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# Sex imbalances at birth in migratory context: evidence from Italy

## 1. INTRODUCTION

The analysis of sex ratio at birth (SRB) is not a new topic in demography. Historical trends of sex ratio at birth have been studied by Graunt, Süssimilch and Gini. Gini, in particular, found that the excess of male births was universal since it was observed in every population and in all countries (1908). Recent studies (Guilmoto, 2009; 2012; Bongaarts and Guilmoto, 2015; Guilmoto, 2015), however, show that sex ratio at birth has risen in a few Asian countries since the 1980s, and it remains abnormally higher than expected for almost 30 years. The trend in SRB observed in some countries of east and southeast Asia was opposite to that observed in the rest of the world (see Table 1), where SRB has been stable at 104-106 in the period 1950-2000[1], and is expected to maintain the same pattern into the future (Guilmoto, 2009). A similar trend is the consequence of practices of sex selection in these areas due to the diffusion of forms of discrimination known as "son preferences". Guilmoto (2012 and 2015) uses an original interpretative framework to explain the causes of the abnormal increase of the proportion of male births in certain countries of the world. His approach is built on Coale's (1973) three preconditions of fertility decline.

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[1] SRB has been stable in Italy as in other countries where prenatal sex selection is not performed. However, in recent decades, SRB has decreased in some western countries such as Denmark, the Netherlands, Canada and the US (Davis, Gottlieb and Stampnitzky, 1998) while it has remained stable or has slightly increased in southern European countries, including Italy (Astolfi and Zonta, 1999). These changes have been attributed to increasing exposure to hazardous environmental conditions.

Table 1 – *Sex ratio at birth (SRB) in selected countries, 2008-2014*

| Country | SRB | Year | Source |
|---|---|---|---|
| China | 115.9 | 2014 | National Bureau of Statistics |
| South Korea | 105.3 | 2013 | Birth registration |
| Hong Kong | 109.3 | 2013 | Birth registration |
| India | 110.0 | 2011-2013 | Sample registration System |
| | 110.1 | 2012 | Birth registration |
| Singapore | 107.0 | 2013 | Birth registration |
| Taiwan | 107.4 | 2012 | Birth registration |
| Vietnam | 112.2 | 2013-2014 | Intercensal survey |
| Azerbaijan | 115.6 | 2013 | Birth registration |
| Armenia | 114.0 | 2012-2013 | Birth registration |
| Georgia | 108.0 | 2012-2015 | Birth registration |
| Albania | 109.0 | 2012-2013 | Birth registration |
| Kosovo | 110.4 | 2011-2013 | Birth registration |
| Macedonia (northwest)(e) | 110.4 | 2009-2013 | Birth registration |
| Germany | 105.3 | 2013 | Birth registration |
| Brazil | 104.8 | 2012 | Birth registration |
| France | 104.8 | 2013 | Birth registration |
| USA | 104.7 | 2012 | Birth registration |
| Japan | 105.2 | 2012 | Birth registration |
| Russia | 105.7 | 2013 | Birth registration |
| Turkey | 105.8 | 2013 | Birth registration |

*Source*: Guilmoto, 2015.

According to Coale's critical review of the demographic transition paradigm, in order to have a decrease in fertility, 1) fertility should be within the calculus of conscious choice; 2) low fertility must be perceived as an advantage; and 3) effective techniques to reduce fertility (i.e., family planning methods) must be available. Guilmoto (2015) stresses that, like in Coale's model for fertility decline, there are three orders of preliminary condition or "intermediate factors" to adopt sex selection at birth. According to Guilmoto, the three preconditions to sex selection at birth are: 1) a supply factor expressed by the ability to realise sex selection at birth through the availability of sex selection technologies; 2) a demand factor expressed by the preference for either female or male children; 3) a demographic factor

expressed by the decline in fertility. These factors have different impacts on the phenomenon, as the major cause of sex selection at birth in favour of male children is ascribed to son preference in patrilineal societies. Son preference is widespread in patrilineal social systems in some eastern and southern Asian countries (Das Gupta, Zhenghua, Bohua, Zhenming, Chung and Hwa-Ok 2003); however, it should be considered as a form of sexual discrimination and gender inequality. In the Program of Action of the 1994 International Conference on Population and Development (UN, 1994) held in Cairo, it was recommended to eliminate all forms of discrimination against the girl child, commonly known as "son preferences". Among those is prenatal sex selection. Sex selection is not a new phenomenon in such societies: before the availability of modern technologies, sex discrimination was perpetrated after birth, resulting in an unbalanced sex ratio of the population due to higher female mortality (Coale, 1991). Since the 1980s, thanks to the availability of prenatal diagnosis technology, couples have the ability to know the sex of the future born. As a direct consequence of early sex knowledge, couples may choose to undergo an (legal or illegal) abortion (Chen *et al*., 2013). Finally, the fertility transition has led many countries to lower levels of fertility: the decline in fertility could have exacerbated the need for sex selectivity, because with a lower number of children, the risk of not having a child of the desired sex increases.

When studying the phenomenon of sex selection before birth, it is important to stress that the SRB increases with birth order, as prenatal discrimination with first births is generally infrequent (Guilmoto, 2015). Prenatal sex selection is practiced for higher order births, while first and second births are often left to chance.

Sex selection, either in early childhood or at birth, has important consequences from the demographic point of view because it leads to the well-known phenomenon of "missing women." In 2010, there were about 125 million missing women worldwide (Bongaarts and Guilmoto, 2015), i.e., girls who were not born or who didn't reach the age of 5 because of sex selection at birth or immediately after birth (female excess mortality). Major contributors to the bulge of missing women were India and China (Guilmoto, 2012). According to Bongaarts and Guilmoto's recent estimates (2015), since 1970, the percentage of missing women in the world increased from 3.3 to 3.7, while the number of missing women has doubled. The countries in which the percentage of missing women has increased during the same period are China, Nigeria and Indonesia. In east and southeast Asia, skewed sex ratio at birth is widespread mainly in China, Hong Kong, Singapore and Vietnam, while South Korea has managed to achieve a decrease from the elevated levels of the 1980s and now has a normal sex ratio at birth (WHO, 2011). In south Asia, the country in which skewed sex ratio at birth is more

diffused is India. In the past, together with China, this country was already known for an unbalanced sex ratio as the consequence of female infanticide (Caldwell and Caldwell, 2005). As far as other south Asian countries are concerned, Nepal has witnessed an increase of male births in the last decade. Unfortunately, no reliable data are available to assess SRB in Pakistan and Afghanistan (Guilmoto, 2015).

Today, sex selection at birth is diffused in other countries of the world in addition to Asian countries, in particular, since the end of the Iron Curtain. An unusual SRB has been recorded in a few countries in western Asia including Azerbaijan, Armenia and Georgia, and in two countries in southeast Europe: Albania and Montenegro.

