise, the areas studied here were extremely varied and qualitatively representative of the evolution of the city between 1880 and 1905. The neighbourhoods located in the historical old town (*Casco Antiguo*) showed significant variation in their

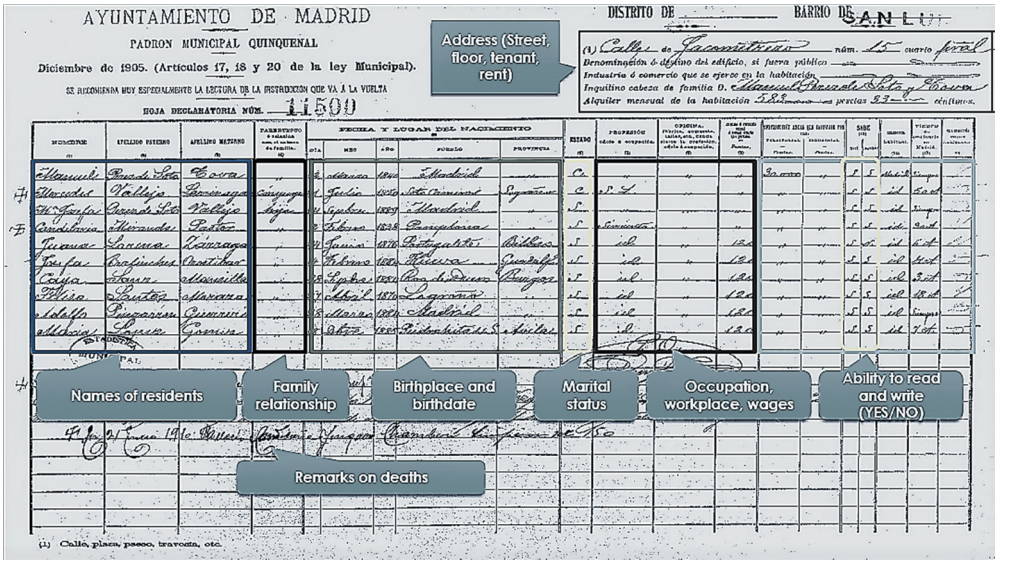


Figure 1. Original sheet of the Municipal Register of Inhabitants (*Padrón*, Madrid, 1905). Source: Padrón Municipal de Habitantes de Madrid (1905).

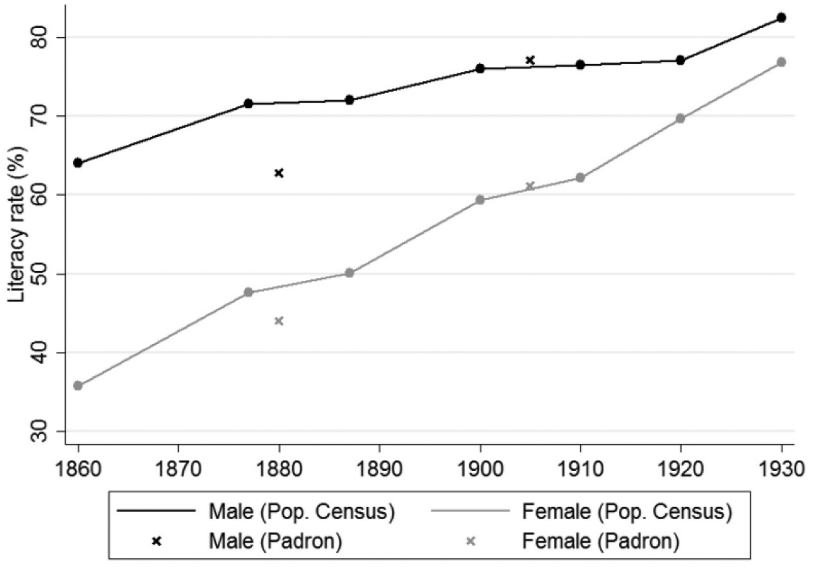
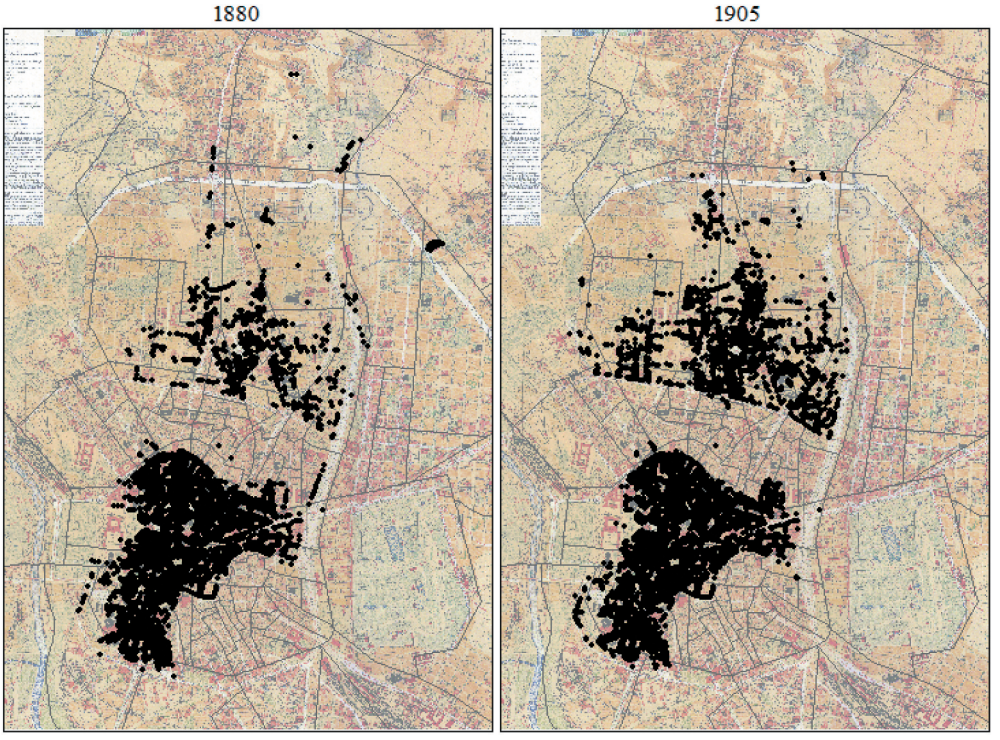


Figure 2. Literacy in Madrid, 1880–1905. Source: Padron Municipal de Habitantes de Madrid (1880, 1905) and Population Census (1860–1930).

social composition, being those in its central area more likely to integrate well-to-do families from the bourgeoisie and middle classes and those in the south more inclined to provide residential accommodation to the working and popular classes (Díaz, 2016; De Miguel, 2016). The northern part of the *Ensanche* was more segregated: while artisans and casual workers populated some neighbourhoods, well-off families chose to live in other areas (Pallol, 2015). In addition, this latter area, which was in the midst of a process of



Map 1. Location of all the observations in the data set. Source: Own elaboration based on the map drawn by Facundo Cañada in 1900 and Padrón Municipal de habitantes de Madrid, 1880 and 1905. The different neighbourhoods are depicted in grey.

growing urbanisation between 1880 and 1905, tended to attract significant proportion of the migratory flows from other provinces due to the high population density levels already reached in the historical old town.see Figure 2

Crucially, families from all backgrounds lived together in the same streets and in the same buildings, thus ensuring an extremely high degree of socio-economic diversity in our sample. This diversity is explained by the existing residential model based on vertical segregation: while better-off families occupied the lower floors (larger and luxurious), the working classes lived in the upper floors (smaller, lower and poorly equipped), a pattern that was also characteristic of other 19th-century cities such as Paris or Vienna (De Miguel, 2016; White, 1984). Map A1 in the Appendix offers a visual depiction of where individuals in our sample lived and confirms that families from all social strata coexisted together.

In order to classify each observation by socioeconomic status, we have first identified each occupation using the HISCLASS code and then grouped those 12 categories into five major groups[23]: (1) Higher managers & professionals; (2) Lower managers, professional, clericals, & sales personnel; (3) Foremen & medium-skilled workers; (4) Low-skilled workers; and (5) Unskilled workers. Table 1 reports literacy rates by socio-economic status both in 1880 and 1905 for those individuals reporting occupation.

