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Immigrants' Differential Health and Demographic Outcomes: Evidence from Italian Administrative Data

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Acknowledgments

More often than supposed to, writing doctoral theses leads up to drained energies and jeopardised mental health[1]. All the more, I feel extremely lucky for the serenity I enjoyed during the last five years, for which I own the many people who have been by my side along the way.

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Introduction

The three chapters of which the thesis consists of have been inspired by upstream considerations regarding the differential use of public health services by immigrants, and, in particular, the observation that compared to natives this population records a systematically higher recurrence to abortive procedures (Baglio et al., 2010; Medda et al., 2002), lower use of preventive health services (Sarría-Santamera et al., 2016), and poorer communication with caregivers regarding female reproductive health (Moreira Almeida et al., 2013). Moving from these premises, I developed three research questions in the fields of demography and public health pertaining immigrants' differential demographic and health outcomes. In the first chapter, I ask whether sex-selective abortion is occurring in Italy among some immigrants communities, with a focus on those for which such practice is documented in origin countries. In the second chapter, I investigate wether undocumented immigrants are more likely to incur into hospitalisations that would be avoided in the presence of timely and effective preventive care, implying an inadequate access to primary care for this subset of the immigrant population. In the third chapter, I examine whether immigrant women originating from countries where Female Genital Mutilation or Cutting (FGM/C) is common are more likely to be hospitalised for medical conditions linked to FGM/C, which would be evidence of the fact that FGM/C health issues are not limited to origin countries.

The thesis is focused on the Italian context. Italy makes an interesting case study since it is the third country in the EU for population size and has witnessed sustained flows of immigration from 1989 onwards, which are also characterized by a significant proportion of undocumented immigrants. At the beginning of 2019, according to the Italian national statistics institute[2], foreign-born residents (4,996,158) accounted for 8.4% of the Italian resident population, with undocumented immigrants estimated to be 562,000[3]. Moreover, Italy allegedly has a generous universal public health system. Art. 32 of the Italian constitution claims that the Italian Republic is responsible of protecting health as a

[2]ISTAT, Istituto Nazionale di Statistica, www.stra-dati.istat.it

[3]Fondazione Ismu, www.ismu.org

fundamental human right of collective interest and should guarantee free care to the needy. In spite of this, evidence has shown that both legal barriers to access to health care and cultural factors shaping individuals' use and medical provision of health services give rise to unequal access to health services and unequal health outcomes for immigrants. Cultural factors may manifest in many ways, e.g. fostering community-specific behaviours among the immigrant population, one case of which is discussed in Chapter I, or resulting in discriminatory behaviours by health care practitioners that tap into existing prejudices or ignorance, as well as poor patient-doctor communication, which are all relevant aspects in Chapter III. As for legal barriers, undocumented immigrants in Italy face particularly strong difficulties to access health care. They cannot register to the National Health System (NHS) and are not entitled to address General Practitioners (GPs). Adding to it, cultural barriers are still in place, e.g. language distance, hampering the access to health care services by all non-Italian speakers. Chapter II specifically focuses on these issues.

The statistical analyses draw heavily on two administrative databases, namely the Italian birth register and the Italian hospital discharge records (HDR). Compared to survey data, administrative data has both advantages and disadvantages (Mazzali and Duca, 2015). On the one hand, they are valuable for their comprehensiveness: by covering the universe of the population, they avoid major pitfalls of sampling strategies, which are particularly problematic when one has an interest in groups for which it is difficult to get representative samples, as it is the case for specific migrant communities, or that are difficult to be reached by surveys in the first place, such as undocumented immigrants. Furthermore, by using administrative data I am able to study longer time frames compared to what would have been possible using survey data.

On the other hand, one common disadvantage of administrative data is the variable quality of collected data, that may be heterogeneous across the territory and over time. Reassuringly, HDR's quality and reliability has steadily improved over the last decade and is increasingly used in research and policy analysis (Trifiro et al., 2019). A second important pitfall is that administrative data are usually less generous in terms of individual controls that could be confounders in the analysis. The problem is partially tackled by adding contextual fixed effects, that control for all place-invariant characteristics, such as provision of local services and socio-economic conditions. In all the analyses, I am able to control for contextual fixed effects at the province level or lower.

The thesis is structured as follows. In the first chapter I will investigate the practice of sex-selective abortion among immigrants living in Italy, exploiting administrative data on the universe of the Italian births registered from 1999 to 2019. I will computer sex ratios at birth by citizenship of the mother in order to highlight possible imbalances. The analysis allows me to quantify the implied number of missing women over a 20-year timeframe. I will then make use of logistic regression models to estimate the likelihood of registering the birth of a female rather than a male for different population groups, conditional to family size and adjusting for individual characteristics of the parents, time and area fixed effects.

The second chapter, co-authored by Carlo Devillanova and Helen Banks, examines avoidable hospitalization (AH) rates as an indicator of poor access to primary care in Italy, where the universal healthcare system fails to assign general practitioners to undocumented immigrants. Using anonymized national hospital discharge records in 2019, undocumented immigrants will be conveniently identified through an administrative financing code. Potential effects of poor access to primary care will be measured by focusing on the incidence of AH, differentiated among chronic, acute and vaccine-preventable conditions, comparing Italian citizens, documented (foreign nationals with residence permits) and undocumented immigrants. Logistic regression models will be estimated controlling for individual and contextual confounders.

Using the same data source as in Chapter II, in the third chapter I provide novel descriptive evidence on patients with FGM/C diagnosis in the universe of hospitalisations over a 15-year time frame (2005-2019). I also calculate the incidence of hospitalisation due to FGM/C-related diseases, divided into physical and obstetrical, for the most recent year (2019) comparing three different populations: natives, immigrants from countries where FGM/C is practiced, and other immigrants, while controlling for individual, time and contextual confounders.

1 Sex-selective Abortions among Immigrant Communities: Evidence from Italian Birth Register Data

Solo work

Abstract

Background: Preference for sons over daughters coupled with desire for limited family sizes has led sex-selective abortions to arise in several countries, notably China and India, following the diffusion of technologies enabling pre-natal sex determination. While existing evidence finds that this fertility behaviour can also be found amongst immigrants in destination countries, the phenomenon remains understudied in most European countries. This research aims to investigate whether the practice of sex-selective abortion occurs among immigrants living in Italy, the third most populous country in the EU.
Methods: I am able to capture sex-selective abortions exploiting administrative data on the universe of the Italian births registered from 1999 to 2019. I calculate sex ratios at birth by mothers' citizenship and I use logistic regression models to estimate the likelihood of registering the birth of a female rather than a male for different population groups, conditional to family size and adjusting for individual characteristics of the parents as well as time and area fixed effects. I provide estimates of the implied number of missing women over the two decades.
Results: For several countries of citizenship of the parents, particularly for India, Philippines and China, the likelihood of registering the birth of a female rather than a male baby is significantly lower compared to the reference (Italy), after controlling for parents' age, marital status, family size as well as for province and year fixed effects. The unbalances are stronger when other minors are already registered in the family. These results point to pre-natal sex-selection.
Conclusions: This research brings attention to the discriminatory practice of sex-selective abortions among immigrant populations in the European context, providing for the first time a comprehensive analysis of the phenomenon on the Italian territory. Targeted action should be taken in order to tackle this issue in destination countries. Regular reporting of sex ratios at birth among population subgroups is needed in order to effectively monitor it.

Disclaimer

I dati utilizzati nel presente lavoro sono di fonte Istat e relativi all'indagine "Iscritti in anagrafe per nascita". Le elaborazioni sono state condotte presso il Laboratorio per l'Analisi dei Dati ELEmentari dell'Istat e nel rispetto della normativa in materia di tutela del segreto statistico e di protezione dei dati personali. I risultati e le opinioni espresse sono di esclusiva responsabilità dell'autore e non costituiscono statistica ufficiale. Si precisa che le analisi sono state condotte senza utilizzare i pesi di riporto all'universo.

The data used in the present work are from Istat source, indagine "Iscritti in anagrafe per nascita". The calculations have been conducted in Istat's "Laboratorio per l'Analisi dei Dati ELEmentari", complying with the regulations that safeguard the statistical secret and in accordance with the protection of individuals' privacy. Results and opinions expressed in the present work are exclusive responsibility of the author and do not constitute official statistics. The analyses have been conducted without using weights.

1.1 Introduction

Imbalances in sex ratio at birth (hereafter SRB) are one of the most notable anomalies in contemporary demography (Tafuro and Guilmoto, 2020), SRB skewed towards male births being commonly interpreted as evidence of sex-selective abortions of female foetuses (Chao et al., 2021). Four conditions are believed to affect prenatal sex-selection: a gendered preference regarding offspring, usually a higher demand for sons over daughters; low(ering) levels of fertility, either imposed or desired, meaning smaller family sizes; accessible technology enabling the identification of foetus' sexes; and the availability of abortion techniques (Guilmoto, 2009).

SRB imbalances have been first empirically studied in countries where the issue is nationally widespread, most notably in China and India (Tuljapurkar et al., 1995; Zeng et al., 1993; Jha et al., 2006; Bhat and Zavier, 2007), but also in other countries within the European and Asian continents, such as Albania, Armenia, Azerbaijan, Georgia, Hong Kong, Korea, Tunisia, Vietnam, Montenegro and Taiwan. To get a grasp of the reach of the phenomenon suffice it to know that the estimated cumulative number of missing female births for the twelve mentioned countries between 1950 and 2017 is of 23.1 million (Chao et al., 2019). For China and India alone, projections estimate another 2.8 and 2.3 million missing female births by 2100, respectively (Chao et al., 2021).

Further research has investigated SRB imbalances of the immigrant diasporas, which is not straightforward given that the behaviour immigrants adopt in the country of destination in regards to family formation and fertility is interwined with both the origin and the destination contexts. For instance, evidence has shown that stronger traditional gender roles in the country of origin have an impact on fertility behavior among immigrant population living in the US (Blau, 1992) and that cultural attributes of second generation immigrants in the US play a significant role on fertility outcomes (Fernandez and Fogli, 2009). On the other hand, other research has suggested that over time immigrants' fertility behavior resembles to the natives' one, particularly among second and later generation immigrants both in Europe (Coleman, 1994; Mayer and Riphahn, 2000) and in the US (Parrado and Morgan, 2008). A more integrate framework contends that both the mainstream society and the minority subculture shape the fertility patterns of immigrants (Kulu et al., 2017).

Empirical evidence regarding sex-selection behaviour among immigrant populations is not always consistent across time and space. Given its large outmigration flow in absolute numbers, a country of origin that many empirical studies focus on is India. It has been shown that the SRB at high parities of Indian-born mothers has been increasingly skewed towards male births in England and Wales in the 80s and 90s, following the availability of sex-determination techniques (Dubuc and Coleman, 2007; Adamou et al., 2013). However, no evidence of prenatal sex selection occurring in the UK was found in more recent research (UK Department of Health, 2013-2018). Male-biased SRBs for second and particularly for third parities have been detected also among US-born children of Indian parents using the 2000 US census (Almond and Edlund, 2008) and the 1970-2005 California birth register (Abrevaya, 2009), as well as among second and further children of Indian parents in Canada using 2001 and 2006 census data (Almond Jr et al., 2009; Ray et al., 2012) and among first parities of Indo-Pakistani speaking mothers in Québec for the period 1987-1992, although the bias disappeared in the following decade (Auger et al., 2009). In Europe, distorted SRB were found in the third and fourth birth order for mothers of Indian origin in 1987-2005 living in Norway (Singh et al., 2010), although further evidence from the same country shows that Indian-born women gave birth to more girls than boys of higher order in the period 2006-2012 (Tønnessen et al., 2013). Finally, Indian origin was correlated with extremely biased SRB in Spain in 2007-2012 (González, 2014) and in one Italian region, Lombardy, in 2008-2009 (Ambrosetti et al., 2015).

Along with the Indian one, the other most studied immigrant community is the Chinese one. Male-biased SRBs for second and particularly for third parities have been detected among US-born children of Chinese parents in the US (Almond and Edlund, 2008) and in California (Abrevaya, 2009). This is confirmed by regionally specific evidence from Italy (Ambrosetti et al., 2015) and in line with evidence from Greece showing that Indian and Chinese parents, pooled together, record male-skewed SRB in 2004-2011 (Gavalas et al., 2015). On the other hand, no significant difference was found between Chinese and natives in Spain in 2007-2012 (González, 2014) and in one Italian regional study, based in Tuscany, in 1992-2002 (Festini et al., 2003).

Evidence regarding other countries of origin is more limited and sometimes inconclusive, which can partially be attributed to the smaller size of these immigrant communities. Indeed, for 1,000 births, the estimated SRB can range from 93 to 119 in 95% of cases (Guilmoto, 2015). Countries of origin for which imbalances have been statistically determined include: South Korea, Romania, Morocco, Ecuador, Albania and Tunisia. Male-biased SRBs for second and particularly for third parities have been detected among US-born children of South Korean parents using the 2000 US census (Almond and Edlund, 2008) and the 1970-2005 California birth register (Abrevaya, 2009). Similarly, male-biased SRBs have been found among second and further children of South Korean parents in Canada using 2001 and 2006 census data (Almond Jr et al., 2009; Ray et al., 2012). No significant difference was found between Romanian and native parents in Spain in 2007-2012, while male-skewed SRB were found for Morocco and female-skewed SRBs for Ecuador (González, 2014). In Lombardy, evidence shows male-skewed SRB for Albanian parents in 2008-2009, and for Tunisian parents only at higher parity; evidence was inconclusive for parents with citizenship from Serbia and Montenegro (pooled together), Pakistan, Bangladesh, Senegal, Romania, Egypt, Morocco, Ecuador, Peru and Philippines (Ambrosetti et al., 2015).

Recent research has highlighted an intrinsic limitation in the use of SRB statistics as proof of sex-selective abortion, showing that SRB fails to correctly detect prenatal sex selection if the changing trend in desired family size is not taken into account. In fact, it is possibile to observe an increase in SRB despite fewer sex selection interventions occurring (Dubuc and Sivia, 2018). Moreover, one has to keep in mind that SRB can only provide evidence of sex-selection when directed systematically at a specific gender, while it would not evidence sex-selection for "family balancing", as male and female specific selections would cancel each other at aggregated level (Unnithan and Dubuc, 2018).

My research aims at contributing to the literature on sex-selective abortions of the immigrant diasporas in several ways. I provide for the first time a comprehensive analysis of immigrants' SRB in Italy, one of the largest European countries, where sustained immigration flows have been witnessed since the 90s, thereby extending previous regional studies by Ambrosetti et al. (2015) and Festini et al. (2003). Exploiting data on the universe of registered births over 19 years, I investigate a greater number of immigrants' origins compared to most of the extant literature, thanks to the greater sample numerosity. Moreover, as improvement with respect to several existing studies, I am able to include family size as control variable in the regression analyses, which corrects for the bias that could arise when looking at plain SRBs. Finally, in addition to the estimated number of missing girls calculated on the basis of SRB alone (González, 2014; Bongaarts and Guilmoto, 2015), I report the fraction of couples invoking sex-selective intervention by taking into account the average number of children within each population subgroup, as suggested by Dubuc and Sivia (2018).

1.2 Methods

Data

I use data from the universe of births registered in Italy from 1999 to 2019, as provided by the Italian National Statistical Office (ISTAT)[4]. In Italy, parents are required to officially register newborns within 6 months after their birth, regardless of the birth's location. The birth register records information on: sex of the newborn, date of birth of the newborn, month and year of birth's official registration, citizenship of both parents, date of birth of both parents, marital status of both parents (8 categories), municipality of residence, family size (up to 99 members), and, from 2004 onwards, the number of underage family members (up to 9). Unfortunately, for technical reasons data for the year 2018 was not available. The total number of observations over the considered period is 10,315,611. Appendix Table A.1 reports the yearly sample sizes. The main analysis is complemented by looking at the official number of registered abortions in the country. As mandated by

[4]Iscritti in Anagrafe per Nascita, ISTAT. *https://www.istat.it/adele/ListaRilevazioni.*

the Italian law since 1978[5], ISTAT collects information on all voluntary interruptions of pregnancy through a form that must be filled in by health care professionals at the time of abortion. I draw descriptive evidence on voluntary interruptions of pregnancy from this ISTAT official register[6].

Definition of variables

In all the regression analyses, the dependent variable is a dummy that takes value one if the sex of the birth registered is marked as female. Following standard practice in the literature (Caird et al., 2015), the citizenship of the mother is the main independent variable of interest. I set a threshold of 400 observations per year for each country of citizenship in order to avoid immigrant groups for which the number of observations is too heterogeneous across time, and also to ensure a good sample size for each citizenship. All fifteen countries of origin considered in the analysis record more than 10,000 observations in total. Citizenship for which the number of observations was below the yearly threshold were pooled together in the category "other immigrants".

I create a categorical variable to control for family size, with four classes: small-size family (up to 3 members), medium-size family (4 members), large-size family (more than 4 members), and a missing class. I group information on parents' marital status into five categories, in which civil unions are assimilated to marriages: married, divorced or separated, widowed, not married, missing. I recode parents' age into a categorical variable according to 5-year age brackets: 20-, 20-24, 25-29, 35-39, 40-44, 45+. No missing values were recorded for this variable. Finally, same citizenship couples are identified through a dummy variable that takes value one if the father has the same citizenship of the mother (see Appendix Table A.4 for details). Regressions by parity are conducted by dividing the sample according to the number of minors in the family, considering five categories: no underage members in the family other than the newborn, 1 underage member, 2 underage members, 3+ underage members, and a missing class. As mentioned, this information

[5] Legge 194/78.
[6] Indagine sulle Interruzioni Volontarie di Gravidanza, ISTAT.

was available only for the period 2004-2019.

Statistical analysis and reporting

The main analysis consists in estimating logistic regression models for the probability of registering the birth of a female child, given the citizenship of the mother. Italian citizenship acts as reference category. Additional controls include: the age of the mother, the age of the father, the mother's marital status, the father's marital status, the family size and a dummy to indicate whether the father has the same citizenship of the mother. Province fixed effects control for all regional specific unobservables that may influence fertility behaviours, such as local availability of abortive procedures. Year fixed effects control for all time specific unobservables, such as the economic downturn in 2008-2009. Additional analyses are conducted in order to unveil the well-known role of parity and possible temporal patterns. The analyses consist in running separate regressions splitting the sample by: number of minors in the family, as proxy for parity and 5-years time periods. All data preparation and statistical analysis was performed using Stata 16 at the Istat office "Laboratorio per l'Analisi dei Dati Elementari (Adele)". Tables report adjusted odd ratios (ORs) and 95% confidence intervals (CIs). P-values are reported at 0.05, 0.01 and 0.001 α level.

1.3 Results

SRBs and cumulative number of missing women

Births from non-Italian mothers make up 14.64% of the sample (1,510,652). As in Italy the *ius sanguis* guarantees Italian citizenship to all individuals with at least one Italian parent, some of these births are registered as Italian. Indeed, 23% of immigrant mothers gave birth to an Italian baby (358,439). Table 1.1 report key descriptive statistics of births given the mother's immigrant status, while Appendix Tables A.1, A.2 and A.3 reports further statistics according to the newborn's immigrant status. As one would expect, immigrant newborns have on average younger parents and their family size is larger compared to Italians. The largest share of immigrant newborns is registered in Lombardy region (26.23%), followed by Lazio (10.08%), while the largest shares of Italian newborns are registered in Lombardy (15.50%) and Campania (12.35%).

[Table 1.1 about here]

Figure 1.1 shows the immigrants' SRB for the fourteen selected countries of origin of the mothers, plus Italy as benchmark (1.06). The share of male births among immigrants is largest for Indian (53.92%), followed by Filipino (52.48%) and Chinese (52.42%) mothers. Also Egypt, North Macedonia, Albania and Romania citizenship record a share of male births above the Italian average. On the other hand, SRB is lower than the Italian average for mothers with citizenship from Peru (51.36%, SRB 1.04), Nigeria (50.78%, SRB 1.03), Ghana (50.71%, SRB 1.03) and Sri Lanka (50.32%, SRB 1.01). In addition, the figure reports the estimated SRB in the country of origin as comparison (UN, 2019). In most cases, SRB are more extreme among the immigrant communities living in Italy compared to the average in their country of origin. Differences are particularly pronounced for Indian (1.17 vs 1.09), Filipino (1.10 vs 1.06) and Egyptian (1.10 vs 1.06). On the contrary, Chinese and Albanian immigrants's SRB is less biased than in their country of origin (1.10 vs 1.13 and 1.07 vs 1.09, respectively).

[Figure 1.1 and Table 1.2 about here]

Different approaches have been used in the literature to provide rough estimations of the number of missing women. An intuitive approach consists in considering the number of observed male births that if changed into female births would deliver the balanced average (González, 2014). In this case, my results imply a cumulative number of 3,775 extra boys in Italy in the period 1999-2019 for the countries of citizenship of India, Philippines, China, Egypt, Macedonia, Albania, Romania, Brazil, Tunisia and Poland. Alternatively, one may consider the number of female births that would have to be added to the observed number in order to reach balance (Bongaarts and Guilmoto, 2015). In this case, the implied number of missing girls would be of 7,346. On the other hand, female-skewed SRBs for citizenship from Morocco, Peru, Nigeria, Ghana and Sri Lanka result in 1,484 missing boys or 763 extra girls. For all calculations I used the Italian SRB as the "balanced" reference. Italy is also the reference category used in all the regression analyses. A different approach proposed by Dubuc and Sivia (2018), which takes into account also the average number of children in the family, consists in calculating the fraction of couples that invoking a sex-selective intervention (ϕ). This is highest among Indians (9.21%), followed by Egyptians and Chinese (both above 4%). Table 1.2 reports the number of births by sex, the SRBs, the implied number of missing girls and extra boys, and the ϕ values. Appendix sections A.1 and A.2 explain in further details how the calculations are made.

Obviously, the data does not allow to investigate whether sex selective abortions are conducted abroad or in Italy, and in the latter case whether in hospitals, bypassing health regulations, or completely outside the Italian health system. However, I report official statistics regarding voluntary interruptions of pregnancy conducted in Italy for completeness (Appendix Table A.5). The figures show that over the analysed time frame abortions occurred 12,495 times among Indian women, 37,400 among Chinese women and 13,382 times among Filipino women. In more than 40% of the cases the immigrant woman had already given birth twice, while among Italians the largest share of voluntary interruptions of pregnancy happens among women without any children. This pattern is coherent with sex-selective abortion happening at higher parity, although it is by no means a proof of it.

