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Skewed sex ratios at birth in Italian migrant populations: evidence from a longitudinal register 1999-2017

Abstract

Many studies in different settings suggested that migrants from countries with skewed sex ratios at birth tend to adjust the sex of their offspring to secure the birth of at least a son. Enlarging the scope of existing research, the present study explores the phenomenon by studying the sex ratio at birth and sex selection at birth among migrants in Italy, focussing on birth order and the sex of the previous child. We perform a descriptive analysis of SRB by birth order (first, second and third), sex of the previous children, inter-birth interval and citizenship of the child. We analyse data from the Longitudinal register on reproductive histories from 1999 to 2017 (ISTAT). Results show significantly higher values of SRB for third births among Indian and Chinese communities when the first and second births are girls. A skewed SRB is also present among Indian babies born after a female firstborn. A more detailed analysis of SRBs for immigrants from China and India, by the sex of the previous children and inter-birth interval between second and third birth, did not indicate significant changes in SRB when the inter-birth interval is longer. Our study provides evidence for policymaking. However, further research is needed to address the causes of sex selection among immigrant communities. Efforts to alter gender norms and reduce son preference within communities are required to tackle gender discrimination against second-generation girls.

BACKGROUND

The elimination of *son preferences*, a form of gender-based discrimination and inequality, has been at the centre of international development policies for more 25 years, when it first was introduced as a recommendation in the Program of Action of the 1994 International Conference on Population and Development held in Cairo (UN 1994). Sex selection due to *son preference* is an ancient and widespread phenomenon extensively documented in various patriarchal societies, especially in certain eastern and southern Asian countries (Das Gupta et al. 2003).

In the past, gender-based discrimination manifested itself after birth in these patriarchal societies, leading to unbalanced child sex ratios driven by an excess of female mortality (Coale 1991). This pattern changed almost 40 years ago when prenatal diagnosis technology enabled early detection of the sex of the future born (Tafuro and Guilmoto, 2020). This technological advance coincided with the entry into the latter stages of the demographic transition for many ‘son preference’ patriarchal societies. The fertility decline, combined with little change in gender equity, increased the ‘risk’ of not having at least a male child, becoming major determinants for the growing foetus sex selection market in all its aspects. By knowing the sex of the foetus, couples could then resort to (legal or illegal) abortion to eliminate any undesired female offspring (Chen, Li, Meng 2013).

While in the rest of the world sex ratios at birth SRBs fluctuate and remain stable around the known demographic constant of 106 male newborns for every 100 females, in countries formerly characterised by imbalanced child ratios, we observe persistent alterations in SRBs since the introduction of prenatal sex detection. A recent study based on births that occurred in the period 1970–2017 identified 12 countries with

strong statistical evidence of SRB imbalance: Albania, Armenia, Azerbaijan, China, Georgia, Hong Kong (SAR of China), India, Republic of Korea, Montenegro, Taiwan (Province of China), Tunisia, and Vietnam (Chao et al. 2019). Consistently, World Bank data (2019) show that SRBs in China (117 in 2007, 115 in 2017), Singapore (107 in 2017), Hong Kong (107 in 2017), Azerbaijan (117 in 2002, 113 in 2017), Georgia (111 in 1997, 108 in 2017), Vietnam (112 average 2013/2014, 111 in 2017), India (111 in 2017), Armenia (117 in 2002, 113 in 2017), Uzbekistan (108 from 2012 to 2017), and Albania (109 in 2002, 108.0 in 2017) considerably exceed the demographic constant. Remarkably, South Korea, after peaking to 114 between 1987 and 1992, recently achieved a decrease reaching an SRB of 107 in 2017 (Tarufó and Guilmoto, 2020). Still, new countries show signs of imbalance: Nepal has recently witnessed an increase in male births, reaching 107 in 2017, while Afghanistan, Tunisia and Nigeria are worthy of attention (Guilmoto 2015; Kaba 2015). The available evidence suggests that in some countries prenatal diagnosis enhanced and transformed the practice of sex selection by making it customary in the prenatal period. Moreover, Sex selection before birth did not wholly replace excess female mortality, especially in India and China (Kashyap 2018; Guilmoto et al. 2018).