Table 1. Socio-economic status in Madrid, 1880 & 1905.

		Padrón 1880					
		Men			Women		
Panel A	Hisclass	Obs.	%	Lit. (%)	Obs.	%	Lit. (%)
Higher managers & professionals	1, 2	4,988	9.4	92.7	974	4.0	88.4
Lower managers, professional, clericals, and sales personnel	3, 4, 5	14,124	26.7	87.8	1,132	4.7	67.8
Foremen & medium-skilled workers	6, 7	8,904	16.8	72.5	2,208	9.1	51.9
Low-skilled workers	8, 9, 10	9,034	17.1	82.6	8,098	33.4	36.0
Unskilled workers	11, 12	15,878	30.0	45.8	11,839	48.8	35.1
Total		52,928	100.0	72.2	24,251	100.0	40.6
		Padrón 1905					
Panel B		Men			Women		
	Hisclass	Obs.	%	Lit. (%)	Obs.	%	Lit. (%)
Higher managers & professionals	1, 2	5,324	9.4	98.7	1,055	5.1	95.6
Lower managers, professional, clericals, and sales personnel	3, 4, 5	16,51	29.1	97.0	941	4.6	79.1
Foremen & medium-skilled workers	6, 7	7,296	12.9	93.1	1,941	9.5	76.6
Low-skilled workers	8, 9, 10	6,812	12.0	93.4	6,845	33.4	56.7
Unskilled workers	11, 12	20,697	36.5	83.2	9,705	47.4	58.9
Total		56,639	100.0	91.2	20,487	100.0	62.7

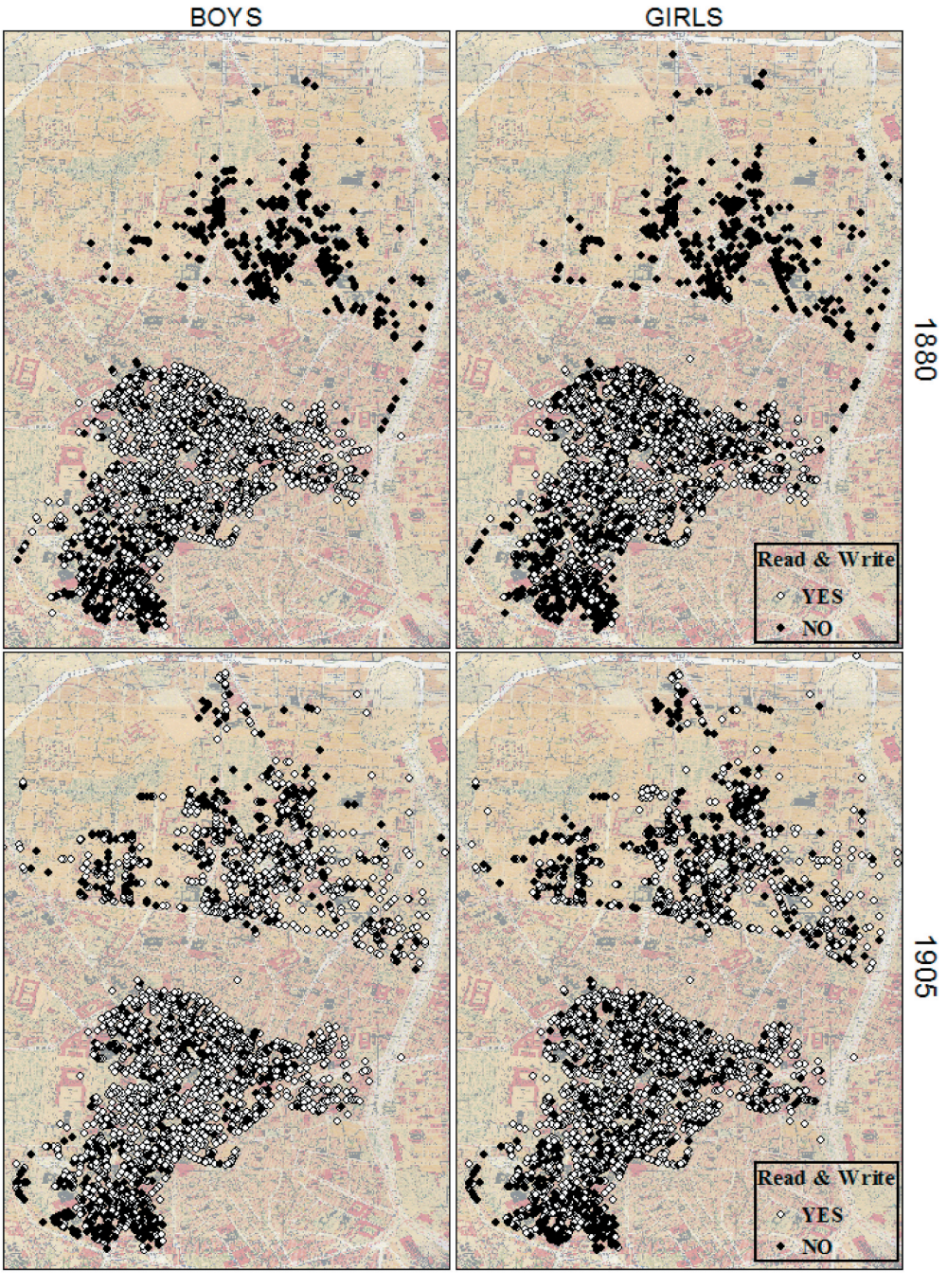
Source: Padrón Municipal de habitantes de Madrid, 1880 and 1905.

Given that many adults got literate at advanced ages and sometimes as a result of their occupation, we restrict our analysis to children. In order to study children who are old enough so as to have got literate but not too old as to have started working, we focus on children aged 8–12.[24] In total, we have more than 20,000 observations. In 1880, 50.8% of these children were able to read and write and this figure had increased to 56.5% by 1905. Table 2 reports children's literacy rates by gender in those dates. These figures accurately mirror what we know about schooling enrolment during this period: as mentioned in the previous section, around one-third of children did not attend school. Children's literacy was also clearly dependent on where they lived. Map 2 provides a visual account of their spatial distribution identifying the place of residence of children classified by those who were literate or not (white and black dots, respectively).[25] Illiterate children tended to live either in the northern or southern neighbourhoods, although this spatial distribution had somewhat faded by 1905.

Table 2. Literacy rates (children aged 8–12), 1880–1905.

	1880			1905		
	Obs.	Read	Read & Write	Obs.	Read	Read & Write
Boys	6,070	61.6	54.8	4,938	63.8	60.6
Girls	6,005	52.0	46.8	5,320	56.0	52.7

Source: Padrón Municipal de habitantes de Madrid, 1880 and 1905.



Map 2. Children's literacy (able to read & write) in Madrid, 1880–1905. Source: Padrón Municipal de Habitantes de Madrid, 1880 and 1905.

4. Methodology

Relying on the individual-level information described in the previous section, this article attempts to (1) quantify the relationship between socio-economic status and the ability to read and write, (2) assess how the expansion of public schooling affected children's literacy, and (3) analyse whether getting literate affected the economic prospects of these boys and girls.