## 2. RESEARCH AIM AND QUESTIONS

### 2.1 *Previous findings*

The increasing number of international migrants worldwide, in particular from southeast and east Asia, could have exported the practice of sex selection into destination countries in the western world. So far, the studies realised on that topic have found evidence of higher than expected SRB from migrants originating from southeast and eastern Asia and Albania, in countries such as the US, UK, Canada, Spain, Norway, Greece, Australia and Italy (Dubuc and Coleman, 2007; Almond and Edlund, 2008; Almond, Edlung and Milligan, 2009; Singh, Pripp, Brekk and Stray-Pedersen, 2010; Verropoulou and Tsimbos, 2010; Meldolesi, 2012; Blangiardo and Rimoldi, 2012; Gonzalez, 2014). This topic was first addressed in the seminal paper of Dubuc and Coleman (2007). SRB was studied in England and Wales during the period of 1969-2005, according to the birthplace of the mother, using exhaustive vital statistics from the Office for National Statistics. An increase of SRB, especially for birth of higher order, was recorded for mothers born in India who gave birth after the 1980s, following the same path that occurred in India in the same time period. The authors ascribe the imbalances in sex ratio to prenatal sex diagnosis, followed by abortion of female foetuses in a context of declining fertility. This research opened the door to similar studies in a migratory context: Almond and Edlund (2008), using 2000 US Census data, documented male-biased sex ratio at higher parities (second and third birth) among US-born children with Chinese, Korean and Asian-Indian parents. According to the authors, the sex selection occurs at the prenatal stage.

Almond *et al*. (2009), analysing the 2001 and 2006 Canadian Censuses (20% sample), found evidence of sex selection at birth for higher order birth (second and third birth) for first- and second-generation migrants from

India, China, Korea and Vietnam if previous children were girls. Religion is an important determinant for sex selection before birth, as Christians and Muslims of Asian origin in Canada are not using abortion to select male children. Through a retrospective cohort study of live births from mothers of Indian- and Pakistani-origin residents in Norway over the period 1969-2005, Singh *et al*. (2010) found a skewed sex ratio for birth of higher order (third and fourth birth) for Indian mothers, beginning in 1988. During the entire observed period, the sex ratio was not biased for Pakistani-origin mothers. As in the previous studies, the main causes of skewed sex ratio for Indian mothers have to be ascribed to availability of prenatal sex selection techniques, followed by selective abortions, in a context of declining fertility. Differences in the behaviour toward female offspring between the two ethnic groups are similar to those recorded in the country of origin: different level of education and different religious belongings are the main explanations for such unequal behaviour.

Using micro-level information on the live births registered in Greece for 2006, Verropoulou and Tsimbos (2010) analysed sex ratio at birth for the entire population comparing immigrants and natives. They found a relatively high sex ratio at birth for some migrant groups: in particular, Albanians (109.5) and Asians (129.0). Gonzalez (2014) studied SRB in Spain using data from birth registrations in the period from 2007-2012. She found skewed sex ratios for Indian parents independent of birth orders, and for Chinese parents at higher birth orders (third order and higher). Results are consistent with previous studies on the topic, highlighting strong cultural factors affecting sex ratio at birth. Likewise, in other case studies, sex ratio is found to be skewed, as a result of abortion performed after prenatal sex selection. Recent data from the Australian Bureau of Statistics for the period of 2003-2013 on births from parents of Indian and Chinese origin living in Australia show a skewed sex ratio at birth for parents of both countries of origin (SBS Radio, 2015).

### 2.2 *Research aim*

This paper aims to explore SRB of migrants in Italy in order to shed light on the possible phenomenon of sex selection at birth. Recent studies addressed the same issue for migrants of Indian and Chinese origin living in Italy (Meldolesi, 2012; Blangiardo and Rimoldi, 2012). The study of Meldolesi was limited to the period of 2006-2009 and used data on birth records, while the latter study uses data from a 2011 survey of 700 women of Chinese and Indian origin in the Lombardy region (a summary of results of previous studies is presented in Table 2).

Table 2 – *Summary of previous studies on SRB of migrants residing in Western Countries*

| Country | Author(s) and year | Origin of migrant populations with unbalanced SRB | Data source |
|---|---|---|---|
| UK | Dubuc and Coleman, 2007 | Indian | Birth registration |
| USA | Almond and Edlund, 2008 | Chinese, Korean and Indian | Census |
| Canada | Almond, Edlung and Milligan, 2009 | Indian, Chinese, Korean and Vietnamese | Census |
| Norway | Singh, Pripp, Brekk and Stray-Pedersen, 2010 | Indian | Birth registration |
| Greece | Verropoulou and Tsimbos, 2010 | Albanian and Indian | Birth registration |
| Italy | Meldolesi, 2012; Blangiardo and Rimoldi, 2012 | Indian and Chinese | Birth registration and Survey |
| Spain | Gonzalez, 2014 | Indian and Chinese | Birth registration |
| Australia | SBS radio, 2015 | Indian and Chinese | Birth registration |

*Source*: authors' elaborations.

Our objective is to go beyond these studies, analysing births from mothers with a foreign background, from countries where sex selection at birth is widespread and that are among the largest immigrant communities in Italy. The paper aims at assessing 1) if a skewed sex ratio at birth is observed among overseas communities; and 2) the possible factors affecting skewed SRB in the migratory context. After an overview of data recorded at the national level for the period of 2005-2013, our study proceeds with two explorative multivariate analyses on two different data sources for the region of Lombardy. Lombardy is one of the Italian regions most affected by immigration. Although referring only to a region, in the two-year span of analysis, foreign children born in Lombardy accounted for 27% of the total number of foreign children born in Italy (Istat, 2015).

## 3. DATA, METHODS AND MEASURES

### 3.1 *Data and methods*

Data used to elaborate descriptive statistics on births at the national level stems from the survey on births from the Resident Population Registers (Rilevazione individuale degli iscritti in anagrafe per nascita). Among the vital statistics sources, an individual and continuative survey on births from the Resident Population Registers was set up by the Italian National Institute of Statistics (Istituto Nazionale di Statistica, Istat) in January 1999, and it ensures the knowledge of the main characteristics of births and parents at the municipal level. The individual sheets currently retrieve information on births (sex, date and place of birth, nationality), parents (place and date of birth, nationality, marital

status) and the main details about the head of the household. Thus, live births registered in the Resident Population Registers provide a descriptive analysis of the phenomenon. The last data available refer to 2013 statistics. Average SRB is calculated for the period of 2005-2013 for same-citizenship couples.

As for explorative multivariate analysis, we rely on two different data sources. A first analysis, a logistic regression, is performed on a Birth Assistance Certificate (CEDAP, Certificato di Assistenza al Parto) dataset collected by the Ministry of Health in 2008-2009 for births that took place in Lombardy. CEDAP is a continuative data source since 2002 on annual deliveries, collected in hospitals' birth departments. The dataset contains information on parents' socio-demographic background, mothers' reproductive history, pregnancy characteristics, delivery and neonatal characteristics. The final regional dataset used for the analysis consists of all births from foreign mothers (55,122 births) and a statistic sample of births from Italian mothers (43,614 births; 29.2% of the total).