Likelihoods of having a daughter

Table 1.3 reports the regressions' ORs with 95% CI in a stepwise manner. Specification (1) includes only the main independent variable of interest, i.e. the mother's citizenship; in specification (2) I add year and province fixed effects; in specification (3) I add individual controls. Results from the latter show that compared to Italian mothers, mothers with citizenship from Indian, Philippines, China, Egypt, Macedonia and Albania are statistically less likely to register the birth of a female baby. The difference compared to Italians spans from 9.9% for Indian mothers to 1.3% for Albanian mothers. On the other hand, mothers from Nigeria and Sri Lanka are less likely to register a birth of a *male* baby compared to Italian mothers. Estimated coefficients for Romanian citizenship loose statistical significance when including fixed effects. For all other immigrant categories, the inclusion of individual controls and fixed effect does not affect the estimated coefficients. No statistical difference compared to Italians was found for the following countries of citizenship: Ghana, Morocco, Poland, Tunisia, Brazil and Peru.

As robustness check, I run the regression as in specification (3) using regional fixed effects rather than province fixed effect. The results are not affected, the only difference being that the coefficient for Romania gains statistical significance (Appendix Table A.6). Moreover, the results are confirmed when using father's citizenship rather than mother's citizenship, as well as reducing the sample to same-citizenship parents (Appendix Table A.7). Instead, focusing on mixed-citizenship parents only, most results turn out statistically insignificant, which may be a statistical artefact due to small sample sizes and by itself cannot be interpreted as suggestions that mixed-citizenship parents are more likely to have fertility preferences closer to those of the country of destination, either because of assimilation or because of that being part of their reasons to emigrate in the first place. However, the fact that Indian and Filipino mothers still tend to have more boys than girls when in mixed-citizenship couples does indicate that, at least for these two countries of citizenship, being exposed to other cultures does not bring fertility behaviours to depart from those prevalent in the home country.

[Table 1.3 and 1.4 about here]

In order to detect temporal patterns, Table 1.4 reports ORs from four different regressions in which the sample is split by 5-year time periods. All specifications include the full set of individual controls, as well as province and year fixed effects. The last period, 2015-2019, is the period in which more unbalances are found (7 countries), while the first period, 1999-2004, records the lowest unbalances (1 country). India is the only country of citizenship for which unbalances are recorded in all four specifications. The four estimated coefficients are not statistically different from each other. For Chinese mothers skewed SRB are found in all periods but the first one. Although the three ORs are not statistically different from each other, the magnitude of the coefficient decreases in the last period whilst its statistical significance increases.

In table 1.5 I split the sample into five subsamples according to the number of minors in the family: one (i.e. the newly registered child), two, three, four or more, and a missing category. In this analysis the timeframe is restricted to the period 2004-2019 because of lack of information on the number of minors in previous years. All specifications include the full set of individual controls, as well as year and province fixed effects.

Results show that when the newborn is the only minor in the family, only Filipino and Sri Lankan origins have unbalanced sex ratios at birth, although in opposite directions (first column). When the newborn is the second minor in the family, Indian, Egyptian and Filipino record lower likelihoods to have a daughter compared to Italians, respectively 10.3% lower, 6.4% lower and 4.3% lower (second column). When there are two minors already in the family in addition to the newborn, the likelihoods to have a daughter are 30.0% lower for Indian, 11.5% lower for Chinese, 4.0% lower for Albanian and 2.2% lower for Moroccan mothers (third column). On the other hand, mothers from Ghana have 8.6% higher likelihood of having a daughter compared to Italians. Finally, when in the family there is a total of four or more minors, including the newborn, the likelihoods of having a daughter are 24.8% lower for Indians, 16.5% lower for Filipinos, 12.3% lower for Chinese, and 8.8% lower for Macedonians (fourth column).

Overall, sex-selective abortions among Indian and Chinese are much more likely when there are already two or more underage family members, which is consistent with previous literature on parity. This is not true for Filipinos, as the three estimated coefficients in the first, second and fourth column are not statistically different from each other, although the statistical significance is highest in the last specification. As alternative check, I run a regression in which I interact the country of citizenship of the mother with the number of underage family members. The difference compared to the split sample strategy is that now only the coefficients of the two interacted variables are affected, while other coefficients are not allowed to change according to the number of minors in the family.

The regression brings to similar results as before.

[Table 1.5 about here]

1.4 Conclusions

By using the universe of births registered in the country over the period 1999-2019, in this chapter I provide an analysis of SRB in Italy, with a focus on immigrant diasporas. To the best of my knowledge, this is the first comprehensive study of such type conducted in Italy. I show that in this country sex-selective abortion against female foetuses is an issue among at least six immigrant communities, the most remarkable results being those for Chinese, Indian and Filipino, followed by Egyptian, Macedonian and Albanian, while results are inconclusive for Romanian. I estimate more than 7,000 cumulative missing female births in the period 1999-2019. The phenomenon is more common when the newborn is not the only minor in the family, which is consistent with previous literature on parity. The estimated share of mothers invoking sex-selection is particularly high for Indians (above 9%). Worrisomely, for Chinese mothers the trend seems to have worsened in the last years. My results for the Chinese community are in contrast with Festini et al. (2003) but confirm evidence by Ambrosetti et al. (2015). To my best knowledge, imbalances for Filipino, Egyptian and Macedonian origins had never been documented before in the Italian context before. Moreover, my results show female skewed SRBs for Sri Lankan and Nigerian citizenship implying a total of 960 missing boys, something that was never discussed in previous international literature, although female-biased SRB were found for another country of origin, Ecuador, in one Spanish study (González, 2014).

The research incurs in several limitations. Previous research has found illiterate mothers in Greece to be more likely to have male births, disregarding of citizenship (Gavalas et al., 2015), and differences according to the educational level were found in Italy for Chinese, Indian and Albanian parents (Ambrosetti et al., 2015). Unfortunately, in my research it was not possible to control for individual factors that could help pinpoint the specific socio-economic background associated with sex-selective abortions. Similarly, information on length of permanence of the parents in the country, which was not available, would have shed more light on cultural integration aspects. However, the issue is partially tackled by fairly granular geographical fixed effects, which control for the average socioeconomic status at the province level. Finally, given the lack of information on previous births, I could only use the number of minors in the family as an imperfect proxy for parity.

Analysis of SRB by country of origin of the parents should be systematically conducted in all major European countries, such as France and Germany, in order to unveil further pre-natal gender discriminations. This type of evidence should be periodically provided in order to monitor progresses over time. Furthermore, some research has shown that neither abortion bans (Nandi et al., 2015) nor deregulation of abortion affect unbalanced SRB (González, 2014). More qualitative research is needed in order to investigate the methods and contexts within which the practice of sex-selective abortion actually take place, whether on the country territory or abroad, through conventional or unconventional channels, and how to effectively tackle it.

1.5 Figures and Tables

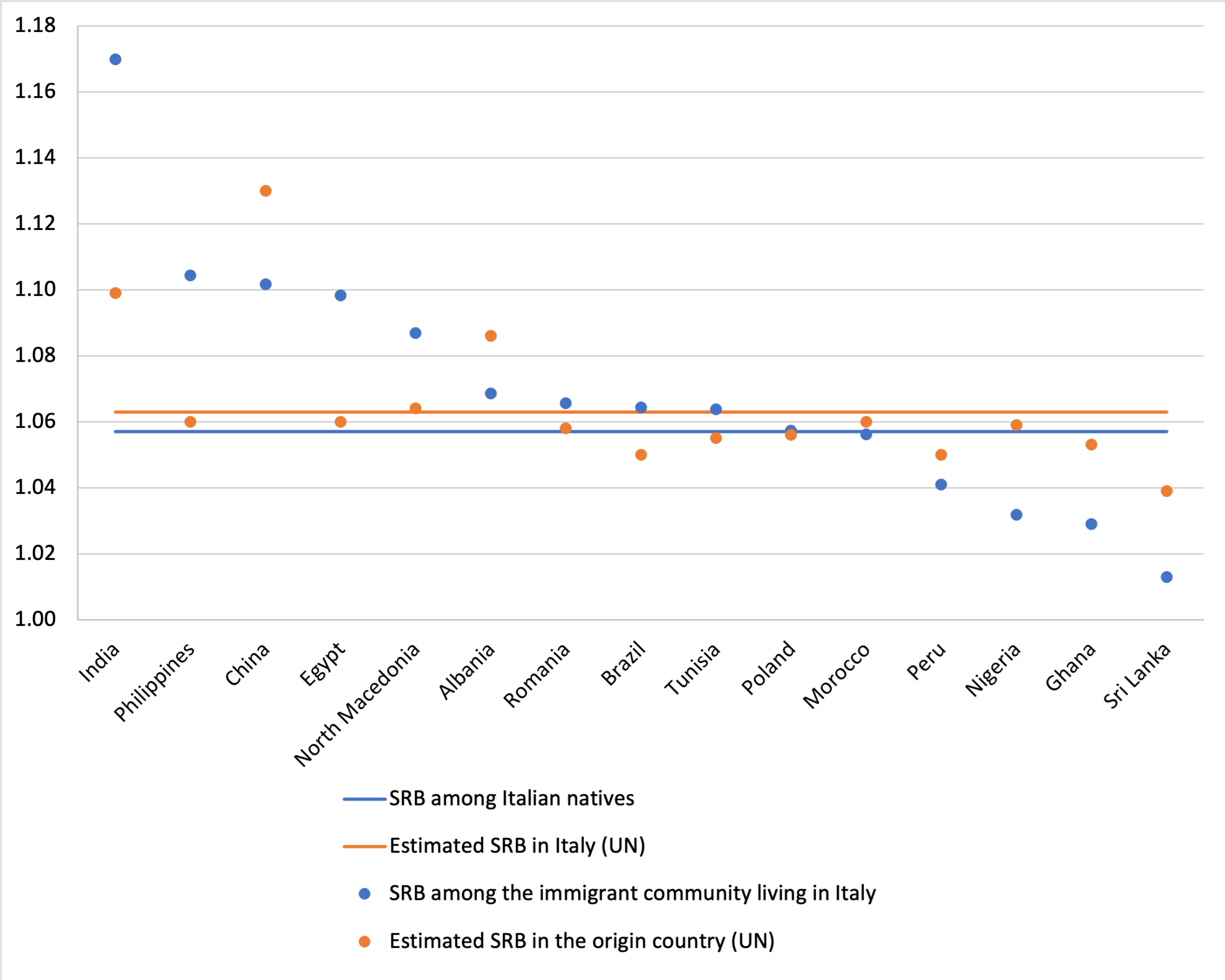

Figure 1.1: SRBs in Italy by mother's citizenship (1999-2019) and comparison with UN estimates in origin countries (2015-2020)

Note: SRB in Italy are based on birth register data. The source for SRB estimates in origin countries is: "United Nations, Department of Economic and Social Affairs, Population Division (2019). World Population Prospects 2019, Online Edition. Rev. 1.'

Table 1.1: Characteristics of births registered in Italy by citizenship of the mother, 1999-2019

	Births from:			
	Italian mothers		Immigrant mothers	
	No.	%	No.	%
Sex				
Male	4,524,493	51.39	778,606	51.54
Mother's age class				
20-	132,532	1.51	38,691	2.56
20-24	677,675	7.70	289,517	19.17
25-29	2,043,340	23.21	466,823	30.90
30-34	3,178,379	36.10	399,121	26.42
35-39	2,127,571	24.16	206,841	13.69
40-44	504,592	5.73	47,961	3.17
45+	36,004	0.41	3343	0.22
Missing	104,866	1.19	58,355	3.86
Mother's civil status				
Unmarried	1,637,179	18.59	263,811	17.46
Married	6,910,034	78.48	1,051,251	69.59
Widowed	16,639	0.19	2,380	0.16
Divorced	94,184	1.07	15,053	1.00
Other/Unknown	146,923	1.67	178,157	11.79
No. of minors				
no minors	3,095,988	35.16	584,186	38.67
1 minor	2,378,924	27.02	443,169	29.34
2 minors	608,731	6.91	181,923	12.04
3+ minors	159,854	1.82	84,719	5.61
Missing	2,561,462	29.09	216,655	14.34
Family size				
Small (3-)	3,747,124	42.56	564,260	37.35
Medium (4)	3,086,353	35.05	420,175	27.81
Large (5+)	1,897,172	21.55	518,459	34.32
Missing	74,310	0.84	7,758	0.51
Father's citizenship				
Same as mother's	8,68,7664	98.67	1,048,159	69.38
Newborn's citizenship				
Italian	8,804,959	100	358,439	23.73
Total	8,804,959	100	1,510,652	100

Table 1.2: SRBs and number of missing women, 1999-2019

	Males	**Females**	**Tot**	**SRB**	**%M**	**Missing girls**	**Extra boys**	ϕ	† SRB in origin country
Mother's citizenship									
Italy	4,524,493	4,280,466	8,804,959	1.0570	51.39	0	0		1.063
Male-skewed SRBs									
India	22,194	18,970	41,164	1.1700	53.92	2027	1,042	9.21%	1.099
Philippines	17,251	15,620	32,871	1.1044	52.48	701	360	3.90%	1.060
China	41,599	37,760	79,359	1.1017	52.42	1,595	820	4.12%	1.130
Egypt	18,518	16,861	35,379	1.0983	52.34	658	338	4.69%	1.060
Macedo	13,813	12,709	26,522	1.0869	52.08	359	184	3.00%	1.064
Albania	82,734	77,425	160,159	1.0686	51.66	847	435	0.97%	1.086
Romania	126,339	118,566	244,905	1.0656	51.59	959	493	0.65%	1.058
Brazil	10,595	9,955	20,550	1.0643	51.56	69	35	0.53%	1.050
Tunisia	21,237	19964	41,201	1.0638	51.54	128	66	0.69%	1.055
Poland	18,149	17,166	35,315	1.0573	51.39	4	2	0.02%	1.056
Total	196,109	179,345	375,454	1.0935	52.23	7,346	3,775		
Female-skewed SRBs									
Morocco	105,101	99,518	204,619	1.0561	51.36	-86	-44	0.09%	1.060
Peru	14,127	13,571	27,698	1.0410	51.00	-206	-106	1.31%	1.050
Nigeria	17,499	16,959	34,458	1.0318	50.78	-404	-207	2.41%	1.059
Ghana	9,002	8,749	17,751	1.0289	50.71	-233	-119	2.96%	1.053
Sri Lanka	13,484	13,313	26,797	1.0128	50.32	-556	-286	3.51%	1.039
Total	39,985	39,021	79,006	1.0247	50.61	-1,484	-763		

Notes: † UN estimates from "United Nations, Department of Economic and Social Affairs, Population Division (2019). World Population Prospects 2019, Online Edition. Rev. 1."

ϕ is the fraction of parents invoking sex-selection (Dubuc and Sivia, 2018).

Table 1.3: Logistic regression results (ORs) for the likelihood of having a daughter, 1999-2019

	(1) **Female birth**	(2) **Female birth**	(3) **Female birth**
Mother's citizenship			
India	0.903***	0.903***	0.901***
	(0.886 - 0.921)	(0.885 - 0.920)	(0.884 - 0.919)
Philippines	0.957***	0.958***	0.958***
	(0.937 - 0.978)	(0.938 - 0.979)	(0.937 - 0.979)
Egypt	0.962***	0.964***	0.961***
	(0.943 - 0.983)	(0.944 - 0.984)	(0.941 - 0.982)
China	0.959***	0.961***	0.962***
	(0.946 - 0.973)	(0.947 - 0.975)	(0.948 - 0.976)
North Macedonia	0.973*	0.973*	0.972*
	(0.949 - 0.996)	(0.949 - 0.997)	(0.949 - 0.996)
Albania	0.989*	0.989*	0.987*
	(0.979 - 0.999)	(0.979 - 0.999)	(0.977 - 0.997)
Tunisia	0.994	0.993	0.989
	(0.975 - 1.013)	(0.974 - 1.012)	(0.970 - 1.009)
Brazil	0.993	0.994	0.990
	(0.966 - 1.021)	(0.967 - 1.021)	(0.963 - 1.019)
Romania	0.992*	0.993	0.992
	(0.984 - 1.000)	(0.985 - 1.001)	(0.984 - 1.000)
Morocco	1.001	1.000	0.997
	(0.992 - 1.010)	(0.992 - 1.009)	(0.988 - 1.006)
Poland	1.000	1.001	0.999
	(0.979 - 1.021)	(0.980 - 1.022)	(0.977 - 1.021)
Other countries	1.006	1.005	1.004
	(1.000 - 1.011)	(0.999 - 1.011)	(0.997 - 1.011)
Peru	1.015	1.017	1.015
	(0.992 - 1.040)	(0.993 - 1.041)	(0.991 - 1.040)
Ghana	1.027	1.024	1.022
	(0.997 - 1.058)	(0.994 - 1.055)	(0.992 - 1.052)
Nigeria	1.024*	1.024*	1.022*
	(1.003 - 1.046)	(1.003 - 1.046)	(1.001 - 1.044)
Sri Lanka	1.044***	1.043***	1.042***
	(1.019 - 1.069)	(1.018 - 1.069)	(1.017 - 1.067)
Observations	10,315,611	10,315,611	10,315,611
Controls	NO	NO	YES
Province FE	NO	YES	YES
Year FE	NO	YES	YES

*** p<0.001, ** p<0.01, * p<0.05
95% CI in parenthesis

Notes:

Italy is the reference category.

Controls include: the age of the mother, the age of the father, the mother's marital status, the father's marital status, the family size and a dummy to indicate whether the father has the same citizenship of the mother.

A threshold of 400 observations per year for each country of citizenship was set, in order to focus on those immigrant groups for which a large enough sample is available. All citizenship for which the number of observations was below the threshold were pooled together in the category "other countries" .

Table 1.4: Logistic regression results (ORs) for the likelihood of having a daughter, by five year periods, 1999-2019

	(1)	(2)	(3)	(4)
Outcome variable	**Female birth**	**Female birth**	**Female birth**	**Female birth**
Time period	1999-2004	2005-2009	2010-2014	2015-2019
Mother's citizenship				
India	0.895***	0.909***	0.886***	0.914***
	(0.839 - 0.954)	(0.872 - 0.948)	(0.856 - 0.917)	(0.885 - 0.944)
China	0.989	0.970*	0.961**	0.945***
	(0.951 - 1.028)	(0.944 - 0.997)	(0.938 - 0.986)	(0.919 - 0.971)
Philippines	0.967	0.964	0.962	0.943**
	(0.922 - 1.014)	(0.922 - 1.008)	(0.922 - 1.002)	(0.904 - 0.983)
North Macedonia	1.035	0.955	0.986	0.944*
	(0.966 - 1.108)	(0.912 - 1.000)	(0.946 - 1.028)	(0.899 - 0.991)
Albania	0.984	0.997	0.972**	0.996
	(0.959 - 1.010)	(0.978 - 1.017)	(0.954 - 0.990)	(0.977 - 1.015)
Egypt	0.982	0.942**	0.974	0.957*
	(0.927 - 1.040)	(0.902 - 0.985)	(0.936 - 1.013)	(0.923 - 0.993)
Romania	0.973	0.993	0.993	0.994
	(0.935 - 1.011)	(0.974 - 1.011)	(0.979 - 1.007)	(0.981 - 1.008)
Morocco	0.990	0.992	1.005	0.997
	(0.967 - 1.014)	(0.974 - 1.010)	(0.989 - 1.022)	(0.980 - 1.014)
Brazil	0.978	0.976	1.004	0.995
	(0.909 - 1.053)	(0.924 - 1.032)	(0.956 - 1.055)	(0.942 - 1.051)
Poland	0.972	1.017	1.004	0.983
	(0.921 - 1.027)	(0.977 - 1.058)	(0.965 - 1.044)	(0.937 - 1.031)
Tunisia	1.030	0.984	0.976	0.980
	(0.986 - 1.076)	(0.949 - 1.020)	(0.941 - 1.012)	(0.940 - 1.021)
Peru	1.038	1.039	0.993	1.012
	(0.973 - 1.107)	(0.989 - 1.092)	(0.951 - 1.037)	(0.966 - 1.059)
Nigeria	1.005	1.010	1.010	1.050**
	(0.943 - 1.070)	(0.966 - 1.055)	(0.972 - 1.050)	(1.012 - 1.089)
Ghana	1.012	1.013	1.021	1.036
	(0.942 - 1.087)	(0.955 - 1.074)	(0.968 - 1.078)	(0.979 - 1.097)
Sri Lanka	1.045	1.017	1.052*	1.050*
	(0.984 - 1.110)	(0.967 - 1.070)	(1.006 - 1.100)	(1.007 - 1.096)
Other countries	0.987	1.002	1.010	1.008
	(0.970 - 1.004)	(0.988 - 1.016)	(0.998 - 1.023)	(0.995 - 1.020)
Observations	2,637,702	2,723,026	2,643,686	2,311,197
Controls	YES	YES	YES	YES
Province FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

*** $p<0.001$, ** $p<0.01$, * $p<0.05$
95% CI in parenthesis

Notes:

Italy is the reference category.

Controls include: the age of the mother, the age of the father, the mother's marital status, the father's marital status, the family size and a dummy to indicate whether the father has the same citizenship of the mother.

A threshold of 400 observations per year for each country of citizenship was set, in order to focus on those immigrant groups for which a large enough sample is available. All citizenship for which the number of observations was below the threshold were pooled together in the category "other countries" .

