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Migrating with Special Needs? Projections of Flows of Migrant Women with Female Genital Mutilation/Cutting Toward Europe 2016–2030

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Abstract Female genital mutilation/cutting (FGM/C) is a rising issue in western societies as a consequence of international migration. Our paper presents demography-driven projections of female flows with FGM/C from each practicing country to each EU28 member state for the 3 sub-periods 2016–2020, 2021–2025, and 2026–2030, with the aim of supporting resource planning and policy making. According to our projections, the EU28 countries will receive a flow of around 400,000 female migrants between 2016 and 2020, and around 1.3 million female migrants between 2016 and 2030 from FGM/C practicing countries. About one-third of them, corresponding to an estimated 127,000 between 2016 and 2020, and more than 400,000 between 2016 and 2030 will have undergone FGM/C before migration. Among these female flows, slightly more than 20% is expected to be made up of girls aged 0–14. According to the expected age at arrival, 20% of these girls are expected to have already undergone FGM/C, while slightly less than 10% are to be considered potentially at risk of undergoing FGM/C after migration. As the number of women with FGM/C in Europe is expected to rise at quite a fast rate, it is important to act timely by designing targeted interventions and policies at the national and at the European level to assist cut women and protect children. Such measures are particularly compelling in France, Italy, Spain, UK, and Sweden that

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are expected to be the most affected countries by migration from FGM/C practicing countries.

Keywords Female genital mutilation/cutting · Public health · Female migration · Europe · Projections · Violence against women

1 Introduction

Female genital mutilation/cutting (FGM/C) is a harmful traditional practice that includes all procedures that intentionally alter the female genital organs for non-medical reasons (WHO 2008). It is internationally recognized as a violation of the human rights of children and women, and it is considered a form of gender-based violence and one of the many manifestations of gender inequality (EIGE 2013a; UNICEF 2014b). The practice of FGM/C is highly concentrated across a vast geographical area of Africa that goes from the Atlantic coast to the Horn of Africa, in areas of the Middle East such as Iraq and Yemen and in some countries in Asia like Indonesia (UNICEF 2016). The most recent global estimate of the phenomenon based on evidences from large-scale representative surveys carried out in 30 countries hypothesizes that at least 200 million girls and women have been subjected to this practice (UNICEF 2016). Although it occurs differently across communities, researchers have underlined some recurrent factors underpinning FGM/C, such as cultural tradition, sexual morals, marriageability, religion, health benefits, and male sexual enjoyment (Berg and Denison 2013).

While migration from FGM/C practicing countries is overwhelmingly intra-continental, since the late 1980s acceleration and diversification of emigration flows beyond colonial patterns, especially from Africa to Europe and North America, led to the accidental consequence of the practice spreading in areas where it was previously unknown (Flahaux and De Haas 2016; Hugo 2007; UNFPA 2015; UNICEF 2013). As a consequence, EU member states have witnessed a constant increase in the number of women with FGM/C seeking health care, assistance, and in some cases asylum (EIGE 2013a; IOM 2014; UNHCR 2014).

Ten years ago, Powell and colleagues pointed out that although interest in FGM/C at the European Union policy level was steadily increasing, general strategies applicable in all member states were still not available (Powell et al. 2004). Today, much has been done and many studies and projects are underway in terms of the evaluation of good practices, data collection, and projects aimed at prevention (e.g., EIGE 2013a, b, 2015; Brown et al. 2013). According to a recommendation of the European Parliament (2014), particular attention has been paid to the estimation of the number of women affected in Europe and of the number of children potentially at risk (EIGE 2013a, 2015). The large number of difficulties and methodological issues related to the estimation of the extent of the phenomenon in overseas communities potentially affected by FGM/C has been discussed extensively, and the scientific debate about methodological improvements is currently building momentum (EIGE 2013a). The availability of data and studies on the diffusion of the

phenomenon is a fundamental tool for targeted and evidence-based policy making. The projection of future migration flows of women with FGM/C toward Europe is another strategic aspect to plan medium-term resource allocation and to engage in the formation of new skilled medical professionals as assistance to women affected by FGM/C requires specialized medical training. To our knowledge, this kind of studies is overlooked in the current debate. Our paper aims to fill this gap, presenting demography-driven projections of expected flows of women with FGM/C from each practicing country to each EU28 member state for the 3 sub-periods 2016–2020, 2021–2025, and 2026–2030.

2 Demographic Perspectives on FGM/C Practicing Countries and Potential Migration Flows

The demographic context of FGM/C practicing countries suggests that overall migration from these areas toward western countries will increase in the coming years (OECD 2009; Bossard 2009; UNFPA 2015; Ratha et al. 2011; IMI and RMMS 2012). Besides Indonesia, FGM/C practicing countries are characterized by a fast population growth, a young age structure, and medium–high fertility (UNFPA 2015). UNICEF (2014b) forecasts that by 2050 nearly 1 in 3 births worldwide will occur in a FGM/C practicing country, while nearly 500 million more girls and women will be living in these same countries than there are today. This is surely an underestimation as Indonesia, the world's fourth most populous country, is not included in this evaluation (UNICEF 2016). Although Indonesia is "a quintessential labor-surplus nation," the EU28 area is not among the main destinations of Indonesian female migrants (Hugo 2007). The same can be said for women from Iraq and Yemen (Eurostat 2017). For this reason, the following argumentation will largely focus on the African context.

