

Supplementary Table 1. Search strategy

Database	Search Terms
PsycINFO	1 Female Genital Mutilation;2 Female Circumcision;3 Female Genital Cutting; 4 Female Genital Alteration; 5 or/1-4; 6 Limit 5 by 2009-2020
Embase	1 'female genital mutilation'/exp; 2 'female genital mutilation'; 3 or/1-2; 4 'female'/exp; 5 female; 6 or/4-5; 7 genital; 8 'mutilation'/exp; 9 mutilation;10- or/8-9;11 7 and 10; 12 11 and 6; 13 Limit 12 by 2009-2020
Ovid Medline	1 female.mp.; 2 Girl*.mp.; 3 wom?n.mp.; 4 or/1-3; 5 adj3 genital*.mp.; 6 adj3 mutilation.mp.; 7 adj3 circumcis*.mp.; 8 adj3 cut*.mp.; 9 adj3 alter.mp.; 10 adj3 alteration.mp.; 11 or/5-10 (1448); 12 4 and 11; 13 Female Genital Mutilation.mp.; 14 Female Circumcision.mp.; 15 Female Genital Cutting.mp.; 16 Female Genital Alteration.mp. (1629); 17 or/13-16; 18 Circumcision, Female.sh. / (1322); 19 12 or 17 or 18 (2024); 20 limit 4 to yr="2009 -Current" (1066)
Web of Science	1 Female Genital Mutilation; 2 Female Circumcision;3 Female Genital Cutting; 4 Female Genital Alteration, 5 or/1-4; 6 Limit 5 by 2009-2020

Supplementary Table 2: Characteristics of studies included in the systematic review

	Author (year)	Date publication; data collection year	Sampling Method	Sampling method for non-FGM	Self-report or examination	Country of origin; Host country (if different)	Region	Total sample size	Total FGM	Participant description (representing group being compared)	Age Group	Risk of Bias
African Region												
1	Nonterah, et al. ¹	2020; 2003-2013	Pregnancy records database.	Pregnancy records database.	Examination	Ghana	Kassena-Nankana district-North Eastern Ghana	9306	1647	Women who delivered at the targeted hospital	Less than 20 to more than 35	High
2	Greis, et al. ²	2020; 2017	Two-part stratified sampling procedure for villages; a random sample of participant	Those who reported not having FGM or unsure of their FGM status	Self-report	Burkina Faso	10 villages and one sector of Nouna town	696	301	Adolescents aged 12-20	12-20	Unclear
3	Njoku, et al. ³	2020; (2018-2019)	Hospital-based; systematic sampling	For each participant with FGM being recruited, 2 consecutive participants were recruited.	Examination	Nigeria	Calabar, Nigeria	450	150	Pregnant women	Under 19 to more than 40	High
4	Sylla, et al. ⁴	2020, 2012	Multi-facility based; whole sample	Multi-facility based; whole sample	Self-report (head of household)	Mali	Bamako	1920	1027	Girls aged 0-15	0-15	Unclear
5	Kandala, et al. ⁵	2019; (Only 2014 used)	Multi-stage cluster sampling (DHS)	Multi-stage cluster sampling (DHS)	Mother's report	Kenya	National	12,434	373	Girls of mothers of reproductive age	0-14	Low
6	Anikwe, et al. ⁶	2019; 2012	Facility-based; random sampling	Purposive (women who delivered in the facility within 24 h of selection of a case).	Examination	Nigeria	Abakaliki, Ebonyi, Nigeria	260	260	Pregnant women	Less than 20 to more than 35	Unclear
7	Kandala and Shell-Duncan ⁷	2019; (Only 2010-2011 used)	Multi-stage cluster sampling (DHS)	Multi-stage cluster sampling (DHS)	Self-report	Senegal	National	15668	4408	Women	15-49	Low
8	Boyle and Svec ⁸	2019; (2010-2014)	Multi-stage cluster sampling (Multiple DHS surveys)	Multi-stage cluster sampling (Multiple DHS surveys)	Mother's report	Multiple Countries *	NA	12,144	6606 **	Women who had daughters aged older than FGM normative age within their regions	Daughters older than normative age in different regions	Unclear
9	Beller and Kröger ⁹	2018; (2008-2009)	Stratified random sampling	Parents who do not have a daughter with FGM	Parent's report	Multiple African countries **	Same	Mothers (n= 6,299) and Fathers (n= 6,778)	Not reported	Parents who have a daughter (study examining daughters with FGM)	Not indicated	High
10	Sakeah, et al. ¹⁰	2018; NA	Two-stage sampling method then proximity selection to select subsequent household	Two-stage sampling method	Self-report	Ghana	Bawku municipality & Pusiga District	830	Pusiga District - 273, Bawku Municipality -236	Women of reproductive age	15-49	Unclear
11	Ojo and Ijadunola ¹¹	2017, 2013	Multistage cluster sampling (DHS)	Same	Self-report	Nigeria	National	38,948	9,652	Women of reproductive age	15-49	Low
12	Gebremariam, et al. ¹²	2016; 2014	School-based, multistage stratified random sampling	School-based, multistage stratified random sampling	Self-report	Ethiopia	Jigjiga district	662	538	High school & college students	15-24	Unclear
13	Gajaa, et al. ¹³	2016; 2014	Cluster sampling	Women from the sample who do not have a daughter with FGM	Mother's report	Ethiopia	Hababo Guduru District	610 Mothers with at least one daughter under 15	293 Daughters	Women with at least one daughter under 15 years	0-15	Low
14	Andualem ¹⁴	2016; 2014	Household based; systematic random sampling	Household based; systematic random sampling	Mother's report	Ethiopia	East Gojjam Zone, Western Amhara	805 Daughters	403 Daughters	Women who had daughters less than 5 years	0-5	Unclear

15	Oljira, et al. ^{15**}	2016; 2013	Multistage cluster sampling (Harar Health and Demographic Surveillance System 2013)	Multistage cluster sampling	Mother's report	Ethiopia	Harar	842 Daughters	160 Daughters	Women with at least one daughter younger than 12 years	0-12	Unclear
16	Ashimi, et al. ¹⁶	2015; 2014	Multi-facilities; systematic random sampling	Multi-facilities; systematic random sampling	Examination and mother's report	Nigeria	Three clinics, Birnin Kudu, Jigawa state	461 Mothers of infants	215	Infants presenting to clinics	Less than 1	Unclear
17	Ifeanyichukwu, et al. ¹⁷	2015; 2014	Household; cluster sampling	Household; cluster sampling	Self-report	Nigeria	Okada Community - Edo State	325	90	Women of reproductive age	15-49	Unclear
18	Chikhungu and Madise ¹⁸	2015 (Only DHS 2010 used)	Multistage cluster sampling	Multistage cluster sampling	Self-report	Burkina Faso	National	17,807	13,551	Women	15-49	Low
19	Bogale, et al. ¹⁹	2014; 2014	Household; stratified random sample	Household; stratified random sample	Self-report	Ethiopia	Bale zone	634	486	Childbearing age women	15-49	Unclear
20	Besera and Roess ²⁰	2014; 2002	Multi-stage cluster sampling (DHS)	Women from the sample who doesn't have a daughter with FGM	Mother's report	Eritrea	National	8754 Mothers	3168 had at least one daughter with FGM	Women with at least one daughter	Daughters of women of reproductive age	Low
21	Tamire and Molla ²¹	2013; 2011	Multi-school based; multi-staged cluster sampling method	Multi-school based; multi-staged cluster sampling method	Self-report	Ethiopia	Hadiya zone, Southern Ethiopia	797	641	High school students	13-25	Unclear
22	Bjälkander, et al. ²²	2013; (2010-2012)	Facility-based; Purposive	Facility-based; Purposive	Self-report and examination	Sierra Leone	Northeastern Sierra Leone	554	451	Attended antenatal clinics	12-47	Unclear
23	Garba, et al. ²³	2012; 2011	Hospital-based; purposive	Hospital-based; purposive	Mother's report	Nigeria	Kano, Northern Nigeria	200	26	Infants in Aminu Kano Teaching Hospital	Less than 1	High
24	Yirga, et al. ²⁴	2012; 2008	Household; Systematic random sampling	Household; Systematic random sampling	Self-report	Ethiopia	Kersa district, East Hararge, Oromia region, Ethiopia	858 mothers (858 daughters) – determinants for both groups studied	Mothers with FGM-792, Mothers with 1 or more daughters with FGM- 288	Women of reproductive age	15-49	Unclear
25	Iliyasu, et al. ²⁵	2012; missing	University-based; multistage sampling	University-based; multistage sampling	Self-report	Nigeria	Bayero University, Kano, Kano State, Northern Nigeria	359	43	University Students	17-40	Unclear
26	Mudege, et al. ²⁶	2012; missing	Community based-every household	Community based-every household	Self-report	Kenya	Korogocho and Viwandani, informal settlements in Nairobi	527	323	Girls/women in informal settlements	12-24	High
27	Shay, et al. ²⁷	2010; 2008	Multi-school-based sample; random sample	Multi-school-based sample; random sample	Parent's or families report	Ethiopia	Adis Ababa	407	106	School girls	Under 5 to above 20 [the majority were in the age group 10-15]	High
28	Mitike and Deressa ²⁸	2009; 2004	Household sample; systematic sampling method	Household sample; systematic sampling method	Parent's report	Somalia; Ethiopia	Somali refugee camps in the Somali Regional State in Eastern Ethiopia.	288	122	492 Parents	12+	Unclear
29	Im, et al. ²⁹	2019; 2013	Snowballing	Snowballing	Self-report	Somalia; Kenya	Eastleigh	143	Not reported	Refugees	15-35	High
Eastern Mediterranean Region (EMR)												
1	Abdulah, et al. ³⁰	2019; 2017	Two stage random sampling	Two stage random sampling	Mother's-report	Iraq	Iraqi Kurdistan region (Duhok, Erbil, and Sulaiymani y)	5048 daughters	2361 daughters	Mothers and their daughters	All age groups	Unclear