Table 1.5: Logistic regression results (ORs) for the likelihood of having a daughter, by number of minors in the family, 2004-2019

	(1)	(2)	(3)	(4)	(5)
Outcome variable	**Female birth**	**Female birth**	**Female birth**	**Female birth**	**Female birth**
N. of minors in the family	One	Two	Three	Four+	Missing info
Mother's citizenship					
India	0.993	0.897***	0.700***	0.752***	0.854
	(0.963 - 1.025)	(0.868 - 0.927)	(0.659 - 0.743)	(0.677 - 0.835)	(0.690 - 1.058)
China	0.993	0.975	0.885***	0.877***	0.992
	(0.969 - 1.018)	(0.949 - 1.000)	(0.852 - 0.920)	(0.828 - 0.929)	(0.877 - 1.121)
Philippines	0.961*	0.957*	0.964	0.835**	1.051
	(0.927 - 0.996)	(0.918 - 0.997)	(0.900 - 1.033)	(0.736 - 0.948)	(0.852 - 1.295)
North Macedonia	0.985	0.967	0.964	0.912*	0.903
	(0.942 - 1.031)	(0.925 - 1.010)	(0.908 - 1.025)	(0.843 - 0.985)	(0.731 - 1.115)
Romania	0.992	0.997	1.005	0.996	0.896**
	(0.980 - 1.004)	(0.982 - 1.012)	(0.974 - 1.037)	(0.949 - 1.045)	(0.825 - 0.973)
Albania	0.993	0.992	0.960*	0.963	1.045
	(0.977 - 1.010)	(0.975 - 1.010)	(0.930 - 0.991)	(0.904 - 1.026)	(0.942 - 1.159)
Morocco	1.008	1.001	0.978*	1.004	1.012
	(0.991 - 1.026)	(0.984 - 1.018)	(0.957 - 1.000)	(0.971 - 1.039)	(0.927 - 1.104)
Egypt	0.978	0.936**	0.978	0.949	0.839
	(0.933 - 1.024)	(0.898 - 0.975)	(0.935 - 1.023)	(0.895 - 1.006)	(0.681 - 1.033)
Tunisia	0.980	0.991	0.988	0.935	0.982
	(0.944 - 1.018)	(0.954 - 1.029)	(0.943 - 1.035)	(0.872 - 1.002)	(0.828 - 1.166)
Peru	1.026	1.006	0.992	0.956	0.951
	(0.988 - 1.066)	(0.962 - 1.053)	(0.916 - 1.075)	(0.823 - 1.111)	(0.740 - 1.221)
Poland	0.997	1.018	1.030	1.010	0.850
	(0.965 - 1.030)	(0.976 - 1.061)	(0.947 - 1.121)	(0.852 - 1.197)	(0.690 - 1.046)
Brazil	1.006	0.974	0.965	1.002	1.005
	(0.967 - 1.047)	(0.921 - 1.030)	(0.860 - 1.082)	(0.803 - 1.250)	(0.773 - 1.306)
Nigeria	1.025	1.026	1.019	1.023	1.033
	(0.988 - 1.062)	(0.985 - 1.067)	(0.965 - 1.075)	(0.943 - 1.110)	(0.903 - 1.182)
Ghana	0.974	1.025	1.086*	1.030	1.067
	(0.919 - 1.032)	(0.968 - 1.085)	(1.014 - 1.163)	(0.932 - 1.138)	(0.840 - 1.354)
Sri Lanka	1.042*	1.036	1.059	1.053	1.048
	(1.005 - 1.081)	(0.992 - 1.083)	(0.969 - 1.156)	(0.861 - 1.289)	(0.868 - 1.264)
Other countries	1.011	1.001	0.999	1.033*	0.975
	(1.000 - 1.022)	(0.988 - 1.014)	(0.979 - 1.020)	(1.004 - 1.063)	(0.919 - 1.034)
Observations	3,680,174	2,822,093	790,654	244,573	140,415
Controls	YES	YES	YES	YES	YES
Province FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES

*** p<0.001, ** p<0.01, * p<0.05
95% CI in parenthesis

Notes:

Italy is the reference category.

Controls include: the age of the mother, the age of the father, the mother's marital status, the father's marital status and a dummy to indicate whether the father has the same citizenship of the mother.

A threshold of 400 observations per year for each country of citizenship was set, in order to focus on those immigrant groups for which a large enough sample is available. All citizenship for which the number of observations was below the threshold were pooled together in the category "other countries" .

A. Appendix Tables and Notes

Table A.1: Births registered in Italy by year and citizenship of the newborn, 1999-2019

	Italian births		Immigrant births		Total	
	No.	%	No.	%	No.	%
Year						
1999	493,414	5.38	20,983	1.82	514,397	4.99
2000	501,409	5.47	31,102	2.70	532,511	5.16
2001	499,999	5.46	29,157	2.53	529,156	5.13
2002	497,863	5.43	32,562	2.83	530,425	5.14
2003	498,826	5.44	32,387	2.81	531,213	5.15
2004	507,128	5.53	46,642	4.05	553,770	5.37
2005	486,326	5.31	49,786	4.32	536,112	5.20
2006	483,656	5.28	54,561	4.74	538,217	5.22
2007	479,048	5.23	61,270	5.32	540,318	5.24
2008	485,611	5.30	68,998	5.99	554,609	5.38
2009	477,179	5.21	74,696	6.48	551,875	5.35
2010	466,274	5.09	75,257	6.53	541,531	5.25
2011	453,679	4.95	76,877	6.67	530,556	5.14
2012	443,005	4.83	78,547	6.82	521,552	5.06
2013	422,833	4.61	75,339	6.54	498,172	4.83
2014	421,118	4.60	73,402	6.37	494,520	4.79
2015	408,571	4.46	71,666	6.22	480,237	4.66
2016	398,533	4.35	69,291	6.01	467,824	4.54
2017	383,597	4.19	67,405	5.85	451,002	4.37
2019	355,329	3.88	62,285	5.41	417,614	4.05
Total	9,163,398	100	1,152,213	100	10,315,611	100

Table A.2: Births registered in Italy by newborn's and parents' citizenship, 1999-2019

	Italian births		Immigrant births			Italian births		Immigrant births	
	No.	%	No.	%		No.	%	No.	%
Mother's citizenship					Father's citizenship				
Italy	8,804,959	96.09	0	0.00	Italy	9,046,102	98.72	0	0.00
Albania	20,851	0.23	139,308	12.09	Albania	11,364	0.12	143,094	12.42
Poland	25,339	0.28	9,976	0.87	Poland†	-	-	-	-
Romania	59,220	0.65	185,685	16.12	Romania	6,512	0.07	185,866	16.13
North Macedonia	2,162	0.02	24360	2.11	North Macedonia	964	0.01	22,764	1.98
Sri Lanka	592	0.01	26,205	2.27	Sri Lanka	394	0.00	26,501	2.30
China	3,331	0.04	76,028	6.60	China	636	0.01	74,382	6.46
Philippines	3,226	0.04	29,645	2.57	Philippines	462	0.01	27,548	2.39
India	1,505	0.02	39,659	3.44	India	1,097	0.01	40,153	3.48
Egypt	1,758	0.02	33,621	2.92	Egypt	2,947	0.03	36,509	3.17
Ghana	907	0.01	16,844	1.46	Ghana	651	0.01	16,756	1.45
Morocco	22,316	0.24	182,303	15.82	Morocco	12,059	0.13	181,041	15.71
Nigeria	4,687	0.05	29,771	2.58	Nigeria	1,070	0.01	27,511	2.39
Senegal	-	-	-	-	Senegal	2,889	0.03	22,800	1.98
Tunisia	3,979	0.04	37,222	3.23	Tunisia	6,413	0.07	39,969	3.47
Brazil	17,391	0.19	3,159	0.27	Brazil†	-	-	-	-
Peru	7,764	0.08	19,934	1.73	Peru†	-	-	-	-
Other countries	183,411	2.00	298,493	25.91	Other countries	69,838	0.76	307,319	26.67
Total	9,163,398	100	1,152,213	100	Total	9,163,398	100	1,152,213	100

Notes: A threshold of 400 observations per year for each country of citizenship of the mother/father was set, in order to focus on those immigrant groups for which a large enough sample is available. All citizenship for which the number of observations was below the threshold were pooled together in the category "other countries" .
† Not considered in the fathers' sample, as less than 400 observations per year were available.

Table A.3: Characteristics of births registered in Italy by citizenship of the newborn, 1999-2019

	Italian		Immigrant	
	No.	%	No.	%
Sex				
Male	4,709,043	51.39	594,056	51.56
Mother's age class				
20-	137,031	1.50	34,192	2.97
20-24	718,777	7.84	248,415	21.56
25-29	2,142,155	23.38	368,008	31.94
30-34	3,295,665	35.97	281835	24.46
35-39	2,200,725	24.02	133,687	11.60
40-44	522,282	5.70	30,271	2.63
45+	37,282	0.41	2,065	0.18
Missing	109,481	1.19	53740	4.66
Mother's civil status				
Unmarried	1,729,916	18.88	171,074	14.85
Married	7,138,187	77.90	823,098	71.44
Widowed	17,613	0.19	1,406	0.12
Divorced	102,769	1.12	6,468	0.56
Other/Unknown	174,913	1.91	150,167	13.03
Father's age class				
20-	29,135	0.32	3,520	0.31
20-24	273,212	2.98	52,305	4.54
25-29	1,161,858	12.68	212,116	18.41
30-34	2,745,533	29.96	323,768	28.10
35-39	2,667,880	29.11	259,669	22.54
40-44	1,244,293	13.58	125,714	10.91
45+	479,513	5.23	53,737	4.66
Missing	561,974	6.13	121,384	10.53
Father's civil status				
Unmarried	1,452,516	15.85	160,267	13.91
Married	6,936,361	75.70	801,086	69.53
Widowed	9,007	0.10	566	0.05
Divorced	84,472	0.92	4,248	0.37
Other/Unknown	681,042	7.43	186,046	16.15
No. of minors				
no minors	3,260,737	35.58	419,437	36.40
1 minor	2,474,250	27.00	347,843	30.19
2 minors	638,246	6.97	152,408	13.23
3+ minors	172,184	1.88	72,389	6.28
Missing	2,617,981	28.57	160,136	13.90
Family size				
Small (3-)	3,912,884	42.70	398,500	34.59
Medium (4)	3,184,161	34.75	322,367	27.98
Large (5+)	1,990,262	21.72	425,369	36.92
Missing	76,091	0.83	5,977	0.52
Parents' citizenship		0.00		0.00
Same citizenship	8,687,665	94.81	1,048,158	90.97
Region of residence				
Lombardia	1,420,654	15.50	302,232	26.23
Campania	1,131,314	12.35	29,495	2.56
Lazio	860,139	9.39	116,120	10.08
Sicilia	892,363	9.74	30,644	2.66
Veneto	703,006	7.67	144,889	12.57
Puglia	689,774	7.53	19,752	1.71
Piemonte	594,442	6.49	104,901	9.10
Emilia-Romagna	586,590	6.40	138,039	11.98
Toscana	497,927	5.43	87,756	7.62
Calabria	334,004	3.64	13,203	1.15
Sardegna	237,053	2.59	6,035	0.52
Marche	217,703	2.38	36,045	3.13
Liguria	193142	2.11	29,352	2.55
Abruzzo	188,226	2.05	15,790	1.37
Umbria	117,864	1.29	21,382	1.86
Trentino-Alto Adige	182,289	1.99	24,935	2.16
Friuli-Venezia Giulia	161,996	1.77	24,962	2.17
Basilicata	90,365	0.99	2,814	0.24
Molise	44,814	0.49	1,610	0.14
Valle d'Aosta	19,733	0.22	2,257	0.20
Total	9,163,398	100	1,152,213	100

Table A.4: Births from same citizenship parents vs. different citizenship parents, 1999-2019

	Same citizenship parents		**Different citizenship parents**		**Totals**	
	Fathers	Mothers	Fathers	Mothers	Fathers	Mothers
Italy	8,687,664	8,687,664	358,438	117,295	9,046,102	8,804,959
Morocco	176,715	176,715	16,385	27,904	193,100	204,619
Romania	174,625	174,625	17,753	70,280	192,378	244,905
Albania	136,637	136,637	17,821	23,522	154,458	160,159
China	72,365	72,365	2,653	6,994	75,018	79,359
Tunisia	36,402	36,402	9,980	1,958	46,382	41,164
India	39,206	39,206	2,044	4,799	41,250	41,201
Egypt	327,51	32,751	6,705	2,628	39,456	35,379
Nigeria	26,520	26,520	2,061	6,091	28,581	32,871
Philippines	26,780	26,780	1,230	7,938	28,010	34,458
Sri Lanka	25,536	25,536	1,359	1,261	26,895	26,797
*Senegal	21,955	n.a.	3,734	n.a.	25,689	n.a.
Macedonia	21,278	21,278	2,450	5,244	23,728	26,522
Ghana	15,463	15,463	1,944	2,288	17,407	17,751
† Peru	n.a.	15,436	n.a.	12,262	n.a.	27,698
† Poland	n.a.	6,863	n.a.	28,452	n.a.	35,315
† Brasil	n.a.	2,427	n.a.	18,123	n.a.	20,550
Other countries	241,926	239,155	135,231	242,749	377,157	481,904
Total	9,735,823	9,735,823	579,788	579,788	10,315,611	10,315,611

** Not considered in the Mothers' sample, as for some years less than 400 observations were available.*
† Not considered in the Fathers' sample, as for some years less than 400 observations were available.

Table A.5: Number of voluntarily interruptions of pregnancy, 1999-2019

	Previous live births											
	0		1		2		3+		Missing		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Woman's citizenship												
Italy	665,552	41.16	301,060	18.62	371,886	23	139,294	8.61	139,312	8.61	1,617,104	100
Nigeria	16,011	55.42	5,500	19.04	3,309	11.45	2,120	7.34	1,951	6.75	2,8891	100
Morocco	15,854	41.38	8,796	22.96	7,026	18.34	5,092	13.29	1,544	4.03	38,312	100
Poland	4,250	36.56	3,178	27.34	2,471	21.25	1,006	8.65	721	6.2	11,626	100
Peru	11,103	35.32	9,278	29.51	6,681	21.25	2,871	9.13	1,503	4.78	31,436	100
Romania	54,867	34.5	52,271	32.86	35,541	22.35	12,724	8	3,650	2.29	159,053	100
Other countries	56,091	30.61	46,681	25.47	43,807	23.91	26,328	14.37	10,338	5.64	183,245	100
Moldova	7,083	30.19	8,400	35.8	6,239	26.59	1,459	6.22	284	1.21	23,465	100
Ecuador	7,156	27.49	7,931	30.47	6,121	23.51	3,581	13.76	1,242	4.77	26,031	100
Ukraine	6,694	23.43	11,741	41.1	8,040	28.15	1,569	5.49	521	1.82	28,565	100
Albania	9,657	20.77	10,821	23.28	18,443	39.68	5,364	11.54	2,200	4.73	46,485	100
Philippines	2,691	20.11	3,458	25.84	3,980	29.74	2,393	17.88	860	6.43	13,382	100
China	7,042	18.83	9,360	25.03	14,680	39.25	5,366	14.35	952	2.55	37,400	100
India	1,345	10.76	3,659	29.28	5,764	46.13	1,438	11.51	289	2.31	12,495	100
Total	865,396	38.33	482,134	21.36	533,988	23.65	210,605	9.33	165,367	7.33	2,257,490	100

Notes: Only citizenship for which more than 10,000 total abortions were recorded are shown.

A.1 Calculating the number of missing women

The Italian SRB for the period 1999-2019 (1.057) is taken as reference in the calculations of the number of missing female births and surplus male births.

The number of missing female births for country of citizenship c is calculated based on González (2014), as follows:

$$Missing\_girls = \frac{Males_c}{SRB_{Italy}} - Females_c \tag{1}$$

The number of surplus male births for country of citizenship c is calculated based on on Bongaarts and Guilmoto (2015), as follows:

$$Extra\_boys = \frac{SRB_{Italy} * Females_c - Males_c}{(1 + SRB_{Italy})} \tag{2}$$

A.2 Calculating the fraction of parents invoking sex-selection

The fraction of couples that will invoke a sex-selective intervention is given by

$$\phi = \frac{(SRB - SRB_{Italy}) * \lambda}{1 + SRB} \tag{3}$$

where λ is the average number of children per family (Dubuc and Sivia, 2018). The Italian SRB for the period 1999-2019 (1.057) is taken as benchmark.

Table A.6: Logistic regression results (ORs) for the likelihood of having a daughter, with regional FE, 1999-2019

	(1) **Female birth**	(2) **Female birth**	(3) **Female birth**
Mother's citizenship			
Albania	0.989*	0.989*	0.987*
	(0.979 - 0.999)	(0.979 - 0.999)	(0.977 - 0.997)
Poland	1.000	1.000	0.998
	(0.979 - 1.021)	(0.980 - 1.021)	(0.977 - 1.020)
Romania	0.992*	0.992	0.991*
	(0.984 - 1.000)	(0.984 - 1.000)	(0.983 - 1.000)
North Macedonia	0.973*	0.973*	0.972*
	(0.949 - 0.996)	(0.949 - 0.996)	(0.949 - 0.996)
Sri Lanka	1.044***	1.043***	1.041**
	(1.019 - 1.069)	(1.018 - 1.068)	(1.016 - 1.066)
China	0.959***	0.959***	0.961***
	(0.946 - 0.973)	(0.946 - 0.973)	(0.947 - 0.974)
Philippines	0.957***	0.957***	0.957***
	(0.937 - 0.978)	(0.936 - 0.978)	(0.936 - 0.978)
India	0.903***	0.903***	0.902***
	(0.886 - 0.921)	(0.886 - 0.921)	(0.884 - 0.919)
Egypt	0.962***	0.962***	0.960***
	(0.943 - 0.983)	(0.942 - 0.982)	(0.939 - 0.980)
Ghana	1.027	1.027	1.024
	(0.997 - 1.058)	(0.997 - 1.058)	(0.994 - 1.055)
Morocco	1.001	1.001	0.997
	(0.992 - 1.010)	(0.992 - 1.010)	(0.988 - 1.006)
Nigeria	1.024*	1.024*	1.022*
	(1.003 - 1.046)	(1.003 - 1.046)	(1.001 - 1.044)
Tunisia	0.994	0.993	0.990
	(0.975 - 1.013)	(0.974 - 1.013)	(0.971 - 1.009)
Brazil	0.993	0.993	0.990
	(0.966 - 1.021)	(0.966 - 1.021)	(0.963 - 1.018)
Peru	1.015	1.015	1.014
	(0.992 - 1.040)	(0.992 - 1.040)	(0.989 - 1.039)
Other countries	1.006	1.006	1.004
	(1.000 - 1.011)	(1.000 - 1.011)	(0.997 - 1.011)
Observations	10,315,611	10,315,611	10,315,611
Controls	NO	NO	YES
Region FE	NO	YES	YES
Year FE	NO	YES	YES

*** $p<0.001$, ** $p<0.01$, * $p<0.05$
95% CI in parenthesis

Notes:
Italy is the reference category.
Controls include: the age of the mother/father, the mother's/father's marital status, the family size.
A threshold of 400 observations per year for each country of citizenship was set, in order to focus on those immigrant groups for which a large enough sample is available. All citizenship for which the number of observations was below the threshold were pooled together in the category "other countries".

Table A.7: Logistic regression results (ORs) for the likelihood of having a daughter, by father's and mother's citizenship, 1999-2019

	(1)	(2)	(3)	(4)	(5)
Outcome variable	**Female birth**	**Female birth**	**Female birth**	**Female birth**	**Female birth**
Subsample of focus	Mothers	Fathers	Mothers mixed-cit	Fathers mixed-cit	Same cit. parents
Citizenship					
Albania	0.987*	0.988*	0.990	1.011	0.986*
	(0.977 - 0.997)	(0.978 - 0.999)	(0.962 - 1.019)	(0.981 - 1.043)	(0.975 - 0.997)
†Poland	0.999	n.a.	0.988	n.a.	0.965
	(0.977 - 1.021)		(0.962 - 1.015)		(0.913 - 1.019)
Romania	0.992	0.989*	0.993	1.003	0.988*
	(0.984 - 1.000)	(0.980 - 0.999)	(0.973 - 1.013)	(0.972 - 1.035)	(0.979 - 0.998)
North Macedonia	0.972*	0.974*	0.976	1.013	0.969*
	(0.949 - 0.996)	(0.949 - 0.999)	(0.923 - 1.033)	(0.935 - 1.098)	(0.943 - 0.996)
Sri Lanka	1.042***	1.039**	1.078	1.028	1.039**
	(1.017 - 1.067)	(1.014 - 1.064)	(0.964 - 1.205)	(0.923 - 1.145)	(1.014 - 1.065)
China	0.962***	0.960***	0.997	1.009	0.958***
	(0.948 - 0.976)	(0.946 - 0.974)	(0.949 - 1.047)	(0.932 - 1.091)	(0.944 - 0.973)
Philippines	0.958***	0.964**	0.933**	1.008	0.962**
	(0.937 - 0.979)	(0.942 - 0.988)	(0.885 - 0.983)	(0.900 - 1.129)	(0.939 - 0.986)
India	0.901***	0.905***	0.876**	0.953	0.902***
	(0.884 - 0.919)	(0.887 - 0.923)	(0.800 - 0.958)	(0.873 - 1.040)	(0.884 - 0.921)
Egypt	0.961***	0.968**	0.948	1.001	0.962***
	(0.941 - 0.982)	(0.949 - 0.988)	(0.877 - 1.026)	(0.953 - 1.052)	(0.941 - 0.984)
Ghana	1.022	1.024	1.034	1.070	1.019
	(0.992 - 1.052)	(0.994 - 1.055)	(0.951 - 1.124)	(0.979 - 1.171)	(0.987 - 1.052)
Morocco	0.997	0.996	0.994	0.990	0.996
	(0.988 - 1.006)	(0.987 - 1.005)	(0.967 - 1.022)	(0.959 - 1.022)	(0.987 - 1.006)
Nigeria	1.022*	1.032**	0.985	1.048	1.031*
	(1.001 - 1.044)	(1.009 - 1.057)	(0.941 - 1.031)	(0.961 - 1.144)	(1.006 - 1.056)
Tunisia	0.989	0.995	0.998	1.028	0.987
	(0.970 - 1.009)	(0.977 - 1.014)	(0.941 - 1.058)	(0.987 - 1.070)	(0.967 - 1.008)
†Brazil	0.990	n.a.	0.983	n.a.	0.958
	(0.963 - 1.019)		(0.952 - 1.014)		(0.880 - 1.042)
†Peru	1.015	n.a.	0.996	n.a.	0.996
	(0.991 - 1.040)		(0.959 - 1.034)		(0.954 - 1.038)
◇Senegal	n.a.	1.049***	n.a.	1.069*	1.040*
		(1.023 - 1.076)		(1.002 - 1.141)	(1.002 - 1.080)
Other countries	1.004	1.013***	0.981*	1.020*	1.011*
	(0.997 - 1.011)	(1.006 - 1.020)	(0.966 - 0.996)	(1.004 - 1.037)	(1.002 - 1.020)
Observations	10,315,611	10,315,611	579,788	579,788	9,735,823
Controls	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES
Province FE	YES	YES	YES	YES	YES

*** p<0.001, ** p<0.01, * p<0.05
95% CI in parenthesis

Notes:
Italy is the reference category.
Controls include: the age of the mother/father, the mother's/father's marital status, the family size.
A threshold of 400 observations per year for each country of citizenship was set, in order to focus on those immigrant groups for which a large enough sample is available. All citizenship for which the number of observations was below the threshold were pooled together in the category "other countries".
◇ *Not considered in the Mothers' sample, as for some years less than 400 observations were available.*
† *Not considered in the Fathers' sample, as for some years less than 400 observations were available.*

2 Avoidable Hospitalizations and Access to Primary Care: Comparisons between Italian, Documented and Undocumented Immigrants

Joint work with Carlo Devillanova and Helen Banks[7]

Abstract

Background: Immigrants face multiple barriers in accessing healthcare; however, empirical assessment of access presents serious methodological issues, and evidence on undocumented immigrants is scant and based mainly on non-representative samples. We examine avoidable hospitalization (AH) as an indicator of poor access to primary care (PC) in Italy, where a universal healthcare system guarantees access but fails to assign general practitioners to undocumented immigrants.

