

**MISSING WOMEN IN THE ITALIAN MIDDLE AGES? DATA AND  
INTERPRETATION**

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THE MISSING FEMALES OF ITALY: SEX RATIO IN MEDIEVAL SOURCES

In his *Cronica* of Florence, Giovanni Villani describes how, in the year 1338, the priest baptized young children in the Church of San Giovanni: "he would, each year, receive anywhere between 5,500 to 6,000, with an excess of the male sex in the range of three hundred to five hundred a year".<sup>1</sup> Given this ratio, the number of male baptisms in this church outweighed that of females in a proportion ranging from 110.5:100 to 120:100.<sup>2</sup> This is significant in that the standard sex ratio at birth is 105 males for every 100 females.<sup>3</sup> Similarly, the cadastres of different Tuscan cities (e.g. Florence, Pisa, and Lucca) from the first half of the fifteenth century show a sex ratio that is clearly unfavourable to females in different phases of the life cycle.<sup>4</sup>

Four hundred years earlier, the polyptych of the monastery of Farfa in Lazio portrays a similar picture.<sup>5</sup> Within the polyptych, the composition of 244 familial units residing in different villages controlled by the monastery towards the end of the 8<sup>th</sup> and beginning of the 9<sup>th</sup> century and positioned in Abruzzi was recorded. A

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<sup>1</sup> Villani, *Chronica*, III. i.i.97.

<sup>2</sup> Biller 2000

<sup>3</sup> A number of studies have examined the phenomenon of imbalanced sex ratios apparent in medieval Florence. See, among others, Frugoni 1965; Herlihy and Klapisch-Zuber 1985: 131-158; Biller 2000.

<sup>4</sup> Herlihy and Klapisch-Zuber 1985: 131-158; Dalla-Zuanna et al. 2012.

<sup>5</sup> Ring 1979: 2-25; Feller 1994: 327-349.

close examination of this data reveals a disproportionate sex ratio of individuals classified as “sons”, with 136 males for every 100 females.

But there is more: a disproportionate sex ratio in favour of males has also been observed in the archaeological record. In fact, a recent study focusing on Italian Early and Late Middle Ages using archaeological and anthropological data shows that the ratio between male and female individuals was clearly disproportionate in favour of the former.<sup>6</sup> More specifically, among the 2,241 individuals aged 20+ buried in thirty necropolises dating between the sixth and fifteenth centuries, the number of men is greater than that of women, with an average sex ratio of 169 males for every 100 females.<sup>7</sup>

Intriguingly, such unbalanced sex ratio values are not observed in Italian cemeteries during Roman times or Late Antiquity. Indeed, changes in sex-ratio values seem to reflect a shifting pattern over the centuries (figure 1). More specifically, the ratio of adult males to females was relatively balanced during Roman times, while we find more males than females buried in medieval cemeteries.

Smaller necropolises, where the sample of adults falls below 40 in number, have been excluded from this study. Among those not included it should, however, be noted that the disproportion between the number of men and women is, in many cases, equally apparent.<sup>8</sup> One can, in good faith, argue that such data

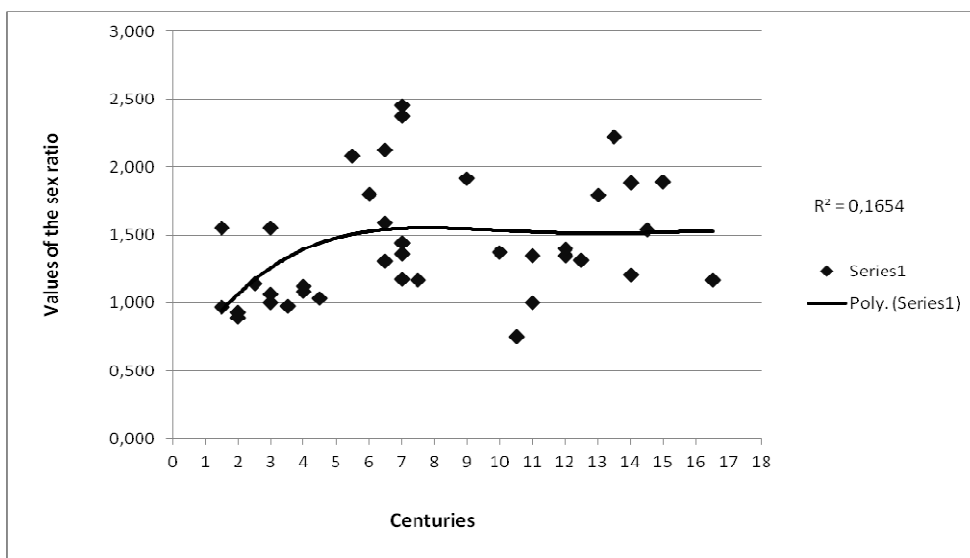
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<sup>6</sup> Barbiera and Dalla Zuanna 2007: 19-42. By the end of this study, data from 154 necropolises dating between Late Antiquity and the Early Middle Ages were collected. This same material is employed here.

<sup>7</sup> See Barbiera 2012 (in press).

<sup>8</sup> For example, a greater number of males were found in the following necropolises: at San Stefano (Cividale), VI-VII century, 16 males compared to 6 females, see Corrain and Capitanio 1990: 185-

reflect a relatively widespread pattern in early medieval and medieval Italian necropolises. Even if the overall number of necropolises considered here is relatively low, the broad interval of time and extensive territory over which they are positioned mean they make up large part of the Italian anthropological material currently available. More data may well become available in the future, following the analysis and publication of new excavation material.



**Figure 1.** Trends of the adult sex ratio in a sample of 39 Italian cemeteries dated from the first until the sixteenth centuries A.D.. We excluded from this graph cemeteries with a  $SR_{20+} < 0.5$  (which in a stationary population corresponds to a  $SR_{0-19} = 2.00$ ) and  $SR_{20+} > 2.5$  (which corresponds to a  $SR_{0-19} = 0.66$ ).

Of interest here is that a disproportionate sex ratio appears to be equally widespread across all the Italian regions, and in the necropolises linked to diverse sites, in the vicinity of settlements, such as villages or cities, churches or castles.

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207; at Marine (Lecce), VII century, 16 males compared to 12 females, see Navari-Padroni 1982: 183-187; at Mesumundu (Sassari) V-VII century, 13 males compared to 11 females, see Grupponi and Belcastro 1987: 81-91; at Dolinova (Cagliari), VII century, 12 males compared to 9 females, see Kiszely and Maxia 1970: 453-488; at Monte di Croce (Florence), XI century, 22 males compared to 5 females, see Fornicari, Giusiani and Vitiello 2003: 716-719; at Faella (Arezzo), XIII-XIV century, 17 males and 10 females, see Galeotti and Pardini 1979: 66-82.

As such, data from medieval necropolises seem even more unbalanced than those gathered from the Florentine, Pisa, or Lucca cadastres, or the polyptych from Farfa. There is another substantial difference between data from written sources and that from the archaeological record: the former clearly reflect a phenomenon of female underrepresentation most evident among infants. For example, in the polyptych from Farfa, the sex ratio becomes balanced only beginning at adults ages (103 to 100). In the Florentine cadastre of 1427, female children are instead underrepresented until the age of 13 and then among women between the ages of 22 and 50. In the necropolises, the disproportionate sex ratio certainly concerns the adult sample, while the ratio of male to female children is unknown, in that it is not possible to determine the sex of individuals who died before 15/18 years of age. In infancy, in fact, the differences between males and females are not visible in analyses typically conducted on skeletal remains.

How might these data be interpreted?