2	Rouzi ³¹	2019; 2016-2017	Facility based; purposive	Same	Self-report	Saudi, Naturalized Saudi, and non-Saudi; Saudi Arabia	Jeddah	963	175	Women attending clinics	18-75	Unclear
3	Alosaimi, et al. ³²	2019; (2008-2009)	Multistage sampling	Same for women; For daughters, the control group were mothers without a daughter subjected to FGM/C	Mother's report	Yemen	National	7076 Women with at least one daughter	Women-3384, Daughters (at least one)-2405	Women with at least one daughter with FGM	Daughters of mothers	Unclear
4	Minsart, et al. ³³	2015; 2012-2014	Facility-based, whole sample	Facility-based, whole sample	Examination	Djibouti	Djibouti-City	614	643	Mothers of live births and stillbirths (excluding mothers from West Africa and Europe)	Less than 25 till more than 35	High
5	Elduma ³⁴	2018; 2014	Multistage cluster sampling (MICS)	Multistage cluster sampling (MICS)	Self-report	Sudan	National	21947	19451	Women	15-49	Low
6	Ali, et al. ³⁵	2018; 2017	Cluster and systematic random sampling	Cluster and systematic random sampling	Self-report	Egypt	Beni-Suef	3353	1846	Young women	12-25	Unclear
7	Milaat, et al. ³⁶	2018; 2017	Cluster random sampling for the region followed by multi-stage random sampling for the household	Cluster random sampling for the region followed by multi-stage random sampling for the household	Report of the head of the household	Saudi Arabia	Hali semi-urban region.	218	175	Girls less than 18 years	0-18	Unclear
8	Arafa, et al. ³⁷	2018; (2016-2017)	University-based sample; multi-stage random sampling	University-based sample; multi-stage random sampling	Self-report	Egypt	Beni-Suef University	1723	815	University Students	Mean age=20.89	Unclear
9	Ahmed, et al. ³⁸	2017; (2015-2016)	Multi-facility; purposive	Multi-facility; purposive	Self-report	Egypt	Suez Canal University	204	135	Students attending clinic	14-19	Unclear
10	Abdel-Aleem, et al. ³⁹	2016; (2011-2014)	Facility based; purposive	Facility based; purposive	Examination	Egypt	Assiut and Sohag	430	376	Recently married women	17-31	High
11	Abolfotouh, et al. ⁴⁰	2015; (2012-2013)	Organization-based; convenient (google survey)	Organization-based; convenient	Self-report	Egypt	Not Applicable (online)	320	47	Medical Students	Not indicated	High
12	Dehghankh alili, et al. ⁴¹	2015; (2010-2013)	Multi-facility based; purposive	Multi-facility based; purposive	Examination	Iran	Hormozgan, Southern Iran	780	535	Women and girls attending clinic	14-38	Unclear
13	Mohammed, et al. ⁴²	2014; (2011-2012)	Computer based multi-stage random sampling	Computer based multi-stage random sampling	Examination	Egypt	Ismailia	2106	1911	Sexually active women	15-45	High
14	Ali, et al. ⁴³	2013; 2012	Multi-school based; random	Multi-school based; random	Self-report	Sudan	Kassala, Eastern Sudan	972	810	School girls	9-16	High
15	Saleem, et al. ⁴⁴	2013; 2011	Multi-facility based; purposive	Multi-facility based; purposive	Self or parent report	Iraq	Kurdistan region	1508	348	Females visiting PHCs	Up to 20	Low
16	Yasin, et al. ⁴⁵	2013; (2007-2009)	Multi-facility-based sample, a convenient sampling	Multi-facility-based sample, a convenient sampling	Examination and Self-report	Iraq	Erbil, Kurdistan Region, Iraq	1987	1397 (self-reported), 1164 (examination)	Women and girls attending clinic	15-49	High
17	Zayed and Ali ⁴⁶	2012; missing	Community-based; random sample	Community-based; random sample	Self-report	Egypt	Cairo & Giza	244	156	Muslim females between the age of 5 and 30 years.	Up to 30	High
18	Rasheed, et al. ⁴⁷	2011; (2008-2010)	Multi-facility based; all those presenting to certain clinic	Multi-facility based; all those presenting to certain clinic	Self-report and parent report	Egypt	Sohag and Qena	4158	3711	Young women and girls attending clinics	5-25	High
European Region												
1	Koschollek, et al. ⁴⁸	2020; (2015-2016)	Community-based, convenience sampling	Community-based, convenience sampling	Self-report	Multiple Countries; Germany	Six cities Munich, the Rhine-Ruhr region, Cologne, Berlin, Frankfurt	1044	281	Migrants from Saharan Africa	Not indicated	High

							am Main, and the region of Hanover					
2	Mbanya, et al. ⁴⁹	2018; 2014	Respondent driven sampling	Respondent driven sampling	Self-report	Somalia; Norway	Oslo	159	82	Migrants	Not indicated	High
3	Koukkula, et al. ⁵⁰	2016; (2010-2012)	National Registry; Random sample	National registry; random sample	Self-report	Somali or Kurdish origins; Finland	Helsinki, Espoo, Vantaa, Turku, Tampere, Vaasa	389 (224 Kurdish and 165 Somali)	Somali Origins - 50, Kurdish Origins - 153	Immigrants	18-64	High
Region of the Americas												
1	Akinsulure-Smith and Chu ⁵¹	2017; (1996-2014)	Whole database (NYU Program for Survivors of Torture)	Whole database (NYU Program for Survivors of Torture)	Self-report	Multiple countries, USA [#]	New York	514	133	African born women, Survivors of Torture	Average age =34.3	Unclear
2	Chu and Akinsulure-Smith ⁵²	2016; 2014	Community based, convenience	Community based, convenience	Self-report	Multiple countries [†] ; USA	New York	68	36	Migrants over 18 years	18+	Unclear
3	Akinsulure-Smith ⁵³	2012; missing	Community based; Purposive	Community based; Purposive	Self-report	Sierra Leon and Liberia; USA	New York	23	7	Immigrants from West Africa	20-57	High
West Pacific Region												
1	Gibson-Helm, et al. ⁵⁴	2015; (2002-2011)	Whole electronic database	Whole electronic database	Examination	Multiple Countries; Australia	North Africa, Middle and East Africa, West Africa	2173	78	Migrants/ refugees at a pregnancy clinic	From less than 20 to more than 35	High

* Six DHS surveys: Burkina Faso 2010, Egypt 2014, Guinea 2012, Kenya 2014, Mali 2012-2013, and Nigeria 2013

** Mothers had a daughter subjected to FGM

*** The survey was conducted in 19 African countries (Botswana, Cameroon, Chad, Democratic Republic of Congo, Djibouti, Ethiopia, Ghana, Guinea Bissau, Kenya, Liberia, Mali, Mozambique, Nigeria, Rwanda, Senegal, South Africa, Tanzania, Uganda, and Zambia)

****After a close examination of the work-study, we found an error in the calculation of a number of the odds ratios, i.e., the reference category and the reported direction of the odds ratio. Results reported in this manuscript represent corrections to the odds ratio calculations

Participants from Guinea, Cameroon, Sierra Leone, Zaire/Democratic Republic of Congo, Cote d'Ivoire, Burkina Faso, Congo, Liberia, Mauritania