A second logistic regression is carried out on data from the First Regional Survey on Sexual and Reproductive Health of Migrant Women ("Indagine sulla presenza nel territorio lombardo di popolazione a rischio in relazione alla salute sessuale e riproduttiva e alle mutilazioni genitali femminili") held in Lombardy in 2010. This cross-sectional survey was set up by the Regional Institute of Statistics (formerly Irer, now Eupolis) and by the Department of Statistics of the University of Milan-Bicocca. It involved 2,011 migrants aged 15-49 living in the Italian region of Lombardy in 2010, and it is representative of the region's main nationalities. Undocumented and naturalised women are included in the sample. The sampling was conducted in 9 of the 12 provinces of Lombardy, covering both urban and rural contexts. This dataset contains information at the personal level on women's experience of abortion (in Italy or abroad) as well as data on the gender of all children born (Farina, 2010). Using a multilevel approach for this analysis did not significantly improve the fit of the models; we therefore opted for the simpler logistic approach.

### 3.2 *Variables for logistic analysis on CEDAP data*

The dependent variable is the sex of the newborn child[2]. The key covariate in this analysis controls for births from parents who are citizens of a country with imbalanced SRB (8,801 births, 8.9% of the sample). For the sake of simplicity, and in order to have better control of the interpretation of results, we considered only citizens of the same country. We also tried to enlarge the analysis to include Italian citizens born in a country with imbalanced sex ratios; however, adding these very few cases did not change results, and the number of foreign-born Italian from countries with imbalanced SRB was too small in order to investigate if there was

[2] We excluded from the analysis 13 cases where the newborn's sex was registered as "undetermined." None of these children were born from citizens of countries with imbalanced SRB.

a significance imbalance in the SRB of their offspring. The number of births of mixed couples from countries with imbalanced SRB was also negligible (5 births).

Building on existing literature, we considered the following as countries with imbalanced SRB: Albania (44.1%), Armenia (0.01%), Azerbaijan (0.03%), Georgia (0.07%), China (25.8%), Montenegro (0.02%) and Macedonia (1.9%)[3].

Other covariates included in the model control for the following characteristics:

- Age of mother and age of father at birth (in single years), factors which have been found in past research to be related to the sex of a newborn (Chahnazarian, 1988; Jacobsen, Møller and Mouritsen, 1999).
- Mother's and father's highest educational degree (university; high school; junior high school; primary school or none) and mother's and father's job positions (manager, businesswoman/businessman, self-employed; other) in order to control for socio-economic factors.
- Mother's self-reported experience of abortion or miscarriage. Miscarriages are taken into account as women may declare a miscarriage instead of an abortion to avoid stigma.
- Prenatal testing during pregnancy (chorionic villus; amniocentesis; number of ultrasound examinations) in order to assess the possibility that these medical examinations are used as prenatal sex selection tools.
- Presence of one, two, or more previous children, as parity is recognised as a key factor in shaping SRBs worldwide (Guilmoto, 2015).

### 3.3 *Measures for logistic analysis on the First Regional Survey on Sexual and Reproductive Health of Migrant Women in Lombardy data*

As in the previous dataset, the dependent variable is the sex of each child. In this dataset, we are not analysing only the most recent birth, as in the case of CEDAP, but we can rely on the entire woman's biography until the moment of the interview. Two models were fitted, the first including all births and the second including only second order births.

As in the previous case, we included a covariate in order to control for births from parents who are both citizens of the same country with imbalanced SRB (17.8 percent of total sample). Among parents who are both citizens of the same country with imbalanced SRB, this dataset accounts only for information from couples from Albania (48.5%), China (24.4%) and India (27.2%). The sample comprises 2,648 births from 1,265 mothers from 22 different countries of origin (Farina, 2010). Two models are fitted on this data controlling for the following covariates:

- Age of mother at each birth

[3] No births were observed from parents from Kosovo. Kosovo was recognised as an independent state by Italy in February 2008; as a consequence, in this data, births from Kosovarian couples are probably registered as Serbian.

- A dummy accounting for a foreign-born child in order to control if SRB may be more imbalanced among children born abroad
- Mother's religion (Muslim, Christian, other)
- Mother's highest educational degree (university; high school; junior high school; primary school or none)
- Mother's self-reported experience of abortion or miscarriage
- Mother's ideal number of children (non-numerical response/up to God; more than 3; 2 or 3; 0 or 1)
- Child's parity
- Finally, we adopted a covariate related to mother's support of gender inequality. To take into account gender attitudes, we used a dummy indicating mother's agreement with the statement "Important decisions should be made only by men" (Yes; No).
- Only in the second model do we control for whether the previous child was a girl (Yes; No).

## 4. RESULTS

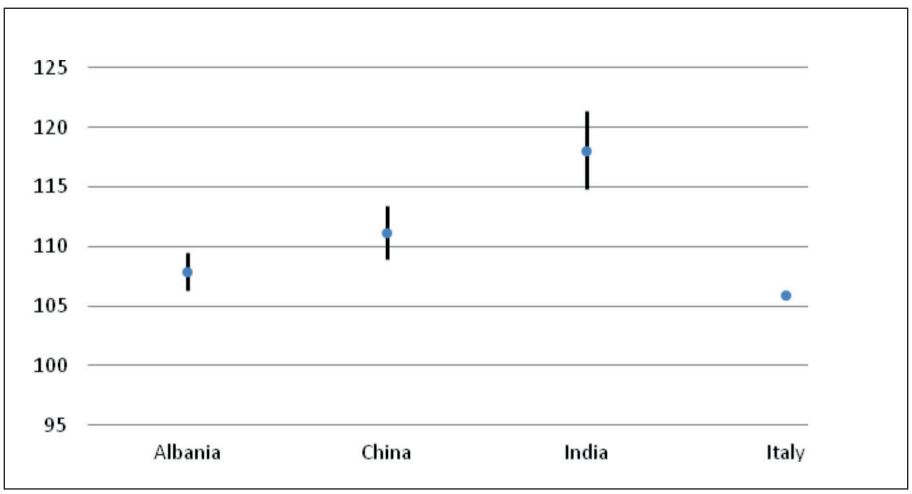
### 4.1 *Descriptive Statistics*

National data - Sex ratios at birth to couples originating from countries with imbalanced SRB (figures 1 and 2) show significant biases and a systematic excess in the expected number of male births; in particular, for migrants from India and China. Skewed sex ratios are also observed for births by Albanian couples starting in 2008.