In the case of the polyptych from Farfa, Ring concludes that an underreporting of female children, above all firstborns, can explain the infant sex ratio values. In fact, in cases in which only one child was recorded (36 families), it was almost always a male (more precisely, among this group there are 30 males compared to 6 females).<sup>9</sup> Among families with more children, the ratio of males to females is

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<sup>9</sup> As recently pointed out by Laurent Feller, these data should be handled with care. To begin with, some young women are recorded as the work force in a separate manorial house. Second, given that ages were not recorded, it is possible that, differently than families composed of parents plus a son, these were not young families but older families whose youngest son was still unmarried and living at home. One might conclude that the high number of sons in these familial units indicates, on the one hand, that daughters worked elsewhere and, on the other hand, that men married later than women, residing as bachelors within the paternal family. According to Ring, however, this second possibility does not justify such a pronounced disproportion in the sex ratio within these families. Feller 1994: 327-349

relatively proportionate. Ring suggests that perhaps firstborns were underreported and made legally invisible for inheritance reasons. A similar explanation could be applicable to Florence in the Late Middle Ages: many female children were made invisible in the cadastres and not baptized, so as to grant visibility and precedence to male offspring. That said, David Herly and Christiane Klapisch-Zuber highlight how a careful analysis shows a number of interconnected factors conditioning the data: beyond distortion of the records,<sup>10</sup> the prevalence of males should also be linked to a true lack of females due to abandonment or other acts of discrimination against female children.<sup>11</sup>

How then to reconcile this data with that from the necropolises? We now turn to some hypotheses.

#### HYPOTHESES ON THE INVISIBILITY OF FEMALES IN CEMETERIES

To begin with, it was possible to demonstrate that the lack of female skeletons is not related to methodological issues of anthropological analysis. Hypothetically, females might not have been identified in the early medieval Italian sample if sexual dimorphism was low, which means that sexual traits visible on the skeletons did not differ significantly between males and females. When this occurs, female skeletons can appear rather masculine and may be

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<sup>10</sup> Distortion in the records does not, in fact, always concern females. In fact, at adolescent ages, when a *testatico*, or poll tax applied to heads of family, began to be implemented, young men tended to be underrepresented, see Klapisch-Zuber and Herlihy 1985:138-143.

<sup>11</sup> Klapisch-Zuber and Herlihy 1985: 133-158. Documentation relative to foundling hospitals in Florence show a greater number of female infant admittances; likewise data on wet-nurses unmistakably shows that male infants were preferably breastfed by their mothers, while female infants more often received the care of a wet-nurse, increasing the risks of infant mortality.

mistakenly interpreted as males.<sup>12</sup> High sexual dimorphism can instead mean that female skeletons are quite fragile, and this can cause bones to be fragmented or not properly readable. Under these conditions, women might appear to be missing from cemeteries because they are poorly preserved. In the early medieval Italian cemeteries considered here, the relatively high sex ratio does not appear to be overly influenced by the presence of poorly preserved skeletons (and hence gender neutral), in that the latter make up a relatively small proportion of the whole.<sup>13</sup> Thus, it was possible to demonstrate these two aspects do not influence the observed sex-ratio.

An Italian scholar recently noted the lack of females in a 6<sup>th</sup> century cemetery near Turin (Collegno) and claimed this was a consequence of barbarian warriors emigrating from northern Europe.<sup>14</sup> This hypothesis seems implausible for several reasons. First, males outnumber females in areas of Italy not touched by Lombard immigration. Second, the percentage of Lombard immigrants has

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<sup>12</sup> Many hypotheses have been advanced to explain sexual dimorphism in humans. According to Hamilton 1982, well-nourished populations are more sexually dimorphic than malnourished ones, in that male growth is more susceptible to nutritional deficiencies during development than is female growth. The women's work hypothesis, advanced by Holden and Males, 1999 suggests that sex biased parental investments could be responsible for variation in sexual dimorphism. For example, women would be taller relative to men in a society where they contribute more to food production, as parents would invest more in their daughters such that their growth would not be compromised compared to that of boys. Touraille, 2008 also recently examined differences in nutrition between males and females as determinant of sexual dimorphism. Building on previous obstetric studies, Guegan, Teriokhin and Thomas, 2000 show that short maternal stature is frequently associated with serious obstetric complications (a smaller pelvis makes giving birth more difficult). It follows that in highly fecund populations, women are taller as higher mortality during parturition counter-selects short women due to their higher incidence of obstetrical complications; selective pressure for higher stature in females is high and sexual dimorphism is reduced.

<sup>13</sup> For the purpose of this study only the more recently and extensively excavated cemeteries were selected, for which the number of undetermined individuals was under 20% of the excavated skeletons. However even in the worst preserved cemeteries it could be proven that there is no relationship between the values of the sex ratio and the number of undermined individuals, for more details see Barbiera 2012.

<sup>14</sup> Pejrani Baricco 2004: 17-51.

been estimated at around 5-8% of the total population in areas where immigration was most intense, which from a demographic perspective does not significantly alter population trends.<sup>15</sup> Third, if the imbalanced sex ratio was the result of male immigration, we would expect to see this disproportion only during the period of migration as opposed to later centuries as well. Fourth, the sex ratio is proportionate in other regions of Europe, such as Hungary (see below), equally touched by several waves of foreign immigration. This would suggest that the hypothesis of a connection between a lack of women and barbarian immigration should be rejected. Similarly, the hypothesis that local female migration, for instance from villages to towns, may have created an unequal gender distribution across different settlements<sup>16</sup> do not seem supported by our data. Medieval towns such as Milan, Rome, and Siena present sex ratio values as equally distorted as the countryside.<sup>17</sup> More data is, however, needed to clarify this issue.<sup>18</sup>

Selection factors may mean that certain cemeteries are unrepresentative of the population as a whole. For example, it is possible that some categories of women were segregated in terms of burial placement or inhumed in others places. At present this hypothesis remains purely speculative in that no cemeteries or funerary areas reserved solely for females have been found in Italy. In addition, although exclusively male cemeteries linked to monasteries have been extensively

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<sup>15</sup> Wickham 2005.

<sup>16</sup> The hypothesis of local female migration has been advanced by Devroey to explain the distorted sex ratio registered in Carolingian polyptychs; see Devroey 1981: 71-88; Devroey 1989: 441-465.

<sup>17</sup> Moreover, written sources from fourteenth century Tuscany indicates that more males moved to towns than females; see Klepisch-Zuber and Herlihy 1985: 155-158.

<sup>18</sup> Barbiera 2012 in press

excavated<sup>19</sup> only one cemetery linked to a female monastery (Santa Giulia in Brescia) has been partly excavated. Here only six graves related to the monastery have been examined, containing one female, two males, and three individuals whose sex is undetermined.<sup>20</sup> It is unlikely that females are missing from funerary evidence due to being buried near monasteries. Moreover, the literature shows that during the Early Middle Ages there were too few a number of monasteries to drastically alter the death sex ratio we observe; moreover, female monasteries were even less common than male ones.<sup>21</sup>

It could be also hypothesized that females did not receive public funerals for social or economic reasons and as such were not buried in the community cemetery. However, while funerary segregation has been documented for children - in fact, several cemeteries dedicated solely to children have been excavated in Italy in different time periods and regions – the same does not hold true of women.<sup>22</sup> In order to verify this hypothesis – i.e. women are missing from larger cemeteries because they were buried in single scattered plots or in graves within religious buildings – an investigation of sex ratio trends in north-western Friuli was carried out. This study examined available data on osteological remains from all types of burials, ranging from larger cemeteries to single graves connected to settlements and churches. Results show that even when all grave types are

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<sup>19</sup> These include the cemetery associated with the Monastery of S. Vincenzo al Volturno, dating to the 10th-13th centuries and the cemetery associated with the Monastery of S. Lorenzo of Aversa, dating to the 10<sup>th</sup>-12<sup>th</sup> centuries. These cemeteries were not included in the present study of sex-ratios. An additional cemetery with a sex ratio of 118:100 was similarly excluded from this study due to its connection to the male monastery of Monte di Croce, Potassieve (Florence).

<sup>20</sup> A larger cemetery was excavated at S. Giulia in Brescia but it was in use before the foundation of the monastery itself. See Brogiolo and Cuni, 1988.

<sup>21</sup> This fact is not only supported by archaeological data, but is also proven by written sources, see Veronese, 1987.

<sup>22</sup> Barbiera and Dalla Zuanna 2007; Barbiera 2008.



considered, males outnumber females with a sex ratio of 160 adult males per 100 adult females. One can therefore conclude that at least in this investigated area females are missing from all types of burial sites.