† Sierra Leone, Guinea, Mali, Gambia

References

1. Nonterah EA, Kanmiki EW, Agorinya IA, et al. Prevalence and adverse obstetric outcomes of female genital mutilation among women in rural Northern Ghana. *European Journal of Public Health* 2020;30(3):561-67.
2. Greis A, Bärnighausen T, Bountogo M, et al. Attitudes towards female genital cutting among adolescents in rural Burkina Faso: a multilevel analysis. *Tropical Medicine & International Health* 2020;25(1):119-31.
3. Njoku C, Emechebe CI, Njoku A, et al. Obstetric Outcomes of Parturients with Female Genital Mutilation in a Tertiary Hospital in Nigeria. *Research Journal of Obstetrics & Gynecology* 2020;13
4. Sylla M, Léonie F, Diakité F, et al. 1. Aspects épidémiologiques, cliniques, socio-culturels et économiques des mutilations génitales féminines dans le district de Bamako au Mali. *Journal of Obstetrics and Gynaecology Canada* 2020;42(2):e15.
5. Kandala N-B, Nnanatu CC, Atilola G, et al. A spatial analysis of the prevalence of female genital mutilation/cutting among 0–14-year-old girls in Kenya. *International Journal of Environmental Research and Public Health* 2019;16(21):4155.
6. Anikwe CC, Ejikeme BN, Obiechina NJ, et al. Female genital mutilation and obstetric outcome: A cross-sectional comparative study in a tertiary hospital in Abakaliki South East Nigeria. *European Journal of Obstetrics & Gynecology and Reproductive Biology* 2019;1:100005.
7. Kandala N-B, Shell-Duncan B. Trends in female genital mutilation/cutting in Senegal: what can we learn from successive household surveys in sub-Saharan African countries? *International Journal for Equity in Health* 2019;18(1):25.
8. Boyle EH, Svec J. Intergenerational transmission of female genital cutting: community and marriage dynamics. *Journal of Marriage and Family* 2019;81(3):631-47.
9. Beller J, Kröger C. Differential effects from aspects of religion on female genital mutilation/cutting. *Psychology of Religion and Spirituality* 2018;13(4):381–89.
10. Sakeah E, Debpuur C, Oduro AR, et al. Prevalence and factors associated with female genital mutilation among women of reproductive age in the Bawku municipality and Pusiga District of northern Ghana. *BMC Women's Health* 2018;18(1):150.
11. Ojo TO, Ijadunola MY. Sociodemographic factors associated with female genital cutting among women of reproductive age in Nigeria. *The European Journal of Contraception & Reproductive Health Care* 2017;22(4):274-79.
12. Gebremariam K, Assefa D, Weldegebreal F. Prevalence and associated factors of female genital cutting among young adult females in Jijiga district, eastern Ethiopia: a cross-sectional mixed study. *International Journal of Women's Health* 2016;8:357.
13. Gajaa M, Wakgari N, Kebede Y, et al. Prevalence and associated factors of circumcision among daughters of reproductive aged women in the Hababo Guduru District, Western Ethiopia: a cross-sectional study. *BMC Women's Health* 2016;16(1):42.
14. Andualem M. Determinants of female genital mutilation practices in East Gojjam Zone, Western Amhara, Ethiopia. *Ethiopian Medical Journal* 2016;54(3):109-16.
15. Oljira T, Assefa N, Dessie Y. Female genital mutilation among mothers and daughters in Harar, eastern Ethiopia. *International Journal of Gynecology & Obstetrics* 2016;135(3):304-09.
16. Ashimi AO, Amole TG, Iliyasu Z. Prevalence and predictors of female genital mutilation among infants in a semi urban community in northern Nigeria. *Sexual and Reproductive Healthcare* 2015;6(4):243-48.
17. Ifeanyichukwu OA, Oluwaseyi A, Adetunji L. Female genital mutilation: Attitude and practices among women in Okada community, Edo state. *Journal of Medicine & Biomedical Research* 2015;14(2):138-50.
18. Chikhungu LC, Madise NJ. Trends and protective factors of female genital mutilation in Burkina Faso: 1999 to 2010. *International Journal for Equity in Health* 2015;14(1):42.
19. Bogale D, Markos D, Kaso M. Prevalence of female genital mutilation and its effect on women's health in Bale zone, Ethiopia: a cross-sectional study. *BMC Public Health* 2014;14(1):1076.
20. Besera G, Roess A. The relationship between female genital cutting and women's autonomy in Eritrea. *International Journal of Gynecology & Obstetrics* 2014;126(3):235-39.
21. Tamire M, Molla M. Prevalence and belief in the continuation of female genital cutting among high school girls: a cross-sectional study in Hadiya zone, Southern Ethiopia. *BMC Public Health* 2013;13(1):1120.

22. Bjälkander O, Grant DS, Berggren V, et al. Female genital mutilation in Sierra Leone: forms, reliability of reported status, and accuracy of related demographic and health survey questions. *Obstetrics and Gynecology International* 2013;2013:680926
23. Garba ID, Muhammed Z, Abubakar IS, et al. Prevalence of female genital mutilation among female infants in Kano, Northern Nigeria. *Archives of Gynecology and Obstetrics* 2012;286(2):423-28.
24. Yirga WS, Kassa NA, Gebremichael MW, et al. Female genital mutilation: prevalence, perceptions and effect on women's health in Kersa district of Ethiopia. *International Journal of Women's Health* 2012;4:45.
25. Iliyasu Z, Abubakar IS, Galadanci HS, et al. Predictors of female genital cutting among university students in northern Nigeria. *Journal of Obstetrics and Gynaecology* 2012;32(4):387-92. doi: 10.3109/01443615.2012.666582
26. Mudege NN, Egondi T, Beguy D, et al. The determinants of female circumcision among adolescents from communities that practice female circumcision in two Nairobi informal settlements. *Health Sociology Review* 2012;21(2):242-50.
27. Shay TZ, Haidar J, Kogi-Makau W. Magnitude of and driving factors for female genital cutting in schoolgirls in Addis Ababa, Ethiopia: A cross-sectional study. *South African Journal of Child Health* 2010;4(3):78-82.
28. Mitike G, Deressa W. Prevalence and associated factors of female genital mutilation among Somali refugees in eastern Ethiopia: a cross-sectional study. *BMC Public Health* 2009;9(1):264.
29. Im H, Swan LET, Heaton L. Polyvictimization and mental health consequences of female genital mutilation/circumcision (FGM/C) among Somali refugees in Kenya. *Women & Health* 2020;60(6):636-51.
30. Abdulah DM, Sedo BA, Dawson A. Female Genital Mutilation in Rural Regions of Iraqi Kurdistan: A Cross-Sectional Study. *Public Health Reports* 2019;134(5):514-21.
31. Rouzi AA, Berg RC, Alamoudi R, et al. Survey on female genital mutilation/cutting in Jeddah, Saudi Arabia. *BMJ Open*:(5)9;2019 e024684-e84.
32. Alosaimi AN, Essén B, Riitta L, et al. Factors associated with female genital cutting in Yemen and its policy implications. *Midwifery* 2019;74:99-106.
33. Minsart A-F, N'Guyen T-S, Ali Hadji R, et al. Maternal infibulation and obstetrical outcome in Djibouti. *The Journal of Maternal-Fetal & Neonatal Medicine* 2015;28(14):1741-46.
34. Elduma AH. Female genital mutilation in Sudan. *Open Access Macedonian Journal of Medical Sciences* 2018;6(2):430.
35. Ali HAAEW, Arafa AE, Abd Allah NAEF, et al. Prevalence of female circumcision among young women in Beni-Suef, Egypt: a cross-sectional study. *Journal of Pediatric and Adolescent Gynecology* 2018;31(6):571-74.
36. Milaat WA, Ibrahim NK, Albar HM. Reproductive health profile and circumcision of females in the Hali semi-urban region, Saudi Arabia: A community-based cross-sectional survey. *Annals of Saudi medicine* 2018;38(2):81-89.
37. Arafa AE, Elbahrawe RS, Shawky SM, et al. Epidemiological and gynecological correlates with female genital mutilation among Beni-Suef University students; cross sectional study. *Middle East Fertility Society Journal* 2018;23(3):184-88.
38. Ahmed MR, Shaaban MM, Meky HK, et al. Psychological impact of female genital mutilation among adolescent Egyptian girls: a cross-sectional study. *The European Journal of Contraception & Reproductive Health Care* 2017;22(4):280-85.
39. Abdel-Aleem MA, Elkady MM, Hilmy YA. The relationship between female genital cutting and sexual problems experienced in the first two months of marriage. *International Journal of Gynecology & Obstetrics* 2016;132(3):305-08.
40. Abolfotouh SM, Ebrahim AZ, Abolfotouh MA. Awareness and predictors of female genital mutilation/cutting among young health advocates. *International Journal of Women's Health* 2015;7:259.
41. Dehghankhalili M, Fallahi S, Mahmudi F, et al. Epidemiology, regional characteristics, knowledge, and attitude toward female genital mutilation/cutting in southern Iran. *The Journal of Sexual Medicine* 2015;12(7):1577-83.
42. Mohammed GF, Hassan MM, Eyada MM. Female genital mutilation/cutting: will it continue? *The Journal of Sexual Medicine* 2014;11(11):2756-63.
43. Ali AAA, Okud A, Mohammed AA, et al. Prevalence of and factors affecting female genital mutilation among schoolgirls in Eastern Sudan. *International Journal of Gynecology & Obstetrics* 2013;120(3):288-89.
44. Saleem RA, Othman N, Fattah FH, et al. Female genital mutilation in Iraqi Kurdistan: description and associated factors. *Women & Health* 2013;53(6):537-51.

45. Yasin BA, Al-Tawil NG, Shabila NP, et al. Female genital mutilation among Iraqi Kurdish women: a cross-sectional study from Erbil city. *BMC Public Health* 2013;13(1):809.
46. Zayed AA, Ali AA. Abusing female children by circumcision is continued in Egypt. *Journal of Forensic and Legal Medicine* 2012;19(4):196-200.
47. Rasheed SM, Abd-Ellah AH, Yousef FM. Female genital mutilation in Upper Egypt in the new millennium. *International Journal of Gynecology & Obstetrics* 2011;114(1):47-50.
48. Koschollek C, Kuehne A, Müllerschön J, et al. Knowledge, information needs and behavior regarding HIV and sexually transmitted infections among migrants from sub-Saharan Africa living in Germany: Results of a participatory health research survey. *PLOS ONE* 2020;15(1):e0227178.
49. Mbanya VN, Gele AA, Diaz E, et al. Health care-seeking patterns for female genital mutilation/cutting among young Somalis in Norway. *BMC Public Health* 2018;18(1):517.
50. Koukkula M, Keskimäki I, Koponen P, et al. Female genital mutilation/cutting among women of Somali and Kurdish origin in Finland. *Birth* 2016;43(3):240-46.
51. Akinsulure-Smith AM, Chu T. Exploring female genital cutting among survivors of torture. *Journal of Immigrant and Minority Health* 2017;19(3):769-73.
52. Chu T, Akinsulure-Smith AM. Health outcomes and attitudes toward female genital cutting in a community-based sample of West African immigrant women from high-prevalence countries in New York City. *Journal of Aggression, Maltreatment & Trauma* 2016;25(1):63-83.
53. Akinsulure-Smith AM. Exploring Female Genital Cutting Among West African Immigrants. *Journal of Immigrant and Minority Health* 2012;16(3):559-61.
54. Gibson-Helm ME, Teede HJ, Cheng IH, et al. Maternal health and pregnancy outcomes comparing migrant women born in humanitarian and nonhumanitarian source countries: a retrospective, observational study. *Birth* 2015;42(2):116-24.

