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Descriptive Finding

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

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Abstract

BACKGROUND
Female Genital Mutilation/Cutting (FGM/C) is an emerging topic in immigrant countries as a consequence of the increasing proportion of African women in overseas communities.

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

METHOD
The method is based on data from Demographic Health Surveys (DHS) and Multiple Indicator Cluster Surveys (MICS). Migrants' Selection Hypothesis is used to correct national prevalence estimates and obtain an improved estimation of prevalence among overseas communities.

RESULTS
The application of the selection hypothesis modifies national estimates, usually predicting a lower occurrence of FGM/C among immigrants than in their respective practicing countries. A comparison of direct and indirect estimations confirms that the method correctly predicts the direction of the variation in the expected prevalence and satisfactorily approximates direct estimates.

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CONCLUSION
Given its wide applicability, this method would be a useful instrument to estimate FGM/C occurrence among first generation immigrants and provide corresponding support for policies in countries where information from ad hoc surveys is unavailable.

1. Introduction

Female genital mutilation/cutting[4] (FGM/C) is a traditional practice that includes all procedures that intentionally alter female genital organs for non-medical reasons, and is internationally recognized as a violation of the human rights of children and women (WHO 2014; UN 2012). The practice affects more than 125 million girls and woman living predominantly in 28 African countries, Yemen, and Iraq[5] (Andro et al. 2009; Farina 2010; UNICEF 2013).

The prevalence of FGM/C in practicing countries has been measured using a standard survey method developed by the Demographic Health Survey (DHS) (Yoder and Shanxiao 2013). However, the prevalence in immigrant countries is substantially unknown, as no standardized methods have existed until now. Existing estimates for some European states (Table 1) are not comparable due to the different methodologies and approaches adopted (EIGE 2013).

FGM/C estimates in immigrant countries must overcome several challenges (Leye et al. 2014; EIGE 2013); among these we underline the reliable determination of number of women at risk and the correction of prevalence estimation by nationality of origin. Although our focus here is not a discussion about migration data, a critical analysis of the quality of the data available in each context is key in order to assess the limitations of final country estimates. 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 contexts with limited irregular migration.

Thus far the proportion of women with FGM/C has been based on three main methods of evaluation: a) applying the prevalence found in the country of origin; b) experts' knowledge or hypotheses (Gallard 1995; Andro and Lesclingand 2007; Johnsdotter et al. 2009); and c) reporting by medical professionals (Korfker et al. 2012;

[4] Many terms have been used internationally to describe this practice. The term "female genital mutilation" (FGM) is used by WHO and many organizations. Some international organizations use the more neutral term "female genital cutting" (FGC). In this paper, we use the most broadly inclusive term "female genital mutilation/cutting " (FGM/C) accordingly to United Nations (UN) agencies.
[5] Data for FGM/C in Iraq was not available until MICS 2011. As a consequence this country is not included in our analysis.

Equality Now et al. 2012; Hänselmann et al. 2011; Bund der Frauenärzte et al. 2005; Jager et al. 2002; Herschderfer and Buitendijk 2012).

Table 1: Examples of Estimates of FGM/C prevalence in selected European countries

