Immediate health consequences of female genital mutilation/cutting (FGM/C)

Report from Kunnskapssenteret (Norwegian Knowledge Centre for the Health Services)
No 8–2014
Systematic review

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Norwegian Knowledge Centre for the Health Services

Background: Female genital mutilation/cutting (FGM/C) has been performed in various forms for millennia and involves the partial or total removal of the external female genitalia or other injury to the female genital organs for non-medical reasons. In this systematic review we addressed harm occurring during the cutting or alteration modification process and the short-term period. • We included 56 observational studies that documented immediate complications. There were 14 studies in which two or more groups of girls and women with different types of FGM/C were compared with regards to the occurrence of one or more acute complications. There are three main findings: • The most common immediate FGM/C complications were pain, excessive bleeding, swelling, problems with wound healing, urine retention. • The girls and women undergoing FGM/C often suffered more than one immediate complication. • There were few differences in risk of immediate complications among different types of FGM/C, but there might be a greater risk of immediate complications for women with FGM/C type III (infibulation) compared to types I-II. • There was evidence of under-

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(continued from page one) reporting of complications. However, the findings show that the FGM/C procedure unequivocally causes immediate, and typically several, health complications during the FGM/C procedure and the short-term period. Each of the most common complications occurred in more than one of every ten girls and women who undergo FGM/C. The participants in these studies had FGM/C types I through IV, thus immediate complications such as bleeding and swelling occur in setting with all forms of FGM/C. Even FGM/C type I and type IV 'nick', the forms of FGM/C with least anatomical extent, presented immediate complications. The results document that multiple immediate and quite serious complications can result from FGM/C. These results should be viewed in light of long-term complications, such as obstetric and gynecological problems, and protection of human rights.

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We would like to thank Elisabeth Couto, Ingeborg B. Lidal, Marleen Temmerman, and Staffan Bergström for their expertise in this project. Norwegian Knowledge Centre for the Health Services assumes final responsibility for the content of this report.

Norwegian Knowledge Centre for the Health Services
Oslo, March 2014

Key messages

Female genital mutilation/cutting (FGM/C) has been performed in various forms for millennia and involves the partial or total removal of the external female genitalia or other injury to the female genital organs for non-medical reasons. In this systematic review we addressed harm occurring during the cutting or alteration modification process and the short-term period.

We included 56 observational studies that documented immediate complications. There were 14 studies in which two or more groups of girls and women with different types of FGM/C were compared with regards to the occurrence of one or more acute complications. There are three main findings:

- The most common immediate FGM/C complications were: pain, excessive bleeding, swelling, problems with wound healing, urine retention.
- The girls and women undergoing FGM/C often suffered more than one immediate complication.
- There were few differences in risk of immediate complications among different types of FGM/C, but there might be a greater risk of immediate complications for women with FGM/C type III (infibulation) compared to types I-II.

There was evidence of under-reporting of complications. However, the findings show that the FGM/C procedure unequivocally causes immediate, and typically several, health complications during the FGM/C procedure and the short-term period. Each of the most common complications occurred in more than one of every ten girls and women who undergo FGM/C. The participants in these studies had FGM/C types I through IV, thus immediate complications such as bleeding and swelling occur in setting with all forms of FGM/C. Even FGM/C type I and type IV 'nick', the forms of FGM/C with least anatomical extent, presented immediate complications. The results document that multiple immediate and quite serious complications can result from FGM/C. These results should be viewed in light of long-term complications, such as obstetric and gynecological problems, and protection of human rights.

Title:
Immediate health consequences of female genital mutilation/cutting (FGM/C)

Type of publication:

Systematic review

A review of a clearly formulated question that uses systematic and explicit methods to identify, select, and critically appraise relevant research, and to collect and analyse data from the studies that are included in the review. Statistical methods (meta-analysis) may or may not be used to analyse and summarise the results of the included studies.

Doesn't answer everything:

-Excludes studies that fall outside of the inclusion criteria
-No health economic evaluation
-No recommendations

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Executive summary

Background

Female genital mutilation/cutting (FGM/C) has been performed in various forms for millennia and involves a range of practices. In 1997, WHO, UNICEF and UNFPA issued the following definition of FGM/C: "all procedures involving partial or total removal of the external female genitalia or other injury to the female genital organs for non-medical reasons." Further, to clarify understanding of both the prevalence and consequences of FGM/C, WHO classified the procedure into four categories: type I (clitoridectomy), type II (excision), type III (infibulation), and type IV (other). According to a recent UNICEF report, there is wide variation in FGM/C prevalence across and within the countries where the practice is concentrated, which include 27 African countries, Yemen, and Iraq. Although trend analyses document an overall decline in prevalence of the practice across generations, UNICEF estimates that FGM/C has been performed on more than 125 million girls and women alive today in the 29 countries where the practice is concentrated.

