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# Missing girls in Liberal Italy, 1861–1921

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## Abstract

By relying on the number of (surviving) boys per hundred girls observed in the population censuses as a cumulative measure of differential mortality during birth, infancy, and childhood, this paper shows that average Italian child sex ratios (aged 0–4) were abnormally high between 1861 and 1921. Our estimations indicate that unexplained excess female mortality resulted in around 2–3 per cent of ‘missing girls’ during this period. Likewise, by constructing a new dataset on child sex ratios at the provincial level during the same period, this article shows that child sex ratios tended to be higher in Southern Italy, a geographical cleavage that became stronger as time went by. Crucially, the results reported here cannot be explained by registration issues because (1) the analysis holds if we focus on the sex ratios of older children (aged 5–9) and (2) these patterns are also clearly visible using death registers. Unexplained excess female mortality early in life disappeared from the 1920s onwards, thus suggesting that either discriminatory practices gradually vanished and/or that they no longer translated into higher mortality rates due to enhanced living standards.

## KEYWORDS

gender discrimination, Italy, mortality, neglect, sex ratios

## JEL CLASSIFICATION

N3, J16, I12

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While the social and economic status of women in Italy has improved in recent decades, this country still has one of the lowest female labour force participation rates in the Organisation for Economic Co-operation and Development (OECD), and women's work is poorly remunerated – especially compared with other countries in the European Union.<sup>1</sup> Likewise, significant gender gaps are visible in managerial ranks and the political arena.<sup>2</sup> There are, however, striking regional disparities, and women's relative status is particularly impaired in Southern Italy.<sup>3</sup> Although ethnographic and anthropological accounts stress the continuities and changes that took place after the Second World War,<sup>4</sup> inherited cultural norms, especially those arising from religious values, have played a crucial role in limiting the involvement of women in Italian society.<sup>5</sup> In this regard, family monographs from the 1930s depict a rigid division of labour by sex.<sup>6</sup> We have, however, very little evidence on the long-term evolution and regional disparities of women's status in Italy.<sup>7</sup>

This article focuses on the possibility that gender discriminatory practices affected female mortality rates early in life. Female neglect tends to go hand in hand with a marked preference for sons, especially in agricultural societies. There is indeed some evidence indicating that sons were more valued than daughters in nineteenth- and early twentieth-century Italy due to their higher economic utility. Between 1819 and 1859, sharecroppers in Casalguidi (Tuscany) tended to favour large families to secure male labour and especially a male heir.<sup>8</sup> Qualitative evidence compiled in rural areas in the 1930s sometimes indicated that newborn girls were not welcome, because while they consumed household resources, their labour was employed somewhere else when they married.<sup>9</sup> Indeed, patrilocal arrangements, found in many Italian regions, also meant that daughters were not expected to take care of their parents in old age. Likewise, the pervasive dowry system meant that daughters imposed an additional burden on family resources.<sup>10</sup>

Accounts of son preference linked to patriarchal dimensions are also present in the ethnographic and anthropological literature written on Italy. A study from a small town in central Italy after the Second World War, for instance, reports that while news of a boy was greeted with jubilation, the birth of a girl brought a more subdued response.<sup>11</sup> Similarly, parents in Southern Italy did not consider daughters as children but as burdens, both because of the dowry and the fact that the longer they remained unmarried the more concerned the parents became about their potential lost virginity and the consequent damage to family honour.<sup>12</sup> Even more extreme is the

<sup>1</sup> OECD, *The pursuit of gender equality*; Mancini, 'Women's labour force participation'.

<sup>2</sup> Bozzano, 'Assessing gender inequality.'

<sup>3</sup> Bozzano, 'On the historical roots', p. 29.

<sup>4</sup> Levi, *Christ stopped at Eboli*; Cornelisen, *Women of the shadows*; Schneider and Schneider, *Festival of the poor*.

<sup>5</sup> Bozzano, 'On the historical roots'.

<sup>6</sup> Mancini, 'Breadwinner, breadmaker'.

<sup>7</sup> On these issues, see Mancini, 'Women's labor force participation'.

<sup>8</sup> Manfredini et al., 'Son preference'. Likewise, illegitimate boys had considerable higher chances of being legally recognized later, at least until the early 1900s (Pinelli and Mancini, 'Gender mortality differences', p. 84).

<sup>9</sup> Mancini, 'Breadwinner, breadmaker'.

<sup>10</sup> Kertzer, *Sacrificed for honor*, p. 9. On the dowry system in Italy, see Brettel, 'Property'.

<sup>11</sup> Silverman, *Three bells*, p. 186. Also in Berkowitz, 'Familism', p. 88. Proverbs also convey similar attitudes: 'Boy: one builds a house, girl: the house falls down' (in Galt 1992, *Town and country*, p. 44).

<sup>12</sup> Schneider and Schneider, *Culture*, pp. 89–90; Galt, 'Marital property', p. 312.



following Sicilian proverb: ‘Blessed is the door out of which goes a dead daughter’.<sup>13</sup> It is indeed very telling that a common toast to the spouses on their wedding day was – and to some extent still is – ‘*Auguri e figli maschi*’, which wishes them ‘happiness and sons’.

These arguments very much resemble those present in developing countries today.<sup>14</sup> It is puzzling that these issues have received little attention despite the fact that many regions in Southern Europe exhibited patriarchal features that have been associated with the phenomenon of missing girls in Southeast Asia – such as patrilocality, dowry systems, strong kin ties, and rigid gender segregation, among others.<sup>15</sup> However, a recent wave of studies has suggested that the inferior status of women in Southern European countries resulted in female neglect during infancy and childhood and unduly increased female mortality early in life.<sup>16</sup> Gender discrimination seems to have occurred both right after birth and as soon as infants were weaned and started competing for familial resources.<sup>17</sup> These results are more visible in higher birth orders and in resource-constrained families, thus suggesting that in patriarchal societies, economic considerations played an important role in activating female neglect early in life. Within Southern Europe, the Greek case stands out as especially dramatic since more than 5 per cent of girls went ‘missing’ there between 1861 and 1920.<sup>18</sup>

Despite the abundant material suggesting that Italian parents may have treated their sons and daughters differently, the hypothesis that Italian girls suffered from an inflated mortality around birth, infancy, and/or early childhood has hardly been explored explicitly. Interestingly, analyses of large samples of birth and death records from different locations in Northern Italy during the nineteenth and early twentieth centuries do not find significant sex differences in the probability of dying during the first months of life.<sup>19</sup> This result clashes with the well-known fact that more boys than girls normally die during infancy due to the male biological vulnerability.<sup>20</sup> In addition, the fact that excess female mortality at ages 1–4 is clearly visible both in the country-level statistics

<sup>13</sup> Chapman, *Milocca*, p. 30.

<sup>14</sup> Sen, ‘More than 100 million women’; Das Gupta et al., ‘Why is son preference’; Attané and Guilamoto, *Watering*; Jayachandran, ‘The roots’. For a more detailed comparison between historical Europe and Asia nowadays, see also Das Gupta, ‘What hypotheses’ and Guilamoto, ‘What can Europe’s history’.

<sup>15</sup> Beltrán Tapia and Szołtysek, ‘Missing girls’.

<sup>16</sup> Beltrán Tapia and Gallego-Martínez, ‘Where are the missing girls?’; Beltrán Tapia, ‘Sex ratios’; Szołtysek et al., ‘Inferring missing girls’. These studies challenge the notion that there were no missing girls in historical Europe (Lynch, ‘Why’) and build on previous research by Tabutin, ‘La surmortalité’; Johansson, ‘Deferred infanticide’; Tabutin and Willems, ‘Differential mortality’; or McNay et al., ‘Excess female mortality’. A related strand of the literature that uses heights or household expenditures argues that girls were discriminated in the allocation of resources within families (Baten and Murray, ‘Heights’; Horrell and Oxley, ‘Gender bias’). Results on gender discrimination seem to be quite context dependent. Indeed, a number of studies focusing on Northern Europe and the United States do not find such patterns (Harris, ‘Gender’; Saaritsa and Kaihovaara, ‘Good for girls’; Hinde, ‘Sex differentials’; Saaritsa, ‘Forever gender equal’; Goldin and Lleras-Muney, ‘XX>YY’).

<sup>17</sup> Beltrán Tapia and Marco-Gracia, ‘Death’; Marco-Gracia and Beltrán Tapia, ‘Son preference’; Echavarrí and Beltrán Tapia, ‘Economic development’.

<sup>18</sup> Beltrán Tapia and Raftakis, ‘Sex ratios’.

<sup>19</sup> Breschi et al., ‘Infant mortality’, pp. 473–84; Scalone et al., ‘Exploring’, p. 35; Minello et al., ‘The growing number’, pp. 204–6. Dalla-Zuanna et al., *Sweet child*, p. 66, also notice that, compared with other European countries, the male disadvantage during infancy in their area of study (Veneto, 1815–1870) is very small. On differences in sex-specific mortality rates in nineteenth-century Italy see also, among the others, Caselli et al., ‘Mortality’; Corsini and Viazzo, *The decline*; Pozzi, *La lotta*; Breschi and Pozzi, eds., *The determinants*; Fornasin and Breschi, ‘La mortalità’.

<sup>20</sup> Drevenstedt et al., ‘The rise and fall’; Zarulli et al., ‘Women’.



and in studies using large individual-level samples is not usually addressed, despite the fact that the biological advantage of females should continue during early childhood.<sup>21</sup> The above results therefore suggest that gender discriminatory practices might have been at play.