Among the many drivers of migration from Africa, one of the most important is in fact the mismatch between the rapid population growth and the capacity to create employment for young people in their country of origin (African Union 2006; Hatton and Williamson 2003; Lucas 2006; Naudé 2010). This awareness is also reflected in policy declarations and documents. At the Executive committee of the African Union in 2006, for example, it was stated that "poor socioeconomic conditions, low wages, high levels of unemployment, poverty and a lack of opportunities are the main economic factors that fuel out migration in the African continent" (African Union 2006: 3). Less than a decade later, this is still a priority: In 2011, the African Union Summit reaffirmed the commitment "to accelerate efforts to reduce unemployment and underemployment of Africa's Youth and Women" (African Union 2011: 1). This attention is well motivated as Africa's 15–24-year-old population has been increasing faster than in any other part of the world driven by a delayed demographic transition (PRB 2009; Page 2012). At the same time, despite 15 years of sustained economic growth, the increase in private sector job numbers is not enough to absorb the large number of African young people entering the labor market each year (McArthur 2014; Page 2012; Fargues 2008). Moreover, the conventional wisdom that African economic growth and

development in the coming years will curb migration is also a questionable one (Clemens 2014). Literature has extensively shown that the process of social and economic development in its broadest sense tends to be associated with generally higher levels of mobility and more migration at least in the short to medium term until countries reach upper-middle income, and only thereafter falls (e.g., Nyberg–Sørensen et al. 2002; Vogler and Rotte 2000; De Haas 2010; Czaika and De Haas 2012). This phenomenon is also known as the "migration hump" (Martin and Taylor 1996; De Haas 2008). According to De Haas (2008b: 1314) "any development takeoff in sub-Sahara Africa is therefore likely to generate an emigration takeoff." Given this framework, it is fully understandable why overall migration from FGM/C countries is expected to rise in the near future irrespective of the effect of the recurrent humanitarian crises in these same areas which will realistically further increase structural flows.

Moreover, the proportion of women among migrants from African FGM/C countries is increasing (Lucas 2006), which represents a departure from the typical historically male-dominated African migration model (Adepoju 2011). In addition to family reunification flows, independent female migration has been growing (Yaro 2008; Cross et al. 2006; Thomas and Logan 2012; Fleury 2016).

Demographic and economic factors along with the growing feminization of flows will therefore result in a growing number of female migrants from FGM/C practicing countries moving toward Europe, raising the challenge to adapt strategies addressing FGM/C issues to the specificities of the migration contexts (UNFPA 2015; IOM 2014).

3 Migrating with Special Needs: Rising Issues About FGM/C in Europe

FGM/C is already a growing concern in European countries. A recent census-based indirect estimation hypothesized the presence of slightly more than 550,000 first-generation migrant women and girls aged 10 years and above with FGM/C in the EU28 countries, most of them living in UK, France, and Italy (Van Baelen et al. 2016).

The strategy to deal with FGM/C in a non-practicing context such as the EU28 is twofold. The first type of actions is directed at the medical assistance for girls and women who have already undergone FGM/C. The second type of action is aimed at prevention of the practice in second-generation girls and uncut first migrant children in the typical age bracket for cutting.

The first type of actions is crucial. The consequences of FGM/C on women's health include long-lasting enduring effects such as organic sequelae, sexual dysfunction, post-traumatic stress disorder, memory problems, and functional repercussions on daily life and reproductive health (Andro et al. 2014; Berg and Denison 2012; Chibber et al. 2011). Many studies underline recurrent critical issues in assistance to women with FGM/C in Europe due to the fact that FGM/C is still not properly addressed in basic and specialized medical training (Leye et al. 2008; Zurynski et al. 2015). The most common findings are uneven awareness of FGM/C among medical professionals, significant gaps in both theoretical knowledge and

practice, lack of familiarity with protocols of action, and profound lack of knowledge on social and cultural foundations of FGM/C (Zaidi et al. 2007; Kaplan-Marcusan et al. 2009; Reig-Alcaraz et al. 2016; Zurynski et al. 2015). Health care professionals are also facing ethical–legal questions about requests as reinfibulation after delivery, pricking or incision of the clitoris as symbolic FGM/C or cosmetic surgery of female genitalia (Leye et al. 2006). Recent studies seem to replicate findings in older studies, showing no significant changes through the years (Surico et al. 2015; Cappon et al. 2015). The urgent need for well-designed research to inform evidence-based guidelines and to improve the health care of women with FGM/C, and the need for appropriate training for caregivers has been recently reaffirmed (Abdulcadir et al. 2015). On the other side, the presence of women with FGM/C has also generated a new supply of public services: Reconstructive surgery, for example, has been available on the French National Health Service since 2004 (Foldès et al. 2012).

Most European qualitative and quantitative studies show a gradual distancing from the practice and a change in attitudes toward it in many communities, implying a dramatically lower risk for second generations than what would be expected in their parents' home countries (Morison et al. 2004; Johnsdotter et al. 2009; Farina and Ortensi 2014). As a consequence, we assume that most of the growth in the number of women affected in the future will be the consequence of new arriving migrants from practicing countries. We also assume that girls who have recently migrated with their families before the age of 15 may be at higher risk compared to second generations, as the family of origin may still be attached to the tradition or may consider FGM/C as a means of reinforcing identity after emigration. Given these two key areas of action, the projection of flows of first migrant women and children with FGM/C or those considered to be at risk by country of origin is of particular importance in order to properly plan actions and resources.

4 Data, Hypotheses, and Methods

4.1 Data

In order to produce an estimation of female flows of women and children with FGM/C, three main categories of data sources were used. The first is the estimation of incoming female flows from practicing countries to EU member states. These data come from the KING—*Knowledge for INtegration Governance* project conducted between September 2013 and March 2015 (Blangiardo 2014; ISMU 2015; Gilardoni et al. 2015). The KING project was co-founded by the European Commission—DG Home Affairs and aimed at gathering knowledge on migrant integration throughout the European Union, with special attention for policy recommendations. As part of this project, a demographic research team including the authors provided, among other results, an estimation of the expected flows from all countries in the world to EU28 member states based on the combination of job market-related and demography-driven push factors. In this paper, we only

considered information about female flows expected from FGM/C practicing countries.