Supplementary Table 3: The odds ratios and proportions of the main determinants of FGM/C

	Wealth	Mother's education	Father's Education	Urban vs. Rural	Religion	FGM family history	Mother's occupation	Father's occupation	Mother's age	Whether religion requires FGM	Mother's knowledge on FGM	Mothers' perception of FGM	Mother's marital status
Nonterah, et al. ¹							Unemployed: 62% Employed: 38% P-value <0.001						
Sakeah, et al. ²	Poor: Reference Middle: 0.98 (0.64-1.48) ^a Rich: 1.21 (0.80-1.85) ^a				Religions other than Islam: Reference Islam: 1.45 (0.73-2.91) ^a								
Greis, et al. ³	Lowest quartile: Reference Second quartile: 0.58 (0.26-1.3) ^a Third quartile: 0.95 (0.63-1.5) ^a Fourth quartile: 0.78 (0.38-1.58) ^a Highest quartile 1.66 (0.90-3.8) ^a	None: Reference Primary: 0.67 (0.32-1.37) ^a Post-primary: 0.17 (0.07-0.41) ^a Not applicable/no mother: 1.47 (0.63-3.40) ^a	None: Reference: Primary: 0.77 (0.36-1.68) ^a Post-primary or higher: 0.77 (0.42-1.39) ^a Not applicable/no father: 1.38 (0.61-1.39) ^a	Urban: Reference Rural: 0.83 (0.63-1.11) ^a	Muslim: Reference Catholic: 0.88 (0.55-1.41) ^a Animest: 1.15 (0.69-1.90) ^a Protestant: 0.18 (0.05-0.63) ^a					Cutting required: 4.24 (2.05-8.76) Do not know if cutting is required by religion: 1.20(0.52-2.78)			

Kandala and Shell-Duncan ⁴	Richer: Reference Poorest: 5.77 (4.55-7.33) Poorer: 3.35 (2.64 -4.27) ^a Middle: 2.16 (1.70-2.73) ^a Richer: 1.37 (1.05-1.79) ^a			Urban: Reference Rural: 0.78 (0.70-0.87) ^a	Other than Muslims: Reference Muslims: 2.52 (1.61-3.96) ^a								
Kandala, et al. ⁵	Middle: Reference Lower Quintile: 1.21 (0.76-1.99) Lowest quintile: 0.94 (0.58-1.59) Higher quintile: 0.86 (0.43-1.66) The highest quintile: 0.45 (0.18-1.00)	Higher: Reference No education: 1.25 (0.35-3.87) Primary: 0.71 (0.19-2.27) Secondary 0.76 (0.23-2.46)		Rural: Reference Urban: 1.31 (0.87-1.99)	Christian: Reference Muslim: 5.50 (2.65-10.60) ^a No religion: 1.10 (0.25-3.71) ^a	Mother is not subjected to FGM/C: Reference Mother is subjected to FGM/C: 1.97 (0.69-6.01) ^a	Mother's occupation is informal: 1.08 (0.61-1.9) Mother is not working: 0.62 (0.3-1.28) ^a		Wife's age is greater than husband: Reference Wife is 10 years younger than husband: 0.82 (0.44-1.77) Wife is 1-4 years younger: 0.79 (0.37-1.63) Wife is 5-9 years younger: 0.47 (0.23-1) Wife same age: 0.34 (0.12-1)	FGM required by religion: 1.5 (0.93-2.45) FGM not required by religion: Reference		Support discontinuation of FGM: Reference Supports the continuation of FGM: 3.08 (1.76-5.55) (Depends): 1.37 (0.49-3.26)	Currently married: Reference Currently married: Reference Formerly married: 0.92 (0.79, 1.16) Never: 0.94 (0.59, 1.59)
Mudege, et al. ⁶		Mother with at least primary level: 0.13 (0.02-0.64) ^a	Has primary education: 1.65 (0.32-8.41) ^a										
Milaat, et al. ⁷	Not enough: Reference Enough or more: 0.5 (0.19-1.18)	Less than university: Reference University and above: 0.55 (0.27-1.14)	Less than university: Reference University and above: 0.6 (0.31-1.18)				Professional: 1.8(0.39-8.16) Not Professional: Reference	Professional: 1.08(0.48-2.45) Not Professional: Reference	Above 18: Reference Age of mother at marriage is under 18 years 2.08 (0.69-6.29)				

Mitike and Deressa ⁸											Knew at least one FGM complication: Reference		
											Parents do not know any of FGM complications: 0.5 (0.2-1.2)		
Oljira, et al. ⁹	Monthly income > 1600: Reference ≤600: 0.7(0.4-1.2) ^a Monthly income 601-1000: 1.0(0.6-1.7) ^a ETB 1001-1600: 1.4 (0.7-2.9) ^a	University level: Reference Unable to read and write: 1.1(0.5-2.8) ^a Grade 1-4: 0.4 (0.2-0.9) ^a Grade 5-8: 0.9 (0.4-2.1) ^a Grade 9-10: 1.3 (0.5-3.5) ^a Grade 10-12: 0.9 (0.4-2.3) ^a			Protestant: Reference Muslim: 0.9 (0.4-2.4) ^a Orthodox: 1.4 (0.7-3.0) ^a Catholic: 0.5 (0.1-2.3) ^a	Mother subjected to FGM/C: 0.4 (0.2-0.8) ^a				Less than 24: Reference 25-29: 0.3 (0.1-0.9) ^a 30-34: 0.1 (0.0-0.5) ^a 35-39: 0.1 (0.0-0.4) ^a 40-44: 0.0 (0.0-0.2) ^a 45-49: 0.0 (0.0-0.1) ^a ≥50: 0.1 (0.0-0.2) ^a		Women do not know: Reference FGM should continue: 0.9 (0.2-4.7) FGM should not continue: 3.5 (0.8-15.9)	
Gajaa, et al. ¹⁰	<555 birr: Reference, 556-1233 birr: 0.91 (0.65-1.51) ^a >1233 birr: 0.24 (0.05-1.24) ^a	Illiterate: Reference Literate: 0.50 (0.28-0.91) ^a Primary and above: 0.42 (0.12-1.42) ^a	Rural: Reference Urban: 0.30 (0.17-0.51) ^a	Mother's religion Orthodox: Reference Protestant: 0.98 (0.46-2.09) ^a Traditional: 3.86 (1.14-13.07) ^a Father's religion: Protestant Christian: 0.62 (0.29-1.34) ^a Traditional: 0.22 (0.07-0.74) ^a		Housewife: Reference Student: 2.19(0.27-18.24) ^a Merchant: 1.71 (0.65-4.52) ^a Civil Servant: 0.80 (0.15-4.30) ^a			15-29: Reference 30-39: 1.95 (1.15-3.31) ^a 40-49: 2.56 (1.40-4.69) ^a	Mother knew FGM was criminal: Reference Mother does not know FGM was criminal: 5.00 (3.07-8.19)	Mother have a positive attitude on discouraging FGM: 0.26 (0.16-0.43)	Mother is married: Reference Mother is single: 1.36 (0.64-2.89) ^a	

Gebremariam, et al. ¹¹		Secondary: Reference Illiterate: 2.4 (1.3-4.3) ^a Primary: 0.96(0.5-1.7) ^a		Urban: Reference Rural: 4 (2.4-6.8) ^a	All Christian: Reference Muslim: 3.7 (1.1-12) ^a					FGM required: 1.7 (1.07-2.8) ^a Not required: Reference			
Yirga, et al. ¹²	<u>For mothers:</u> Not owning a radio: Reference Ownership of a radio: 1.187 (0.67–2.07) <u>For daughters:</u> Ownership of a radio: 1.716 (0.98–3.00)			Urban: Reference Rural: 0.116 (0.065–0.207).									
Tamire and Molla ¹³		High school and above: Reference Under high school: 1.84 (1.10-3.38) ^a	High school and above: Reference, Under high school: 2.04 (1.25-3.09) ^a	Urban: Reference, Rural: 1.97 (1.25-3.09) ^a	All Christians: Reference, Muslims:4.21 (1.01-17.00)		Currently employed: Reference, Farmer: 1.49 (0.63-3.53) ^a	Currently employed: Reference, Farmer: 1.2 (0.47-1.44) a					
Andualem ¹⁴		Literate: Reference Illiterate: 1.64 (1.24-2.36) ^a	Literate: Reference Illiterate: 1.78 (1.38-2.56) ^a	Urban: Reference Rural: 1.54 (1.09-2.50) ^a				Parent's age ≥25: Reference Parent's age <25: 0.61 (0.52-1.86)		Mother knew negative impacts of FGM: 0.89 (0.68-1.49) Mother did not know FGM had a negative impact: Reference Mother did not know FGM was		Married mothers: Reference Single: 0.86 [0.66-1.96]	

											criminalized: Reference		
											Mother knew FGM was criminal: 0.78 (0.72- 1.74)		
Elduma ¹⁵	Poorest: Reference, Second: 1.423 (1.237-1.635) ^a			Rural: Reference, Urban: 1.03 (0.90-1.18) ^a		Having a daughter subjected to FGM/C:36.8 (27.96-48.54) ^a							
	Middle: 2.614 (2.259-3.026) ^a												
	Fourth: 1.543 (1.257-1.893) ^a												
	Richest: 0.897 (0.662-1.216) ^a												
Dehghankh alili, et al. ¹⁶						Family history mother (94.6%)							
						P-value<0.001							
						Family history (sister): 66.4%							
						P-value<0.001							
						Family history (grandmother): 75%							
						Having a mother, sister or grandmother subjected to FGM is significantly associated with the practice							