The practice is generally performed on pre-pubescent girls, often without anaesthetics, thus, it is reasonable to assume that it is a traumatic event that may cause both short-term and long-term harm. With regards to long-term harm, in previous systematic reviews we established that women with FGM/C were more likely than women without FGM/C to experience attenuation of sexual functioning, obstetric complications, and possibly psychological disturbances. In the present systematic review we addressed harm occurring during the cutting or alteration modification process and the short-term period.

Objective

The main objective of this systematic review was to summarize the empirical quantitative research describing the immediate (acute) consequences of FGM/C on girls and women. The overall aim of the systematic review is to support well-informed decisions in health promotion and health care, and improve quality of services related to the consequences of FGM/C.

Method

We conducted this systematic review of the immediate consequences of FGM/C in accordance with the NOKC Handbook for Summarizing Evidence and the Cochrane Handbook for Systematic Reviews of Interventions. Our main literature search strategy was searches in 15 international electronic databases. Studies eligible for inclusion were systematic reviews, cohort studies, case control studies, cross-sectional studies, case series, and case reports. The population of interest was girls and women who have been subjected to any type of FGM/C. Thus, the event or intervention was FGM/C, and the comparison was no- or an alternative type of FGM/C. In the present report, we summarized the immediate (acute) consequences of FGM/C, including but not limited to outcomes such as bleeding, pain, infection, swelling, and fever.

Two reviewers assessed studies for inclusion, considered the methodological quality of the studies, and extracted data from the included sources. Pre-designed forms (inclusion, checklists, data recording) were used to guide the reviewers' assessment and enable consistency. Each step was done independently and then jointly by the two reviewers. We prioritized presenting results from those studies with highest internal validity (studies which compared groups of girls/women), summarizing the study level results in texts and tables and calculating effect estimates. There were no studies that analyzed whether there were statistical differences in the frequency of immediate outcomes between groups of girls/women. Thus, all presented effect estimates are unadjusted. We concluded that the included studies were not reasonable resistant to biases and relatively homogeneous in this respect. It was therefore not warranted to combine outcome data across studies in meta-analyses. However, we show the forest plots with no pooled effect estimate, in order to illustrate the direction of effect across studies.

Results

We included 56 primary (observational) studies that reported on immediate outcomes of FGM/C. There were 14 comparative cross-sectional studies in which two or more groups of girls/women with different types of FGM/C were compared with regards to one or more acute complication, and 42 non-comparative studies (single group cross-sectional studies, case series, case reports). The methodological study quality was low in about half (55%) of the 56 included studies, but among the 14 comparative studies, the majority (79%) had moderate methodological study quality. Overall, the 56 studies included 133,515 females of various ages and types of FGM/C. Across the studies, the most frequently measured outcomes were bleeding/ hemorrhage, infections, problems with urination, and swelling. Three quarters of the studies included outcomes that were self reported or where mothers reported on circumstances surrounding the FGM/C procedure of their daughters.

There are three main findings:

- The most common immediate FGM/C complications were: pain, excessive bleeding, swelling, problems with wound healing, urine retention.
- The girls and women undergoing FGM/C often suffered more than one immediate complication.
- There were few differences in risk of immediate complications among different types of FGM/C, but there might be a greater risk of immediate complications for women with FGM/C type III compared to types I-II.