Other studies have nonetheless explicitly considered the existence of discriminatory practices. Baptismal records and *status animarum* ('state of souls') suggest that female infanticide could have been relatively prevalent in Italy during the sixteenth to eighteenth centuries, especially under difficult circumstances.<sup>22</sup> Likewise, parents in nineteenth-century Venice neglected female infants more than male infants, either overtly or covertly, an issue that was particularly prominent in resource-constrained families.<sup>23</sup> It is in fact well known that some Italian regions abandoned more girls than boys, especially before 1850 and in areas where foundling homes allowed the abandonment of legitimate children.<sup>24</sup> Similarly, complex families seem to have been especially detrimental to girls' health during the first years of life.<sup>25</sup> The patrilocal and patrilineal nature of these families, many under sharecropping contracts that strongly relied on male labour, decreased female survival chances, especially in early childhood. Indeed, Pinnelli and Mancini argue that an unequal allocation of care and nutrition played a crucial role in explaining sex-specific mortality differences early in life, at least until the 1920s.<sup>26</sup> According to these authors, deep structural transformations improved women's status from then onwards which, in turn, led to changes in sociocultural practices that benefitted girls' overall living conditions.<sup>27</sup>

Relying on population censuses, this article stresses the existence of an excess of male children in the second half of the nineteenth century and the early twentieth century. Child sex ratios – defined as the number of males per hundred females aged 0–4 – provide a cumulative measure of neonatal, infant, and child mortality and therefore allow for the detection of patterns of female neglect. Comparing the observed sex ratios with what would be expected according to the mortality environment suggests that around 2–3 per cent of girls went 'missing' during this period: these girls died due to neglect right after birth and/or due to differential treatment in terms of food and care during infancy and childhood. Crucially, this excess female mortality is also visible using death statistics, which rules out the possibility that our results are driven by registration issues with the censuses: while female under-registration would bias child sex ratios upwards, it would also underestimate female mortality rates. Although the importance of this phenomenon is not as dramatic as in Greece,<sup>28</sup> these numbers are far from negligible and conform with what has

<sup>21</sup> Alter et al., 'Gender differences', p. 334; Oris et al., 'Infant and child mortality', p. 366; Dalla-Zuanna et al. *Sweet child*, pp. 66–7.

<sup>22</sup> Hynes, 'Routine infanticide'; Hanlon, 'Routine infanticide'. Although data from baptismal records, population counts, and cemeteries point to an excess of males in medieval Italy, the nature of the sources does not allow for strong conclusions to be derived regarding whether women's invisibility is due to under-registration or neglect (Herlihy and Klapisch-Zuber, *Tuscans*; Barbiera, 'Il mistero'; Barbiera et al., 'Missing women').

<sup>23</sup> Derosas, 'Watch out', p. 126; idem, 'Suspicious deaths'.

<sup>24</sup> Corsini, *Breastfeeding*; Hunecke, 'Intensità'; Kertzer, *Sacrificed for honor*, pp. 110–2; Da Molin, *Nati*; idem, *Bambini*. Son preference also seems to apply to the likelihood of adopting those foundlings later on (Kertzer, *Sacrificed for honor*, p. 112).

<sup>25</sup> Manfredini et al., 'Son preference'.

<sup>26</sup> Pinnelli and Mancini, 'Gender mortality differences'.

<sup>27</sup> Recently, Mancini, 'Breadwinner', shows that women worked as much (or even more) as men but commanded a lower share of total household income in the 1930s. An analysis of household nutrition and expenditures suggest that perhaps young girls were somewhat discriminated in the allocation of household resources, but the analysis is not conclusive. In addition to issues of how representative these biographies are from the rural population and especially the bottom part of the population, it should be acknowledged that the South is under-represented.

<sup>28</sup> Beltrán Tapia and Raftakis, 'Sex ratios'.



been observed in nineteenth-century Spain.<sup>29</sup> Lastly, this article also uncovers significant regional patterns, both in levels and in their trajectories over time. In this regard, while excess female mortality declined in the Northern provinces during the period of study, child sex ratios in the South remained relatively high at least until 1921.

Apart from incorporating Italy into the wider issue of missing girls in historical Europe,<sup>30</sup> these results imply that the relative changes in male and female mortality rates during infancy and childhood that took place during the epidemiological transition are partly explained by changes in parental practices.<sup>31</sup> While the increase in the female advantage in life expectancy that started in the late nineteenth and early twentieth centuries has been associated with the reduction in infectious diseases as a major cause of death,<sup>32</sup> our research suggests that the biological female advantage was less visible in the nineteenth century because it was constrained by existing discriminatory practices in infancy and childhood. The gradual fading of these practices would have therefore contributed to explaining the improvements in female health in regions where son preference penalized girls. The experience of Southern Europe fits this pattern as the improvement in female labour opportunities (and subsequently the status of girls) during this period has been linked to a reduction in the relative mortality rates of female infants and girls.<sup>33</sup>

Likewise, this article also contributes to capturing the influence of sociocultural factors on infant and child mortality in Italy. As Breschi et al. acknowledge, this mechanism is often mentioned but rarely measured.<sup>34</sup> Recent research, however, has started filling this gap. Analysing, for instance, the life histories of almost 34 000 births in the Veneto region between 1816 and 1865, Minello et al. show that the number of given names is positively associated with the probability of surviving the first months of life. The authors argue that this measure captures the investments that parents tend to make in the child and the relative level of attention and care given to them.<sup>35</sup> Similarly, Derosas refers to ‘suspicious’ or ‘avoidable’ deaths and argues that parental neglect partly explains the extremely high mortality rates during birth, infancy, and childhood observed in some Italian regions.<sup>36</sup> Our article follows this trend by considering the possibility that gender discriminatory practices, reflecting the perceived relative value of boys and girls, influenced their respective survival chances.

Lastly, our findings are not only important because they bring to light veiled patterns of gender discrimination, but also because they open up the possibility of further linking gender inequality and Italian economic development. According to recent literature, the prevailing attitudes towards girls have historically affected women’s education, fertility rates, and female participation in the labour market.<sup>37</sup> Other authors also stress how gender inequality may even influence

<sup>29</sup> Beltrán Tapia and Gallego-Martínez, ‘Where are the missing girls?’; Beltrán Tapia, ‘Sex ratios’.

<sup>30</sup> Beltrán Tapia and Szoltysek, ‘Missing girls’.

<sup>31</sup> On differences between male and female mortality rates early in life, see also Waldron, ‘Sex differences’; Sawyer, ‘Child mortality’; Costa et al., ‘Gender bias’.

<sup>32</sup> Hinde, ‘Sex differentials’; Goldin and Lleras-Muney, ‘XX>YY’.

<sup>33</sup> Pinnelli and Mancini, ‘Gender mortality differences’; Beneito and García-Gómez, ‘Gender gaps’.

<sup>34</sup> Breschi et al., ‘Mortality’, p. 212.

<sup>35</sup> Minello et al., ‘The growing number’.

<sup>36</sup> Derosas, ‘Watch out’, p. 126; idem, ‘Suspicious deaths’.

<sup>37</sup> Dilli et al., ‘Achieving’; Carmichael et al., ‘Introduction’. See also De Moor and Van Zanden, ‘Girl power’; Foreman-Peck, ‘The Western’; Humphries and Sarasúa, ‘Off the record’; Dennison and Ogilvie, ‘Does the European marriage’; eadem, ‘Institutions’; Szoltysek and Poniati, ‘Historical family systems’; De Pleijt and Van Zanden, ‘Two worlds’; or Baten and De Pleijt, ‘Girl power’, among others.

social stability and crime rates.<sup>38</sup> Although several features have been linked to the long-term evolution of Italian economic development, both in terms of its relative decline compared with other advanced economies and the persistence of a clear regional divide,<sup>39</sup> the potential role played by gender inequality has been mostly neglected. Given that the importance of gender inequality can be proxied by the intensity of female neglect, the trajectories depicted here using child sex ratios, both at the national and regional levels, may carry important implications for the analysis of Italian economic development over the long run.<sup>40</sup>

## I | SEX RATIOS AT BIRTH, INFANCY, AND CHILDHOOD IN ITALY

The potential effect of gender discriminatory practices on the relative mortality of males and females should theoretically be visible in the relative number of boys and girls observed in birth statistics and population censuses.<sup>41</sup> However, a comprehensive analysis of sex ratios has not yet been carried out for Liberal Italy (1861–1921).<sup>42</sup> This section analyses sex ratios at birth, infancy, and childhood in Italy from the Unification to the beginning of the twenty-first century to investigate whether – and to what extent – discriminatory practices linked to gender were taking place and how they changed over time.

The ratio of male to female births is relatively regular, at least in large populations. In most high-income countries today, the sex ratio at birth revolves around 105–106 boys per 100 girls.<sup>43</sup> Figure 1 compares the Italian sex ratios at birth with those of other European countries between 1750 and 2015. While the Italian experience mostly conforms to the general international pattern, the figures in the second half of the nineteenth century were slightly elevated, averaging 106.3 boys per 100 girls between 1862 and 1890 (with a maximum of 107.1 in 1869).<sup>44</sup>

Although not excessively distorted, these numbers suggest the possibility that a small fraction of girls could have been neglected around birth during the second half of the nineteenth century. Notice also that, although the literature normally uses 105–106 as the expected sex ratio at birth, we have very little evidence of what the historical figure in absence of human manipulation should be.<sup>45</sup> Nevertheless, we know that the probability of miscarriages is high in the high-mortality

<sup>38</sup> Hesketh and Xing, 'Abnormal sex ratios'; Edlun et al., 'Sex ratios and crime'.

<sup>39</sup> While one strand of the literature stresses that social and institutional features did not promote human capital, innovation, and technological progress (Felice and Vasta, 'Passive modernization?'; Colli and Rinaldi, 'Institutions'; Nuvolari and Vasta, 'The ghost'; Cappelli, 'One size'; Federico et al., 'The origins'; Cappelli and Vasta, 'Can school centralization?'), other contributions focus on the role played by geography and market access (A'Hearn and Venables, 'Regional disparities'; Basile and Ciccirelli, 'The location'; Missiaia, 'Market'). Scholars have also stressed the importance of informal institutions, including social capital and generalized trust, on limiting economic performance (Felice, 'Regional'; Di Martino et al., 'A tale').

