Patrizia Farina - patrizia.farina@unimib.it
University of Milan- Bicocca, Department of Sociology and Social Research

Livia Elisa Ortensi- livia.ortensi@statistica.unimib.it
University of Milan- Bicocca, Department of Sociology and Social Research
http://www.sociologia.unimib.it/

Improving estimates of the prevalence of Female Genital Cutting among migrants in Western countries

BACKGROUND

In 2012 the UN General Assembly adopted a first-ever resolution against Female Genital Cutting (FGC) confirming this issue as most important for the defence of women's rights. This is an also an emerging topic in non-practicing immigration countries as a consequence of the increasing proportion of African women in overseas communities.

OBJECTIVE

While the prevalence of FGC is routinely measured in practicing countries, the prevalence of the phenomenon in Western Countries is substantially unknown, as no standardized methods exist yet for immigration countries. The aim of this paper is to present an improved method of indirect estimation of the prevalence of FGC among first generation migrants based on a migrant selection hypothesis. A criterion to assess reliability of indirect estimates is also provided.

METHODS

The method is based on data from Demographic Health and Multiple Indicator Cluster Surveys. Details on how to apply the method to each community are provided.

RESULTS

The application of the selection hypothesis modifies national estimates, usually predicting a lower occurrence of FGC among immigrants than in their respective practicing countries. A comparison between direct and indirect estimation provided as a case study confirms that the method correctly predicts the direction of the variation in the expected prevalence and satisfactorily approximates direct estimates.

CONCLUSION

Given its wide applicability, this method would be a useful instrument to estimate FGC occurrence among first generation immigrants, provide corresponding support for policies and to better plan health care assistance to women who have experienced FGC.

Introduction

Female genital cutting[1] (FGC) is a traditional practice that includes all procedures that intentionally alter female genital organs for non-medical reasons. It is internationally recognized as a violation of the human rights of children and women as it violates a person's rights to health, security and physical integrity, the right to be free from torture and cruel, inhuman or degrading treatment, and the right to life when the procedure results in death (WHO, 2013). The practice occurs predominantly in 29 African countries, but also in other areas where large communities from practicing countries are settled, including Europe (Unicef, 2013). The prevalence of FGC has been measured in 22 African countries, as well as in Yemen, using a standard survey method developed by the Demographic Health Survey (DHS) of Macro International (now ICF International) (Yoder and Khan, 2008; Yoder et al.,

[1] In 1990 the Inter-African Committee on Traditional Practices Affecting the Health of Women and Children adopted the term "female genital mutilation". However, as objections have been raised to this terminology the more culturally sensitive term 'female genital cutting' has become widely used among researchers and international development agencies. This term is also used in the Demographic and Health Survey (DHS) program and will be adopted along with its acronym through this paper referring to the practice. Occasionally terms as "circumcision", "cutting" or 'excision' are employed for easier reading.

2004). On the contrary, the prevalence of the phenomenon in Western Countries is substantially unknown, as no standardized methods exist yet for immigration countries. In the EU Member States there are no ongoing, systematic, representative surveys that use a harmonized approach to estimate the FGC prevalence similar to the MICS (Multiple Indicators Cluster Surveys) and DHS surveys. Some Member States, regions and even International Agencies have used a variety of other data sets to collate and formulate indirect national or regional FGC estimates that aim to gain insights into the expected extent of FGC prevalence among immigrants. However, these have not generated comparable data due to the variation in methodologies and approaches used (EIGE, 2013). A number of issues have emerged from these studies. They include, among others, the limitations arising when using official data sources to extrapolate the denominator of African foreign presence, the underestimation effect due to women's naturalization, and the non-systematic data collection.

The determination of the number of migrants with Female Genital Cutting is nevertheless very important for informed decision-making, to determine resource allocation, to monitor progress towards practice abandonment in emigration and to better plan health care assistance to women who have experienced FGC.

This paper aims to present a new method of estimating the prevalence of FGC among first generation migrants. Our approach is intended to address mainly the technical side of the problem and to propose a refined instrument for policy evaluations and the planning of targeted services based on such estimates. After a brief presentation of the topic and the reasons why it is emerging as a new issue in migration studies, we will review the most popular methods of estimating FGC prevalence in practicing countries and in countries of immigration, paying close attention to their methodological or theoretical limits.

After this discussion, we will proceed to illustrate the theoretical basis of the proposed methods. Application of the methods to Italian data and a comparison between direct and indirect estimation will be provided as a case study.

Female Genital Mutilations: definition, diffusion and trends in practicing countries

Female genital mutilation (FGC) is a traditional practice that includes all procedures that intentionally alter female genital organs for non-medical reasons. The World Health Organization identifies four types of practices (WHO, 2008; Unicef, 2013):

- *Type I or clitoridectomy*: Partial or total removal of the clitoris and/or the prepuce;
- *Type II or excision*[2]: Partial or total removal of the clitoris and labia minora, with or without excision of the labia majora;
- *Type III or infibulation*: Narrowing of the vaginal orifice by cutting and bringing together the labia minora and/or the labia majora to create a type of seal, with or without excision of the clitoris.
- *Type IV*: all other modifications (e.g. stretching, cauterization, piercing, and the scraping of tissue, etc.)

These practices are currently common in some Africa and Middle East countries and affect more than 125 million girls and women (Unicef, 2013). Among sexual and reproductive health rights the topic of Female Genital Cutting (FGC) has long been debated mainly on its adverse health consequences. However, the campaigns against FGC focused on health issues didn't result in significant reductions in its prevalence because they inadvertently promoted the 'medicalization' of the practice rather than its abandonment.

By the early 1990s the topic was reconceptualised as a human rights (Shell Duncan, 2008; Unicef, 2013) and gender-based violence issue (EIGE, 2013b), and the most recent approach

[2]This term must not be confused with the French term 'excision' that generally refers to all forms of FGC.

attempts to combine both the protection of human rights and the safeguard of women's health. In 1993 at the Vienna World Conference on Human Rights, FGC was classified as a form of violence against women. More recently the UN General Assembly adopted a first-ever resolution against FGC defining it as "an irreparable, irreversible abuse that impacts negatively on the human rights of women and girls" and reaffirming "that female genital mutilations are a harmful practice that constitutes a serious threat to the health of women and girls […] and that the abandonment of this harmful practice can be achieved as a result of a comprehensive movement that involves all public and private stakeholders in society (UN General Assembly, 2012). Despite the criticism that accompanies this approach, especially in regard to the defence of multiculturalism (Bell, 2005; Londoño Sulkin, 2009; Wade, 2011; Smith, 2011), international campaigns as well as local initiatives against FGC have been successful. Many countries have taken steps to eliminate the practice through educational programs as well as law enforcement against FGC. In most African countries penalties range from a minimum of three months to a maximum of life in prison and many impose monetary fines (Leye et al, 2007; WHO, 2008).