Moreover, Italian cemeteries are not normally organized according to gender groups<sup>23</sup> as has been observed in other regions of Europe such as Western Pannonia and the region of Metz.<sup>24</sup> As such, the hypothesis that females were buried at the edges of cemeteries and then not found by archaeologists is not relevant to our data. Northern Italian cemeteries were more commonly organized into clusters of graves corresponding to kin groups or affiliates. In fact, in these cases, females are especially visible in terms of grave good selection and deposition.<sup>25</sup>

It is possible that females are missing due to special funerary rituals making their bodies archaeologically invisible. At present the available archaeological data and written sources do not contain any evidence that would suggest such behaviour. Moreover, recent work has shown that special care of dead bodies developed during Late Antiquity.<sup>26</sup> A number of scholars of this time period underline the importance of properly burying deceased loved ones, insisting that cremation was not a “humane” way of treating the dead.<sup>27</sup> It is therefore unlikely that precisely when Christians began paying special attention to the dead, women were not properly buried. In any case, as additional data from cemeteries becomes

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<sup>23</sup> Barbiera 2012.

<sup>24</sup> Halsall 2010; Barbiera 2005

<sup>25</sup> Barbiera 2012.

<sup>26</sup> Brown, 1981 and 1988; Rebillard 2009.

<sup>27</sup> In his *De cura pro mortis grenda*, Augustin is particularly clear on this matter; see also Tertullianus, *De Anima* 51.4; Minucius Felix, *Octavius* 34.10; Origenes Adamantius, *Contra Celsum*, 5.24, see also Rebillard 2009.

available, discussion of the issues presented above will become more sophisticated and precise.

If the data currently available do not lend support to hypotheses related to anthropological analyses of remains, to migration patterns, or to burial segregation, it might very well be that females are underrepresented because they died in higher numbers compared to males before reaching adulthood. In what follows we consider this hypothesis in some detail.

#### EXPOSURE, OBLATION, INFANTICIDE BY NEGLECT

One of the challenges of examining sex ratios of the past is that archaeological data cannot provide the sex of an individual who died before the age of 16/18 years, and hence we cannot know if females more commonly died in their first months of life or instead towards adolescence. In the case of the latter, one might surmise that female were made to wed very early and then died very young due to maternal mortality risks. If, on the one hand, sources seem to consistently show that at least in the Early Middle Ages there was a relatively marked difference in age between husband and wife, it is, on the other hand, unclear whether women married in very early adolescence. The laws of the Lombards banned girls from getting married before the age of 12,<sup>28</sup> from which it is difficult to know how frequently young women entered marriage in early adolescence. In addition, while there is little doubt that girls married quite early during Roman times and in

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<sup>28</sup> Liutprandi Leges 12.

Tuscany during the XIV and XV century,<sup>29</sup> no data indicates a decline in age at marriage during the Early Middle Ages. If anything, recent studies instead suggest that the Italian Early Middle Ages were characterized by a decline in fertility, in part due to a rising age of marriage among young women.<sup>30</sup>

Various scholars have, on different occasions, interpreted the underrepresentation of females in certain cemeteries as a sign of female infanticide.<sup>31</sup> Preliminary research using written sources on Italy does not seem to support this argument, although further study is needed.<sup>32</sup> Harris, for example, has shown that infant or child exposure, often resulting in death, was widespread in many areas of the Roman Empire.<sup>33</sup> Exposure has also been documented during and following the Early Middle Ages.<sup>34</sup> Attempts to ban exposure can be observed in both secular and canon laws, reflecting, on a one hand, changing attitudes towards this practice (more tolerated during Roman times) and, on the other hand, the persistence of this practice during the medieval period, given the continued need to legally condemn it.<sup>35</sup> In addition, beginning in the 4<sup>th</sup> century A.D, the Church started regulating child abandonment in the form of oblation. Parents were encouraged to offer their children to monasteries or to abandon them in front of ecclesiastic buildings to be raised by the Church. This practice became increasingly frequent during the Early Middle Ages. Sometimes it was the poor,

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<sup>29</sup> For the Roman period see: Saller 1991, see also Shaw 1987b: 30-46, who suggests an average age at marriage for girls around late teens. For the late medieval period see: Herlihy and Klapisich-Zuber 1985 and Dalla Zuanna et al. 2012.

<sup>30</sup> Barbiera and Dalla Zuanna 2007; Giovannini 2001; Lo Cascio and Malanima 2005.

<sup>31</sup> Giovannini 2001; Wicker 1998; Halsall 1996: 1-24.

<sup>32</sup> On the tacit toleration of exposure and infanticide in Modern Times Tuscany and thus on the difficulty of finding explicit reference to this practice in the sources see Hanlon 2003: 453-498.

<sup>33</sup> Harris, 1982 : 114-116 and 1994 : 1-22; Shaw 2001: 31-77.

<sup>34</sup> Boswell 1991; De Jong, 1996; Barbiera 2012.

<sup>35</sup> Boswell 1991; Barbiera 2012.

who felt forced to anonymously give away their children, but more often it involved the rich, willing to openly offer their offspring to prestigious monasteries, thus establishing powerful connections between aristocratic families and religious institutions.<sup>36</sup> This practice did not, however, translate into an elimination of children, but rather their displacement. Moreover, the available evidence does not indicate that females were more subject to abandonment than males.<sup>37</sup> Data collected up to present on exposure and oblation do not therefore indicate a link between the lack of women in early medieval cemeteries and female infanticide or abandonment.

Another hypothesis has been put forth to explain higher mortality among female children. It is argued that girls died more frequently than boys not because they were abandoned or killed, but because they were neglected during their first years of life (or even during their first months), experienced unequal resource allocation and hygienic care, and as such were more exposed and vulnerable to numerous childhood diseases. Hints of such conditions come from the polyptych of Farfa, where, as observed above, the recorded sex ratio among children is clearly unbalanced towards males. It is possible that young girls were rendered legally invisible for reasons of inheritance. In fact, during antiquity as well as the Early Middle Ages, inheritance on the Italian peninsula was by law equally divided between sons and daughters. One common reaction to this regulation may have been efforts on the part of families to seek an advantage for their sons,

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<sup>36</sup> De Jong 1996.

<sup>37</sup> Nevertheless, a detailed study on Early Modern *Status animorum* and baptism registers from Tuscany carried on by Hanlon allowed to conclude that exposure and infanticide were quite widespread and that females were more subjected than males, see Hanlon 2003: 453-498.

particularly firstborns, so as not to divide family patrimony.<sup>38</sup> While documentation from Farfa seems to support the idea that female children were neglected in comparison to their male counterparts, the undeniable fact is that the sex ratio of adults registered in the polyptych is generally balanced. This of course contradicts data from the cemeteries, suggesting that while it is likely that peasant families in Farfa did not always report their daughters, they did not let them die. Unfortunately, this extremely subtle source is the only one of its type available in Italy. Later data from Florentine land registries (*cadasto*) offer a more complex picture, where, as mentioned above, female under registration and infanticide by neglect concurred in making them invisible.<sup>39</sup>

Research on alimentary distribution and the health of children through the pathological study of bones could also prove informative, but also here data at our disposal is scarce. For example, enamel hypoplasia of teeth corresponds to arrested episodes of amelogenesis due to nutritional stress or illness which afflicts the individual during the period of tooth formation, from intrauterine life up to about seven years of age.<sup>40</sup> Hypoplasia is seen on teeth in the form of a distinct spot on one tooth or diffuse streaks or cloudy opacities on all teeth. Because teeth do not change over the life course, it is possible to observe alterations in the former at any age. In addition, based on the position of the hypoplasia defect on the tooth, it is possible to calculate the age at which it formed.<sup>41</sup> It is thus possible to ask, on the basis of the presence or absence of enamel hypoplasia and –

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<sup>38</sup> Smith 2005.

<sup>39</sup> Herlihy and Klapisch-Zuber 1985.

<sup>40</sup> Bedini 1991: 411-438.

