


Artículo

Were there *missing girls* in Biscay? Sex ratios in Northern Spain, 1550-1899

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ABSTRACT

This paper seeks to contribute to the knowledge of sex ratios at birth, their long-term evolution, and their determinants, on a sound documentary base of almost one million records between 1550 and 1890. The region studied likewise offers the advantage of being industrialised at the end of the observation period, which allows relevant conclusions to be drawn about the effect of modern economic growth on family decisions regarding their offspring. The main conclusions include the preference for males in the rural world, favoured by the inheritance regime and the scarce ecclesiastical regulation in this territory, while the city levels were similar to those of other European cities. From the 18th century onwards, a stability around the reference values in all areas could be observed and which was only broken by the economic and social changes during industrialisation.

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¿Hubo *missing girls* en Bizkaia? Sex ratios en el norte de España, 1550-1899

RESUMEN

Este trabajo pretende contribuir, con una sólida base documental de casi un millón de registros entre 1550 y 1890, al conocimiento de las proporciones de sexos al nacer, su evolución a largo plazo y sus posibles determinantes. La región estudiada tiene además la ventaja de que estaba industrializada al final del periodo de observación, por lo que pueden extraerse conclusiones pertinentes sobre el efecto del crecimiento económico moderno en las decisiones de las familias sobre su descendencia. Entre las principales conclusiones podemos destacar la preferencia por los varones en el mundo rural, favorecida por el régimen hereditario y la escasa regulación eclesiástica en este territorio, mientras que la ciudad mantenía niveles similares a los de otras ciudades europeas. A partir del XVIII, se observa una estabilidad en todas las áreas en torno a los valores de referencia, que solo se romperá con los cambios económicos y sociales producidos durante la industrialización.

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1. Introduction

Recent historiography has highlighted the possibility of gender discrimination in early life in historical Europe. This practice may have resulted either in female over-mortality or under-recording for girls, or both, leading to lost generations of *missing girls*. If female over-mortality has serious demographic and social consequences for subsequent generations, documentary under-recording – beyond the methodological problems affecting the validity of the source itself – implies the legal invisibility of women, and may, in fact, be an indication that more extreme forms of gender discrimination were also practised (Beltrán-Tapia and Szoltysek, 2022, p. 625).

Amartya Sen (1990) was the first to draw attention to the phenomenon of *missing girls* in Asia, where male preference in offspring and female infanticide as a form of neonatal abortion was historically widespread in India (Gupta, 2005; Fenske, Gupta and Neumann, 2022), China (King, 2014; Shi and Kennedy, 2016) and Japan (Drixler, 2013). In Europe, there is also a preference for sons, although religious and cultural values should have prevented or limited such behaviour (Lynch, 2011). The most extreme case is Greece where it is estimated that more than 5% of girls “disappeared” between 1861 and 1920 (Beltrán-Tapia and Raftakis, 2021). Neglect of care and other discriminatory practices in early life have been noted in some regions of Spain, Italy and other places scattered across Central Europe, especially during times of hardship or among the landless population, as in Denmark and Norway (Beltrán-Tapia, 2019; Beltrán-Tapia and Szoltysek, 2022; Manfredini, Breschi and Fornasin, 2016; Szoltysek *et al.*, 2022; Marco-Gracia and Beltrán-Tapia, 2021). In contrast, in regions with low mortality environments, such as England in the 19th century, the sex ratio was not only relatively lower, but showed a decreasing trend with increasing age (Coale, 1991; Reher *et al.*, 2017).

The asymmetry in the sex ratio is not easy to explain and historiography is torn between conscious carelessness resulting in death and under-reporting, which is nothing more than a form of legal discrimination. There is evidence of infanticidal practices through the sporadic cases that reached the courts, although all involved single, poor women or women in incestuous and illicit relationships, and almost never married or socially well-integrated women (Rodríguez, 2018; Hanlon, 2022). However, the lack of documentary evidence does not mean that these practices did not exist. Due to their very nature, these facts were kept hidden and a taboo, even in the family sphere. One wonders to what extent, in an environment of extremely high infant mortality, the lack of care of a new-born baby in its first hours of life could be considered as a “natural” death or as infanticide. And one could reason in the same way about abandoned infants, whose chances of survival were minimal.

In this context, this paper aims to contribute to the knowledge of sex ratios at birth, their long-term evolution, and their possible determinants in a region of northern Spain, which has received little attention so far. The study relies on an extensive and unexplored database of almost one million baptismal records, covering an unusually large period compared to other studies in the literature. Moreover, this broad time span allows us to observe the effect of the transition from a predominantly rural to an industrial economy on family decisions about their offspring.

Local studies of Protestant and Catholic communities in Italy, southwest France and England seem to confirm that neonatal abortion was a customary practice not only among the lower classes, but also among the elites as a way of safeguar-

ding their social status (Hynes, 2011; Derosas, 2012; Hanlon, 2022). In Spain, there is evidence of infanticide and/or neglect in the care of new-borns, as evidenced by an abnormally high sex ratio at baptism, an unusual distance in the intergenerational intervals after the third or fourth child in vulnerable families, an increase in female mortality in the hours immediately after birth, and higher survival rates of males in infancy and early childhood, despite being biologically more vulnerable (Marco-Gracia and Beltrán-Tapia, 2021, 2022; Beltrán-Tapia and Szoltysek, 2022; Beltrán-Tapia and Gallego, 2017, 2020). Similarly, the parish registers of localities in Catalonia and Castilla-La Mancha also show a specifically female deficit in the deaths of children under one year of age, although the authors interpret this as discrimination against women in the recording of vital events (Llopis *et al.*, 2022a; 2022c). And what can we say about the heights reached by foundlings during the 18th and 19th centuries? It was common for women in illicit relationships and poor families unable to feed their offspring to resort to abandonment. We do not know the number who died before being found, which must have been greater than those who managed to survive (Pérez Moreda, 2005).

All this evidence supports the view that discriminatory practices during childhood were part of a cultural heritage that privileged – in terms of access to food and/or care – those offspring who were most likely to enter the labour market. In general, the preference for males was common in poorer agrarian regions, while in urban settings this preference was diluted by the presence of wage labour opportunities for women, even tipping the balance in their favour (Lynch, 2011; Hanlon, 2022; Hynes, 2011; Beltrán-Tapia and Gallego, 2020; Llopis *et al.*, 2022b).