The main demographic consequence of sex selection and excess female mortality in the age class 0-5 is the well-known phenomenon of 'the missing women'. According to Bongaarts and Guilmoto (2015), in 2010, there were about 125 million missing women worldwide, most of them in India and China (Guilmoto 2012).

As unbalanced SRBs characterise several countries showing significant emigration flows, scholars began to consider the possibility that emigrants from those areas may express or maintain son preference in the new countries of settlement and resort to

prenatal sex selection. A growing number of studies have therefore focused on newborn children with a foreign background and have found evidence of higher than expected SRBs among births from immigrants originating from South East, Eastern Asia, and Albania in several immigration countries, including the United States (Almond and Edlund 2008), the United Kingdom (Dubuc and Coleman 2007), Canada (Almond, Edlung and Milligan 2009; Adsera and Ferrer 2020), Spain (González 2014), Norway (Singh et al. 2010), Sweden (Mussino, Miranda and Ma 2018), Greece (Verropoulou and Tsimbos 2010), Australia (Edvardsson et al. 2018; Edvardsson et al. 2021), and Italy (Ambrosetti et al. 2015).

RATIONALE AND AIM OF THE STUDY

In the Italian context, few studies have addressed the topic of SRB among migrants. All of them have reported an imbalance in SRB among births from immigrants of Indian and Chinese origin. The first study by Meldolesi (2012) was limited to the period of 2006-2009 and used data on birth records. Later, Ambrosetti et al. (2015) systematically analysed births from mothers born in countries where sex selection at birth or son preference is widespread, considering Italy's most prominent immigrants' communities. They found a significant excess in male births at the national level from couples where both parents are Indian or Chinese during 2005-2013 and Albanian couples from 2008 to 2013. Their findings built on cross-sectional data on all births without parity information.

Moreover, using data from Birth Assistance Certificates collected by the Ministry of Health recorded in the Lombardy region in 2008/9, they found a positive association between the excess of male births and higher parity births of parents from countries

with traditionally imbalanced SRBs. They also found a positive relation between previous abortions and the mothers' support for female discrimination using regional survey data.

To better understand the framework of our analysis, it is important to mention a recent study on migrants' fertility ideals in Italy carried out by Mussino and Ortensi (2018).

However, crucial aspects of the drivers of prenatal sex selection among immigrants are still unresearched in the Italian context. Despite not focusing on SRB, researchers have shown that the ideal number of children among Indian, Albanian, and Chinese women in Italy is around 2. This finding supports the notion that migrants share the preference for small families observed among Italian natives. This finding, however, also implies a higher 'risk' of lack of male offspring and possible demand for prenatal sex selection by couples with a strong male preference.

Previous findings regarding non-migrants in countries with unbalanced sex ratios show that prenatal discrimination is generally infrequent at first birth. First and even second births appear to be left to chance, but the SRB does increase with birth order, and that increase is highly dependent on the sex of earlier siblings (Guilmoto 2015; Saikia et al. 2021; Jha et al. 2006; Zhu et al. 2009).