As the precision of SRB calculated on the small annual number of births is limited - being subjected to the binomial law - we provided the information on the statistical significance based on a 95% confidence interval for each year and for the whole period of analysis. In fact, as Guilmoto (2015) recently pointed out, due to the small size of populations, even in many countries or regions, the sex ratio cannot be reliably calculated on an annual basis, and this measurement issue is even more cogent among foreign communities and minorities. Considering the total births that occurred between 2005 and 2013, the 95% confidence interval is above 105 for births from Albanian, Chinese and Indian parents (Table 3).

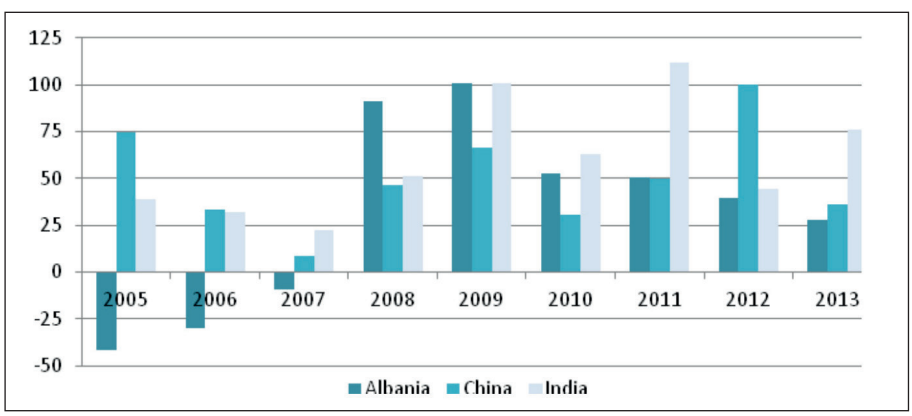
Contrarily, no systematic excess in the number of male births in Italy is observed for couples from other countries where preference for boys over girls is strongly and culturally embedded, such as Pakistan and Bangladesh (Qadir, Khan, Medhin and Prince, 2011; Kabeer et al., 2013), or for those with a weaker gender preference for boys and geographically near such as Sri Lanka (Abeykoon 1995) (Table 4). The SRB for births from Italian couples, on the other side, is comprised between 105.7 and 106.1 for the whole period, while the overall SBR from foreign couples is a bit higher, ranging from 106.1 to 107.1.

Figure 1 – *SRB for same citizenship couples from China, India, Albania and Italy with confidence intervals: Italy, years 2005 to 2013*




*Source*: Authors' elaborations on Istat data.

Figure 2 – *Differences between observed number and expected* number of males 2005-2013: Italy, selected citizenships*




*Notes*: * As (Total birth)*(1-0,485).
*Source*: Authors' elaborations on Istat data.

Regional data for Lombardy - CEDAP data accounting for births in the Italian region of Lombardy are helpful in order to analyse sex ratios with more details.

As for the countries of origin most concerned by imbalance in the SRB, in 2008/2009, births in Lombardy accounted for 22% of births from both Albanian parents recorded at the national level, for 23% of births by both Chinese parents and for 45% of the births from both Indian parents.

Table 3 – *SRB for births by both parents from China, India and Albania: Italy, years 2005-2013*

| | Albania | | China | | India | |
|---|---|---|---|---|---|---|
| | SRB | Total births | SRB | Total births | SRB | Total births |
| 2005 | 103.6 | 6,846 | 115.4 * | 3,602 | 119.0 * | 1,362 |
| 2006 | 104.5 | 7,515 | 109.7 | 4,125 | 114.6 | 1,676 |
| 2007 | 105.7 | 8,042 | 107.0 | 4,386 | 110.9 | 2,063 |
| 2008 | 110.8 * | 8,633 | 110.4 | 4,754 | 114.8 * | 2,631 |
| 2009 | 111.1 * | 8,882 | 112.0 * | 4,980 | 122.4 * | 2,855 |
| 2010 | 108.8 | 8,644 | 109.2 | 4,426 | 116.6 * | 2,686 |
| 2011 | 108.7 | 8,500 | 111.1 | 4,445 | 127.1 * | 2,496 |
| 2012 | 108.2 | 8,182 | 117.1 * | 4,110 | 115.0 * | 2,253 |
| 2013 | 107.6 | 8,634 | 109.3 | 4,925 | 119.7 * | 2,533 |
| Total | 107.8 * | 73,878 | 111.1 * | 39,753 | 118.0 * | 20,555 |

*Notes*: * SRB confidence interval significantly above 105 ($p<0.05$).
*Source*: authors' elaborations on Istat data.

Table 4 – *SRB for births by both parents from Italy, foreigner's, Bangladesh, Pakistan and Sri Lanka: Italy, years 2005-2013*

| | Italy | | All foreigners | | Bangladesh | | Pakistan | | Sri Lanka | |
|---|---|---|---|---|---|---|---|---|---|---|
| | SRB | total births | SRB | total births | SRB | total births | SRB | total births | SRB | total births |
| 2005 | 106.5 | 493,548 | 107.1 | 50,482 | 112.3 | 1,178 | 100.6 | 937 | 116.6 | 1,046 |
| 2006 | 106.1 | 495,853 | 106.1 | 56,166 | 98.3 | 1,422 | 96.9 | 1,032 | 102.4 | 1,107 |
| 2007 | 105.9 | 492,577 | 106.7 | 63,012 | 102.0 | 1,757 | 108.3 | 1,031 | 106.6 | 1,341 |
| 2008 | 105.4 | 499,188 | 106.5 | 70,991 | 107.9 | 1,819 | 105.7 | 1,234 | 103.5 | 1,380 |
| 2009 | 105.8 | 484,314 | 107.9 | 75,945 | 108.6 | 2,161 | 112.2 | 1,638 | 101.6 | 1,502 |
| 2010 | 106.0 | 473,305 | 106.5 | 76,489 | 102.2 | 2,060 | 102.3 | 2,169 | 94.9 | 1,347 |
| 2011 | 105.8 | 453,885 | 106.6 | 76,885 | 104.5 | 2,186 | 104.4 | 1,991 | 99.4 | 1,366 |
| 2012 | 105.7 | 443,278 | 106.4 | 78,577 | 99.3 | 2,081 | 103.0 | 1,969 | 103.6 | 1,403 |
| 2013 | 105.6 | 422,833 | 105.8 | 75,339 | 99.6 | 2,347 | 102.2 | 2,216 | 102.2 | 1,628 |
| Total | 105.9 | 4,258,781 | 106.6* | 623,886 | 103.5 | 17,011 | 104.0 | 14,217 | 102.9 | 12,120 |

*Notes*: * SRB confidence interval significantly above 105 ($p<0.05$).
*Source*: authors' elaborations on Istat data.

Sex ratios observed in Lombardy for the two-year period of 2008-09 are significantly over the benchmark value of 105 for children born from couples in which both parents are from Albania, China or India (Table 5).