Methods: Using anonymized national hospital discharge records in 2019, undocumented immigrants were identified through an administrative financing code. Potential effects of poor access to PC were measured by focusing on the incidence of AH, differentiated among chronic, acute and vaccine-preventable conditions, comparing Italian citizens, documented (foreign nationals with residence permits) and undocumented immigrants. We estimated logistic regression models, controlling for individual and contextual confounders.

Results: Compared with Italians, undocumented and documented immigrants' adjusted odd ratios (OR) for the risk of AH were 1.422 (95% CI 1.322-1.528) and 1.243 (95% CI 1.201-1.287), respectively. Documented immigrants showed no statistically significant difference in risk of AH due to chronic diseases compared with Italians, while undocumented immigrants registered higher adjusted OR for all AH categories – chronic (OR 1.187; 95% CI 1.064-1.325), acute (OR 1.645; 95% CI 1.500-1.803) and vaccine-preventable (OR 2.170; 95% CI 1.285-3.664).

Conclusions: Documented and undocumented immigrants face considerably higher risk of AH compared to Italians. Considering the burden of AHs, access to PC (including preventive and ambulatory care) should be provided to undocumented immigrants, and additional barriers to care for all immigrants should be further explored.

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2.1 Introduction

Extensive literature documents inequalities in access to healthcare services for immigrants (Sarría-Santamera et al., 2016), with particularly severe underutilization observed for undocumented individuals (Winters et al., 2018). Barriers to access comprise numerous social, cultural, economic, and legal factors, which makes it difficult to identify the sources of inequalities and to design proper policy interventions to improve immigrant health (Devillanova and Frattini, 2016; Diaz et al., 2017).

In general, existing studies on immigrant access to healthcare have been conducted mainly in the United States (US) and present considerable methodological limitations. Evidence based on survey data often exhibits inadequate sample size, poor outcome measures, and selection bias in recruitment (Diaz et al., 2017). These limitations are particularly severe when addressing undocumented immigrants, as survey data generally fail to identify such populations, except for small, non-representative samples (Hintjens et al., 2020). Conversely, administrative data on healthcare usage include only those patients who have received health services, which compromises efforts to study barriers to access (Rechel et al., 2012). In addition, to compute reliable access rates for immigrants requires estimates of the underlying population, which are largely unreliable; moreover, administrative health data seldom allows the identification of undocumented immigrants (Rechel et al., 2012).

The present paper aims to overcome many of the above methodological issues by focusing on lack of access to primary healthcare services, as captured by the incidence of avoidable hospitalization (AH) rates in the Italian national hospital discharges (HDR) database (Italian Ministry of Health, Planning Department, schede di dimissione ospedaliere, SDO), using data from 2019 and comparing Italians and immigrants according to legal status. AHs are hospitalizations due to ambulatory care sensitive conditions (ACSC), i.e., medical conditions for which hospitalization is not needed when primary care is timely and effective (Gibson et al., 2013). The incidence of AHs and ACSCs has been extensively used to proxy for quality of, and access to, preventive health services within and across countries (Gibson et al., 2013; Rosano et al., 2013a; Gusmano et al., 2006; Rosano et al., 2013b; Pongiglione et al., 2020) and to detect inequalities related to race and ethnicity (Doshi et al., 2017; Laditka et al., 2003; Gusmano et al., 2017), socioeconomic conditions (Wallar et al., 2020; Billings et al., 1993) and immigrant status (Doshi et al., 2017; Dalla Zuanna et al., 2017; Wallar and Rosella, 2020). In the European context, evidence on immigrants' AH rates is relatively recent (Dalla Zuanna et al., 2017) and in general shows that immigrants experience a higher risk of AHs, although results differ by country, reason to migrate and illness.(Lichtl et al., 2017; Brandenberger et al., 2020; Dalla Zuanna et al., 2020) Analysis of AHs in one Italian region (Sicily) from 2003 to 2013 (Mipatrini et al., 2017) showed that undocumented migrants have a higher risk of AHs than documented migrants, controlling for gender, age group and geographical origin. The present study extends the analysis to all Italian regions, compares documented and undocumented adult immigrant groups with Italians, controlling for a larger set of individual characteristics and local health authorities (LHAs) fixed effect, to flexibly capture geographic differences across areas, and excluding hospitalizations for pregnancy and childbirth-related conditions.

The Italian context makes an interesting case study since Italy has witnessed sustained flows of immigration from 1989 onwards that is characterized by a significant proportion of undocumented immigrants. At the beginning of 2019, according to the Italian national statistics institute [8], foreign-born residents (4,996,158) accounted for 8.4% of the Italian resident population, with undocumented immigrants estimated to be 562,000[9]. Importantly, the Italian institutional and legal context is such that immigrants often change their legal status, by obtaining residence permits or citizenship by design or through random or unpredictable policy changes (e.g., an amnesty) (Cremaschi and Devillanova, 2021; Cvajner and Sciortino, 2010; Vickstrom, 2014; Devillanova et al., 2018) a feature that helps in identifying mechanisms related to unmet primary care health needs. A second important feature is that the Italian constitution safeguards health as a fundamental right of the

[8]ISTAT, Istituto Nazionale di Statistica, *www.stra-dati.istat.it*
[9]Fondazione Ismu, *www.ismu.org*

individual and equitable access to health care is a core objective of the Italian National Health Service (SSN, Servizio Sanitario Nazionale). Specifically, documented immigrants, those who hold a valid residence permit, must enrol in the SSN and can access healthcare services in public and private accredited facilities through an official SSN registration code, as Italian citizens do. Undocumented immigrants are guaranteed emergency and first aid care, essential treatments (all pathologies not immediately dangerous, but which could worsen in the future), pre- and post-natal care, pediatrics and geriatrics. However, outside of these exceptions they are not entitled to an official SSN registration code and access the SSN through an anonymous code (STP for straniero temporaneamente presente, or foreigner temporarily present), that expires after 6 months. Moreover, they cannot access General Practitioners (GPs), who are contracted by the SSN to provide primary care, preventive care and gatekeeping referrals to specialized care for all legal residents; in general undocumented immigrants access the SSN through emergency departments, although differences exist across regions (Devillanova and Frattini, 2016), a phenomenon also observed in other countries (Lichtl et al., 2017; Brandenberger et al., 2020). The distinctions introduced by the Italian government between immigrants' legal status and the type of access to treatments allows for identifying undocumented immigrants in the anonymized HDR using an administrative financing code. Finally, although citizens of countries that joined the European Union from the 2004 EU enlargement onward (New EU) are entitled to legally reside in Italy, they often experience difficulties in access to the SSN, either because they lack the European Health Insurance Card (EHIC) needed to receive health care, or because LHAs do not accept it as proof of comprehensive insurance (Pirani et al., 2006). We therefore performed a separate analysis to examine New EU country immigration for similarities or differences between undocumented immigrants and uninsured New EU citizens residing in Italy.

2.2 Methods

Data

The present study uses the most recently available data (2019) from Italian HDRs, using 2016 for comparison. For each hospital episode, the data report information on up to six medical diagnoses and procedures, codified according to the International Classification of Diseases, Ninth Revision (ICD-9-CM), plus contextual variables (region, province, and LHA), demographic characteristics of the patient (age, sex, country of citizenship), and socio-economic variables (marital status, educational level, health insurance status).

Definition of variables

The outcome variables of the study are the overall proportion of AHs (as defined by ACSC) (Billings et al., 1993), over the number of hospitalizations, and three subcategories: AHs determined by worsening of chronic conditions, acute conditions and vaccine preventable conditions(Mipatrini et al., 2017). AH conditions were selected following the classification proposed in Pirani et al. (2006), which adapts previous classifications present in the literature to the Italian context (see Table B.1), as the definition of ACSC can be context dependent (Pirani et al., 2006; Figueroa et al., 2020; Caminal, 2004). We also replicate all analyses using two alternative definitions for coding ACSC as a robustness check (Laditka et al., 2003; Caminal, 2004). We define immigrants as those individuals lacking Italian citizenship. We distinguish between documented and undocumented immigrants using an administrative financing code for hospitalizations (ODG, onere della degenza, or financing source), e.g., financed through the SSN, out-of-pocket, etc. The latter allows for identifying undocumented immigrants since their STP codes are uniquely associated with specific ODG codes. Because STP codes expire after six months, HDRs do not allow for consistently identifying individuals in the sample; therefore, hospitalizations are the unit of analysis.

Study population

We focused on the more homogeneous sample of HDRs fully financed by the SSN (HDR initial sample), that is, excluding those financed partially or fully out-of-pocket or through private insurance; hospitalizations can occur in public or private, accredited facilities. HDRs for adults with complete information on citizenship and principal diagnosis were included in the study database, excluding hospitalizations for pregnancies, childbirth and puerperium (Major Diagnostic Category (MDC) 14), newborns and neonates (MDC 15), and minors (patients younger than 18) since these categories are provided with official registration codes, thus impeding the identification of immigrants' legal status. Transfers from other hospitals were excluded to avoid double counting (Pirani et al., 2006). Finally, the analysis includes Italian citizens and immigrants from a subset of strong migratory pressure countries (SMPC), as defined by the Italian national statistics institute (ISTAT, Istituto Nazionale di Statistica), including Africa, Asia (excluding Israel and Japan), Central and South America. SMPC also include New EU countries, but New EU citizens have been excluded from the main analysis since they cannot be undocumented. However, the latter might fail to access the SSN through an official registration code and be hospitalized through an STP code. We have therefore replicated the analysis for New EU citizens, distinguishing between insured (SSN code) and uninsured (STP code).

Statistical analysis and reporting

We estimate logistic regression models for the probability of AHs of any type, or one of the three AH subcategories: chronic, acute and vaccine-preventable. The main independent variable of interest is an indicator that distinguishes among Italians, documented immigrants, and undocumented immigrants. Additional individual controls include age class, sex, Charlson Comorbidity Index (CCI),34 macro area of origin, marital status and educational level. An additional "missing" category has been included for marital status and education to account for high levels of missing values. Models also include LHA of hospitalization fixed effect, to control for all possible area-specific characteristics, such as hospital-based primary care centers for undocumented immigrants in a few areas (which are however not well-described or consistent across LHAs or regions) or non-governmental organization-based primary care centers (also not well-documented). Data preparation and statistical analysis was performed using Stata 17. We report adjusted odd ratios (ORs) and 95% confidence intervals (CIs) in tables and use log scale in figures.

2.3 Results

The 2019 HDR includes information regarding 8,537,262 hospitalizations. After exclusions for unreliable primary diagnosis and country of citizenship codes, and out-of-pocket or private insurance-funded hospitalizations, 8,229,910 records remained in the initial sample. After study exclusions (for New EU citizenship, age, maternal-infant admissions and transfers), the 2019 regression dataset included 6,207,979 HDRs (or 72.8% of the initial database), made up of 6,029,492 (97.12%) Italian citizens, 167,199 (2.69%) documented immigrants and 11,288 (0.18%) undocumented immigrants. The share of immigrants in the sample markedly decreases after excluding for age and maternal/neonatal health, which is consistent with the demographic characteristics of the three populations (Sarría-Santamera et al., 2016).

[Table 2.1 about here]

The share of AHs is highest among the undocumented population (8.5%) and lowest among the documented population (6.74%) (Table 1). AHs due to chronic conditions are most common in the Italian population, while AHs due to acute conditions are most common among immigrants. Females make up a lower proportion of undocumented immigrants (42.6%), in keeping with selection criteria (i.e., exclusion of MDC 14 and 15). Immigrants tend to be younger than Italians, with a median age of 68, 46, and 43 for Italians, documented immigrants and undocumented immigrants, respectively. Undocumented immigrants exhibit lower educational levels and fewer are married, however there are high numbers of missing values among the undocumented. Nearly three-quarters of documented immigrants showed no comorbidities (CCI=0), and mean weighted Charlson scores (wcharlsum) for documented immigrants were lower than both Italians and undocumented immigrants for all study hospitalizations as well as for the proportion of AHs (Table 1). Undocumented immigrants, by contrast, more closely mirror the proportions exhibited by Italian citizens, with an overall charlsum higher than Italians and documented immigrants (1.09, 0.86 and 0.64, respectively), though lower than Italians for AHs (0.93 vs. 1.28, respectively). Table B.2 shows the prevalence of the 17 CCI disease categories for total and avoidable hospitalizations. With few exceptions (e.g., liver disease, peptic ulcer, AIDS/HIV and cancer for undocumented immigrants), the prevalence of the CCI categories was higher for Italians compared to both immigrant groups. For Italians and immigrants, several categories were noted in much higher proportions of patients in the AH share compared to total HDRs: congestive heart failure, chronic pulmonary disease, diabetes (with and without complications), and renal disease.

Table B.3 provides descriptive statistics from 2016 HDRs for comparison. A notable difference between 2019 and 2016 is the decline in the total number of hospitalizations, dropping by more than 6%, a trend that has been registered in Italy since at least 2010, a result of directed health policy interventions to promote non-hospital care, where appropriate.

Figure 1 summarizes the main results of the logistic multivariable analyses, for AHs in general and by subcategories, for 2019 and 2016. Table 2.2 provides complete estimation results for 2019 (see Table B.4 for 2016). Figure 1 shows that immigrant status is associated with a higher probability of AH, both for documented and undocumented populations compared to Italians, with adjusted ORs of 1.243 (95% CI 1.201-1.287) and 1.422 (95% CI 1.322-1.528), respectively. Higher AH rates due to chronic conditions were observed for undocumented immigrants (OR 1.187; 95% CI 1.064 - 1.325) but not for documented immigrants. Both documented and undocumented immigrants show higher adjusted ORs for AH due to acute conditions (OR 1.377; 95% CI 1.320 - 1.437 and OR 1.645; 95% CI 1.500 - 1.803 respectively). Vaccine-preventable AHs register the largest differences between Italians and the two immigrant groups (OR 1.824; 95% CI 1.364 -

2.440 and OR 2.170; 95% CI 1.285 - 3.664 for documented and undocumented immigrants, respectively), though CIs are large and the difference between documented and undocumented immigrants is not statistically different from zero.

[Figure 2.1 and Table 2.2 about here]

Figure 1 shows consistent results for 2019 and comparison year 2016. Moreover, they are robust to the use of alternative definitions of AHs that account for possible selection into hospitalization due by either individual's(Caminal, 2004) or doctor's (Laditka et al., 2003) behavior (see Figure B.1 and Table B.5). Replication of the main analysis comparing Italians and the 110,810 citizens from New EU countries, categorized according to insurance status, for 2019, is shown in Table 3 along with documented and undocumented immigrant results from the main analysis. Results for insured and uninsured New EU citizens (OR 1.205 95% CI 1.161 - 1.252 and OR 1.694, 95% CI 1.390 - 2.064 respectively) are very close to those of documented and undocumented immigrants. Table B.6 reports the New EU results for 2016.

[Table 2.3 about here]

2.4 Conclusions

This study investigates barriers in access to primary health care services for immigrants by examining AHs in 2019 HDR data from Italy. We address several limitations in the literature by innovatively identifying legal status of SMPC immigrants from anonymized administrative data using information on financing sources for hospitalizations, and by focusing on the incidence of AHs, a set of hospitalizations that should be avoided through timely and effective primary care (Caminal, 2004; Purdy et al., 2009). We estimate logistic regression models for the probability of AH, controlling for age, sex, education, marital status, comorbidities (CCI), macro geographic area of origin and contextual dummies.

Among 8,229,910 HDRs (excluding unreliable citizenship and diagnosis codes and privately-funded admissions) from 2019 in Italy, approximately 7.1% were identified as

AHs, slightly lower than the 8% observed in a 2013 study comparing AHs in Italy and Germany using national discharge records, but expected since that study noted decreases in both total hospitalizations and AHs over time (Rosano et al., 2013b). Immigrants accounted for nearly 6% of the initial HDR sample. After exclusions, the proportion of immigrant patients in the study database dropped to 2.9% of the remaining 6,207,979 hospitalizations, 6.3% of all immigrants were undocumented, with similar proportions observed for comparison year 2016 (Table B.3). Such disproportionate representation of the immigrant population (estimated at roughly 8.4% of the total population in Italy) - along with the generally lower prevalence of CCI disease categories we observed for documented and undocumented immigrants compared to Italians (Table B.2) - appears consistent with findings in other studies that have observed self-selection of "healthier" (and younger) individuals into migration (Kennedy et al., 2015) and lower use of healthcare services by immigrants compared to native populations (Sarría-Santamera et al., 2016; Winters et al., 2018), likely due to barriers in accessing the SSN (Devillanova and Frattini, 2016).

Results show that, compared to Italians, undocumented and documented immigrants are at considerably higher risk for AH, with adjusted odds ratios of 1.422 (95% CI 1.322-1.528) and 1.243 (95% CI 1.201-1.287), respectively. This is in keeping with results found in Sicily showing higher risk of AH for undocumented vs. documented immigrants (Mipatrini et al., 2017) and with studies in other countries that found higher rates of AH for migrants compared to native born citizens (Dalla Zuanna et al., 2017). Though other studies have found that race and ethnicity are associated with higher rates of AH as well as socioeconomic status (Doshi et al., 2017; Laditka et al., 2003; Dalla Zuanna et al., 2017; Wallar and Rosella, 2020), we believe that socioeconomic conditions are unlikely to have played a major role here. First, relative to previous research, we controlled for a larger set of individual confounders that capture, although imperfectly, socio-economic individual factors and a full set of LHA fixed effects to adjust for any area differences (e.g., economic conditions, differences in local management of health services in the decentralized Italian SSN, local initiatives for the immigrant population). Second, we find no difference in the incidence of chronic AHs between Italians and documented immigrants, at least partially supported by an Italian study comparing AH for diabetes mellitus in immigrants and natives, which found significant differences in AH only for immigrant males (Dalla Zuanna et al., 2020). We interpret the latter result as evidence that for those chronic conditions that last over time and require ongoing medical attention, informational and linguistic barriers to access are less relevant, and the incidence of AHs does not differ between Italians and documented immigrants, who can fully access the SSN. In apparent support of this, a Canadian study where researchers were able to link a national community health survey with demographic and risk factor information with hospital discharge records to determine times to AHs for chronic conditions, found that immigrant status lowered the risk of AHs and stressed the importance of prevention in combating AH for chronic conditions (Wallar and Rosella, 2020). However, for acute and vaccine preventable ASCS, documented immigrants with infrequent contact with the SSN may be more affected by linguistic and informational barriers and fail to access non-hospital health care services. Indeed, other studies have found that documented immigrants show higher use of emergency services and AHs for acute and vaccine preventable conditions compared to natives in Italy and elsewhere (Devillanova and Frattini, 2016; Lichtl et al., 2017; Brandenberger et al., 2020).

Notably, undocumented immigrants experience higher incidence for all AH categories (chronic, acute and vaccine preventable). Considerable debate in the research community addresses the importance of primary care in preventing AH, as well as hospital rates often used to measure healthcare system performance. Results here support the likelihood that AH is exacerbated by the lack of access to GPs in Italy for undocumented immigrants, adding to other (informational, linguistic, socioeconomic) barriers experienced by all immigrants, by limiting preventive care and gatekeeping to ambulatory care; in addition, GPs would also presumably complete a full history on each assigned patient, uncovering any gaps in childhood vaccinations (Purdy et al., 2009; Agabiti et al., 2009). In support of this, regression results here for uninsured New EU immigrants closely mirror those observed for undocumented immigrants, since uninsured New EU also lack GPs as they do not register with the SSN. Because New EU immigrants may legally reside in Italy, this result also weakens the likelihood of alternative explanations that undocumented immigrants avoid seeking medical care for fear of authorities and deportation.

This study has shown how unmet health disparities, as measured by AHs rates, are pervasive for all immigrants in Italy and for the undocumented in particular. The Ministry of the Interior instituted Territorial Councils for Immigration (Consigli territoriali per l'immigrazione) in 1999 to examine issues related to the immigrant community and promote integration, monitor problems and coordinate solutions. Family counseling centers (Consultori familiari), run by local health authorities, provide services to women immigrants, both documented and undocumented, particularly regarding maternal-infant health. In addition, considerable effort has been made in Italy to provide cultural mediation services in hospital, ambulatory care and primary care settings, and a three-year degree in linguistic and cultural mediation is now offered in several universities. At present in Italy, services for the largely male undocumented immigrant population are still scarce, with access to primary care notably absent or unevenly provided by a few larger public hospitals in urban centers (anecdotal evidence) or through non-governmental organizations (Devillanova et al., 2020), but primary care centers for undocumented immigrants coordinated by LHAs or regional health authorities are still lacking.

Several limitations affected the study, including completeness and accuracy of diagnostic coding in administrative health records, the lack of individual identity codes to follow patients over time and link records to other demographic (individual socioeconomic status) and health records (including emergency and ambulatory care), scarce information on undocumented immigrant populations in Italy and elsewhere (including the ability to determine the length of a patient's permanence in Italy).

The main strength of our study is that we were able to identify undocumented immigrants in the Italian anonymized HDR, a national administrative dataset, whose quality and reliability has steadily improved over the last decade and is increasingly used in research and policy analysis (Trifiro et al., 2019). Additionally, we take advantage of the Italian legal framework, where publicly-provided primary care is provided differently according to legal status (documented and undocumented immigrants) and insurance status (insured and uninsured immigrants from New EU countries) to explore possible mechanisms underlying the higher incidence of AHs among documented and undocumented immigrants.