Do migrants show similar behaviour in Italy? To answer this question, a longitudinal approach is needed. Our study analyses SRB among immigrants by birth order and sex of the previous child using the *Longitudinal register on reproductive histories* provided by ISTAT. Given the composition of the immigrant population in Italy, we focus on the SRB of Albanian, Indian and Chinese children. Further, insofar as previous evidence for the Italian region of Lombardy suggested that SRBs among Tunisian newborns is worthy of attention (Ambrosetti et al. 2015), we also include the SRBs of new-borns

Tunisian in the present analysis. Moreover, we analyse SRBs of newborn Sri Lanka and Pakistani citizens because son preference is very diffused in those countries (Qadir et al. 2011; Kabeer, Huq and Mahmud 2014) despite no evidence of prenatal sex selection. We also include SRBs among newborns to Italian women as a control group. We also provide data on induced abortion by parity and citizenship of the mother to assess abortion ratios among immigrants' mothers from countries where SRB is higher than the biological constant. Prenatal sex determination is legal in Italy. As more recent techniques such as chorionic villus sampling and maternal blood can be performed from as early as 7 weeks of gestation, such an early determination of the sex of the future born can result in sex-selection driven legal abortion.

Abortion in Italy is regulated by Law 194 of 1978. According to this law, all women can request an abortion during the first 90 days of gestation for health, economic, social, or familial reasons. Abortion is performed free of charge either at a health care structure in the National Health Care System or a private structure authorised by regional health authorities. Induced abortion is allowed after the first 90 days of gestation in case of 1) serious danger for the woman's life; 2) major anomalies or malformations of the foetus, which determine a severe danger to the physical or mental health of the woman. Induced abortion is constantly monitored by the Italian Ministry of Health through the Epidemiological Surveillance System of Induced Abortions as established by the art. 16 of Law 194/1978.

The current analyses aim to provide answers to the following research questions in the Italian context: while we assumed evidence of existing imbalanced SRB among newborns in some communities (Ambrosetti et al., 2015).

RQ1. Are SRB imbalances observed among newborns with selected foreign backgrounds in Italy dependent on

- a) birth parity;
- b) sex of siblings;
- c) inter-birth interval?

RQ2. Is lack of evidence of statistically significant SRB imbalance among the most relevant communities from countries where son preference - but no sex selection – confirmed by refined analyses according to birth parity, sex of siblings and inter-birth interval?

DATA AND MEASURES

The data used to compile descriptive statistics on births at the national level were drawn from the *Longitudinal Register on Reproductive Histories*. This longitudinal data source is based on the *Survey on Births* from the resident population registers, an individual and continuative survey on births established by ISTAT in January 1999, which provides information on the main demographic characteristics of newborns and parents at the municipal level. The individual sheets currently retrieve information on the child (sex, date and place of birth, nationality, birth order), his/her parents (place and date of birth, nationality, marital status) and the main details about the head of the household. The last data available refer to 2017.

ISTAT applies the *Darlink* deterministic record linkage to link data from the surveys on births by year with the Lists of Municipal Registries to build the *Longitudinal Register on Reproductive Histories*. In the first instance, *Darlink* is used to group all live births of the same mother recorded in the various registers of live births between 1999 and

2017. At a later stage, researchers use *Darlink* to ‘fill the gaps’ in the offspring using the information on mothers in the Lists of Municipal Registries through the study of relationship within the mother and other members of the household to identify the mother-child relationship.

The *Longitudinal Register on Reproductive Histories* contains a vast and valuable information asset: information about the offspring of all the Italian and immigrant women resident in Italy who have had at least one birth registered in the Italian Registry from 1999 to 2017. The database contains more than 11 million birth records from 1975 (year of birth of the first sibling of children born between 1999 and 2017). Moreover, this register is crucial for the immigrant population because it also contains data on births of resident foreign-born children with at least one sibling born in Italy between 1999 and 2017. We could have chosen to perform our analysis with births that occurred from 1980, when obstetric ultrasonography became widespread as a prenatal test for pregnant women. Nevertheless, we decided to restrict our analysis to births that occurred from 1999 on for two main reasons: first, births before 1999 are likely to be selective as their inclusion criteria are different, thus choosing a shorter period helps to get a more unbiased dataset; second, migration flows to Italy from countries where SRB is widespread were negligible between 1980 and 1999 except for Albania, where previous findings have shown that the practice of sex selection has increased only in the last decade (Ambrosetti et al., 2015).