As a consequence of the increasing presence of migrants from practicing countries, international mobilization against FGC has recently involved high income countries as well, (Andro et al., 2009; present Author, 2010; Nour, 2005). Many European countries have adopted laws that ban all forms of mutilation and have financed enforcement actions aimed at protecting girls. The heightened awareness around this practice has also placed the subject of prevalence at the forefront as understanding the extent of FGC is important in many respects. First of all, women who have been mutilated and especially those infibulated, have different complications that have to be managed by health services. Women have often reported several consequences including serious and disabling health conditions due to FGC (Farina, 2010; Andro et al., 2009). An estimate is also important for preventative purposes.

Understanding the intensity of the phenomenon as it relates to the migrants' countries of origin can facilitate identification of the second generations most at risk and a reaction at the local level. In this sense, knowledge has a very important political and social significance.

Estimates of female genital mutilation in practicing countries

Before the implementation of reliable surveys, attempts at providing national estimates of FGC occurrence in practicing countries were based on anecdotal evidence (Hosken, 1982) or on partial surveys (Toubia, 1993; ORC Macro, 1990). The improvement in the estimates' quality ran at the same pace as the implementation of population-based surveys, especially in the Demographic and Health Surveys (DHS) environment (Yoder et al., 2004) and through Multiple Indicator Cluster Surveys, (Unicef, 2005; Unicef Innocenti Center, 2010). Presently the estimates produced from the results of these surveys are based on the percentage of girls and women of reproductive age (15 to 49) who self-reported the experience of any form of FGC.

Self-reported data on FGC need to be treated with caution for several reasons. The need to consider the context in which questions about FGC status are being asked is crucial: if FGC is widespread, socially acceptable and there are no well-publicized interventions causing people to question its acceptability and legality, then self-reporting is likely to be valid. In a setting where any one of these conditions is not present, women may be unwilling to report having undergone the procedure for fear of being stigmatized or for the illegal status of the practice (Askew, 2005). They may also be unaware of whether and how they have been cut if the operation occurred during early infancy.

Despite these important limitations, data collected through women's reports have proven to be fairly reasonable. The availability of large samples guarantees a fair reliability of the data

even for countries where the phenomenon is unevenly spread or differentiated among various communities and regions.

Alternative approaches to estimation such as clinical examinations are typically restricted to a small number of volunteers. As Obermeyer states (2003), large-scale clinical research on such a delicate issue is "*neither feasible nor desirable*". Some studies point out that clinicians might incorrectly evaluate the circumcision status when cuts are minimal or if they don't fit a specific type (Klouman et al., 2002). In the contexts where mutilations are widespread, the clinically determined circumcision status shouldn't necessarily be regarded as the gold standard; self-reporting by women could be more reliable (Obermeyer, 2003). Where comparisons between women's reports and clinical examinations have been attempted, the correspondence among data has been high in certain settings such as Sudan (100%; Elmusharaf, et al., 2006), Egypt (94%; Egyptian Fertility Care Society, 1996) or the Gambia (97%; Morison et al., 2001) and lower but still substantial (74% to 80%) in others such as Tanzania or the Edo State in Nigeria, where a high percentage of women uncertain about their FGC experience (14%) was found (Snow et al., 2002; Klouman et al., 2005). In any case, studies combining clinical examination and a survey approach suggest that there is a sufficiently strong argument for calculating the prevalence of FGC on the basis of self-declaration data (Yoder et al., 2004; Unicef, 2013).

European estimates

Indirect estimations

Although detailed information is needed for the planning and commissioning of health services and to calibrate policies towards the discontinuation of the practice, data on FGC is less reliable in the countries of emigration, where dedicated surveys are usually unavailable. In a 2009 press release, the European Parliament stated that "*about 180,000 women and girls*

living in Europe undergo FGC or are threatened with having to undergo the practice every year" (European Parliament, 2009), but the rationale and sources of data were not explained. As a matter of fact, none of the European countries have ever carried out prevalence studies of the phenomenon at the national level (Behrendt, 2011).

FGC estimates among migrant women must overcome two major challenges: determining a reliable number of women living in emigration (including irregular stayers, naturalized and second generations) and determining the prevalence among different national groups.

In most cases the number of migrants with FGC has been evaluated by applying an assumed prevalence to the best data available regarding women. Examples of the data used as a basis for estimates include labour force surveys (Kwateng-Kluvitse, 2004), population census and survey data on smaller census samples (Andro and Lesclingand, 2007; Dorkenoo et al., 2007; Nour, 2005; Leye and Leblond, 2004; Jones et al., 1997), residence permits (Italian Ministry of Health, 2008; Gallard, 1995), population's or foreigners' registers (Dubourg et al., 2011; Terres des Femmes, 2007; Italian Ministry for Equal Oppurtunities, 2009; Thierfelder et al., 2005; Leye and Leblond, 2004) and data on school attendance (L'albero della vita, 2011). In some studies, data on women requesting political asylum or related procedures are also included (Jager et al., 2002; Dubourg et al., 2011; UNHCR, 2013) as citizens from FGC practising countries are usually well-represented among this particular subpopulation. Several studies also provide estimates based on delivery registers: from this data it is possible to derive a measure of prevalence among childbearing women as well as an estimate of the number of second generation girls at risk and to predict the number of deliveries from women with FGC (Korfker et al., 2012; Dorkenoo et al., 2007; Dubourg et al., 2011)[3].

Omission of undocumented migrants as well as naturalized citizens can result in a large underestimation of FGC because not being included doesn't mean that they have not

[3]When primary data on childbearing women is used to assess the prevalence in emigration, researchers should be aware that women giving birth may not be fully representative of the main female population (Equality Now et al., 2012).

undergone FGC. This may be particularly true for communities characterized by a high percentage of mixed marriages or for countries where second generation children acquire citizenship immediately by birth. They "disappear" from estimations of the migrant population while still being part of the population with FGC and related needs. Although a discussion of the quality of data is not the main objective of this reflection, we advise that a critical analysis of the quality of the data available in each context is critical in order to assess the limitations of final country estimations. However, as the method proposed is intended to be applied to first generation migrants, the use of data on foreign born citizens may be fairly reasonable in a context with limited irregular migration.