<sup>41</sup> Canci, Minozzi 2005.

especially – the age of formation, whether in the communities under examination children experienced nutritional stress. Moreover, if such stress was linked to weaning, at around what age did this occur? Hypoplasia was also observed in many of the necropolises included in the sample under consideration, although study of its incidence by juxtaposing males with females has been carried out in only 9 cemeteries dated from the first until the sixteenth centuries. This data suggest that the percentage of individuals affected by hypoplasia declined dramatically in the early medieval cemeteries. In addition, females were less affected than males in all of the cemeteries considered with only one exception (the cemetery of Misciano, dated from the seventh to the tenth centuries).<sup>42</sup> It is however difficult to draw any definitive conclusions from this limited evidence, two rough contrasting assumptions can be drawn: female children were stronger or might have been better fed than males, or on the contrary, higher mortality of female children within the first months of lives, when the crowns of permanent tooth were not grown yet, might have led to a selection of for stronger girls, who were later less affected by hypoplasia. In one cemetery, dating to the 4<sup>th</sup> century (in Gallicano, Latium), scholars observed hypoplasia formation as early as 2.7 years of age for females and 3.4 years for males, suggesting that males may have been breastfed longer than females. Clearly more data is needed on this matter, both for Italy and other areas.

It is also possible that a variety of factors concurrently determined the invisibility of females in cemeteries under investigation. In a recent study

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<sup>42</sup> Barbiera 2012.

focusing on the underrepresentation of female newborns in China between 1981 and 1989, Johansson and Nygren persuasively show that infant girls were missing from live birth samples in part because they were given up for adoption and in part due to infanticide.<sup>43</sup> Both these practices reflect the lower status attributed to females in this society. Although contemporary China and Medieval Central Europe are extremely different and the lack of females is observed in two very different samples (live births in China and cemeteries in medieval Central Europe), it should not be excluded that similar mechanisms may have played a role in determining the unbalanced sex ratio.

Another important point to note is that mortality trends in Italy show higher values of  $d = D5-19/D5+$  ( $D5-19$  equals the number of skeletons of individuals estimated to be aged 5-19 years and  $D5+$  the number of skeletons over the age of 5) in cemeteries dating to the period between the 6<sup>th</sup> and 9<sup>th</sup> centuries, in contrast to lower values of  $d$  found in earlier and later cemeteries.<sup>44</sup> This means that in the early medieval Italian cemeteries where female adults were missing, the number of buried individuals between the ages 5 and 19 was higher than in earlier and later phases. This value could be attributed to an increase in mortality among younger individuals and/or a very young population structure.<sup>45</sup> Is there a relationship between the  $d$  and sex ratio values? And more generally, what sex

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<sup>43</sup> Johansson and Nygren 1991: 35-51.

<sup>44</sup> Barbiera and Dalla Zuanna 2009.

<sup>45</sup> Barbiera and Dalla Zuanna 2009. This aspect may, in this specific historical period, be related to different outbreaks of the so-called Justinian plague that occurred in Italy and the Mediterranean between the 6<sup>th</sup> and 7<sup>th</sup> centuries, see Little 2007: 3-31. The high  $d$  values observed during the first two centuries of the Early Middle Ages might therefore be attributed to a “stop and go” demographic mechanism, driven by mortality crises and subsequent population recoveries with rapidly de-aging population growth.

ratio values are found in other regions of Europe? And the d values? How do they relate to one another?

#### A META-ANALYSIS OF EUROPEAN CEMETERIES: DATA, SAMPLES AND RESULTS

In light of these data and hypotheses, we launched a new project with the aim of collecting data from cemeteries located in different parts of Europe.<sup>46</sup> The goal was to observe the d values and adult sex ratios that characterized areas outside of Italy and determine whether there is a relationship between the two which would help to interpret the invisibility of females observed in Italy.

To this end we selected a sample area (see map 1), which includes north-central Europe, in particular the territories occupied by present day Belgium, the Netherlands, France, Switzerland, Germany, Austria, Hungary, Serbia, Croatia, Slovenia and Italy.<sup>47</sup>

Before collecting the data, we established several selection criteria for the inclusion of sites in our sample. More specifically, we considered only cemeteries with more than 40 individuals aged 5+,<sup>48</sup> excluding those where more than twenty percent of adult individuals were of unknown sex, and those where  $SR_{20+}$  was less than 0.5 and more than 2. In addition, we include only those sites which have a final d value between 0.15 and 0.30. We ultimately collected data from about 150

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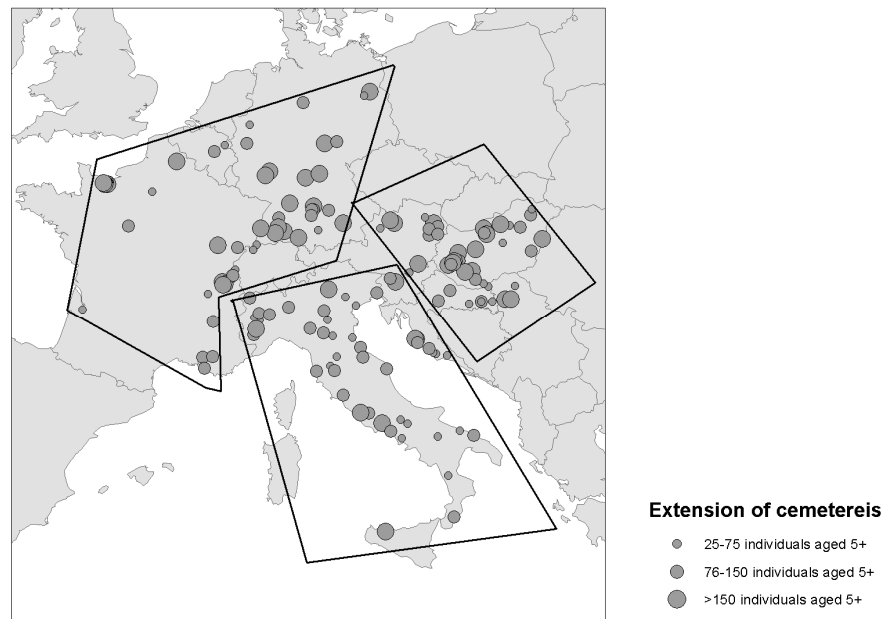
<sup>46</sup> The project entitled EWDEMA (European Women Discrimination in the Early Middle Ages) is financed by Cariparo Foundation and supported by the University of Padua, Department of Statistical Sciences and Department of History.

<sup>47</sup> All of the data was interpreted and displayed using an Access database and geographical information systems software. We thank Irina Gilfanova for her invaluable help in entering and displaying data from our database into the GIS system and Vicktor Lagutov and Eugenio Pappalardo for their helpful suggestions in using the GIS software.

<sup>48</sup> Individuals aged 0-5 were not considered as there is general consensus that this age group is underrepresented in cemeteries, as is similarly seen in many cemeteries dedicated solely to children, excavated in different regions of Italy and Europe (see also above).



sites including a total of 21,744 individuals aged 5+. Although the sample is quite broad and allows us to draw reliable conclusions, map 1 shows that some areas such as central France, Belgium, and the Netherlands are poorly represented due to a lack of available data.



**Map 1:** Investigated sites

In order to organize our data and allow for comparisons, we divided the material into chronological and territorial groups. These are of course arbitrary, the selected sample area is quite extensive and experienced radical and repeated social and political change from Roman times to the Late Middle Ages. Moreover, chronological dates may reflect various degrees of change in different regions. With these limits in mind, we grouped together cemeteries from the Roman times and Late Antiquity, that is from the first to the fifth century AD. We included cemeteries from the sixth to the ninth century in the same group due to the