Data on induced abortions stem from the Survey on Induced Abortion, a survey lead by ISTAT in agreement with the Regions and the Ministry of Health, on an annual basis since 1979.

We analyse the SRB by birth order and sex of the previous child and by inter-birth interval for foreign newborns. We use the newborns' citizenship at birth instead of parents' citizenship to identify foreign newborns better. Indeed, according to the Italian law on citizenship, parents may have acquired Italian citizenship over time¹.

As Guilmoto (2015) 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. As the precision of SRB is therefore limited for some groups - being subject to the binomial law - we provided the information on the statistical significance based on a 95% confidence interval for each year and the whole analysis period.

RESULTS

First, we consider all births by parity (**RQ1a**): to account for time trends, we divided our sample into two periods: 1999-2008 and 2009-2017. Table 1 illustrates that SRB is significantly above the biological constant for births recorded in 1999-2017 for Indian newborns. The SRB is also higher than the biological norm for Chinese and Tunisian children in 2009-2017. For Tunisian, given the small number of births, the deviation is not statistically significant. In both periods, the SRB was statistically significantly skewed in second-order births of Indian children and third-order births of Chinese and Indian children. For Albanian children, we observed that SRBs of third-order births are skewed for both periods, however not statistically significant given a Lower confidence interval below 107. We also observe non-statistically significant deviations for first-order births of Pakistani children in 1999-2008 and third birth order

¹ While naturalisation rates among Albanians are not negligible, naturalisation among Chinese and Indian first generation migrants are quite low due to the impossibility of holding dual citizen (MACIMIDE, 2021).

Tunisian children in 2009-2017. Although statistically inconclusive, these results suggest that trends should be monitored for these nationalities.

As a second step, calculated the sex ratio by birth order as a function of the sex of the first and second-order births pooling all the births by parity and citizenship of the newborn occurred in the period 1999-2017 (**RQ1b**).

-----Table 1 here-----

-----Table 2 here-----

Results show significantly increased values of SRB for Indian children when the first birth was either a boy or a girl (table 2). The same effect is found for Chinese and Indian children when the first and second births were girls, and for Indian children after a boy and a girl (table 3). The difference between the SRB observed among Italian children and the SRB of Indian or Chinese children born after two girls is particularly striking. In the first case, the observed SRB is significantly below the demographic constant (hypothesising a biological tendency for these couples to have girls: Gellatly 2009; James 1975) and has a similar trend in most of the analysed immigrants' groups. Among Chinese and Indian newborns, the SRB of babies born after two girls is, on the contrary, exceptionally high. We observe a higher probability of having a boy if previous children are boys, except for Sri Lankans, among all the children regardless of their citizenship, also hypothesising, in this case, the role of a biological component in the absence of sex selection (Gellatly 2009; James 1975).

No significant deviation from the norms is observed among children from Pakistan, Bangladesh and Sri Lanka regarding birth parity, sex of siblings and inter-birth interval (**RQ2**).

-----Table 3 here-----

In the context of son preference, the spacing between births after a daughter's birth is often shorter than the one after the birth of a son, especially for third births (Bumpass et al. 1986; Hemochandra et al. 2010). Thus, considering that the SRB is significantly high for Chinese and Indian children, we calculated SRB for Chinese and Indian descendants by sex of the previous child and inter-birth interval between second and third birth (**RQ1c**). Our findings didn't show a specific trend either when the first two children were boys or when the first two children were girls. Therefore we cannot conclude that the sex selection either decreases or increase when the inter-birth interval is longer.