						P-value <0.001							
Yasin, et al. 17		Intermediate school and higher education: Reference Illiterate: 1.5 (0.9-2.6) Read and write: 1.4 (0.7-2.8) Primary: 1.3 (0.7-2.5) ^a	Intermediate school and higher education: Reference Illiterate: 1.4 (1.1-1.9) Read and write: 1.6 (1.02-2.5) Primary school: 1.3 (0.9-1.8) ^a			Mother not subjected to FGM/C: Reference Subjected to FGM/C: 15.1 (10.6-21.6) Don't Know: 7.3 (4.4-12.0)^a							
Saleem, et al. 18		High school/Higher: Reference Basic education: 3.2 (1.5-6.6) None: 8.00 (3.8-16.5)^a											
Ali, et al. 19 (Egypt)		Illiterate: 34.1% Elementary: 25.9% High: 40% Higher level of education is protective P-value<0.01	Illiterate: 22.4% Elementary: 25.9% High: 51.5% Higher level of education is protection P-value<0.01	Significant difference between urban & rural areas prevalence of FGC in urban is 31.8% whereas in rural it is 75.4% P<0.001									
Ali, et al. 20 (Sudan)		Less than secondary: 1.5 (1-2.2)^a	More than secondary: Reference	Urban: Reference		Presence of sister subjected to FGM/C: 4.3 (3.1-5.9)^a	Housewife: 0.8 (0.5-1.5) ^a	Non-skilled worker: 0.7 (0.5-1.1) ^a					

			Less than secondary: 2.3 (1.5-3.4) ^a	Rural: 1 (0.7-1.6) ^a									
Arafa, et al. ²¹		Illiterate: Reference Literate OR:0.8	Illiterate: Reference Literate OR:0.91	Rural: Reference Urban OR: 0.55									
Mohammed , et al. ²²				Rural: 75% of type I; 66.7% of type II and 0% none. Urban: 25% of type I , 33.3% of type II FGM/C and 100% none. Statistically significant at P < 0.05									
Abdel-Aleem, et al. ²³				Rural: Reference Urban: 1.09 (0.61-1.93)									
Ahmed, et al. ²⁴	Economic level low: 64.4% Intermediate: 68.7% High: 61.4% P-value: 0.7	Illiterate 58.6% Primary: 63.8% Preparatory: 70.3% Secondary: 69.8% He P-value: 0.8	Illiterate: 61.8% Primary: 65.4% Preparatory: 68.8% Secondary: 67.4% Higher: 67.5% P-value: 0.9	Urban: 43% Rural: 91.8% Significantly higher among those living in rural areas P-value: 0.0001	Muslim: 66.8%, Christian: 60.0% P-value: 0.6								

Rasheed, et al. ²⁵	High socioeconomic status: Reference Low: 2.06(1.42-3.61) Moderate: 1.13 (0.88-2.24) ^a	Educated: Reference Illiterate: 2.16(1.33-2.95) Can read and write: 1.26 (0.88-2.61) ^a	Educated: Reference Illiterate: 1.98(0.56-3.06) Can read and write: 1.36 (0.98-2.15) ^a	Urban: Reference, Rural: 8.20 (2.77-6.21)^a	Christian: Reference, Muslim 1.04 (0.91-1.26) ^a	Mother not subjected to FGM: Reference Mother subjected to FGM: 9.12 (2.11-14.09)^a Presence of circumcised sisters: 6.28 (1.18-10.89)^a							
Chikhungu and Madise ²⁶		No education: Reference Primary: 0.80 (0.69-0.92)^a		Urban: Reference Rural: 1.61 (1.20-2.15)^a	Christian: Reference Muslim: 2.13 (1.86-2.45) Traditional and other religions: 1.44 (1.14-1.82)^a								
Besera and Roess ²⁷		Primary: 1.08 (0.85-1.38) Greater or equal to secondary: 0.54 (0.36-0.81)^a			Muslim: Reference Christian: 0.60 (0.45-0.79) ^a	Respondent the mother has FGM: 8.59 (5.63-13.10)^a			Less than 20: Reference 20-29: 2.47 (1.39-4.40) 30-39: 5.54 (3.06-10.03) 40-49: 11.90 (6.28-22.54) ^a				

²³ Alosaimi, et al. ²⁸ (Women)	Lowest tertile: Reference Second tertile: 0.63 (0.55-0.72) Highest tertile: 0.61 (0.53-0.69) ^a Housing quality: second quartile: 1.04(0.92-1.19) Highest quartile: 1.76(1.55-2.00) ^a												
Alosaimi, et al. ²⁸ (Daughter)	Lowest tertile: Reference Second tertile: 0.68 (0.57-0.82) Highest tertile: 0.70 (0.59-0.85) ^a Housing quality second quartile: 0.97 (0.81-1.17) Highest quartile: 1.18(0.99-1.41) ^a	Lowest tertile: Reference Second tertile: 0.79 (0.66-0.94) Highest tertile: 0.82(0.69-0.97)				Mother subjected to FGM/C: 7.40 (6.01-9.13) ^a			Mother aged less than 20 years: Reference Aged 20-35: 1.82 (1.51-2.18) Aged 36-49: 1.82 (1.51-2.18)			Mothers believing that the practice should not continue: Reference Should continue: 3.52 (3.10-4.00)	
Boyle and Svec ²⁹	Poorest: Reference Poor: 0.72 (0.59-0.86)	Less than primary: Reference Primary: 1.00 (0.84-1.2)		Rural: Reference, Urban: 0.71 (0.55-0.90)	Islam: 4.11 (3.45-4.89)	Mother subjected to FGM/C: 33.58 (25.51-44.21)	Mother earns cash: 0.99 (0.87-1.13)		Mother's age: 0.99 (0.98-1.00)				

	<p>Middle: 0.72 (0.59-0.86)</p> <p>Rich: 0.58 (0.47-0.71)</p> <p>Richest: 0.47 (0.36-0.61)</p>	<p>Secondary or higher: 0.62 (0.52-0.75)</p>												
Njoku, et al. ³⁰	<p>Social class: low: 47.2%</p> <p>Middle: 26.5%</p> <p>Upper 25%</p> <p>FGM was higher among those from low social class</p>													
Anikwe, et al. ³¹	<p>Social class 1: 6.8%, Social class 2: 12.9%, Social class 3: 38.8%, Social class 4: 38.3% social class 5: 15.3%, significant at social class 2 and 4</p> <p>P value:0.001</p>			<p>Urban: 54.8%</p> <p>Rural: 45.2%</p> <p>P value: 0.012</p> <p>The odds of a woman having FGM in the cohort of women residing in rural communities is 66% more than in the group in urban communities</p>										
Ashimi, et al. ³²		<p>Formal education (primary or secondary): Reference</p> <p>Informal education (Quranic form of education):</p>			<p>Islam: 49.8%</p> <p>Christianity: 0%</p> <p>P value: 0.001</p>		<p>Mother not employed: Reference</p> <p>Mother employed: 2.89(1.66-5.03)^a</p>							

		6.39 (3.99-10.23) ^a											
Ifeanyichukwu, et al. ³³					Not significant, Islam: 28.9% Christianity: 25% African traditional religion (ATR): 10% P-value > 0.99								
Iiyasu, et al. ³⁴					Muslim: Reference, Christian: 1.27 (0.55-2.97) ^a P-value: >0.99								
Garba, et al. ³⁵			Not significant (Fathers having secondary education and above versus fathers having less than secondary education) P value: 0.18	Residence (Urban versus rural) Not significant P-value: 0.12	Not significant (Islam versus Christianity) P value: 0.19								
Koschollek, et al. ³⁶					Christian: Reference Muslim: 3.44 (2.52-4.70) No, other, or unknown religion: 1.24(0.63-2.43)								

Beller and Kröger ³⁷		Mother's increased level of education: 0.72 (0.63-0.82)	Father's increased level of education: 0.75 (0.67-0.83)						Mother's increasing age: 1.12 (1.08-1.29)				
Koukkula, et al. ³⁸					Other than Muslim: Reference Muslim: 2.02 (1.12-3.63) ^a								
Shay, et al. ³⁹		Less than grade 10: 44.3% Grade 10 or higher and college level: 18.8% Significantly higher for girls of mothers who attained less than grade 10 P-value: 0.001	Less than grade 10: 51.3% Grade 10 or higher and college level: 20.2% Significantly higher at grade 10+ P-value: 0.001			Mother employed: 22.2% Mother not employed: 28.8% Not significant P-value: 0.08	Father employed: 24% Father not employed: 42.2% Significantly higher risk when the father is unemployed P-value: 0.009		Mother knew FGC has no religious grounds: 23% Mother did not know: 32.3%; significant P-value:0.03	Mother did not know that FGM was harmful: 24.4% Mother did not know that FGM was harmful: 50% Statistically significantly higher among mothers who do not know FGM is harmful P-value: 0.006			
Bjälkander, et al. ⁴⁰				Rural: Reference Urban : 1.98 (1.21-3.22) ^a	Christian: Reference Muslim: 2.0 (1.28-3.39) ^a								