This paper has been structured in four main sections in order to analyse gender discrimination at birth. The first section analyses the characteristics of the Biscayan baptismal series as a proxy for births. The second section presents the data and trends in the analysis of sex ratios: the long-term evolution, identifying conjunctures and intensity; sex ratios by legal status at the time of baptism (legitimate, illegitimate and natural children, and foundlings); the comparison between sex ratios in rural and urban areas; and, finally, sex ratios in population censuses, distinguishing between age cohorts. In the third and last section, with the evidence collected, we will try to answer the main question of this work: Were there *missing girls* in Biscay? and concludes.

2. Baptism registers as a proxy for births

A total of 857,681 baptisms took place in the period between 1550 and 1899, which in practice is equivalent to a very similar number of live births. The data comes from the computerised register of the database of the Historical Ecclesiastical Archive of Biscay [AHEB-BEHA] from which the aggregate by sex, year and parish has been obtained¹. These registers correspond to those baptised in a total of one hundred and thirty-three parishes distributed in seventy-seven municipalities, involving 67% of the province's population in the 18th and 19th centuries (Table 1). The sample since 1690 is complete and stable and, despite the high volatility for the 16th and 17th centuries, it has been considered appropriate to include this period to plot the trend of the sex ratios in the exceptionally long term.

¹ Full years rather than harvest years as recommended for agrarian societies (Hanlon, 2003; Hynes, 2011) have thus been considered.

Table 1.

Sample size with respect to the number of inhabitants in Biscay

Inhabitants	1787			1857			1887		
	Sample	Biscay	S/B	Sample	Biscay	S/B	Sample	Biscay	S/B
<2,000	49,430	79,573	62.1	54,330	90,925	59.8	55,375	89,522	61.9
2,000-2,999	13,859	17,952	77.1	22,795	29,125	78.3	12,666	20,827	60.8
> 3,000	-	3,757	-	3,470	12,863	27.0	32,671	67,137	48.7
Bilbao & Anteiglesias	15,918	15,918	100	28,269	28,269	100	60,421	60,421	100
Biscay	79,207	117,220	67.6	108,864	161,182	67.5	161,133	237,907	67.7

Source: Prepared by the author. Floridablanca Census (1787) and population censuses 1857 and 1887 (INE).

The localities have been classified by population size using the Floridablanca census (1787) as a reference. Thus, the rural world was made up of towns with between 2,000 and 3,000 inhabitants; these agro-towns were strategically located on the main communication routes, functioned as county seats and served the strictly rural localities of less than 2,000 inhabitants in which agricultural and fishing activities were conducted, as well as those involved in coal and iron and steel production. Many of them, especially those located on the banks of the River Nervión, were transformed into industrial towns with the mining and industrial boom of the last third of the 19th century. The urban and commercial counterpoint is Bilbao and its “anteiglesias”² (Begoña, Deusto and Abando) with a clear external projection.

Although the hegemonic position of the Catholic Church allows the use of baptismal records as a proxy for the number of births, the impact of the time lag between birth and baptism must be considered, if stillbirths and those who received baptism of succour and died before the baptism could be made official were systematically registered. Some of the notes made by the parish priests, or those that they did not make, allow us to sense generalised practices and attitudes in this respect (Table 2).

Table 2.

Special notations on baptismal certificates (1550-1899) (% of total baptised)

	No name/ no sex	Baptisms “Subconditione”	Baptised at home
1550-1599	1.8%	-	-
1600-1649	3.6%	0.01%	0.1%
1650-1699	3.3%	0.1%	0.1%
1700-1749	2.5%	0.2%	0.03%
1750-1799	1.4%	0.4%	0.2%
1800-1849	0.5%	1.0%	0.3%
1850-1899	2.0%	1.8%	0.4%

Source: Prepared by the author. AHEB-BEHA. Baptism books.

² This is a concept specific to the Biscayan Law (Fuero) by which a legally independent municipality is designated, but which has strong economic links with the town. The concept is similar to a peripheral district.

The frequency with which baptismal records appear in which neither name nor sex is specified, or simply designated by the generic term “criatura” [infant], may indicate that these were children who were stillborn or died in labour and cannot be included in the analysis because their sex is unknown. That may have been an oversight on the part of the parish priest when he formally noted the baptismal certificate with the possible loss of the original entry. This situation that was corrected when the signing by the godparents and witnesses became widespread. From the second half of the 19th century, when the sacramental registers were being fully standardised, the generic designation of “criatura” was used to be corresponded to stillbirths, as recorded in the records. This should be considered because it may lead to a bias in favour of one sex or the other, usually in favour of girls who have better survival rates. Much more testimonial are the entries of baptisms at home and “subconditione”. In the first case, these are babies who received the baptism of succour and whose baptism was registered at that time. As for the latter, this formula was used for those who were abandoned at birth and who appeared with some indication of a previous baptism.

Nor does that mean there were any significant omissions arising from the lapse between birth and baptism, at least from 1722 when the form for this sacrament was standardised in the bishopric of Calahorra. In Biscay, following the custom of the maritime Basque Country, the ceremony used to take place the same day or the following day, depending on the time of birth (Piquero, 1991, pp. 53-56). In the last third of the 19th century, a slight increase in this interval can be observed, especially in parishes with a strong migratory contribution. The parish priests found dealing with the needs of an extraordinarily high increase in the number of births (and deaths) to be overwhelming, and which led to delays to the usual times. Even so, in only 13% of the cases did it take more than two days to bring the new-born into the Christian fold. This situation contrasts with what happened in other Spanish regions, which show much longer intervals between both events. For example, it took an average of 9.3 days to baptise a child in Ciudad Real, 10.6 days in Albacete and around 8 days in the mountainous area of Cantabria in the early 18th century. These time gaps were progressively reduced until they reached intervals of no more than 3 days by the end of the 19th century (Abarca *et al.*, 2015, p. 111; Lanza, 1991, p. 61). In short, we can affirm that Biscayan baptisms were *quam primum* and, in this sense, the assimilation between birth and baptism does not leave much room for error.

3. Sex ratios in Biscay. Data and trends

Assess the existence of *missing girls* requires a value to be set for the sex ratio at birth in the absence of “manipulation”, bearing in mind that this has varied over time. In contemporary societies, a natural sex ratio is between 105 and 107 boys per one hundred girls, with a median of 105.9 (Coale, 1991, p. 518). However, as Beltrán-Tapia and Szoltysek (2022, pp. 623-626) explain, we have little information on what the “natural” sex ratio at birth would have been in the past. The evidence suggests that it was lower than it is today because of the greater likelihood of male deaths in utero. In addition, the available data are from parish registers so that those who died between birth and baptism must be considered. Analysis of sex ratios in European countries between 1750 and 2015 suggests that the standard sex ratio at birth would be around 104 and has risen steadily since the mid-19th century. In the case of Biscay, we have taken into account the chronological amplitude of the sample in order to establish a reference sex ratio; and, therefore, the variation in time of the median; the limits of credibility established by Henry (1983, p. 78) according to the number of baptisms observed; the interval between birth and baptism, which in this case was a few hours. Consequently, the reference threshold for establishing whether girls were missing would be between 102 and 106 boys per one hundred girls, for their minimum and maximum values.