The second broad question, and the main focus of our reflection, arises in determining the prevalence to be applied to the estimated number of women from practicing countries. Thus far the expected number of women with FGC has been based on three methods of evaluation: a) applying the prevalence found in the country of origin (extrapolation-of-African-prevalence-data-method); b) experts' knowledge or hypotheses as well as c) notifications and reporting by medical professionals.

The first approach has strong methodological limitations but is nevertheless the most widely used as it's the cheapest and least complex technique (Equality Now et al., 2012). Despite its popularity, this method fails to consider the process of social and geographical selection of migrants as will be explained later. It amounts to saying that migration is non-selective and that behaviours and attitudes towards circumcision of second generation girls cannot change over time. Estimates by means of this method have been released over the years in many countries (Tab. 1).

Changes in the direction and intensity of FGC prevalence can also be traced to hypotheses and experts' knowledge. As an example, Gallard (1995) assumes that only half of the women who have migrated from FGC practicing countries to France are excised. Following a slightly

different approach, Andro and Lesclingand (2007) apply a different prevalence to selected subpopulations, assuming an eventual null risk on the basis of place of birth and year of arrival. Again, in Italian research by the NGO L'albero della vita (2011) on school attendance data the prevalence for underage girls is supposed to be 30% less than the estimate in each girl's country of origin.

The third method is based on medical notification. These studies are usually carried out in order to analyse the occurrence of FGC in subpopulations that can be easily contacted through a facility-based approach. Examples include the analysis of FGC occurrence among women hospitalized during pregnancy and at child delivery in the Netherlands (Korfker, 2012) and UK (Equality Now, 2012) or data gathered during gynaecological examinations in Germany (Hanselmann et al., 2011; Bund der Frauenärzte et al., 2005) and Switzerland (Jager et al., 2002). Similar experiences in Italy have proven to be unreliable, especially in the case of excisions, which go largely unnoticed by professionals not having undergone specific training (Authors, 2007). Undersampling of circumcised women using a facility-based approach is also pointed out by Hanselmann et al. (2011) who conclude that practice-based gynaecologists in Germany are rarely contacted by women with FGC and that dedicated facilities are needed in order to reach these women directly.

The use of data gathered from case histories on women giving birth have proved in many cases to be unreliable, as maternity units are not usually suitable for recording FGC data and there are typically no nationwide standardized obstetric notes. Because of the discrepancies in record-keeping, research using this type of data is often unable to definitively assess whether a lack of indication of FGC corresponds to the absence of FGC (Equality Now et al., 2012) or to missing information. Moreover, several studies underline that knowledge of the practice among medical professionals is still uneven (Simpson et al., 2012; Zaidi et al., 2007).

Table 1. Examples of Estimates of FGC prevalence in selected European countries

Country	Year	Estimate	Reference
Austria	2000	About 8,000 individuals are from countries where FGM is practiced and are therefore at risk.	Poldermans 2006
Belgium	2011	6,260 have 'most probably already undergone FGM' (women born in the country of origin), and 1,975 are 'at risk' (second generation born in Belgium).	Dubourg et al., 2011
Belgium	2003	Among the main nationalities from FGM practicing countries around 2,700 women are mutilated or at risk.	Leye and Leblond, 2004b
England and Wales	2001	Nearly 66,000 women with FGM were living in England and Wales in 2001 and their numbers are likely to have increased since then.	Dorkenoo et al. 2007
France	1991	About 25,000 have already undergone genital mutilation and 36,000 girls at risk.	Ungeheuer 1991
France	2004	From 42,000 to 61,000 women.	Andro and Lesclingand, 2007
Germany	2006	Approximately 19,406 women aged 15 years and over lived in Germany with the consequences of FGM and 4,289 girls younger than 15 were at risk.	Terre des femmes, 2006
Germany	2011	24,000 females in Germany are currently affected.	Hänselmann. et al., 2011
Germany (Hamburg)	2010	About 30% of the women from Sub-Saharan African countries interviewed in Hamburg had been subjected to FGM.	Behrendt, 2011
Hungary	2011	Between 170 and 350 women affected.	Cited in European Institute for Gender Equality, 2013
Ireland	2011	3,170 estimated of women with FGC.	Cited in Patel, 2011
Italy	2008	Women with FGM could be 35,000. The number of underage girls with FGM or at risk could be 1,100.	Ministry for Equal Opportunities, 2009
Italy	2006	Women with FGM could be 94,000, the number of underage girls with FGM or at risk could be 4,000	Ministry of Health, 2008
Italy	2011	Girls at risk are about 7,700 if a reduction of 30% from the prevalence of mothers is assumed.	L'alberodella vita, 2011
Sweden	2002	Among the main nationalities from FGM-practicing countries, around 1,860 girls aged 0-15 are at risk of FGM.	Leye and Leblond, 2004
Switzerland	2005	10,000 African female immigrants from countries where FGM is practiced of which 6,000–7,000 already genitally mutilated or at risk.	Société Suisse de Gynécologie et d'Obstétrique, 2005
Switzerland	2005	Around 6,000 girls and women with FGM could be living in Switzerland.	Thierfelder et al., 2005
United Kingdom	1999	Among the main nationalities from FGM practicing countries around 70,000 women aged 16 and over and 5,500 girls under 16 may be mutilated or at risk.	Leye and Leblond, 2004

European Surveys on FGC

These important methodological constraints and limitations, along with a lack of information on the specific types of excision widespread in migrant communities, have increased the need for primary data on FGC occurrence in western countries.

The first examples of European surveys on FGC are the "Excision et Handicap (ExH) project" carried out from February 2007 to February 2009 in five French regions (Andro et al., 2009), the "Listening to African Voices" project undertaken in 2010 in the German city of Hamburg (Behrendt, 2011) and the "Survey on the prevalence of women at risk of FGC" that was conducted in Italy in 2010 (Farina, 2010). All of the three quantitative European surveys

are based on non-randomly sampled participants, a limit that is impossible to overcome on such hard-to-reach population surveys.

