Sesión 18

¿Discriminación de género y *missing girls* en la historia española?

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Demography, economy, and missing girls in 18th century Spain

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VERY PRELIMINARY. PLEASE DO NOT QUOTE.

Abstract:

Relying on local-level information provided by the Census of Floridablanca (1787), this article (1) identifies which regions were more prone to suffer from “missing girls” and (2) explores the factors that might be behind this phenomenon in 18th-century Spain. Our results show that, broadly speaking, Southern Spain exhibited an excess of male children. Those areas showing relatively high child sex ratios are associated with precarious economic conditions and a marriage market that resulted in (almost) universal female marriage and a large spousal age gap. Lastly, our model only explains a small part of the variation in child sex ratios, thus suggesting that unobserved social and cultural factors, which are more difficult to measure, were also playing a role in triggering gender-discriminatory practices during infancy and childhood.

Keywords: Child sex ratios, gender discrimination, infant and child mortality, demography

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1. Introduction

Sex-selective abortion, female infanticide and gender discriminatory practices unduly increase female mortality during infancy and childhood have resulted in high sex ratios in some developing countries today, most notably in South and East Asia but also in Africa and the Caucasus (Sen 1990; Das Gupta et al. 2003; Jayachandran 2015). Rooted in economic, social, and cultural considerations, gender discrimination against girls have long been practiced in societies characterised by strong patriarchal traditions (Bhaskar and Gupta 2007; Drixler 2012; Gupta 2014, Satomi; Drixler and Kok 2016). Although previous research argued that these practices had been absent in historical Europe (Derosas and Tsuya 2010; Lynch 2011), recent studies have uncovered that they were probably more widespread than customarily assumed, especially in southern and eastern Europe (Hanlon 2016; Beltrán Tapia 2019; Beltrán Tapia and Raftakis 2021; Szoltysek et al. 2022)[1].

The Spanish case shows pre-eminently in these studies. Firstly, the population censuses published during the second half of the 19th century reported relatively high average child sex ratios (Beltrán Tapia and Gallego-Martínez 2017). Secondly, parish registers from a rural area in Northeastern Spain show that these patterns are unlikely to arise due to registration issues (Beltrán Tapia and Marco-Gracia 2021; Marco-Gracia and Beltrán Tapia 2021). In particular, this longitudinal information shows that female neglect happened not only around birth, but also during infancy and childhood (especially regarding the allocation of food and/or care between boys and girls), patterns which were more visible among resource-constrained families. Lastly, the national averages hide substantial regional disparities and the variation in child sex ratios in the 1860 population census has been linked to economic, social, and cultural factors (Beltrán Tapia and Gallego-Martínez 2020). The lack of wage labour opportunities for women and the prevalence of nuclear families exhibits a negative association with girls' survival. In this regard, the expansion of wage labour associated to the expansion of the textile sector in the late 19th century indeed appears to have had beneficial effects on girls' status and their survival chances during infancy and childhood (Beneito and García-Gómez 2021). Although discriminatory patterns affecting female mortality early in life disappeared in the first decades of the 20th century, they seemed to have re-emerged during the difficult circumstances arising from the Spanish Civil War (1936-39) and its aftermath (Echavarri 2021).

Most of this evidence, however, pertains to the 19th and early 20th centuries, so little is known on earlier periods. Although Beltrán Tapia and Marco-Gracia (2021) document extremely unbalanced sex ratios at baptism during the 17th and 18th century, those records might be contaminated by registration issues (the infant mortality rates computed from those early sources are abnormally low). Relying also on parish registers from nine locations in Central Spain during the 19th century, Llopis et al. (2022), on the other hand, show that sex ratios at baptism did not significantly deviate from the 105 benchmark commonly used to assess the presence of female neglect around birth. These authors,

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[1] These studies also follow the tradition of Tabutin (1978), Johansson (1984), Pinelli and Mancini (1997), Tabutin and Willems (1998), Alter et al. (2004) and MacNay et al. (2004) who put the focus on the excess female mortality during childhood in several European regions before 1930.

however, argue that female mortality rates in infancy and childhood are likely to be under-estimated, thus suggesting that parents may have treated sons and daughters differently during the first years of life.

As well as parish registers that go back to the early 16th century, there is a wealth of countrywide statistical information that could be used to fill this gap and shed further light to the Spanish case. The 18th century is promising since it witnessed the undertaking of several counts for all (or most) of the territory: Campoflorido (1712-1717), Ensenada (1749-1753), Aranda (1768-1769), Floridablanca (1787) and Godoy (1797)[2]. In all these sources the information was presented at the population entity (or "pueblo") level, that is, the smallest spatial unit[3]. These entities also often kept their own records, commonly known as *padrones*[4]. This article relies on the Census of Floridablanca (1787) which is considered as the best count of the 18th century (Livi Bacci 1967; Dopico and Rowland 1990, 591-592; Reher and Valero Lobo 1995, 20)[5]. This enumeration was the first that did not have a tax purpose and was carried out anonymously to avoid the widespread concerns about being registered. Local authorities, with the help of the parish priest, visited each household and annotated the number of individuals classifying them by sex, age, marital status, and occupation. Crucially, the Census of Floridablanca (1787) covered most of the territory[6].

Although the population is classified in very broad age-groups, the census allows computing sex ratios for the population younger than 7 years old, which yields a figure of 104.5 boys per hundred girls (children aged 0-7). Given that the high-mortality environments that afflicted historical populations were especially harsh for boys due to biological male vulnerability, this figure cannot be compared to the contemporary one. Precise information on the mortality environment existing in late 18th century Spain is scarce but the available studies suggest that around 20-25 percent of infants died during the first year of life, a figure that was even higher during difficult periods (Pérez Moreda 1980; Reher et al. 1997; Ramiro-Fariñas and Sanz-Gimeno 2000; Marco-Gracia 2017). Recent estimations suggest that contexts where infant mortality rates went beyond 220 deaths per 1000 live births are compatible with child sex ratios around parity (100 boys per hundred girls) or below (Beltrán Tapia and Gallego Martínez 2017; Beltrán Tapia 2019; Szoltysek et al. 2021). Compared to this benchmark, therefore, the child sex ratios found in the Floridablanca census suggest that around 4-5 per cent of girls went "missing".