3.1. Sex ratios at birth

If we analyse the behaviour of the baptised series, we find that there are no differences for boys and girls either in their

means or in their variances³; both sexes have a similar probability of being born (0.511% to 0.522%) and both the mean and median sex ratios are within the limits considered ($\mu=106.5$; $M_e=105.5$). However, as can be seen in Figure 1, there were significant variations with respect to this average until the 18th century, due to the lower representativeness of the sample and the disparity of criteria used by the parish priests when registering the baptismal certificate.

A deficit of girls during the sixteenth and seventeenth centuries can be observed, which becomes extraordinarily strong in the periods 1580-1609 and 1630-1670. A close look at the annual data for the period shows that the plague of 1596-1600 left behind several consecutive years of great under-recording of girls, with values that exceeded the ratio of 115 boys for every one hundred girls. Many of these extraordinary years coincide with the mortality crises of 1607, 1616-1617, 1637-38, 1650 and 1670, probably caused by the succession of extremely cold winters that affected the European continent (Hanlon 2022, p. 78); furthermore, with epidemics or with periods when the international grain trade was paralysed, such as during the Nine Years' War (1688-1697) and the War of the Spanish Succession (1701-1714). From the 1730s onwards, the sex-ratio at birth stabilised within the parameters we have established as normal, with a clear tendency towards the lower limit (especially in the 1760s-1770s and during the war periods of the 19th century). In the last third of the 19th century, the trend changed again to show a clear deficit of girls, at a time when the traditional rural world was in clear decline due to the advance of industrialisation.

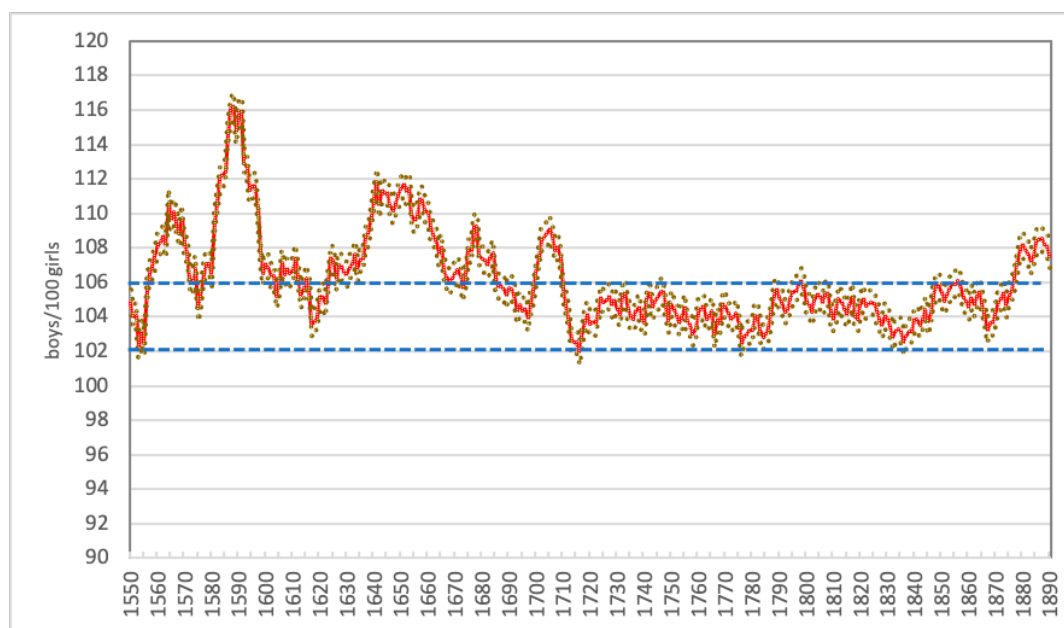


Figure 1. Sex ratios of those baptised in Biscay, 1550-1899. 11-year moving averages weighted by population size in 1787.

Source: Prepared by the author. AHEB-BEHA. Baptism books. Blue dotted lines reflect the minimum and maximum threshold of the universal sex ratio. The maximum and minimum thresholds are plotted to 95% confidence level, together with the 25-year moving averages.

³ Difference in means = 1.51555. Two-tailed p-value = 0.1301 (one-tailed = 0.06504). Quotient of variances = 1.10721. Two-tailed p-value = 0.3419 (one-tailed = 0.1709).

3.1.1. Trends and intensity of the sex ratios at birth

The coincidence of extraordinary episodes in sex ratios with times of crisis suggests that the two phenomena may be correlated. Hanlon (2022, p. 97) in his work on Italian agricultural regions argues that in the absence of gender discrimination, random variations in sex ratios should also occur to the same extent in years with extraordinary mortality. Therefore, if families practised gender discrimination at times of economic hardship, sex ratios should increase above the reference threshold during these episodes. In order to test this hypothesis, a correlation calculation would have to be made between the change in the sex ratio at birth and the variation in the prices of subsistence goods and the years of high incidence of neonatal and infant mortality, which is not possible given the poor quality of the Biscayan death records and the absence of price series for early stages⁴. Failing this, a synthetic index has been constructed, whereby a year with a high incidence is one in which the ten-year average is 5% above the reference threshold of 106 boys per one hundred girls and compared with adult mortality shocks or wheat price changes calculated using the same procedure⁵. Since no sufficiently representative series of deaths and prices are available for the sixteenth and seventeenth centuries, we have limited ourselves to measuring the frequency and intensity of periods with a deficit of girls. Thus, there are 13 years between 1550-1599 in which the sex ratios are well above the ten-year average, even above 10%, resulting in a cumulative percentage variation of 126.89%, the highest of the period. In the 17th century, the extraordinary periods are of similar duration, but less intense: 11 years between 1600-1649 with a cumulative 85.2%; and 12 years with a variation of 101.4% between 1650-1699.

Table 3.