<sup>40</sup> Interestingly, female labour market participation rates show diverging regional trends (Mancini, 'Women's labor'), a feature that is likely to have limited labour productivity in some regions (Cappelli et al., 'Divergence').

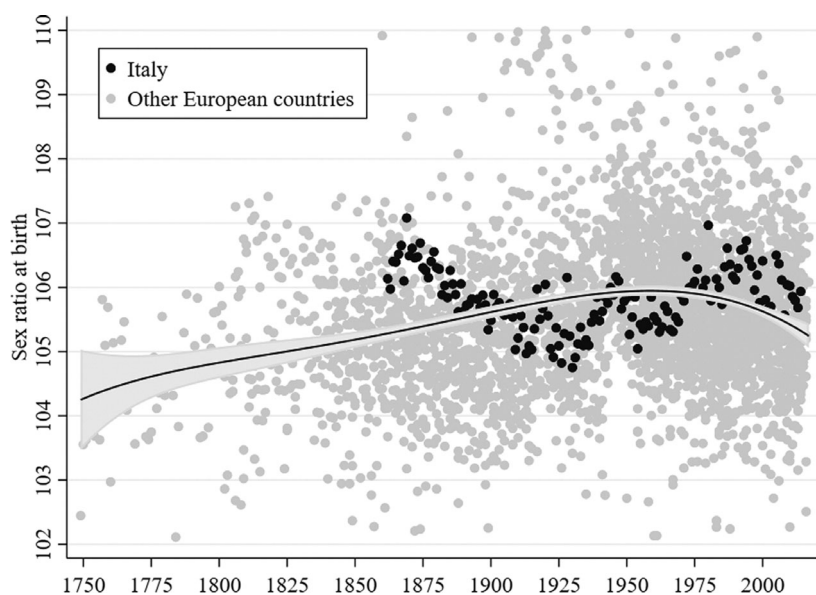
<sup>41</sup> Sen, 'More than 100 million women'; Klasen and Wink, 'Missing women'; Das Gupta et al., 'Why is son preference?'; Attané and Guilamoto, *Watering*; Jayachandran, 'Fertility decline'.

<sup>42</sup> Although A'Hearn and Ciccirelli, 'Literacy', show the existence of a North–South gradient on child sex ratios (aged 0–4) in 1911, these authors do not explore the nature of these regional differences.

<sup>43</sup> Hesketh and Xing, 'Abnormal sex ratios'; Chao et al., 'Systematic assessment'.

<sup>44</sup> See also Rettaroli and Scalone, 'The human sex ratio', who analyse the evolution of Italian sex ratios at birth from 1910 onwards.

<sup>45</sup> Visaria, 'Sex ratio'; Chahnazarian, 'Determinants'; Beltrán Tapia and Szoltysek, 'Missing girls'.



**FIGURE 1** Sex ratios at birth in Italy and Europe, 1750–2015. *Note:* The coverage varies by country: Austria (1871–2017), Belgium (1840–2017), Bulgaria (1947–2010), Croatia (2001–16), Czechia (1947–2016), Denmark (1835–2016), East Germany (1946–89), England & Wales (1841–2016), Estonia (1959–2014), Finland (1865–2015), France (1806–2016), Germany (1946–2015), Greece (1860–2004), Hungary (1950–2014), Ireland (1950–2014), Italy (1862–2014), Latvia (1959–2014), Lithuania (1959–2014), the Netherlands (1850–2016), Norway (1801–2014), Poland (1958–2016), Portugal (1886–2015), Russia (1959–2014), Scotland (1855–2016), Spain (1858–2017), Slovakia (1950–2014), Slovenia (1954–2014), Sweden (1749–2016), Switzerland (1871–2016), and Ukraine (1959–2013). The fitting line is estimated using a fractional polynomial. *Source:* Human Mortality Database (HMD).

environments existing in the past and males are biologically more vulnerable than females to strenuous contexts.<sup>46</sup> This hypothesis is indeed clearly visible in the Italian case: while the number of male stillbirths significantly exceeded that of females during the first decades of the twentieth century, this gap declined over time, and especially so from the 1950s onwards.<sup>47</sup> If more male foetuses were dying before birth, the expected sex ratio at birth should therefore be lower in the past compared with today. The exercise plotted in figure 1 indeed suggests that this was the case, thus further suggesting that the relatively high sex ratios at birth observed in nineteenth-century Italy definitely depart from what should be expected.<sup>48</sup> Recent research also argues that girls were

<sup>46</sup> Woods, *Death before birth*. The mechanisms behind the higher vulnerability of male foetuses are still largely unknown (Di Renzo et al., ‘Does fetal sex’; Dipietro and Voegtline, ‘The gestational’). As well as in perinatal and neonatal mortality, the female biological advantage continues through infancy and childhood (Waldron, ‘Sex differences’; Drenstedt et al., ‘The rise’; Peacock et al., ‘Neonatal’; Peelen et al., ‘Impact’; Zarulli et al., ‘Women’).

<sup>47</sup> Rettaroli and Scalone, ‘The human sex ratio’, p. 183. Regression analyses further confirm that late foetal mortality, associated with a higher proportion of males among stillborns, is negatively linked to the sex ratio at birth.

<sup>48</sup> The average sex ratios at birth plotted in figure 1 should be considered a maximum threshold of what this figure should look like in the past because it is based on what is observed, thus potentially including observations from countries where female infants were actually being neglected. It is true nonetheless that this estimation is based on a limited number of countries before 1850. Studying Scandinavian countries, Fellman and Eriksson, ‘Temporal trends’, indeed show that sex ratios at birth were lower during the second half of the eighteenth century and the early nineteenth century and rose steadily between then and the 1950s.



neglected around birth in other areas of Southern Europe during the nineteenth century, notably in Greece.<sup>49</sup>

It is important to note that one should be cautious about the reliability of these early demographic reports.<sup>50</sup> Although the new Italian state started to systematically collect birth, death, and marriage statistics in the early 1860s, the new institutional setting might have temporarily produced some errors in the vital statistics since counting and revisions happened locally and were therefore prone to suffer from the administrators' low skills, particularly in remote rural and Southern Italy.<sup>51</sup> These errors became marginal from 1883 onwards, when all the revision procedures were centralized.<sup>52</sup> Likewise, there was some confusion regarding the definition of live births, which probably led to an overestimation of stillbirths before 1910.<sup>53</sup> Despite this, the male vulnerability implies that the sex ratio at birth should have been even higher if these stillbirths had been counted as live births. There is therefore room to hypothesize that Italian families could have neglected a fraction of female infants.

Population censuses offer an alternative way of looking at sex ratios. On the one hand, it is a completely different source, so the registration process is different and, therefore, it does not necessarily suffer from the limitations of vital statistics. On the other hand, by analysing the number of surviving boys and girls at different ages, censuses allow for assessing whether discriminatory practices may have affected female mortality rates during infancy and childhood, instead of just at birth.

As already discussed regarding sex ratios at birth, it is key to note that child sex ratios in the past cannot be directly compared with contemporary ones. The number of surviving children at different ages is affected by the prevailing mortality rates. Due to male vulnerability, harsher environments are damaging to boys, which result in more boys than girls dying, especially during the first year of life.<sup>54</sup> High-mortality environments therefore automatically translate into lower sex ratios in infancy and childhood. Figure 2 follows previous research and plots infant mortality rates and child sex ratios (ages 0–4) in 25 European countries between 1750 and 2001.<sup>55</sup> This exercise clearly confirms that child sex ratios were lower in the past. The fitting line can indeed be considered an estimation of what the child sex ratio should look like in the absence of gender discriminatory practices inflating female mortality, that is, what we refer to as the predicted sex ratio.<sup>56</sup> In particular, infant mortality rates around 200 deaths per 1000 live births or higher, as

<sup>49</sup> Beltrán Tapia and Marco-Gracia, 'Death'; Beltrán Tapia and Raftakis, 'Sex ratios'.

<sup>50</sup> Breschi et al., 'The Sardinian experience'.

<sup>51</sup> Favero, *Le misure*; Ministero di Agricoltura, Industria e Commercio, *Movimento dello stato civile nell'anno 1862*. The local authorities in charge of collecting vital statistics data varied among regions, from priests to mayors (Ministero di Agricoltura, Industria e Commercio, 1864: VIII). In 1866, the procedures were eventually harmonized among all pre-unification states, including the recently annexed Veneto (but still excluding Rome and Lazio). From then onwards, in every municipality, the mayor was in charge of collecting and sending vital statistics to the central statistical office, although no revision from the central authority was carried out at that time (Ministero di Agricoltura, Industria e Commercio, *Movimento dello stato civile nell'anno 1866*). The civil registry (*anagrafe*), supposedly in charge of residence-related data, was yet to be fully established in the 1860s. Therefore, vital statistics kept being labelled *Movimento dello stato civile*, instead of *Movimento della popolazione*, since reliable residence and migration figures could not be published.