In this study we'll use the direct estimation results from the Italian survey as a cross check control to test the ability of the proposed indirect method to produce estimations for overseas communities. For this reason the Italian Survey on the prevalence of women at risk of FGC is presented with further details in Appendix 1.

The proposal for an improved method of indirect estimation for first generation migrants

Theoretical background and working hypothesis

An improved FGC estimation method is necessary. Non-migrant populations are quite different from overseas communities and when the estimated prevalence in the country of origin is applied to these communities it creates a strong bias (Mafukidze, 2006; Kohnert, 2007; Behrendt, 2011). Migration, especially at the pioneering stage, is a selective process that changes the population profile of the flows (Lindstrom and Ramírez, 2010). Previous studies have shown that on average migrants are more educated and have more innovative behaviours compared to non-migrants (Lindstrom and Ramírez, 2010; McKenzie and Rapoport, 2010). As there is evidence from different practicing countries indicating that lower age and higher levels of wealth and education or urban residence are often correlated with lower occurrence of FGC (Unicef, 2005; Sipsma et al., 2012; tab 2) it is thus improbable that the FGC rates assessed in African countries match those of the communities abroad[4].

Given that a selection effect is likely to bias first generation indirect estimates of FGC occurrence, an evaluation of its expected direction and strength in overseas communities,

[4] It should be noted that the selection effect also has a direct impact on the continuation of the practice on daughters born in emigration. In fact many studies show that migrants who grew up in Europe versus their home country have a lower risk of being circumcised, (Korfker et al., 2012; Johnsdotter et al., 2009; Morison et al., 2004, Author, 2010), but the phenomenon among second generations should be analysed according to a "mother to daughter transmission" approach accounting for the impact of family and community network characteristics (Farina, Ortensi, 2013 IUSSP).

based on the prevalence variations among different socio-demographic groups and inter-regional variations in the migrants' countries of origin, could improve indirect estimations and assess their reliability.

In fact the more homogeneous the population is in terms of FGC the higher the expectation that immigrants be representative of their countries of origin and that an a priory estimation can be considered reliable. Based on these assumptions we have used results of the DHS/MICS surveys for selected subpopulations to correct the classic extrapolation-of-African-prevalence-data-method and the Unicef classification (2005b) to assess their reliability (table 2).

Our first and second working hypothesis follows:

WH1: The process of immigrant selection deeply affects the composition of first generation migrant flows. As a consequence these flows may be characterized as younger and more educated and urban than the overall national population profile. This process has a direct effect on the prevalence of FCG among African women in overseas communities.

WH2: Socio-demographic groups and inter-regional variations in FGC occurrence in the migrants' countries of origin can be used to assess the expected variability of FGC occurrence in migrants' flows

Table 2. Unicef country classification and prevalence of FGC at the national level according to selected women's characteristics (different years)

Country	*Group (according to Unicef)*	*Year of last DHS/ MICS survey*	*age 15-19* $m_{15,19}$	*age 45-49* m_{45-49}	*urban areas* m_{urb}	*rural areas* m_{rur}	*no education* m_{ledu}	*highest education level* m_{hedu}	*first wealth quintile* m_{lw}	*highest wealth quintile* m_{hw}
Egypt	1	DHS 2008	80.7	96.0	85.1	95.5	97.6	87.4	95.4	78.3
Eritrea	1	DHS 2002	78.3	95.0	86.4	90.5	92.9	83.2	94	84.3
Senegal	2	DHS 2010	24.0	28.5	23.4	27.8	33.7*	19.1	n.a.	n.a.
Cote d'Ivoire	2	MICS 2006	28.0	39.7	33.9	38.9	51.8	15.2	55.2	23.4
Burkina Faso	2	DHS 2010	57.7	89.3	68.7	78.4	70.7*	73.8	73.2*	75.9*
Nigeria	2	DHS 2008	21.7	38.1	36.8	25.6	18.0	37.2	13.4	39.2
Ethiopia	1	DHS 2005	62.1	80.8	68.5	75.5	77.3	64.0	73.0	70.6
Somalia	1	MICS 2006	96.7	99.1	97.1	98.4	98.0	96.3	98.4	96.2
Ghana	3	DHS 2006	3.3	7.9	3.5	7.1	14.1	1.9	n.a.	n.a.
Yemen*	3	MICS 2003	19.3	25.0	22.6	25.8	22.1	34.1	30.2	26.3
Benin	3	DHS 2006	7.9	15.8	11.8	15.4	17.9	1.7	15.2	5.1
Cameroon	3	DHS 2004	0.4	2.4	0.9	2.1	4.7	0.4	n.a.	n.a.
Central African Rep.	2	MICS 2008	18.7	31.8	20.9	29.3	30.0	13.6	37.5	14.3
Chad	2	MICS 2010	41.0	47.6	45.5	43.8	46.9	30.9	46.6	6.4
Gambia	2	MICS 2005	79.9	74.2	72.2	82.2	81.1	71.2	75.4	63.9
Djibouti	1	MICS 2006	89.5	94.4	93.1	95.5	93.5	90.7	n.a.	n.a.
Guinea	1	DHS 2005	89.3	99.5	93.9	96.4	97.1	89.9	n.a.	n.a.
Guinea Bissau***	2	MICS 2010	43.5	40.7	39	48.2	54.4	21.3	50.3	36.1
Kenya	2	DHS 2008	14.6	48.8	16.5	30.6	53.7	19.1	40.2	15.4
Liberia	2	DHS 2007	44.0	85.4	44.9	80.7	83.9	41.3	83.8	39.5
Mali	1	DHS 2006	84.7	85.8	80.9	87.4	85.4	83.7	93.7	85.7
Mauritania	2	MICS 2007	65.9	68.5	64.9	76.8	72.2	72.1	81.8	58.8
Niger	3	MICS 2006	0.1	0.1	0	0.2	0.2	0.0	n.a.	n.a.
Sierra Leone	1	MICS 2010	70.1	96.4	80.7	92.4	95.0	74.2	94.1	75.8
Sudan**	1	SHHS 2010	86.6	90.5	93	86.8	68.6	70.7	57.0	77.6
Tanzania	3	DHS 2004	11.3	24.0	10.8	20.8	23.1	6.8	29.2	11
Togo	3	MICS 2010	1.1	6.7	2.9	4.6	7.9	0.8	3.1	1.6
Uganda	3	DHS 2010	1.0	1.9	1.4	1.4	1.5	1.5	2.2	1.5

*Some data refers to YDHS 1997; **Some data refers to SDHS 2000; *** Some data refers to the MICS 2006
Source: Unicef, 2013 (column 1); authors' synthesis from DHS, MICS datasets.