Discussion

There was evidence of under-reporting of complications. However, the findings show that girls and women who undergo any form of FGM/C suffer a range of, and typically several, complications during the FGM/C procedure and the short-term period. The most common physical complications caused by the removal of, or damage to, healthy female genital tissue in the short-term include pain, excessive bleeding, swelling, problems with wound healing, and urine retention. Each of these complications occurred in more than one of every ten girls and women who undergo FGM/C. Further, the female participants in these studies had FGM/C types I through IV, thus immediate complications such as bleeding and swelling occur in settings with all forms of FGM/C. Even FGM/C type I and type IV 'nick', the forms of FGM/C with least anatomical extent, presented acute complications, thus there is no evidence to support a shifting to a form with less anatomical extent, such as type I, on the rationalization that it involves limited immediate harm. In fact, the evidence base from the comparative studies shows that there were few differences in risk of immediate complications between girls and women who undergo different types of FGM/C. We found no health benefits of the practice. The results should be viewed in light of long-term complications, such as obstetric and gynecological problems, and protection of human rights. As a whole, the findings explicate the avoidance of unnecessary harm for many girls and women in the short- and long-term with the abandonment of FGM/C.

Conclusion

The evidence base, which covers over half a century of research from more than twenty countries in Africa and beyond, shows that the FGM/C procedure unequivocally causes immediate health complications. Although the exact frequency of complications is unclear – there is evidence of under-reporting of complications – and caution is required in interpreting the findings, it is highly unlikely that further research would find that there are no short-term complications associated with the FGM/C procedure. The results document the importance of continuing to raise awareness that ending FGM/C will avoid multiple short-term problems suffered by girls and women when they undergo FGM/C as well as preserve their human rights.

Hovedfunn (norsk)

Kvinnelig kjønnslemlestelse er blitt utført i ulike former i årtusener og innebærer at hele eller deler av de ytre kvinnelige kjønnsorganene fjernes eller skades uten at det er medisinsk begrunnelse for det. I denne systematiske oversikten hadde vi som mål å dokumentere skader som inntreffer under selve inngrepet og/eller kort tid etter inngrepet.

Oversikten bygger på 56 primærstudier som dokumenterte umiddelbare komplikasjoner. 14 studier sammenlignet to eller flere grupper av jenter og kvinner med ulike typer kjønnslemlestelse med hensyn til én eller flere umiddelbare komplikasjoner. Det er tre hovedfunn:

- De vanligste umiddelbare komplikasjonene var: smerte, store blødninger, hevelser, problemer med sårtilheling, urinretensjon.
- Jenter og kvinner som blir utsatt for kjønnslemlestelse har ofte flere enn én umiddelbar komplikasjon.
- Det var få forskjeller i risiko for umiddelbare komplikasjoner mellom de ulike typene av kjønnslemlestelse, men det så ut til at det kan være en større risiko for umiddelbare komplikasjoner hos kvinner med kjønnslemlestelse type III (infibulering) sammenlignet med typene I-II.

Resultatene tyder på under-rapportering av komplikasjoner. Men funnene viser utvetydig at kvinnelig kjønnslemlestelse fører til umiddelbare, og vanligvis flere, helsekomplikasjoner under selve inngrepet og i perioden etter. Mer enn hver tiende jente og kvinne fikk en eller flere av de vanligste komplikasjonene. Deltakerne i de inkluderte studiene hadde kjønnslemlestelse type I til IV, noe som viser at alle typer kjønnslemlestelse kan føre til umiddelbare komplikasjoner, som blødning og hevelse. Selv kjønnslemlestelse type I og type IV ('snitting'), som er de to typene med minst anatomisk inngrep, førte til komplikasjoner. Resultatene viser at kjønnslemlestelse fører til en rekke umiddelbare og til dels alvorlige helsekonsekvenser. Resultatene bør ses i sammenheng med senkomplikasjoner som obstetriske og gynekologiske følger, og i lys av menneskerettigheter.

Tittel:
Umiddelbare helsekonsekvenser av kvinnelig kjønnslemlestelse

Publikasjonstype:

Systematisk oversikt

En systematisk oversikt er resultatet av å
- innhente
- kritisk vurdere og
- sammenfatte

relevante forskningsresultater ved hjelp av forhåndsdefinerte og eksplisitte metoder.

Svarer ikke på alt:

- Ingen studier utenfor de eksplisitte inklusjonskriteriene
- Ingen helseøkonomisk evaluering
- Ingen anbefalinger

Hvem står bak denne rapporten?

Kunnskapssenteret har skrevet rapporten på oppdrag fra NORAD og Verdens Helseorganisasjon.

Når ble litteratursøket utført?

Søk etter studier ble avsluttet Januar 2012.