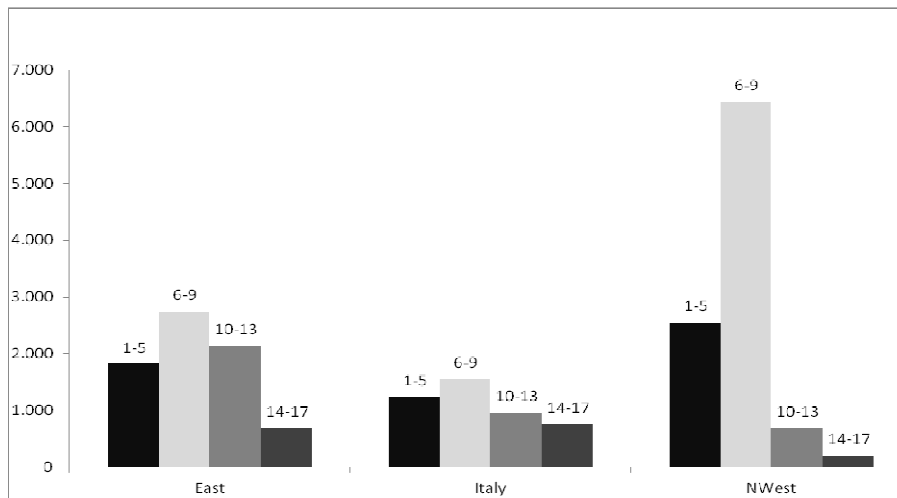
relatively high  $d$  values found in Italy during this period and the desire to compare this value to those of other regions of Europe during this same time span. Finally, we grouped cemeteries dating between the tenth and thirteen centuries together, which is the period preceding the Black Death, and then those cemeteries dating to the period following the plague, from the fourteenth to the seventeenth century. As to the selection of regions, we distinguished between a Mediterranean area (Italy, Dalmatia and western Slovenia);<sup>49</sup> a Northern-western area (Belgium, the Netherlands, France, Germany and Switzerland) which was annexed into the Carolingian kingdom; and a Central-eastern area (eastern Austria,<sup>50</sup> Hungary, north-east Croatia, eastern Slovenia and north-west Serbia) settled by the Avars and Slavs (see map 1). It should, in any case, be kept in mind that shifting political borders may have meant very little in terms of population trends and standards of living, although we observe that cemetery data is quite homogeneous within each of these three macro areas and present some differences among them.

Organizing the data in this fashion (see figure 2) means we have at least one thousand individuals over age five for each chronological period in each selected region, the only exception being the period after the fourteenth century which, due to the low number of individuals, was excluded from this study. The best represented area is north-western Europe between the sixth and the ninth century (6,400 individuals), thanks to extensive and well-documented material excavated and published in contemporary Germany.

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<sup>49</sup> In the original plan of this project we wanted also to include sites from Spain, but finally we were able to find only very few cemeteries there which satisfied our conditions.

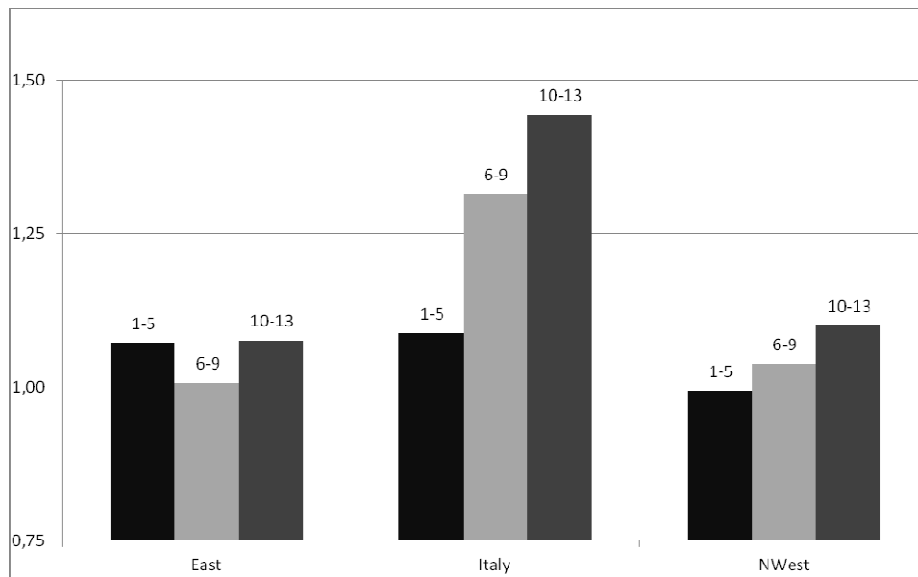
<sup>50</sup> We did not find any sites from western Austria that met our conditions.



**Figure 2:** Number of deaths aged 5+ (total 21,744) in the European sample.

In the *Appendix* we show that when youth mortality is very high, the death sex ratio over age 20  $M/F_{20+}$  tells us little about the level of  $M/F_{0-19}$ . On the contrary, if youth mortality is relatively low, high levels of  $M/F_{20+}$  actually do correspond to strong discrimination against female children. In other words, if the risk of dying before the age of 20 is less than 70%, a high death sex ratio  $M/F_{20+}$  corresponds to a low death sex ratio  $M/F_{0-19}$ , which can be interpreted as a supramortality of female children and young women.

From this result, it is possible to contextualize gender discrimination observable for the Italian Middle Ages within a European perspective (table z). Table 1.a shows that the death sex ratio  $M/F_{20+}$  is clearly higher than one only during the Italian Early and Late Middle Ages (Figure 3). The same result is depicted in the maps of the death sex ratio  $M/F_{20+}$  for the three periods under consideration (see map 2).

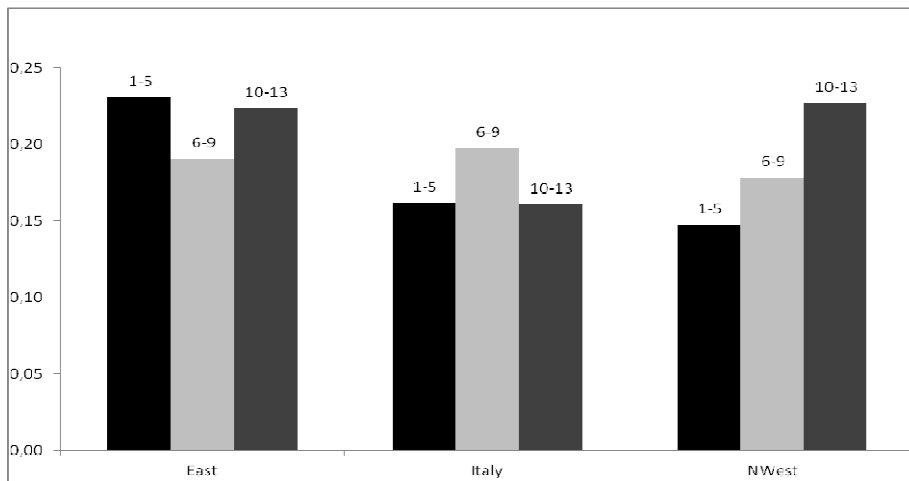


**Figure 3:** sex ratio M/F of deaths 20+ in different European regions and chronological spans

In Europe during Late Antiquity and the Middle Ages, the  $d$  ratio fluctuated between 0.15 and 0.23 (table 1.b and figure 4). Using these values and standard life tables, we estimated the probability of dying before the age of twenty (table 1.c).<sup>51</sup> Subsequently, we calculated the death sex ratio  $M/F_{0-19}$  for the different regions during the three time periods, assuming a stationary population (i.e. an invariable age structure and number over time) and a sex ratio at birth fixed at  $M/F=1.05$  (table 1.d).<sup>52</sup>

<sup>51</sup> When using the first 10 mortality levels from Coale and Demeny's West life-tables, the square of the linear correlation between  $d$  and  ${}_{20}q_0$  is 0.98. Barbiera and Dalla Zuanna (2009) show a similarly strict association between  $d$  and other functions of Coale and Demeny's model life-table for the four "regions" they consider. In this chapter – which specifically studies hypotheses attempting to explain gender discrimination in the Italian Middle Ages – regional differences in Europe in Late Antiquity and the Middle Ages are not systematically examined, extending the study dedicated to Italy (Barbiera and Dalla Zuanna 2009).