According to the Unicef classification, countries within the three defined groups show similarities in the way that FGC is practiced and in inter-regional prevalence variations.

Group 1 includes countries with prevalence rates of 80% or greater, where socio-demographic variables, including geographic location or background characteristics, are weakly discriminating. Group 2 is made up of countries where the prevalence rates are at intermediate levels ranging from 25% to 79%. In these countries only certain ethnic groups practice FGC and at varying intensities and background characteristics are in most cases highly discriminating. Finally, Group 3 consists of countries where only certain ethnic groups practice FGC but national prevalence rates are lower (between 1% and 24%) and background characteristics are in most cases highly discriminating.

For countries in Group 1, the hypothesis that prevalence among migrants could be close to the national level was indeed more realistic than for countries in Group 2. The expectation for Group 2 countries was that an a priori estimation would be less reliable and that there would be greater differences with national estimates. For countries in Group 3, especially those with a very low overall prevalence, the expected occurrence in emigration could be expected to be reasonably residual as, even under the geographical selection hypothesis, the probability that FGC practicing ethnic groups be present among immigrants was low.

Following the same approach, the indirect estimation could be corrected with an evaluation of the phenomenon's variation among women with different socio-demographic characteristics. According to the selection hypothesis we could in fact expect the prevalence among first generation migrants of the overseas community to be closer to what is observed among more educated, wealthier and younger urban women (table 2).

A final consideration concerns the phenomenon's observed evolution in practicing countries in recent years. As in most countries the phenomenon is decreasing in younger generations, so the application of prevalence rates based on an old survey would overestimate the phenomenon even under the hypothesis that the sample of migrants fully represents the country of origin. An indirect estimation based on old data should also include a correction based on the expected decline of the phenomenon across younger generations. Improved indirect estimation according to the selection hypothesis should therefore include a correction according to the variation observed across generations at the national level.

Therefore, our final working hypothesis was as follows:

WH3: Given that the phenomenon is declining in many countries, a correction of the indirect estimation of the expected prevalence in the country of origin up to the year of interest should be included in the correction.

4. Implementing corrected Indirect Estimates

Our method proceeded in two phases: the first was the updating of national estimations for the country of origin to a certain year of interest *y*, the second was the application of the selection hypothesis to these updated national estimates[5].

Updating national estimates

The preliminary operation was a correction of the prevalence from DHS/MICS data up to a particular year *y* of interest according to WH3. This update was needed since national surveys are performed in different years. In order to update the estimates up to *y* it was necessary to have a reliable age structure for each country of origin in the year y.

This structure can be obtained in two ways:

1) using UN country data by gender and 5-years age classes if available for the year of interest

2) using the weighted age structure of each DHS/MICS sample, which is designed to be fully representative of women aged 15-49 at the national level (ICF International, 2012), and the prevalence of FGC in each country's age-group. This data is usually available from national DHS or MICS reports or may be directly calculated from each survey's datasets. This data is used to obtain an updated population structure by replacing an estimated group of women aged 49, who exit from the age classes considered, with an estimated new group of women, aged 15, for every year of difference between the national survey and the year of the a priori estimate.

The estimation of the population according to 2) works under the hypothesis that (a) in every age class women are equally distributed in every single age.

[5] Data on national prevalence of FGC in practicing countries used for indirect estimations in this paper comes from the most recent waves of Demographic and Health Surveys (DHS) or Multiple Indicators Cluster Surveys (MICS).

According to (a), the number of incoming girls in the earlier age class for every single replaced age is 1/5 of the number of girls aged 15-19 in the sample; while the number of older women that exit the targeted age 15-49 (1/5 of the number of women aged 45-49) is usually lower.

This estimated structure was acceptable for most developing countries. For the least developed countries where mortality rates are very high and the fertility trend is not declining, hypothesis (a) was less likely to hold and therefore (a'), the number of incoming young girls, was inflated by a coefficient - calculated as the ratio of the number of women aged 15-19 to the number of women aged 20-24 – in order to enlarge the base of the age pyramid.

Once the updated age structure was available or estimated, the expected number of mutilated women was obtained by simply applying the updated punctual age prevalence to every single age year. As prevalence is available from DHS/MICS data by 5-years age classes and data are not usually available for girls younger than 15 at the time of the survey two further hypotheses were necessary (b) the prevalence is the same for each single age class in the 5 year span of reference and (c) the prevalence among girls under the age of 15 is the same as that observed for the nearest sampled age class (15-19).

The updated prevalence was therefore calculated as follows:

Let $P_{x,x+a-1}$ be the number of women for each age class for $x = 15 \ldots 49$

Let a be the interval length

Let P_x^* be the estimated number of women at each age in the hypothesis of equal distribution through ages in every class $P_x^* = \frac{1}{a}(P_{x,x+a-1})$

Let t be the number of years to between the year of the national survey and the year of the estimation

Let $m_{x,x+a}$ be the prevalence of mutilated women for the age class $x, x+a$

The updated prevalence m_t for $a = 5$ and $t < a$ years of distance among the year of the survey and the year of the secondary estimation is calculated as follows:

$$m_t = \frac{\sum_{x=15-t}^{19}(P_x^*)\left(m_{x,x+a}\right) + \cdots + \sum_{x=45}^{49-t}(P_x^*)(m_{x,x+a})}{\sum_{x=15-t}^{19}(P_x^*) \ + \cdots + \sum_{x=45}^{49-t}(P_x^*)}$$

While for $a < t < 2a$ and for $a = 5m_t$ it is

$$m_t = \frac{\sum_{x=15-t}^{19}(P_x^*)\left(m_{x,x+a}\right) + \cdots + \sum_{x=40}^{49-t}(P_x^*)(m_{x,x+a})}{\sum_{x=15-t}^{19}(P_x^*) \ + \cdots + \sum_{x=40}^{49-t}(P_x^*)}$$

For older surveys (e.g. when $t > 5$) in countries where the prevalence of mutilated women is steadily decreasing, the estimated updated prevalence among younger girls was obtained (c') by multiplying the prevalence among women aged 15-19 from the survey by the ratio of prevalence among women 15-19 to prevalence among women 20-24[6].