Firstly, the relationship between socio-economic status and the ability to read and write is assessed by estimating the following econometric model:

$$lit = \alpha + \beta socio\_ec\_status + X'y + \varepsilon \quad (1)$$

where *lit* is a binary variable which takes the value of 1 for those children who are literate and *socio_ec_status* refers to four dummy variables identifying the parents' socio-economic status (being the top class, 'higher managers and professionals', the reference category). While ε is the error term, X' refers to an additional set of demographic variables that allows controlling for other dimensions that might be correlated with both family background and educational attainment. As well as the number of siblings, we introduce a set of dummy variables capturing the province of origin and an additional dummy variable distinguishing between those families coming from a provincial capital and those born in more rural areas. Given that age is also a crucial dimension of the learning process of these children, a set of dummies controlling for age is also included in the model.[26]

The influence of socio-economic status on children's educational achievements, however, can occur via different channels. On the one hand, parents directly influence school attendance and learning efforts (Glewwe & Kremer, 2006). As mentioned in section 2, attending school was costly and children's earnings was often crucial to complement household incomes, thus limiting schooling enrolment. Likewise, complaints about the poor families' lack of interest in educating their offspring are prevalent in contemporary reports (Tiana Ferrer, 1987, p. 47). Children from disadvantaged backgrounds were indeed likely to leave primary school before completion. In addition, deficient nutrition and health also negatively affects schooling enrolment and learning outcomes (Bobonis et al., 2006; Miguel & Kremer, 2004). Around 1920, a school teacher in *Prosperidad*, a working-class neighbourhood in the outskirts of Madrid, complains about the poverty of his pupils and how malnourishment and overworking is severely affecting their ability to concentrate and remain awake while at the school (Bello, 1926, pp. 67–68).

On the other hand, families from lower backgrounds tend to live in cheaper areas where the quality of public services, including schools, suffers. In this regard, 41 neighbourhoods (out of 100) lacked public school in 1900, especially in the outskirts (Tiana Ferrer, 1992; Pozo Andrés). An official report dated in 1913 still complains that there are children who have to walk up to 3 km to attend their schools (Ayuntamiento de Madrid, 1913, p. 8). The situation was even worse in 1880. Map A3 in the Appendix shows the spatial distribution of public schools for boys and girls in both dates.[27] The supply of public education increased during this period: from 70 schools in 1880 to 125 in 1905[28]. Given that most public schools during this period only had one classroom, this expansion seems insufficient to address the existing schooling problem (Tiana Ferrer, 1992, p. 140).[29] However, living in different neighbourhoods may not only affect education by having access to schools (as well as their quality), but also via other dimensions related to the

characteristics and behaviour of people surrounding them (Chetty & Hendren, 2018; Gibbons et al., 2013). In this regard, social interactions and peer effects are likely to influence children's outcomes. Although the existence of the 'neighbourhood effect' makes identifying the separate role of schooling more difficult, we can use the level of rents to capture the social structure of each neighbourhood (Tiana Ferrer, 1992, p. 98).

In order to isolate the channels through which socioeconomic status affected literacy, Equation (1) will be expanded to include two additional variables. Firstly, we include a measure of school density by computing the number of public schools within a 500-m radius (see Map A4 in the Appendix).[30] In 1880, 1,304 of the children in our sample (10.8%) had either zero or one public school within that distance. One school only could attend around a maximum of 100 pupils, so their access to school was severely limited. This figure had decreased to 514 children (5.0%) in 1905. We should bear in mind that we do not have information of private schools, so they are not considered in the model. Secondly, we consider the socio-economic composition of neighbourhoods by including a set of dummies that classify the different vicinities according to the level of average rents (by quantile; see Map A2 in the Appendix comparing the different areas included in our sample). This measure also indirectly captures the availability of private schools because, as discussed in section 2, they were catering for the demands of the upper and middle classes.

This first part of the analysis thus attempts to explore how socioeconomic status interacts with the supply of public schooling and other neighbouring effects in determining the likelihood of being literate. But, what happened to those children that overcame their background and got literate despite all the obstacles the lower classes faced? Did learning literacy skills improve their opportunities of climbing up the social ladder? In order to study how literacy influenced social mobility during the period studied here, we have matched the children existing in our sample in 1880 with their corresponding adult-selves in 1905, 25 years later. We restrict our sample to those children aged 10 or less in 1880 and employ six matching variables: name, surname 1, surname 2, birthplace, province, and birthdate. As usual with historical data, the data set contains transcription errors and typos. Moreover, the information was originally digitalised by different researchers which sometimes relied on different abbreviation methods. The surname 'Sánchez' for instance, may also appear shortened as 'schez'. Probabilistic record linkage allows overcoming these issues and refine the matching procedure by comparing the similarity of the records.[31]

Relying on these techniques, we are able to match 3,432 individuals (out of 20,234). A 17% matching rate is not very high though. In contrast to other studies that rely on the whole population,[32] our sample only includes a fraction on the population on Madrid (around 40 and 35% in 1880 and 1905, respectively), thus complicating the linkage if those individuals have moved out to a neighbourhood not covered in our sample (or elsewhere in Spain or abroad). Moreover, children are subject to much higher mortality rates than adults, so an important fraction of these children would have died by 1905, especially the youngest ones. Comparing the literacy rates of the children matched to those of the whole sample in the same age-cohort in 1905 (aged 25–35) is reassuring, especially for males. Male literacy rates are virtually identical in both groups (92.9 and 92.8%, respectively), thus evidencing than the matching procedure does not have introduced any bias in the case of boys. Girls, however, show considerably higher literacy rates

(90.0 and 73.6%, respectively), thus making inferences from this group to the wider population more tentative.

Each occupation is again classified into five major groups. Given that not all individuals reported their occupation, we lose observations. This problem is especially acute for women who were often listed as housewives and therefore unable to be included in the HISCLASS code. We then estimate the effect of being literate on the likelihood of belonging to different social classes, conditional on parents' socio-economic status and other individual characteristics such as age (and its square), marital status, number of children and place of origin:

$$socio\_ec\_status = \alpha + \beta literacy\_\beta parents\_socio\_ec\_status + X'y + \varepsilon \quad (2)$$

5. Results

Table 3 reports the results of estimating Equation (1), which analyses the relationship between socio-economic status and literacy, using a single-level logistic model for both boys and girls and for each period in our database. All coefficients show the expected signs are statistically significant at the 99% level.[33] Given that the reported coefficients do not offer a clear interpretation of the size of the effect studied here, Figure 3 depicts the predicted probabilities of being literate obtained from this model. The socio-economic status of the parents crucially shaped the educational achievements of these children. Although this result is hardly surprising, the size of the social gap is remarkable. While a boy coming from a family of unskilled workers only had, on average, 34% probabilities of being literate in 1880, this figure reached 88% in the case of the sons of the highest classes (54 percentile points difference; the difference in predicted probabilities is reported in Table 3). The gap was even higher for girls (60 percentile points).[34] Although this social

Table 3. Disparities in literacy by socio-economic status, 1880 & 1905.

	Padrón 1880		Padrón 1905	
	Boys (1)	Girls (2)	Boys (3)	Girls (4)
Ref. Cat.: Higher managers & professionals				
Lower managers, professional,	−1.06	−1.00	−1.34	−0.87
clericals, & sales personnel	(0.17)	(0.21)	(0.29)	(0.19)
Foremen & medium-skilled workers	−1.90	−1.78	−1.98	−1.67
	(0.20)	(0.23)	(0.33)	(0.21)
Low-skilled workers	−1.57	−1.61	−1.83	−1.39
	(0.21)	(0.22)	(0.30)	(0.22)
Unskilled workers	−2.67	−2.79	−2.50	−2.22
	(0.23)	(0.24)	(0.31)	(0.22)
Controls	YES	YES	YES	YES
Observations	5,531	5,477	4,184	4,474
Pseudo R-squared	0.138	0.152	0.119	0.120

Logit regression. Clustered standard errors in parentheses. All coefficients are statistically significant at the 95 and 99% level. The reference category is top socio-economic status: Higher managers & professionals. Controls include children's age, number of siblings and parents' place of origin (see text for more details).