[2] Although it only attains to the Crown of Castile, the individual-level information provided by the Catastro of Ensenada is also especially valuable (see, for instance, Álvarez and Ramos-Palencia 2018 or Sarasúa 2018).
[3] Information for the Census of Godoy (1797) is only available for the whole country at the province-level.
[4] For instance, the *Vezindario of Zaragoza* in 1723, an extraordinary source for this particular city in North-eastern Spain, provides household-level information, including the sex composition of surviving children. Computing sex ratios using the number of surviving sons and daughters yields a figure as high as 133 boys for hundred girls. This number is even higher if we only focus on poor families (153 boys per hundred girls).
[5] The digitalisation of the Floridablanca Census (1787) has been a long-term endeavour that has benefited from the efforts of Vicente Pérez Moreda, David Reher and Alfonso Herranz, as well as our own.
[6] Although the aim was to gather information for the whole territory, the Census of Floridablanca (1787) missed out some small areas.

This average, however, conceals a significant degree of regional variation. The Floridablaca census actually distinguishes more than 17,000 entities classified according to its type (city, village, etc.) and jurisdiction (royal domain, lordships, military orders). Relying on this wealth of local-level information, we are able to (1) identify which regions were more prone to suffer from "missing girls" and (2) explore the factors that might be behind this phenomenon in 18th century Spain. Our results show that, broadly speaking, southern Spain exhibited an excess of male children, thus suggesting that girls' survival in that area was compromised. Those regions showing relatively high child sex ratios are associated with precarious economic conditions and a particular marriage market. On the one hand, areas exhibiting a large proportion of the population living close to subsistence levels were probably forced to make hard choices when allocating limited household resources, a circumstance that seems to have increased female unexplained mortality during infancy and childhood. A large spousal age gap, arising from early and (almost) universal marriage for women, together with a later marriage and higher celibacy rates for men, also had detrimental effects on girls' survival chances. Lastly, our model only explains a small part of the variation in child sex ratios, thus suggesting that unobserved social and cultural factors, which are more difficult to measure, were also playing a role. The analysis of the residuals… STILL TO BE DONE.

2. Data

The Census of Floridablanca (1787) reports the number of individuals classified by sex, age, marital status, and occupation for more than 17,000 locations across the Spanish Crown (excluding the territories in Spanish America). According to this source, this territory hosted a population of more than 10.4 million people. In order to measure the importance of missing girls, we rely on the child sex ratio, defined as the number of boys per hundred girls (aged 0-7). Although the choice of the age-group is dictated by the nature of our data, this indicator provides a cumulative measure of gender discrimination affecting sex-specific mortality rates around birth and during infancy and childhood. Its main limitation is that it cannot distinguish whether the unexplained female mortality is due to female infanticide (or other forms of female neglect around birth) and/or the result of an unequal allocation of food and/or care during the first years of life.

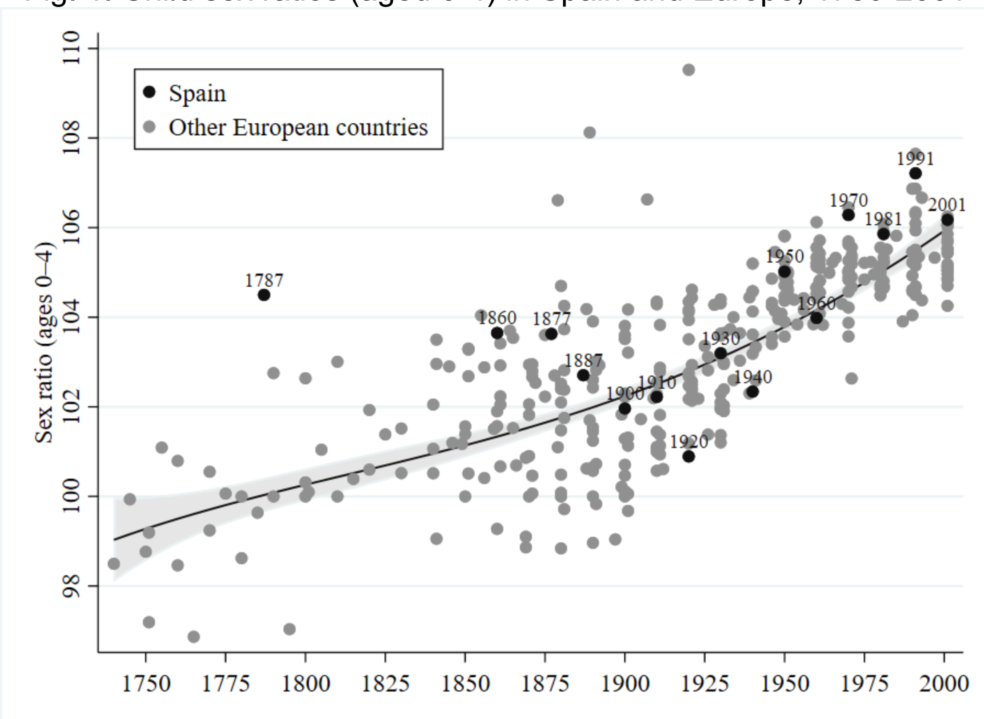
The census yields a figure of 104.5 boys per hundred girls (out of almost 1.9 million children aged 0-7)[7], a figure that is quite similar to those found in the censuses of 1860, 1877 and 1887. As mentioned, this figure cannot be compared to today's standard because the high-mortality environments existing in the past especially affected boys due to the female biological advantage. Child sex ratios were indeed lower in the past as it is shown in Figure 1 that shows their evolution both in Spain and other European countries between 1750 and 2001 (Figure A2 in the Appendix relates these child sex ratios with the corresponding infant mortality rates)[8]. In particular, it is argued that the "natural" benchmark is absence of gender discrimination should be around parity (100 boys per

[7] This number does not include those who are institutionalised in foundling hospitals and similar institutions. Although the classification by age is very crude, the overall population pyramid shows the expected shape (see Figure A1 in the Appendix).

[8] Figure A2 in the Appendix relates these child sex ratios with the corresponding infant mortality rates.

hundred girls) when infant mortality rates are around 220 deaths per 1000 live births (Beltrán Tapia and Gallego Martínez 2017; Beltrán Tapia 2019; Szoltysek et al. 2021). Although the figures are not as precise as those existing for later periods, this benchmark seems adequate for the conditions existing when the census was carried out. According to Chacón et al. (1985, 37), infant mortality could affect between 30 and 50 per cent of all births in late 18th century. Comparing the child sex ratios observed in the Floridablanca Census with its appropriate historical benchmark therefore suggests that around 4-5 per cent of girls were "missing".