We conclude that providing access to primary care to all immigrants, regardless of their legal status, may considerably decrease the risk of AHs among the undocumented. At the same time, other types of barriers should be addressed to reduce AHs due to acute and vaccine-preventable diseases among documented immigrants and to strengthen available resources to cover health needs for all immigrants in Italy, regardless of legal status.

2.5 Figures and Tables

Table 2.1: Hospital discharge records (HDR) database, avoidable hospitalizations and patient characteristics, 2019

	Italian citizens		**Documented Immigrants**		**Undocumented Imm.**	
HDR initial sample (N, % of total)	7,740,876	94.06	468,488	5.69	20,546	0.25
Avoidable hospitalizations, (N, %)						
(note: % of HDRs per category)	563,377	7.28	22,870	4.88	1,343	6.54
Exclusions, N. % of total HDRs						
New EU citizens	0	0.00	108,806	98.19	2,004	1.81
Patients <18 years or age missing	988,810	89.23	116,667	10.53	2,704	0.24
MDC 14 and MDC 15	822,915	82.44	169,958	17.03	5,334	0.53
Transfers from other hospitals	279,245	96.10	10,556	3.63	776	0.27
Total exclusions	1,711,384	84.64	301,289	14.90	9,258	0.46
Study database, after exclusions	6,029,492	97.12	167,199	2.69	11,288	0.18
AHs, (N, % of category), of which:	474,956	7.88	11,262	6.74	959	8.50
Chronic	263,115	4.36	4,099	2.45	380	3.37
Acute	210,356	3.49	6,994	4.18	559	4.95
Vaccine-preventable	1,485	0.02	169	0.10	20	0.18
Female (N, %)	2,958,769	49.07	89,408	53.47	4,806	42.58
Age class						
18-24	173,355	2.88	12,642	7.57	1,148	10.17
25-44	708,837	11.76	63,851	38.19	4,855	43.01
45-64	1,746,313	28.96	64,588	38.63	4,066	36.02
65-74	1,317,705	21.85	16,621	9.94	863	7.65
75 or older	2,083,282	34.55	9,487	5.67	356	3.15
Education						
None, elementary	1,673,454	27.75	38,101	22.79	3,126	27.69
Lower secondary	1,360,875	22.57	43,924	26.27	2,158	19.12
Upper secondary	1,160,421	19.25	31,298	18.72	1,005	8.90
University	415,261	6.89	11,044	6.61	449	3.98
Missing	1,419.481	23.54	42,832	25.62	4,550	40.31
Marital status						
Married	2,593,763	43.02	61,368	36.70	2,248	19.91
Missing	1,951,057	32.36	66,341	39.68	5,912	52.37
Citizenship, by geographic area						
Europe	6,029,492	100	57,735	34.53	4,475	39.64
North Africa			49,325	29.5	3,586	31.77
Sub-Saharan Africa			1,531	0.92	84	0.74
West Asia			2,566	1.53	377	3.34
Other Asia			29,785	17.81	1,341	11.88
Central-South America			22,336	13.36	1,392	12.33
Stateless			3,921	2.35	33	0.29
Charlson Comorbidity Index (CCI)						
CCI = 0 (no CCI comorbidities)	3,673,574	60.93	120,852	72.28	6,768	59.96
CCI = 1	919,916	15.26	17,920	10.72	1,590	14.09
CCI = 2	1,436,002	23.82	28,427	17.00	2,930	25.96
Weighted sum of CCI comorbidities (wcharlsum)						
wcharlsum for Total (mean, sd)	0.86	1.44	0.64	1.36	1.09	1.85
wcharlsum for AHs (mean, sd)	1.28	1.24	0.81	1.12	0.93	1.31

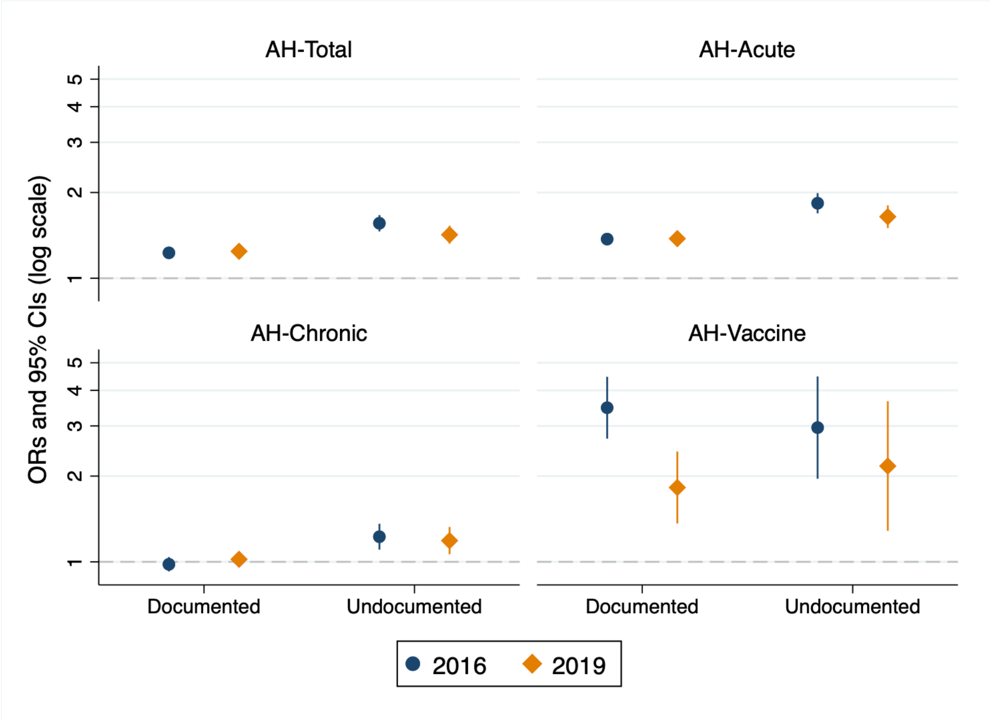

Figure 2.1: Main results, 2019 and 2016

Table 2.2: Logistic regression results (ORs) for the likelihood of AHs, 2019

	AH-Total	**AH-Chronic**	**AH-Acute**	**AH-Vaccine**
Documented	1.243***	1.021	1.377***	1.824***
	(1.201 - 1.287)	(0.966 - 1.079)	(1.320 - 1.437)	(1.364 - 2.440)
Undocumented	1.422***	1.187***	1.645***	2.170***
	(1.322 - 1.528)	(1.064 - 1.325)	(1.500 - 1.803)	(1.285 - 3.664)
Female	0.949***	0.943***	0.969***	0.659***
	(0.944 - 0.955)	(0.935 - 0.951)	(0.961 - 0.978)	(0.596 - 0.728)
Undefined sex	28.056***	9.263***	9.721***	
	(19.150 - 41.104)	(6.635 - 12.933)	(6.827 - 13.842)	
Age 18-24	1.341***	0.555***	1.789***	2.196***
	(1.309 - 1.375)	(0.523 - 0.589)	(1.739 - 1.839)	(1.793 - 2.689)
Age 25-44	1.080***	0.609***	1.389***	2.602***
	(1.064 - 1.096)	(0.593 - 0.627)	(1.365 - 1.414)	(2.309 - 2.933)
Age 65-74	1.285***	1.319***	1.209***	0.393***
	(1.272 - 1.298)	(1.301 - 1.337)	(1.190 - 1.228)	(0.331 - 0.466)
Age 75+	2.384***	2.103***	2.538***	0.213***
	(2.363 - 2.405)	(2.078 - 2.128)	(2.505 - 2.571)	(0.177 - 0.255)
No/elementary	1.491***	1.380***	1.542***	1.117
	(1.474 - 1.507)	(1.359 - 1.400)	(1.518 - 1.566)	(0.948 - 1.315)
Lower secondary	1.184***	1.170***	1.176***	1.025
	(1.171 - 1.198)	(1.152 - 1.189)	(1.157 - 1.195)	(0.887 - 1.185)
University	0.898***	0.874***	0.921***	1.061
	(0.882 - 0.914)	(0.853 - 0.897)	(0.898 - 0.945)	(0.873 - 1.290)
Missing education	1.423***	1.264***	1.561***	1.761***
	(1.406 - 1.441)	(1.243 - 1.285)	(1.534 - 1.588)	(1.497 - 2.071)
Married	0.895***	0.904***	0.891***	0.824***
	(0.888 - 0.903)	(0.894 - 0.914)	(0.880 - 0.901)	(0.724 - 0.938)
Missing marital status	1.009*	0.900***	1.139***	1.062
	(0.999 - 1.018)	(0.889 - 0.911)	(1.124 - 1.154)	(0.926 - 1.217)
Cci score=1	4.958***	17.026***	1.600***	3.109***
	(4.919 - 4.996)	(16.790 - 17.265)	(1.583 - 1.618)	(2.750 - 3.514)
Cci score=2+	2.649***	9.667***	0.884***	0.656***
	(2.629 - 2.669)	(9.535 - 9.801)	(0.874 - 0.894)	(0.556 - 0.774)
Constant	0.025***	0.006***	0.016***	0.000***
	(0.025 - 0.026)	(0.006 - 0.006)	(0.015 - 0.016)	(0.000 - 0.000)
Observations	6,207,979	6,207,979	6,207,979	6,125,469
Area of citizenship	YES	YES	YES	YES
LHA FE	YES	YES	YES	YES

*** p<0.01, ** p<0.05, * p<0.1
95% CI in parenthesis

Table 2.3: Regression analysis: citizens of countries that joined the European Union from the 2004 EU enlargement onward (New EU), 2019

	Documented	Undocumented	New EU	New EU uninsured
Odds Ratios	1.243***	1.422**	1.205***	1.694***
95 CI	(1.201 - 1.287)	(1.322 - 1.528)	(1.161 - 1.252)	(1.390 - 2.064)
Observations	6,207,979	6,207,979	6,089,838	6,089,838
Controls	YES	YES	YES	YES
LHA FE	YES	YES	YES	YES

*** p<0.01, ** p<0.05, * p<0.1
95% CI in parenthesis

B. Appendix Tables and Figures

Table B.1: Ambulatory Care Sensitive Conditions leading to Avoidable Hospitalizations

ACS conditions	**ICD-9 Diagnosis Codes**	**Notes**
Acute conditions		
Perforated appendix	540.0, 540.1	Principal diagnosis.
Disorders of hydro-electrolyte metabolism	276.5, 276.8	Principal diagnosis.
Gastroenterities	008.6, 008.8, 009.0-009.3, 558.9	Principal diagnosis.
Pneumonia	481, 482.2, 482.3, 482.9, 483, 485, 486	Principal diagnosis. Excluded if secondary diagnosis 282.6 (sickle-cell anemia).
Urinary tract infections	590.0-590.9, 595.0, 595.9, 599.0	Principal diagnosis.
Acute respiratory infections	382, 462, 463, 465, 472.1	Principal diagnosis. Excluded diagnosis 382 with procedure 20.01 (myringotomy with intubation) in any field.
Nutritional deficiency	260, 261, 262, 268.0, 268.1	Principal diagnosis.
Pelvic inflammatory disease	614	Principal diagnosis. Excluded procedures 68.3-68.8 (hysterectomy) in any field.
Bleeding of perforated ulcers	531.0, 531.2, 531.4, 531.6, 532.0, 532.2, 532.4, 532.6, 533.0, 533.2, 533.4, 533.6	Principal diagnosis.
Chronic conditions		
Amputations of lower limbs in patients with diabetes	84.10-84.19 + 250.0-250.9	Any field. Excluded diagnosis of traumas in any field (895, 896, 897).
Diabetes	250.0-250.9, 251.0, 785.4 + 250.7	Principal diagnosis.
Epilepsy and recurrent seizures	345, 780.3	Principal diagnosis.
Hypertension	401.0, 402.0, 403.0, 404.0, 405.0, 437.2	Principal diagnosis. Excluded cardiac procedures in any field (35.00-35.99 36.0-36.99 37.31-37.35 37.5-37.54 37.7-37.89 37.94-37.98).
Angina pectoris	413	Principal diagnosis. Excluded cardiac procedures in any field (35.00-35.99 36.0-36.99 37.31-37.35 37.5-37.54 37.7-37.89 37.94-37.98).
Hearth failure	428, 518.4	Principal diagnosis. Excluded cardiac procedures in any field (35.00-35.99 36.0-36.99 37.31-37.35 37.5-37.54 37.7-37.89 37.94-37.98).
Chronic-obstructive pulmonary disease	491, 492, 494, 496, 466.0	Principal diagnosis. Including code 466.0 only if secondary diagnosis is 491, 492, 494, 496.
Asthma	493	Principal diagnosis.
Vaccine preventable conditions		
Diphtheria	032	Principal diagnosis.
Whooping cough	033	Principal diagnosis.
Tetanus	037	Principal diagnosis.
Acute poliomyelitis	045	Principal diagnosis.
Measles	055	Principal diagnosis.
Hepatitis B	070.2, 070.3	Principal diagnosis.
Mumps	072	Principal diagnosis.
Hemophilus meningitis	320	Principal diagnosis.

Table B.2: Charlson Index analysis: prevalence of various comorbidities among total and avoidable hospitalizations (AHs), 2019

	Italian citizens				Documented Immigrants				Undocumented Imm.			
	Total		Share AH		Total		Share AH		Total		Share AH	
N. Hospital Discharge Records (HDRs)	6,029,492		474,956		167,199		11,262		11,288		959	
Charlson comorbidity index categories	N	%	N	%	N	%	N	%	N	%	N	%
Acute Myocardial Infarction	134,425	2.23	7,660	1.61	2,816	1.68	119	1.06	177	1.57	6	0.63
Congestive Heart Failure	427,817	7.10	196,812	41.44	4,481	2.68	1,937	17.20	381	3.38	174	18.14
Peripheral Vascular Disease	136,921	2.27	17,217	3.62	1,630	0.97	243	2.16	117	1.04	21	2.19
Cerebrovascular Disease	367,377	6.09	29,571	6.23	5,253	3.14	243	2.16	438	3.88	14	1.46
Dementia	111,120	1.84	22,844	4.81	493	0.29	108	0.96	16	0.14	3	0.31
Chronic Pulmonary Disease	264,983	4.39	77,334	16.28	3,587	2.15	1,302	11.56	352	3.12	138	14.39
Rheumatologic Disease	37,845	0.63	2,927	0.62	1,096	0.66	68	0.60	38	0.34	2	0.21
Peptic Ulcer Disease	21960	0.36	9,331	1.96	905	0.54	343	3.05	123	1.09	45	4.69
Mild Liver Disease	101,441	1.68	8,739	1.84	3,142	1.88	332	2.95	500	4.43	57	5.94
Diabetes without complications	335,976	5.57	57,662	12.14	7,579	4.53	1,377	12.23	535	4.74	103	10.74
Diabetes with complications	62,962	1.04	23,036	4.85	1,390	0.83	477	4.24	119	1.05	47	4.90
Hemiplegia or Paraplegia	33,275	0.55	823	0.17	934	0.56	30	0.27	58	0.51	0	0.00
Renal Disease	282,189	4.68	54,562	11.49	6,077	3.63	746	6.62	377	3.34	47	4.90
Cancer	570,571	9.46	12,029	2.53	10,730	6.42	172	1.53	1,115	9.88	12	1.25
Moderate/Severe Liver Disease	25,767	0.43	580	0.12	804	0.48	18	0.16	100	0.89	2	0.21
Metastic Carcinoma	211,099	3.50	3,105	0.65	4,678	2.80	56	0.50	521	4.62	3	0.31
AIDS/HIV	12,252	0.20	521	0.11	1,373	0.82	50	0.44	490	4.34	23	2.40

Table B.3: Hospital discharge records (HDR) database, avoidable hospitalizations and patient characteristics, 2016

	Italian citizens		**Documented Immigrants**		**Undocumented Imm.**	
HDR initial sample (N, % of total)	8,246,093	94.19	481,476	5.50	27,115	0.31
Avoidable hospitalizations (AHs), (N, %)						
(note: % of HDRs per category)	596,254	7.23	23,014	4.78	1,896	6.99
Exclusions, N. % of total HDRs						
New EU citizens	0	0.00	119,180	95.83	5,182	4.17
Patients <18 years or age missing	1,096,722	89.66	122,555	10.02	3,899	0.32
MDC 14 and MDC 15	953,171	82.61	193,242	16.75	7,445	0.65
Transfers from other hospitals	282,566	96.54	9,125	3.12	999	0.34
Total exclusions	1,893,817	85.00	320,329	14.38	13,851	0.62
Study database, after exclusions	6,352,276	97.33	161,147	2.47	13,264	0.20
AHs, (N, % of category), of which:	490,625	7.72	10,578	6.56	1,228	9.26
Chronic	295,135	4.65	3,910	2.43	439	3.31
Acute	193,857	3.05	6,420	3.98	762	5.74
Vaccine-preventable	1,633	0.03	248	0.15	27	0.2
Female (N, %)	3,133,565	49.33	86,699	53.8	4,759	35.88
Age class						
18-24	192,296	3.03	13,798	8.56	2,730	20.58
25-44	837,042	13.18	67,915	42.14	5,746	43.32
45-64	1,833,776	28.87	59,274	36.78	3,637	27.42
65-74	1,377,822	21.69	12,664	7.86	852	6.42
75 or older	2,111,340	33.24	7,496	4.65	299	2.25
Education						
None, elementary	2,422,913	38.14	5,0617	31.41	5,784	43.61
Lower secondary	1,616,206	25.44	4,9175	30.52	3,371	25.41
Upper secondary	1,262,159	19.87	3,1234	19.38	1,401	10.56
University	432,990	6.82	1,0516	6.53	437	3.29
Missing	618,008	9.73	1,9605	12.17	2,271	17.12
Marital status						
Married	2,880,272	45.34	60,109	37.3	2,439	18.39
Missing	1,872,358	29.48	61,679	38.27	6,571	49.54
Citizenship, by geographic area						
Europe	6,352,276	100	54,674	33.93	4,707	35.49
North Africa			49,716	30.85	5,830	43.95
Sub-Saharan Africa			1,500	0.93	185	1.39
West Asia			2,194	1.36	280	2.11
Other Asia			27,586	17.12	1,247	9.4
Central-South America			20,763	12.88	978	7.37
Stateless			4,714	2.93	37	0.28
Charlson Comorbidity Index (CCI)						
CCI = 0 (no CCI comorbidities)	3,830,916	60.31	118,845	73.75	8,767	66.1
CCI = 1	966,148	15.21	16,420	10.19	1,650	12.44
CCI = 2	1,555,212	24.48	25,882	16.06	2,847	21.46
Weighted sum of CCI comorbidities (wcharlsum)						
wcharlsum for Total (mean, sd)	0.91	1.52	0.625	1.39	0.91	1.74
wcharlsum for AHs (mean, sd)	1.38	1.29	0.79	1.13	0.82	1.27

Table B.4: Logistic regression results (ORs) for the likelihood of AHs, 2016

	AH-Total	AH-Chronic	AH-Acute	AH-Vaccine
Documented	1.228***	0.98	1.372***	3.476***
	(1.184 - 1.274)	(0.925 - 1.039)	(1.311 - 1.437)	(2.707 - 4.464)
Undocumented	1.560***	1.225***	1.834***	2.960***
	(1.460 - 1.667)	(1.104 - 1.360)	(1.690 - 1.990)	(1.958 - 4.475)
Female	0.956***	0.965***	0.955***	0.619***
	(0.950 - 0.962)	(0.957 - 0.973)	(0.946 - 0.964)	(0.563 - 0.682)
Age 18-24	1.305***	0.568***	1.819***	1.553***
	(1.274 - 1.338)	(0.538 - 0.600)	(1.769 - 1.871)	(1.254 - 1.923)
Age 25-44	1.054***	0.646***	1.387***	1.954***
	(1.039 - 1.069)	(0.630 - 0.662)	(1.362 - 1.412)	(1.742 - 2.192)
Age 65-74	1.268***	1.308***	1.187***	0.323***
	(1.256 - 1.281)	(1.291 - 1.325)	(1.168 - 1.206)	(0.276 - 0.377)
Age 75+	2.357***	2.144***	2.476***	0.171***
	(2.336 - 2.378)	(2.119 - 2.168)	(2.442 - 2.510)	(0.145 - 0.203)
No/elementary	1.443***	1.383***	1.469***	1.003
	(1.428 - 1.458)	(1.364 - 1.402)	(1.447 - 1.493)	(0.878 - 1.146)
Lower secondary	1.169***	1.180***	1.141***	0.979
	(1.156 - 1.182)	(1.163 - 1.198)	(1.122 - 1.159)	(0.864 - 1.108)
University	0.945***	0.926***	0.966***	1.059
	(0.928 - 0.962)	(0.905 - 0.949)	(0.942 - 0.992)	(0.873 - 1.285)
Missing education	1.276***	1.196***	1.344***	1.307**
	(1.256 - 1.297)	(1.171 - 1.222)	(1.314 - 1.376)	(1.028 - 1.663)
Married	0.906***	0.908***	0.906***	1.219***
	(0.899 - 0.913)	(0.899 - 0.917)	(0.895 - 0.917)	(1.078 - 1.378)
Missing marital status	1.028***	0.923***	1.172***	1.327***
	(1.019 - 1.038)	(0.912 - 0.934)	(1.156 - 1.187)	(1.156 - 1.523)
Cci score=1	5.351***	15.817***	1.640***	6.466***
	(5.309 - 5.393)	(15.610 - 16.027)	(1.621 - 1.659)	(5.802 - 7.206)
Cci score=2+	3.019***	9.540***	0.929***	1.024
	(2.996 - 3.042)	(9.417 - 9.663)	(0.918 - 0.939)	(0.882 - 1.190)
Constant	0.024***	0.007***	0.015***	0.000***
	(0.023 - 0.024)	(0.006 - 0.007)	(0.014 - 0.015)	(0.000 - 0.000)
Observations	6,526,687	6,526,687	6,526,687	6,425,039
Area of citizenship	YES	YES	YES	YES
LHA FE	YES	YES	YES	YES