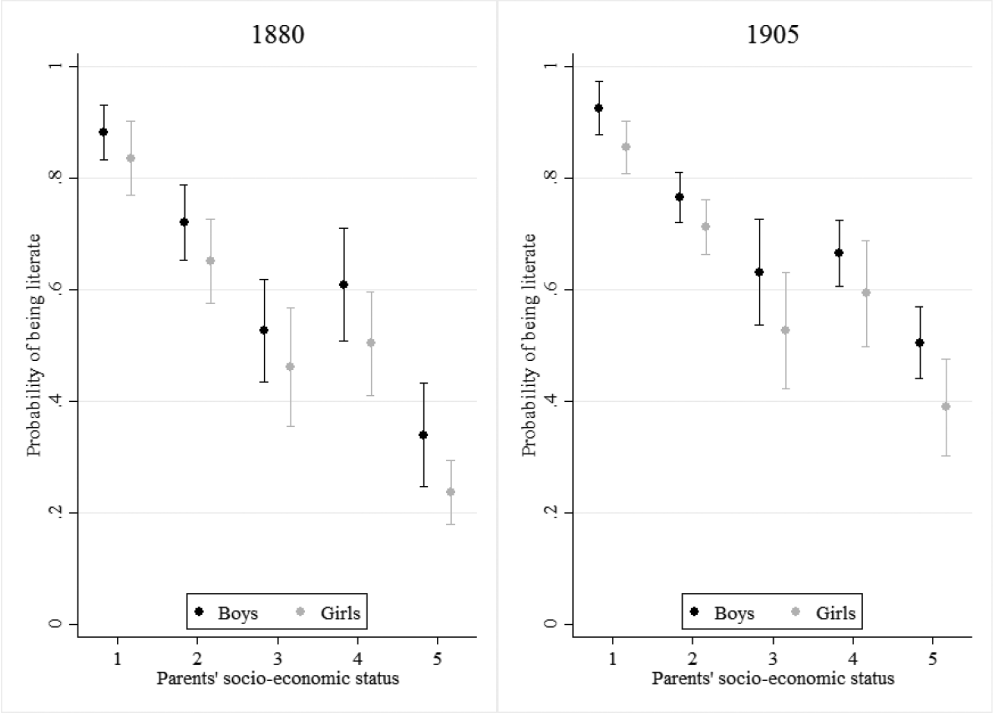


Figure 3. Predicted probabilities of being literate, by parents' socio-economic status. Categories: 1. Higher managers & professionals; 2. Lower managers, professionals, clericals & sales personnel; 3. Foremen & medium-skilled workers; 4. Low-skilled workers; 5. Unskilled workers. Adjusted predictions with 95% confidence intervals. These predicted probabilities are the result of estimating Equation 1 controlling for children's age, number of siblings and parents' place of origin (see text for more details).

gulf had somewhat been reduced by 1905, differences between socio-economic groups were still considerable (42 and 47 percentile points for boys and girls, respectively).

As discussed in the previous section, the influence of socio-economic status on children's literacy can be shaped by the supply of public schooling and by other dimensions related to the characteristics and behaviour of people living in the same neighbourhood. We, therefore, expand the previous exercise by including two additional variables: the number of public schools within a 500-m radius and a set of dummies that classify the different areas according to the level of average rents. Table A1 in the Appendix presents the results of this specification that, as done previously, also controls for children's age, number of siblings and parents' place of origin. The results show that, although both access to school and the wider external environment played a role in shaping children's outcomes, the main source of the social gap in educational attainments lied within the household. Let us address these issues separately.

Holding the other covariates fixed, including the parents' socio-economic status, having access to more schools nearby had a substantial impact on the likelihood of being literate in 1880. The lack of public schools significantly prevented that many children attended one. The fact that school density is no longer significant in 1905 does

not mean that schools were not important. All the contrary, the expansion of the network of public schools between these two dates facilitated access to school to virtually all neighbourhoods in our sample, so school density no longer explains the variation in the ability to read and write. In any case, as explained in the second section, the number of schools was insufficient to secure access to education for all children. In addition, either the direct or the opportunity costs of schooling, together with weak incentives, also helps explaining the large number of children out of school.

It is possible, however, that this exercise over-estimates the role of schools if the location of the new schools followed the demand for education. The information contained in the municipal sources, however, indicate that these decisions were not taken considering the city's needs but the results of corruption and nepotism (Tiana Ferrer, 1992, pp. 167–170). In this regard, in 1901, only 22% of the schools were established in publicly owned buildings (Pozo Andrés, 100). The majority of schools were located in rented buildings that belonged to influential personalities who, through rent-seeking behaviour, obtained extremely advantageous deals, regardless of the location of these schools (Pozo Andrés 101–102). Even the buildings that were publicly owned had not been initially constructed as schools but had other purposes (official, residential or religious) and had been reformed so as to be used as schools (Tiana Ferrer, 1992, p. 167). In this regard, contemporaries continuously stressed the lack of informed guidelines regarding the location of new schools, at least until the 1910s when progressive sectors within the municipality began to intervene in these issues (Dicenta, 1910). Although the model does not directly consider the availability of private schools, it includes a set of dummies that classify each neighbourhood according to the average rent and therefore indirectly controls for this issue if more private schools were located well-off areas to cater for the needs of the upper and middle classes.

On the other hand, the type of neighbourhood where these children lived in also had a distinct effect on their educational attainments. The poorest neighbourhoods showed significantly lower literacy rates, even controlling for parents' socioeconomic status and school density. This influence got smaller over time but was still visible by 1905, especially for girls. Given that our measure of school density does not contain information on school quality, the neighbourhood variable may reflect, apart from social interactions and peer effects, better public services, including schooling and therefore partly explain the lack of correlation of school density and literacy in 1905 observed above.

Lastly, despite the role played by school density (as well as the 'neighbourhood effect'), parents' socio-economic status remained the major driver of disparities in children's literacy. Table 4 reports the adjusted differences in the probability of being literate by social class (being 'Higher managers & professionals' the reference category) before and after controlling for school density and type of neighbourhood. This exercise shows, on the one hand, that most of the effect of the external environment variables is concentrated in the lower-class families. While the coefficients of the other classes hardly change when controlling for school density and type of neighbourhood, the effect of parents' socioeconomic status gets reduced for those children raised by unskilled-workers, especially in 1880. The environment where some of these lower-class families lived negatively affected the chances of their children to become literate, either through access to school or other peer effects. The expansion of public schooling and other improvements in urban conditions between 1880 and 1905 meant a reduction of the importance of the external

Table 4. Differences in literacy by socio-economic status (adjusted probabilities), 1880 & 1905.

	Padron 1880				Padron 1905			
	Boys		Girls		Boys		Girls	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Ref. Cat.: Higher managers & professionals								
Lower managers, professional, clericals, & sales personnel	−0.16	−0.16	−0.18	−0.16	−0.16	−0.17	−0.14	−0.14
	(0.02)	(0.03)	(0.03)	(0.04)	(0.02)	(0.03)	(0.03)	(0.03)
Foremen & medium-skilled workers	−0.35	−0.32	−0.37	−0.31	−0.29	−0.27	−0.33	−0.29
	(0.04)	(0.04)	(0.05)	(0.04)	(0.04)	(0.04)	(0.05)	(0.03)
Low-skilled workers	−0.27	−0.25	−0.33	−0.30	−0.26	−0.24	−0.26	−0.21
	(0.04)	(0.04)	(0.04)	(0.04)	(0.03)	(0.03)	(0.05)	(0.04)
Unskilled workers	−0.54	−0.43	−0.60	−0.47	−0.42	−0.36	−0.47	−0.37
	(0.04)	(0.04)	(0.04)	(0.04)	(0.03)	(0.03)	(0.04)	(0.03)
Controls	YES	YES	YES	YES	YES	YES	YES	YES
School density	NO	YES	NO	YES	NO	YES	NO	YES
Neighbourhood type	NO	YES	NO	YES	NO	YES	NO	YES
Observations	5,531	5,531	5,477	5,477	4,184	4,184	4,474	4,474

Differences in the predicted probabilities of being literate by socio-economic status. The reference category is top socio-economic status (Higher managers & professionals). These predicted probabilities result from the resulted reported in Table A1 in the Appendix. The set of controls include children's age, number of siblings and parents' place of origin Clustered standard errors in parentheses. All coefficients are statistically significant at the 95 and 99% level.

context in explaining the social gap in educational attainments (although less so in the case of girls).[35]

In any case, children from unskilled families still suffered a considerable penalty in 1905: the probability that these boys and girls had of being literate was 42 and 47 percentile points lower than that of children raised by higher managers and professionals. Controlling for school density and type of neighbourhood, however, only slightly reduces the social gap: the distinct effect of belonging to the bottom part of the distribution still meant a literacy gap of 36 and 37 percentile points. As explained in the previous section, not only these children were likely to leave school early to start working, but also their parents were not able (or were not so inclined) to facilitate their children's education. Malnutrition and deficient health might be another channel explaining why the educational achievements of these children were lower. We should also bear in mind that, as discussed in section 2, private schools fulfilled an important role filling the demands from the middle and upper classes. Public schools were in fact referred to as 'schools for the poor' and thus avoided by these segments of the population (Liébana Collado, 2009, p. 6). It is also crucial to bear in mind that being literate is a bounded variable, so the increase in the educational achievements of children from well-off families is under-estimated because their chances of being literate were already very high in 1880. The social gap in 1905 would therefore be even wider that our results show if we could measure other educational achievements (such as high school attendance, for instance).