Fig. 1. Child sex ratios (aged 0-4) in Spain and Europe, 1750-2001



Note: As explained in the text, the child sex ratio for the Floridablanca Census refers to the 0-7 age-group.

To our knowledge, only a few studies have explicitly considered the high child sex ratios in this census. In fact, it does not seem that this abnormally high figure has been acknowledged before, possibly because of the lack of an appropriate benchmark. Others quickly disregarded this excess of boys by relying on the possibility that girls were under-registered (Eiras Roel 1985, 74). These authors, however, do not discuss why under-registration may have affected girls more. Although it was the first census that did not have a tax purpose and was carried out anonymously to mitigate the concerns on registration[9], the authorities did not completely succeed in their purposes. However, if anything, the population was concerned about taxes and conscription (*quintas*), issues that would incentivise them to hide boys, not girls. Another problem of this census is that

[9] The census was also carried out during a long period of peace, which also mitigates population's concerns about using the enumeration to help raising new taxes and military obligations (Livi-Bacci 1985, 44).

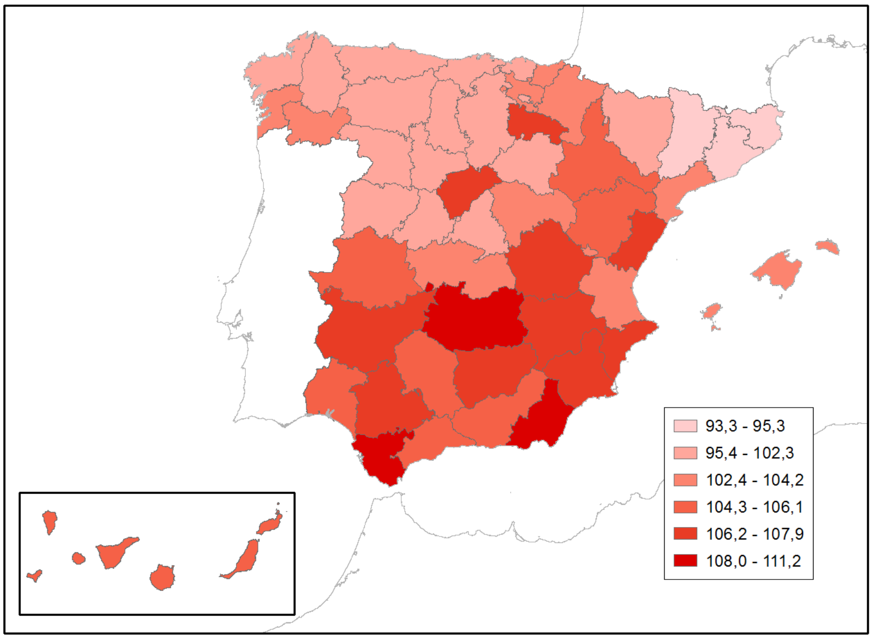
it separately recorded the population living in communities without distinguishing by age. This exclusion however did not alter the image depicted here because (1) this issue mostly affected adults and (2) boys outnumbered girls in these institutions.

Moreover, the sex ratio of the population aged 7-16 was even higher (105.5) than that of those aged 0-7 (104.5). In a context where female emigration abroad was negligible and the fear of conscription may have incentivised to hide older boys, this figure confirms that child sex ratios did not suffer from an under-enumeration of girls. Recent research has indeed shown that the high child sex ratios found in the 19th century censuses did not arise from female under-registration because death registers also point in the same direction (Beltrán Tapia and Marco-Gracia 2021; Marco-Gracia and Beltrán Tapia 2021). This is crucial because the under-registration of girls in population counts and death registers would bias the results in opposite directions.

The national average conceals a high degree of internal variation. Map 1 depicts child sex ratios (aged 0-7) at the province level. Broadly speaking, there were an excess of male children in southern Spain. The North-South divide mimics differences in other dimensions such as settlement patterns, literacy and living standards, among others. Although suggestive, this spatial variation cannot thus be taken as a direct proxy of the importance of gender-discriminatory practices unduly increasing female mortality because child sex ratios could also be influenced by other factors, especially differences in the quality of the registration and the underlying mortality environment (as well as random fluctuations in the smallest provinces). Although we have already discussed that, on average, female under-registration was negligible, we cannot completely rule out that it may have affected some of the regional patters detected here[10]. Likewise, those districts with higher infant and child mortality rates would naturally exhibit lower child sex ratios due to the higher male vulnerability to harsh conditions. If anything, however, conditions were especially detrimental in inland Spain (Pérez Moreda 1980; Reher et al. 1997; Ramiro-Fariñas and Sanz-Gimeno 2000), so the mortality environment cannot explain the high child sex ratios found in some of these areas.

Map 1. Child sex ratios (aged 0-7) in 1787

[10] Eiral Roel (1985, 74) warns about the serious deficiencies found in Jaen.



Source: Census of Floridablanca (1787)

The wealth of information contained in this historical source allows to further explore patterns at the local level and its relation to particular demographic and socio-economic features. The enumeration included information on more than 17,000 locations. It should be stressed that most of these locations are very small: there were, on average, 107 children aged 0-7 and 50 per cent of these settlements have only 40 children or less. Child sex ratios are therefore subject to a high degree of random variability. The observed figures can therefore be really high or low just out of chance[11]. Figure A4 in the Appendix illustrates this extreme variation[12]. The large number of locations nonetheless assures that the general patterns are not affected by this feature of our data. Child sex ratios are only slightly higher in the smallest entities and this probably reflects that either rural areas enjoyed a less pernicious mortality environement and/or that son preference tended to

[11] A small settlement with only 8 boys and 4 girls aged 0-7 yields a child sex ratio of 200 boys per hundred girls. This extreme figure however falls within what it is statistically plausible due to the small sample size underlying the sex ratio. Likewise, the average sex ratio does not perfectly coincide with the figure reported by the census itself based on the national information. This can be due to small discrepancies between the local figures and the aggregation done by the census enumerators. Likewise, some of our locations are extremely small and do not have any girl, which results in a missing sex ratio (by construction, the denominator cannot be 0).