The second data source relates to the prevalence of FGM/C in practicing countries. This information was taken from the most recent available publications based on DHS (2015), MICS (Multiple Indicators Cluster Surveys; UNICEF 2014a), PHS (Population and Health Surveys; NSO Eritrea and Fafo AIS 2010) or HHS (Household and Health Survey; Sudan Federal Ministry of Health et al. 2012) surveys available for each practicing country (see online Appendix for more details). DHS, MICS, PHS, and HHS are nationally representative household surveys with large samples of women aged 15–49 usually carried out approximately every 5 years. They provide data on many demographic and health-related topics including interviewees' self-reported FGM/C statuses. These surveys are the main sources of information about FGM/C in practicing countries (Yoder and Shanxiao 2013). They are also currently used by many researchers for performing an indirect estimation of the phenomenon in overseas communities from practicing countries settled worldwide (EIGE—European Institute for Gender Equality 2013a; Leye et al. 2014).

Finally, data on the age structure of migrant flows over the past five-year period from Africa, Yemen, Iraq, and Indonesia to the EU28 area were taken from the Eurostat database (Eurostat 2017).

4.2 Assumptions and Methods for the Estimation of Migration Flows

This study is based on two sets of assumptions. The first set relates to the evolution of female migration flows, while the second group deals with the estimation of the future prevalence of FGM/C in practicing countries and among migrants.

Although a discussion of the primary data on migration flows is not the main objective of this study, it is a necessary step in order to understand the rationale of the projections and results. International migration is fuelled by a complex combination of factors at the macro- and micro-level (De Haas 2011; Massey et al. 2005; Boswell 2002), making it one of the most difficult demographic processes to predict (NRC 2000; Bijak et al. 2015).

The estimation of future migration flows from FGM/C practicing countries toward EU28 member states presented in this paper is based on a combination of demography-driven projections of the working-age population and of job market-related push factors in the sending countries. Demography-driven calculations of migration potential drawn from information about the age structure of the future population, and age-specific migration calculations have already been used in the African context (e.g., Fassmann 2014; Fargues 2008). The advantage of demographic-driven projections is that they allow for relatively valid evaluations of future developments for a period of one to two decades (Fassmann 2014). The rationale of the projections used for this study is that if the working-age group in a country grows while the ability of the local labor market to absorb such workers grows proportionally to the observed trend, the country's migration potential is expected to rise due to the consequent surplus in the labor force. As previously discussed above, most FGM/C practicing countries have been characterized by rapid

population growth over recent decades and consequently show a large youth bulge (Ahmed et al. 2014). If no substantial acceleration in the growth of national economies occurs, migration outflows will likely play a key role in offsetting these demographic imbalances.

Migrant flows were projected starting from the evaluation of a surplus/deficit matrix in the main countries that traditionally have had migrants moving into the European area, estimating an origin/destination matrix of flows for work addressed to each EU country, and combining it with appropriate assumptions about their effects in terms of family reunification (Blangiardo 2014). To determine the proportion of migrants who are expected to migrate in each EU28 country, a coefficient of attraction has been computed for each country of origin and each country of destination as the ratio between the average inflow that the country of destination received from a given country of origin between 2001 and 2010, as the numerator, and the corresponding labor force surplus of the latter, when occurs, in the same period as the denominator. By definition, countries showing a deficit in labor force receive a null coefficient of attraction toward any immigration country. This means that inflows observed between 2001 and 2010 from countries with a deficit in labor force were due to factors other than structural labor surplus. This elaboration has been performed for all countries including non-FGM/C practicing countries. The coefficient accounts for both the attraction power of each country and for existing migration links as one of the major pull factors. Such links lead to the establishment of networks that bring about new migration in a process that tends to become self-perpetuating over time (Fassmann and Sievers 2014; Massey et al. 2005).

It should be noted that these projections do not account for future flows related to humanitarian reasons. These flows will potentially add or complement those deriving from demography-driven factors. Building on these existing projections for female flows from the 30 FGM/C practicing countries, we have provided a secondary estimation of female flows with FGM/C.

4.3 Assumptions on FGM/C Prevalence Among Migrants

Once the potential flows of female migrants due to demography-driven factors were established, the crucial subsequent step was to determine the proportion of women already subjected to FGM/C at the time of migration.

The estimation consisted of three steps:

1. The estimation of the occurrence of FGM/C in each age class for women aged 15 and over, for each practicing country in each period.
2. An estimation of FGM/C prevalence for girls aged 0–4, 5–9, and 10–14 in each period.
3. An estimation of the age structure of the flows by 5-year intervals.

4.3.1 The Estimation of the Occurrence of FGM/C in Each Age Class for Women Aged 15 and Over for Each Country

In order to estimate the expected prevalence of women aged 15 and over with FGM/C for each country in the 5-year periods 2016–2020; 2021–2025; 2026–2030, we first updated the structure of each set of national prevalence rates. We followed the demography-driven procedure suggested by Ortensi et al. (2015) using the median year y as the reference year for the estimation (e.g., $y = 2018$ for the 5-year period 2016–2020).

This procedure, similar to the cohort component method for population projections, is used to obtain an updated prevalence rate age structure for a given year y of interest. This passage is useful to reduce the error deriving from the application of the most recent FGM/C estimation to future generations. In fact, especially in countries having an overall lower prevalence of FGM/C, the younger groups tend to have lower prevalence figures (Yoder et al. 2013). This suggests that the phenomenon is decreasing and that in the future the overall prevalence rate will decline due to the demographic substitution of older cohorts of women with high prevalence rates by younger cohorts less affected by FGM/C.

To estimate the prevalence of FGM/C among women aged 50 and over, we applied the prevalence found in the 45–49 age groups to the entire 50+ cohort following the method proposed by Yoder et al. (2013) to provide national estimates. We are aware that this method of calculation provides a potential underestimation for this age group. However, we do not expect this to bias our estimation, as the 50+ cohort is much less represented among migrants compared to younger age groups.