Social class thus crucially shaped children's chances of becoming literate. Next exercise relies on our match sample of children appearing in 1880 and linked to their adult-selves in 1905 in order to assess whether getting literate affected their chances of moving up the social ladder. Table 5 reports the results of estimating Equation (2) using an ordered logistic model for men and women where dependent variable is the socioeconomic status

Table 5. Literacy and social mobility.

	Dep. Variable: Socio-economic status in 1905			
	Men		Women	
	(1)	(2)	(3)	(4)
Literacy	−1.44	−1.64	−1.43	−1.17
	(0.29)	(0.32)	(0.28)	(0.34)
Parents' socio-economic status				
Lower managers, professional, clericals, and sales personnel	1.42	1.46	1.33	1.70
	(0.24)	(0.27)	(0.41)	(0.54)
Foremen & medium-skilled workers	2.36	2.42	2.19	2.42
	(0.26)	(0.29)	(0.49)	(0.59)
Low-skilled workers	2.39	2.37	1.77	2.03
	(0.28)	(0.31)	(0.45)	(0.58)
Unskilled workers	2.61	2.61	1.82	2.16
	(0.26)	(0.29)	(0.41)	(0.55)
Controls	NO	YES	NO	YES
Observations	953	953	356	356
Pseudo R-squared	0.070	0.090	0.054	0.126

Order logit regression. Clustered standard errors in parentheses. All the coefficients are statistically significant at the 95 and 99% level. The reference category is top socio-economic status: Higher managers & professionals. Controls include age (and its square), marital status, number of children and place of origin (see text for more details).

(in 1905), controlling for parents' socioeconomic status. Columns (2) and (4) control for individual characteristics such as age (and its square), marital status, number of children and place of origin. As expected, parents' socio-economic status crucially shaped children's future prospects. Social fluidity was quite sticky during the period analysed here. Interestingly, getting literate enhances your chances of moving up the social ladder (although the effect is smaller for women). Note the negative coefficient of literacy actually means upward mobility because the socio-economic status ranges from 5 (lowest social class) to 1 (top social class).

If we focus on those individuals coming from the lowest classes (group 5), Figure 4 illustrates the quantitative effect of getting literate on social mobility by plotting the predicted probabilities of ending up in a different socio-economic group. Those boys who managed to get literate were more likely to climb up the social ladder as adults and this difference increases as they moved into higher ranks: while only around 3% of those children who did not get literate ended up working as 'lower managers, professionals, clericals or sales personnel', around 20% of those who learnt how to read and write acceded those professions. Although also positive, the effect is less clear for women. As explained above, this might be due to the limitations of the source when registering women's occupations with results in a lower number of observations. Also, although quantitatively important, the female labour market in Madrid was relatively narrow: around three-fourth of women working were employed as household servants in the early 20th century (Tiana Ferrer, 1992, p. 67). Our estimates, however, constitute only an upper bound. Individuals' innate ability and effort influence both the likelihood of becoming literate and their job market prospects. Our data do not allow controlling for these individual characteristics, so these estimations are likely to be upwards biased. In order to mitigate this concern, columns (2) and (4) control for other individual characteristics that might be correlated with ability and effort. The results reported in Table 5 remain qualitatively unchanged regardless it considers individual-level characteristics or not.

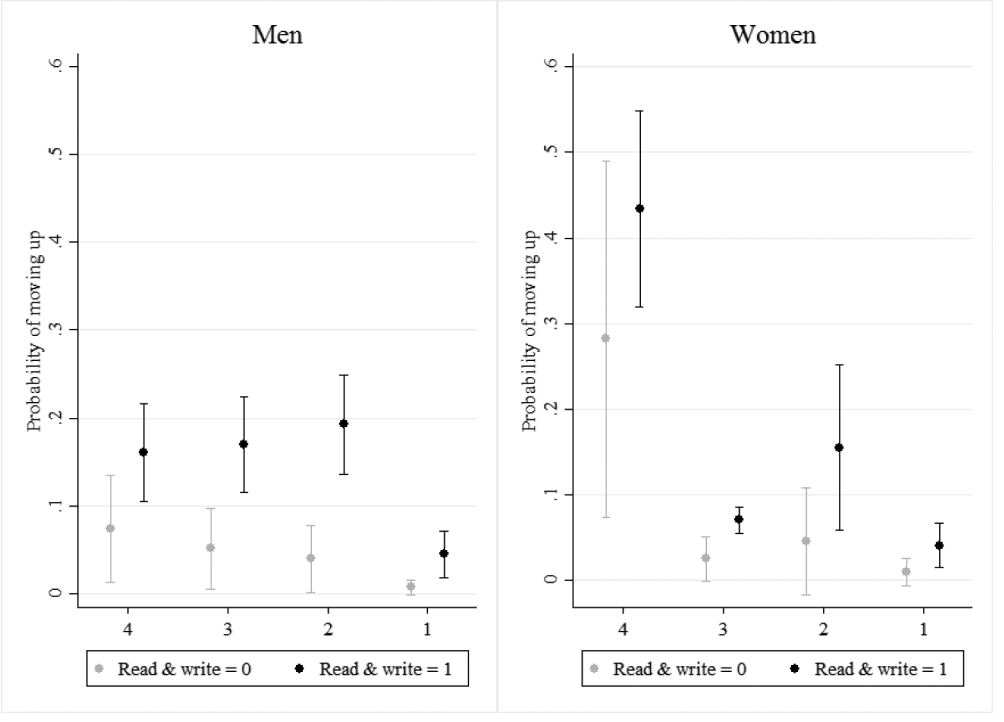


Figure 4. Predicted probabilities of moving up the social ladder for children of unskilled workers (5). Adjusted predictions with 95% confidence intervals. These predicted probabilities are based on the results reported in Table 5. This model controls for age, marital status, number of children and place of origin (see text for more details).

6. Conclusion

The increasing availability of digitalised data sets containing individual-level information has significantly expanded our capacity to better understand how the first stages of economic growth and the increasing supply of education changed the costs and incentives to accumulate human capital and how individuals reacted to the new conditions depending on a wide range of personal and societal characteristics. This article shows that socioeconomic status was the main determinant of educational levels in late-19th-century Madrid, thus evidencing the huge social gap existing at that time. Although the expansion of public schooling during this period facilitated access to education to children from disadvantaged background, the public initiative was insufficient and could not suppress the barriers that these children faced to access education. Due to their economic situation, they were likely to leave school early and start working so as to supplement family incomes. As a result, a significant fraction of the schooling-age population was out of school and the educational gap between children from different social classes remained substantial in the early 20th century. This has profound implications because getting education paid off and was a means to climb up the social ladder: those children who managed to overcome their social background and got literate were

more likely to end up in a higher social class than their parents. However, high inequality levels, together with an inadequate schooling system, limited the chances that children from lower backgrounds had to become educated and therefore constrained their economic prospects and those of the society as a whole.