*** p<0.01, ** p<0.05, * p<0.1
95% CI in parenthesis

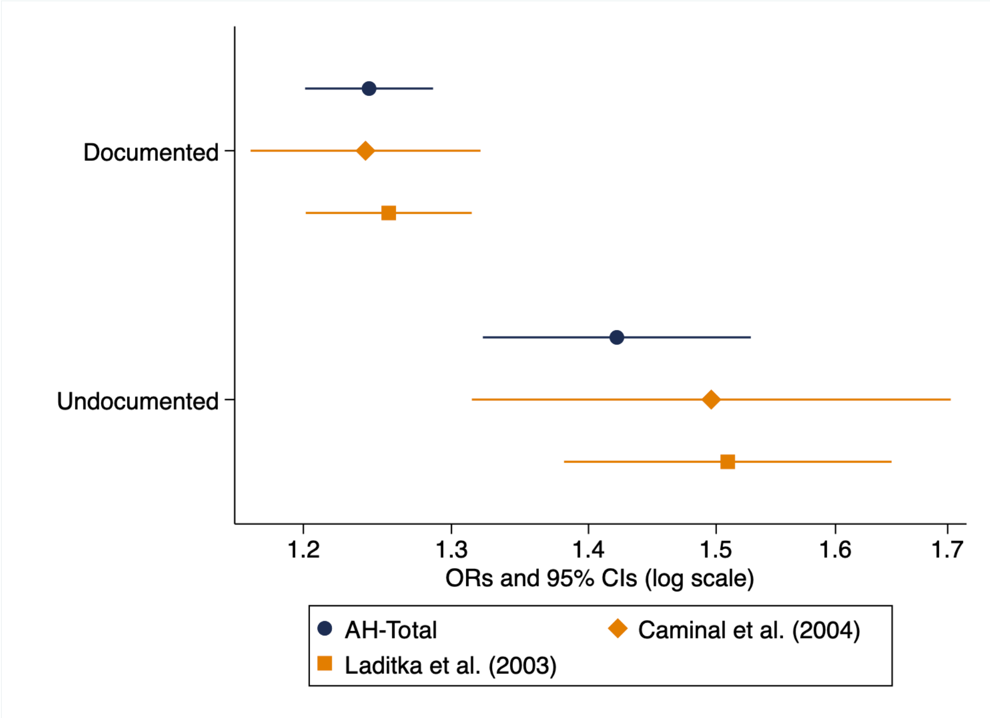

Figure B.1: ORs with an alternative selection criteria for AH

Table B.5: Logistic regression results (ORs) with alternative AH selection criteria, 2019

	AH-Total	Caminal et al. (2004)	Laditka et al. (2003)
Documented	1.243***	1.241***	1.257***
	(1.201 - 1.287)	(1.166 - 1.321)	(1.202 - 1.314)
Undocumented	1.422***	1.496***	1.509***
	(1.322 - 1.528)	(1.314 - 1.703)	(1.382 - 1.649)
Female	0.949***	0.777***	0.901***
	(0.944 - 0.955)	(0.768 - 0.786)	(0.893 - 0.908)
Undefined sex	28.056***	11.782***	24.196***
	(19.150 - 41.104)	(8.298 - 16.730)	(15.399 - 38.020)
Age 18-24	1.341***	0.910***	1.222***
	(1.309 - 1.375)	(0.871 - 0.951)	(1.186 - 1.260)
Age 25-44	1.080***	0.787***	1.109***
	(1.064 - 1.096)	(0.767 - 0.808)	(1.089 - 1.130)
Age 65-74	1.285***	1.307***	1.166***
	(1.272 - 1.298)	(1.283 - 1.331)	(1.150 - 1.182)
Age 75+	2.384***	2.176***	1.921***
	(2.363 - 2.405)	(2.141 - 2.211)	(1.897 - 1.944)
No/elementary	1.491***	1.516***	1.493***
	(1.474 - 1.507)	(1.485 - 1.547)	(1.471 - 1.516)
Lower secondary	1.184***	1.169***	1.189***
	(1.171 - 1.198)	(1.144 - 1.194)	(1.171 - 1.207)
University	0.898***	0.895***	0.898***
	(0.882 - 0.914)	(0.866 - 0.925)	(0.876 - 0.920)
Missing education	1.423***	1.549***	1.401***
	(1.406 - 1.441)	(1.514 - 1.584)	(1.378 - 1.425)
Married	0.895***	0.939***	0.903***
	(0.888 - 0.903)	(0.925 - 0.953)	(0.893 - 0.913)
Missing marital status	1.009*	1.139***	1.033***
	(0.999 - 1.018)	(1.119 - 1.159)	(1.020 - 1.047)
Cci score=1	4.958***	1.494***	3.468***
	(4.919 - 4.996)	(1.474 - 1.515)	(3.432 - 3.504)
Cci score=2+	2.649***	0.811***	1.793***
	(2.629 - 2.669)	(0.800 - 0.823)	(1.774 - 1.812)
Constant	0.025***	0.011***	0.023***
	(0.025 - 0.026)	(0.011 - 0.012)	(0.023 - 0.024)
Observations	6,207,979	6,207,979	4,556,266
Area of citizenship	YES	YES	YES
LHA FE	YES	YES	YES

*** p<0.01, ** p<0.05, * p<0.1
95% CI in parenthesis

Table B.6: Regression analysis: citizens of countries that joined the European Union from the 2004 EU enlargement onward (New EU), 2016

	Documented	Undocumented	New EU	New EU uninsured
Odds Ratios	1.228***	1.560**	1.265***	1.651***
95 CI	(1.184 - 1.274)	(1.460 - 1.667)	(1.217 - 1.315)	(1.433 - 1.902)
Observations	6,526,687	6,526,687	6,412,917	6,412,917
Controls	YES	YES	YES	YES
LHA FE	YES	YES	YES	YES

*** p<0.01, ** p<0.05, * p<0.1
95% CI in parenthesis

3 Female Genital Mutilations/Cuttings and their Health Consequences: Evidence from Italian Hospital Discharge Records

Solo work

Abstract

Background: More than 200 million women live with FGM/C, a condition linked to adverse health consequences, and for which the quality of available health care is often inadequate. In addition, estimations of FGM/C prevalence in European countries are not highly reliable, as they rarely adjust for the migrant selection hypothesis and often fail to account for undocumented and second-generation immigrants. This research aims to investigate medical reporting of FGM/C in Italian administrative data, and the probability for immigrants originating from countries where FGM/C is practiced to be hospitalised for FGM/C-related issues.

Methods: I provide for the first time descriptive evidence on patients with FGM/C diagnosis in the universe of Italian anonymised national hospital discharge records over a 15-year time frame (2005-2019). I also calculate the incidence of hospitalisation due to FGM/C-related diseases (physical and obstetrical) among three different populations: natives, immigrants from countries where FGM/C is practiced, and other immigrants, while controlling for individual, time and contextual confounders.

Results: I document an extremely limited number of FGM/C diagnoses in Italian hospital discharge records. Among immigrants from the 31 countries where FGM/C is known to be practiced, hospitalisation for obstetrical, but not for physical, FGM/C-related diseases was positively correlated with the share of FGM/C women in the home country. Immigrants from 18 out of 31 countries where FGM/C is practiced are significantly more likely to be hospitalised for physical, but not for obstetrical, FGM/C-related diseases compared to other immigrants.

Conclusions: Results point to poor medical reporting of FGM/C in Italy. Increasing health professionals' knowledge of FGM/C and providing specific training on correct medical reporting is crucial to improve health conditions of women living with FGM/C in Italy. Evidence of adverse health consequences, proxied by hospitalisation rates, for immigrants living with this condition is more nuanced. Further research should aim at better differentiating between FGM/C types.

3.1 Introduction

The term "female genital mutilation or cutting", hereafter FGM/C, refers to any procedure of modification, partial or total removal or other injury to the female genital organs for non-medical reasons (WHO, 2018). According to the last available figures for the countries practicing FGM/C in Africa, the Middle East and Asia where survey data is available, more than 200 million girls and women live today with FGM/C. The World Health Organisation (WHO) classifies FGM/C into four types:

- Type I: partial or total removal of the clitoral glans (clitoridectomy) and/or the prepuce;
- Type II: partial or total removal of the clitoral glans and the labia minora, with or without excision of the labia majora (excision);
- Type III: narrowing of the vaginal opening with the creation of a covering seal by cutting and appositioning the labia minora or labia majora, with or without excision of the clitoral prepuce and glans (infibulation);
- Type IV: all other harmful procedures to the female genitalia for non-medical purposes, for example pricking, piercing, incising, scraping and cauterization.

FGM/C is therefore an umbrella term encompassing extremely different, often geographically specific, practices. The underlying causes also differ greatly across typologies and territories. In some places FGM/C is seen as an important rite of adulthood passage; in other communities FGM/C is (wrongly) believed to enhance female fertility; Type III FGM/C is often performed to ensure chastity; in other cases the fear of breaking social conventions, which would lead to undesired consequences such as lower chances of marriage, plays a strong role as well (Berg et al., 2010a).

Research on FGM/C is hampered by difficulties in reaching the population of interest. As there are no nationally representative surveys on FGM/C in non-practicing countries, direct estimations of the number of women living with FGM/C in Europe are not available. However, other types of estimations have been proposed, commonly based on applying the home-countries FGM/C prevalence rate to the known number of immigrants in destination countries. Inconveniently, such estimations often differ across time and space in the age bracket considered, and are therefore not comparable. Moreover, this approach fails to consider self-selection into immigration, which may lead women without FGM/C to emigrate disproportionally compared to women with FGM/C, although there have been also attempts to adjust for the selection hypothesis (Ortensi et al., 2015). In addition to this, indirect estimations rarely account for undocumented and second-generation immigrants. As for the latter, the expectation is that the prevalence of daughters with FGM/C in emigration countries would be lower than in the countries of origin, because there are more non-circumcised women present in emigration context, and almost all non-circumcised women do not circumcise their daughters (Farina and Ortensi, 2014). Furthermore, there is an increasing incidence of families in which the mother has been cut abandoning the practice. A faster decline in FGM/C among daughters in emigration than in countries of origin is generally expected (Farina and Ortensi, 2014).

Across Europe, it has been estimated that 578,068 women aged 10 or more lived with FGM/C in 2011 (Van Baelen et al., 2016), the majority of which were born in East-Africa (Somalia, Egypt, Ethiopia, Eritrea, Kenya, Sudan and Djibouti). In Italy, indirect estimates calculated using data from 2010, 2011 and 2016 indicate respectively a number of 57,000 (Farina et al., 2016), 59,700 (Van Baelen et al., 2016), and 60-80,000 women living with FGM/C (Ortensi et al., 2018). It should be noted that these three estimations are not directly comparable as the considered age brackets differ, being 15-49 in the first study, 10+ in the second study and 15+ in the third study. Moreover, although the latest estimation applies corrections according to the selection hypothesis, they all fail to consider second-generation immigrants with Italian citizenship, and only the first estimate includes undocumented immigrants.

A different strategy to draw conclusions on FGM/C prevalence in destination countries consists in surveying health practitioners. This type of evidence shows that mutilations were present through all regions of Italy as back as in the 90s, with 46% (218/475) of the surveyed obstetricians and gynecologists reporting experience with mutilated women, one of which was Italian (Grassivaro Gallo and Viviani, 1995; Gallo et al., 1997). Additional, more recent, research addressing paediatricians, nurses, midwives and gynaecologists working in a tertiary teaching hospital in Northern Italy finds that 71.5% (73/102) of surveyed healthcare professionals had dealt with patients with FGM/C (Surico et al., 2015).

Women living with FGM/C incur in a number of adverse health consequences, both short- and long-term (Klein et al., 2018), whose complication extent depends largely on the FGM/C type (Chibber et al., 2011). It has been estimated that 1 in 500-1,000 FGM/C results in death (Reyners, 2004). Other health consequences pertain physical health, e.g. higher incidence of urinary tract infections and complications of delivery (Berg et al., 2014); mental health, such as depression, anxiety and PTSD (Abdalla and Galea, 2019); sexual health, including pain during intercourse and reduced sexual satisfaction (Berg et al., 2010b); and psycho-social wellbeing, such as adverse effects on women's sense of identity and self-esteem (O'Neill and Pallitto, 2021). However, the quality of the studies, particularly on mental and sexual consequences, is generally weak (Abdalla and Galea, 2019; Berg et al., 2010b).

Health care services addressing women with FGM/C are often inadequate and there is little high quality clinical research assessing intervention strategies. In many countries only a small number of professionals correctly identify the four FGM/C categories defined by the WHO (Zurynski et al., 2015). Cut women experience significant challenges to obtain timely and holistic care, especially for deinfibulation, and may experience care as disrespectful, unsafe and disempowering (Evans et al., 2019b), possibly due to lack of knowledge and training of health professionals, bad communication, cultural misunderstandings, poor clinical management practices and service configuration (Evans et al., 2019a; Turkmani et al., 2019). Moreover, there is a paucity of practical research into the obstetric management of women with Type III FGM/C, such as guidance on the best timing of deinfibulation, and into the role of deinfibulation in general, e.g. in the relief of urinary symptoms and dyspareunia (Reisel and Creighton, 2015).

In Italy, some efforts have been put forward to address these issues. In 2006 the parliament passed a law prohibiting FGM/C, that introduced the development of informative campaigns, training of health workers, instituted of a tollfree number, international cooperation programmes and the responsibility of the institution where the crime is committed, and recognised that doctors have a role in eliminating FGM/C by educating patients and communities (Turillazzi and Fineschi, 2007). Nevertheless, some evidence highlights inadequate levels of awareness of health practitioners regarding FGM/C practices and legislation. A study conducted in one Italian hospital showed that only 55% of midwives, 50% of paediatricians and 28.5% of gynaecological residents were aware of the Italian law, and most professionals were not aware of protocols of action (Surico et al., 2015). A survey conducted in five Italian Shelter for Refugees and Asylum Seekers (CARA) showed that only 7.3% of respondents asserted to know well FGM/C, and only 34 % of health professionals were aware of guidelines/procedures for the management of women with FGM/C (Caroppo et al., 2014).

My contribution to the literature on immigrants living with FGM/C in developed countries and their health condition is twofold. First, I describe for the first time medical cases of FGM/C diagnosis and deinfibulation procedure in the universe of hospital discharge records from all existing hospitals in Italy over a prolonged time frame. This will shed light both on the accuracy of FGM/C reporting by health care professionals in Italy, and on the appropriateness of the reporting methods offered by the ICD-9-CM medical classification. Moreover, it will allow me to discuss the observable characteristics of women that have been actually cut, rather than focussing on indirect extrapolations. Second, I test for disproportional incidence of obstetrical and other physical health issues for women with citizenship from high-prevalence FGM/C compared to other immigrant women, by estimating the likelihoods of getting hospitalised for a set of diseases that have been identified in the literature as health complications of FGM/C (Cottler-Casanova et al., 2020). This part of the analysis will therefore rely on indirect observation: while I do not observe the actual share of women living with FGM/C in Italy, higher hospitalisation rates for FGM/C-related health conditions among certain immigrant communities can be interpreted as a sign of FGM/C being practiced among them.

3.2 Methods

Data

The present study uses data from the universe of Italian hospital discharge records (HDRs). In the first part of the analysis, the full available time frame (2005-2019) is used for descriptive statistics regarding women with an FGM/C diagnosis, while the most recently available data (2019) is used to estimate regressions regarding the rate of hospitalisation for FGM/C-related health conditions in the second part of the analysis. For each hospital episode, the data report information on up to six medical diagnoses and procedures, codified according to the International Classification of Diseases, Ninth Revision (ICD-9-CM), plus contextual variables (region, province, and local health authority, i.e. LHA), demographic characteristics of the patient (age, sex, country of citizenship), socio-economic variables (marital status, educational level, health insurance status) and type of hospital (private, public). The initial 2019 dataset includes 8,537,262 observations. As the analysis focuses on female immigrants' health, from the dataset I drop all observations of male sex. Moreover, I include only Italian citizens and immigrants from a subset of strong migratory pressure countries (SMPC), as defined by the ISTAT, including Africa, Asia (excluding Israel and Japan), Central and South America, and EU countries of recent accession. Finally, I drop observations younger than 15 years old. This results in a dataset of 3,990,077 observations. Given that in the dataset is not possible to uniquely identify individuals, I cannot track patients over time. The unit of analysis is therefore the hospitalisation event.

Definition of variables

I identify patients hospitalised with FGM/C diagnosis or deinfibulation procedure by selecting the appropriate ICD-9 codes in any field, i.e. looking both at principal and secondary diagnoses/procedures. The analysis of the ICD-9 classification adopted in Italy over time reveals two major issues. First, the ICD-9 classification used up to 2008 did not include any code for the diagnosis of FGM/C, and second, no procedure codes for deinfibulation procedures have been ever specified. The fully revised ICD-9 classification adopted in Italy in 2009 includes five 5-digit codes for the diagnosis of FGM/C (629.20, 629.21, 629.22, 629.23, 629.29)[10], which will be used to identify hospitalisations of cut women in the first part of the analysis. Moreover, several regional guidelines created to coadiuvate the correct filling of hospital discharge records, explicitly mention two ICD-9 procedure codes that should be used in case of deinfibulation (71.01, 71.09), which I also adopt in my descriptive analysis. However, it is important to notice that these procedure codes do not refer exclusively to deinfibulation operations, as incision of the vulva may be a necessary operation for other health conditions, such as Lichen Sclerosus (Krapf et al., 2020). Appendix Table C.1 fully describes the codes indicating FGM/C diagnoses and deinfibulation procedures.

The second part of the analysis consists in regression estimations. The outcome variables are the proportion of FGM/C complications linked to obstetrical health or other physical health, over the number of hospitalizations (WHO, 2018). In the main analysis, only the principal diagnosis was considered in order to identify FGM/C-related hospitalisations, while all five diagnosis fields were considered in additional robustness check. The conditions were selected following the classification proposed by Cottler-Casanova et al. (2020), who operationalized previous descriptive literature by identifying a list of ICD-9 codes (Appendix Table C.5 and Table C.6). The analysis focuses on obstetrical and other physical conditions, as the sexual conditions suggested by Cottler-Casanova et al. (2020) were too rarely diagnosed to be studied, and endogeneity problems would arise from the inclusion of psychological conditions. Indeed, events like wars and unsafe migratory patterns are highly correlated both with citizenship and psychological health, leading to a strong omitted variable bias.

The main independent variables of interest identify women whose country of origin is a country with nonzero prevalence of FGM/C. In order to select such countries, I refer to evidence of FGM/C prevalence among women aged 15-49 in 32 countries as reported by

[10] "Manuale Versione Italiana 2007" and "Manuale Versione Italiana 2002", available on www.salute.gov.it.

different survey sources, mostly the USAID Demographic and Health Surveys (DHS) and the UNICEF Multiple Indicator Cluster Surveys (MICS) (see Appendix Table C.2 for details). Data from Indonesia was only available for the age bracket 0-11, and it has therefore to be considered as a lower bound (Ortensi et al., 2018). The main independent variable is operationalised in two ways. First, the 32 countries of citizenship are grouped into four categories following the subdivision suggested by Macfarlane and Dorkenoo (2015): countries with almost universal FGM/C, and over 30% FGM/C, Type III; countries with high national prevalence of FGM, Types I and II; countries with moderate national prevalence of FGM, Types I and II and countries with low national prevalence of FGM, WHO Types I and II (see Appendix Tables C.3 and C.4 for details on the subdivision of countries into the four categories and their sample size). The grouping is helpful to get more precise estimations, given that some countries of citizenship record a low number of observations, while differentiating for known FGM/C prevalence and type in the country of origin, which my affect the severity of FGM/C-related illnesses and therefore the likelihoods of hospitalisation. The expectation is that the probability of hospitalisation for FMG/C-related conditions is highest in the first category and lowest in the last category. In a second analysis, the categories are fully disaggregated into the 32 countries citizenship. Despite the inevitable loss of precision and in same cases also of observations, this analysis is conducted with the purpose of uncovering possible heterogeneity across citizenship.

Statistical analysis and reporting

The statistical analysis is divided into four parts. First, I provide descriptive statistics regarding hospitalisations with FGM/C diagnosis (629.2) and deinfibulation procedures (71.01, 71.09). Second, I estimate logistic regression models for the probability of FGM/C-related hospitalisations (physical and obstetrical). The main independent variable is an indicator of FGM/C prevalence in the origin country, following the epidemiology approach used by several researchers in order to estimate correlation between home country and country of destination behaviours (Fernández, 2011). Then, I estimate the likelihoods of hospitalisation for FGM/C-related diseases using a categorical variable indicating the patient's citizenship as main independent variable. Finally, I group patients' citizenship according to the prevalence of FGM/C in the home country. In all regression analyses, additional individual controls include age class, marital status, educational level, type of health insurance and type of hospital. An additional missing category has been included for marital status and education to account for high levels of missing values. Models also include LHA of hospitalization fixed effect, to control for all possible area-specific characteristics. Data preparation and statistical analysis was performed using Stata 17. I report adjusted odd ratios (ORs) and 95% confidence intervals (CIs) in tables.

3.3 Results

FGM/C diagnoses and deinfibulation procedures

Among the about 60 million female hospitalisations that were recorded in the period 2005-2019, only 287 reported a diagnosis for FGM/C in any of the five diagnosis fields. The share of hospitalisations with FGM/C diagnosis is therefore extremely low. Medical procedures of incision (71.01 and 71.09), which according to guidelines should be used in case of deinfibulation, are more common in the HDR dataset over the 15 year period compared to FGM/C diagnoses, for a total of 14,956 hospitalisations. This is due to the fact that these procedure codes are not use exclusively for deinfibulation, but also for other surgical interventions. Table 3.1 reports the number of such hospitalisations by FGM/C typology, Table 3.2 by citizenship of the patient and 3.3 provide further descriptive evidence regarding these records.

As shown in Table 3.1, FGM/C Type III, i.e. infibulation, is the most often registered type (41%), followed by Unspecified type (21%) and Type II (20%). The share of infibulated (Type III) patients that underwent an operation linked to deinfibulation, either the 71.01 or the 71.09 procedure, is about 40%. The share is halved among patients with diagnosis of FGM/C Type II, Unspecified type and Other types. Among patients with FGM/C Type I diagnosis, only 8.8% had an incision operation. Nineteen different countries of citizenship are found among patients with an FGM/C diagnosis, including Italy and other four countries where FGM/C is not known to be practiced, namely Morocco, Romania, Spain and India (Table 3.2). On the other hand, many countries for which FGM/C is known to be prevalent are not found in the sample[11]. Among hospitalisations of immigrants, citizenship from Somalia is the most common (98 observations, 34.2% of the sample), followed by Nigeria (30 observations, 10.5% of the sample) and Burkina Faso (16 observations, 5.6% of the sample). The ratio between the female population resident on 1st January 2019 and the number of hospitalisations with FGM/C diagnosis is highest for Somali (98/2,553, 3.8%) and Sudanese women (15/496, 3.0%). The share of hospitalisations with Italian citizenship is of 17% (50 observations), possibly indicating second-generation immigrants. Most hospital discharge records recording procedures for vulvar lysis are of Italian women (above 90%), while among immigrants the most common citizenship is Romania, followed by Somalia and Morocco. Among these, only Somalia is a country where FGM/C is known to be practiced.