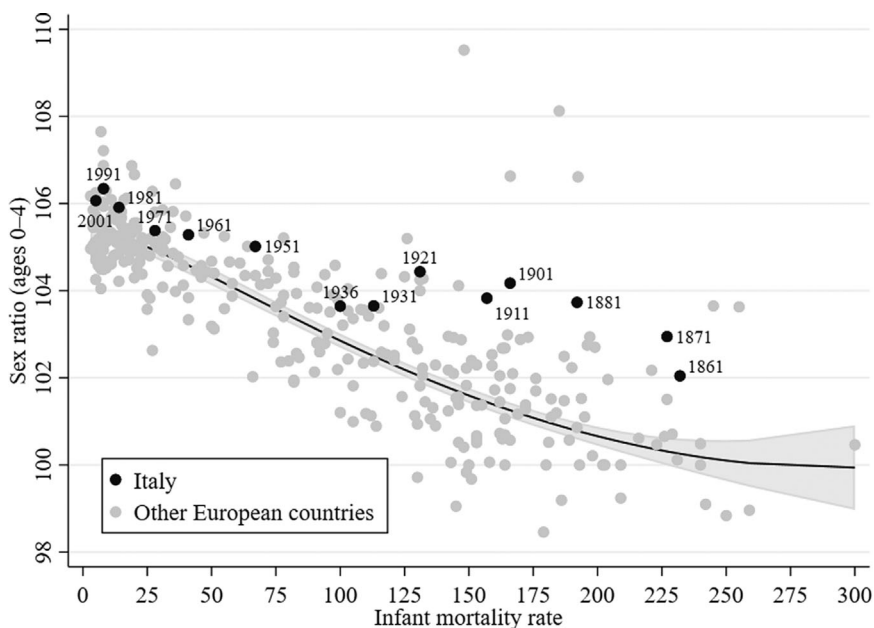
<sup>52</sup> Ministero di Agricoltura, Industria e Commercio, *Movimento dello stato civile. Anno XXII. – 1883*.

<sup>53</sup> Pozzi, *La lotta*.

<sup>54</sup> Drevenstedt et al., 'The rise'.

<sup>55</sup> Beltrán Tapia, 'Sex ratios'; Beltrán Tapia and Szoltysek, 'Missing girls'.

<sup>56</sup> Given that there is evidence of gender discriminatory practices inflating female mortality in Southern Europe (Beltrán Tapia and Gallego-Martínez, 'Where are the missing girls?'; Beltrán Tapia and Raftakis, 'Sex ratios'), the estimation of the



**FIGURE 2** Child sex ratios (ages 0–4) in Italy and Europe 1750–2015. *Note:* The coverage varies by country: Austria (1869–2001), Belgium (1846–2001), Bulgaria (1880–2001), Czechia (1921–1990), Denmark (1845–2001), East Germany (1946–81), England & Wales (1841–2001), Finland (1751–2001), France (1740–2001), Germany (1871–2001), Greece (1870–2001), Hungary (1869–2001), Ireland (1841–2001), Italy (1861–2001), the Netherlands (1840–2001), Norway (1801–2001), Poland (1921–2001), Portugal (1864–2001), Romania (1899–2001), Russia (1897–2001), Scotland (1841–2001), Spain (1787–2001), Sweden (1751–2001), Switzerland (1860–2001), and Yugoslavia (1890–1990). The fitting line is estimated using a fractional polynomial, and represents the predicted sex ratio based on the prevalent infant mortality rates. Child sex ratios tended to be higher in Southern and Eastern Europe (see Beltrán Tapia, ‘Sex ratios’). The most extreme figures are found in Greece (Beltrán Tapia and Raftakis, ‘Sex ratios’). *Source:* Beltrán Tapia, ‘Sex ratios’ and Mitchell, *International historical statistics*.

those existing in Italy during most part of the nineteenth century (see table 1),<sup>57</sup> would be compatible with child sex ratios around 100–101 boys per 100 girls. Compared with the benchmark depicted in figure 2, the relative number of surviving boys reported in the Italian population censuses is much higher than expected, at least until 1921. Although these figures are not as extreme as those found in Greece during the same period,<sup>58</sup> they nonetheless suggest that excess female mortality was higher than it should have been.

It is sometimes argued that female under-registration may explain relatively high child sex ratios.<sup>59</sup> In this regard, infants sometimes tended to be under-enumerated in historical censuses

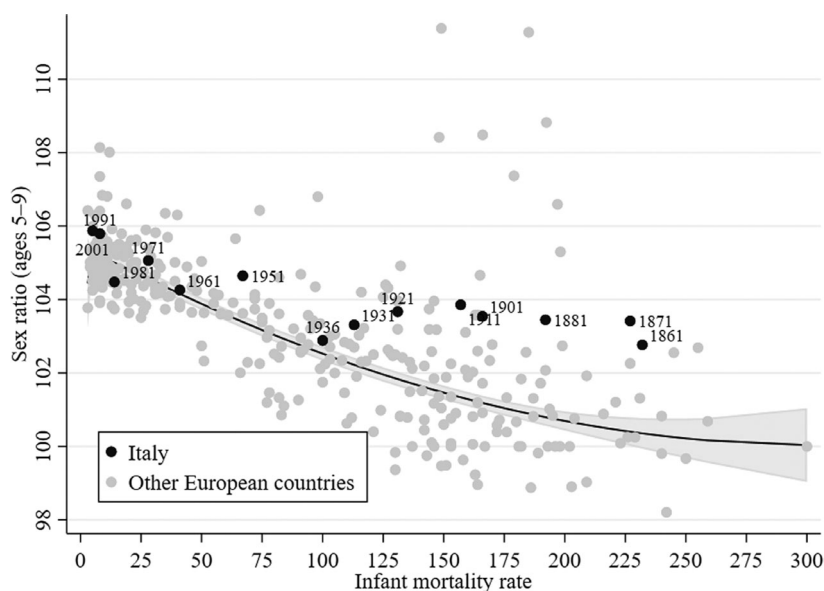
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fitting line excludes those countries (see also Beltrán Tapia and Szołtysek, ‘Missing girls’). Notice that such a benchmark might be overestimated because it is computed using the observed sex ratios. If some of those countries were treating boys and girls differently (to the extent of increasing female mortality rates early in life), their ‘natural’ child sex ratios would have been even lower (Beltrán Tapia, ‘Sex ratios’, pp. 5–6).

<sup>57</sup> On Italian infant and child mortality during the period of study, see Del Panta, ‘Infant and child mortality’, Pinnelli and Mancini, ‘Gender mortality differences’, Breschi et al., ‘Infant mortality.’

<sup>58</sup> Beltrán Tapia and Raftakis, ‘Sex ratios’.

<sup>59</sup> See Beltrán Tapia and Szołtysek, ‘Missing girls’.



**FIGURE 3** Child sex ratios (ages 5–9) in Italy and Europe 1750–2015. *Note:* The coverage varies by country: Austria (1869–2001), Belgium (1846–2001), Bulgaria (1880–2001), Czechia (1921–1990), Denmark (1845–2001), East Germany (1946–81), England & Wales (1841–2001), Finland (1751–2001), France (1740–2001), Germany (1871–2001), Greece (1860–2001), Hungary (1869–2001), Ireland (1841–2001), Italy (1861–2001), the Netherlands (1840–2001), Norway (1801–2001), Poland (1921–2001), Portugal (1864–2001), Romania (1899–2001), Russia (1897–2001), Scotland (1841–2001), Spain (1787–2001), Sweden (1751–2001), Switzerland (1860–2001), and Yugoslavia (1890–1990). The fitting line is estimated using a fractional polynomial. *Source:* Beltrán Tapia, ‘Sex ratios’ and Mitchell, *International historical statistics*.

and it is therefore plausible that females were more likely to be omitted given the prevailing attitudes towards women and girls. Yet, it should be mentioned that there were no particular incentives to under-register girls in nineteenth-century Italy.<sup>60</sup> The enumeration was carried out by local committees that visited each household and collected information on all individuals living there. The administrative procedures followed to collect census data from households during the nineteenth and early twentieth centuries were not so different from today’s.<sup>61</sup> Moreover, it is worth noting that, although census figures before 1881 might have suffered from some (minor) measurement bias, the centralization of the enumeration procedures which started then brought about a growing role of the central statistical offices, thus reducing the chance of errors introduced in the data-gathering process carried out by the municipalities.<sup>62</sup> In addition, under-registration mostly affected infants, so even if more female infants escaped enumeration, they should appear in the censuses as they grew up. Older age groups should therefore be less prone to this issue and lower sex ratios would then be expected. Replicating the previous exercise using the relative number of boys and girls in the 5–9 age group (figure 3) hardly alters the picture provided using

<sup>60</sup> In fact, it can be argued that families had more incentives to under-register boys so they were not conscripted later on. On the attitudes towards conscription in Italy during this period, see *Rovinello*, ‘The draft’.

<sup>61</sup> Likewise, the period prior to 1922 did not suffer from top-down control for propaganda purposes that characterized the subsequent Fascist period during Mussolini’s rule (*Gallo and Paluzzi*, ‘Le trasformazioni’, pp. 40–7).

<sup>62</sup> *Gallo and Paluzzi*, ‘Le trasformazioni’.

**TABLE 1** Missing girls in Italy, 1861–2001.

Year	Infant mortality	Observed sex ratios		Predicted sex ratios		Missing girls	
		Age 0–4	Age 5–9	Age 0–4	Age 5–9	Age 0–4	Age 5–9
1861	232	102.0	102.8	100.3	100.3	1.8	2.4
1871	227	102.9	103.4	100.3	100.4	2.6	3.0
1881	192	103.7	103.4	100.8	100.8	2.9	2.6
1901	166	104.2	103.5	101.3	101.2	2.9	2.4
1911	157	103.8	103.9	101.4	101.3	2.4	2.5
1921	131	104.4	103.7	102.0	101.8	2.4	1.8
1931	113	103.7	103.3	102.5	102.2	1.2	1.1
1936	100	103.6	102.9	102.9	102.5	0.8	0.4
1951	67	105.0	104.6	103.8	103.4	1.2	1.3
1961	41	105.3	104.3	104.6	104.2	0.7	0.1
1971	28	105.4	105.1	104.9	104.6	0.5	0.5
1981	14	105.9	104.5	105.2	105.0	0.7	–0.5
1991	8	106.3	105.8	105.2	105.1	1.1	0.7
2001	5	106.1	105.9	105.2	105.0	0.9	0.9

*Note:* Sex ratios refer to the number of boys per hundred girls. The predicted sex ratios are estimated on the basis of the association between infant mortality rates (infant deaths per thousand live births) and child sex ratios in 25 European countries between 1750 and 2001 – see fitting line in figures 2, 3. The missing girls are computed as the difference between observed and predicted sex ratios in each age group and can therefore be interpreted as the percentage of girls that are ‘missing’. The relative number of boys and girls, together with infant mortality rates, are taken from Mitchell, *International historical statistics*.

the 0–4 age group, thus ruling out potential concerns arising from sex-specific under-registration. If anything, sex ratios at ages 5–9 were actually higher in the first two censuses, whose quality might be arguably inferior to the later ones.