[12] Instead of sex ratios (100*males/females), Figure A3 reports the relative number of boys and girls (aged 0-7) as proportions (males/total number of children) due to its statistical properties. Assuming that the sex of an individual is a random draw, the proportion of males follows a binomial distribution that can be approximated by a normal distribution (symmetrical and bounded between 0 and 1; see Wilson and Hardy 2002; also Garenne 2008).

be stronger there. Table 1 reports the relative number of boys and girls excluding the smallest locations[13].

Table 1. Child sex ratios (aged 0-7) and sample size, 1787

	Children aged 0-7				
	All	>=50	>=100	>=250	>=500
Child sex ratio	106.3	105.8	105.9	105.8	105.6
Observations	17,671	7,654	4,085	1,520	627

Note: weighted averages (by the underlying sample size).

Map 2 depicts the regional variation obtained from this wealth of information. In order to mitigate the role of random noise, smoothing techniques are employed.

MAP 2 (TO BE DONE; GEO-REFERENCE NOT FINISHED YET)

Can this variation be explained by demographic, socio-economic and cultural factors? Next section therefore conducts an econometric exercise with the aim of identifying local features that are correlated with child sex ratios.

3. What might be behind child sex ratios?

3.1 Methodology

The Census of Floridablanca exhibits a relatively unbalanced number of boys aged 0-7, a feature that is especially visible in some regions. Given that the dataset offers detailed information for each entity, this section delves into the factors that might explain the large regional variation found in the descriptive analysis.

Apart from pure randomness, regional disparities may arise from multiple causes, including factors that are unrelated to the presence of gender discrimination itself. In order to shed light on this, we identify economic, demographic, social, and environmental factors that may theoretically explain this variability and then regress district sex ratios on that set of variables:

$$CSR_i = \alpha + \beta X_i + \varepsilon_i \quad (1)$$

The dependent variable is thus the child sex ratio (aged 0–7) in each location. As explained in the previous section, the census contains information for more than 17,000 population entities (or “pueblos”). In line with the literature on gender discrimination in infancy and childhood, the independent variables aim to capture the demographic,

[13] Assuming that, according to the high-mortality environment existing in late 18th-century Spain, the benchmark for comparison in absence of gender discrimination is around parity, Figure A2 also depicts the range of values that would be compatible with that figure depending on the underlying sample size. As it is evident here, the number of locations that exhibit abnormally high child sex ratios is very important. As with Fig. A1, instead of sex ratios as such, this figure is constructed using proportions in order to benefit from its statistical properties.

economic, social, and environmental factors characterizing those locations. For the sake of simplicity we have arranged these in the following three sections:

a) Economic dimensions

Economic conditions are captured using different proxies that are intended to reflect the underlying economic structure. First, the size of the community is captured by a set of dummy variables referring to different population thresholds. As commented above, son preference and related discriminatory practices tend to be stronger in small and rural areas due to the lack of female labour opportunities outside the domestic sphere (Klasen and Wink 2003; Qian 2008). Still, larger urban and semi-urban areas tend to suffer from higher mortality rates[14], so the net effect is somewhat uncertain. Besides, and to better identify the economic context, we also rely on the occupational structure. In this regard, we consider the importance of (male) manufacturing and liberal professions, measured as the percentage of the working-age population (aged 16-50) who is reported working in these occupations[15]. Although specific information on the availability of female occupations, this feature is captured by population size and the importance of manufacturing. As well as the most important manufacturing sector, the textile sector was probably the economic activity that generated the largest demand for female wage labour in 18th century Spain (Sarasua 2018).

Likewise, the relative importance of servants and labourers often indicates a higher level of socioeconomic inequality. If most are unskilled low-productive wage labourers then it is likely that this community, on average, is near subsistence which in turn could lead to discriminatory practices[16]. Again, this could be offset by the female survival advantage in utero, infancy and early childhood that would result in lower child sex ratios in populations suffering economic deprivation. In this regard, the census also identifies the jurisdictional rights assigned to each location, that is, whether the community lived under royal domain (realengos), a lordship (*señoríos*, either of noble or ecclesiastical nature) or the auspices of a military order (*órdenes militares*). While the economic and political power in *realengos* was exercised by the king himself, the Crown delegated these rights to the holder of the title jurisdictions under lordships or military orders. It is argued that their different institutional features made them more or less conducive to extraction or rent-seeking and therefore affected the living standards of the population. Oto-Peralías (2019), for instance, shows that the delegation of governmental authority to

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[14] Not only the prevalence of infectious diseases increases with population density but rural areas may enjoy a better access to animal proteins. It should be stressed that the urban penalty might be an artefact of the existence of particular institutions that inflated mortality rates such as hospitals, foundling homes, etc. (xxxxx).

[15] While manufacturing is captured by the presence of *fabricantes* and *artesanos*, liberal professions include *abogados*, *escribanos*, *estudiantes* and *comerciantes*.

[16] Apart from potential starvation, food deprivation reduces the capacity to survive infectious diseases. Indeed, malnourishment as a factor contributing to mortality rates in Spain did not disappear until the twentieth century.

lordships during the Old Regime had a negative effect that is still visible today[17]. A set of dummy variables are therefore included to capture this variation.

b) Demographic and social features

It is argued that the patriarchal dimensions attached to family systems partly explain the strength of son preference and gender discriminatory practices in contemporary developing countries (Miller 2001; Das Gupta et al. 2003; Grogan 2018). Recent research has indeed showed that these considerations also played a crucial role shaping child sex ratios in historical Europe (Szoltysek et al. 2022). More specifically, these authors document that patrilocal norms and low female age at marriage were strongly associated with higher child sex ratios. Quantitative and qualitative evidence on Modern Greece also suggest that these features, in combination with a strict (and costly) dowry system, penalised daughter's status within the household and resulted in discriminatory practices (Beltrán Tapia and Raftakis 2021)[18]. The role of extended and complex families is however less clear. Although strong family ties have been related to more traditional views on gender roles (Alesina and Giuliano, 2010), research on historical Europe shows that, if anything, the presence of older generations in the household is related to lower child sex ratios (Szoltysek et al. 2022). Similarly, analysing the 1860 Spanish population census, Beltrán Tapia and Gallego-Martínez (2020) find that areas where extended families prevailed also exhibited lower child sex ratios. The latter is consistent with other studies arguing that co-residence with her mother-in-law increased the wife's contribution to farming work in traditional peasant families, which in turn has resulted in lower levels of intimate-partner violence nowadays (Tur-Prats, 2019).