Notes

1. These statistics are taken from the 1900 Spanish Population Census. The relatively low literacy levels prevalent in most of Spain were similar to those of Italy but much lower than those existing in other areas in North-western Europe or Scandinavia (Pamuk & Van Zanden, 2010). For more details on the evolution of Spanish literacy, see Núñez (1992), Guereña and Viñao (1996), and De Gabriel (1997), among others. This section describing the economic and social context of Madrid follows Tiana Ferrer (1992), Pozo Andrés (1999), Liébana Collado (2009), Pallol (2015), Vicente (2015), Carballo (2015), Díaz (2016), and De Miguel (2016).
2. The 1900 Population Census indicates that 55% of the population aged 16 to 40 in Madrid were women.
3. See, for instance, Fortunata y Jacinta (1887), La Lucha por la vida (1904) or La Horda (1905), respectively.
4. In 1905, the general mortality rate in Madrid was 28 per 1,000, clearly higher than in European cities such as London (15,6 per 1,000), Paris (17,9 per 1,000), Berlin (16,3 per 1,000) or Vienna (19,5 per 1,000). A description of these comparisons for the early 20th century context in Lasbennes (1912).
5. Descriptions of the Spanish school system can be found in Cossio (1897, 1915), Viñao, 1998), De Gabriel (1997), Beltrán Tapia (2013), and Beltrán Tapia and Martínez-Galarraga (2018). For the situation in Madrid, see Ruiz de Azúa (1986, 1987), Tiana Ferrer (1992), Pozo Andrés (1999), and Liébana Collado (2009).
6. Ruiz de Azúa (2001, p. 522). Not only local finances were strained but municipalities often preferred to devote fund to other uses. Referring to a village nearby Madrid, Bello (1926, p. 35) complains that, although the local school is severely underfinanced, the municipality is expending lavishly in bullfights.
7. Compulsory education was extended to 12 years old in 1901 with the creation of the Ministry of Public Education and Arts, which also began to take care of paying the salaries of schoolteachers (Cossio, 1915, p. 81).
8. Absenteeism was also significant: only around 80% of the enrolled pupils attended school regularly (Tiana Ferrer, 1992, p. 143).
9. The Moyano Act recommended the figure of one school per 2,000 inhabitants for Madrid in 1857. By 1901, the Spanish capital was far from reaching that proportion, having 3.14 schools per 10,000 inhabitants (13.03 per 10,000 inhabitants in the rest of Spain). See Pozo Andrés (1999, p. 94).
10. Solving the shortcomings of primary education in the Spanish capital became one of the main objectives of the municipal action developed by the anti-monarchist political forces in the Madrid City Council (Republicans and Socialists) from 1910 onwards, as can be seen in De Miguel (2019, pp. 131–156).
11. According to the data handled by Pozo Andrés (1999), the first medical-school inspections revealed that only 20% of the official schools in Madrid were in adequate hygienic-sanitary conditions. Reports made in 1909 also showed that a third of the students enrolled were short-sighted. The author refers to a confluence of factors to explain this situation of school premises, including not only the lack of concern on the part of the authorities, but also on the part of the owners, the neighbours (who refused to rent their modern homes for educational uses) and the parents themselves, who saw the schools as 'daytime shelters' for their children (Pozo Andrés, 1999, pp. 99–105).

12. On the structure of primary schooling in Spain, see Cossio (1897). Although there also existed *escuelas de párvulos* devoted to children aged 3 to 6, they were few in number and were only used as day-care for working mothers.
13. The number was slightly lower in private schools: around 74 (Tiana Ferrer, 1992, p. 140).
14. The poor status had to be certified by the local priest and the municipal mayor (Cossio, 1915, p. 79). Otherwise, children had to pay a weekly or monthly fee (stipulated by the municipality), which served to complement the teacher's salary. Information about payments is dispersed. Bello (1926, p. 21), for instance, referring to a public school in a village nearby Madrid in the early 1880s, indicates that, apart from receiving 600 *reales* a year from the municipality, each child paid 2 *cuartos* every week.
15. The first law limiting child labour was passed in 1873 forbidding children younger than 10 to work in industries, workshops, foundries and mines, as well as limiting the working day to 5 hours to those younger than 13. The law, however, was not implemented in practice and had to be replaced by another law that was enacted in 1900 which, although slowly, began to improve children's working conditions (Tiana Ferrer, 1987, pp. 47–55).
16. Child labour was particularly prevalent in households headed by unskilled manual workers, where all had to contribute to the family income. The meager salaries of these workers, which proved to be clearly insufficient to cover even minimally the expenses of board and lodging (wages were approximately 2.50 pesetas per day in 1905), thus contributing to this process.
17. Obtaining complete and precise information on private schools is more difficult than for public schools (Tiana Ferrer, 1992, p. 160).
18. In 1909, there apparently existed 78 charitable schools in the whole province of Madrid (Tiana Ferrer, 1992, p. 315).
19. Our sample contains 161,824 and 189,998 observations in 1880 and 1905 respectively. See also Pallol (2015), Díaz (2016), De Miguel (2016), and Beltrán Tapia and De Miguel (2017) for other studies using this information.
20. The 1900 Map by Facundo Canada (ref), which also provides a City Street Guide. We have not been able to locate 236 observations, a negligible fraction of the total sample, which mostly lived in dispersed buildings in the outskirts. For a detailed digitalised view of this map, see IDE Histórica de la Ciudad de Madrid: http://idehistoricamadrid.org/hisdimad/index.htm.
21. After some delays, the implementation of the *Ensanche* fully began from 1868, progressing slowly and coexisting with a more spontaneous and disorganised process that densely populated the *Extrarradio* or the suburbs on the outskirts, located beyond the limits set out for Madrid's urban expansion by Castro (Carballo et al., 2008; Vorms, 2012).
22. As a result of urban speculation in land use and the differences observed in budget allocation, the Ensanche districts (North, East and South) showcased disparate socio-professional and health conditions through the years. The differences between the neighbourhoods of those districts was evidently reflected by the vast discrepancies they showed in the quality of housing and in the quantity of services or infrastructures (Carballo, 2015; Pallol, 2015; Vicente, 2015).
23. Apart from missing, unknown or illegible records, the HISCLASS scheme does not allow to classify students, pensioners, unable or sick individuals and, more importantly, women doing housework. The latter group is especially important as the lower number of women than men reported in Table 1 evidences. However, given that we focus on children and the socio-economic status of the head of the household, this shortcoming does not constitute a problem for our analysis.
24. The ages selected are aimed to target those children that were old enough so as to have learnt how to read and write but not as old as to have entered the labour market. Using slightly different ages hardly changes the results reported here.
25. See also Tiana Ferrer (1992, pp. 123–126) for differences in adult literacy rates between neighbourhoods.
26. In order to take into account that model errors are likely to be correlated between individuals living close by, robust standard errors are clustered at the neighbourhood level. Given that the aim is to capture differences in literacy according to socio-economic status, parents'

literacy is not included in the model because it is highly correlated with their socio-economic status. Including this variable would underestimate the influence of class because parents' literacy would partly capture part that effect.

27. Given that the information available for 1880 does not distinguish between elementary and superior schools, they are combined together. In theory, elementary and superior schools targeted children between 6 and 9 and 9 and 12 years old, respectively. However, as explained in the text, children of all ages were put together.
28. This provision slightly favoured schools for girls, at least in quantity: 34 for boys and 36 for girls in 1880 and 61 and 64 in 1903. Unfortunately, we do not have information on sizes or quality of schools.
29. Only in 1903, 20 schools for boys and 10 for girls established a double turn (one in the morning and one in the afternoon), so as to increase the existing schooling capacity (Tiana Ferrer, 1992, p. 143).
30. Computing school density within a 1,000-metre radius does not affect the results reported here.
31. On these techniques, see Wisselgren et al. (2014), Thorvaldsen et al. (2015), Feigenbaum (2016, 2018) or Massey (2017).
32. Feigenbaum (2018), for instance, obtains a 59% matching rate relying on the whole census but other studies such as Parman (2011) or Guest et al. (1989) obtain lower rates.
33. As expected due to the fact that we are analysing individual behaviour, the explained variance is relatively low. Interestingly, the pseudo R-squared is lower in 1905 than in 1880.
34. Our results contradict those by Tiana Ferrer (1992, p. 125) who, relying on differences in adult literacy rates between neighbourhoods in 1915, argues that social differences played a larger role in shaping men's literacy rates than women's.
35. The results reported here are robust to two additional specifications: controlling for neighbourhood fixed effects and excluding the northern neighbourhoods, whose dispersed settlement pattern differs to that of the city centre.