Variations of sex ratios in baptism and adult mortality with respect to price deviations in Biscay (1680-1860)

Crisis years	Delay since the crisis year (t=0)	Percentage change compared to the 10-year moving average		
		Prices >25%	Adult Deaths >25%	Sex ratios >5%
1693	t0	35.0	56.2	3.6
	t1	2.6	45.1	-3.8
	t2	-21.9	-21.8	0.7
1699	t0	61.8	36.2	-3.7
1700	t0	41.1	36.0	-3.0
	t1	3.7	44.3	-1.1
	t2	-6.5	-16.3	2.4

⁴ In most parishes, the death records began to be completed from 1840 onwards. Prior to this, the annotations of the ages of the deceased were sporadic and tended to be rounded off, which made them unusable. The effect of emigration must also be taken into account and which significantly altered the evolution of demographic variables.

⁵ Del Panta and Livi-Bacci (1977, p. 401; 1980) first used this method to measure the intensity of mortality shocks. A year is considered to be particularly critical if it exceeded the decennial average of prices and adult deaths by 25%.

Crisis years	Delay since the crisis year (t=0)	Percentage change compared to the 10-year moving average		
		Prices >25%	Adult Deaths >25%	Sex ratios >5%
1710	t0	54.9	-0.1	3.1
1711	t0	39.3	74.9	5.0
	t1	-9.1	33.8	6.4
	t2	17.5	28.9	-2.5
1741	t0	27.1	11.4	-1.0
1742	t0	31.6	26.9	7.6
	t1	-1.7	-11.9	-1.6
	t2	-13.5	-22.2	-6.2
1754	t0	56.0	-15.2	-1.0
	t1	-16.4	11.6	-0.6
	t2	-27.9	7.4	5.0
1770	t0	-7.1	13.3	7.0
1771	t0	34.5	34.7	3.8
	t1	7.0	-17.8	-0.6
	t2	-10.0	-12.4	-0.8
1803	t0	28.0	20.8	-1.3
1804	t0	30.2	30.3	0.0
	t1	6.5	-14.2	0.4
	t2	-12.4	10.1	-1.1
1811	t0	26.7	-19.5	-5.4
1812	t0	56.4	35.3	-2.7
	t1	16.5	79.8	10.8
	t2	9.9	-2.1	2.6
1821	t0	29.5	-0.5	-3.3
	t1	14.2	2.3	1.2
	t2	-0.6	20.5	-4.2
1837	t0	29.9	28.3	-3.4
	t1	28.5	-2.8	2.1
	t2	27.0	-0.8	-0.3
1856	t0	40.3	-32.1	-0.1
	t1	-26.1	2.5	5.7
	t2	3.8	-0.5	3.3

Source: Prepared by the author. Adult mortality and wheat prices (Catalán and Lanza, 2015 p. 34, table 7). Sex ratios: AHEB-BEHA- baptism books.

The data on prices and adult deaths for the region from the 18th century onwards allow a more precise comparison of the behaviour of these variables and their possible relationship with each other (Table 3). In addition to establishing the intensity and duration of the periods in which a deficit of girls is observed, it has therefore been related to the years in which there are episodes of overmortality or an exceptional rise in prices, which we were able to identify as their variation is greater than 25% (crisis year: t=0) with respect to the average. As these phenomena can occur one or two years after the actual crisis, we have added the variations corresponding to the following two years (lag since the crisis: t1 and t2). As can be seen, from the 18th century onwards, the years with a deficit of girls became longer and longer in time without a clear pattern of correlation between high mortality and high sex ratios, even though some of the abrupt variations coincide with epidemics such as those of 1724, 1733, 1742, 1748-1749. It is true that the crisis years were

accompanied by an increase in adult mortality and sex ratio in the same year or within the following two years, but this relationship is not observed with the same intensity throughout the 19th century. Only the mortality crises caused by the War of Independence, during the retreat of the Napoleonic armies through the province, and the cholera outbreak of 1855 were correlated with a change in the sex ratio of more than 5%. Thus, the correlation is established with convulsive periods in which fathers could not provide the necessary care for the survival of new-borns and clearly prioritised male offspring.

3.1.2. Sex ratios at birth of bastards and foundlings

Scholars have pointed to the high incidence of abandoned children in pre-industrial Europe as *de facto* infanticide, given the extremely high mortality associated with foundling homes (Derosas and Tsuya, 2010; Lynch 2011). Case studies from these institutions suggest that girls were more frequently abandoned than boys, a likelihood that increased significantly in legitimate families with large offspring (López-Antón, Marco-Gracia and Beltrán-Tapia, 2022).

In Biscay, the computerised and nominative register of those baptised has made it possible to distinguish between those born

within a legitimate marriage (the filiation of the father and mother is known) and those born outside it. Thus, it has been found that bastardy rates, which include natural and illegitimate children and foundlings, show remarkably high values for the 17th century, and which were higher in rural than in urban areas, with several localities exceeding 10%. These rates must be understood in the context of a stem-family household system in which the family patrimony was passed on undivided, favouring emigration and marriage at an older age; in which natural children were perfectly integrated, as they were often the fruit of a stable relationship with the promise of a subsequent marriage. From the 18th century onwards, the permissiveness of this type of situation was attenuated and, consequently, the bastardy rate fell considerably (3.4%). However, it was still higher than the national average (1.7%) and somewhat lower than the rate for Galicia (4.1%, between 1760 and 1790), which was the highest in the country (Dopico and Rowland, 1990, p. 604).

Although the comparison between the sex ratios of children born in and out of wedlock may be biased by the lower number of the latter⁶, it can be affirmed that in Biscay there was a marked preference for males among the legitimate offspring until the 18th century. In counterpart, this situation favoured the existence of a surplus of girls both among natural/legitimate children and among those who were abandoned (Table 4).

Table 4.

Sex ratios by legitimacy status at baptism, 1550-1899

	Legitimate children	Natural and illegitimate children		Foundlings	
	Sex ratios	Sex ratios	of baptised	Sex ratios	of baptised
1550-1599	112.9	96.8	6.6%	101.4	3.7%
1600-1649	107.9	101.5	7.4%	90.5	1.8%
1650-1699	107.8	109.3	4.1%	88.3	1.0%
1700-1749	104.8	96.7	2.1%	94.4	1.4%
1750-1799	103.8	103.6	1.2%	100.9	1.3%
1800-1849	104.3	104.0	1.2%	94.2	2.3%
1850-1899	106.4	105.7	1.1%	108.4	2.5%

Source: Prepared by the author. AHEB-BEHA- baptism books.