[Table 3.1 and Table 3.2 about here]

Table 3.3 reports additional characteristics of the universe of hospitalisations with FGM/C diagnosis or deinfibulation procedures in 2005-2019: year and region of hospitalisation, sex of the patient, age class, marital status, education, type of hospital and health insurance (public vs private). As mentioned in the previous section, no FGM/C diagnosis was recorded between 2005-2008 because the appropriate codes were not included in the ICD-9 classification. Only 5 hospitalisations for FGM/C diagnosis were recorded in 2009 and 17 in 2010. Afterwards, an average of 30 observations per year was recorded. This seems to indicate that a 3-year period of adjustment was needed for the new classification to be adopted. At the same time the figures, that remain low, likely underestimate the real number of women hospitalised with FGM/C due to a lack of diagnosis, as the literature suggests (Evans et al., 2019b). The vast majority of observations is in the age bracket 15-44 (93%), with more than 50% of observations being of women aged 25-44. The share of unmarried women is only slightly larger than married ones. Half of the observations

[11]These are: Benin, Cameroon, CAR, Chad, Djibouti, Ghana, Guinea, Guinea-Bissau, Indonesia, Iraq, Kenya, Liberia, Maldives, Mauritania, Niger, South Sudan, Togo, Uganda, Tanzania, Yemen.

has lower secondary education or lower, while in only 1.74% of the cases the women holds a university degree. However, about a third of the hospitalisations record missing information for marital status and education. Most hospitalisations happen in public hospitals (93.73%), and the totality is covered by the NHS through the public health insurance. Finally, FGM/C diagnoses are found throughout Italy, in all regions but Valle d'Aosta. Four regions (Piemonte, Lombardy, Emilia Romagna and Tuscany) make up for more than 65% of the observations. This is not surprising given that these regions have a large number of resident immigrants (respectively 411,083, 1,130,587, 529,580 and 396,301 in 2019) compared to most of the other Italian regions, which record less than 300,000 immigrants, but Lazio and Veneto that record 626,748 and 481,916 resident immigrants in 2019[12], and for which one would therefore expect to show a higher number of FMG/C hospitalisations. One FGM/C diagnosis and 24 procedures of incision of the vulva were recorded for male patients.

[Table 3.3 about here]

Health consequences of FGM/C

Characteristics of the HDR data for the year 2019, after exclusions, are reported in Table 3.4. The share of hospitalisations for FGM/C health consequences, either for obstetrical or other physical conditions, is of 4.98% among Italians, 10.11% among immigrants from FGM/C countries and 9.74% among other immigrants. Among these, obstetrical conditions are more common in the immigrant population compared to the native one, which is expected given that their fertility rate is higher. Immigrants from FGM/C practicing countries are on average younger, less likely to be educated and married, and more likely to access public hospitals through the public health system. Overall, immigrants from FGM/C countries share more similar characteristics with other immigrants than with natives. As this is likely to be the case also for unobservable variables, the "other immigrants" category will make a better reference for regression analysis purposes. The largest

[12]www.dati.istat.it

share of their hospitalisations was located in Lombardy (29.80%), followed by Emilia Romagna (13.55%) and Veneto (10.75%). Hospitalisations of Italians are more common in Lombardy (16.94%), Campania (9.74%) and Lazio (9.70%).

[Table 3.4 about here]

Table 3.5 reports the ORs of being hospitalised for a FGM/C-related disease, given the share of cut women in home countries. In this analysis the sample is restricted to immigrants with citizenship from countries where FGM/C is known to be practiced (26,988 observations). Results show that for a one-unit increase in the home-country FGM/C prevalence, it is expected a 0.43% increase in the likelihood of hospitalisation for an obstetrical FGM/C-related conditions, after controlling for individual characteristics and province fixed effects. The fact that the main results are not statistically significant before adding controls is expected due to the large heterogeneity of individual and contextual characteristics that affect the probability of hospitalisation. Contrary to expectations, hospitalisations for other physical conditions related to FGM/C are negatively correlated with FGM/C rates in home countries. A one-unit increase in the home-country FGM/C prevalence is correlated with a 0.31% decrease in the likelihood of hospitalisation for other physical conditions related to FGM/C, after controlling for individual characteristics and province fixed effects. Being hospitalised in a public rather than a private hospital has a positive correlation with the likelihood of hospitalisation for a FGM/C-related condition. Being unmarried has a negative correlation in the first set of regressions and a positive correlation in the second set of regressions. Having no or elementary education does not have a significant correlation with the probability of being hospitalised for obstetrical outcomes, while it has a positive correlation for other physical outcomes.

[Table 3.5 about here]

Table 3.6 reports the ORs for being hospitalised for a FGM/C-related disease conditional to the country of citizenship by grouping women into different sub-categories: Italians, immigrants from a country with high, medium and low prevalence FGM/C, and other immigrants, the latter being the reference category. Additionally, a further category is included to indicate immigrants from countries with a high prevalence of type III FGM/C (infibulation). Results show that, after controlling for individual and contextual characteristics, Italians always record a lower likelihood to be hospitalised for FGM/C related conditions compared to "other immigrants'. For obstetrical outcomes, none of the four categories indicating immigrants with citizenship from countries where FGM/C is known to be practiced has significant higher likelihoods to be hospitalised compared to other immigrants (column 3), while for other physical conditions, their likelihoods are higher in all but one case (column 6). Education as an opposite correlation in the first and in the second set of regression: it is positively correlated with the probability of being hospitalised for obstetrical FGM/C-related conditions and negatively correlated with the probability of being hospitalised for other physical FGM/C-related conditions. The same is true for being married. In both sets of regressions, being hospitalised in a public rather than a private hospital is positively correlated with FGM/C-related outcomes.

[Table 3.6 about here]

In order to get finer grained results, table 3.7 reports the ORs for being hospitalised for a FGM/C-related disease conditional to the country of citizenship, without any grouping. Observations were not recorded for Maldives citizenship and too few observations were available for South Sudan citizenship. Results show that female immigrants from 14 out of the 30 countries considered are more likely to be hospitalised for a physical condition related to FGM/C compared to immigrants from non-FGM/C countries. Estimates' magnitude is particularly large for Liberia, Chad, Yemen, Central African Republic, Sierra Leone, Tanzania and Mauritania (ORs above 3.00). In addition, for other 6 countries of citizenship the estimates are above 1, indicating a positive correlation, although not statistically significant, which may be due to small sample sizes. On the other hand, estimates indicates a lower incidence of hospitalisation for a physical FGM/C-related condition among Egyptian and Senegalese women compared to immigrants from non-FGM/C countries. Estimations were not possibile for the countries of Djibouti, Yemen and Uganda due to the lack of variation in the outcome variable for these sub-populations. The incidence of hospitalisation for obstetrical consequences of FGM/C is 11.53 times higher for Djibouti and and 1.25 higher for Burkina Faso, compared to the reference category. In six other cases the estimates are above 1, but not statistically significant (Yemen, Sierre Leone, Guinea-Bissau, Guinea, Gambia). Italian women are on average 11.9% less likely to be hospitalised with a diagnosis for a FGM/C-related physical condition and 14.7% less likely to be hospitalised with a diagnosis of a FGM/C-related obstetrical condition than the immigrant category of reference.

[Table 3.7 about here]

3.4 Conclusions

In this chapter I analysed data from the universe of Italian hospital discharge records in order to discuss the quality of FGM/C medical reporting and the incidence of FGM/C-related health conditions for immigrant women. First, I discussed the accuracy of medical reporting of FGM/C by providing descriptive statistics on hsopitalisations with diagnosis "629.2" (FGM/C) and procedures "71.01/71.09" (deinfibulation) for the period 2005-2019. Differently from most research on FGM/C, the sample conveniently includes all immigrants, regardless of their legal status. Moreover, if second-generation immigrants with FGM/C are hospitalised, they would also be included in the sample, regardless of their citizenship. My results seem to confirm previous literature on low levels of training and awareness of health practitioners regarding FGM/C (Zurynski et al., 2015; Surico et al., 2015; Caroppo et al., 2014). First of all, for the period 2005-2008 it was not possibile to study FGM/C diagnoses in the Italian administrative medical records because the ICD-9-CM classification adopted in Italy in that period was missing the appropriate codes. Over the subsequent decade (2009-2019), an extremely low number of hospitalisations (287) mentioned a diagnosis for FGM/C in any field, despite an estimated number of 57-80k women living with FGM/C in Italy and an average of about 4 million female hospital discharge records per year. In the first three years after the introduction of the new ICD-9-CM classification (2009-2011) the number of diagnosis for FGM/C grew by a factor of 6 (from 5 to 32). However, it does not appear that practitioners improved their reporting accuracy over the following years. Hospitalisations with an FGM/C diagnosis and Italian citizenship most likely masks second-generation immigrants; given their large share (17%) over the total of the observations, I conclude that FGM/C prevalence among second-generation immigrants in Italy is not negligible. Male hospitalisations with FGM/C diagnosis (1 case) and incision of the vulva procedures (24 cases) can be interpret either as indicating transgender patients or as errors in the compilation of the HDRs.

Second, using HDR data from 2019 I investigated the prevalence of health consequences due to FGM/C among immigrants from countries where FGM/C is practiced, distinguishing between obstetrical and other physical conditions. My results showed that, among immigrants from FGM/C-practicing countries, a one-unit increase in the home-country FGM/C prevalence is correlated with a 0.43% increase in the rate of hospitalisation for obstetrical FGM/C consequences. However, it is negatively correlated with hospitalisation rate for other physical conditions linked to FGM/C. Immigrants from countries where the prevalence of FGM/C Type III is high are more likely to be hospitalised for physical FGM/C-related conditions compared to immigrants from countries not known to practice FGM/C. Immigrant women from several FGM/C practicing countries (Liberia, Chad, CAR, Sierra Leone, Tanzania, Mauritania, Guinea-Bissau, Benin, Togo, Kenya, Somalia, Gambia and Nigeria) are 2-8 times as likely to be hospitalised for a physical condition related to FGM/C, compared to immigrants from non-FGM/C practicing countries, although this doesn't hold for obstetrical conditions. Differences found across countries of citizenship may be linked to the prevalent FGM/C type in the community, as well as to culturally specific propensities to address doctors as far as female reproductive health is concerned.

Unfortunately, outcomes on sexual conditions and psychological health, both indicated in the literature as medical areas affected by the practice of FGM/C, could not be studied due to the low number of observed cases as well as endogeneity issues. Indeed, other factors such as migration patterns and extreme conditions in the country of origin (wars) are likely to be correlated both with citizenship and psychological health. I would encourage future research to focus on these understudied areas of interest. Further quantitative and qualitative research is needed to investigate FGM/C among immigrants in destination countries in general, and especially second generation and undocumented immigrants. Research should aim also to understand the mechanisms behind the preservation of this practice in destination countries, with the goal of developing empowering strategies for all women at risk to get freedom of choice on their own bodies.

3.5 Figures and Tables

Table 3.1: FGM/C diagnoses and deinfibulation procedures in Italian HDRs (2005-2019)

	Diagnosis 629.2		**Procedure 71.01**		**Procedure 71.09**		**Either procedure**	
	No.	% of total FGM/C	No.	% within FGM/C type	No.	% within FGM/C type	No.	% within FGM/C type
FGM/C Type I	34	11.85	2	5.88	1	2.94	3	8.82
FGM/C Type II	57	19.86	5	8.77	9	15.79	11	19.30
FGM/C Type III	118	41.11	22	18.64	42	35.59	47	39.83
FGM/C, Other type	18	6.27	2	11.11	4	22.22	4	22.22
FGM/C, Unspecified	60	20.91	5	8.33	10	16.67	11	18.33
FGM/C	287	100	36	12.54	66	23.00	76	26.48
71.01/71.09 procedures,								
Without FGM/C diagnosis			2,808		12,132		14,880	
With an FGM/C diagnosis			36		66		76	
Total			2,844		12,198		14,956	

Table 3.2: Citizenship of patients with FGM/C diagnosis (2005-2019)

	Diagnosis 629.2		**Procedure 71.01**		**Procedure 71.09**		**Either procedure**	
	No.	% of total	No.	% of total	No.	% of total	No.	% of total
Somalia	98	34.15	29	1.02	84	0.69	100	0.67
Italy	50	17.42	2,714	95.53	10,999	90.53	13,654	91.29
Nigeria	30	10.45	5	0.18	41	0.34	44	0.29
Burkina Faso	16	5.57	0	0	8	0.07	8	0.05
Cote D'Ivoire	15	5.23	0	0	4	0.03	4	0.03
Sudan	15	5.23	1	0.04	6	0.05	6	0.04
Egypt	14	4.88	2	0.07	10	0.08	12	0.08
Senegal	11	3.83	1	0.04	17	0.14	17	0.11
Eritrea	10	3.48	11	0.39	13	0.11	18	0.12
Guinea	6	2.09	1	0.04	3	0.02	3	0.02
Ethiopia	5	1.74	0	0	4	0.03	4	0.03
Sierra Leone	5	1.74	0	0	2	0.02	2	0.01
Mali	4	1.39	1	0.04	3	0.02	3	0.02
Gambia	3	1.05	2	0.07	1	0.01	3	0.02
Philippines	1	0.35	1	0.04	14	0.12	15	0.10
Morocco	1	0.35	7	0.25	93	0.77	100	0.67
Romania	1	0.35	15	0.53	207	1.70	222	1.48
Spain	1	0.35	0	0	5	0.04	5	0.03
India	1	0.35	3	0.11	16	0.13	19	0.13
Other immigrants	0	0	48	0.82	619	1.54	665	4.45
Missing citizenship	0	0	3	0.83	49	3.56	52	0.35
Total	287	100	2,844	100	12,198	100	14,956	100

Note: Only countries for which it is recorded at least 1 observation with FGM/C diagnosis (629.2), in any field, are listed.

Table 3.3: Hospitalisations with ICD-9 FGM/C diagnosis and deinfibulation procedures in 2005-2019 and patient characteristics

	Diagnosis 629.2		**Procedure 71.01**		**Procedure 71.09**	
	No.	% of total	No.	% of total	No.	% of total
Year						
2005	n.a.	n.a.	248	8.72	952	7.8
2006	n.a.	n.a.	209	7.35	1,084	8.89
2007	n.a.	n.a.	290	10.2	1,016	8.33
2008	n.a.	n.a.	225	7.91	1,015	8.32
2009	5	1.74	230	8.09	901	7.39
2010	17	5.92	194	6.82	840	6.89
2011	32	11.15	190	6.68	822	6.74
2012	41	14.29	208	7.31	808	6.62
2013	22	7.67	150	5.27	779	6.39
2014	22	7.67	137	4.82	753	6.17
2015	23	8.01	153	5.38	748	6.13
2016	33	11.5	195	6.86	697	5.71
2017	31	10.8	161	5.66	582	4.77
2018	32	11.15	147	5.17	610	5
2019	29	10.10	107	3.76	591	4.85
Female						
Male	1	0.35	4	0.14	20	0.16
Female	286	99.65	2840	99.86	12,178	99.84
Age						
Undefined	0	0.00	2	0.07	9	0.07
Age 0	1	0.35	251	8.83	41	0.34
Age 1-4	1	0.35	1,061	37.31	56	0.46
Age 5-14	4	1.39	482	16.95	268	2.2
Age 15-24	114	39.72	106	3.73	1,888	15.48
Age 25-44	153	53.31	374	13.15	5,656	46.37
Age 45-64	12	4.18	229	8.05	2,687	22.03
Age 65-74	1	0.35	135	4.75	796	6.53
Age 75 or older	1	0.35	204	7.17	797	6.53
Marital status						
Unmarried	88	30.66	1,713	60.23	4,582	37.56
Married	103	35.89	418	14.7	4,616	37.84
Missing	96	33.45	713	25.07	3,000	24.59
Education						
No/elementary	61	21.25	723	25.42	1,197	9.81
Lower secondary	92	32.06	157	5.52	1,657	13.58
Upper secondary	37	12.89	156	5.49	1,946	15.95
University	5	1.74	68	2.39	716	5.87
Missing	92	32.06	1,740	61.18	6,682	54.78
Type of Hospital						
Private	18	6.27	469	16.49	3,022	24.77
Public	269	93.73	2,375	83.51	9,165	75.14
Missing	0	0.00	0	0.00	11	0.09
Health insurance						
Public	287	100	2,793	98.21	11,878	97.41
Co-pay	0	0.00	51	1.79	316	2.59
Region						
Piemonte	63	21.95	158	5.56	1,260	10.33
Val d'Aosta	0	0.00	23	0.81	10	0.08
Lombardia	46	16.03	280	9.85	1,835	15.04
P.A. di Bolzano	0	0.00	26	0.91	271	2.22
P.A. di Trento	1	0.35	11	0.39	149	1.22
Veneto	13	4.53	148	5.2	1,406	11.53
Friuli Venezia Giulia	16	5.57	32	1.13	244	2
Liguria	5	1.74	95	3.34	423	3.47
Emilia Romagna	41	14.29	223	7.84	818	6.71
Toscana	44	15.33	102	3.59	631	5.17
Umbria	4	1.39	30	1.05	168	1.38
Marche	3	1.05	26	0.91	333	2.73
Lazio	9	3.14	101	3.55	1,434	11.76
Abruzzo	3	1.05	33	1.16	210	1.72
Molise	1	0.35	3	0.11	71	0.58
Campania	6	2.09	346	12.17	1,056	8.66
Puglia	9	3.14	446	15.68	561	4.6
Basilicata	2	0.7	7	0.25	74	0.61
Calabria	2	0.7	152	5.34	316	2.59
Sicilia	14	4.88	388	13.64	763	6.26
Sardegna	5	1.74	214	7.52	165	1.35
Total	287	100	2,844	100	12,198	100

Table 3.4: Hospital discharge records (HDR) database, hospitalisations for FGM/C consequences and patient characteristics, 2019

	Italians		FGM/C countries		Other immigrants	
	No.	% of total	No.	% of total	No.	% of total
Principal diagnosis						
FGM/C consequences, of which	185,252	4.98	2,712	10.11	23,926	9.74
Physical	119,894	3.22	937	3.49	7,055	2.87
Obstetrical	65,358	1.76	1,775	6.62	16,871	6.87
Sex						
Female	3,717,709	100	26,828	100	245,540	100
Age class						
15-24	168,129	4.52	5,296	19.74	28,094	11.44
25-34	396,038	10.65	10,924	40.72	80,803	32.91
35-44	439,597	11.82	6,744	25.14	58,954	24.01
45-54	430,100	11.57	1,932	7.20	31,553	12.85
55-64	480,654	12.93	809	3.02	25,116	10.23
65-74	621,113	16.71	628	2.34	13,824	5.63
75 or older	1,182,078	31.8	495	1.85	7,196	2.93
Education						
No/elementary	763,917	20.55	3,964	14.78	23,023	9.38
Lower secondary	770,708	20.73	7,641	28.48	67,806	27.62
Upper secondary	788,788	21.22	4,571	17.04	62,634	25.51
University	355,568	9.56	1,661	6.19	2,0891	8.51
Missing	1,038,728	27.94	8,991	33.51	71,186	28.99
Marital status						
Married	1,450,165	35.19	10,664	31.18	97,031	33.35
Missing	1,212,316	29.42	11,251	32.89	95,315	32.76
Health insurance						
NHS	3,594,116	96.68	26,370	98.29	239,502	97.54
Co-pay	123,593	3.32	458	1.71	6,034	2.46
Type of Hospital						
Public	2,625,976	70.63	23,486	87.54	20,5745	83.79
Private	1,082,978	29.13	3,261	12.16	38,984	15.88
Missing	8,755	0.24	81	0.30	811	0.33
Region						
Piemonte	268,378	7.22	2,436	9.08	21,959	8.94
Val d'Aosta	9,344	0.25	15	0.06	611	0.25
Lombardia	629,742	16.94	7,995	29.80	52,105	21.22
P.A. di Bolzano	36,077	0.97	207	0.77	2,919	1.19
P.A. di Trento	35,021	0.94	204	0.76	2,941	1.2
Veneto	293,286	7.89	2,884	10.75	25,028	10.19
Friuli Venezia Giulia	80,096	2.15	586	2.18	6,035	2.46
Liguria	111,040	2.99	662	2.47	8,216	3.35
Emilia Romagna	330,190	8.88	3,636	13.55	30,142	12.28
Toscana	232,591	6.26	1,555	5.80	21,476	8.75
Umbria	59,823	1.61	398	1.48	5,544	2.26
Marche	96,454	2.59	729	2.72	8,489	3.46
Lazio	360,614	9.7	2,485	9.26	27,401	11.16
Abruzzo	79,677	2.14	298	1.11	4,675	1.9
Molise	22,006	0.59	26	0.10	184	0.07
Campania	362,039	9.74	1,086	4.05	9,676	3.94
Puglia	209,167	5.63	608	2.27	7,358	3
Basilicata	31,794	0.86	71	0.26	1,063	0.43
Calabria	93,768	2.52	233	0.87	3,634	1.48
Sicilia	264,812	7.12	679	2.53	5,963	2.43
Sardegna	111,790	3.01	35	0.13	121	0.05
Total	3,717,709	100	26,828	100	245,540	100

Table 3.5: Logistic regression results (ORs) for the likelihood of FGM/C-related hospitalisations, 2019

	Physical health			**Obstetrical health**		
	(1)	(2)	(3)	(4)	(5)	(6)
FGM/C % in home country	0.9921*** (0.990 - 0.994)	0.9947*** (0.992 - 0.997)	0.9969** (0.994 - 1.000)	1.0008 (0.999 - 1.002)	0.9999 (0.998 - 1.002)	1.0043*** (1.003 - 1.006)
Age						
15-24		0.9273 (0.751 - 1.145)	0.9330 (0.751 - 1.160)		0.8075*** (0.711 - 0.917)	0.8372*** (0.735 - 0.954)
35-44		1.7106*** (1.440 - 2.033)	1.6839*** (1.412 - 2.008)		0.5644*** (0.499 - 0.639)	0.5406*** (0.476 - 0.614)
45-54		4.0140*** (3.292 - 4.895)	3.5243*** (2.855 - 4.350)			
55-64		2.4605*** (1.778 - 3.405)	2.4391*** (1.745 - 3.409)			
65-74		1.4849* (0.946 - 2.331)	1.5832* (0.984 - 2.547)			
75 or older		1.7931** (1.102 - 2.919)	1.5824* (0.938 - 2.669)			
Education						
No/elementary		1.6816*** (1.310 - 2.159)	1.5362*** (1.186 - 1.990)		0.8302* (0.688 - 1.002)	0.8727 (0.716 - 1.063)
Lower secondary		1.0682 (0.839 - 1.360)	1.0918 (0.853 - 1.397)		1.0351 (0.892 - 1.202)	0.9818 (0.843 - 1.144)
University		0.8238 (0.542 - 1.253)	0.7756 (0.508 - 1.184)		1.0798 (0.866 - 1.346)	1.1297 (0.901 - 1.416)
Missing		1.8439*** (1.480 - 2.298)	1.6626*** (1.313 - 2.106)		0.9073 (0.777 - 1.059)	1.0393 (0.885 - 1.221)
Marital status						
Married		0.5158*** (0.427 - 0.622)	0.5841*** (0.483 - 0.707)		1.7508*** (1.493 - 2.054)	1.7872*** (1.516 - 2.106)
Missing		0.9056 (0.767 - 1.070)	0.9984 (0.821 - 1.214)		2.1859*** (1.870 - 2.556)	1.6016*** (1.348 - 1.903)
Health insurance						
NHS		1.3109 (0.744 - 2.310)	1.3642 (0.752 - 2.475)		2.8281*** (1.402 - 5.706)	3.0176*** (1.510 - 6.031)
Hospital type						
Public		1.4662*** (1.155 - 1.862)	1.5409*** (1.197 - 1.983)		2.2292*** (1.766 - 2.814)	1.8875*** (1.457 - 2.446)
Missing					3.4029*** (1.435 - 8.069)	6.6278*** (2.534 - 17.333)
Observations	26,988	26,906	26,226	23,094	23,094	22,835
LHA FE	NO	NO	YES	NO	NO	YES

*** p<0.01, ** p<0.05, * p<0.1
Robust cieform in parentheses.

Notes to Table 3.5:

The sample is restricted to immigrants with citizenship from countries where FGM/C is known to be practiced.