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References

Altamira, R. (1912). *Problemas urgentes de la Primera Enseñanza en España* [Pressing problems of primary schooling in Spain]. Imprenta Asilo de Huérfanos de Sagrado Corazón de Jesús.

Álvarez, B., & Ramos-Palencia, F. (2018). Human capital and earnings in eighteenth-century Castile. *Explorations in Economic History*, *67*, 105–133. https://doi.org/10.1016/j.eeh.2017.10.005

Ayuntamiento de Madrid. (1913). *Proyecto de construcción de edificios escolares* [Project for building schools]. Imprenta Municipal.

Baten, J., & Van Zanden, J. L. (2008). Book production and the onset of modern economic growth. *Journal of Economic Growth*, *13*(3), 217–235. https://doi.org/10.1007/s10887-008-9031-9

Bello, L. (1926). *Viaje por las Escuelas de España* [Journey around Spanish schools] (Vol. 1). Manrique.

Beltrán Tapia, F. J. (2013). Enclosing literacy? Common lands and human capital in Spain, 1860–1930. *Journal of Institutional Economics*, *9*(4), 491–515. https://doi.org/10.1017/S1744137413000209

Beltrán Tapia, F. J., & De Miguel, S. (2017). Migrants' self-selection in the early stages of modern economic growth, Spain (1880–1930). *Economic History Review*, *70*(1), 101–121. https://doi.org/10.1111/ehr.12332

Beltrán Tapia, F. J., Díez-Minguela, A., Martínez-Galarraga, J., & Tirado, D. A. (2019). *The uneven transition towards universal literacy in Spain, 1860–1930* (EHES Working Paper 173).

Beltrán Tapia, F. J., & Martínez-Galarraga, J. (2018). Inequality and education in pre-industrial economies: Evidence from Spain. *Explorations in Economic History*, *69*, 81–101. https://doi.org/10.1016/j.eeh.2017.12.003

Bobonis, G. J., Miguel, E., & Puri-Sharma, C. (2006). Anemia and school participation. *The Journal of Human Resources*, *41*(4), 692–721. https://doi.org/10.3368/jhr.XLI.4.692

Cappelli, G. (2016). Escaping from a human capital trap? Italy's regions and the move to centralized primary schooling, 1861–1936. *European Review of Economic History*, *20*(1), 46–65. https://doi.org/10.1093/ereh/hev020

Cappelli, G., & Vasta, M. (2020). Can school centralization foster human capital accumulation? A quasi-experiment from early twentieth-century Italy. *The Economic History Review*, *73*(1), 159–184. https://doi.org/10.1111/ehr.12877

Carballo, B. (2015). *El Ensanche Este. Salamanca-Retiro, 1860–1931: El Madrid burgués* [The East expansión. Salamanca-Retiro, 1860–1931: the bourgeois Madrid]. Los Libros de la Catarata.

Carballo, B., De Miguel, S., & De Pedro, C. (2016). La evolución del servicio doméstico en el mercado laboral madrileño (1880–1930) [The evolution of domestic service in the Madrid labour market (1880–1930)]. *Revista de Demografía Histórica*, *34*(1), 63–100.

Carballo, B., Pallol, R., & Vicente, F. (2008). *El Ensanche de Madrid. Historia de una capital* [The expansión of Madrid. History of a capital city]. Editorial Complutense.

Casado, Y. P., & Ramiro Fariñas, D. (2018). La evolución de la mortalidad en la ciudad de Madrid en el primer tercio del siglo XX y su infraestructura de saneamiento [The evolution of mortality in Madrid during the first third of the 20th century and its sanitation structure]. In L. E. Otero & S. De Miguel (Eds.), *La escuela y la despensa. Indicadores de modernidad. España, 1900–1936* [School and provision. Indicators of modernity. Spain, 1900–1936] (pp. 183–217). Los Libros de la Catarata.

Chetty, R., & Hendren, N. (2018). The Impacts of Neighborhoods on Intergenerational Mobility I: Childhood Exposure Effects. The Quarterly Journal of Economics, 133(3), 1107–1162. https://doi.org/10.1093/qje/qjy007

Ciccarelli, C., & Weisdorf, J. (2019). Pioneering into the past: Regional literacy developments in Italy before Italy. *European Review of Economic History*, *23*(3), 329–364. https://doi.org/10.1093/ereh/hey014

Clark, G., & Gray, R. (2014). Geography is not destiny: Geography, institutions and literacy in England, 1837–63. Oxford Economic Papers, 66(4),1041–1069. https://doi.org/10.1093/oep/gpu020.

Cossio, M. B. (1897). *La enseñanza primaria en España* [Primary schooling in Spain]. Fortanet.

Cossio, M. B. (1915). *La enseñanza primaria en España* [Primary schooling in Spain]. Museo Pedagógico Nacional.

De Gabriel, N. (1997). Alfabetización y escolarización en España (1887–1950) [Literacy and schooling in Spain]. *Revista De Educación*, *314*, 217–243.

De Miguel, S. (2016). *Madrid, sinfonía de una metrópoli europea, 1860–1936* [Madrid, symphony of an European metrópolis, 1860–1936]. Los Libros de la Catarata.

De Miguel, S. (2019). *Madrid, un laboratorio de socialismo municipal, 1900–1936* [Madrid, a laboratory of municipal socialism, 1900–1936]. Los Libros de la Catarata.

De Pleijt, A. M., & Van Zanden, J. L. (2017). Accounting for the "Little divergence": What drove economic growth in pre-industrial Europe, 1300–1800? *European Review of Economic History*, *20*(4), 387–409. https://doi.org/10.1093/ereh/hew013

Díaz, L. (2016). *Los barrios bajos de Madrid: 1880–1936* [The low neighbourhoods of Madrid: 1880–1936]. Los Libros de la Catarata.

Dicenta, J. (1910). *Informe sobre reorganización de la enseñanza municipal de Madrid* [Report on the reorganisation of public schooling in Madrid]. Imprenta Municipal.

Feigenbaum, J. J. (2016). *A machine learning approach to census record linking* (Unpublished manuscript). Available here: https://scholar.harvard.edu/jfeigenbaum/publications/automated-census-record-linking.

Feigenbaum, J. J. (2018). Multiple measures of historical intergenerational mobility: Iowa 1915 to 1940. *The Economic Journal*, *128*(612), 446–481. https://doi.org/10.1111/ecoj.12525

Fernández García, A. (2001). Modelo demográfico y problemas sanitarios [Demographic model and sanitary problems]. *Arbor: Ciencia, pensamiento y cultura*, *169*(666), 323–342. https://doi.org/10.3989/arbor.2001.i666.886

Gibbons, S., Silva, O., & Weinhardt, F. (2013). Everybody needs good neighbours? Evidence from students' outcomes in England. *The Economic Journal*, *123*(571), 831–874. https://doi.org/10.1111/ecoj.12025

Glewwe, P., & Kremer, M. (2006). Chapter 16 Schools, Teachers, and Education Outcomes in Developing Countries. *Handbook of the Economics of Education*, *2*, 945–1017. doi:10.1016/S1574-0692(06)02016-2

Goldin, C. D., & Katz, L. F. (2009). *The race between education and technology*. Harvard University Press.

Gómez Redondo, R. (1985). El descenso de la mortalidad infantil en Madrid, 1900–1970 [The decline of infant mortality in Madrid, 1900–1970]. *REIS*, *32*, 101–139.

Guereña, J. L., & Viñao, A. (1996). *Estadística escolar, proceso de escolarización y sistema educativo nacional en España, 1750–1850* [Schooling statistics, schooling enrolment and the educational system in Spain, 1750–1850]. EUB.