Country	Year	Estimate	Reference
Austria	2000	About 8,000 individuals are from countries where FGM/C is practiced and are therefore at risk.	Poldermans 2006
Belgium	2011	6,260 have 'most probably already undergone FGM/C' (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/C practicing countries around 2,700 women are mutilated or at risk.	Leye and Deblonde 2004
England and Wales	2011	An estimated 137,000 women and girls with FGM/C, born in countries where FGM/C is practiced, were permanently resident in England and Wales in 2011	Macfarlane and Dorkenoo 2014
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/C and 4,289 girls younger than 15 are at risk.	Terre des femmes 2007
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/C.	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 FGM/C.	Cited in European Institute for Gender Equality 2013,
Italy	2008	Women with FGM/C could be 35,000. The number of underage girls with FGM or at risk could be 1,100.	Italian Ministry for Equal Opportunities 2009
Italy	2006	Women with FGM/C could be 94,000, the number of underage girls with FGM/C or at risk could be 4,000	Italian 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'albero della vita 2011
Netherlands	2012	The total number of girls in the Netherlands who are at risk of FGM/C varies between 557 and 3,477 girls originating from one of the 28 African countries and between 9 and 297 Kurdish girls from Northern Iraq. Among asylum seekers, between 38 and 42 girls run a risk of FGM/C.	Exterkate 2013
Sweden	2002	Among the main nationalities from FGM-practicing countries, around 1,860 girls aged 0-15 are at risk of FGM/C.	Leye and Deblonde 2004
Switzerland	2005	10,000 African female immigrants from countries where FGM/C is practiced, of which 6,000–7,000 are already genitally mutilated or at risk.	Société Suisse de Gynécologie et d'Obstétrique 2005
Switzerland	2005	Around 6,000 girls and women with FGM/C could be living in Switzerland.	Thierfelder et al. 2005
United Kingdom	2007	65,790 mutilated women and 1,000 girls at risk	Dorkenoo E, Morison L, Macfarlane A. 2007
United Kingdom	1999	Among the main nationalities from FGM/C-practicing countries around 70,000 women aged 16 and over and 5,500 girls under 16 may be mutilated or at risk.	Leye and Deblonde 2004

The first approach is the most widely used, as it is the cheapest and least complex (Equality Now et al. 2012). Despite its popularity, this method has strong methodological limitations as it fails to consider the process of selection of migrants. This paper aims to present an improved method of estimating the prevalence of FGM/C among first generation migrants. Our approach is intended to mainly address the technical side of the problem and to propose a refined instrument for policy evaluation and the planning of targeted services based on such estimates.

2. Theoretical background

It is widely recognized that migration, especially at the pioneering stage, is a selective process. In fact previous studies have shown that, on average, migrants are usually younger, wealthier, and more educated than non-migrants (Lindstrom and Ramírez 2010; McKenzie and Rapoport 2010). As migrants are not a random cross-section of the populations from which they originate, the proportion of women with FGM/C is also likely to be different from the estimated national level. In fact there is evidence from practicing countries indicating that lower age and higher levels of wealth and education or urban residence are usually correlated with lower occurrence of FGM/C (UNICEF 2005, 2013; Sipsma et al. 2012; Table 2). As a consequence, the application of the prevalence in the country of origin to overseas communities is likely to bias first generation indirect estimates of FGM/C occurrence (Mafukidze 2006; Kohnert 2007; Behrendt 2011). The selection effect also has a direct impact on the continuation of the practice on daughters born in emigration, but the phenomenon among second and subsequent generations should be analysed separately, according to a "mother-to-daughter transmission" approach accounting for the impact of family and community network characteristics (Farina and Ortensi 2014; Hayford 2005).

According to these premises, we propose a correction of the classical extrapolation of the African-prevalence-data method based on the selection effect in overseas communities. This correction is calculated on the prevalence variations among different socio-demographic groups and inter-regional variations in the migrants' countries of origin. We also suggest including an assessment of the reliability of this correction based on inter-regional variations in the migrants' countries of origin, using as a tool the UNICEF classification by prevalence level among girls and women aged 15 to 49, which separates practicing countries into five groups (UNICEF 2013: 27). In fact the more homogeneous the population is in terms of FGM/C occurrence the higher the expectation is that immigrants will be representative of their countries of origin and that an a priori estimation can be considered reliable. According to the UNICEF classification, countries within the five defined groups show similarities in the way that

FGM/C is practiced and in inter-regional prevalence variations. For countries in Group 1 (very high prevalence countries: >80%) where socio-demographic-geographical variables are weakly discriminating, the hypothesis that prevalence among migrants could be close to the national level is indeed more realistic than for countries in Group 2 (moderately high prevalence countries: 80%|- 51%) and 3 (moderately low prevalence countries: 50%|- 26%). 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 Group 4 (low prevalence countries: 25%|- 10%) and 5 (very low prevalence countries: <10%), especially those with a very low overall prevalence, the expected occurrence after emigration could be reasonably residual as, even under the geographical selection hypothesis, the probability that FGM/C-practicing ethnic groups are present among immigrants is low.