The Census of Floridablanca allows measuring some of these features by using the information on marital status by age-groups. In this regard, we have considered both the fraction of females married in the age-groups 7-16 and 16-26 and the difference between this proportion and the male one to account for the spousal age-gap. In order to further capture other dimensions of the different family types existing in Modern Spain, we have computed the importance of male and female celibacy (at age 50) and the number of adult women per household which attempts to distinguish between the prevalence of extended versus nuclear families. Likewise, demographic pressures, and the resource constraints that they imply to large families, are proxied by the number of children (aged 0–16) per woman aged 16–50. In addition, we have also computed the percentage of the elderly (above 50) over the total population to further characterise the demographic setting present in these societies.

Other social and cultural factors are also likely to have played an important role, either fostering or mitigating gender discrimination. Lynch (2011) argues that, due to the explicit prohibition of infanticide, the role of the Catholic Church was crucial in shaping European families' behaviour regarding this practice. Yet, religious authorities clearly promoted patriarchal values, so its effect on gender discrimination may not be so clear-cut. Although Catholicism was the only religion present in Spain during this period, the

[17] Lordships who were subject to the expulsion of Moriscos in 1609 and then repopulated appear to have suffered especially extractive conditions (Chaney and Hornbeck 2016; Beltrán Tapia et al. 2021).
[18] On the role of dowries on contemporary low-income countries such as India, see Bhalotra et al. (2020).

level of identification with Catholic teachings could vary across regions. The importance of the Church has been proxied by computing the importance of priests (and their helpers) over the total active population[19]. It can be argued that this variable not only captures the underlying religiosity, but also the capacity of these priests to monitor the community.

c) Other factors

Geographic and climatic features might also play a role in shaping child sex ratios. On the one hand, these dimensions may affect the productive specialisation and therefore affect the different incentives to raise sons and daughters. They may also shape the underlying agrarian productivity, which may also result in different income levels and thus affect the need to prioritise sons in resource-constraint environments. On the other hand, not only high-mortality environment tends to take a greater toll on boys (Beltrán Tapia and Gallego-Martínez 2017; Szoltysek et al. 2021), but many diseases affect males and females differently (Waldron 1998; Anderson and Ray 2010), so child sex ratios may also reflect these differences. Infant and child mortality rates varied indeed significantly across regions in Modern Spain and these differences partly reflect climatic conditions, especially due to the incidence of digestive diseases during summer (Dopico; Cussó and Nicolau 2000; Dopico and Reher, 1998; Ramiro-Fariñas and Sanz-Gimeno 2000). To capture these environmental factors, information on temperature and rainfall, together with altitude, ruggedness, and distance to the coast, are included in the analysis and treated as controls (NOT DONE YET). Although we do not have a direct measure of the mortality environment that children faced, this set of variables should capture regional differences due to geographic and climatic features. Moreover, we should bear in mind that we consider population size and larger cities and expected to suffer higher mortality rates. Furthermore, our variable of interest could be influenced by the proximity of urban markets and administrative and political entities, so distance to major cities and to provincial capitals is therefore included in the model. Including distance to provincial capitals is especially relevant because most foundling hospitals were based in these capitals (Pérez Moreda 2005).

Tables AX and AX in the Appendix summarise how the variables employed here have been constructed and report summary statistics. These set of factors however does not exhaust the different dimensions that may shape the relative number of boys and girls observed in our sources. Given the potential existence of further unobserved heterogeneity, it is also important to test our models including districts fixed-effects. Furthermore, most of our locations are very small and are therefore subject to a high degree of random noise. As well as using OLS, it is therefore crucial to test the robustness of our results using a generalized linear model (GLM) that takes into account the varying uncertainty derived from the sample size underlying each sex ratio (Beltrán

[19] As well the the priests themselves (*curas*), we have considered *beneficiados* and *tenientes de cura*.

Tapia and Gallego-Martínez 2020[20]; Szoltysek et al. 2021)[21]. Lastly, we should stress that the research strategy implies that our results cannot be interpreted as causal. Instead, this article aim is to unveil general patterns behind the data and test existing hypotheses.

3.2 Results

Table 2 reports the results of regressing child sex ratios on the set of variables described above using OLS (columns 1-4) and GLM (columns 5-8). While columns 1 and 5 present the baseline specification including the set of variables described above, columns 2 and 6 extend the model by including district fixed-effects. Columns 3-4 and 7-8 replicate columns 2 and 6 with the full sex of controls but excluding those locations with less than 50 and 100 children aged 0-7, respectively.

Table 2. Correlates of child sex ratios (aged 0-7), 1787

	Dependent variable: Child sex ratio (aged 0-7)							
	OLS				GLM			
	All locations		Exc.<50	Exc.<100	All locations		Exc.<50	Exc.<100
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Population (ref.: 0-100)								
100-500	-10.76***	-12.00***			0.0161	0.0079		
	(2.24)	(1.94)			(0.0110)	(0.0112)		
500-1,000	-12.42***	-14.24***	0.60	-2.21	0.0308**	0.0221*	0.0152**	-0.0107
	(2.47)	(2.21)	(0.97)	(2.68)	(0.0122)	(0.0125)	(0.0072)	(0.0179)
1,000-5,000	-12.80***	-15.58***	-0.39	-2.95	0.0365***	0.0241*	0.0173**	-0.0111
	(2.61)	(2.56)	(1.31)	(2.88)	(0.0126)	(0.0130)	(0.0080)	(0.0182)
5,000-10,000	-12.37***	-16.41***	-0.93	-3.45	0.0398**	0.0322*	0.0245*	-0.0030
	(2.95)	(3.05)	(1.84)	(3.17)	(0.0175)	(0.0169)	(0.0136)	(0.0218)
10,000-20,000	-12.68***	-18.47***	-1.09	-2.57	0.0382**	0.0240	0.0192	-0.0008
	(3.09)	(3.62)	(2.32)	(3.76)	(0.0179)	(0.0177)	(0.0149)	(0.0228)
20,000-50,000	-14.51***	-22.07***	-3.75	-5.45	0.0333	0.0159	0.0106	-0.0197
	(4.29)	(4.19)	(2.70)	(5.20)	(0.0228)	(0.0261)	(0.0252)	(0.0321)
>50,000	-14.65***	-28.92***	-8.58	-9.27	-0.0073	0.0102	0.0126	-0.0030
	(4.72)	(8.31)	(6.73)	(6.72)	(0.0289)	(0.0332)	(0.0325)	(0.0391)
Liberal occ.	0.12	0.08	0.03	0.05	0.0011**	0.0008*	0.0006	0.0006
	(0.10)	(0.10)	(0.08)	(0.10)	(0.0005)	(0.0005)	(0.0006)	(0.0007)
Manufacturing	0.05	0.07	0.02	0.03	0.0001	0.0004*	0.0003	0.0003
	(0.04)	(0.05)	(0.03)	(0.04)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Servants	-0.05*	-0.04	0.01	0.02	-0.0001	-0.0001	-0.0001	-0.0004
	(0.03)	(0.03)	(0.04)	(0.11)	(0.0002)	(0.0002)	(0.0002)	(0.0003)
Labourers	-0.01	0.05***	0.03***	0.04**	0.0002**	0.0003***	0.0003***	0.0004***