Guest, A.M., Landale, N.S., & McCann, J.C. (1989). Intergenerational occupational mobility in the late19th century United States, Social Forces, 68(2), 351–378. doi:10.2307/2579251

Huertas, R. (2002). Vivir y morir en Madrid: La vivienda como factor determinante del estado de salud de la población madrileña (1874–1923) [Living and dying in Madrid: Housing as the crucial factor determining the health of Madrid's population (1874–1923)]. *Asclepio*, *54*(2), 253–276. https://doi.org/10.3989/asclepio.2002.v54.i2.150

Juliá, S., Ringrose, D., & Segura, C. (2008). *Madrid, historia de una capital* [Madrid, history of a capital city]. Alianza.

Lasbennes, L. (1912). *Mortalidad de Madrid comparada con la de las demás capitales de Europa: Sus causas y reformas administrativas que podrían contribuir a su disminución* [Mortality in Madrid compared to other capital cities in Europe: Causes and administrative reforms that could contribute to its decline]. Imprenta Municipal.

Liébana Collado, A. (2009). La educación en España en el primer tercio del siglo XX: La situación del analfabetismo y la escolarización [Education in Spain during the first third of the 20th century: Illiteracy and schooling]. *Cuadernos UMER*, *58*.

Long, J. (2006). The socioeconomic return to primary schooling in Victorian England. *The Journal of Economic History*, *66*(4), 1026–1053. https://doi.org/10.1017/S0022050706000416

Luzuriaga, L. (1926). *El analfabetismo en España* [Illiteracy in Spain]. J. Cosano.

Massey, C. G. (2017). Playing with matches: An assessment of accuracy in linked historical data. *Historical Methods: A Journal of Quantitative and Interdisciplinary History*, *50*(2), 129–143. https://doi.org/10.1080/01615440.2017.1288598

Miguel, E., & Kremer, M. (2004). Worms: Identifying impacts on education and health in the presence of treatment externalities. *Econometrica*, *72*(1), 159–217. https://doi.org/10.1111/j.1468-0262.2004.00481.x

Mitch, D. (1992). *The rise of popular literacy in Victorian England: The influence of private choice and public policy*. University of Pennsylvania Press.

Núñez, C. E. (1992). *La fuente de la riqueza. Educación y desarrollo económico en la España contemporánea* [The source of wealth. Education and economic development in Spain]. Alianza.

Otero, L. E. (2018). La educación en España. La apuesta por la modernidad. Reducción del analfabetismo y participación de las mujeres en el sistema educativo, 1900–1936 [Education in Spain. Betting for modernity. The decline of illiteracy and women's contribution to the educational system, 1900–1936]. In L. E. Otero & S. De Miguel (Eds.), *La escuela y la despensa. Indicadores de modernidad. España, 1900–1936* [School and provision. Indicators of modernity. Spain, 1900–1936] (pp. 17–51). Los Libros de la Catarata.

Otero, L. E., & Pallol, R. (2009). El Madrid moderno, capital de una España urbana en transformación [Modern Madrid, capital of an urban Spain in transformation]. *Historia Contemporánea*, *39*, 541–588.

Pallol, R. (2015). *El Ensanche Norte. Chamberí, 1860–1931. Un Madrid moderno* [The Northern expansion. Chamberí, 1860–1931. A modern Madrid]. Los Libros de la Catarata.

Pamuk, S., & Van Zanden, J. L. (2010). Standards of living. In S. Broadberry & K. H. O'Rourke (Eds.), *The Cambridge Economic History of Modern Europe* (pp. 217–234). Cambridge University Press.

Parman, J.M. (2011). American mobility and the expansion of public education, *The Journal of Economic History*, *71*(1), 105–132. doi:10.1017/S0022050711000040

Porras Gallo, M. I. (2002). Un acercamiento a la situación higiénico-sanitaria de los distritos de Madrid en el tránsito del siglo XIX al XX [An approach to the sanitary condition of Madrid's districts between the 19th and the 20th century]. *Asclepio*, *54*(1), 219–250. https://doi.org/10.3989/asclepio.2002.v54.i1.127

Pozo Andrés, M. D. M. (1999). *Urbanismo y educación. Política educativa y expansión escolar en Madrid (1900–1931)* [Urban planning and education. Educational policy and the expansion of schooling in Madrid (1900–1931)]. Servicio de Publicaciones de la Universidad de Alcalá.

Reis, J. (2005). Economic growth, human capital formation and consumption in Western Europe before 1800. In R. C. Allen, T. Bengtsson, & M. Dribe (Eds.), *Living standards in the past: New perspectives on well-being in Asia and Europe,* 195-225. Oxford University Press.

Ringrose, D. (1985). *Madrid y la economía española, 1560–1850* [Madrid and the Spanish economy]. Alianza.

Ruiz de Azúa, E. (1986). La enseñanza pública primaria en Madrid a mediados del siglo XIX [Public schooling in Madrid in mid-19th century]. In L. E. Otero Carvajal & N. Bahamonde Magro (Eds.), *Madrid en la sociedad del siglo XIX* [Madrid during the 19th century] (Vol. 2, pp. 413–434). Comunidad de Madrid-Alfoz-Universidad Complutense de Madrid.

Ruiz de Azúa, E. (1987). La instrucción pública y las clases trabajadoras en Madrid, 1883–1903 [Public education and working classes in Madrid, 1883–1903]. In *El reformismo social en España: La Comisión de Reformas Sociales* [Social reform in Spain: The Commision of Social Reforms] (pp. 233–249). Monte de Piedad y Caja de Ahorros de Córdoba.

Ruiz de Azúa, E. (2001). Madrid en 1900: La capital del Sistema educativo [Madrid in 1900: The capital of the educational system]. *Arbor: Ciencia, pensamiento y cultura*, *169*(666), 519–540. https://doi.org/10.3989/arbor.2001.i666.895

Thorvaldsen, G., Andersen, T., & Sommerseth, H. L. (2015). Record linkage in the Historical Population Register for Norway. In G. Bloothooft, P. Christen, K. Mandemakers, & M. Schraagen (Eds.), *Population Reconstruction* (pp. 155–171). Springer.

Tiana Ferrer, A. (1987). Educación obligatoria, asistencia escolar y trabajo infantil en España en el primer tercio del siglo XX [Compulsory education, schooling and child labor in Spain during the early 20th century]. *Historia De La Educación: Revista Interuniversitaria*, *6*, 43–60.

Tiana Ferrer, A. (1992). *Maestros, Misioneros y Militantes. La educación de la clase obrera madrilena, 1898–1917* [Schoolteachers, missionaries and militants. The education of the working class in Madrid, 1898–1917]. CIDE.

Vicente, F. (2015). *El Ensanche Sur: Arganzuela (1860–1931): Los barrios negros* [The Southern expansion: Arganzuela (1860–1931): The black neighbourhoods]. Los Libros de la Catarata.

Viñao, A. (1998). Liberalismo, alfabetización y primeras letras (siglo XIX) [Liberalism, literacy and schooling (19th century)]. *Bulletin Hispanique*, *100*(2), 531–560. https://doi.org/10.3406/hispa.1998.4985

Vorms, C. (2012). *Bâtisseurs de banlieue à Madrid. Le quartier de la Prosperidad (1860–1936)* [Suburban builders in Madrid. The Prosperidad neighbourhood (1860–1936)]. Créaphis Éditions.
Westberg, J. (2017). *Funding the rise of mass schooling. The social, economic and cultural history of school finance in Sweden, 1840–1900*. Palgrave MacMillan.
White, P. (1984). *The West European City: A Social Geography*. Longman.
Wisselgren, M. J., Edvinsson, S., Berggren, M., & Larsson, M. (2014). Testing methods of record linkage on Swedish censuses. *Historical Methods: A Journal of Quantitative and Interdisciplinary History*, *47* (3), 138–151. https://doi.org/10.1080/01615440.2014.913967
World Bank. (2012). *World development report 2012: Gender equality and development*.