A final consideration concerns recent FGM/C trends in practicing countries. They are decreasing in younger generations, so the application of prevalence rates based on old surveys to obtain estimation for more recent years would overestimate the phenomenon among women aged 15−49, 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 according to the variation observed across generations at the national level.

Therefore, our final working hypotheses are as follows:

> WH1: The process of immigrant selection 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 FGM/C among African women in overseas communities.
>
> WH2: Socio-demographic groups and inter-regional variations in FGM/C occurrence in the migrants' countries of origin can be used to assess the expected variability of FGM/C occurrence in migrant flows.
>
> WH3: Given that the phenomenon is changing and, in most cases, declining in the younger generation, 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.

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 (2013) to assess their reliability (Table 2).

Table 2: UNICEF country classification and prevalence of FGM/C 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 $m_{45\text{-}49}$	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	PHS2010***	68.8	95.0	80.0	85.0	90.6	72.8	89.4	75.2
Senegal	3	DHS 2010	24.0	28.5	23.4	27.8	33.7*	19.1	42.6	14.7
Cote d'Ivoire	3	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	3	DHS 2008	21.7	38.1	36.8	25.6	18.0	37.2	13.4	39.2
Ethiopia	2	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	5	DHS 2006	3.3	7.9	3.5	7.1	14.1	1.9	12.8	1.1.
Yemen	4	PAPFAM 2003	19.3	25.0	22.6	25.8	22.1	34.1	30.2	26.3
Benin	4	DHS 2006	7.9	15.8	11.8	15.4	17.9	1.7	15.2	5.1
Cameroon	5	DHS 2004	0.4	2.4	0.9	2.1	4.7	0.4	n.a.	n.a.
Central African Rep.	4	MICS 2006	18.7	31.8	20.9	29.3	30.0	13.6	37.5	14.3
Chad	3	MICS 2010	41.0	47.6	45.5	43.8	46.9	30.9	46.6	6.4
Gambia	2	MICS 2010	77.1	79.0	74.6	78.1	76.7	73.9	72.7	69.8
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	3	MICS 2010	48.4	50.3	41.3	57.2	64.8	27.7	49.4	40.5
Kenya	3	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	MICS 2010	87.7	88.5	89.1	88.2	89.0	88.0	84.0	92.0
Mauritania	2	MICS 2007	65.9	68.5	64.9	76.8	72.2	72.1	81.8	58.8
Niger	5	MICS 2006	0.1	0.1	0.0	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	MICS 2010	83.7	89.1	83.5	89.8	68.6	70.7	57.0	77.6
Tanzania	4	DHS 2010	7.1	21.5	7.8	17.3	20.3	3.1	24.5	6.3
Togo	5	MICS 2010	1.1	6.7	2.9	4.6	7.9	0.8	3.1	1.6
Uganda	5	DHS 2010	1.0	1.9	1.4	1.4	1.5	1.5	2.2	1.5

*some data refers to SDHS 2000; **Some data refers to the MICS 2006

Source: UNICEF 2013 (column 1); authors' synthesis from DHS, MICS datasets.

***Data from Population and Health Survey 2010

°Group 1: Very high prevalence countries (>80%); Group 2: Moderately high prevalence countries (80%|- 51%); Group 3: Moderately low prevalence countries (50%|- 26%); Group 4: Low prevalence countries (25%|- 10%); Group 5: Very low prevalence countries (<10%).

3. Implementing corrected indirect estimates

The first step of our method is the updating of national estimates for the country of origin to a certain year of interest *y*; the second step is the application of the selection hypothesis to these updated national estimates.