Rouzi, et al. 41	<p><=US\$1330: 42.3%</p> <p>≈US\$1331– US\$2665: 32.6%</p> <p>More than US\$2665: 21.5%</p> <p>More wealth is a protective factor.</p>												
Akinslure- Smith 42					<p>Female Muslim participants had significantly higher rates of FGM/C compared to female Christian participants</p> <p>(4 out of 7 verses 2 out of 16)</p>								
Akinslure- Smith and Chu 43					<p>Muslim: 87.9%</p> <p>Christian: 11.4%</p> <p>Other: 0.8%</p> <p>Religion P<0.001</p>								
Sylla, et al. 44		<p>Qur'anic: 2.75 (2.00-3.78)</p> <p>Illiterate: 1.05-1.39</p> <p>Primary: 1.244 (1.07- 1.46)</p> <p>Secondary: 0.676 (0.58- 0.79)</p> <p>Higher education:</p>	<p>Qur'anic 2.206 (1.68-2.9)</p> <p>Illiterate 1.236(1.02-1.5)</p> <p>Primary: 1.29 (1.07-1.56)</p> <p>Secondary: 0.78 (0.67-0.91)</p> <p>Higher education: 0.579 (0.49- 0.69)</p>									<p>Parents married: 1.03 (1.01- 1.06)</p> <p>Parents divorced: 0.71 (0.23- 2.24)</p> <p>Single: 0.58 (0.41-0.81)</p> <p>Widowed: 6.00 (1.35- 26.73)</p>	

		0.289 (0.20-0.41)											
Ojo and Ijadunola ⁴⁵	Poorer: 1.04 (0.79-1.37) Middle: 0.82 (0.58-1.18) Richer: 0.76 (0.53-1.10) Richest 0.59 (0.39-0.82)			Rural: reference Urban: 1.12 (0.85-1.46)	Muslim: 0.72 (0.39-1.33) Other Christians: 0.55 (0.30-1.02) Catholic: 0.59 (0.31-1.12)								
Chu and Akinsulure-Smith ⁴⁶	Not significant as reported by the authors												
Bogale, et al. ⁴⁷				Urban: Reference Rural: 3.31 (1.48-7.43) ^a	Protestant: Reference Muslim: 3.55 (1.35- 9.37) ^a Orthodox: 1.65 (0.61-4.40) ^a								

References

1. Nonterah EA, Kanmiki EW, Agorinya IA, et al. Prevalence and adverse obstetric outcomes of female genital mutilation among women in rural Northern Ghana. *European Journal of Public Health* 2020;30(3):561-67.
2. Sakeah E, Debpuur C, Oduro AR, et al. Prevalence and factors associated with female genital mutilation among women of reproductive age in the Bawku municipality and Pusiga District of northern Ghana. *BMC Women's Health* 2018;18(1):150.
3. Greis A, Bärnighausen T, Bountogo M, et al. Attitudes towards female genital cutting among adolescents in rural Burkina Faso: a multilevel analysis. *Tropical Medicine & International Health* 2020;25(1):119-31.
4. Kandala N-B, Shell-Duncan B. Trends in female genital mutilation/cutting in Senegal: what can we learn from successive household surveys in sub-Saharan African countries? *International Journal for Equity in Health* 2019;18(1):25.
5. Kandala N-B, Nnanatu CC, Atilola G, et al. A spatial analysis of the prevalence of female genital mutilation/cutting among 0–14-year-old girls in Kenya. *International Journal of Environmental Research and Public Health* 2019;16(21):4155.
6. Mudege NN, Egondi T, Beguy D, et al. The determinants of female circumcision among adolescents from communities that practice female circumcision in two Nairobi informal settlements. *Health Sociology Review* 2012;21(2):242-50.
7. Milaat WA, Ibrahim NK, Albar HM. Reproductive health profile and circumcision of females in the Hali semi-urban region, Saudi Arabia: A community-based cross-sectional survey. *Annals of Saudi medicine* 2018;38(2):81-89.
8. Mitike G, Deressa W. Prevalence and associated factors of female genital mutilation among Somali refugees in eastern Ethiopia: a cross-sectional study. *BMC Public Health* 2009;9(1):264.
9. Oljira T, Assefa N, Dessie Y. Female genital mutilation among mothers and daughters in Harar, eastern Ethiopia. *International Journal of Gynecology & Obstetrics* 2016;135(3):304-09.
10. Gajaa M, Wakgari N, Kebede Y, et al. Prevalence and associated factors of circumcision among daughters of reproductive aged women in the Hababo Guduru District, Western Ethiopia: a cross-sectional study. *BMC Women's Health* 2016;16(1):42.
11. Gebremariam K, Assefa D, Weldegebreal F. Prevalence and associated factors of female genital cutting among young adult females in Jigjiga district, eastern Ethiopia: a cross-sectional mixed study. *International Journal of Women's Health* 2016;8:357.
12. Yirga WS, Kassa NA, Gebremichael MW, et al. Female genital mutilation: prevalence, perceptions and effect on women's health in Kersa district of Ethiopia. *International Journal of Women's Health* 2012;4:45.
13. Tamire M, Molla M. Prevalence and belief in the continuation of female genital cutting among high school girls: a cross-sectional study in Hadiya zone, Southern Ethiopia. *BMC Public Health* 2013;13(1):1120.
14. Andualem M. Determinants of female genital mutilation practices in East Gojjam Zone, Western Amhara, Ethiopia. *Ethiopian Medical Journal* 2016;54(3):109-16.
15. Elduma AH. Female genital mutilation in Sudan. *Open Access Macedonian Journal of Medical Sciences* 2018;6(2):430.
16. Dehghankhalili M, Fallahi S, Mahmudi F, et al. Epidemiology, regional characteristics, knowledge, and attitude toward female genital mutilation/cutting in southern Iran. *The Journal of Sexual Medicine* 2015;12(7):1577-83.
17. Yasin BA, Al-Tawil NG, Shabila NP, et al. Female genital mutilation among Iraqi Kurdish women: a cross-sectional study from Erbil city. *BMC Public Health* 2013;13(1):809.
18. Saleem RA, Othman N, Fattah FH, et al. Female genital mutilation in Iraqi Kurdistan: description and associated factors. *Women & Health* 2013;53(6):537-51.
19. Ali HAAEW, Arafa AE, Abd Allah NAEF, et al. Prevalence of female circumcision among young women in Beni-Suef, Egypt: a cross-sectional study. *Journal of Pediatric and Adolescent Gynecology* 2018;31(6):571-74.
20. Ali AAA, Okud A, Mohammed AA, et al. Prevalence of and factors affecting female genital mutilation among schoolgirls in Eastern Sudan. *International Journal of Gynecology & Obstetrics* 2013;120(3):288-89.
21. Arafa AE, Elbahrawe RS, Shawky SM, et al. Epidemiological and gynecological correlates with female genital mutilation among Beni-Suef University students; cross sectional study. *Middle East Fertility Society Journal* 2018;23(3):184-88.
22. Mohammed GF, Hassan MM, Eyada MM. Female genital mutilation/cutting: will it continue? *The Journal of Sexual Medicine* 2014;11(11):2756-63.