Finally, we analysed the abortion ratio by parity for the years 2015, 2016 and 2017. Unfortunately, data on induced abortion are not available by the sex of the foetus. Results are presented in table 4 and show an evident higher occurrence of induced abortion for Albanian, Chinese, Indian, Sri-Lankan and Tunisian communities compared to natives. Such propension is particularly high for parity 2 and 3 and over. While we cannot claim causality between abortion ratio and skewed SRB because abortion rates are high also for nationality with balanced SRB, it's important to stress that communities that show SBR imbalance indeed also largely recur to induced abortion. Induced abortion rate is generally higher in Italy for migrant women than natives even if it has decreased during the last 10 years: factors such as accessibility and use of health services are particularly relevant for immigrants' women's reproductive health outcomes (D'Errico et al. 2020).

-----Table 4 here-----

CONCLUSIONS

In this paper, we estimated SRB among immigrants to Italy, focussing on birth order, the sex of the previous child, and inter-birth interval. Indeed, SRB is skewed for second-order births of Indian children and third-order births of Chinese and Indian children (**RQ1A**). Additionally, the statistical evidence shows that birth parity and the sex of older children are associated with an imbalance in SRBs (**RQ1b**). Our data suggest that prenatal sex selection occurs more frequently among second-birth order Indian newborns following the birth of a girl and third-order Chinese and Indian babies after the birth of two girls. We did not find evidence for sex selection for first births. Evidence regarding the inter-birth interval is also inconclusive (**RQ1c**).

As evidence for our second research question (**RQ2**: SRB imbalances among immigrants from countries with son preference - but no sex selection), we found that SRBs among immigrants from countries characterised by male preference but not sex selection such as Pakistan, Sri Lanka and Bangladesh show no alterations also if birth parity, sex of siblings and inter-birth interval are taken into account.

Moreover, while we also show evidence of a higher incidence of abortions among migrants than natives, we observed that the intensity is also high among women from communities with balanced sex ratios. Son preference is, therefore, only one of the factors explaining the trend.

Our findings reflect a growing consensus that skewed SRBs characterise specific immigrant communities to western countries. Guilmoto (2015) postulates three intermediate factors for sex selection: a supply factor related to the availability of technologies allowing early sex detection, a demand factor related to son preference and

a low fertility demographic factor. At least two of these factors are present in Italy: early sex detection is available through prenatal diagnosis technology, and immigrants tend to prefer small families (Mussino and Ortensi 2018). Our data suggest that son preference is also present and could explain unbalanced sex ratios.

This study is not without limitations. First, we did not have access to microdata, so it was impossible to adjust results for some characteristics of the parents (e.g. age) or analyse relationships with education or age at the arrival. Second, we miss information about the offspring of mixed couples, where son preference is potentially weaker. However, intermarriage is uncommon in Italy among Chinese and Indian communities (Gabrielli et al., 2019). Third, when we consider data on abortion, we miss information on miscarriages, which can be as well the results of prenatal sex selection. Finally, we only consider foreign children at birth in our analysis, a bias that, considering naturalisation trends in Italy (ISMU, 2021), is mainly expected to affect results for recent Albanian newborns.

In the context of international migration, further research is needed to analyse the socio-demographic characteristics associated with SRB imbalances and identify factors involved in discriminatory behaviour towards girls. Such knowledge is essential for adequate policy formulation.

Although ending gender-based violence is on the top of the European priorities, the topic of sex selection among migrant offspring is completely missing in the Italian and European agenda. A campaign of awareness-raising is needed, especially targeting health professionals and medical care institutions. Previous experience from countries where sex selection is widespread shows that implementing effective policies is difficult: neither bans nor the other policy interventions can quickly eliminate sex

selection, but both show some impact (Das Gupta 2016; Vogel 2012). Further concerns arise in countries of immigration, where bans may increase stereotypes and discrimination while not enhancing the promotion of gender equity (Guttmacher Institute 2019). Although banning sex-selection detection before the legal term for abortion may be the first solution, efforts to alter gender norms and reduce son preference within communities would seem to offer advantages over bans in tackling gender discrimination among second-generation girls. Our data shows that families from selected countries that have already one or two girls could be targeted.

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