3.1 Updating national estimates

The preliminary operation is a correction of the prevalence from DHS/MICS data up to a particular year *y* of interest, in order to include the variation observed across generations (WH3). This update is needed since national surveys are performed in different years.

In order to update the estimates up to *y* it is necessary to have a reliable age structure for each country of origin in the year *y* and the prevalence of FGM/C in each country's age group.

This structure can be obtained by 1) UN country data by gender and 5-year age classes, if available for the year of interest, or 2) 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 (Yoder and Shanxiao 2013). 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.

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 is 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) is less likely to hold and therefore (a'), the number of incoming young girls, may be 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 is available or estimated, the expected number of mutilated/cut women is obtained by simply applying the updated punctual age prevalence to every single age year. As prevalence is available from DHS/MICS data by 5-year age classes and data are not usually available for girls younger than 15 at the time of the survey, two further hypotheses are 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 is therefore calculated as follows:

- Let *y* be the year of reference of the new estimates
- 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 x 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 in-between the year of the national survey and the year y of the estimation
- Let $m_{x,x+a-1}$ be the prevalence of mutilated women for the age class $x, x + a - 1$

The updated prevalence m_y 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:

$$m_y = \frac{\sum_{x=15-t}^{19}(P_x^*)(m_{x,x+a-1}) + \cdots + \sum_{x=45}^{49-t}(P_x^*)(m_{x,x+a-1})}{\sum_{x=15-t}^{19}(P_x^*) + \cdots + \sum_{x=45}^{49-t}(P_x^*)}$$

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

$$m_y = \frac{\sum_{x=15-t}^{19}(P_x^*)(m_{x,x+a-1}) + \cdots + \sum_{x=40}^{49-t}(P_x^*)(m_{x,x+a-1})}{\sum_{x=15-t}^{19}(P_x^*) + \cdots + \sum_{x=40}^{49-t}(P_x^*)}$$

For older surveys (e.g., when $a > 5$) in countries where the prevalence of mutilated women is steadily decreasing, the estimated updated prevalence among younger girls may be obtained 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.

In this case: for $a = 5$ and $a = 5 < t < 10 = 2a$ let m'_x be the estimated prevalence for the estimated ages prior to $P_{15,19}$ and

$$m'_{15-(t-a),15,} = m_{15,19}\frac{m_{15,19}}{m_{20,24}}$$

$$m_y = \frac{\sum_{x=15-(t-a)}^{15}(P_{15,19}^*)(m'_{15,15-(t-a)}) + \sum_{x=15}^{19}(P_x^*)(m_{x,x+a-1}) + \cdots + \sum_{x=40}^{49-t}(P_x^*)(m_{x,x+a-1})}{\sum_{x=15-(t-a)}^{15}(P_x^*) + \sum_{x=15}^{19}(P_x^*) + \cdots + \sum_{x=40}^{49-t}(P_x^*)}$$

3.2 Application of the selection hypothesis

According to the Selection Hypothesis (WH1), the expected prevalence amongst migrant women should be closer to the level observed among higher-educated, wealthier, urban and younger women in the countries of origin (Table 2) than the overall national level.

Consequently a more realistic estimate is 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 (3.1). The arithmetic mean is 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 in the year *y-t* of the original survey
- Let m_y be the expected updated prevalence in the practicing country in the year *y*
- 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 in the year *y-t* of the original survey
- Let m_{urb} be the prevalence rate estimated at the national level through the DHS or MICS survey for women settled in urban areas in the year *y-t* of the original survey
- 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 in the year *y-t* of the original survey
- 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 in the year *y-t* of the original survey

The predicted updated prevalence in emigration m'_y for each country of origin will therefore be defined as:

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

4. Case study: Estimating the prevalence of women with FGM/C in the Italian region of Lombardy by nationality

In this section we applied the proposed method to the Italian region of Lombardy. The Italian region of Lombardy is chosen as a case study because direct estimates for women from selected countries of origin are available for the year *y*=2010 and provide us with a unique opportunity to compare direct and indirect estimates of prevalence. Direct estimates are taken from the Regional Survey on the Prevalence of Women at Risk of FGM/C (Farina 2010; Farina and Ortensi 2014; Table 5).