Fagfeller:

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Sammendrag (norsk)

Umiddelbare helsekonsekvenser av kvinnelig kjønnslemlestelse

Bakgrunn

Kvinnelig kjønnslemlestelse er blitt utført i årtusener og innebærer flere ulike inngrep. Verdens helseorganisasjon (WHO), UNICEF og UNFPA ga i 1997 følgende definisjon av kjønnslemlestelse: «alle inngrep som innebærer delvis- eller fullstendig fjerning av de eksterne kvinnelige kjønnsorganer eller andre skader av de kvinnelige kjønnsorganer for ikke-medisinske årsaker.» For å klargjøre forståelsen av forekomst og konsekvenser av praksisen har verdens helseorganisasjon klassifisert kjønnslemlestelse i fire kategorier: type I (klitoridektomi), type II (eksisjon), type III (infibulasjon) og type IV (andre former). Ifølge en ny UNICEF rapport er det stor variasjon i forekomst av kjønnslemlestelse i de landene hvor praksisen er mest utbredt - 27 land i Afrika samt Yemen og Irak. Selv om trendanalyser viser en generell nedgang i forekomst på tvers av generasjoner anslår UNICEF at mer enn 125 millioner jenter og kvinner i dag lever med kjønnslemlestelse i de 29 landene hvor praksisen er mest utbredt. Kjønnslemlestelse utføres vanligvis før pubertetsalderen, ofte uten bedøvelse, og det er derfor rimelig å anta at det er en smertefull og traumatisk hendelse som kan føre til kortsiktige så vel som langsiktige helseproblemer. Når det gjelder langsiktige følger konkluderte Kunnskapssenteret i tidligere systematiske oversikter at kjønnslemlestede kvinner er mer utsatt for seksuelle problemer, fødselskomplikasjoner og mulige negative psykologiske konsekvenser. I denne systematiske oversikten har vi sett på skader og komplikasjoner som inntreffer under selve inngrepet og i perioden etter inngrepet.

Problemstilling

Målet med denne systematiske kunnskapsoversikten var å oppsummere den kvantitative forskningen som beskriver de umiddelbare (akutte) konsekvensene av kvinnelig kjønnslemlestelse. Den overordnede hensikten er å bidra til velinformerte beslutninger når det gjelder helsefremmende arbeid og bedre kvaliteten på tjenester knyttet til konsekvensene av kvinnelig kjønnslemlestelse.

Metode

Denne systematiske oversikten ble utført i henhold til Kunnskapssenterets metodehåndbok og Cochrane Handbook for Systematic Reviews of Interventions. Den viktigste strategien for identifisering av litteratur var litteratursøk i 15 internasjonale databaser. Vi kunne inkludere følgende studiedesign: systematiske oversikter, kohortstudier, kasuskontrollstudier, tverrsnittstudier, kasus-serier og kasuistikker. Populasjonen var jenter/kvinner som var blitt utsatt for en type kjønnslemlestelse. Hendelsen ('tiltaket') var kjønnslemlestelse og sammenligningen var med versus uten kjønnslemlestelse, eller én type kjønnslemlestelse versus en annen type kjønnslemlestelse. I denne rapporten oppsummerte vi umiddelbare konsekvenser av kjønnslemlestelse, slik som blødninger, smerte, infeksjoner, hevelse og feber. To medarbeidere vurderte studier for inklusjon, vurderte den metodiske kvaliteten på studiene og hentet ut data fra de inkluderte studiene. Forhåndsutviklede skjemaer (inklusjon, sjekklister, datauttrekking) ble brukt for å sikre konsistens. De to medarbeiderne utførte hvert steg først uavhengig av hverandre og deretter sammen. Vi prioriterte å presentere resultater fra studier med høyest intern validitet (studier som sammenlignet jenter/kvinner), og vi oppsummerte resultater på studienivå i tekst og tabeller og beregnet effektestimat. Ingen studier analyserte hvorvidt det var statistiske forskjeller i forekomst av umiddelbare helsekonsekvenser (utfall) mellom grupper av jenter/kvinner, derfor er alle effektestimatene ujusterte. Vi konkluderte at de inkluderte studiene verken hadde få systematiske feil eller var homogene når det gjaldt systematiske feil. Det var derfor ikke forsvarlig å kombinere utfallsdata på tvers av studiene i meta-analyser. Vi viser likevel forest plottene uten kombinerte effektestimat for å belyse retning på effekten på tvers av studier.