In this case:

for $a = 5$ and $a < t < 2a$ let $m_x^{'}$ be the estimated prevalence for the estimated ages prior to $P_{15,19}$ and

$$m_{x,x-t}^{'} = m_{15,19}\frac{m_{15,19}}{m_{20,24}}$$

$$m_t = \frac{\sum_{x=15-t}^{15}(P_{15,19}^*)\left(m_{x,x-t}^{'}\right) + \sum_{x=15}^{19}(P_x^*)\left(m_{x,x+4}\right) + \cdots + \sum_{x=40}^{49-t}(P_x^*)(m_{x,x+4})}{\sum_{x=15-t}^{15}(P_x^*) + \sum_{x=15}^{19}(P_x^*) \ + \cdots + \sum_{x=40}^{49-t}(P_x^*)}$$

[6] The application of this further correction to the Eritrean DHS reduced the 2002 prevalence (88.7%) from 84.8% to 81.4%. For Ethiopia's 2005 prevalence (74.3%), the application of the correction reduced the updated prevalence from 71.3% to 69.4%.

Application of the selection hypothesis

According to the Selection Hypothesis (WH1), migrants are likely to be a selected group in terms of age, education, wealth level and pre-migration urban settlement. As a consequence, the expected prevalence amongst these overseas communities should be closer to the level observed for these sub-groups in the countries of origin (Table 3) than the overall national level.

Consequently a more realistic estimate among migrants was obtained by applying a function *f* to each country's observed national variations for these selected groups and later by applying the expected variation to the updated prevalence calculated in paragraph (3.2). The arithmetic mean was chosen here as the *f* function for its mathematical properties.

Let m be the prevalence rate estimated at the national level through the DHS or MICS survey

Let m_t be the expected updated prevalence in emigration

Let $m_{15,19}$ be the prevalence rate estimated at the national level through the DHS or MICS survey for women in the youngest age class

Let m_{urb} be the prevalence rate estimated at the national level through the DHS or MICS survey for women settled in urban areas

Let m_{hedu} be the prevalence rate estimated at the national level through the DHS or MICS survey for women with the highest education level

Let m_{hw} be the prevalence rate estimated at the national level through the DHS or MICS survey for women with the highest level of wealth

The predicted updated prevalence in emigration $m_t^{'}$ for each country of origin will therefore be defined as:

$$m_t^{'} = f\left(\frac{m_{15,19}}{m}, \frac{m_{urb}}{m}, \frac{m_{hedu}}{m}, \frac{m_{hw}}{m}\right) m_t$$

Case study: Estimating the number of women with FGC in the Italian region of Lombardy

In this section we applied the proposed method to data available for the Italian region of Lombardy and then compared indirect and direct estimates. The Italian region of Lombardy was chosen because direct estimates for women from selected countries of origin were available and provided us the opportunity to compare direct and indirect estimations (See Appendix 1 for details). In the case of Lombardy, the regional agency in charge of producing regional data on immigration (the Regional Observatory for Immigration) provided high quality data for foreigners born in MGF practicing countries, including undocumented migrants, legal non-residents, legal residents and naturalized women[7]. Data of this quality represents an important step forward in obtaining reliable FGC estimations and should be considered the gold standard as it covers the entire population with a foreign background at risk of FGC irrespective of current nationality or legal status.

We used y=2010 as the estimation year to allow a comparison with direct estimations available for Lombardy. A priori estimations obtained by applying updated national FGC prevalence rates (WH3) are reported in table 3.

According to this first simple correction, approximately 27,000 women living in Lombardy were expected to be mutilated. The average estimated prevalence among women from FGC-practicing countries was 56.4% with the updated national prevalence ranging from 0.2% to 97.7%.

[7] Such figures, usually unavailable from official data or at the national level, are provided for the Region of Lombardy by the Regional Observatory on Migration and are based on a combination of official data and survey data based on center sampling (Baio et al., 2011; Blangiardo, 2010; Ismu Foundation, 2011).

Table 3. Estimated number of women with FGM in Lombardy (2010) according to the application of the updated national prevalence

	Estimated number of women aged 15-49 $P_{15,49}$	*National prevalence from last DHS/MICS survey* m	*Year of last DHS/ MICS survey*	*Updated national prevalence 2010* m_t	*Estimated number of women with FGM in Lombardy 2010* $P_{15,49}^{m}$
Egypt	19063	91.1	DHS 2008	90.1	17.080
Eritrea	1999	88.7	DHS 2002	84.8	1.627
Senegal	7598	25.7	DHS 2010	25.7	1.953
Cote d'Ivoire	3907	36.4	MICS 2006	34.9	1364
Burkina Faso	1641	75.8	DHS 2010	75.8	1.244
Nigeria	4040	29.6	DHS 2008	28.7	1.147
Ethiopia	1055	74.3	DHS 2005	71.3	752
Somalia	560	97.9	MICS 2006	97.7	547
Ghana	4830	3.8	DHS 2006	3.2	150
Yemen*	52	38.2	MICS 2003	38.2	20
Benin	384	12.8	DHS 2006	12.1	46
Cameroon	868	1.4	DHS 2004	1.1	10
Central African Rep	7	25.7	MICS 2008	24.5	2
Chad	14	44.2	MICS 2010	44.2	6
Gambia	137	78.3	MICS 2005	78.7	108
Djibouti	1	93.1	MICS 2006	92.5	1
Guinea	309	95.6	DHS 2005	94.4	292
Guinea Bissau	133	50.0	MICS 2010	50.5	67
Kenya	315	27.1	DHS 2008	26.2	83
Liberia	246	65	DHS 2007	62.5	154
Mali	127	85.2	DHS 2006	85.1	108
Mauritania	48	71.3	MICS 2007	69.5	33
Niger	210	0.2	MICS 2006	0.2	0
Sierra Leone	246	88.3	MICS 2010	88.3	217
Sudan	96	65.5	SHHS 2010	65.5	63
Tanzania	52	17.7	DHS 2004	16.6	9
Togo	505	3.9	MICS 2010	3.9	20
Uganda	75	1.4	DHS 2010	1.4	1
Total					*27.104*

*Information needed to update the prevalence was not available for these countries. The original prevalence was applied.

As a second step we applied the selection hypothesis (WH1) to arrive at the results shown in table 4.