23. Abdel-Aleem MA, Elkady MM, Hilmy YA. The relationship between female genital cutting and sexual problems experienced in the first two months of marriage. *International Journal of Gynecology & Obstetrics* 2016;132(3):305-08.
24. Ahmed MR, Shaaban MM, Meky HK, et al. Psychological impact of female genital mutilation among adolescent Egyptian girls: a cross-sectional study. *The European Journal of Contraception & Reproductive Health Care* 2017;22(4):280-85.
25. Rasheed SM, Abd-Ellah AH, Yousef FM. Female genital mutilation in Upper Egypt in the new millennium. *International Journal of Gynecology & Obstetrics* 2011;114(1):47-50.
26. Chikhungu LC, Madise NJ. Trends and protective factors of female genital mutilation in Burkina Faso: 1999 to 2010. *International Journal for Equity in Health* 2015;14(1):42.
27. Besera G, Roess A. The relationship between female genital cutting and women's autonomy in Eritrea. *International Journal of Gynecology & Obstetrics* 2014;126(3):235-39.
28. Alosaimi AN, Essén B, Riitta L, et al. Factors associated with female genital cutting in Yemen and its policy implications. *Midwifery* 2019;74:99-106.
29. Boyle EH, Svec J. Intergenerational transmission of female genital cutting: community and marriage dynamics. *Journal of Marriage and Family* 2019;81(3):631-47.
30. Njoku C, Emechebe CI, Njoku A, et al. Obstetric Outcomes of Parturients with Female Genital Mutilation in a Tertiary Hospital in Nigeria. *Research Journal of Obstetrics & Gynecology* 2020;13
31. Anikwe CC, Ejikeme BN, Obiechina NJ, et al. Female genital mutilation and obstetric outcome: A cross-sectional comparative study in a tertiary hospital in Abakaliki South East Nigeria. *European Journal of Obstetrics & Gynecology and Reproductive Biology* 2019;1:100005.
32. Ashimi AO, Amole TG, Iliyasu Z. Prevalence and predictors of female genital mutilation among infants in a semi urban community in northern Nigeria. *Sexual and Reproductive Healthcare* 2015;6(4):243-48.
33. Ifeanyichukwu OA, Oluwaseyi A, Adetunji L. Female genital mutilation: Attitude and practices among women in Okada community, Edo state. *Journal of Medicine & Biomedical Research* 2015;14(2):138-50.
34. Iliyasu Z, Abubakar IS, Galadanci HS, et al. Predictors of female genital cutting among university students in northern Nigeria. *Journal of Obstetrics and Gynaecology* 2012;32(4):387-92. doi: 10.3109/01443615.2012.666582
35. Garba ID, Muhammed Z, Abubakar IS, et al. Prevalence of female genital mutilation among female infants in Kano, Northern Nigeria. *Archives of Gynecology and Obstetrics* 2012;286(2):423-28.
36. Koschollek C, Kuehne A, Müllerschön J, et al. Knowledge, information needs and behavior regarding HIV and sexually transmitted infections among migrants from sub-Saharan Africa living in Germany: Results of a participatory health research survey. *PLOS ONE* 2020;15(1):e0227178.
37. Beller J, Kröger C. Differential effects from aspects of religion on female genital mutilation/cutting. *Psychology of Religion and Spirituality* 2018;13(4):381-89.
38. Koukkula M, Keskimäki I, Koponen P, et al. Female genital mutilation/cutting among women of Somali and Kurdish origin in Finland. *Birth* 2016;43(3):240-46.
39. Shay TZ, Haidar J, Kogi-Makau W. Magnitude of and driving factors for female genital cutting in schoolgirls in Addis Ababa, Ethiopia: A crosssectional study. *South African Journal of Child Health* 2010;4(3):78-82.
40. Bjälkander O, Grant DS, Berggren V, et al. Female genital mutilation in Sierra Leone: forms, reliability of reported status, and accuracy of related demographic and health survey questions. *Obstetrics and Gynecology International* 2013;2013:680926
41. Rouzi AA, Berg RC, Alamoudi R, et al. Survey on female genital mutilation/cutting in Jeddah, Saudi Arabia. *BMJ Open* 2019;9(5):e024684-e84.
42. Akinsulure-Smith AM. Exploring Female Genital Cutting Among West African Immigrants. *Journal of Immigrant and Minority Health* 2012;16(3):559-61.
43. Akinsulure-Smith AM, Chu T. Exploring female genital cutting among survivors of torture. *Journal of Immigrant and Minority Health* 2017;19(3):769-73.
44. Sylla M, Léonie F, Diakité F, et al. 1. Aspects épidémiologiques, cliniques, socio-culturels et économiques des mutilations génitales féminines dans le district de Bamako au Mali. *Journal of Obstetrics and Gynaecology Canada* 2020;42(2):e15.
45. Ojo TO, Ijadunola MY. Sociodemographic factors associated with female genital cutting among women of reproductive age in Nigeria. *The European Journal of Contraception & Reproductive Health Care* 2017;22(4):274-79.

46. Chu T, Akinsulure-Smith AM. Health outcomes and attitudes toward female genital cutting in a community-based sample of West African immigrant women from high-prevalence countries in New York City. *Journal of Aggression, Maltreatment & Trauma* 2016;25(1):63-83.
47. Bogale D, Markos D, Kaso M. Prevalence of female genital mutilation and its effect on women's health in Bale zone, Ethiopia: a cross-sectional study. *BMC Public Health* 2014;14(1):1076.

Supplementary Table 4: Other FGM determinants identified in included studies.

Determinant	Study	Unadjusted Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)	Proportions as reported by authors
Living grandmother	Ali, et al. ¹		7.1 (4.6–10.8)	
Living conditions	Im, et al. ²		Living separately from home: 0.16 (0.05-0.52)	
	Shay, et al. ³			Live with father only: 34.8% Living with mother only: 32% Living with both: 12.4% Living with relatives: 48.5% → FGM statistically significantly lower when living with both parents P value: 0.001
Polyvictimization	Im, et al. ²		1.23 (1.07-1.40)	
Village FGC rate (higher)	Greis, et al. ⁴		1.63 (1.40-1.90)	
Percentage of Muslims in the village (higher)	Greis, et al. ⁴	1.24 (1.01–1.51)		
Presence of community norms that are not significant: Domestic abuse	Kandala, et al. ⁵			Not significant No: Reference Wife Beating for Going Out: 1.00 (0.68-1.45) Wife Beating for Neglecting the Children: 1.51 (1.06-2.2) Wife Beating for Arguing with the Husband: 1.03 (0.67-1.56)

				Wife Beating for Denying Husband Sex: 0.79 (0.53-1.19) Wife Beating for Denying Husband Food: 0.82 (0.48-1.36)
Cultural influence*	Andualem ⁶	1.60 (1.25-2.53)		
Mother's decision-making and power	Kandala, et al. ⁵	Mother owns house: 1.75 (1.14-2.86) Mother owns land: 0.75 (0.48-1.16) <u>Father Beats Mother</u> No: Reference Yes: 1.21 (0.77-1.82) Missing/Not available: 1.01 <u>Who makes large household purchases?</u> Alone: Reference Husband/Partner: 1.4 (0.85-2.13) With Husband/partner: 0.91 (0.57-1.41) <u>Who decides on wife's expenditures?</u> Alone: Reference Husband/partner: 0.52 (0.2-1.32) With her husband: 0.68 (0.39-1.18) Missing/not available: 0.9 (0.53-1.48)		

		<p><u>Who Makes Decision on Mother's Health</u></p> <p>Alone: Reference</p> <p>Husband/Partner: 1.17 (0.77-1.86)</p> <p>With husband/partner: 0.92 (0.62-1.41)</p>		
	Boyle and Svec ⁷			<p>Mother's autonomous decisions: 1.02 (0.95-1.10)</p> <p>Mother takes joint decision: 0.98 (0.93-1.03)</p>
Parent's increased age	Mitike and Deressa ⁸		6.65 (2.6-16.7)	
Father's increased age	Beller and Kröger ⁹	1.10 (1.06-1.13)		
Father's religion	Gajaa, et al. ¹⁰	<p>Orthodox: Reference</p> <p>Protestant Christian: 0.62 (0.29-1.34).</p> <p>Traditional: 0.22 (0.07-0.74)</p>		
Participation in anti-FGM activities	Mitike and Deressa ⁸	Participation of the parents in anti-FGM activities: 0.3 (0.2-0.6)		
	Andualem ⁶	<p>Participation in anti FGM interventions: 0.42 (0.29-0.62)</p> <p>Received health education on FGM: 0.39 (0.38-0.76)</p>		
	Mudege, et al. ¹¹		Since birth: Reference	

Movement from one area to another			Came to Demographic Surveillance Area: 1.50 (0.53-4.30)	
	Mbanya, et al. ¹²		Age at migration to Norway is ≥ 12 years: 4.78 (1.53-15.00) Age at migration to Norway is 0-11 years: Reference	
Health system related factors	Koschollek, et al. ¹³	No health insurance or medical treatment voucher for asylum seekers or unknown: 1.6 (1.13-2.25)		
	Ashimi, et al. ¹⁴	<u>Type of health facility where the infants received care</u> Primary healthcare facility: Reference Secondary facility: 0.73 (0.45-1.18) Tertiary healthcare facility: 0.49 (0.26-0.92)		
Other religion related factors	Beller and Kröger ⁹	Mother's private prayer frequency: 0.93 (0.87-0.99) Father's private prayer frequency: 0.92 (0.87-0.98) <u>Perceived religious suppression:</u> Mother: 1.03 (0.88-1.19) Father: 1.10 (1.06-1.13) <u>Parent's religion (unaffiliated as the reference group)</u>		

		<p>Mother Christian Affiliation: 0.47 (0.25-0.90)</p> <p>Father Christian Affiliation: 1.06 (0.59-1.90)</p> <p>Mother Traditional Affiliation: 10.57 (4.79-23.31)</p> <p>Father Traditional affiliation: 9.78 (5-18.78)</p> <p>Mother Muslim affiliation: 0.79 (0.41-1.52)</p> <p>Father Muslim Affiliation: 1.66 (0.91-3.02)</p> <p><u>Governmental unfairness towards one's own religious group</u></p> <p>Mother: 1.18 (1.08-1.29)</p> <p>Father: 1.24 (1.15-1.35)</p> <p>Father's religious service attendance: 0.98 (0.87-1.09)</p> <p>Mother's religious service attendance: 1.10 (1.02-1.18)</p>		
Consanguinity	Alosaimi, et al. ¹⁵		<p><u>Odds of experiencing FGM among daughters</u></p> <p>Marriage with a second cousin or closer: 1.18 (1.03-1.35)</p>	
	Milaat, et al. ¹⁶	No parental consanguinity: Reference		

		Parental Consanguinity: 1.7 (0.86-3.3)		
Family factors	Sylla, et al. ¹⁷	<p>For girls from a polygamous household: 1.37 (1.23-1.53)</p> <p>Mothers in a monogamous union: 0.78 (0.72-0.85)</p> <p>Belonging to big family: 1.37 (1.28-1.47)</p> <p>Belonging to nuclear family: 0.59 (0.53-0.67)</p>		
	Kandala, et al. ⁵	<p>Mother is in a polygamous union: 1.23 (0.86-1.69)</p> <p>Marriage by arrangement: 0.89 (0.65-1.2)</p>		
Child marriage	Alosaimi, et al. ¹⁵		<p><u>Odds of experiencing FGM among daughters</u></p> <p>Underage marriage: 1.60 (1.38-1.84)</p>	
Maternal place of birth or origin	Abolfotouh, et al. ¹⁸			<p>FGM prevalence among females of rural origin: 25%</p> <p>FGM prevalence among females of non-rural origin: 10.8% (P=0.001)</p>
	Iliyasu, et al. ¹⁹		<p><u>Geographic origin:</u></p> <p>North-west: Reference</p> <p>Northeast: 0.87 (0.41-2.70)</p>	