Resultat

Vi inkluderte 56 observasjonsstudier som presenterte resultater av umiddelbare konsekvenser av kjønnslemlestelse. 14 komparative tverrsnittstudier sammenlignet jenter/kvinner med ulike typer kjønnslemlestelse i forhold til én eller flere umiddelbare komplikasjoner, og 42 ikke-komparative studier (tverrsnittstudier, kasus-serier og kasuistikker). Den metodologiske kvaliteten på studiene var lav i ca. halvparten (55 %) av de 56 inkluderte studiene, men blant de 14 komparative studiene hadde majoriteten (79 %) av studiene moderat metodologisk kvalitet. Totalt sett inkluderte de 56 studiene 133 515 jenter/kvinner i ulike aldre og med ulike typer kjønnslemlestelse. De hyppigst undersøkte utfallsmålene var blødninger, infeksjoner, problemer med vannlating og hevelser. Tre fjerdedeler av studiene inkluderte utfallsmål som var selvrapporterte eller hvor mødre rapporterte på vegne av sine døtre. Det er tre hovedfunn:

- De vanligste umiddelbare komplikasjonene var: smerte, store blødninger, hevelser, problemer med sårtilheling, urinretensjon.
- Jenter og kvinner som blir utsatt for kjønnslemlestelse har ofte flere enn én umiddelbar komplikasjon.

- Det var få forskjeller i risiko for umiddelbare komplikasjoner mellom de ulike typene av kjønnslemlestelse, men det så ut til at det kan være en større risiko for umiddelbare komplikasjoner hos kvinner med kjønnslemlestelse type III (infibulering) sammenlignet med typene I-II.

Diskusjon

Resultatene tyder på under-rapportering av komplikasjoner. Men funnene viser at jenter og kvinner som blir utsatt for enhver type kjønnslemlestelse opplever en rekke, og vanligvis flere, helsekomplikasjoner under selve inngrepet og i perioden etter inngrepet. De vanligste fysiske komplikasjonene på kort sikt inkluderer smerte, store blødninger, hevelser, problemer med sårtilheling og urinretensjon. Mer enn hver tiende jente og kvinne fikk en eller flere av de vanligste komplikasjonene. Deltakerne i de inkluderte studiene hadde kjønnslemlestelse type I til IV, noe som viser at alle typer kjønnslemlestelse kan føre til umiddelbare komplikasjoner, som blødning og hevelse. Selv kjønnslemlestelse type I og type IV ('snitting'), som er de to typene med minst anatomisk omfang, førte til komplikasjoner. Det fins derfor ingen evidens for å skifte til en type kjønnslemlestelse med mindre anatomisk omfang, som klitoridektomi med den begrunnelse at det fører til begrensede umiddelbare skader. Resultatene fra de komparative studiene viser at det er få forskjeller i risiko for umiddelbare komplikasjoner mellom jenter og kvinner som blir utsatt for ulike typer kjønnslemlestelse. Vi kan ikke finne at praksisen på noen måte gir helsefordeler for kvinner. Resultatene bør ses i sammenheng med senkomplikasjoner som obstetriske og gynekologiske følger, og i lys av menneskerettigheter. Funnene i sin helhet peker på at svært mange jenter og kvinner kan unngå unødige helseskader både på kort og lang sikt dersom praksisen med kjønnslemlestelse stopper.

Konklusjon

Kunnskapsgrunnlaget, som dekker over et halvt århundre av forskning fra mer enn 20 land i og utenfor Afrika, viser utvetydig at kvinnelig kjønnslemlestelse fører til umiddelbare helsekomplikasjoner. Selv om det nøyaktige omfanget av komplikasjoner er usikker og tolkning av resultatene må gjøres med forsiktighet, så er det svært lite sannsynlig at fremtidig forskning vil vise at det ikke er umiddelbare helsekomplikasjoner assosiert med kjønnslemlestelse. Vår oppsummering av umiddelbare helsekomplikasjoner kan understøtte det helhetlige arbeidet med å stoppe kjønnslemlestelse av jenter og kvinner, og dermed bidra til at deres menneskerettigheter blir ivaretatt.

Nasjonalt kunnskapssenter for helsetjenesten fremskaffer og formidler kunnskap om effekt av metoder, virkemidler og tiltak og om kvalitet innen alle deler av helsetjenesten. Målet er å bidra til gode beslutninger slik at brukerne får best mulig helsetjenester. Kunnskapssenteret er formelt et forvaltningsorgan under Helsedirektoratet, men har ikke myndighetsfunksjoner og kan ikke instrueres i faglige spørsmål.