The expected prevalence of the new expected cohort of women aged 15–19 in each country $\left(m^{*}_{15,19}\right)$ was obtained by multiplying the prevalence among women aged 15–19 registered from the most recent survey ($m_{15,19}$) by the ratio of prevalence among women 15–19 to prevalence among women 20–24 ($m_{20,24}$)

$$m^{*}_{15,19} = m_{15,19}\frac{m_{15,19}}{m_{20,24}} \tag{1}$$

Using this updated prevalence rate $m^{*}_{15,19}$ to estimate the expected rate among women aged 15–19 5 years after the last available survey instead of the simple $m_{15,19}$ implies the assumption that we expect the trend observed among younger cohorts to persist in the next years consistently with the UNFPA (2015) FGM/C abandonment targets.

4.3.2 Exposure Analysis to FGM/C for Girls Aged 0–14

Next, we estimate the FGM/C prevalence for ages 0–14, which is particularly challenging as girls at this age are still at risk of being subjected to FGM/C and the risk changes according to the customary age for cutting in each country. In order to estimate the proportion of cut girls at migration for every country of interest, we conceived a method combining information about typical age at cutting available

from DHS/MICS/PHS/HHS surveys and the expected final proportion of circumcised girls for those aged 0–14 at migration.

The assumption underlying this method is that girls are exposed to the risk of cutting typical in their country of origin as long as they are settled in the country of origin, while the risk may change at emigration (EIGE—European Institute for Gender Equality 2015). Starting from DHS/MICS/PHS/HHS information about the typical age at cutting in each country, we calculated the cumulative proportion of cut girls among those who would be subjected to FGM/C at the end of the exposure risk by age interval.

So let g_x be the cumulated proportion of girls cut at age x (with $g_{19} = 1$)

Let $m^*_{15,19}$ be the prevalence of girls aged 15–19 with FGM/C according to [1].

We have considered the updated prevalence $m^*_{15,19}$ as the final proportion of girls who will be expected to be cut at age 15 following the proposal of Yoder et al. (2013).

Then:

$$m^*_{x,x+4} = \left(\frac{g_x + g_{x+4}}{2}\right)\left(m^*_{15,19}\right) \tag{2}$$

will be the estimated prevalence of girls with FGM/C aged $x, x+4$ (with $x = 0; 5; 10$) at the moment of migration.

4.3.3 Estimation of the Age Structure of Female Migrants

At this point, we have the whole series of estimated prevalence of FGM/C occurrence by five-year intervals and the total number of women expected to migrate from each practicing country *i* to each EU28 member state *j*. As prevalence varies considerably among age classes, it is very important to make some assumptions about the age structures of migrant flows. As it is quite difficult to build reliable assumptions concerning future emigration profiles (Fassmann 2014), we have considered a valid and purposeful approach to transfer recent observations of age-specific emigration profiles to future flows. This approach seems justified since empirical profiles of age-specific migration display remarkably persisting regularities (Rogers and Castro 1981). The most prominent regularity in age-specific profiles of migration is the high concentration of migration among young adults, with high rates also among children (Raymer and Rogers 2008). We therefore assumed, as the best approximation we could get from the available data, that female migration flows will have the same 5-year age structure as flows of African-born women plus Indonesia and Iraq toward EU28 member states in the 5-year period 2000–2012. This structure can be computed starting from the most recent Eurostat data (Eurostat 2017).

Combining FGM/C prevalence by 5 age intervals for each practicing country *i*, and the estimation of age-specific female flows from each practicing country *i* to each EU member state *j*, it is possible to obtain a matrix of expected flows of women with FGM/C (baseline estimation).

4.4 Implementation of the Selection Hypothesis

Evidence from FGM/C practicing countries indicates that some individual characteristics such as belonging to younger age cohorts, having higher levels of wealth and education, or urban residence are usually correlated with a lower occurrence of FGM/C (UNICEF 2013). At the same time, many studies have shown that migrants are not a random cross section of the populations from which they originate (Lindstrom and Ramírez 2010; McKenzie and Rapoport 2010; Czaika and Vothknecht 2012). The recent surge in studies on contemporary African migration has confirmed the existence of mechanisms of positive selection in international flows from Africa (Shaw 2007; Wouterse and van den Berg 2011; Schoumaker et al. 2015). According to De Haas (2008b:1308) "although commonly portrayed as destitute or desperate, [African] migrants are often relatively well educated and from reasonably well-off backgrounds, not least because of the relatively high costs of the journey." This concept was also re-marked in a more recent analysis of migration from Africa by Flahaux and De Haas (2016). Also for the subgroup of African female migrants, correlations between migration and good levels of education, middle class status, and a young age have been observed (Jamie 2013; IMI and RMMS 2012; Thomas and Logan 2012; Reynolds 2006; Spadavecchia 2013).

The selection hypothesis has been used already to correct the indirect estimation of FGM/C prevalence in the Italian context, and the comparison with direct estimations for some communities confirmed that this correction has the potential to reduce the bias deriving from the application of national estimate to overseas communities (Ortensi et al. 2015). The use of this correction appears particularly suitable for our study, which focuses on first-generation migrant flows related to demographic and economic push factors.

In order to implement this correction, we have adjusted our baseline estimation $P^{i}_{fgm/c}$ of the overall flow of women with FGM/C from each country i by multiplying it by the ratio of the prevalence of selected population subgroups from national DHS/MICS/PHS/HHS surveys that are expected to be similar to migrants (most educated, urban settled, belonging to the higher wealth quintile) to the overall national prevalence. Contrary to the study where this correction was first proposed, the correction for age is not needed as our baseline estimate already includes the effect of the expected age structure.