Computing the difference between the observed and the predicted sex ratios (estimated according to the mortality environment – see the fitting line in figures 2 and 3) allows for the estimation of the importance of the ‘missing girls’ phenomenon. According to our results (see table 1), discriminatory practices resulted in around 2.4–3.0 per cent of girls gone ‘missing’ between 1861 and 1911.<sup>63</sup> Although the estimated figure for 1921 is lower (1.8 per cent), it is still sizable. As also evident in figures 2 and 3 themselves, the child sex ratios found in Italian censuses from then onwards do not fundamentally deviate from our expectations, so it appears that either (1) discriminatory behaviour gradually disappeared from 1911 onwards and/or that (2) it no longer translated into higher female mortality rates due to the increase in living standards.

## II | INFANT AND CHILD MORTALITY RATES

Although the previous exercises strongly suggest that the high child sex ratios found in the Italian censuses between 1861 and 1921 are not driven by female under-registration, we now turn to death registers to further support this claim. However, notice that these registers may be less reliable than population censuses because deaths could be under-reported, especially at early ages. Again,

<sup>63</sup> The number of observations underlying each child sex ratio is very large (the 1861 Italian census, for instance, contains almost 3 million children aged 0–4). The confidence intervals are therefore extremely narrow, so they are not reported.



this under-registration could also especially affect female children.<sup>64</sup> However, compared with female under-registration in census records, this potential bias now acts in the opposite direction: if female deaths were under-reported, we would be under-estimating girls' mortality rates, so the observed figures only provide a minimum estimation of the gender mortality gap.

The Human Mortality Database (HMD) provides yearly infant (ages 0–1) and early childhood (ages 1–5) mortality rates for boys and girls for a large sample of countries going back to the eighteenth century. The temporal coverage varies by country and there are only a few countries that provide information before 1850. This information allows for the tracing of how excess male mortality early in life has evolved in Italy and other European countries from 1850 to 2015. Focusing first on what happened during infancy, figure 4 shows how the female biological advantage was especially visible during the second half of the nineteenth century: on average, around 24 more boys than girls were dying (per 1000 live births) during the first year of life in Europe at that time.<sup>65</sup> The gender gap declined as overall mortality levels were reduced over time. However, excess male mortality (the difference between the male and female mortality rates) was lower in Italy than the European average: more girls (or less boys) were dying up to the 1920s, when the Italian experience began to converge with that of their European counterparts.

The same exercise can be performed but focusing now on early childhood (figure 5). Although the gender gap in child mortality (ages 1–5) is significantly lower than during infancy, it still tends to favour girls: on average, around 2.5 more boys than girls (per 1000 live births) were dying in Europe before 1920. The Italian case, however, was again different since the opposite pattern is observed: girls were suffering a higher mortality rate than boys until the 1920s. The Italian gender gap in mortality from then onwards is nonetheless virtually identical to that of other European countries. As discussed above, the evolution of the mortality gap is directly affected by the existing level of mortality. Linking excess male mortality during infancy (ages 0–1) and early childhood (ages 1–5) to the corresponding mortality rates nonetheless provides a very similar picture (see figures A1 and A2 in the supplementary material). More girls (or less boys) were dying in Italy than in other European countries when infant and child mortality rates were high.

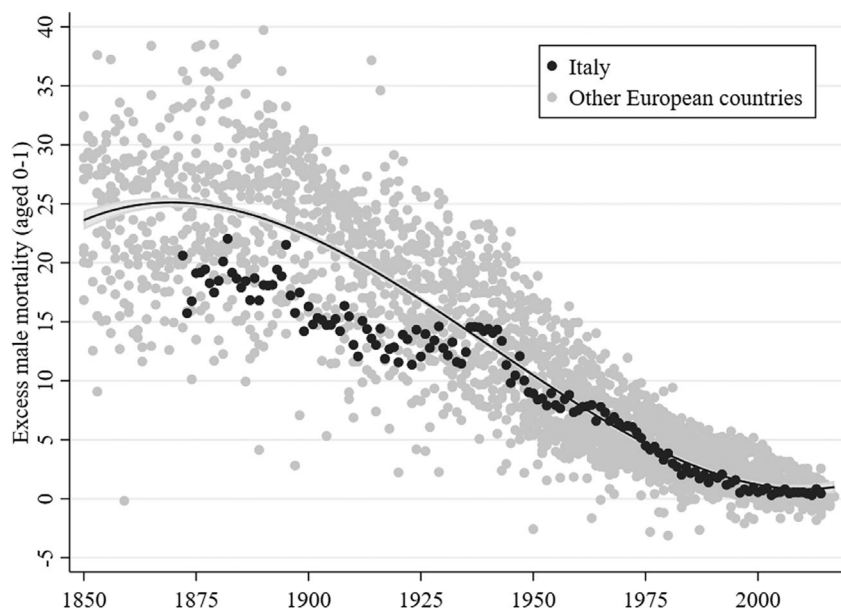
The fact that the results are similar regardless of whether we are relying on population censuses or death registers confirms that female under-reporting is not likely to be behind these patterns.<sup>66</sup> The relatively high child sex ratios found in Italy until the first decades of the twentieth century are associated with a relatively high female mortality early in life, thus suggesting that girls were indeed dying at greater numbers than should be expected. Recent research argues that the improvements in female health that occurred during the late nineteenth and early twentieth centuries were associated with the reduction in infectious diseases as a major cause of death.<sup>67</sup> This explanation, however, mostly applies to older girls, so it should not affect our results on infancy and early childhood (ages 0–1 and 1–5). Moreover, to explain the striking pattern found in Italy before the early twentieth century, infectious diseases should have taken a greater toll on Italian

<sup>64</sup> Llopis et al., 'Excess female mortality'.

<sup>65</sup> This male frailty automatically translated into lower 'natural' child sex ratios as shown in the previous section and in previous studies (Beltrán Tapia and Gallego-Martínez, 'Where are the missing girls?'; Beltrán Tapia, 'Sex ratios'; Szoltysek et al., 'Inferring').

<sup>66</sup> Perner et al., 'Gendered mortality', argue that child sex ratios are probably inadequate to detect gender discrimination in low-mortality environments (such as early twentieth-century Denmark). Although this was not the case in Italy during the period under study, it is reassuring that both set of records (population censuses and death registers) point in the same direction.

<sup>67</sup> Hinde, 'Sex differentials'; Goldin and Lleras-Muney, 'XX>YY'.



**FIGURE 4** Excess male mortality in Italy and Europe (ages 0–1), 1850–2015. *Note:* The coverage varies by country: Austria (1947–2017), Belarus (1959–2015), Belgium (1841–2017), Bulgaria (1947–2010), Croatia (2002–16), Czechia (1950–2016), Denmark (1835–2016), East Germany (1956–89), England & Wales (1841–2016), Estonia (1959–2014), Finland (1878–2015), France (1816–2015), Germany (1956–2015), Greece (1981–2013), Hungary (1950–2014), Ireland (1950–2014), Italy (1872–2014), Latvia (1959–2014), Lithuania (1959–2014), Luxembourg (1960–2014), the Netherlands (1850–2016), Norway (1846–2014), Poland (1958–2016), Portugal (1940–2015), Russia (1959–2014), Scotland (1855–2016), Spain (1908–2014), Slovakia (1950–2014), Slovenia (1983–2014), Sweden (1751–2016), Switzerland (1876–2016), and Ukraine (1959–2013). The fitting line is estimated using a fractional polynomial. *Source:* Human Mortality Database (HMD).

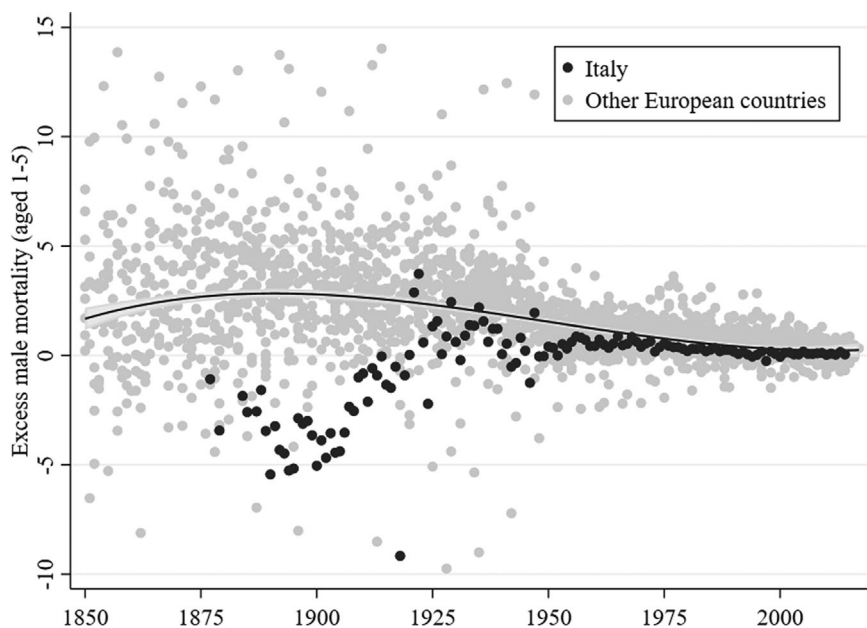
girls than in other countries, a hypothesis that is very unlikely. According to a survey on mortality from tuberculosis – by far the most important infectious disease at that time<sup>68</sup> – that was published by the *Ministero di Agricoltura, Industria, e Commercio* (Ministry of Industry, Trade, and Labour) in 1918, the incidence of tuberculosis in the age groups 0–1, 1–4, and 5–9 did not differ between males and females, independently of the region observed.<sup>69</sup> The evidence presented here therefore suggests that discriminatory practices arising from son preference were negatively affecting female mortality rates during infancy and childhood.