Table 3.6: Logistic regression results (ORs) for the likelihood of FGM/C-related hospitalisations, 2019

	Physical health			**Obstetrical health**		
	(1)	(2)	(3)	(4)	(5)	(6)
FGM/C prevalence group						
Italians	1.1265***	0.9047***	0.8802***	0.6194***	0.7200***	0.8533***
	(1.099 - 1.154)	(0.882 - 0.928)	(0.858 - 0.903)	(0.608 - 0.630)	(0.707 - 0.733)	(0.837 - 0.870)
High, type III	1.5274**	1.3947**	1.3928**	0.5221***	0.5622***	0.6038**
	(1.103 - 2.116)	(1.006 - 1.935)	(1.005 - 1.931)	(0.351 - 0.776)	(0.376 - 0.840)	(0.403 - 0.905)
High	0.6590***	0.7300***	0.7767***	0.8166***	0.7716***	0.9543
	(0.553 - 0.785)	(0.613 - 0.870)	(0.652 - 0.926)	(0.742 - 0.899)	(0.699 - 0.851)	(0.863 - 1.055)
Medium	1.4510***	1.5017***	1.5002***	0.7189***	0.7490***	0.7289***
	(1.335 - 1.577)	(1.381 - 1.633)	(1.380 - 1.631)	(0.673 - 0.768)	(0.700 - 0.801)	(0.681 - 0.781)
Low	1.2743***	1.3427***	1.3404***	0.7930***	0.7465***	0.6396***
	(1.077 - 1.507)	(1.135 - 1.588)	(1.134 - 1.585)	(0.700 - 0.899)	(0.658 - 0.847)	(0.563 - 0.727)
Age						
15-24		1.2773***	1.2671***		0.4495***	0.4481***
		(1.233 - 1.324)	(1.223 - 1.313)		(0.438 - 0.461)	(0.437 - 0.460)
35-44		1.4125***	1.4218***		0.5088***	0.4915***
		(1.374 - 1.452)	(1.383 - 1.462)		(0.501 - 0.517)	(0.484 - 0.500)
45-54		2.0386***	2.0428***			
		(1.984 - 2.094)	(1.988 - 2.099)			
55-64		1.6984***	1.7056***			
		(1.652 - 1.746)	(1.659 - 1.753)			
65-74		1.6606***	1.6772***			
		(1.616 - 1.706)	(1.632 - 1.723)			
75 or older		2.4373***	2.4669***			
		(2.377 - 2.499)	(2.406 - 2.529)			
Education						
No/elementary		1.1789***	1.1735***		0.7683***	0.8015***
		(1.156 - 1.202)	(1.150 - 1.197)		(0.739 - 0.799)	(0.768 - 0.836)
Lower secondary		1.0765***	1.0718***		0.7845***	0.8151***
		(1.056 - 1.097)	(1.052 - 1.092)		(0.768 - 0.801)	(0.797 - 0.833)
University		0.8708***	0.8696***		1.2902***	1.3370***
		(0.848 - 0.894)	(0.847 - 0.893)		(1.265 - 1.316)	(1.310 - 1.365)
Missing		1.1913***	1.1987***		0.9364***	1.0052
		(1.170 - 1.214)	(1.176 - 1.222)		(0.917 - 0.956)	(0.983 - 1.028)
Marital status						
Married		0.8402***	0.8370***		1.3576***	1.5383***
		(0.828 - 0.852)	(0.825 - 0.849)		(1.333 - 1.383)	(1.509 - 1.568)
Missing		0.9174***	0.9070***		1.5343***	1.1814***
		(0.904 - 0.931)	(0.892 - 0.922)		(1.504 - 1.565)	(1.157 - 1.207)
Health insurance						
NHS		1.4292***	1.3818***		0.9158***	0.8914***
		(1.364 - 1.497)	(1.318 - 1.448)		(0.875 - 0.958)	(0.851 - 0.934)
Hospital type						
Public		1.9164***	1.9292***		3.1481***	2.5807***
		(1.887 - 1.946)	(1.899 - 1.960)		(3.070 - 3.228)	(2.516 - 2.647)
Missing		1.2878***	1.0773		2.9894***	3.0413***
		(1.133 - 1.464)	(0.935 - 1.241)		(2.556 - 3.496)	(2.584 - 3.580)
Observations	3,990,077	3,990,073	3,990,073	1,194,579	1,194,576	1,194,576
LHA FE	NO	NO	YES	NO	NO	YES

*** p<0.01, ** p<0.05, * p<0.1
Robust cieform in parentheses.

Notes to Table 3.6:

The group of immigrants from strong migratory pressure countries not known to practice FGM/C is the reference category.

Table 3.7: Logistic regression results (ORs) for the likelihood of FGM/C-related hospitalisations, 2019

	Physical health	**Obstetrical health**
	(1)	(2)
Citizenship		
Italy	0.8806***	0.8528***
	(0.858 - 0.904)	(0.836 - 0.869)
Djibouti		11.5347***
		(2.019 - 65.885)
Liberia	8.7940***	1.167
	(4.105 - 18.840)	(0.429 - 3.176)
Chad	6.7931***	
	(2.437 - 18.933)	
Central African Republic	4.8500**	
	(1.306 - 18.006)	
Sierra Leone	4.8409***	1.3483
	(2.457 - 9.537)	(0.555 - 3.275)
Tanzania	4.7396***	0.1923*
	(2.566 - 8.753)	(0.028 - 1.321)
Mauritania	3.9612***	0.2699
	(1.623 - 9.670)	(0.040 - 1.808)
Guinea-Bissau	3.1861*	1.1593
	(0.974 - 10.425)	(0.358 - 3.750)
Benin	2.5483***	0.4588
	(1.279 - 5.077)	(0.179 - 1.173)
Togo	2.5419***	0.5113**
	(1.583 - 4.080)	(0.301 - 0.870)
Kenya	2.4973***	0.6181
	(1.435 - 4.347)	(0.307 - 1.245)
Somalia	2.2650***	0.3694**
	(1.457 - 3.522)	(0.161 - 0.848)
Gambia	2.0536*	1.0967
	(0.963 - 4.381)	(0.584 - 2.058)
Nigeria	1.7457***	0.6519***
	(1.584 - 1.924)	(0.596 - 0.713)
Sudan	1.6946	0.7098
	(0.695 - 4.131)	(0.350 - 1.438)
Guinea	1.6001	1.1554
	(0.819 - 3.124)	(0.699 - 1.909)
Niger	1.539	0.2923**
	(0.572 - 4.140)	(0.093 - 0.921)
Indonesia	1.4684	0.5688
	(0.644 - 3.349)	(0.277 - 1.167)
Cote D'Ivoire	1.2690*	0.6713***
	(0.957 - 1.684)	(0.541 - 0.833)
Cameroon	1.262	0.6345***
	(0.909 - 1.752)	(0.497 - 0.810)
Ghana	1.059	0.6854***
	(0.828 - 1.355)	(0.582 - 0.807)
Burkina Faso	0.9615	1.2461*
	(0.586 - 1.578)	(0.971 - 1.599)
Ethiopia	0.906	0.9736
	(0.602 - 1.362)	(0.654 - 1.450)
Eritrea	0.802	0.7152
	(0.450 - 1.431)	(0.374 - 1.368)
Senegal	0.7992**	0.9575
	(0.641 - 0.996)	(0.848 - 1.081)
Mali	0.7764	0.9644
	(0.252 - 2.392)	(0.567 - 1.641)
Egypt	0.5668***	0.8811**
	(0.441 - 0.729)	(0.780 - 0.996)
Iraq	0.2822	0.8597
	(0.040 - 2.003)	(0.424 - 1.745)
Yemen		2.2504
		(0.318 - 15.948)
Uganda		0.9903
		(0.282 - 3.472)
Observations	3,990,015	1,194,542
Controls	YES	YES
LHA FE	YES	YES

Notes to Table 3.7:

**** p<0.01, ** p<0.05, * p<0.1*

Robust cieform in parentheses.

The group of immigrants from strong migratory pressure countries not known to practice FGM/C is the reference category.

C. Appendix Tables

Table C.1: ICD-9 FGM/C diagnosis codes and deinfibulation procedure codes

FGM/C Diagnosis	ICD-9 code	Deinfibulation procedure	ICD-9 code
Female Genital Mutilation Status	629.2	Incision Of Vulva And Perineum	71.0
FGM status, unspecified	629.20	Lysis of vulvar adhesions	71.01
FGM Type I status	629.21	Other incision of vulva and perineum	71.09
FGM Type II status	629.22		
FGM Type III status	629.23		
Other FGM status	629.29		

Sources:
www.icd9data.com (accessed on 22 November 2021).
Linee Guida per la Compilazione e la Codifica ICD-9-CM della Scheda di Dimissione Ospedaliera (2018).

Table C.2: FGM/C prevalence in origin countries among women aged 15-49

Country	FGM/C prevalence (%)	Year	Source
Benin	9.20	2014	MICS
Burkina Faso	75.80	2010	DHS/MICS
Cameroon	1.40	2004	DHS
Central African Republic	21.60	2018-19	MICS
Chad	34.10	2019	MICS
Cote d'Ivoire	36.70	2016	MICS
Djibouti	94.41	2012	PAPFAM
Egypt	87.20	2015	Health Issues Survey (DHS)
Eritrea	83.00	2010	Population and Health Survey
Ethiopia	65.20	2016	DHS
Gambia	75.70	2018	MICS
Ghana	2.40	2017-18	MICS
Guinea	94.50	2018	DHS
Guinea-Bissau	52.10	2018-19	MICS
Indonesia †	49.00	2016	UNICEF
Iraq	7.40	2018	MICS
Kenya	21.00	2014	DHS
Liberia	44.40	2013	DHS
Maldives	12.90	2016-17	DHS
Mali	88.60	2018	DHS
Mauritania	66.60	2015	MICS
Niger	2.00	2012	DHS/MICS
Nigeria	19.50	2018	DHS
Senegal	25.20	2019	Continuous DHS
Sierra Leone	86.10	2017	MICS
Somalia	99.20	2020	SHDS
South Sudan	1.40	2010	Southern Sudan Household Survey
Sudan	86.60	2014	MICS
Togo	3.10	2017	MICS
Uganda	0.30	2016	DHS
United Republic of Tanzania	10.00	2015-16	DHS
Yemen	18.50	2013	DHS

† *Women aged 0-11.*
Sources: data.unicef.org (accessed 22 November 2021) and Ortensi et al. (2018).

Table C.3: Subdivision of origin countries according to FGM/C prevalence and type

Category	**Description**	**Included countries**
1	Almost universal prevalence of FGM/C, over 30% Type III	Sudan (north), Somalia, Eritrea, Djibouti
2	High national prevalence of Types I and II	Egypt, Ethiopia, Mali, Burkina Faso, Gambia, Guinea, Sierra Leone
3	Moderate national prevalence of Types I and II	Central African Republic, Chad, Cote d'Ivoire, Guinea Bissau, Iraq (Kurdistan), Kenya, Liberia, Mauritania, Nigeria, Senegal, Yemen
4	Low national prevalence of Types I and II	Benin, Cameroon, Ghana, Niger, Uganda Democratic Republic of Congo, Togo United Republic of Tanzania, (South Sudan, Maldives)

Source: Macfarlane and Dorkenoo (2015)

Table C.4: Hospitalisations by citizenship category in the HDR, cfr. with total female population, 2019

	No. of hospitalisations	% of total	Female population in Italy
Italians	3,717,709	93.174	28,103,605
Other immigrants	245,385	6.150	2,412,761
Category 1			
Eritrea	453	0.011	3,736
Somalia	303	0.008	2,553
Sudan	120	0.003	496
Djibouti	3	0.000	14
Category 2			
Egypt	4,791	0.120	40,561
Ethiopia	818	0.021	4,183
Burkina Faso	621	0.016	4,625
Guinea	208	0.005	1,613
Mali	147	0.004	962
Gambia	134	0.003	751
Sierra Leone	80	0.002	537
Category 3			
Nigeria	9,381	0.235	45,858
Senegal	3,819	0.096	27,146
Cote D'Ivoire	1,470	0.037	1,090
Kenya	204	0.005	1,483
Iraq	124	0.003	1,091
Liberia	41	0.001	253
Guinea-Bissau	36	0.001	201
Chad	28	0.001	89
Central African Republic	25	0.001	71
Yemen	12	0.000	105
Category 4			
Ghana	2,214	0.055	16,509
Cameroon	1,105	0.028	7,046
Togo	282	0.007	1,911
Congo, The Democratic Republic of The	201	0.005	1,535
Benin	136	0.003	915
Niger	97	0.002	327
Tanzania, United Republic of	87	0.002	630
Uganda	40	0.001	286
South Sudan, Republic of	3	0.000	29
Maldives	0	0.000	1
Total	3,990,077	100	30,685,478

Notes: the number of hospitalisations refers to the HDR dataset (2019), after applying the exclusions described in the methodology section.
Data on female population registered in Italy on the first of January 2019 is from ISTAT (www.dati.istat.it).

Table C.5: FGM/C physical ICD-9 complications & codes

ICD-9 FGM/C Complications	ICD-9 code
Diseases of the genitourinary system	
Disorders of the urinary system	
Renal failure	584-586
Infections of Kidney	590
Hydronephrosis	591
Calculus of lower urinary tract	594
Other lower urinary tract calculus	594.8
Calculus unspecified	594.9
Cystitis	595
Acute cystitis	595.0
Other chronic cystitis	595.2
Other cystitis	595.8
Cystitis, unspecified	595.9
Other functional disorders of bladder	596.5
Hypertonicity of bladder	596.51
Lower bladder compliance	596.52
Urethritis not sexually transmitted and urethral syndrome	597
Urethral stricture	598
Other disorders of urethra and urinary tract	599
Urinary tract infection, site not specified	599.0
Urinary obstruction	599.6
Hematuria	599.7
Other specified disorders of urethra and urinary tract	599.8
Symptoms, signs and ill-defined conditions	
Dysuria	788.1
Retention of urine	788.2
Incontinence of urine	788.3
Oliguria and anuria	788.5
Incontinence of faeces	787.6
Inflammatory diseases of female pelvic organs	
Inflammatory disease of ovary fallopian tube pelvic cellular tissue and peritoneum	614
Acute salpingitis and oophoritis	614.0
Chronic salpingitis and oophoritis	614.1
Salpingitis and oophoritis not specified as acute, subacute, or chronic	614.2
Pelvic peritoneal adhesions, female (postoperative) (postinfection)	614.6
Unspecified inflammatory disease of female pelvic organs and tissue	614.9
Inflammatory disease of uterus except cervix	615
Inflammatory disease of cervix vagina and vulva	616
Vaginitis and vulvovaginitis	616.1
Other abcess of vulva	616.4
Ulceration of vulva	616.5
Other specified inflammatory diseases of cervix, vagina, and vulva	616.8
Unspecified inflammatory diseases of cervix, vagina, and vulva	616.9
Fistula involving female genital tract	619
Dysplasia of cervix	622.1
Noninflammatory disorders of female genital tract	
Non inflammatory disorders of vagina	623
Stricture or atresia of vagina	623.2
Old vaginal laceration	623.4
Vaginal hematoma	623.6
Other specified noninflammatory disorders of vagina	623.8
Unspecified noninflammatory disorder of vagina	623.9
Non inflammatory disorders of vulva and perineum	624
Old laceration or scarring of vulva	624.4
Hematoma of vulva	624.5
Other specified noninflammatory disorders of vulva and perineum	624.8
Unspecified noninflammatory disorder of vulva and perineum	624.9
Pain and other symptoms associated with female genital organs	625
Dyspareunia	625.0
Vaginismus	625.1
Stress incontinence, female	625.6
Vulvodynia	625.7
Other specified symptoms associated with female genital organs	625.8
Unspecified symptom associated with female genital organs	625.9
Disorders of menstruation and other abnormal bleeding from female genital tract	626
Postcoital bleeding	626.7
Female infertility	628
Other disorders of female genital organs	629
Other specified disorders of female genital organs	629.8
Unspecified disorder of female genital organs	629.9
Infections and parasitic diseases	
Tetanus	37
Unspecified septicemia	38.9
Sepsis	995.91
Gas gangrene	40
Candidiasis of vulva and vagina	112.1
Candidiasis of other urogenital sites	112.2
Viral hepatitis	70
Human immuniodeficiency virus [HIV] disease	42
Diseases of the skin and subcutaneous tissue	
Keloid scar	701.4
Scar conditions and fibrosis of skin	709.2
Injury and Poisoning	
Injury to colon or rectum, without mention of open wound into cavity	863.4
Injury to bladder and urethra, without mention of open wound into cavity	867
Fracture of clavicle due to birth trauma	767.2
Fracture of any bone except clavicle or spine due to birth trauma	767.3
Other injury of external genitals	959.14

Source: Cottler-Casanova et al. (2020)

Table C.6: FGM/C obstetrical, psychological and sexual ICD-9 complications & codes

ICD-9 FGM/C Complications	ICD-9 code
Obstetric/Perinatal/Fetal	
Pregnancy, childbirth, and the puerperium	
Pregnancy with abortive outcome	
Spontaneous abortion	634
Spontaneous abortion complicated by genital tract and pelvic infection	634.0
Complications mainly related to pregnancy	
Anemia complicating pregnancy childbirth or the puerperium	648.2
Normal delivery, and other indications for care in pregnancy, labor and delivery	
Disproportion in pregnancy labor and delivery	653
Outlet contraction of pelvis in pregnancy labor and delivery	653.3
Fetopelvic disproportion	653.4
Disproportion of other origin in pregnancy labor and delivery	653.8
Unspecified disproportion in pregnancy labor and delivery	653.9
Abnormality of organs and soft tissues of pelvis	654
Congenital or acquired abnormality of vagina complicating pregnancy childbirth or the puerperium	654.7
Congenital or acquired abnormality of vulva complicating pregnancy childbirth or the puerperium	654.8
Complications occurring mainly in the course of labor and delivery	
Obstructed labour	660
Obstruction by abnormal pelvic soft tissues during labor	660.2
Failed forceps or vacuum extractor unspecified	660.7
Other causes of obstructed labor	660.8
Unspecified obstructed labor	660.9
Long labour	662
Prolonged second stage of labor	662.2
Trauma to perineum and vulva during delivery	664
First-degree perineal laceration during delivery	664.0
Second-degree perineal laceration during delivery	664.1
Third-degree perineal laceration during delivery	664.2
Fourth-degree perineal laceration during delivery	664.3
Unspecified perineal laceration during delivery	664.4
Vulvar and perineal hematoma during delivery	664.5
Other specified trauma to perineum and vulva during delivery	664.8
Unspecified trauma to perineum and vulva during delivery	664.9
Other obstetrical trauma	665
High vaginal laceration during and after labor	665.4
Other obstetrical injury to pelvic organs	664.5
Obstetrical pelvic hematoma	665.7
Other specified obstetrical trauma	665.8
Unspecified obstetrical trauma	665.9
Postpartum hemorrhage	666
Third-stage postpartum hemorrhage	666.0
Other immediate postpartum hemorrhage	666.1
Delayed and secondary postpartum hemorrhage	666.2
Postpartum coagulation defects	666.3
Other complications of labor and delivery not elsewhere classified	669
Maternal distress	660.0
Obstetric shock	669.1
Maternal hypotension syndrome	669.2
Acute kidney failure following labor and delivery	669.3
Other complications of obstetrical surgery and procedures	669.4
Forceps or vacuum extractor delivery without mention of indication	669.5
Breech extraction without mention of indication	669.6
Cesarean delivery without mention of indication	669.7
Other complications of labor and delivery	669.8
Unspecified complication of labor and delivery	669.9
Complications of the puerperium	
Major puerperal infection	670
Major puerperal infection, unspecified	670.0
Puerperal endometritis	670.1
Puerperal sepsis	670.2
Puerperal septic thrombophlebitis	670.3
Other major puerperal infection	670.8
Other complications of the puerperium not elsewhere classified	674
Disruption of obstetrical perineal wound	674.2
Perinatal period	
Birth trauma	767
Unspecified condition originating in the perinatal period	779.9
Psychological	
Major depressive disorder single episode	296.2
Major depressive disorder recurrent episode	296.3
Anxiety states	300.0
Sexual	
Frigidity and impotence	302.7

Source: Cottler-Casanova et al. (2020)

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