So for each practicing country i, we computed the correction

$$s_i = \text{mean}\left(\frac{m_{urb,i}}{m_i}, \frac{m_{hedu,i}}{m_i}, \frac{m_{hw,i}}{m_i}\right) \tag{3}$$

according to the most recent DHS/MICS/PHS/HHS data available (see online Appendix for details).where $m_{urb,i}$ is the prevalence of FGM/C among women settled in urban areas, $m_{hedu,i}$ is the prevalence of FGM/C among women with a higher level of education, $m_{hw,i}$ is the prevalence of FGM/C among women belonging to the highest wealth quintile, m_i is the prevalence of FGM/C among all women

The use of an unweighted mean is due to the fact that we miss detailed information about the composition of future or even past flows of migrants by educational level, wealth quintile of the family of origin or place of birth (urban/rural). The correction is expected to get the order of magnitude and the direction of the difference between national prevalence and overseas community prevalence for communities where other factors correlated with FGM/C prevalence (e.g., a strong geographical or a strong ethnic selection) are not preponderant.

The estimation $P^{(S)i}_{fgm/c}$ corrected on the basis of the selection hypothesis is obtained by simply applying the set of coefficient s_i to the baseline estimation of the number of expected women with FGM/C from each practicing country i $P^{i}_{fgm/c}$

$$P^{(S)i}_{fgm/c} = \left(P^{i}_{fgm/c}\right)s_i \tag{4}$$

4.5 Estimation of the Number of Girls at Risk

In our study, we adopt EIGE's "FGM/C risk estimation in an EU member state" definition, identifying "girls living in an EU Member State who might actually be at risk of female genital mutilation, expressed as a proportion of the total number of girls (in the age range of 0–17) who come from FGM/C practicing countries, or were born to parents (or one parent) who originate from these same countries" (EIGE 2015: 30). To estimate the number of girls at risk of FGM/C, we considered the difference between the number of actually expected cut girls by the end of the typical age for cutting if they remained in their country and the number of girls who, according to typical age pattern for cutting, are expected to be already cut at migration. To determine the number of cut girls by the age of 15, we started from the suggestion of Yoder and Shanxiao (2013) who come up with an estimate of the number of girls aged 10–14 who have been or will be cut by the age of 15 by applying the FGM/C prevalence of young women aged 15–19 years. We corrected part of the effect of overestimation of this procedure by using the updated prevalence $m^{*}_{15,19}$ but at the same time we extended this benchmark also to girls aged 0–9.

To sum up the total number of girls at risk of FGM/C $R^{i}_{0,14}$ from each practicing country i is given by:

$$R^{i}_{0,14} = \left(P^{i}_{0,14}\right)(m^{i*}_{15,19}) - \sum_{x=0,5,10}\left(P^{i}_{x,x+4}\right)\left(m^{i*}_{x,x+4}\right) \tag{5}$$

With $P^{i}_{0,14}$ being the overall flow of girls aged 0–14 from practicing country i, $P^{i}_{x,x+4}$ being the flow of girls aged $x, x+4$ from practicing country i and $m^{*i}_{x,x+4}$ being the estimated prevalence of girls with FGM/C aged $x, x+4$ $\sum_{x=0,5,10}\left(P^{i}_{x,x+4}\right)\left(m^{i*}_{x,x+4}\right)$ is the number of girls already cut at the moment of migration. The corrected estimation of this subpopulation according to the selection hypothesis is given by:

$$R^{(S),i}_{0,14} = \left(R^{i}_{0,14}\right)s_i \tag{6}$$

We thus assume that the effect of selection is the same among women and children. This is quite reasonable, as it has been shown that the risk of being cut for daughters of uncut mothers is virtually inexistent (Farina and Ortensi 2014).

Since we know that the risk of being cut reduces dramatically after migration, even with strong differences between communities (EIGE 2015), the number of girls at risk that we estimated is to be interpreted as a maximum. This information is, nevertheless, useful to design prevention campaigns focused on newly arrived immigrant children at risk.

4.6 Evaluation of Projections' Reliability

The data about national prevalence of FGM/C in practicing countries often mask differences among regions within a country. These differences are generally greater in countries where national prevalence is lower. This suggests that the presence or absence of the practice is influenced by factors that are shared among specific population groups within various areas of a country. This has direct consequences for the assessment of the reliability of the indirect estimation of FGM/C among present or future migrant flows. In fact, the more homogeneous the population is in terms of FGM/C occurrence, the higher the expectation that immigrants are a subpopulation representative of their countries of origin and that an indirect estimation can be considered reliable. On the other hand if FGM/C is practiced only in some areas or among few ethnic groups, the national prevalence rate may be very different from that observed in overseas communities because ethnic groups and regions may be differently affected by international migration. A simple tool to assess the reliability of prevalence estimation is the UNICEF classification by prevalence levels among girls and women aged 15–49 that separates practicing countries into five groups according to similarities in the way that FGM/C is practiced, and in inter-regional prevalence variations (UNICEF 2013: 27; Ortensi et al. 2015). For countries in Group 1 (Very high prevalence countries: >80%) where socio-demographic–geographical variables are weakly discriminating, the assumption that prevalence among migrants could be close to the national level is indeed more realistic than for countries in Groups 2 (Moderately high prevalence countries 51–80%) and 3 (Moderately low prevalence countries 26–50%). For these countries, the expectation is that an indirect estimation would be less reliable as only certain ethnic groups practice FGM/C and background characteristics are often highly discriminating. For countries in Groups 4 (Low prevalence countries 10–25%) and 5 (Very low prevalence countries <10%), especially those with a very low overall prevalence, the expected occurrence in emigration could be reasonably residual as, even under the geographical selection hypothesis, the probability that FGM/C practicing ethnic groups be present among immigrants is low. This has a direct impact also on our projections. For countries in Group 1, the number of women expected to migrate with FGM/C according to the baseline projection and according to the selection hypothesis will be very similar and have to be considered as most reliable. On the contrary, projections for countries in Groups 2–3 and 4 have to be considered as less reliable compared to others (see online Appendix).