[20] For more details, see Beltrán Tapia and Gallego-Martínez (2020, 68) and Szoltysek et al. (2021).
[21] This procedure has the added advantage of not losing any observation due to have a value of 0 females in the denominator (this increases our sample size from 17,671 to 17,857 locations).

	(0.02)	(0.02)	(0.01)	(0.02)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Jurisdiction (ref. NA)								
Lordship	1.35	0.99	1.38	7.87**	0.0376**	0.0443**	0.0405*	0.0653***
	(3.29)	(4.59)	(3.21)	(3.30)	(0.0163)	(0.0206)	(0.0221)	(0.0241)
Military Order	5.80	5.84	5.90*	12.51***	0.0611***	0.0536**	0.0541**	0.0753***
	(3.61)	(5.87)	(3.48)	(3.81)	(0.0157)	(0.0219)	(0.0233)	(0.0254)
Royal domain	1.28	-0.81	0.44	5.71*	0.0244*	0.0187	0.0141	0.0307
	(3.04)	(4.41)	(2.96)	(2.95)	(0.0145)	(0.0177)	(0.0189)	(0.0206)
Female early marriage	-11.07*	-6.65	4.16	-2.47	-0.0650*	-0.0386	-0.0380	-0.0813
	(6.27)	(6.30)	(6.93)	(7.37)	(0.0389)	(0.0336)	(0.0412)	(0.0513)
Early marriage gap	49.68***	40.02***	34.74***	29.36**	0.4217***	0.3149***	0.3401***	0.3594***
	(8.95)	(8.06)	(9.62)	(12.49)	(0.0627)	(0.0508)	(0.0655)	(0.0818)
Female celibacy	0.03	-0.01	-0.14*	-0.20	-0.0007	-0.0008**	-0.0012**	-0.0013*
	(0.06)	(0.07)	(0.07)	(0.13)	(0.0004)	(0.0004)	(0.0006)	(0.0008)
Male celibacy	-0.08	0.06	0.17*	0.24	0.0004	0.0008**	0.0013**	0.0016**
	(0.07)	(0.07)	(0.09)	(0.18)	(0.0004)	(0.0004)	(0.0006)	(0.0008)
Child population	1.14**	1.30**	-0.32	-0.53	-0.0039	0.0019	-0.0024	-0.0021
	(0.54)	(0.55)	(0.60)	(0.72)	(0.0040)	(0.0037)	(0.0048)	(0.0055)
Elderly population	-6.68	1.82	2.76	13.60	0.0479	0.0454	0.0782	0.1389
	(12.04)	(12.66)	(9.09)	(12.67)	(0.0636)	(0.0563)	(0.0732)	(0.0941)
Family type	2.03	1.66	1.99	-1.10	0.0246	0.0130	0.0069	-0.0088
	(3.08)	(3.09)	(4.78)	(6.03)	(0.0225)	(0.0217)	(0.0316)	(0.0436)
Priests	0.21	0.25	0.16	-0.56	-0.0018	-0.0003	-0.0003	-0.0027
	(0.23)	(0.26)	(0.36)	(0.44)	(0.0015)	(0.0014)	(0.0025)	(0.0032)
District FE	NO	YES	YES	YES	NO	YES	YES	YES
Observations	16,472	16,440	7,227	3,813	16,834	16,538	7,228	3,813
Adjusted R-squared	0.010	0.008	0.010	0.012				
Deviance					22149	20073	10518	6097

Standard errors clustered at the district level; *** p<0.01, ** p<0.05, * p<0.1"

Despite the intrinsic noise arising from the small sample size that characterises most of our locations (as indicated by the very low R-squared), this exercise confirms that part of the regional variation in the relative number of boys and girls is clearly linked to local features. These results also stress the need of using GLM methods when analysing differences in sex ratios when the size of the location varies significantly. As already explained, while child sex ratios obtained from large locations are relatively accurate, those resulting from small sample sizes are highly unstable and can therefore bias the coefficients if these locations are also different in other dimensions. This is clearly visible not only in the coefficients of the dummy variables that capture the size of each location (their effect is much less clear in the GLM regressions), but also when analysing the link between the other variables and child sex ratios: while some coefficients become statistically significant, other are no longer different from zero, statistically speaking. What follows therefore relies on the results from the GLM models reported in columns 5-8.

Economic dimensions, on the one hand, appear to have shaped child sex ratios in different ways. Although the effect of population size disappears when controlling for district fixed-effects and excluding the smallest settlements, those locations more economically complex, as measured by the importance of manufacturing and liberal occupations, exhibit a larger number of boys. Rather than the effect of son preference, this result can perhaps be explained by the higher incomes that these locations enjoyed. This prosperity probably resulted in lower mortality rates and therefore in less boys dying due to their higher biological vulnerability. The importance of labourers is also related to higher child sex ratios. This indicator however reflects more unequal societies where a larger part of the population lives close to subsistence levels[22], a circumstance that should result in lower child sex ratios due the male biological vulnerability. Our exercise, however, shows the opposite result, which suggest that this socio-economic group had to hard choices when allocating limited household resources, a circumstance that seems to have negatively affected girls' survival. A similar interpretation can perhaps arise from the positive coefficients found in those locations under the jurisdiction of military orders and lordships, institutional regimes that have been found to be detrimental to living standards, at least in comparison to royal domains (Chaney 2016; Beltrán Tapia et al. 2022).