### III | ANALYSING REGIONAL VARIATION, 1861–1921

The previous discussion is based on national averages, and those figures hide significant regional variation, an issue that is especially important in Italy, where North–South differences have been repeatedly stressed as a crucial dimension for understanding these societies. To shed more light

<sup>68</sup> Atella, Francisci, and Vecchi, ‘Health.’

<sup>69</sup> Ufficio Centrale di Statistica, *Notizie*, p. XXI. Malaria and other infectious diseases had a more limited impact than tuberculosis in the early twentieth century. In 1911, while tuberculosis caused around 170 deaths per 100 000 inhabitants, malaria only resulted in fewer than 10 deaths (diphtheria also caused around 10 deaths).



**FIGURE 5** Excess male mortality in Italy and Europe (ages 1–5), 1850–2015. *Note:* The coverage varies by country: Austria (1947–2017), Belarus (1959–2015), Belgium (1841–2017), Bulgaria (1947–2010), Croatia (2002–16), Czechia (1950–2016), Denmark (1835–2016), East Germany (1956–89), England & Wales (1841–2016), Estonia (1959–2014), Finland (1878–2015), France (1816–2015), Germany (1956–2015), Greece (1981–2013), Hungary (1950–2014), Ireland (1950–2014), Italy (1872–2014), Latvia (1959–2014), Lithuania (1959–2014), Luxembourg (1960–2014), the Netherlands (1850–2016), Norway (1846–2014), Poland (1958–2016), Portugal (1940–2015), Russia (1959–2014), Scotland (1855–2016), Spain (1908–2014), Slovakia (1950–2014), Slovenia (1983–2014), Sweden (1751–2016), Switzerland (1876–2016), and Ukraine (1959–2013). The fitting line is estimated using a fractional polynomial. *Source:* Human Mortality Database (HMD).

on Italy's missing girls, we have collected information on sex ratios at infancy and childhood, as well as infant and early childhood mortality rates, at the province level between 1861 and 1921. It should be noted that, although provincial child sex ratios can be computed for each census year between these two dates, mortality rates at the province level are only available for the years 1871, 1881, and 1921.<sup>70</sup> This section therefore describes the underlying regional patterns and their evolution over time.

Splicing the analysis into smaller units introduces more noise in the analysis because sex ratios constitute a very random outcome in and of themselves.<sup>71</sup> Italian provinces are, however, rather large (most of them have more than 30 000 children aged 0–4 and the smallest ones do not fall short of 10 000 children), so this is not likely to be an issue (see table A1 reporting summary statistics in the [appendix](#)).<sup>72</sup> Although the previous sections show that female under-reporting does

<sup>70</sup> Aggregates at a larger regional level are nonetheless available and provide virtually the same results as those reported using provinces as units of analysis.

<sup>71</sup> Beltrán Tapia and Gallego-Martínez, 'What explains'; Sołtysek et al., 'Inferring missing girls'.

<sup>72</sup> Only four provinces reported less than 20 000 children below age 5 in each census year between 1861 and 1921: Grosseto, Livorno, Porto Maurizio, and Sondrio. Excluding these provinces from the subsequent analyses does not change the overall picture depicted here.



not constitute a problem at the national level, this might not necessarily be the case for particular provinces. As mentioned above, however, under-registration especially affects the youngest children, so older age groups should be virtually free of this concern because they would show up in the statistics as they grow up. Province sex ratios at ages 0–4 actually correlate quite well with those at ages 5–9 (see [figure A3](#) in the appendix), thus confirming that potential under-registration does not affect the results reported here.

Figure 6 depicts the relative number of boys and girls (ages 0–4) in Italian provinces between 1861 and 1921. Interestingly, province child sex ratios correlate very well between censuses (particular provinces systematically exhibit higher figures; see [figure A4](#) in the appendix), so these spatial patterns persisted over time.<sup>73</sup> Apart from clear regional patterns, these maps show that the geography of child sex ratios also evolved over time. While an excess of male children could be found all across Italy (regardless of the latitude) in the earlier censuses, the South seems to concentrate the highest child sex ratios in the early twentieth century. This geographical evolution resembles that of gender inequalities in literacy rates: although differences in male and female literacy were higher in the North at the end of the Napoleonic War, this gap declined dramatically over the course of the nineteenth century, a pattern that was not followed in the rest of the country until later on.<sup>74</sup>

Part of the temporal and geographical variation observed here could be explained by differences in the mortality environments.<sup>75</sup> Due to the biological female advantage, more boys are expected to die during the first years of life in those provinces and/or periods suffering especially harsh conditions. Child sex ratios should therefore be lower where infant mortality was higher. Although this is somewhat true for the whole period studied here, analysing each census year separately yields the opposite pattern.<sup>76</sup> Figure 7 shows that those provinces with higher infant mortality rates exhibited higher child sex ratios, thus suggesting that something else was going on (the same picture holds if under-5 mortality is employed instead of infant mortality; see [figure A5](#) in the appendix).<sup>77</sup> Interestingly, this positive relationship got stronger over time, suggesting that behavioural factors leading to female neglect were more widespread across the Italian territory during the nineteenth century but became geographically concentrated in the less developed regions in the late-nineteenth and early twentieth centuries. These results also suggest that discriminatory practices intensified in those provinces.

Analysing the male-to-female mortality ratio during infancy and childhood further supports the hypothesis that female neglect was reducing girls' survival chances, especially in particular regions. Figure 8 shows that high child sex ratios during the period of study were associated with more girls (or less boys) dying during infancy and childhood.<sup>78</sup> As already discussed in the

<sup>73</sup> The correlation coefficient is somewhat lower between the years 1871 and 1881, but this might arise from the quality of those particular censuses (from particular provinces). As mentioned before, the growing role of the central statistical offices in the data-gathering process which started in 1881 increased the quality of the subsequent enumerations ([Gallo and Paluzzi](#), 'Le trasformazioni').

<sup>74</sup> [Cicarelli and Weisdorf](#), 'Pioneering into the past'.

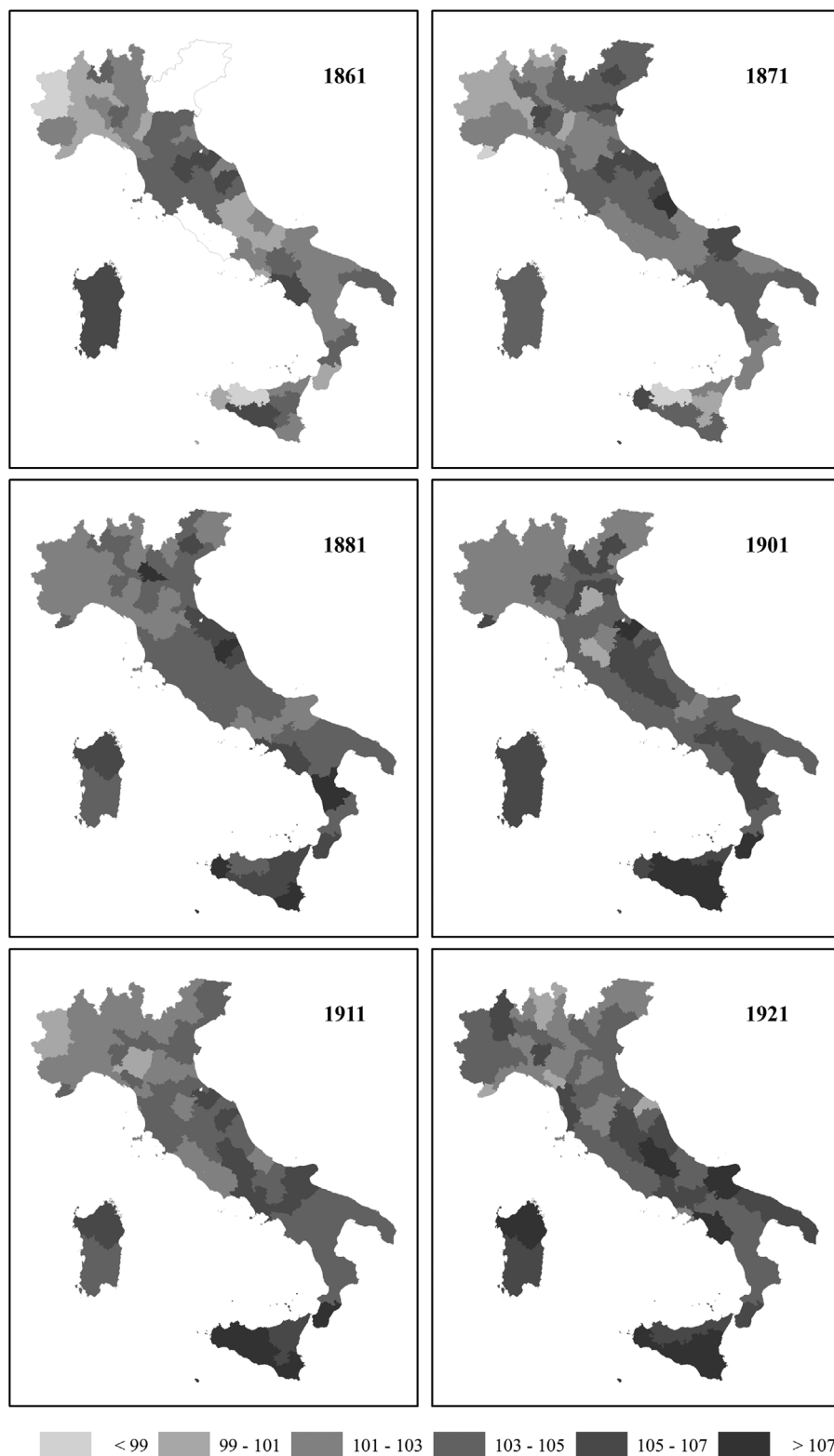
<sup>75</sup> [Beltrán Tapia 2019](#), 'Sex ratios'; [Szołtysek et al.](#), 'Inferring missing girls'.