The preference for boys in the legitimate offspring has also been observed in other parts of Europe until well into the 20th century (Beltrán-Tapia and Szoltysek, 2022, p. 630). However, this pattern of behaviour was diluted in Biscay throughout the 18th century as there was a convergence towards normality in the sex ratios of the children raised by their families (both legitimate and illegitimate/natural). Girls continue to predominate among the foundlings, due to both their lower social status and higher survival rates. As there were no foundling home in Biscay, these children had to spend their first hours of life in the open, so the probability of staying alive was in-

versely proportional to the time elapsed between abandonment, their discovery and the act of baptism. However, the most surprising aspect of the provincial foundling ratios is to be found in the second half of the 19th century, when a marked male predominance is recorded. By then, the Diputación (Provincial Council) had been the driving force behind the construction of a foundling home in the Abando district (Bilbao), which meant that children were abandoned directly there. This fact may have increased male survival rates at least up to the time of baptism, but it would also imply a higher abandonment rate for males than in previous periods.

⁶ The behaviour of the series of those born with their parents united in legitimate marriage does not differ statistically from those born out of wedlock, although the volatility of the latter is significantly higher ($S_{(leg)}/S_{(ileg)} = 3,4935$) and determines the differences between the two groups.

3.1.3. Sex ratios at birth in rural and urban environment

Given that different patterns of behaviour in the countryside and in the city have been found for other European regions (Hynes, 2011; Hanlon, 2022; Beltrán-Tapia and Gallego, 2020; Beltrán-Tapia and Marco Gracia, 2022), a differentiated analysis of Biscayan sex ratios in both environments has been conducted. The urban world is represented by Bilbao and its “anteiglesias”,

while the rural sphere is made up of small towns, which exercised a strong regional centrality, and localities of less than 2,000 inhabitants. In the latter, a distinction has been made between coastal and inland areas, in case the prolonged absence of men on the Newfoundland and the Great Sun fishing banks might have conditioned the behaviour of families with respect to their offspring (Table 5).

Table 5.

Sex ratios at birth in Biscay by population size, 1600-1899

	Urban environment		Rural environment		Biscay
	Bilbao & anteiglesias	Towns	Inland	Coast	
1550-1599*	-	104.9	110.2	107.7	109.3
1600-1649	102.4	107.7	109.6	104.9	107.1
1650-1699	103.6	110.9	110.0	106.2	108.0
1700-1749	101.7	105.5	105.9	107.0	104.9
1750-1799	103.3	104.4	104.8	104.6	104.2
1800-1849	103.4	105.0	104.8	104.7	104.2
1850-1899	107.0	104.2	106.5	105.6	106.4
\bar{X} (1550-1899)	105.2	105.9	107.4	105.8	105.8

Source: Prepared by the author. AHEB-BEHA-Baptism Books. The data for Bilbao and its outskirts in the period 1550-1599 are unstable and incomplete until the 1580s and, therefore, not comparable with the rural environment.

The provincial dynamic shows its own patterns of behaviour in both urban and rural environments, at least until the second half of the 18th century. Bilbao and its “anteiglesias”, in the same way as other European cities (Hynes, 2011), show low sex ratios, but at the limit of normality until the second half of the 19th century, when a deficit of girls increased sharply. By contrast, the rural world is more diverse than one might at first think. The villages at the head of the district and the inland rural localities show a high prevalence of men, which determines the provincial averages. From the 17th century onwards, the crisis in manufacturing activities, the increase in fiscal pressure and the reduction in port activity, favoured a progressive ruralisation of the economy and, with it, an assimilation of its demographic patterns. The convergence in the sex ratios was completed during the second half of the 19th century when the ratio was around 104.2 boys for every one hundred girls, and slightly lower in the urban area. This pattern was only altered in the last decades of the eighteenth century, due to the economic and social transformations derived from the industrialisation process (Table 6).

Table 6.

Sex ratios at baptisms in mining and industrial areas

	Bilbao & anteiglesias	Mining areas	Industrial areas
1870-1879	104.3	94.7	106.7
1880-1889	109.6	102.9	105.7
1890-1899	107.4	113.1	106.7

Source: Prepared by the author. AHEB-BEHA. Books of baptised persons. Mining localities: parishes of Valle de Trápaga; Abanto-Zierbena; Industrial localities: Baracaldo, Sestao, Erandio.

An analysis of the sex ratios of the localities affected by industrialisation reveals that they increased in the decades of greatest migratory influx, especially in the mining areas where living conditions were tougher and, consequently, there was a sharp drop in life expectancy (González-Ugarte, 1994). Proof of this is the evolution of the mining districts of Bilbao –the district of “Bilbao la Vieja” and “Abando”– which were responsible for the sharp rise in sex ratios from the 1880s onwards. In contrast, the industrial municipalities show greater stability with levels close to the reference standard, which is consistent with a more rapid decline in mortality rates in this area.

3.2. Sex ratios in childhood. Population censuses

Although this paper focuses on sex ratios at birth, sex ratios have been calculated in the available population censuses for this period to contrast the data obtained from parish registers. Sex ratios at different ages allow us to assess the cumulative impact of gender bias on perinatal, infant and child mortality and, consequently, the importance or otherwise of discriminatory practices towards girls (Beltrán-Tapia and Gallego, 2020; Beltrán-Tapia and Szoltysek, 2022). Analysis of sex ratios for cohorts of 0-4 year-olds available for twenty-five countries has shown that the sex ratio should have been around parity in settings of high infant mortality (220 deaths per 1,000 live births). The little data available for the second half of the 18th century, put infant sex ratios at around 97-101 children; a figure that increased as living standards rose and infant mortality declined (Beltrán-Tapia and Szoltysek, 2022, pp. 626-627).

In Biscay, the Floridablanca census (1787) provides aggregate data on the population under 7 years of age, with a sex ratio of 100.04 boys/100 girls for the province as a whole and

101.1 for the towns making up the sample of baptisms. In other words, values that are close to parity and which are in line with the evolution shown by the sex ratios at birth, and situated between the reference limits.

The 1860 census raises the sex ratio (between 0-5 years) for the populations in the sample to 106.8, especially in towns with more than 3,000 inhabitants (117.4) and Bilbao and its parishes (111.0). These are localities which are beginning to receive an important migratory contribution which causes a slight increase in infant mortality rates, and which places them at thresholds much higher than those registered in rural enclaves –145.4% in Baracaldo (industrial) compared to 109.7% in Mungia (rural)— (González Ugarte, 1994, p. 45). Discriminating by age group (Table 7), the average sex ratio at age 0-1 was above the national average (104.7 years in 1860), which seems to suggest that gender discrimination was reducing the number of girls (Beltrán-Tapia and Gallego, 2020).