Interestingly, even if the absolute number of births reduces - and must therefore be interpreted with caution - the SRB is higher than that observed at the community level for women who declare to have experienced a previous abortion or miscarriage. As happens within countries with skewed SRB (Guilmoto, 2015), regional data shows that SRB increases with birth order, reaching extremely high levels especially among children born from Indian parents. Another interesting point is that among children born from Chinese and Indian couples, SRB is normal for births of first order, suggesting that parents leave the sex of their first child up to chance for the first birth, and then practice prenatal sex selection to adjust the sex composition of their offspring starting from second or third birth. For Albanian couples, the SRB is high for first children, although the number of births is not enough to ensure a 95% confidence interval above the benchmark level of 105.

Table 5 – *SRB for births by both parents from China, India and Albania: Lombardy, years 2008-2009*

| Parents' origin | Total births | SRB |
|---|---|---|
| *Both parents Chinese* | 2,271 | 115.3 * |
| First child | 1,103 | 106.6 |
| With a previous abortion or miscarriage | 461 | 140.1 * |
| With a previous abortion | 243 | 133.7 * |
| With a previous miscarriage | 248 | 136.2 |
| With a previous child | 1,168 | 124.2 * |
| With at list two previous children | 313 | 144.5 * |
| *Both parents Indian* | 2,472 | 118.8 * |
| First child | 1,318 | 97.3 |
| With a previous abortion or miscarriage | 371 | 129.0 |
| With a previous abortion | 64 | 120.7 |
| With a previous miscarriage | 308 | 129.9 |
| With a previous child | 1,154 | 149.8 * |
| With at list two previous children | 220 | 223.5 * |
| *Both parents Albanian* | 3,882 | 115.1 * |
| First child | 2,089 | 112.7 |
| With a previous abortion or miscarriage | 559 | 121.8 |
| With a previous abortion | 130 | 124.1 |
| With a previous miscarriage | 446 | 125.3 |
| With a previous child | 1,793 | 117.9 * |
| With at list two previous children | 376 | 129.3 |
| *Both parents Serbia and Montenegro* | 622 | 110.1 |

*Notes*: * SRB confidence interval significantly above 105 ($p<0.05$).
*Source*: Authors' elaboration on CEDAP data for Lombardy 2008-2009.

Table 6 – *SRB for births by both parents from Italy, Pakistan, Senegal, Romania, Egypt, Tunisia, Morocco, Ecuador and Peru: Lombardy, years 2008 - 2009.*

| Parents' origin | Total births | SRB |
|---|---|---|
| *Both parents from Italy* | 40,610 | 105.6 |
| First child | 22,841 | 105.0 |
| With a previous abortion or miscarriage | 8,506 | 105.1 |
| With a previous abortion | 1,608 | 100.2 |
| With a previous miscarriage | 7,197 | 104.8 |
| With a previous child | 17,769 | 106.2 |
| With at list two previous children | 3,597 | 104.6 |
| *Both parents from Pakistan* | 1,276 | 103.5 |
| *Both parents from Senegal* | 1,235 | 103.5 |
| *Both parents from Romania* | 4,105 | 109.1 |
| First child | 2,526 | 110.1 |
| With a previous abortion or miscarriage | 1,161 | 103.7 |
| With a previous abortion | 596 | 100.7 |
| With a previous miscarriage | 666 | 108.1 |
| With a previous child | 1,579 | 107.5 |
| With at list two previous children | 381 | 93.4 |
| *Both parents from Egypt* | 2,974 | 105.8 |
| *Both parents from Morocco* | 6,457 | 103.1 |
| *Both parents from Tunisia* | 1,156 | 115.3 |
| First child | 450 | 110.3 |
| With a previous abortion or miscarriage | 223 | 120.8 |
| With a previous abortion | 49 | 145.0 |
| With a previous miscarriage | 185 | 117.6 |
| With a previous child | 386 | 107.5 |
| With at list two previous children | 320 | 133.6 * |
| *Both parents from Ecuador* | 1,064 | 101.9 |
| *Both parents from Peru* | 984 | 110.7 |
| First child | 527 | 118.7 |
| With a previous abortion or miscarriage | 348 | 108.4 |
| With a previous abortion | 151 | 122.1 |
| With a previous miscarriage | 222 | 105.6 |
| With a previous child | 329 | 100.6 |
| With at list two previous children | 128 | 106.5 |
| *Both parents from Philippines* | 1,201 | 109.6 |

*Notes*: * SRB confidence interval significantly above 105 ($p<0.05$).
*Source*: Authors' elaboration on CEDAP data for Lombardy 2008-2009.

The hypothesis of a sex selection starting from the second birth is also consistent with results about the ideal number of children, coming from a recent survey performed in Lombardy by the Regional Observatory for Integration and Multiethnicity in 2011 (Blangiardo, 2012). According to this survey, immigrants from these three countries indicate a preferred number of children around 2[4]. As for other citizenships, no evidence of imbalanced sex ratios emerges.

Some high values are found for countries where skewed sex ratios have never been observed, such as Romania or Peru, probably due to the limited precision assured by the small number of births. In fact, the related 95% confidence interval for these citizenships all includes normal values of SRB. Also, SRB calculated on subgroups that may disclose sex selection, such as children born to women with a previous abortion or miscarriage or of higher parity, are not systematically higher than the overall community level for Romania and Peru.

Tunisia is an exception to this rule. In fact, if the total number of births observed is not enough to assess if the observed value of 115 male births per 100 female is statistically different from 105, the very high value observed among births to Tunisian couples with at least two previous children is significantly higher than 105, despite the small number of births. Moreover, the pattern of SRBs observed among subgroups of interest shows the typical pattern related to sex selection, with a lower SRB for first children and a systematically higher level among women of higher parities or with a previous abortion or miscarriage. The SRB among children from Tunisian couples is, therefore, worthy of attention in future studies, particularly because the SRB at the national level has held around 108 since 1991, and is even higher in the capital's Governatorate (Guilmoto, 2015).

Finally, data from the First Regional Survey on Sexual and Reproductive Health of Migrant Women, which also includes information on births abroad or before migration (Table 4), additionally shows significant bias in SRB for mothers from China (108.5), India (126.8) and Albania (108.6). Despite the small number of births observed, results from this data are consistent with the overall trends observed in Italy and Lombardy.

## 5. MULTIVARIATE ANALYSIS

The first multivariate analysis is based on results from CEDAP data on births in the Italian region of Lombardy already used for descriptive analysis. Stepwise logistic analysis shows that the dummy covariate indicating that

[4] Detailed results indicate that the mean ideal number of children is 2.02 among Albanian citizens, 1.73 among Chinese citizens and 2.16 among Indians citizens.

both newborn's parents are citizens of the same country where skewed sex ratios are observed is significant until we control for parity. When a control for birth's parity is included, we observe that the interactions between the dummy indicating higher parities (1 or 2+), and the dummy indicating that both child's parents are citizens of a country with skewed sex ratios, are significant.