Demographic features, on the other hand, also played a crucial role, especially those related to the marriage market. In particular, child sex ratios are especially high in those locations where women married early and men didn't. Similarly, the effect of male and female celibacy also underlie the importance of unbalances in the marriage market: while low female celibacy (that is, universal female marriage) is associated with a larger number of male children, a low male celibacy acts in the opposite direction. Other demographic features, such as the number of children per married women, the importance of the elderly or the type of family, seem to be unrelated to the relative number of boys and girls. In this regard, although previous research has found that the prevalence of extended families in which different generations of women lived together had beneficial effects of girls' survival (Beltrán Tapia and Gallego-Martínez 2020), our results do not support this hypothesis. It should be borne in mind that, by accounting for a richer set of demographic features, our specification may better identify the familial features that mattered most in shaping girls' social status and subsequent discriminatory practices. Lastly, the relative importance of priests does not seem to be associated with child sex ratios.

As mentioned above, the lack of direct information on the underlying mortality context is an important limitation of this analysis because low mortality rates could result in more boys surviving and the mortality environment could be related to other features analysed here. This issue however should not affect the results reported here because the econometric exercise effectively controls for unobserved regional differences using district fixed-effects. Moreover, within-district differences in mortality rates are further captured by the size of the location and other geographic characteristics (altitude, ruggedness, temperature and rainfall; STILL TO BE DONE).

[22] Likewise, being labourer also implied more uncertainty about future incomes due to their reliance on the availability of waged labour, a feature that especially affected females (Borderías and Martini 2020).

Lastly, it should be noted that our model only explains a small part of the variation in child sex ratios. This is not only explained by the small sample size of most of our locations, a feature that results in a high degree of random variability, but also because we are probably not capturing all the relevant variables that may affect our variable of interest (despite the large number of variables included in our model), especially those social and cultural dimensions that are more difficult to measure. Including district dummies, however, not only increases the explanatory power of the model, but the information contained in these coefficients can indeed be extremely suggestive because it captures the effect of unobserved features that are shaping the relative number of boys and girls in the different areas. Map X below depicts this information and shows that child sex ratios in XXXXXXX are still relatively high after controlling for the set of variables employed here. STILL TO BE DONE / INSTEAD OF THE EFFECT OF THE DUMMIES, IT CAN ALSO BE DONE MAPPING THE RESIDUALS FROM THE MODEL.

4. Concluding remarks

The Census of Floridablanca (1787) reports an extremely unbalanced number of boys aged 0-7. Our estimations, based on the underlying mortality environment, suggest that around 4-5 per cent of girls were "missing". Although we cannot completely rule out the possibility that female under-registration may partly explain this result, the quality of this enumeration makes this issue very unlikely. In fact, these findings are in line with recent research that shows that gender discrimination against girls was affecting sex-specific mortality rates around birth and during infancy in 19th-century Spain (Beltrán Tapia and Gallego-Martínez 2017; Marco-Gracia and Beltrán Tapia 2021; Beltrán Tapia and Marco-Gracia 2021). Our results therefore suggest that these practices were also visible during the late 18th century.

These practices however do not seem to be homogenous across space. The local-level information contained in this source (more than 17,000 locations) evidences clear-cut patterns, both between and within regions. In brief, the "missing girls" phenomenon was more striking in southern Spain. Interestingly, the South also presented internal differences: girls' survival was not as compromised in XXXX and it was in XXXX. These patterns suggest that economic, social, and cultural dimensions played a relevant role in driving gender discrimination.

Our econometric analysis indeed shows that those regions showing relatively high child sex ratios are associated with precarious economic conditions and a particular marriage market. On the one hand, areas exhibiting a large proportion of the population living close to subsistence levels were probably forced to make hard choices when allocating limited household resources, a circumstance that seems to have increased female unexplained mortality during infancy and childhood. A large spousal age gap, arising from early and (almost) universal marriage for women, together with a later marriage and higher celibacy rates for men, also had detrimental effects on girls' survival chances.

Lastly, our model only explains a small part of the variation in child sex ratios, thus suggesting that unobserved social and cultural factors, which are more difficult to measure, were also crucial for this matter. The analysis of the residuals (TO BE DONE)

Given that the Census studied here groups together all children aged 0-7, it is impossible to gauge whether female neglect was taking place right after birth and/or during infancy and childhood.

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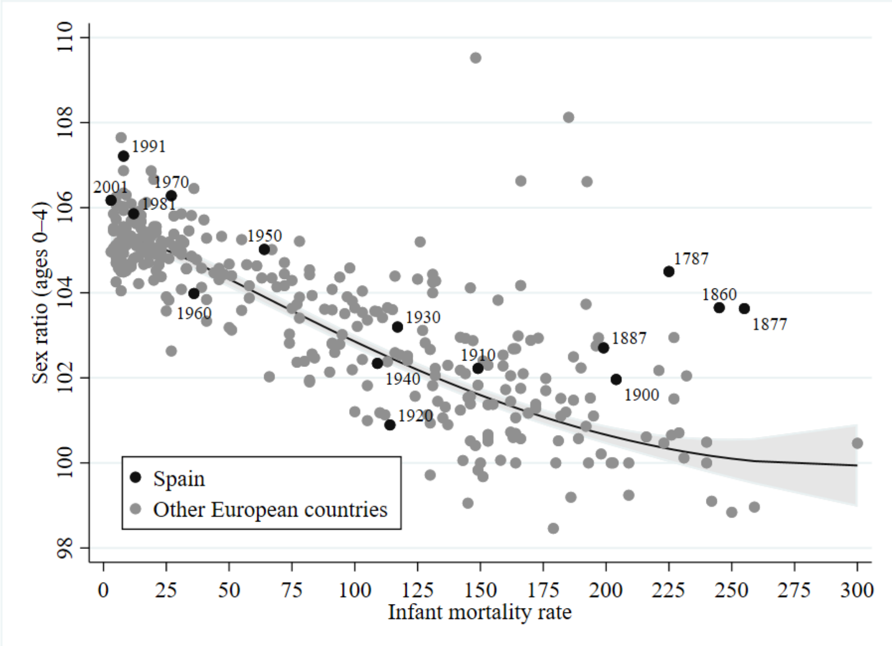
SUPPLEMENTARY MATERIAL