5 Results

Tables 1, 2, and 4 and the Appendix provide results for both the baseline estimation and the estimation according to the selection hypothesis, obtained by hypothesizing that migrants may originate mainly from some subgroups in the country of origin such as the most educated, wealthier and urban settled (Ortensi et al. 2015). As we are aware that uncertainty for projections of migration grows with time, a higher emphasis will be given in the presentation to results for the first period considered.

For women born in countries where the diffusion of FGM/C is quite uniform in the overall population despite socioeconomic differences, like Mali or Egypt, the two estimations are quite similar, as expected. On the other side, while the overall effect of considering the selection effect of migration usually results in a lower expected number of women with FGM/C than in the baseline estimation, this is not true for countries where educational level, wealth quintile, and urban settlement positively correlate with FGM/C prevalence such as Nigeria, Mali, or Indonesia.

According to our projections, the EU28 countries will receive a flow of around 400,000 women from FGM/C practicing countries between 2016 and 2020. About one-third of them, corresponding to an estimated 127,000, will have undergone FGM/C before migration (Table 1).

With reference to the entire period of analysis, the overall flow is expected to exceed 1.3 million women between 2016 and 2030 corresponding to more than 400,000 expected migrants with FGM/C. In all three of the five-year intervals considered, France is expected to be the main receiving country of female flows with FGM/C. This country is expected to receive a proportion of around 20% of the total number of cut women in all the three periods. Italy is expected to be the second main receiving country in 2016–2020 with around 21,000 arrivals, while for the following sub-periods this position is expected to be held by Spain.

The UK and Sweden are also expected to receive a proportion of migrants with FGM/C slightly higher than 10% of the total flow in each sub-period analyzed, consisting of around 14,000–17,000 incoming women with FGM/C. On the contrary Bulgaria, Croatia, Romania, Latvia, Lithuania, Estonia are expected to be virtually unaffected by the phenomenon.

The top sending country of women with FGM/C is expected to be Somalia with more than 15,000 women in 2016–2020 and an expected overall flow of 60,000 between 2016 and 2030. Importantly, Somalia which is among the main sending countries has a large diffusion of FGM/C defined as type III (Infibulation), the most extreme form FGM/C related with the worst long-term health consequences (WHO 2008; UNICEF 2013). Other main flows are expected to originate from Nigeria (around 17,000 in 2016–2020), Mali and Egypt (each around 13,000 in 2016–2020), and Guinea (around 11,000 in 2016–2020).

With the exception of Nigeria, all of the main flows originate from countries with a very high FGM/C prevalence, little regional differences in the spread of the phenomenon and a low sign of decrease in the young generations. The estimation of the prevalence among migrants' flows is therefore expected to be fairly reliable.

Table 1 Expected flows of women with FGM/C toward EU28 countries

Total flows	2016–2020		2021–2025		2026–2030		Total	
	408,300		459,300		508,600		1,376,000	
	Selection hypothesis	Baseline hypothesis	Selection hypothesis	Baseline hypothesis	Selection hypothesis	Baseline hypothesis	Selection hypothesis	Baseline hypothesis
Flows of women with FGM/C	127,500	137,200	137,500	147,700	145,600	156,200	410,600	441,100
% of women with FGM/C	31.2	33.6	29.9	32.2	28.6	30.7	29.8	32.1
Top 5 receiving countries	France		France		France		France	
	21,900	25,000	24,400	27,800	27,100	30,600	73,400	83,400
	Italy		Spain		Spain		Spain	
	20,900	22,700	22,900	24,200	25,400	26,800	69,000	72,800
	Spain		Italy		Italy		Italy	
	20,600	21,700	21,100	24,100	22,800	24,900	65,700	71,700
	UK		UK		UK		UK	
	17,000	17,500	17,500	18,100	17,800	17,600	52,300	54,000
	Sweden		Sweden		Sweden		Sweden	
	13,700	14,300	15,400	16,200	16,900	17,600	46,000	48,100
Top 5 sending countries	Somalia		Somalia		Somalia		Somalia	
	16,900	17,100	19,900	20,200	22,600	22,900	59,400	60,200
	Nigeria		Nigeria		Mali		Nigeria	
	16,900	13,600	16,700	13,400	18,400	18,300	49,900	40,100
	Egypt		Mali		Nigeria		Mali	
	12,800	13,600	15,500	15,400	16,300	13,100	46,900	46,700
	Mali		Egypt		Egypt		Egypt	
	13,000	12,900	13,600	14,500	14,000	14,900	40,400	43,000

Table 1 continued

Total flows	2016–2020		2021–2025		2026–2030		Total	
	408,300		459,300		508,600		1,376,000	
	Selection hypothesis	Baseline hypothesis	Selection hypothesis	Baseline hypothesis	Selection hypothesis	Baseline hypothesis	Selection hypothesis	Baseline hypothesis
Guinea		Guinea		Guinea		Guinea		
11,100	11,500	12,300	12,700	13,500	13,900	37,000	38,100	

Results are rounded to nearest hundred; countries are ordered according to the selection hypothesis estimation

Table 2 Main corridors of flows of women with FGM/C toward EU28 countries, 2016–2020 and 2016–2030

Main corridors	Expected flow 2016–2020		Expected flow 2016–2030	
	Selection hyp.	Baseline est.	Selection hyp.	Baseline est.
Somalia–Sweden	9000	9100	31,600	32,000
Mali–France	7700	7600	27,700	27,600
Egypt–Italy	6200	6600	19,600	20,900
Nigeria–UK	6200	5000	18,300	14,800
Mali–Spain	4600	4600	16,700	16,600
Gambia–Spain	3500	3600	12,400	13,000
Guinea–France	3500	3600	11,600	12,000
Cote d'Ivoire–France	3000	4400	9100	13,300
Guinea–Spain	3400	3500	11,200	11,500
Senegal–Italy	2700	3400	9200	11,300
Senegal–France	2700	3000	9100	11,100
Senegal–Spain	2500	3000	8300	10,200
Nigeria–Spain	3300	2700	9800	7900
Somalia–UK	2400	2500	8700	8900
Guinea–Belgium	2300	2400	7600	7900

Results are rounded to the nearest hundred; countries are ordered according to the selection hypothesis estimation

Although France will be the country that is most affected by the arrival of women with FGM/C, the main migration corridor is expected to be between Somalia and Sweden with around 9000 women with FGM/C in the first sub-period and an overall flow of 32,000 women between 2016 and 2030. Between 2016 and 2020, other flows of around 6–7000 incoming women with FGM/C are expected between Mali and France, Egypt and Italy and Nigeria and UK (Table 2).