			North central: 1.23 (0.54-5.03) South-west: 2.31 (1.13-2.14) Southeast or South-South: 3.78 (1.21-4.99)	
	Gibson-Helm, et al. ²⁰			<u>FGM/C among women from North Africa</u> North Africa Non-humanitarian source countries group: 0.5% North Africa HSC: 5.1% P-value <0.001 <u>Among women from Middle and East Africa</u> Middle and East Africa non- HSCs: 0.3% Middle and East Africa HSCs: 13.8% P-value <0.001 <u>Among women from West Africa</u> West Africa HSCs: 3.3%, West Africa Non-HSCs: 6.7% P-value=0.65
	Yasin, et al. ²¹	Urban: Reference Rural: 1.0 (0.8-1.2)		
Maternal Origin	Minsart, et al. ²²			<u>Maternal Origin</u> P value<0.00001

				<p>Djibouti-Somali: 1.7% No FGM, 0.2% for type I FGM, 58.2% for type II, and 40% for infibulated</p> <p>Djibouti-Afar: 0% No FGM, 6.7% for Type I, 40% for type II, 53.3% for infibulated</p> <p>Djibouti Arabic: 21.2% No FGM, 3% for type I, 57.6% for type II, 18.2% for infibulated</p> <p>Somalia: 0% No FGM, 0% for type I, 38.5% for type II, and 61.5% for infibulated</p> <p>Ethiopia: 28% No FGM, 16% for type I, 52% for type II, and 4% for infibulated</p> <p>Yemen: 28.6% No FGM, 0% for type I, 74% for type II, and 0% for infibulated</p>
Residence	Zayed and Ali ²³			<p><u>Residence (of the participant subjected to FGM/C)</u></p> <p>Giza: 64.4%</p> <p>Cairo: 62.5%</p> <p>P- value: 0.781</p>
	Abdulah, et al. ²⁴			<p>Governorate of residence was significantly associated with FGM among daughters</p> <p>P value <0.001</p>
Nationality	Rouzi, et al. ²⁵			<p>Saudi: 49.7%</p> <p>Saudi (natural): 13.1%</p> <p>Non-Saudi: 37.2%</p> <p>P value <0.001</p>

Immigration status	Akinsulure-Smith and Chu ²⁶			<p>Undocumented: 43.7%</p> <p>Refugee, asylee, TPS, withholding of removal: 10.1%</p> <p>Has applied or intends to apply for asylum: 29.5%</p> <p>US citizen, permanent resident, valid visa: 4.7%</p> <p>Others: 8.5%</p> <p>→ Statistically significantly higher among undocumented P value<0.001</p>
Living in camp	Im, et al. ²		<p>Living outside the camp: Reference</p> <p>Living in camp: 1.54 (0.5-4.74)</p>	
Duration of stay in the camp	Mitike and Deressa ⁸		<p>Duration of stay in the camp <10 years: Reference</p> <p>Duration of stay in the camp >10 years: 0.5 (0.1-1.5)</p>	
Islamic sects	Dehghankhalili, et al. ²⁷			<p>Shiaa Islam: 51.4%</p> <p>Sunni Islam: 48.6%</p> <p>P-value: 0.019</p>

*Defined as normal community practices. Results highlighted in bold are statistically significant.

Brackets report 95% Confidence intervals.

References

1. Ali AAA, Okud A, Mohammed AA, et al. Prevalence of and factors affecting female genital mutilation among schoolgirls in Eastern Sudan. *International Journal of Gynecology & Obstetrics* 2013;120(3):288-89.
2. Im H, Swan LET, Heaton L. Polyvictimization and mental health consequences of female genital mutilation/circumcision (FGM/C) among Somali refugees in Kenya. *Women & Health* 2020;60(6):636-51.
3. Shay TZ, Haidar J, Kogi-Makau W. Magnitude of and driving factors for female genital cutting in schoolgirls in Addis Ababa, Ethiopia: A cross-sectional study. *South African Journal of Child Health* 2010;4(3):78-82.
4. Greis A, Bärnighausen T, Bountogo M, et al. Attitudes towards female genital cutting among adolescents in rural Burkina Faso: a multilevel analysis. *Tropical Medicine & International Health* 2020;25(1):119-31.
5. Kandala N-B, Nnanatu CC, Atilola G, et al. A spatial analysis of the prevalence of female genital mutilation/cutting among 0–14-year-old girls in Kenya. *International Journal of Environmental Research and Public Health* 2019;16(21):4155.
6. Andualem M. Determinants of female genital mutilation practices in East Gojjam Zone, Western Amhara, Ethiopia. *Ethiopian Medical Journal* 2016;54(3):109-16.
7. Boyle EH, Svec J. Intergenerational transmission of female genital cutting: community and marriage dynamics. *Journal of Marriage and Family* 2019;81(3):631-47.
8. Mitike G, Deressa W. Prevalence and associated factors of female genital mutilation among Somali refugees in eastern Ethiopia: a cross-sectional study. *BMC Public Health* 2009;9(1):264.
9. Beller J, Kröger C. Differential effects from aspects of religion on female genital mutilation/cutting. *Psychology of Religion and Spirituality* 2018;13(4):381–89.
10. Gajaa M, Wakgari N, Kebede Y, et al. Prevalence and associated factors of circumcision among daughters of reproductive aged women in the Hababo Guduru District, Western Ethiopia: a cross-sectional study. *BMC Women's Health* 2016;16(1):42.
11. Mudege NN, Egondi T, Beguy D, et al. The determinants of female circumcision among adolescents from communities that practice female circumcision in two Nairobi informal settlements. *Health Sociology Review* 2012;21(2):242-50.
12. Mbanya VN, Gele AA, Diaz E, et al. Health care-seeking patterns for female genital mutilation/cutting among young Somalis in Norway. *BMC Public Health* 2018;18(1):517.
13. Koschollek C, Kuehne A, Müllerschön J, et al. Knowledge, information needs and behavior regarding HIV and sexually transmitted infections among migrants from sub-Saharan Africa living in Germany: Results of a participatory health research survey. *PLOS ONE* 2020;15(1):e0227178.
14. Ashimi AO, Amole TG, Iliyasu Z. Prevalence and predictors of female genital mutilation among infants in a semi urban community in northern Nigeria. *Sexual and Reproductive Healthcare* 2015;6(4):243-48.
15. Alosaimi AN, Essén B, Riitta L, et al. Factors associated with female genital cutting in Yemen and its policy implications. *Midwifery* 2019;74:99-106.
16. Milaat WA, Ibrahim NK, Albar HM. Reproductive health profile and circumcision of females in the Hali semi-urban region, Saudi Arabia: A community-based cross-sectional survey. *Annals of Saudi medicine* 2018;38(2):81-89.
17. Sylla M, Léonie F, Diakité F, et al. 1. Aspects épidémiologiques, cliniques, socio-culturels et économiques des mutilations génitales féminines dans le district de Bamako au Mali. *Journal of Obstetrics and Gynaecology Canada* 2020;42(2):e15.
18. Abolfotouh SM, Ebrahim AZ, Abolfotouh MA. Awareness and predictors of female genital mutilation/cutting among young health advocates. *International Journal of Women's Health* 2015;7:259.
19. Iliyasu Z, Abubakar IS, Galadanci HS, et al. Predictors of female genital cutting among university students in northern Nigeria. *Journal of Obstetrics and Gynaecology* 2012;32(4):387-92. doi: 10.3109/01443615.2012.666582
20. Gibson-Helm ME, Teede HJ, Cheng IH, et al. Maternal health and pregnancy outcomes comparing migrant women born in humanitarian and nonhumanitarian source countries: a retrospective, observational study. *Birth* 2015;42(2):116-24.
21. Yasin BA, Al-Tawil NG, Shabila NP, et al. Female genital mutilation among Iraqi Kurdish women: a cross-sectional study from Erbil city. *BMC Public Health* 2013;13(1):809.
22. Minsart A-F, N'Guyen T-S, Ali Hadji R, et al. Maternal infibulation and obstetrical outcome in Djibouti. *The Journal of Maternal-Fetal & Neonatal Medicine* 2015;28(14):1741-46.
23. Zayed AA, Ali AA. Abusing female children by circumcision is continued in Egypt. *Journal of Forensic and Legal Medicine* 2012;19(4):196-200.

24. Abdulah DM, Sedo BA, Dawson A. Female Genital Mutilation in Rural Regions of Iraqi Kurdistan: A Cross-Sectional Study. *Public Health Reports* 2019;134(5):514-21.
25. Rouzi AA, Berg RC, Alamoudi R, et al. Survey on female genital mutilation/cutting in Jeddah, Saudi Arabia. *BMJ Open* 2019;9(5):e024684-e84.
26. Akinsulure-Smith AM, Chu T. Exploring female genital cutting among survivors of torture. *Journal of Immigrant and Minority Health* 2017;19(3):769-73.
27. Dehghankhalili M, Fallahi S, Mahmudi F, et al. Epidemiology, regional characteristics, knowledge, and attitude toward female genital mutilation/cutting in southern Iran. *The Journal of Sexual Medicine* 2015;12(7):1577-83.