<sup>52</sup> In a stationary population, the age structure of observed deaths overlaps with the age structure of deaths in the corresponding life-table (i.e. the basic hypothesis of the so-called Halley method of building life-tables). Barbiera and Dalla Zuanna 2009 show that even if a population slowly

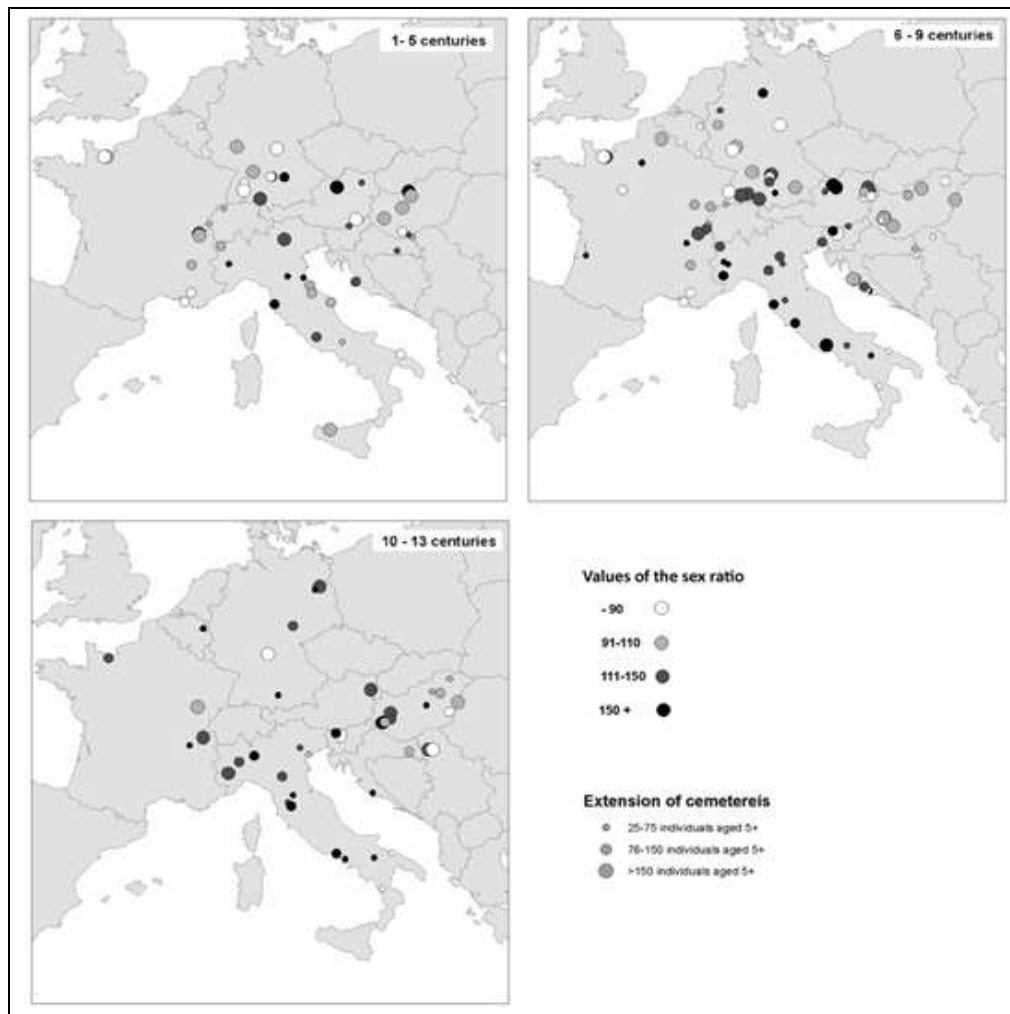


**Figure 4:** values of  $d$  in different European regions and chronological spans

**Table 1. Death sex ratio and mortality in Europe during centuries 1-13. Data on about 150 necropolises and 21,744 individuals aged 5+**

	Late Antiquity (1-5)	Early Middle Ages (6-9)	Late Middle Ages (10-13)
<b>(a) Death sex ratio <math>M/F_{20+}</math></b>			
<b>East</b>	1.071	1.007	1.076
<b>Italy</b>	1.088	1.307	1.438
<b>NWest</b>	0.994	1.037	1.100
<b>(b) <math>d = D_{5-19}/D_{5+}</math></b>			
<b>East</b>	0.231	0.191	0.223
<b>Italy</b>	0.161	0.198	0.161
<b>NWest</b>	0.147	0.178	0.227
<b>(c) Estimation of the probability of dying before age 20</b>			
<b>East</b>	0.71	0.62	0.70
<b>Italy</b>	0.54	0.63	0.55
<b>NWest</b>	0.54	0.60	0.68
<b>(d) Estimation of death sex ratio <math>M/F_{0-19}</math></b>			
<b>East</b>	1.042	1.077	1.039
<b>Italy</b>	1.019	0.924	0.815
<b>NWest</b>	1.101	1.059	1.027

declines or grows, as seen in the Italian Early and Late Middle Ages, this stationary hypothesis holds.

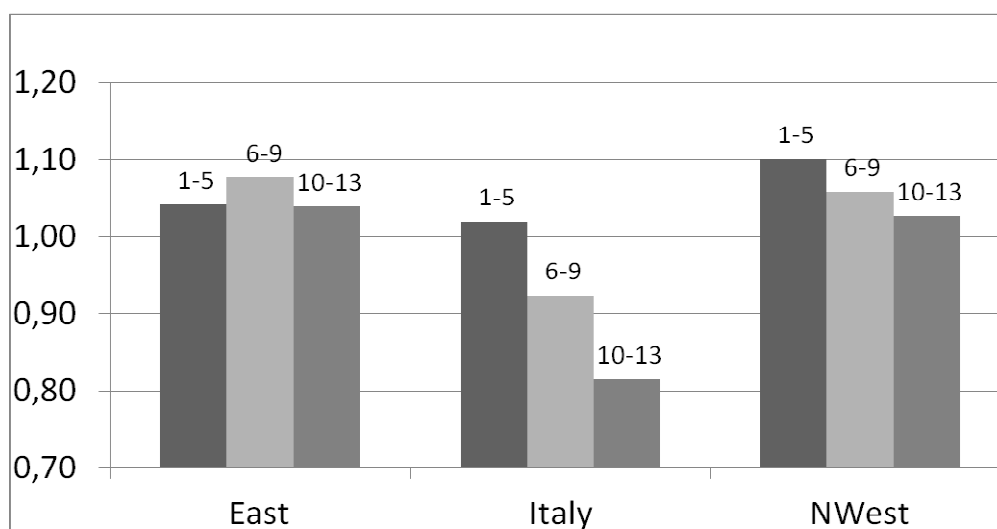


**Map 2:** values of the sex ratio in the sample areas in different chronological periods

Given that mortality before age 20 during the Italian Middle Ages was well under 70% (63% in the Early Middle Ages and 55% in the Late Middle Ages),<sup>53</sup> high levels of death sex ratio  $M/F_{20+}$  correspond to values that are considerably less than one for the death sex ratio  $M/F_{0-19}$ . In particular, according to our estimates, during the Italian Middle Ages, the death sex ratio  $M/F_{0-19}$  was 0.92 between the sixth and the ninth centuries and 0.81 in the tenth and thirteen

<sup>53</sup> Barbiera and Dalla Zuanna 2009

centuries, in contrast to the higher values (1.02) observed in Italy between the first and the fifth centuries and in all of the other European regions during the three periods considered here, where the death sex ratio  $M/F_{0-19}$  fluctuated between 1.01 and 1.10, which are values entirely compatible with identical levels of mortality for male and female children, recalling that the standard sex ratio at birth is about 1.05 (Figure 5).



**Figure 5:** estimation of death sex ratio 0-19 in different areas and chronological spans

Data from this meta-analysis of European necropolises clearly delineate the historical dilemma at hand. Why, during the Italian Middle Ages, did female children and youth have higher mortality rates compared to their male counterparts? And why does such gender discrimination appear only in the Italian Middle Ages, and not during Roman times or in other areas of Europe?

#### THE ITALIAN PECULIARITY: SOME HYPOTHESES

About ten years ago, in a contribution entitled «Did Women Have a Transformation of the Roman World?» Julia Smith reflects on how the end of the Roman Empire changed the lives of women.<sup>54</sup> Rather than finding an answer, the author aims to highlight the lack of scientific research on this topic and raises a series of questions she felt useful for further study. A number of investigations have since been dedicated to understanding changes in marriage and family following the end of the Roman Empire.<sup>55</sup> Aspects such as the shift from an agnatic kinship system (characteristic of Roman times) to a cognatic system, the loss of power of the *pater familias*, and the forming of a dowry system that no longer involved solely the bride's family but also that of the groom, together led to a more significant role of women in marital politics, making the latter “socially useful” in establishing links between different familial clans.<sup>56</sup> Similarly, in the context of the necropolises, it was observed that women could receive rich feminine grave goods in greater numbers than men, and this is especially true in Italy, precisely where women are so scarcely represented.<sup>57</sup> How thus to reconcile female underrepresentation with the fact that commemorative practices make them more visible? And how to explain the hypothesis of discrimination against female children if women appeared, precisely in this time period, to take on a more important role in marital politics? And above all, what made Italy distinct from the rest of Europe following the end of the Roman Empire?