<sup>76</sup> Similar unexpected results have been found in Spain between 1900 and 1920 ([Echavarrí and Beltrán Tapia](#), 'Economic development').

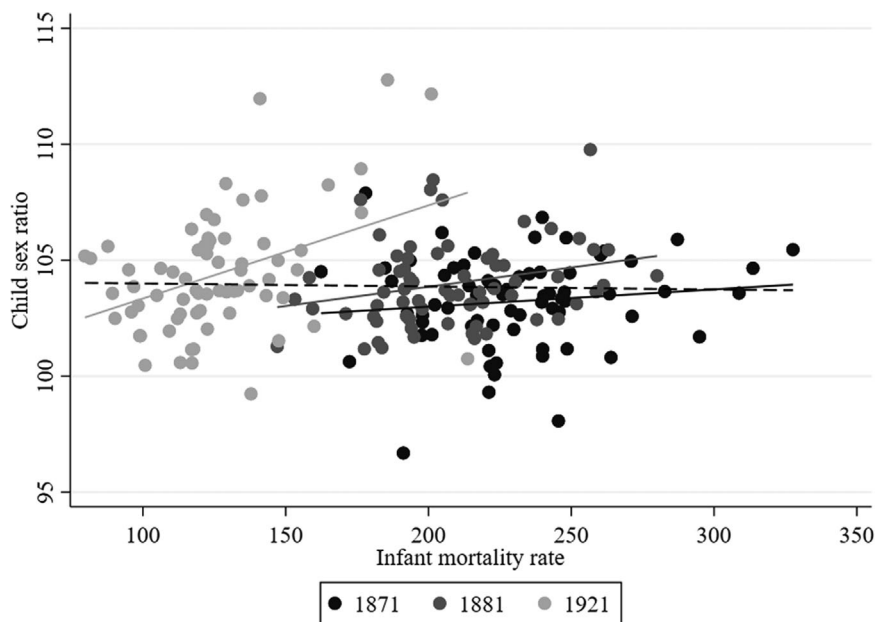
<sup>77</sup> The correlation coefficients and the corresponding *p*-values are 0.12 (0.3195), 0.26 (0.0302), and 0.40 (0.0008) for the years 1871, 1881, and 1921, respectively. To mitigate unexplained year-to-year variation, we have average mortality rates over two consecutive years (the results, however, do not change if only 1 year is used).

<sup>78</sup> Figure A6 in the appendix reports the results using under-5 mortality rates. Moreover, the results reported here are virtually identical if the ratio of male-to-female mortality is computed using only the raw number of male and female

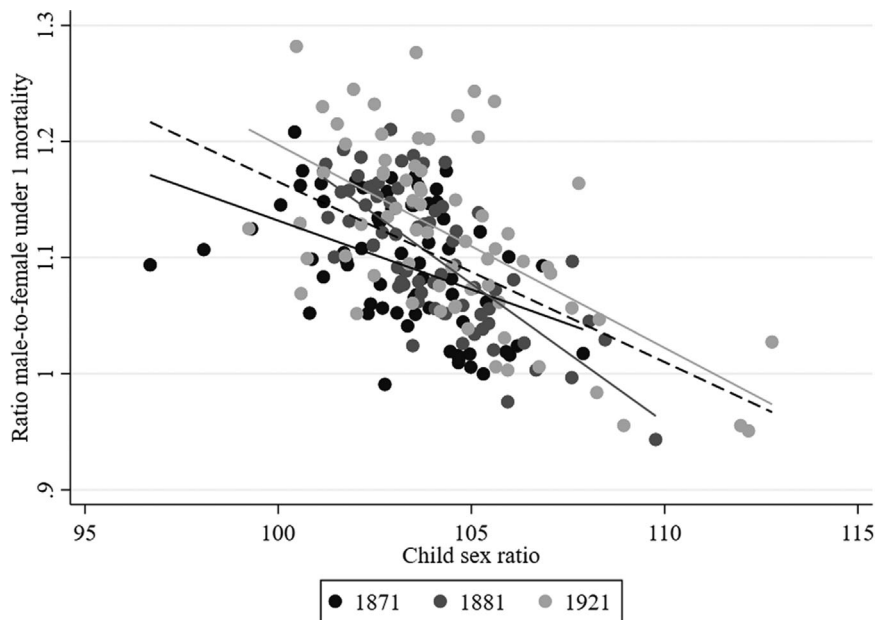




**FIGURE 6** Child sex ratios (ages 0–4) in Italy, 1861–1921. *Source:* Population censuses.



**FIGURE 7** Child sex ratios (ages 0–4) and infant mortality in Italian provinces, 1871–1921. *Note:* While the dashed line depicts the fitting line using all observations, the coloured lines estimate the relationship separately for each census year.



**FIGURE 8** Child sex ratios (ages 0–4) and infant mortality in Italy, 1871–1921. *Note:* While the dashed line depicts the fitting line using all observations, the coloured lines estimate the relationship separately for each census year.



previous section, this pattern is crucial because it rules out the possibility that our results are driven by registration issues. If female under-registration in the censuses was increasing the relative number of surviving boys and girls (child sex ratios), under-registration of female deaths would increase the mortality gap during infancy and childhood. We observe exactly the opposite pattern: excess male mortality is lower when child sex ratios are higher, thus confirming that both sources, population censuses and vital statistics, provide a congruent picture: those provinces where censuses reported an excess of (surviving) boys are also the ones where death records point towards higher excess female mortality.<sup>79</sup> As mentioned above, figures 7 and 8 only use information around 1871, 1881, and 1921 because Italian vital statistics did not provide the number of deaths at the province level between 1890 and 1911. Information at a wider level of aggregation is however available for all census years between 1861 and 1921. Reassuringly, the results are virtually identical if regions are used as unit of analysis (see figures A7 and A8 in the appendix).

Taken together, the relatively high female mortality rates registered in the vital statistics and the high sex ratios observed in the surviving children recorded in the population censuses indicate the existence of discrimination against girls around birth and/or during infancy and childhood. These practices appear to have been more pronounced in Southern Italy, especially from the end of the nineteenth century onwards. These patterns suggest that contextual factors were playing an important role in shaping son preference and how parents treated their sons and daughters.

#### IV | DISCUSSION AND CONCLUDING REMARKS

Child sex ratios provide a cumulative measure of neonatal, infant, and child mortality, and therefore allow for the detection of patterns of female neglect. According to our estimations, around 2–3 per cent of girls went ‘missing’ in Italy during the second half of the nineteenth and early twentieth centuries as a result of neglect right after birth and/or due to differential treatment in terms of food and care during infancy and childhood. While such figures are not as extreme as those being observed in a number of South and East-Asian countries nowadays,<sup>80</sup> they place Italy (and especially the South) among the European countries and regions with the highest sex ratios and fraction of missing girls at the eve of the twentieth century. Crucially, in the case of Italy, excess female mortality is also visible using death statistics, ruling out the possibility that these results are driven by registration issues, thus pointing to the existence of discriminatory practices that increased female mortality rates early in life. The gradual fading of these practices would therefore partly explain the improvements in girls’ health and the reduction of ‘suspicious’ or ‘avoidable’ deaths that took place from the early twentieth century onwards.<sup>81</sup>

As in other contexts, female neglect seems to have been the result of a strong son preference, possibly dictated by economic motives and cultural norms. Sharecroppers, for instance, preferred large families so as to secure male labour and a male heir.<sup>82</sup> While raising boys helped to ensure

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deaths to eliminate potential registration issues coming from the birth figures that are employed to compute mortality rates.

<sup>79</sup> The correlation coefficients and the corresponding *p*-values are  $-0.44$  (0.0002),  $-0.73$  (0.0000), and  $-0.59$  (0.0000) for the years 1871, 1881, and 1921, respectively.

<sup>80</sup> Child sex ratios (aged 0–5) in China and South Korea in the 1990s and 2000s revolved around 110 and 120 boys per 100 girls, and some regions in India could reach even higher figures (Guo et al., ‘Missing girls’).

<sup>81</sup> Derosas, ‘Watch out’; idem, ‘Suspicious deaths’.

<sup>82</sup> Manfredini et al., ‘Son preference’.



the viability of the family farm, girls were considered a burden for their families.<sup>83</sup> In patrilineal contexts, investing in daughters was considered a waste of resources since this investment was lost to their parents as soon as they married and entered their husbands' families.<sup>84</sup> In addition, the dowry system made daughters even more costly. Although girls could contribute to their own dowries by finding employment, parents were nonetheless the main funders, even in urban areas.<sup>85</sup> In the countryside, where female wage opportunities were scarce, the dowry's responsibility mostly fell on the families. Finally, the culture of honour could have also played an important role in fostering son preference.<sup>86</sup>

Given that sex ratios at birth were not excessively unbalanced, our analysis suggests that most of these girls went 'missing' during infancy and childhood. The lack of anecdotal evidence on female infanticide during our period of study further supports this argument. The existence of a thick network of foundling hospitals probably made infanticide unnecessary for getting rid of unwanted children. Contemporary statistical reports indicate that around 100 000 children under the age of one were assisted in foundling hospitals in the early 1890s (22 000 new ones being admitted yearly).<sup>87</sup> While the sex of the newborn was irrelevant for unwed mothers, married couples had more incentives to neglect their female infants and tended in fact to abandon more girls than boys.<sup>88</sup> It is indeed argued that the evolution in the relative number of girls being abandoned is closely linked to the extent to which legitimate children were abandoned.<sup>89</sup> The same report mentioned above indeed confirms that more girls than boys were being abandoned in Italy in the early 1890s: the sex ratio of children in charge of foundling institutions was 90.7 boys per 100 girls (50 027 males and 55 142 females in 1893/94).<sup>90</sup> Selective infant abandonment therefore partly contributed to some of the 'missing girls' observed here due to the foundlings' extreme mortality rates, both before and after reaching the foundling home.<sup>91</sup>

Many Italian regions, however, actively prevented the abandonment of legitimate children, so this possibility was not readily available everywhere, and especially so in rural areas.<sup>92</sup>

<sup>83</sup> Kertzer, *Sacrificed*, p. 111

<sup>84</sup> Mancini, 'Breadwinner'. Studying medieval Tuscany, Botticini, 'A loveless economy', argues that dowries could also be considered a compensation for the share of the family wealth that daughters helped building while working within the household.