With regard to covariates related to prenatal sex selection tools, we observe that the dummies indicating the mother's self-reported experience of a previous abortion or a miscarriage (and interaction with the SRB dummy) are not significant, suggesting diffused underreporting of these events.

Interestingly, the covariate resulting from the interaction between the dummy indicating that both child's parents are citizens of a country where skewed sex ratios are observed, and having received a chorionic villus prenatal test, is significant. This finding suggests that this prenatal test, performed in the earlier weeks of the pregnancy (from the 10$^{th}$ week), may be used to assess with certainty the sex of the foetus. This test may be chosen because it provides the possibility to request an abortion within the legal terms (within the 12$^{th}$ week). No statistical significant relation is observed with amniocentesis (performed between the 15$^{th}$ and 17$^{th}$ week) or with the number of ultrasound examinations.

Interestingly, no relation is observed with parents' biological characteristics (parents' age) or socio-economical position (parents' education or job position).

Table 7 – *Odds ratios from stepwise logistic regression assessing associations between selected characteristics and male births: Lombardy 2008-2009*

| | OR | OR | OR | OR | OR | OR |
|---|---|---|---|---|---|---|
| Country of origin with Sex imbalances at birth (SRB): Yes (ref. No) | 1.106*** | 1.126*** | 1.110*** | 1.098*** | 1.098*** | 1.024 |
| Mother's age | | 1.002 | 1.002 | 1.003 | 1.003 | 1.002 |
| Father's age | | 1.001 | 1.001 | 1.001 | 1.000 | 1.000 |
| Legally Married parents | | 1.030 | 1.030 | 1.029 | 1.027 | 1.028 |
| Mother's education level: University graduated | | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| Mother's education level: High School | | 0.997 | 0.997 | 0.995 | 0.994 | 0.994 |
| Mother's education level: Junior High School | | 0.979 | 0.979 | 0.975 | 0.971 | 0.971 |
| Mother's education level: Primary School or None | | 0.983 | 0.982 | 0.973 | 0.967 | 0.968 |
| Father's education level: | | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |

*...Cont'd...*

Table 7 – *Cont'd*

| | OR | OR | OR | OR | OR | OR |
|---|---|---|---|---|---|---|
| University Graduated | | | | | | |
| Father's education level: High School | | 0.993 | 0.993 | 0.992 | 0.992 | 0.991 |
| Father's education level: Junior High School | | 0.985 | 0.985 | 0.984 | 0.983 | 0.983 |
| Father's education level: Primary School or None | | 1.006 | 1.007 | 1.004 | 1.003 | 1.003 |
| Mother's job position: Manager, Businesswoman, Self-employed | | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| Mother's job position: Other | | 0.994 | 0.994 | 0.997 | 0.998 | 0.997 |
| Father's job position: Manager, Businessman. Self-employed | | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| Father's job position: Other | | 0.983 | 0.983 | 0.986 | 0.986 | 0.986 |
| At least one previous abortion | | | 0.993 | 0.993 | 0.993 | 0.993 |
| At least one previous abortion*SRB Country° | | | 1.061 | 1.054 | 1.053 | 1.034 |
| At least one previous miscarriage | | | 0.997 | 0.997 | 0.997 | 0.997 |
| At least one previous miscarriage*SRB Country | | | 1.018 | 1.017 | 1.017 | 1.010 |
| Prenatal test: chorionic villous | | | | 0.931* | 0.932* | 0.934 |
| Prenatal test: chorionic villous*SRB Country | | | | 3.137*** | 3.122*** | 2.995*** |
| Prenatal test: Amniocentesis | | | | 0.983 | 0.984 | 0.986 |
| Prenatal test: Amniocentesis *SRB Country | | | | 1.027 | 1.025 | 1.004 |
| Number of ultrasound examinations | | | | 0.993 | 0.994 | 0.994 |
| One previous child | | | | | 1.012 | 1.001 |
| One previous child *SRB Country | | | | | | 1.120* |
| At least two previous children | | | | | 1.025 | 1.003 |
| At least two previous children*SRB | | | | | | 1.333*** |
| AIC | 1.385 | 1.385 | 1.386 | 1.385 | 1.385 | 1.385 |
| Obs. | 98723 | 92.452 | 92449 | 92449 | 92449 | 92449 |
| Log likelihood | -68380 | -64028 | -64025 | -64013 | -64012 | -64004 |

*Notes*: *** (P>|z|)<0.001, **(P>|z|)<0.01, *(P>|z|)<0.05.
° Interaction between two variables are indicated as variable1*variable2. SRB country indicates the mother's origin from a country with Sex imbalances at birth (SRB).
*Source*: Authors' elaboration on CEDAP data for Lombardy 2008-2009.

The second analysis performed on data from the First Regional Survey on Sexual and Reproductive Health of Migrant Women confirms the findings of the previous model. Although the results should be considered with cau-

tion due to the relatively small sample, this survey gives us the possibility to explore the associations between male births and some mothers' characteristics not analysed to date. Moreover, it's interesting to perform the analysis on multiple births from the same couple.

As shown in Table 8, couples originating from countries with imbalanced sex ratios (Albania, China and India) have an overall higher odds of having male children, and this is especially true when dealing with higher parity births. We also observed an association with female births among women with an ideal number of 2 or 3 children, meaning that the larger the ideal family size, the higher the probability of having also female births; and also with medium-high education levels, meaning that more educated women are less likely to perform sex selection.

The significance in the covariate accounting for parents born in a country with imbalanced SRB, however, disappears when we introduce in the model a covariate accounting for gender attitudes. Mothers who agree with the statement "Important decision should be taken only by men" are especially more likely to have male children.

Table 8 – *Odds ratios from stepwise logistic regression assessing associations between selected characteristics and male births: Lombardy, 2010*

| | Model 1 all children | | | | Model 2 only second order births | |
|---|---|---|---|---|---|---|
| | OR | OR | OR | OR | OR | OR |
| Country of origin with Sex imbalances at birth (SRB): Yes (ref. No) | 1.223* | 1.976** | 1.886** | 0.646 | 0.301 | 0.010 |
| Mother's age at child's birth | 1.207** | 1.002* | 1.005 | 1.005 | 0.967 | 0.965 |
| Child was born abroad: Yes (ref. No) | 0.781 | 1.233 | 1.261* | 1.258* | 1.339 | 1.329 |
| Child was born abroad *SRB Country: Yes (ref. No)° | | 0.741 | 0.825 | 0.797 | 0.894 | 0.825 |
| *Mother's religion*: | | | | | | |
| Muslim | | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| Christian | | 0.907 | 0.951 | 0.982 | 1.011 | 1.046 |
| Other religion | | 0.841 | 0.866 | 0.859 | 0.524* | 0.470* |
| *Mother's educational level:* | | | | | | |
| University graduated | | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| High School | | 1.015 | 1.098 | 1.085 | 0.681 | 0.657 |
| Junior High School | | 1.135 | 1.277 | 1.248 | 0.985 | 0.950 |
| Primary School or None | | 0.968 | 0.985 | 0.934 | 0.760 | 0.730 |