Table 7.

Sex ratios in childhood by age group, Biscay 1787-1920

Population censuses	Cohort <1 year	Cohort 0-4 years	Cohort 0-7 years
1787	-	-	100.0
1860	106.0	106.8*	-
1887	107.0	106.7	107.9
1900	98.5	103.0	104.3
1910	116.0	111.8	111.1
1920	101.3	100.5	102.2

Source: Prepared by the author. INE. Floridablanca Census (1787); Population censuses of 1860, 1887, 1900, 1910 and 1920. * Sex ratio for the cohort 0-5 years.

Population censuses from the 1880s and the early decades of the 20th century confirm that the female deficit was exacerbated by the industrial development of the region, when infant mortality rates were well over two hundred thousand in most industrial localities. In this context, and against the natural trend, the preference for boys was evident from the moment of birth and during their first years of life, with strong variations linked to successive waves of migration. As family living conditions improved, which started in industrial cities, ratios tended to stabilise around the national average -102.7 boys/100 girls aged 0-4 years- (Beltrán-Tapia, 2019, p. 21).

4. Discussion. Were there missing girls in Biscay?

The quantitative analysis of sex ratios at birth reveals a clear preference for males in the rural world, in sharp contrast to the balance of urban sex ratios. Throughout the eighteenth century, both demographic patterns converged to lie within the reference values and would only be altered with the onset of industrialization. The question then arises as to the reason for the gender disproportion in the first centuries of modernity.

First, it should not be forgotten that the data we are dealing with come from parish registers and that the episcopal authority in Biscay was considered to be contrary to historical ri-

ghts⁷. Consequently, there were no attempts at reforming ecclesiastical administration, including the standardisation of parish registers, until well into the 18th century. In a context of scarce penetration of the Tridentine provisions, a certain laxity in the administrative practices of the Church is within the realm of possibility, as has also been observed in other Spanish regions (González-López, 2022; Llopis *et al.*, 2022b). For example, until well into the 18th century the death books in most localities only recorded those who had paid the funeral and burial fees, indicating who had made the payment. Thus, we know that the tenants were buried in a grave owned by the owner of the farmhouse, who also paid for the funerals. Paupers resorted to charity to be buried in a common grave with a short response. It is reasonable to think that these criteria were applied to baptisms and that, therefore, only those who paid the corresponding fee were recorded; this does not mean that they were not baptised, simply that they were not registered. It is therefore worth asking whether families with scarce resources (and this would include mothers with illegitimate children, the families of servants, artisans and merchants affected by the collapse of manufacturing activities in the 17th century) could afford to pay the fee for the administration of the sacraments—in Bilbao in 1738 a baptism cost 7.5 reals of vellon⁸— especially when the probability of death in the first months of life was so high.

The combination of high sacramental fees and the laxity of ecclesiastical registers suggests that families with scarce resources and in times of economic hardship favoured sons when it came to “investing” in an act that gave legal identity to the new-born. This was particularly evident in times of upheaval such as epidemics or wars, when it was difficult to administer baptism in church or to record it properly in the sacramental books, and during prolonged periods of famine such as those that occurred during the 17th century. Once the baptism had been conducted at home, the spiritual part was covered, but it was not felt necessary to make it official (and pay the corresponding fee) if that would involve a large financial outlay. This is reflected in the synodals of the bishopric of Calahorra prior to the 18th century:

Por relación que nos ha sido hecha, hemos sabido, que en muchos lugares de este nuestro Arçobispado, quando algunas criaturas recién nacidas son bautizadas en casa por necesidad que tuvieron sus padres, despues son muy negligentes en las embiar a la iglesia, para que se les pongan Oleo y Chrisma dejando pasar muchos días: de lo qual resulta mucha offensa a Nuestro Señor porque muchas veces se quedan las criaturas sin los recibir⁹.

⁷ In Biscay, there was a predominance of its own churches served by a patrimonial clergy (appointed by the owner of the church). The Fuero (historical rights) protected this ecclesiastical regime and, therefore, they could not be subject to an authority that was alien to them.

⁸ AHFB-BFAH. Sección Municipal, Archivo Municipal de Bilbao [AMB]. Bilbao Libramientos 1738/002

⁹ “From a report made to us, we have learned that in many places in this Archbishopric of ours, when some newborn babies are baptised at home due to the needs of the parents, they are very negligent at bringing them to church, so that they can be given oil and chrism, leaving many days to pass, which results in much offence to Our Lord, because many times the babies are left without receiving them”. Constituciones Sinodales. AHEB-BEHA/F006.080 (0352/002-00). Book III. Of Baptism. Chap. III, p. 246.

Second, the dynamics of the Biscayan baptisms were determined by the evolution of the rural environment, where the stem-family household and a succession system favouring the male were predominant. This system implied that property belonged to the family (lineage), not to the individual, and its transmission had to be complete (*pro-indiviso*) (Gorostiza, 2005, p. 343). Although Charter law did not discriminate against women in matters of inheritance, the fact is that, in practice, male predominance was maintained in 60% of cases, which implied a high female participation (Arbaiza, 1996, p. 41). The payment of the marriage dowry had a double economic effect depending on whether it was the bride's or the groom's family. Normally, the dowry of the consort was calculated according to the yield of the inherited estate, which implied a considerable outlay for the bride's family, which in return reinforced the ties between related lineages, and brought in considerable social capital. In the case of the recipient family, it meant a monetary injection to compensate the sons and daughters excluded from the family patrimony. In this way, a system of compensation for non-heirs was developed, giving rise to an "inheritance strategy" that was to combine the indivisibility of the house and the individual well-being of each of the children (Arbaiza, 1996, pp. 40-43). Young people without access to land or a good family dowry were forced into the labour market in their early adolescence. The predominance of handicraft activities linked to the iron industry, by their very masculinised nature, or fishing work along the coast favoured the permanence of sons in the household. Their work was more profitable for the family economy than that of their sisters, who were forced to look for salaried work that would allow them to gather the minimum resources needed to enter the marriage market¹⁰. Undoubtedly, all of this contributed to the preference for sons being expressed from the moment of birth and to providing them with better care in early childhood.