In order to plan targeted health services and prevention policies, the heterogeneity of the flows is also interesting. Having to deal with few communities is far easier than having to target a variety of FGM/C traditions and customs. For example, considering 2016–2020, Malta, Sweden, and Finland are expected to receive a migration flow of women with FGM/C composed by more than 60% Somali. They will therefore need a strong focus on intervention directed to this community and may share experiences and good practices in the future. Other countries like Malta, Greece, Ireland, Cyprus, Hungary, Sweden, or Finland will be able to target around 80% of the new arrivals focusing on the main three communities. On the contrary, countries like Germany, Luxemburg, Czech Republic, or Poland have to consistently plan more complex interventions focusing on a wider number of communities in order to target a substantial proportion of women and girls affected (Table 3). More detailed tables about the projections are available in the Appendix.

Slightly more than 20% of the overall flow between 2016 and 2020 is expected to be made up of girls aged 0–14 (about 90,000). According to the expected age at arrival, around 20,000 (20% of these girls) are expected to have already undergone FGM/C, while slightly less than 10% (around 7000) are to be considered potentially at risk of undergoing FGM/C after migration or during trips to the country of origin. The overall flow of girls aged 0–14 between 2016 and 2030 is expected to be around 310,000 of whom slightly more than 60,000 (around 20%) are expected to have experienced FGM/C before migration and around 20,000 are considered at risk (Table 4). The most important receiving countries of this group are expected to be France, Spain, and Italy, consistently with the estimation of the general flows. However, due to the combination of flows' composition by country of origin, typical age at FGM/C and expected final prevalence among girls aged 0–14, countries like Malta, Finland, Greece, Sweden, Portugal, Cyprus, and Spain are expected to receive flows with a prevalence of cut girls higher than 25%. For the same combination of factors, the proportion of girls considered at risk will be particularly high (between 15 and 20%) in Malta, Cyprus, and Greece.

Table 3 Relative importance of the first three communities on the total number of expected migrant women projected

Country	First		Second		Third		Proportion of the main 3 communities
Malta	Somalia	79.9	Eritrea	9.3	Mali	3.9	93.1
Greece	Egypt	49.0	Ethiopia	21.7	Nigeria	14.3	85.0
Ireland	Nigeria	41.8	Somalia	29.1	Sudan	12.6	83.5
Cyprus	Egypt	51.3	Ethiopia	16.3	Indonesia	15.3	82.9
Hungary	Nigeria	50.4	Egypt	24.9	Ethiopia	5.7	81.0
Sweden	Somalia	62.6	Eritrea	11.1	Iraq	6.3	80.0
Finland	Somalia	68.7	Sudan	5.6	Ethiopia	5.4	79.7
Portugal	Egypt	29.2	Indonesia	25.0	Ethiopia	12.3	66.5
Denmark	Somalia	51.4	Ethiopia	6.5	Sudan	5.6	63.5
Slovakia	Indonesia	22.7	Sudan	22.0	Egypt	16.3	61.0
UK	Nigeria	35.2	Somalia	14.2	Sierra Leone	10.5	59.6
Austria	Nigeria	29.3	Egypt	17.2	Somalia	10.7	57.2
Netherlands	Indonesia	33.8	Ethiopia	12.8	Egypt	10.5	57.1
France	Mali	30.6	Guinea	14.0	Ivory Coast	11.8	56.4
Spain	Mali	21.2	Gambia	16.0	Guinea	15.5	52.7
Belgium	Guinea	38.3	Nigeria	6.9	Somalia	5.5	50.7
Italy	Egypt	27.2	Senegal	12.0	Nigeria	10.9	50.1
Poland	Indonesia	17.3	Ethiopia	15.3	Somalia	13.7	46.3
Czech Republic	Egypt	17.1	Nigeria	16.9	Indonesia	12.1	46.1
Luxembourg	Nigeria	17.3	Guinea	15.3	Gambia	9.1	41.7
Germany	Egypt	12.4	Nigeria	11.8	Indonesia	10.1	34.3

Main EU28 receiver countries 2016–2020

Percentages are calculated on the basis of the selection hypothesis estimation

Table 4 Flows of girls aged 0–14 estimated to be cut or at risk of FGM/C by EU28 country, 2016–2020 and 2016–2030

	2016–2020					2016–2030				
	Total flows	With FGM/C at migration		At risk after migration		Total flows	With FGM/C at migration		At risk after migration	
		Selection hyp.	Baseline est.	Selection hyp.	Baseline est.		Selection hyp.	Baseline est.	Selection hyp.	Baseline est.
Austria	2100	500	500	200	200	7300	1500	1500	700	700
Belgium	4200	800	900	400	400	14,300	2600	2800	1100	1200
Bulgaria	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Croatia	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Cyprus	<100	<10	<50	<10	<10	200	<50	<50	<50	<50
Czech Rep.	200	<50	<50	<100	<100	500	<100	<100	<100	<100
Denmark	1000	200	200	<100	<100	3200	700	800	300	300
Estonia	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Finland	800	300	300	100	100	2800	900	1000	400	400
France	17,400	3700	4200	1100	1200	59,300	12,500	13,900	3500	4000
Germany	12,200	1800	1900	700	800	40,500	5400	5700	2200	2500
Greece	1100	300	300	200	200	3500	800	900	500	600
Hungary	100	<50	<50	<50	<50	500	<50	<50	<50	<50
Ireland	600	100	100	<100	<100	2100	400	400	200	200
Italy	14,000	3000	3300	1300	1400	47,000	9200	10,000	4100	4500
Latvia	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Lithuania	<10	<10	<10	<10	<10	<50	<10	<10	<10	<10
Luxembourg	200	<50	<50	<10	<10	600	100	100	<50	<50
Malta	100	<100	<100	<50	<50	400	200	200	100	100
Netherlands	2200	500	500	100	200	7000	1300	1300	400	500
Poland	<50	<10	<10	<10	<10	100	<50	<50	<10	<10
Portugal	<100	<50	<50	<50	<50	300	<100	<100	<50	<50