*...Cont'd...*

Table 8 – *Cont'd*

| | Model 1 all children | | | Model 2 only second order births | |
|---|---|---|---|---|---|
| | OR | OR | OR | OR | OR |
| *Mother's educational level:* | | | | | |
| University graduated | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| High School | 1.015 | 1.098 | 1.085 | 0.681 | 0.657 |
| Junior High School | 1.135 | 1.277 | 1.248 | 0.985 | 0.950 |
| Primary School or None | 0.968 | 0.985 | 0.934 | 0.760 | 0.730 |
| *Mother's educational level *SRB Country:* | | | | | |
| Non SRB Country | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| University Graduated & SRB C.try | 0.616 | 0.689 | 0.608 | 2.072 | 1.419 |
| High School & SRB C.try | 0.641* | 0.601** | 0.564** | 1.837 | 1.589 |
| Junior High School & SRB C.try | 0.683* | 0.646* | 0.623* | 1.065 | 1.038 |
| Primary School or None & SRB C. | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| *Mother's ideal number of children:* | | | | | |
| Non numerical response | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| 4 or more | 1.035 | 0.935 | 0.905 | 0.525 | 0.519 |
| 2-3 | 1.203 | 1.117 | 1.113 | 1.053 | 1.061 |
| 0-1 | 0.711 | 0.622 | 0.618 | 0.658 | 0.668 |
| *Mother's ideal number of children*SRB Country:* | | | | | |
| Non SRB Country | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| Non numerical response & SRB C. | 1.271 | 0.747 | 0.797 | 1.934 | 2.548 |
| 4 or more & SRB C.try | 1.029 | 0.674 | 0.673 | 1.340 | 1.360 |
| 2-3 & SRB C.try | 0.806 | 0.515*** | 0.506*** | 1.449 | 1.309 |
| 0-1 & SRB C.try | 2.643 | 1.425 | 1.313 | 2.055 | 1.402 |
| At least one previous abortion | | 0.830 | 0.837 | 0.874 | 0.894 |
| At least one previous abortion*SRB country | | 1.181 | 1.246 | 2.386*** | 3.113*** |
| At least one previous miscarriage | | 0.739* | 0.734 | 0.693* | 0.691 |
| At least one previous miscarriage*SRB C.try | | 1.153 | 1.231 | 1.216 | 1.585* |
| Parity | | 0.949 | 0.948 | | |
| Parity*SRB country | | 1.285*** | 1.296*** | | |
| First birth was a girl | | | | 0.874 | 1.432 |
| First birth was a girl*SRB country | | | | 2.386 | 3.043 |
| Mother agrees with the statement "Important decision should be taken only by men": Yes (Ref. No) | | | 1.865*** | | 6.858*** |
| Mother agrees with the statement "Important decision should be taken only by men"*SRB C.try: Yes (Ref. No) | | | 0.834 | | 0.882 |
| AIC | | 1.395372 | 1.394907 | 1.417 | 1.403116 |
| Obs | | 2,430 | 2,430 | 758 | 758 |
| Log likelihood | | -1.658 | -1655.8121 | -500.001 | -492.780 |

*Notes*: ***(P>|z|)<0.001 **(P>|z|)<0.01 *(P>|z|)<0.05

° Interaction between two variables are indicated as variable1*variable2. SRB country indicates the mother's origin from a country with Sex imbalances at birth (SRB).

*Sourc*e: Authors' elaboration on the First Regional Survey on Sexual and Reproductive Health of Migrant Women Lombardy 2010.

The second analysis, performed only on second order births, gives us the possibility to control the sex of the second order child, controlling for the sex of the first child. We observe again that couples from countries with unbalanced SRB have a higher odds of having a male child, controlling for the sex of the elder child. Moreover, women from Albania, China and India who declare to have undergone at least one abortion have more than twice the odds of having a male boy as second child, suggesting the use of abortion as a prenatal sex selection tool. This same association was not found in CEDAP data. Particular emphasis was placed, during the Regional Survey on Sexual and Reproductive Health of Migrant Women, on an approach similar to that of in-depth interviews to avoid bias due to social desirability or stigma, and to facilitate intimate talk with the women involved (Farina, 2010). As a result, we may hypothesise that this resulted in a substantial success in limiting underreporting of abortion. Again, we observe a very high and significant odds ratio (6.858) when we control for the covariate related to gender attitudes.

Although this model has the substantial limitation of being based on a small sample, the relations observed between male births from parents from countries with skewed SRB with 1) birth order; 2) previous experience of abortion; and 3) gender inequality, are consistent with the literature about countries of origin (Guilmoto, 2015).

## 6. CONCLUSIONS

This paper aimed to explore SRB of migrants in Italy, analysing births from foreign mothers coming from countries where sex selection at birth or male child preference is widespread, and that are from among the largest immigrant communities in Italy, including Albania, China, India, Pakistan and Bangladesh. At the national level, we found a significant bias in SRB at birth, in particular, during the period 2005-2013, among couples where both parents are Indian and Chinese, and for births by Albanian couples since 2008. In order to shed light on the factors affecting skewed sex ratio at birth, we performed two logistic regressions on two different datasets focusing on the Lombardy region. In both models, a positive relationship emerged between male births and foreign couples from countries with imbalanced SRB and a positive association between excess of male births and higher parity births of parents from countries with imbalanced SRB. These results suggest that when families reach the desired number of children, they may opt for gender selection in order to have at least one male child. Our results also suggest a relationship between previous abortion and mother's support for female discrimination. Results from Lombardy also suggest that sex selection at higher parities is likely to occur also among Tunisian couples.

Our results are consistent with the growing literature of studies regarding SRB of migrants in western societies that we described in detail in this paper (e.g., Dubuc and Coleman, 2007; Almond and Edlund, 2008; Almond *et al*., 2009; Singh *et al*., 2010; Verropoulou and Tsimbos, 2010; Meldolesi, 2012; Blangiardo and Rimoldi, 2012; Gonzalez, 2014). In Italy, as in other Western countries, in a context of fertility decline, migrant couples from certain origins adopt prenatal sex selection through abortion to obtain the desired number of male offspring.

According to our results, couples may base prenatal sex selection on early results available from prenatal tests and in particular from the chorionic villous test. This test is performed in the earlier weeks of the pregnancy and it provides the possibility to request an abortion within the legal terms (within the 12$^{th}$ week). In order to prevent prenatal sex selection, policies could be addressed that ensure not revealing the sex of the future born at that early stage of pregnancy.