Updated national FGM/C prevalence rates calculated according to paragraph 3.1 are reported in Table 3.

Table 3: Prevalence of women with FGM/C according to national surveys and to the application of the updated national prevalence.

	National prevalence from last DHS/MICS survey m	Year of last DHS/ MICS survey	Updated national prevalence 2010 m_y
Egypt	91.1	DHS 2008	90.1
Eritrea	83.0	PHS2010	83.0
Senegal	25.7	DHS 2010	25.7
Cote d'Ivoire	36.4	MICS 2006	34.9
Burkina Faso	75.8	DHS 2010	75.8
Nigeria	29.6	DHS 2008	28.8
Ethiopia	74.3	DHS 2005	71.3
Somalia	97.9	MICS 2006	97.7
Ghana	3.8	MICS 2006	3.2
Yemen*	38.2	PAPFAM 2003	38.2
Benin	12.8	DHS 2006	12.1
Cameroon	1.4	DHS 2004	1.1
Central African Rep	25.7	MICS 2006	24.3
Chad	44.2	MICS 2010	44.2
Gambia	76.3	MICS 2010	76.3
Djibouti	93.1	MICS 2006	92.6
Guinea	95.6	DHS 2005	94.4
Guinea Bissau	50.0	MICS 2010	50.0
Kenya	27.1	DHS 2008	25.4
Liberia	65	DHS 2007	62.5
Mali	88.5	MICS 2010	88.5
Mauritania	72.2	MICS 2007	71.4
Niger	2.2	MICS 2006	2.2
Sierra Leone	88.3	MICS 2010	88.3
Sudan	65.5	SHHS 2010	65.5
Tanzania	14.6	DHS 2010	14.6
Togo	3.9	MICS 2010	3.9
Uganda	1.4	DHS 2010	1.4

*Information needed to update the prevalence is unavailable for these countries. The original prevalence is applied.

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

Table 4: Coefficients, estimated prevalence, and estimated number of women with FGM/C 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_y	Ratios' mean	m'_y	Expected variation $m - m'_y$
Egypt	91.1	0.89	0.93	0.96	0.86	90.1	0.91	**82.0**	-9.1
Eritrea	88.7	0.88	0.97	0.94	0.95	84.8	0.94	**69.4**	-19.3
Senegal	25.7	0.93	0.91	0.74	0.57	25.7	0.79	**20.3**	-5.4
Cote d'Ivoire	36.4	0.77	0.93	0.42	0.64	34.9	0.69	**24.1**	-12.3
Burkina Faso	75.8	0.76	0.91	0.97		75.8	0.88	**66.7**	-9.1
Nigeria	29.6	0.73	1.24	1.26	1.32	28.7	1.14	**32.8**	+3.2
Ethiopia	74.3	0.84	0.92	0.86	0.95	71.3	0.89	**63.6**	-10.7
Somalia	97.9	0.99	0.99	0.98	0.98	97.6	0.99	**96.4**	-1.5
Ghana	3.8	0.87	0.92	0.50		3.2	0.76	**2.4**	-1.4
Yemen*	38.2	0.51	0.59	0.89	0.69	38.2	0.67	**25.6**	-12.6
Benin	12.8	0.62	0.92	0.13	0.40	12.1	0.52	**6.2**	-6.6
Cameroon	1.4	0.29	0.64	0.29		1.1	0.40	**0.5**	-0.9
Central African Rep.	25.7	0.73	0.81	0.53	0.56	24.5	0.66	**15.9**	-9.8
Chad	44.2	0.93	1.03	0.70	0.14	44.5	0.70	**31.0**	-13.3
Gambia	78.3	0.98	0.95	0.94	0.89	78.7	0.94	**72.0**	-6.3
Djibouti	93.1	0.96	1.00	0.97		92.5	0.98	**90.6**	-2.5
Guinea	95.6	0.93	0.98	0.94		94.4	0.95	**89.9**	-5.7
Guinea Bissau	50.0	0.97	0.83	0.55	0.81	44.5	0.79	**39.9**	-10.1
Kenya	27.1	0.54	0.61	0.70	0.57	26.2	0.61	**15.4**	-11.7
Liberia	65.0	0.68	0.69	0.64	0.61	64.0	0.65	**40.8**	-24.2
Mali	85.2	1.03	1.05	1.03	1.08	85.1	1.05	**92.7**	+7.5
Mauritania	71.3	0.91	0.90	1.00	0.81	69.5	0.91	**64.7**	-7.5
Niger	0.2	0.05	0.00	0.00		0.2	0.02	**0.0**	-2.2
Sierra Leone	88.3	0.79	0.91	0.84	0.86	88.3	0.85	**75.2**	-13.1
Sudan	69.4	1.28	1.27	1.08	1.18	69.4	1.20	**78.9**	+13.4
Tanzania	17.7	0.49	0.53	0.21	0.43	16.6	0.42	**6.1**	-8.5
Togo	3.9	0.28	0.74	0.21	0.41	3.9	0.41	**1.6**	-2.3
Uganda	1.4	0.71	1.00	1.07	1.07	1.4	0.96	**1.4**	-0.1