On the other hand, this system of patrimonial transmission contributed to young Basques getting married "after the age of 25, even though hundreds of them have contracted a marriage contract, but have not joined for lack of a home" (Vargas Ponce, 1982, p. 12), resulting in gross marriage rates in the rural area of less than 8‰ and, consequently, low fertility rates with regular and long intergenerational intervals (Ortega 1989, p. 48 and 65-66). Difficulties of access to marriage and delaying marriage generated high bastardy rates, which until the second half of the 17th century were between 5% and 9%, much higher than in other areas with a similar demographic system. Many of these natural children were perfectly integrated into society as they were the fruit of a stable and even socially accepted relationship based on the promise of a subsequent marriage. Given the high infant mortality rate, it was common for them to be designated as heirs in the absence of legitimate offspring, and even to be preferred over legitimate offspring to take over the family estate. The sex ratios of both groups show a clear deficit of sons among the natural offspring, while the sex ratios are extremely high among the legitimate children. This disparity could be thought to be the result of a

conscious strategy of the families to guarantee the continuity of the lineage and prevent future claims on the family assets. That would have required the invaluable help of the parish priest—let us not forget that he was appointed and paid by the head of the lineage who owned the church— who could omit the birth from the book of the baptised or simply register it with the given name, without surnames or filiation. This would be a denial of civil rights to the new-born, since it is the baptismal certificate that attests that he or she belongs to the family and, therefore, guarantees his or her rights. The omission implied his or her "legal non-existence", preventing him or her from claiming his or her inheritance in the future. The complementarity and interdependence between the charter towns and the surrounding countryside led to an assimilation in the demographic behaviour of both, even though the charter towns were governed by common Castilian law in matters of inheritance.

Throughout the 18th century, the sex ratio stabilised in both rural and urban areas at around 103-104 boys for every one hundred girls. This convergence can be partly explained by the progressive loss of power of the lay patronages, which led to a greater presence of the episcopal authority in the territory. Consequently, the Tridentine dispositions and the sacramental regulation gradually standardised and changed customs until they were completely integrated within the margins of Catholic orthodoxy. On the one hand, the standardisation of the sacramental book forms by the bishopric of Calahorra in 1722 (Piquero, 1991, p. 53) became generalised in the parishes of Biscay in the 1730s, although the deaths of infants remained unrecorded in most parishes until the 19th century. The result was a progressive reduction in the concealment of baptised persons and a lower volatility of the series. On the other hand, the demand for adequate training of parish priests was reflected in greater control and especially in the penalisation of practices that had been common until then: the family cohabitation of clergymen and the transmission of the curacy from parents to children as a patrimonial asset, the permissibility of extra-marital relations and the social acceptance of natural children. Furthermore, the progressive disintegration of the lay patronages favoured the presence of a clergy more aligned with the directives of the bishopric than with private interests. As a result, practices of intergenerational solidarity that allowed for the upbringing of children born out of wedlock gradually disappeared from the rural world. Women who became pregnant outside the law were no longer understood by the community, which came to see this as immoral behaviour. Consequently, many of them had no choice but to go to the city that offered the best chance of survival and where they could give birth in anonymity. Bilbao must have been the preferred destination for these women, judging by the sharp increase in exposure in the city—from 1.7% between 1650 and 1699, to 4.5% in the mid-18th century and 6% in the 19th century—and the reduction of bastardy in the rural world. In Biscay there were no foundling homes (in fact, there were none in the whole bishopric), so they were looked after by pious charities set up for this purpose. In Bilbao, it was the town council that paid for the nursing period of all the children abandoned at the door of the town's churches, with the possibility of their being fostering at the end of that period. This system provided a dignified solution for single mothers and for families who, in a situation of poverty, decided to abandon their new-born child with the possibility of recovering it in the future if it had sur-

¹⁰ This phenomenon has been measured for the later period—Police Census of 1825— through the sex ratios of children over 10 years of age who remained in the family home: 123 boys for every one hundred girls in the rural areas and 117 in the villages (Arbaiza, 1996, p. 49).

vived. In both cases, mothers had access to well-paid work as wet nurses, which was often essential for the survival of the family (Sarasúa, ed., 2021).

All these factors help to explain the stabilisation of sex ratios in the rural world at values considered as normal, and the counterpoint of Bilbao which, in the same way as other European cities, shows sex ratios below the lower limit at many points in the eighteenth century. It does not seem that this behaviour was due to differences in the survival strategies of artisan families compared to those of farmers, as argued by Hanlon (2022, pp. 62-67) and Hynes (2011) for the region of Parma. In the case of Bilbao, job opportunities did not have a clear female bias as they did in cities with a strong presence of the textile industry. Men were concentrated in activities related to trade, mining, crafts, seafaring, or shipbuilding; while women worked in stevedoring and transport, domestic service, and unskilled trades. A double factor determined the urban under-registration of children. On the one hand, the high percentage of foundlings concentrated in the city since the 18th century must have influenced the greater presence of women, since they had better survival indicators until the moment of baptism. On the other hand, gestation and the critical moments of childbirth and the hours that followed were affected by the deficient health and living conditions that prevailed in most of the world's cities and which had a negative impact on the survival of males. In fact, mortality studies conducted specifically for the province of Biscay highlight the influence that the high degree of urban concentration had on mortality levels, especially among infant deaths (González-Ugarte, 1991, p. 163; 1994). Furthermore, the networks of female support and solidarity around the woman in labour and her child must have been smaller in the urban world than in the rural world, especially when the baby could not be breastfed and there were no means to pay for a wet nurse, and the figure of "the milk brother" was frequent.

In the last third of the 19th century, the impact of industrialisation and the strong migratory influx again broke the gender balance in births, with a clear preference for males in the industrial and mining centres, which is consistent with the observations of Echávarri-Aguinaga and Beltrán-Tapia (2022) for the rest of Spain. The process of accelerated urbanisation and greater job opportunities for men eventually altered the behavioural patterns around offspring. The progressive advance of nuclear families in industrial areas and the incorporation of mothers into the labour market made it difficult to raise children, activating a selection process that favoured males from the moment of birth and, as population censuses show, throughout the first years of life. In this context, the return on the "investment" of raising a child was higher given the better prospects of finding well-paid employment in factories or mines.

In this period, we have also observed an unusual increase in the sex ratio of foundlings at the time of baptism, for which we have no explanation except that it is the effect of the founding of the foundling house. The fact that the children could be placed directly in the institution itself meant that the period of exposure to the street could be eliminated, increasing the boys' chances of survival and, with it, of being baptised.

5. Conclusions

To the initial question of whether the phenomenon of *missing girls* had an impact in Biscay, the answer must be yes, at

least until the first third of the 18th century in the rural world and in the industrial areas at the end of the 19th century.