Once the selection hypothesis was applied, all communities excluding those from Nigeria and Sudan showed a lower expected prevalence than in their countries of origin. This reduction was higher for Niger, Benin and Cameroon while it was less than 10% in most of the countries classified by Unicef as Group 1.

In Nigeria the prevalence rate of excised women is higher than the national level for women who are more educated, live in wealthier families and reside in urban settings, while it is lower for girls aged 15-19. Therefore the expected prevalence in emigration was 14% higher than the DHS survey result. The same occurred for Sudan (+11%) where the projected prevalence was higher for all of the selected groups.

According to the selection hypothesis, the expected number of excised women was expected to be close to 25,000. This hypothesis reduced the first estimates based on updated prevalence by 12%.

Table 4. Coefficients, estimated prevalence and estimated number of women with FGM in Lombardy (2010) according to the selection hypothesis

Country	m	$\frac{m_{15.19}}{m}$	$\frac{m_{urb}}{m}$	$\frac{m_{hedu}}{m}$	$\frac{m_{hw}}{m}$	m_t	*Ratios' mean*	$m_t^{'}$	$P_{15,49}^{m'}$
Egypt	91.1	0.89	0.93	0.96	0.86	90.10	0.91	82.0	15,632
Eritrea	88.7	0.88	0.97	0.94	0.95	84.80	0.94	79.4	1,587
Senegal	25.7	0.93	0.91	0.68	NA.	25.70	0.84	21.6	1,641
Cote d'Ivoire	36.4	0.77	0.93	0.41	0.64	34.9	0.69	24.1	942
Burkina Faso	75.8	0.76	0.91	0.96	NA.	75.80	0.88	66.5	1,091
Nigeria	29.6	0.73	1.24	1.26	1.32	28.70	1.14	32.7	1,321
Ethiopia	74.3	0.84	0.92	0.86	0.95	71.30	0.89	63.6	671
Somalia	97.9	0.99	0.99	0.98	0.98	97.60	0.99	96.6	541
Ghana	3.8	0.87	0.92	0.50	NA.	3.20	0.76	2.4	116
Yemen*	38.2	0.51	0.59	0.89	0.69	38.20	0.67	25.6	13
Benin	12.8	0.62	0.92	0.13	0.40	12.06	0.52	6.2	24
Cameroon	1.4	0.29	0.64	0.29	NA.	1.14	0.40	0.5	4
Central African Rep.	25.7	0.73	0.81	0.53	0.56	24.47	0.66	16.1	1
Chad	44.2	0.93	1.03	0.70	0.14	44.51	0.70	30.9	4
Gambia	78.3	1.02	0.92	0.91	0.82	78.71	0.92	72.2	99
Djibouti	93.1	0.96	1.00	0.97	NA.	92.50	0.98	90.7	1
Guinea	95.6	0.93	0.98	0.94	NA.	94.40	0.95	89.9	278
Guinea Bissau	50.0	0.98	0.88	0.48	0.81	44.51	0.79	39.5	53
Kenya	27.1	0.54	0.61	0.70	0.57	26.23	0.61	15.9	50
Liberia	65.0	0.68	0.69	0.64	0.61	64.00	0.65	41.8	103
Mali	85.2	0.99	0.95	0.98	1.01	85.09	0.98	83.6	106
Mauritania	71.3	0.92	0.91	1.01	0.82	69.49	0.92	63.8	31
Niger	0.2	0.50	0.00	0.00	NA.	0.20	0.17	0.0	0
Sierra Leone	88.3	0.79	0.91	0.84	0.86	88.3	0.85	75.1	185
Sudan	69.4	1.24	1.04	1.02	1.12	69.4	1.11	77.0	74
Tanzania	17.7	0.64	0.61	0.38	0.62	16.60	0.56	9.36	5
Togo	3.9	0.28	0.74	0.21	0.41	3.9	0.41	1.6	8
Uganda	1.4	0.71	1.00	1.07	1.07	1.40	0.96	1.35	1
Total									24,581

Source: Authors' elaborations on DHS/MICS data

Data from the Italian "Survey on the prevalence of women at risk of FGC" provided us the unique possibility to make a comparison between direct and indirect estimation for the 9 citizenships of origin included in the survey and therefore to assess the level of reliability of the proposed method (WH2). The comparison between estimates for countries where both estimates were available is presented in table 5.

Table 5. Estimated number of women with FGM in Lombardy (2010) according to survey data

Countries	*Prevalence in Lombardy among first generation migrants $\bar{m}'$ [a]*	*Updated country prevalence*	*Updated predicted county prevalence according to the selection hypothesis [b]*	*Group (according to Unicef)*	*Direction of the predicted variation according to indirect estimation*	*Difference between direct and indirect estimations [a]-[b]*
Cote d'Ivoire	22.8%	34.9	24.1	2	-	-1.3
Burkina F.	65.7%	75.8	66.5	2	-	-0.8
Egypt	76.7%	90.1	82.9	1	-	-6.2
Ethiopia	56.4%	71.3	66.3	1	-	-9.9
Ghana	4.2%	3.2	2.9	3	-	1.3
Nigeria	75.3%	28.7	33.7	2	+	41.6
Senegal	5.9%	25.7	21.6	2	-	-15.7
Somalia	91.5%	97.0	96.6	1	-	-5.1
Eritrea	87.0%	84.8	83.1	1	-	3.9

Source: Authors, 2010; Authors' elaborations on DHS/MICS data

For countries where FGC is widespread with little variation in the occurrence of the phenomenon across regions (Group 1), the a priori estimate was quite accurate for the first generation of women with variation between direct and indirect estimation below 10%. Close results were also observed for Cote d'Ivoire and Burkina Faso in Group 2, the typology with the less expected level of reliability of indirect estimation. Greater differences were observed for the other two countries in this group - Senegal and Nigeria[8] - even if the direction of the expected variation as compared with the country of origin (increase for the Nigerian community and decrease for Senegalese community) was predicted correctly. For the only country in Group 3 (Ghana) there was also good correspondence between indirect and direct estimation.