Results on gender attitudes and education level of mothers are also consistent with previous studies indicating that culture is among the main determinants of sex selection at birth. In cultural settings where male preference is largely widespread, sex selection before birth has become an alternative to sex preferences, leading to female infanticide, since the availability has arisen of prenatal tests to assess the sex of the future born. Even if the economic benefits for having a male offspring are lost after migration, the cultural factor remains and determines the persistence of sex selection.

Given the regional context of our analysis and some intrinsic data limitation, such as the small sample size of the second source of data used, these results should be interpreted with some caution and should be considered more as initial hypotheses to be tested in future studies.

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## References

ABEYKOON A.T.P.L. (1995), "Sex Preference in South Asia: Sri Lanka an Outlier", *Asia-Pacific Population Journal*, 10 (3): 5-16. http://www.popline.org/node/294235.

ALMOND D., EDLUND L. (2008), "Son-biased sex ratios in the 2000 United States Census", *Proceedings of the National Academy of Sciences of the United States of America*, 105 (15), 5681-5682. http://www.pnas.org/content/105/15/5681.full.

ALMOND D., EDLUND L., MILLIGAN K. (2009), "O Sister, Where Art Thou? The Role of Son Preference and Sex Choice: Evidence from Immigrants to Canada", *NBER Working Papers 15391*, National Bureau of Economic Research, Inc. http://www.nber.org/papers/w15391.

ASTOLFI P., ZONTA L.A. (1999), "Reduced male births in major Italian cities", *Human Reproduction*, 14 (12): 3116-3119.

BLANGIARDO G.C. (2012) (a cura di), *L'immigrazione straniera in Lombardia. L'undicesima indagine regionale,* Osservatorio Regionale per l'integrazione e la multietnicità, Fondazione Ismu, Milano. http://www.orimregionelombardia.it/index.php?c=536.

BLANGIARDO G.C., RIMOLDI S. (2012), "100 milioni di bambine mancano all'appello nel mondo. E in Italia?", *Neodemos* 24/10/2012. http://www.neodemos.it/index.php?file=onenews&form_id_notizia=642.

CALDWELL B.K., CALDWELL J.C. (2005), "Family size control by infanticide in the great agrarian societies of Asia", *Journal of Comparative Family Studies*, 36(2): 205-226.

CHAHNAZARIAN A. (1988), "Determinants of the sex ratio at birth: review of recent literature", *Social Biology*, 35(3/4): 214-235. http://doi.org/10.1080/19485565.1988.9988703.

CHEN Y., LI H., MENG L. (2013), "Prenatal Sex Selection and Missing Girls in China: Evidence from the Diffusion of Diagnostic Ultrasound", *Journal of Human Resources*, 48(1): 36-70. http://jhr.uwpress.org/content/48/1/36.abstract.

DAVIS D.L., GOTTLIEB M.B., STAMPNITZKY J.R. (1998), "Reduced ratio of male to female births in several industrial countries. A Sentinel Health Indicator?", *Journal of the American Medical Association*, 279, 1018-1023.

DAS GUPTA M., ZHENGHUA J., BOHUA L., ZHENMING X., CHUNG W., HWA-OK B. (2003), "Why is son preference so persistent in East and South Asia? A cross-country study of China, India and the Republic of Korea*", Journal of Development Studies*, 40(2), 153-187. http://doi.org/10.1080/00220380412331293807.

DUBUC S., COLEMAN D. (2007), "An Increase in the Sex Ratio of Births to India-born Mothers in England and Wales: Evidence for Sex-Selective Abortion", *Population and Development Review*, 33(2): 383-400. http://doi.org/10.1111/j.1728-4457.2007.00173.x.

FARINA P. (ed.) (2010), *Indagine sulla presenza nel territorio lombardo di popolazione a rischio in relazione alla salute sessuale e riproduttiva e alle mutilazioni genitali femminili*, IRER, Milano.

GINI C. (1908), *Il sesso dal punto di vista statistica: le leggi della produzione dei sessi*, Remo Sandron Editore, Bologna.

GONZÁLEZ L. (2014), "Missing Girls in Spain", *Barcelona Graduate School of Economics Working Papers*, 760. http://www.barcelonagse.eu/sites/default/files/working_paper_pdfs/760.pdf.

GUILMOTO C.Z. (2009), "The Sex Ratio Transition in Asia", *Population and Development Review*, 35 (3): 519-549. http://doi.org/10.1111/j.1728-4457.2009.00295.x.

GUILMOTO C.Z. (2012), *Sex Imbalances at Birth. Current trends, consequences and policy implications*, UNFPA Asia and Pacific Regional Office. http://www.unfpa.org/sites/default/files/pub-pdf/Sex%20Imbalances%20at%20Birth.%20PDF%20UNFPA%20APRO%20publication%202012.pdf.

GUILMOTO C.Z. (2015) "The Masculinization of Births. Overview and Current Knowledge", *Population*, 70(2): 183-244. http://www.ined.fr/fichier/rte/General/Publications/Population/articles/2015/N2/199-PopF2-2015-Guilmoto-Article.pdf.

ISTAT (2015) *On line resource*. http://demo.istat.it/ accessed November 17th, 2015.

JACOBSEN R., MØLLER H., MOURITSEN A. (1999), "Natural variation in the human sex ratio", *Human Reproduction* 14(12): 3120-3125. http://doi.org/10.1093/humrep/14.12.3120.

MELDOLESI A. (2012), *Mai nate. Perché il mondo ha perso 100 milioni di donne*, Mondadori Università, Milano.

QADIR F., KHAN M.M., MEDHIN G., PRINCE M. (2011), "Male gender preference, female gender disadvantage as risk factors for psychological morbidity in Pakistani women of childbearing age - a life course perspective", *BMC Public Health*, 11, 745. http://doi.org/10.1186/1471-2458-11-745.

SBS RADIO, *The news "it's a girl", still unwelcome in some cultures in Australia* http://www.sbs.com.au/radio/storystream/news-its-girl-still-unwelcome-some-cultures-australia (accessed November 17th, 2015).

SINGH N., PRIPP A.H., BREKK E.T., STRAY-PEDERSEN B. (2010), "Different sex ratios of children born to Indian and Pakistani immigrants in Norway", *BMC Pregnancy and Childbirth*, 10(1): 40-45. http://doi.org/10.1186/1471-2393-10-40.

UNITED NATIONS (1994), *Programme of Action of the United Nations International Conference on Population & Development*, Cairo, September.

VERROPOULOU G., TSIMBOS C. (2010), "Differentials in sex ratio at birth among natives and immigrants in Greece: An analysis employing nationwide micro-data", *Journal of Biosocial Science*, 42(3): 425-430. http://dx.doi.org/10.1017/S0021932009990599.

WHO (2011), *Preventing Gender-biased Sex Selection, UNFPA, Report of the International Workshop on Skewed Sex Ratios at Birth: Addressing the Issue and the Way Forward*. Hanoi, UNFPA.