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<sup>54</sup> Smith, 2001 ; see also Le Jan 1995; Arjava 1996; Goody 2000.

<sup>55</sup> Tra i lavori recenti più importanti: Bougard, Feller Le Jan (eds.) 2002; Bougard, La Rocca, Le Jan (eds.) 2005; Cooper 2007. Among the most important recent work see: Bougard, Feller Le Jan (eds.) 2002; Bougard, La Rocca, Le Jan (eds.) 2005; Cooper 2007.

<sup>56</sup> See for example: Cooper 2007; Wood 2005; Goetz 2005; Halsall 2010.

<sup>57</sup> Barbiera 2012



It is quite difficult to say: sources for Italy are scarce for this time period, making conjectures a challenge. If, on the one hand, Early Middle Age documentation relative to the aristocratic classes shows that women took on a more important role in marital politics with respect to Roman times, on the other hand the marriage of a daughter was not always hoped for or necessarily considered advantageous. While Teodorico and Desiderio used the marriages of their daughters to weave ties and alliances with other foreign kings, Charlemagne preferred not to wed his daughters, thus avoiding the arrival of unwelcome heirs. The latter, in a phase of delicate assertion of Carolingian power, could have had a destabilizing effect if in conflict with the line of male descendants.<sup>58</sup> The daughters were thus “living treasures”, to use an apt expression by Pauline Stafford,<sup>59</sup> that could be spent or treasured accordingly.

If, in fact, changes in marriage in Late Antiquity resulted in a greater weight of women in the formation of new family groups, these same changes also meant (in contrast to Roman times) that women were no longer under the control and guardianship of their fathers but entered the orbit of the groom’s family. Thus while in Roman times a daughter and the goods she inherited remained under the *patria potestas* of the father (at least as long as he was alive), in the Early Middle Ages a wife and her goods were integrated into the husband’s clan, resulting in a more clear-cut detachment from the family of origin. This process was perhaps even more radical in Italy, where under the Lombards, the groom was requested to

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<sup>58</sup> La Rocca 2010; Nelson 1998: 171-190; Joy 2010: 29-54.

<sup>59</sup> Stafford 2001: 61-82.

purchase his wife's *mundio* (legal right), such that the father lost any power over his daughter.<sup>60</sup>

Simultaneously, in Late Antiquity the Church began, with increasing insistence, to back a policy against marriage between blood relatives.<sup>61</sup> Different theories have been formulated to explain the reasons behind laws against incest, prohibiting marriage up until the sixth degree of kinship. Here we are not so much interested in the motives behind these choices, but the consequences they may have had.<sup>62</sup> As observed by anthropologists, the ban against marriage between blood relatives and the encouragement of exogamous marriages (external to the extended kin group) meant that women and their property necessarily left the family of origin and went to another family.<sup>63</sup> This may have been perceived as an occasion to establish new ties or, in the inability or impossibility of creating advantageous marital contracts, as a loss.<sup>64</sup> That the marriage of daughters was a delicate affair and not always successful in Early Middle Ages is equally testified

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<sup>60</sup> For more on the groom's purchase of the *mundio* under Lombard law, see L. Feller ; on daughters' departure from the family of origin upon marriage during the Early Middle Ages in Italy, see: G. Bühner-Thierry 2010: 55-66; La Rocca 2011a: 65-83.

<sup>61</sup> Goody 1983; Herlihy 1985; De Jong 1998: 107-140.

<sup>62</sup> One problem is to understand to which extent endogamous marriages were frequent in Roman times and how the bans against them changed the scenario of marriage alliances. According to Augustine marriages among cousins were not frequent in his times, see Augustine, *De Civitate Dei*, XV.16, see also Shaw 1987a: 3-51.

<sup>63</sup> Levi-Strauss 2<sup>e</sup> éd.1967; Fox 1967; Bell 1998: 187-209; Remotti 2008.

<sup>64</sup> In a recent contribution, Youssef Courbage and Emmanuel Todd (2007) show that discrimination against women in the Muslim world is strongly linked to the type of familial structure in force. In societies that practice exogamy (marriage between different familial groups) and where residence is patrilocal (young brides move to their husband's home and became part of his family), young girls are discriminated against by their family of origin: being given away in marriage is perceived as a loss, any offspring will form part of an unrelated family's line of descendants, and any inheritance will go to a different group. Vice-versa, where marriages are endogamous (between blood relatives), investments in daughters are equal to those of sons, in that when marrying a relative, daughters remain directly linked to the family of origin, and patrimony and children stay within the extended kin group.

to by sources of different nature.<sup>65</sup> In this context, the Church was able to offer an advantageous alternative to marriage. In other words, the establishment of monasteries on the part of the aristocracy allowed the latter to obviate the division of familial patrimony while simultaneously creating centres of power managed by the descendants of the founding family, among whom the abbot or abbess was chosen.

It should, however, be pointed out that options available to the elites were not necessarily accessible to the lower classes. Little or nothing is known about the conditions women of peasant or small producer origin, who mostly used the necropolises spread across the territory and considered here. That which is, however, even more difficult to discern from the relatively fragmentary sources available is in what ways Italy differed with respect to Europe; why daughters here were seemingly less desired and thus discriminated against. One could argue that Italy that had been the heart of the Roman Empire experienced the transformations which accompanied the crumbling of the Empire differently and perhaps more dramatically than other territories, with the gothic wars and the Lombard conquest. While it is difficult to tell how these events affected women's lives, the sparse and fragmentary information available does offer some insight.

A number of scholars similarly emphasize, for example, how the Lombard laws were among the most restrictive of the roman-barbarian codes in terms of women's actions. As mentioned above, women were, throughout their lives, under

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<sup>65</sup> Smith 2005.

the guardianship of a male: first their fathers, then their husband, and finally their sons.<sup>66</sup>

Moreover, while the Lombard sovereigns seem to have wanted to protect women against violence through the codes of the laws, they also endeavoured to control their conduct by limiting their freedom of action.<sup>67</sup> It is not possible to know to what extent the intent to defend the female sex was motivated by an actual desire to protect the latter in a particularly violent society or was instead an attempt to control women in order to protect the interests of male family members. Further, it is not clear to what extent efforts to segregate women in the laws were actually applied in real life.<sup>68</sup>

That the marriage of a woman was not always a welcome occasion is hinted at in the codes relative to women *in capillo*. As pointed out by Cristina La Rocca, unmarried women, daughters, sisters, and aunts under the guardianship of *parentes propinqui* appear frequently both in the Lombard laws and in testamentary documents. One of Astolfo's legal codes reads as follows:

while they remained unwed at home, without dowry, suffering every scarcity, they joined forces with servants. Thus, drawing inspiration from God, let us agree that if a dying Lombard leaves one or more unmarried sisters or one or more children, his sons must assess how their aunts can live without shortages, in accordance with the amount of their inheritance, so their aunts do not suffer from hunger or a lack of clothes or servants.<sup>69</sup>

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<sup>66</sup> Wickham 2006; Edictum Rothari 2004.

<sup>67</sup> Smith 2005; Wickham 2006.

<sup>68</sup> La Rocca, 2005: 431-457.

<sup>69</sup> *Ahistulfi Leges*, 10, in Azzara and Gasparri 2005.

In addition to suggesting a certain weight of this phenomenon, the text hints at the potential strains that a woman *in capillo* could generate within a family in terms of inheritance.<sup>70</sup> Later, a chapter from the Canonical of Pavia of 850 encourages priests to ensure that fathers wed their daughters:

It has come to the attention of the holy synod, from different parts, that certain fathers keep at home longer than necessary their daughters, who have reached marrying age and can wed in a sufficiently suitable manner; such that it often happens that [these daughters] experience corruption in the same paternal home. It has been reported that in some cases, impious even to tell it, that these same fathers connive with the corrupters of their daughters and make bawds out of those they have generated. The priests should therefore admonish fathers, such that they guarantee their daughter's wedding in due course and ward off the ardour of an impetuous age with the discipline of marriage.<sup>71</sup>

The sources thus seem to indicate that if in some cases and contexts the marriage of a daughter could be advantageous, it could also represent a loss preferable to avoid.