Source: Authors' elaborations on DHS/MICS data.

All communities except those from Nigeria, Mali, and Sudan show a lower expected prevalence in emigration than in their countries of origin. This expected reduction is higher for Liberia, Sierra Leone, and Chad.

In Nigeria the prevalence rate 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 is 3.2% higher than the DHS survey result. An even higher increase in emigration is expected for Sudan (+11%) and Mali (+7.5) where the prevalence is higher for all of the selected subgroups.

Table 5 compares direct and indirect estimates for countries with both sets of information available. For countries where FGM/C is widespread (Group 1) the a priori estimate is quite accurate, with the difference between direct and indirect estimates below 10%. Close results are also observed for Cote d'Ivoire and Burkina Faso in Groups 3 and 2, the typologies with a less-expected level of reliability of indirect estimates. Greater differences are instead observed for the other countries in these groups – Senegal, Ethiopia, and Nigeria – even if the direction of the expected variation as compared with the country of origin is predicted correctly. In the case of Nigeria the increase is largely underestimated as a result of a strong geographical selection of migration flow of Nigerian women to Lombardy, who mainly originate from the area of Benin City. For the only country in Group 5 (Ghana) there is also good correspondence between the two estimates as expected.

Table 5: Estimated prevalence of women with FGM in Lombardy (2010) according to indirect estimation and survey data.

Countries	Prevalence in Lombardy among first generation migrants $\overline{m}'$ [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	3	-	-1.3
Burkina F.	65.7	75.8	66.7	2	-	-1.0
Egypt	76.7	90.1	82.0	1	-	-5.3
Ethiopia	56.4	71.3	63.6	2	-	-7.2
Ghana	4.2	3.2	2.4	5	+	+1.8
Nigeria	75.3	28.7	32.8	3	+	+42.5
Senegal	5.9	25.7	20.3	3	-	-14.4
Somalia	91.5	97.0	96.4	1	-	-4.9
Eritrea	67.2	83.0	69.4	1	-	-2.2

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

5. Conclusion

The migration from Africa to western countries is likely to persist and even further increase (OECD 2009; Bossard 2009). Therefore, the occurrence of FGM/C is a topic that is likely to become more important in western countries.

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 towards indirect estimation as the main method.

The proposed indirect estimates method is an easy and cost-effective technique applicable to any country that has data about foreign-born women by country of birth.

The Italian case study confirmed the migrant selection effect and showed that the method correctly predicts the direction of the variation in the expected prevalence and approximates direct estimates fairly well, especially those with a very high or low prevalence. Ignoring the effect of migrant selection resulted in a general overestimation of the phenomenon.

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