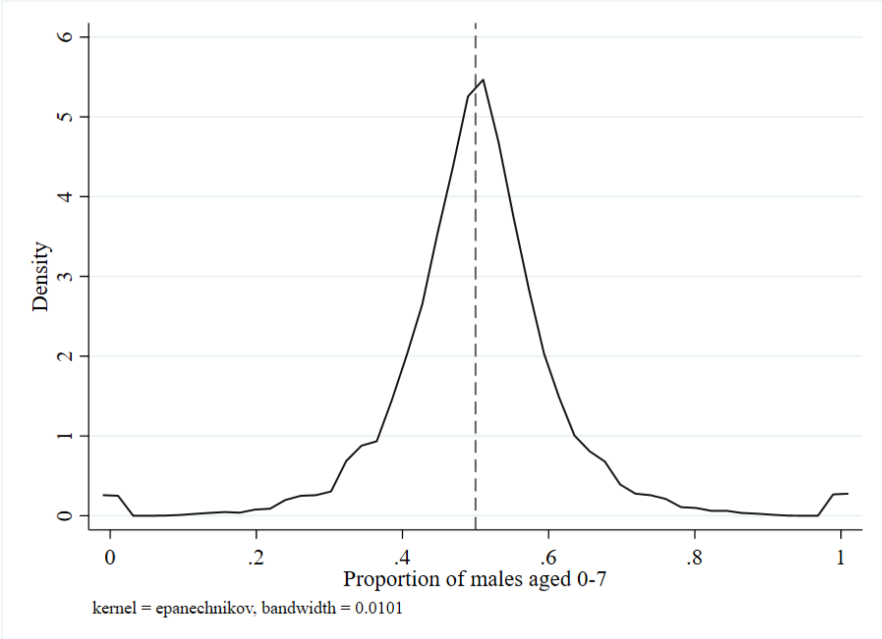
Fig. A1. Population pyramid in Spain, 1787

Fig. A2. Child sex ratios and infant mortality rates in Europe, 1750-2001



Note: As explained in the text, the child sex ratio for the Floridablanca Census refers to the 0-7 age-group.

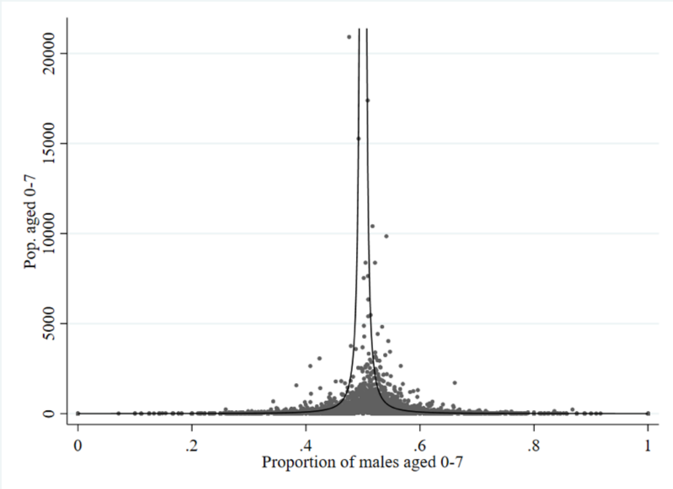
Fig. A3. Proportion of males aged 0-7. Kernel density



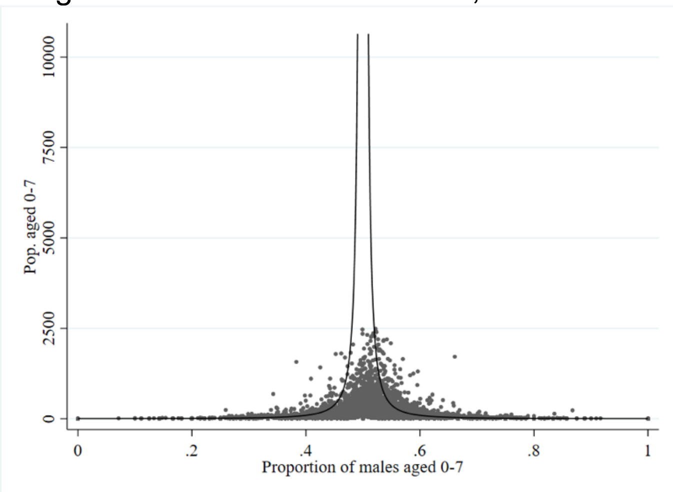
Note: The dashed line indicates parity (p=0.5), which would correspond to a sex ratio of 100 boys per hundred girls.

Fig. A4. Child sex ratios and sample size, aged 0-7

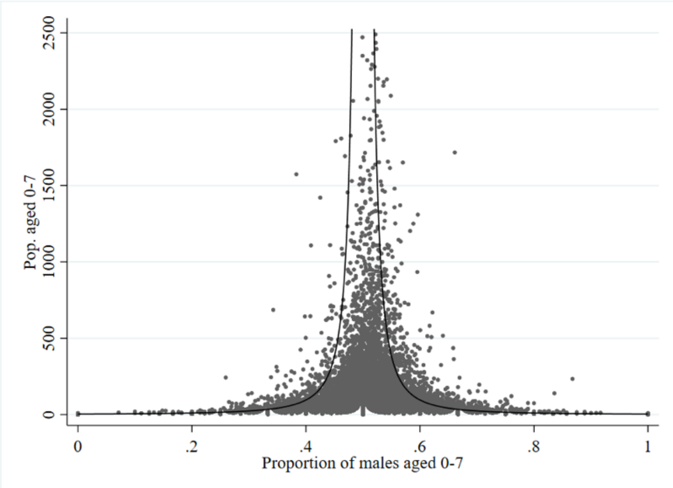
(a) All locations



(b) Excluding locations with more than 10,000 children aged 0-7



(c) Excluding locations with more than 2,500 children aged 0-7



Note: The dashed lines plot the 95 per cent confidence intervals compatible with a binomial distribution around parity (p=0.5) depending on the underlying sample size. Given that most of the locations are relatively small, panels (b) and (c) exclude the largest locations (those above 10,000 and 2,500 children aged 0-7, respectively) in order to better depict the variation in the data.