<sup>85</sup> Zucca Micheletto, 'The relevance of dowry'.

<sup>86</sup> Schneider and Schneider, *Culture*, pp. 89–90; Galt, 'Marital property', p. 312.

<sup>87</sup> Ministero di Agricoltura, Industria e Commercio, *Statistica dei brefotrofi anni 1893 e 1894*.

<sup>88</sup> Corsini, 'Breastfeeding'; Hunecke, 'Intensità'; Kertzer, *Sacrificed*, pp. 110–12; Da Molin, *Nati*; idem, *Bambini*. Foundling homes were in charge of dowering their wards, thus providing an additional incentive to abandon girls.

<sup>89</sup> Kertzer, *Sacrificed*, p. 111.

<sup>90</sup> The *Movimento dello stato civile* also provides the number of male and female *esposti*. Although not as unbalanced as the one reported by the *Statistica dei brefotrofi anni 1893 e 1894*, the sex ratio of these foundlings was below 100 boys per 100 girls between 1867 and 1881 (Ministero di Agricoltura, Industria e Commercio, *Movimento dello stato civile Anno XX. – 1881*). The sex ratio of *esposti* increased slightly in the following decades but remained well below the natural benchmark at birth (105 boys per 100 girls): 100.1 in 1891/1895, 101.0 in 1896/1900, 101.5 in 1901/1905, and 100.8 in 1906/1910. It should be noted nonetheless that the *Movimento* seems to underestimate the number of foundlings since it reports a bit more than 32 000 children abandoned yearly in 1893 and 1894.

<sup>91</sup> While infant mortality in foundling hospitals was around 385 deaths per 1000 admitted children, this figure was only 145 for the country as a whole (Atella, Francisci and Vecchi, 'Health').

<sup>92</sup> Kertzer, *Sacrificed*, p. 71. While foundling homes in Milan, Brescia, and Tuscan cities hardly erected any barrier against the abandonment of legitimate children and subsequently received a significant inflow of these foundlings, other Northern



Likewise, child abandonment could put the family honour at risk.<sup>93</sup> Therefore, resorting to infanticide was perhaps the only (or the easiest) means of adjusting family size in some areas. The number of prosecuted infanticides was relatively high in Italy during the late nineteenth century, and those figures only represented a small fraction of the actual reality.<sup>94</sup> Given the high rates of neonatal mortality, it was indeed quite easy for married couples to conceal infanticides as natural deaths, and the vast majority of infanticides never came to the attention of the police or the judicial authorities.<sup>95</sup> Braglia and Nicolini argue that many infanticides were not only effectively hidden before the mid-twentieth century, but also that they especially affected female infants.<sup>96</sup> Although the problem was likely to be worse in earlier periods in terms of both female infanticide and female abandonment,<sup>97</sup> it is also plausible that the closing of the turning wheel from the 1860s onwards (that is, a wheel placed outside foundling homes that allowed for the anonymous abandonment of infants), which basically prevented married couples from abandoning their unwanted children, may have increased the number of undetected sex-biased infanticides.<sup>98</sup>

A large part of the relative excess of boys is nonetheless probably explained by how Italian parents treated their children as they grew up before the 1920s, especially if we analyse sex-specific mortality rates during infancy and childhood. While the Italian figures indicate that female infants suffered higher (relative) mortality than their European counterparts, those girls aged 1–5 were especially penalized. This is consistent with the fact that breastfeeding is a non-competitive resource that protected boys and girls alike during the first months of life. The effects of gender discriminatory practices are, however, quite visible as soon as infants are weaned.<sup>99</sup> Berkowitz argues that women in Southern Italy indulged sons far more than daughters.<sup>100</sup> This unequal allocation of food and care during early childhood could have also included longer breastfeeding periods for boys. Notwithstanding, the unexplained female mortality observed during the

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areas such as Bologna, Bergamo, and other cities in Emilia-Romagna restricted the use of the wheel to illegitimate children. Although it is more difficult to estimate the importance of child abandonment by married couples in the South, it seems they also constituted an important fraction of the foundlings abandoned there (pp. 94–7). Although policy changes from the 1870s made this possibility more and more difficult, Southern Italy lagged behind adopting these policies.

<sup>93</sup> Derosas, 'Suspicious deaths', p. 98.

<sup>94</sup> Tagliacarne, *Infanticidio*; Corsini, 'Sull' infanticidio'. Most research on infanticide focuses on court cases and therefore deals with unmarried young women, whose sins were more difficult to conceal (see also Olivieri, 'L'infanticidio'). Interestingly, the punishment for infanticide became increasingly less severe and commonly linked to women's mental status. Gentilomo et al., 'L'infanticidio', argue that, due to the difficulty of proving mental illness, this was just a way to grant milder sanctions for infanticides.

<sup>95</sup> Kertzer, *Sacrificed*, p. 29; Derosas, 'Suspicious deaths', p. 96. Female infanticide was also visible in other European countries during this period (Hanlon, 'Routine infanticide'; Beltrán Tapia and Marco-Gracia, 'Death'; Beltrán Tapia and Raftakis, 'Sex ratios').

<sup>96</sup> Braglia and Nicolini, 'Infanticide'. These authors also hypothesize that sex-selective abortion may explain the low number of female live births and the high incidence of female stillbirths in the 1970s and 1980s due to the availability of various methods of diagnosing the sex of unborn babies.

<sup>97</sup> While 110 boys per 100 girls were born among the legitimate children in Naples around 1803–4, the Annunziata, the foundling home there, only received 90 boys for every 100 girls in 1815 (Kertzer, *Sacrificed*, p. 92; Da Molin, *Bambini*).

<sup>98</sup> Although some contemporary commentators warned that the abolition of the wheel would increase the number of infanticides, there is little evidence confirming or refuting that hypothesis (Kertzer, *Sacrificed*, pp. 157–9).

<sup>99</sup> Marco-Gracia and Beltrán Tapia, 'Son preference', has found similar patterns in North-Eastern Spain using the information contained in the parish registers.

<sup>100</sup> Berkowitz, 'Familism', p. 88.



first year of life could in any case result from other forms of differential care.<sup>101</sup> Relying on the information about household nutrition and expenditures contained in family monographies in the 1930s, Mancini tentatively suggests that young girls were somewhat discriminated in the allocation of household resources but these results are not conclusive, as the author acknowledges.<sup>102</sup> However, the economic difficulties that families suffered in this later period are probably not as dire as the situation existing under the period of study here. Italian living standards had significantly increased during the first third of the twentieth century (particularly in some regions), so even in the case that son preference was still in place, the consequences of gender discriminatory practices did not probably result in higher mortality rates.

Lastly, our results also uncover significant regional patterns, both in levels and in their trajectories over time. In this regard, while excess female mortality declined in the Northern provinces during the period of study here, it remained relatively high in the South at least until 1921. It is worth mentioning that the anonymous abandonment of infants through the wheel not only continued for longer in the South, but families there were also more prone to abandon their babies in other public places when there was no wheel nearby.<sup>103</sup> Similarly, economic conditions in the South, albeit not deteriorating in absolute terms, did not improve as much as in the North during the late nineteenth century – as reflected in GDP per capita, real wages, and average heights – which might have aggravated the need to ration scarce resources.<sup>104</sup>

Although these patterns are probably linked to the relative importance of different agricultural and family systems, as well as other economic, social, and cultural dimensions (and their evolution during a period of rapid societal change), identifying the reasons behind this phenomenon (and its demise from the 1920s onwards) goes beyond the scope of this paper. This article constitutes only a first exploration of a complex issue. More research is needed to shed light on (1) when and how discrimination actually happened, and (2) the mechanisms that led parents to neglect their daughters. In addition, the patterns unveiled here also open the way to exploring the socio-economic implications of gender discriminatory practices on the divergent trajectories followed by Northern and Southern Italy.

## DATA AVAILABILITY STATEMENT

The data and the replication files that support the findings of this study are available in the supplementary material of this article.

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<sup>101</sup> Recent research shows that exposure to extreme winter conditions was an important factor behind infant mortality in nineteenth-century Italy (Dalla-Zuanna and Rosina, ‘An analysis’; Scalone and Samoggia, ‘Neonatal mortality’). Therefore, an unequal allocation of warm clothes (or spaces) could have also penalized girls. Similarly, fatalistic attitudes that were only indirectly driven by gender bias could have also played a role (Pitkänen, ‘Infant mortality’).

<sup>102</sup> Mancini, ‘Breadwinner’.

<sup>103</sup> Kertzer, *Sacrificed*, p. 161.

<sup>104</sup> Felice, ‘The roots of a dual equilibrium’; Federico et al., ‘The origins’; A’Hearn and Vecchi, ‘Height’. According to the new series provided by Federico et al., ‘The origins’, real wages improved in the South from the early twentieth century onwards. Data on heights show that the gap between the North and the South remained roughly the same up to the Second World War (A’Hearn and Vecchi, ‘Height’).



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## SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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