Table 4 continued

	2016–2020					2016–2030				
	Total flows	With FGM/C at migration		At risk after migration		Total flows	With FGM/C at migration		At risk after migration	
		Selection hyp.	Baseline est.	Selection hyp.	Baseline est.		Selection hyp.	Baseline est.	Selection hyp.	Baseline est.
Romania	<10	<10	<10	<10	<10	<50	<10	<10	<10	<10
Slovakia	<50	<10	<10	<10	<10	<100	<50	<50	<50	<50
Slovenia	<50	<10	<10	<10	<10	<50	<10	<10	<10	<10
Spain	12,400	3500	3700	900	1000	42,500	11,700	12,400	3000	3200
Sweden	8200	2200	2300	800	900	27,700	7300	7600	2700	2800
UK	14,900	2300	2300	800	900	50,500	6700	6700	2400	2600
Total	92,000	19,400	20,700	6900	7500	310,500	61,600	65,700	21,900	23,800

Results are rounded to the nearest hundred

6 Discussion and Conclusion

Female genital mutilation/cutting (FGM/C) is a rising issue in western societies as a consequence of international migration. Our paper introduces demography-driven projections of female flows with FGM/C in the current scientific debate on the estimation of the phenomenon in western countries. Projections of flows from each practicing country to each EU28 member state are presented for the 3 sub-periods 2016–2020, 2021–2025, and 2026–2030, with the aim of supporting resource planning and policy making. Results suggest that the issue will gain even more importance in Europe in the coming years due to the sizeable inflows of women with FGM/C and of girls moving in the typical age bracket for cutting that are expected as the consequence of demographic and job market-related push factors in FGM/C practicing countries. The EU28 area will receive a flow of around 400,000 female migrants from FGM/C practicing countries between 2016 and 2020, and of around 1.3 million between 2016 and 2030. About one-third of them, corresponding to an estimated 127,000 women between 2016 and 2020, and to more than 400,000 women between 2016 and 2030 will have undergone FGM/C before migration. Such sizeable flows of women are expected to determine a considerable growth in the number of women with FGM/C settled in Europe.

The number of incoming girls aged 0–14 at the time of migration is expected to be around 92,000 between 2016 and 2020 and around 310,000 between 2016 and 2030. According to these projections, the implementation of prevention programmes that should also include European-born second-generation girls with parents from FGM/C practicing countries should be planned as a valid instrument in order to enhance children's protection. In fact, while around 1 out of 4 girls will have already undergone FGM/C before migration, slightly less than 10% will be considered still at risk of being cut.

Future flows are expected to be strongly geographically selective. They will involve mainly France, Italy, Spain, the UK, and Sweden while leaving Eastern Europe largely unaffected.

As with all studies providing population projections, understanding limitations is key in order to make them more useful for policy and planning purposes. This study shares most of the limitations of population projections on migration. On the positive side, data on future flows used for this study consider a limited period of time (15 years), while projection experts recognize that uncertainty increases substantially beyond 30–40 years (O'Neill et al. 2001). Moreover, the relation between youth bulge, labor surplus, and migration flows has solid theoretical and empirical bases (Fargues 2011; Martin 2009). On the other side, no methods exist to predict sudden migrations generated by political, economic, or environmental crises whose additional effects are not considered in this study (PRB 2001). As in all short-term projections, inaccuracies in the population data at the beginning point of the projection or, in our case, bias from surveys about FGM/C prevalence are expected to be the most important source of error (PRB 2001). Although large-scale surveys are considered as the best available source of information on FGM/C, they have some limitations (UNICEF 2013). As fieldwork in rural areas is often more

subjected to data quality concerns (Johnson et al. 2009), estimation of FGM/C may be particularly affected in countries where the practice occurs mainly among few rural-based ethnic groups. Finally, another limitation lies in the need to make assumptions in order to predict FGM/C prevalence in cohorts of younger women. The assumptions of this study are trend-based. We speculate, according to UNFPA (2015) FGM/C abandonment targets, that trends observed today in young generations will continue in the future. However, we are aware that when the greater part of the local community formerly practicing FGM/C is persuaded to abandon the practice, a "tipping point" is reached and the abandonment becomes faster and permanent (Mackie and LeJeune 2009). On the other hand, political unrests and instability may pose serious threat to the consolidation of results on FGM/C prevention as seen recently, for example, in Egypt (Mukherjee 2014; Orchid Project 2012).

The projections presented in this paper only consider structural job market-related push factors. However, additional asylum-related flows will presumably add to projected flows as FGM/C practicing countries, and former countries of mass immigration from practicing countries (such as Libya), are currently deeply affected by political instability, human rights abuse, terrorism, and conflicts. In this sense, these projections can be considered as a minimum, as humanitarian migration flows are also potentially deeply affected by FGM/C.

To conclude, as the number of women with FGM/C in Europe is expected to rise at quite a fast rate, it is important to act timely by designing targeted interventions and policies at the national and at the European level to assist cut women and protect children. Such measures are particularly compelling in France, Italy, Spain, UK, and Sweden that are expected to be the most affected countries by migration from FGM/C practicing countries

Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

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