In the early years, and in the absence of conclusive data on female over mortality in the first years of life, it can be affirmed that the preference for boys in the rural world seems to be due to an under-recording of girls in sacramental registers. This would not exclude more extreme forms of discrimination such as infanticide and/or neglect of care in early life, as is the case in other European regions (Hanlon, 2022). Indeed, as noted above, documentary under-recording implicitly implies the legal invisibility of women and could be a sign that more extreme forms of gender discrimination were also practised. In the case of Biscay, the predominance of the stem-family household must have favoured the "legal concealment" of girls by families seeking to preserve the patrimony within the male branches, helped by the scarce presence of the episcopal authority and a patrimonial clergy at the service of the rural elites. The inefficient enforcement of the annotation of the full filiation of parents and godparents on baptismal certificates facilitated the "omission" of female baptisms, although population growth in the second half of the seventeenth century seems to disprove the existence of a marked female over mortality. On the other hand, it would have to be confirmed that the cost of baptisms in the rural world was as high as that paid in Bilbao at the beginning of the 18th century, as it exceeded the weekly wage of a skilled artisan. If so, this would be a determining factor in explaining why many families, especially in tough times, did not record the baptism of their daughters – in fact, the annotations indicating that the act had been conducted at home are statistically insignificant –.

From 1730 onwards, sex ratios at birth tended to converge in the urban and rural world towards parameters considered normal, which were only altered in particularly convulsive moments – epidemics or wars – when it was easy to neglect the registration of new-borns. The gender distribution obtained from the Floridablanca census for the age cohort of children under 7 years of age does not show evidence of female discrimination either, as the values are close to parity, typical of environments with high infant mortality. Undoubtedly, the standardisation of baptismal registers contributed to regularising the administration of the sacrament and stabilising sex ratios, but this fact alone does not explain the existing differences with other inland areas of the peninsula which, by the 19th century, showed periods of high sex ratios among families in vulnerable situations, caused by neglect of care immediately after birth (Beltrán-Tapia and Marco-Gracia, 2022; Marco-Gracia and Beltrán-Tapia, 2021, 2022). In other cases, signs of concealment and/or discrimination at birth have not been found either, but a lack of girls on the death certificates has been observed (Llopis *et al.*, 2022a, 2022b, 2022c).

In the absence of further studies on the Cantabrian area to confirm this, gender balance may be a differential feature of areas with demographic models of low demographic pressure in which late marriages, a high degree of permanent celibacy and intense migration, lower birth rates than in the interior due to a high degree of permanent celibacy and intense emigration predominated. The responsibilities assumed by women during periods of male absence, together with the prevalence in the rural world of cohabitation of several generations in the same household, must have favoured the survival of girls. The absence of foundlings or illegitimate children in rural areas from the 18th century onwards confirms the existence of an under-recording of these cases, even

though most of them ended up concentrated in Bilbao. In any case, the increase in exposure refers us to a complementary strategy to control family size which was common to the whole of Europe and which fundamentally affected girls, who were abandoned to a greater extent than their brothers.

The urban world shows differential behaviour with respect to the countryside, although both end up converging from the middle of the 18th century onwards. As in other European cities, Bilbao's sex ratios were at the lower limit of the established standard, often reaching the point of under-registration of children. Overcrowding, poor sanitary conditions at the time of childbirth and a lesser network of sorority around the upbringing of the new-born must have had an influence on the lower survival of males, aggravated by the concentration of foundlings in the same place.

The balance shown by the sex ratios at the time of birth was disrupted from the 1870s onwards, when the province received a strong migratory influx from other Spanish regions to work in the iron mines and iron & steel factories. The economic transformations brought with them a change in the family structure, reducing it to the basic nucleus. This made the conditions for raising offspring more difficult, especially given the poor living conditions in the workers' dwellings and the need for all family members to work. This situation not only led to an increase in infant mortality, with the consequent reduction in life expectancy, but it also affected girls between the ages of 0 and 4, judging by the sex ratios observed in the population censuses of 1860 and 1887.

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Baptism Books. In order not to make the list too long, the localities that make up the sample (in their current nomenclature) and the year of the beginning of the series are indicated. With these data, the exact reference can be found at https://internet.aheb-beha.org/paginas/catalogacion/n_catalogo.php#buscar

Urban environment. Bilbao (1570), Abando (1680), Deusto (1620), Begoña (1660).

Rural environment (towns): Durango (1550), Elorrio (1550), Orozko-Murueta (1560), Markina-Xemein (1580), Balmaseda (1550).

Rural environment (inland): Zeanuri (1610), Gordexola (1560), Güeñes (1590), Zeberio (1550), Erandio (1620), Otxandiano (1550), Galdames (1570), Etxebarria (1610), Iurreta (1600), Izurtza (1650), Mañaria (1570), Zaldibar (1590), Areatza (1620), Ugao-Miravalles (1620), Artea (1620), Galdakao (1590), Igorre (1610), Lemoa (1570),

Ubidea (1690), Zamudio (1550), Sondica (1580), Lezama (1550), Loiu (1660), Larrabezu (1610), Leioa (1690), Fruniz (1620), Gamiz-Fika (1620), Gatika (1620), Derio (1640), Arrieta (1560), Kortezubi (1620), Morga (1630), Arratzu (1560), Ereño (1600), Errigoiti (1580), Narbarniz (1590), Alonsotegi (1660), Arrigorriaga (1550), Basauri (1680), Etxebarri (1670), Ziortza (1550), Mallabia (1590), Ermua (1580), Munitibar (1550), Berriatua (1570), Amoroito (1600), Abanto-Zierbena-Gallarta (1610), San Salvador del Valle-La Arboleda (1620).

Rural environment (coast): Getxo (1630), Lekeitio (1580), Ondarroa (1580), Aulesti (1620), Ibarrangelu (1640), Ea-Bedaronna-Natxitua-Elantxobe (1660), Sopelana (1610), Urduliz (1650), Plentzia (1590), Lemoiz (1590), Gorliz (1610), Bakio-San Pelayo (1580), Barrika (1650), Berango (1650), Busturia-Axpe (1590), Gautegiz de Artea (1600), Mundaka (1610), Guizaburuaga (1670), Ispaster (1600), Mendexa (1640).

Synodal Constitutions

Constituciones Sinodales antiguas y modernas del Obispado de Calahorra y La Calzada reconocidas, reformadas y aumentadas novísimamente por el ilustrísimo Señor Don Pedro de Lepe, obispo de este obispado [...] en el sínodo diocesano que se celebró en la ciudad de Logroño en el año de mil y seiscientos y noventa y ocho. AHEB-BEHA/F006.080(0352/002-00).

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