Other material of interest comes from a fascinating study by Geneviève Bühner-Thierry who compares the allotment of property among brothers and sisters in Baviera and Lucca between the eighth and ninth centuries.<sup>72</sup> The study reveals two rather different situations. In Baviera, sisters were often co-owners of property together with their brothers and *nepotes* (nephews), suggesting the

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<sup>70</sup> La Rocca 2011b: 9-18.

<sup>71</sup> Capitolari di Ludovico II, Sinodo di Pavia, 40.9, in C. Azzara, P. Moro, *I capitolari italici. Storia e diritto della dominazione carolingia in Italia*, Roma, 1998.

<sup>72</sup> Bühner-Thierry 2010: 55-66.

persistence of a link between women and their family of origin. This never took place in Lucca; here women do not emerge as joint owners with other members of their family of origin. The author concludes that it is probable that married women maintained few links with their family of origin: “from the moment they take on a husband, it seems that women can no longer pass down anything to the descendants of their own family”; it is the acquired family that manages the women’s assets. “Unless they come from a very powerful and socially much more elevated family compared to that of the groom, the wife is ‘cut off’ from her family of origin.”<sup>73</sup>

In conclusion, data on Italian medieval necropolises are sufficiently robust to demonstrate high infant and youth female mortality rates; levels that were not, on the contrary, observed in Italy during either the Roman Empire or in Central and Eastern Europe between the first and thirteenth centuries. Understanding the causes of these differences is not a simple task. That said, high female mortality does not seem due to either statistical artefacts or to selection problems concerning data on the necropolises compared those on the general population.

Written sources support the idea that the transition from Roman to medieval times in Italy was characterized by a weakening of the *pater familiais* and – more generally – the family of origin’s control over women (throughout their lives), in part due to a widespread affirmation of exogamous marriage. That women in the Italian Middle Ages were a resource to their parents becomes a possibility and no longer a certainty, as was true during the Roman Empire. This

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<sup>73</sup> Bühler-Thierry 2010: 65

shift may have been particularly drastic in Italy – the heart of the Roman familial system – compared to Central-Eastern Europe. If, however, archaeological sources confirm higher mortality rates among young female children and youth in the Italian Middle Ages, further interpretation of this phenomenon requires a gathering of more conclusive information.

## APPENDIX: DEATH SEX RATIO AND MORTALITY LEVELS

Comparison of the death sex ratios in the different time periods and different regions of Europe under consideration requires a methodological premise. For the necropolises in our database, it was possible to construct the sex ratio of skeletons age 20+ ( $M/F_{20+}$ ). For younger individuals, traditional anthropological analyses – or those carried out in the large majority of studies available regarding European necropolises – do not allow the sex of the deceased to be determined. Intuitively, one could say that when  $M/F_{20+}$  is significantly greater than one – considering that the sex ratio at birth is (relatively) constant across all human populations (typically 105 male births for every 100 female births) – the risk of dying for an individual under the age of twenty should be greater among girls. Female infants and youth died in greater numbers before adulthood. This is, however, only partially true. In fact, the difference between female and male mortality at young ages is not linked solely to  $M/F_{20+}$  but also to mortality levels (of males and females taken together) during the first phases of life. When youth mortality was very high, an  $M/F_{20+}$  higher than one does not indicate discrimination against girls. If, instead, youth mortality is moderate, an  $M/F_{20+}$  higher than one indicates that during the preceding ages mortality was experienced above all by female children.

These assertions can further be understood through use of simulations that represent “extreme” cases (Table 2). We hypothesize 205 births, of which 105 are male and 100 are female and we observe how infant, male, and female mortality



values change in relation to variations in the sex ratio after the age of twenty and in youth mortality.

**Table 2. Four simulations of demographic dynamics in populations a and b with equivalent moderate youth mortality and differing death sex ratios  $M/F_{20+}$  and in populations b, c, and d with equivalent death sex ratios  $M/F_{20+}$  and differing youth mortality**

	Births	Deaths 0-19	Deaths 20+
<b>(a) Individuals deceased before age 20: 56%</b>			
# Males	105	60	45
# Females	100	55	45
# Total	205	115	90
Sex ratio M/F	1.050	1.091	1.000
<b>(b) Individuals deceased before age 20: 56%</b>			
# Males	105	45	60
# Females	100	70	30
# Total	205	115	90
Sex ratio M/F	1.050	0.643	2.000
<b>(c) Individuals deceased before age 20: 71%</b>			
# Males	105	65	40
# Females	100	80	20
# Total	205	145	60
Sex ratio M/F	1.050	0.813	2.000
<b>(d) Individuals deceased before age 20: 85%</b>			
# Males	105	85	20
# Females	100	90	10
# Total	205	175	30
Sex ratio M/F	1.050	0.944	2.000

In tables 2.a and 2.b youth mortality is at the same level, relatively contained for that time period (56% of youth died before their twentieth birthday), while the sex ratio values differ: in fact,  $M/F_{20+}$  in table 2.b is double that observed in table 2.a; in table 2.a the value of  $M/F_{0-19}$  is also close to one, while in table 2.b this same indicator is 0.643, suggesting higher mortality among female children.<sup>74</sup>

Conversely, tables 2.b, 2.c, and 2.d have the same level of  $M/F_{20+}$ , always equal to

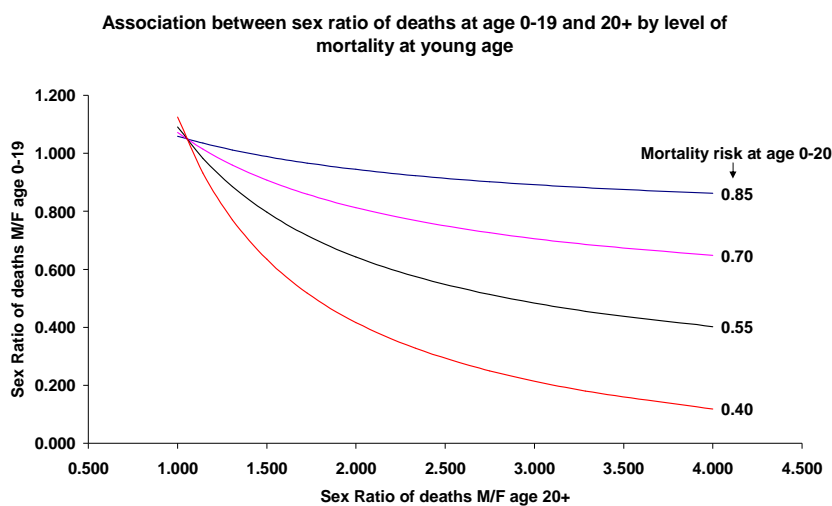
2. However, the sex ratio among those who died young changes radically,

<sup>74</sup> This result would be analogous if in place of the sex ratio  $M/F_{0-19}$  one constructed the ratio among the probabilities of dying at age 0-19, in that the two denominators of the probabilities are, between them, constant in ratio:  $(M_{0-19}/105) / (F_{0-19}/100) = (M_{0-19}/F_{0-19}) / (100/105)$ .

increasingly rapidly towards values ever more closer to 1, with rising mortality. When mortality is at very high levels even for the past (table 2.d, where the probability of dying before one's twentieth birthday equals 0.85), the sex ratio at young ages equals 0.944, indicating the absence of supermortality for female children and young women.

These results are easily generalizable. Figure 6 shows the association between  $M/F_{0-19}$  and  $M/F_{20+}$  for four levels of the risk of dying before age 20. As already seen in table 2, when youth mortality is very high,  $M/F_{20+}$  says very little about the level of  $M/F_{0-19}$ . On the contrary, if youth mortality is relatively low, high levels of  $M/F_{20+}$  actually correspond to a strong discrimination against female children. In other words, if the risk of dying before the age of 20 is less than 70%, high death sex ratios  $M/F_{20+}$  correspond to low death sex ratios  $M/F_{0-19}$ , or a supramortality of female children and young women.

**Figure 6.**



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