Conclusion, critical appraisal and the direction of future research

The recent development in African migration flows and the demographic conditions present in Africa suggest that migration away from this continent towards western countries is likely to persist and even further increase (OECD, 2009; Bossard, 2009). The number of women among these flows is increasing, which represents a departure from the historically male-dominated trend especially in that many are not leaving to join husbands. Independent female migration has become a major survival

[8] In the case of Nigeria the increase was largely underestimated as a result of a strong geographical selection of the migration flow of Nigerian women to Lombardy, which mainly originated from the area of Benin City.

strategy in response to deepening poverty in the sub-region (Yaro, 2008; Adepoju, 2011). As a consequence, the occurrence of Female Genital Cutting among the immigrant population is a topic that is likely to gain further importance in western countries. Direct estimation and FGC-focused surveys in Western countries are necessary in order to better investigate not only the simple estimation of FGC occurrence but also broader and crucial topics such as the type of female genital cutting common among immigrants, health consequences and the process of discontinuing the practice among second generations girls. The development of a standard method of direct estimation shared at the international level should therefore be regarded as a goal in order to better understand the phenomenon and prevent its continuation (EIGE, 2013). While we fully agree that direct estimation is to be regarded as the preferred approach in the study of this topic, the difficulties and cost of targeted surveys may push researchers in favour of indirect estimation as the main method or as a complementary method for small communities that may be difficult to include in a sample analysis (see Appendix 2 for an example).

Given that it is an extension of the classical extrapolation-of-African-prevalence-data-method the proposed indirect estimation shares many of its limitations and advantages. It is an easy and cost-effective technique that can be applied within many different contexts and it also has the potential to be further adapted to any particular country should more detailed information become available about select overseas communities (e.g. ethnicity, age structure, etc.). Moreover, since the low quality of national migration data remains a major problem, and the method is expected to be applied to first generation women, the expected proportion could be applied to national data on foreign born residents by country of birth and gender, which are available for a broad range of countries if better data are not available. Data on foreign residents may also be suitable for new immigration destinations with a low level of naturalization (e.g. Mediterranean countries or Eastern European member states).

Finally, the Italian case study confirmed the migrants' selection effect and showed that the method correctly predicts the direction of the variation in the expected prevalence and

approximates direct estimates for most countries fairly well, especially those with a very high or low prevalence. It also suggested a criterion that can be used to assess the reliability of the estimate for each country. Results of our case study showed that ignoring the effect of migrants' selection in estimating the number of first generation women with FGC resulted in a general overestimation of the phenomenon.

Appendix 1: The Italian Survey on the population at risk of FGC

The primary data used in this analysis was derived from the "First survey on the Prevalence of Women at risk of FGC", which involved 2,011 migrants aged 15-49 living in the Italian region of Lombardy in 2010[9]. This sample was representative of the main nationalities through a quota sampling based on figures released by the Regional Observatory on Migration (ORIM), a governmental agency currently responsible for producing detailed yearly immigration data (Ismu Foundation, 2011). To obtain the number of interviews required for each nationality, a combination of facility-based and respondent-driven sampling was used. Of the interviewers, 52.4% were recruited from a variety of facilities (hospitals, family planning clinics and other services). In order to correct the bias resulting from the under sampling of non-users of these services, 47.6% of the sample was instead respondent-driven. To obtain a sample representative of the region, the data collection was followed by a data weighting procedure[10].

[9] This survey was carried out by the Regional Institute of Statistics (Eupolis) and the Department of Statistics of the University of Milan-Bicocca.

[10]The weight is the combination of three partial multipliers:

Let δ_t be the macro-area sampling fraction[10] - Let ε_i^R be the proportion of women of age class i according to regional estimates

Let γ_s be the country sampling fraction[10]

Let ε_i^S be the proportion of women of age class *i* according to the survey

Let ε_i^R be the proportion of women of age class *i* according to the age structure for immigrants at the regional level made available by the Regional Observatory (Blangiardo, 2010).

The final weight is therefore defined as $v_{sti} = \frac{1}{\delta_t} * \frac{1}{\gamma_s} * \frac{\varepsilon_i^R}{\varepsilon_i^S}$ and provides corrections for nationality and age structure.

As one of the aims of the survey was to estimate the prevalence of women with FGC, certain nationalities of the FGC subsample had a higher sampling fraction[11]. The very sensitive nature of the study raised serious challenges. In African societies, issues related to sexuality and female genitals are generally not viewed as matters for public discussion (McCaffrey et al., 1995). Due to the difficulty of the topic under study, all of the interviewers (all female and either cultural facilitators or social workers) underwent appropriate training, including interviewing skills and fieldwork protocol. All of the interviewers were selected from the communities included in the sample and their role as an "insider" proved to be fundamental. Interviewers reported that women usually spoke openly about female genital mutilation and most of them were eager to be questioned and to explain their reasons for sustaining or opposing the practice. This resulted in a high completeness of the data while less than 15% of the women initially involved refused the interview.

While this survey did provide a unique source of information about FGC and migrants' sexual and reproductive health in the Italian and European context, it is necessary to underline some limitations common to retrospective surveys on hard-to-reach populations. The main drawback is the selection effect, since data was only obtained from women who did not (eventually) return to their countries of origin. Moreover, young girls subjected to FGC have a higher risk of death and health complications, which could indirectly reinforce the selection effect of migration. Again, participants were not randomly sampled as the reference population included undocumented migrants or legal non-residents. The survey was quite successful in including some undocumented migrants (3.9% of the sample); however, there is no information about the inclusion of particular groups of interest (e.g. asylum seekers) because the interviewee's residence permit typology was not included on the information request.

[11] For example, the 1,000 women interviewed represented 4.9‰ of the target population, as estimated at 1 July 2010, but this level was higher for Somalia (212.7‰), Eritrea (98.7‰) or Ethiopia (92.1‰).

Appendix 2

Combining direct and indirect estimations (Lombardy 2010)

Given the proportions, the total number of women with FGC is estimated as follows:

Let $P_{15,49,j}$ be the number of women aged 15-49 living in Lombardy at July 1, 2010 from countries *j* included in the survey

Let $\bar{m}$ be the prevalence estimated from the survey for countries *j* included in the survey

Let $P_{15,49,i}$ be the number of women aged 15-49 living in Lombardy at July 1, 2010 from countries *i* not included in the survey

Let $m_t^{'}$ be the estimated prevalence according to the selection hypothesis for countries *i* not included in the survey

The estimated number of mutilated women is calculated as

$$\overline{P_{15,49}^{m}} = \sum_j \bar{m}_j \, P_{15,49,j} + \sum_i m_{t,i}^{'} \, P_{15,49,i} \quad (1)$$

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