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Preface

The World Health Organization (WHO) and the Norwegian Agency for Development Cooperation (NORAD) commissioned a summary of available research on the physical health consequences following female genital mutilation/cutting (FGM/C) from the Norwegian Knowledge Centre for the Health Services (NOKC). This systematic review will contribute to the background documentation for supporting organizations like the WHO and NORAD's work concerning FGM/C among girls/women subjected to and at risk for the practice in countries where FGM/C may occur.

Given the enormous scope of the documentation identified, we prepared three reports. The present report concerns the immediate (acute) consequences of FGM/C. One report, which examines the obstetric consequences following FGM/C, has been completed (1). The third report, which covers the gynecological consequences following FGM/C will be completed spring 2014.

The project group consisted of:

- Project coordinator: researcher, Rigmor C Berg, NOKC
- Researcher: Vigdis Underland, NOKC

The literature search was conducted by search specialist Sari Ormstad. Jan Odgaard-Jensen provided statistical support. They are both with the NOKC. We are grateful for peer review by two internal and two external reviewers:

- Elisabeth Couto, researcher, NOKC, Norway
- Ingeborg B. Lidal, researcher, NOKC, Norway
- Marleen Temmerman, director, RHR WHO, Switzerland
- Staffan Bergström, professor, Karolinska Institute, Sweden

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Department director	*Unit director*	*Project coordinator*

Objective

This systematic review summarizes empirical quantitative research describing the immediate (acute) consequences of FGM/C on girls and women. The overall aim of the systematic review is to support well-informed decisions in health promotion and health care, and improve quality of services related to the consequences of FGM/C.

The main research question for this systematic review was:
• What are the immediate (acute) health consequences of FGM/C?

Background

FGM/C

Terminology

Female genital mutilation/cutting (FGM/C) involves a range of practices. In 1997, WHO, UNICEF and UNFPA issued the following definition of FGM/C: "all procedures involving partial or total removal of the external female genitalia or other injury to the female genital organs for non-medical reasons" (2)p1). The terminology used for these practices has varied across time, practicing cultures, regions, and stakeholder perspectives. It has been referred to as 'female circumcision', 'female genital mutilation', 'female genital cutting' and 'female genital mutilation/cutting' (2). In this report, we adopt the official terminology used by UNICEF and UNFPA 'female genital mutilation/cutting' (3). A glossary of terms is listed in appendix 1.

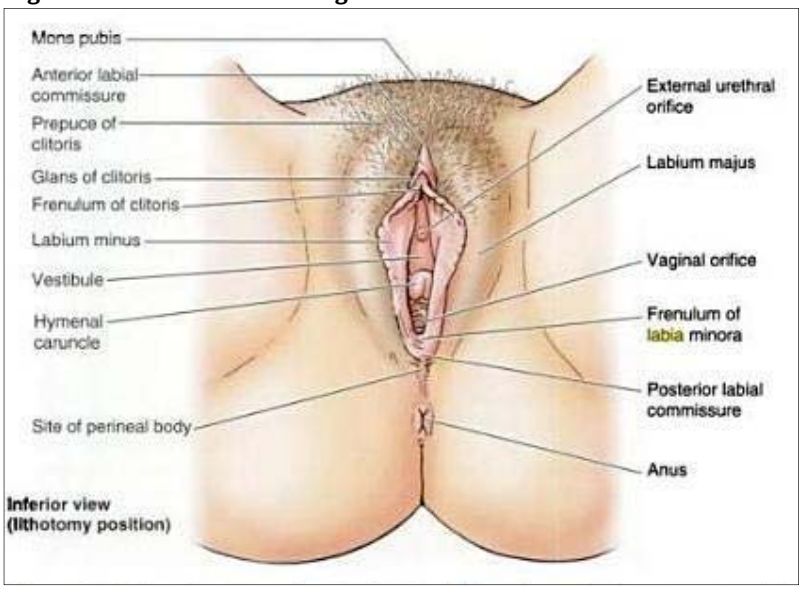
Types of FGM/C

There is a wide range of variation in FGM/C. However, to clarify understanding of both the prevalence and consequences of FGM/C, WHO (2) has classified the procedure into four categories:

Type I	Clitoridectomy	Partial or total removal of the clitoris and/or the prepuce
Type II	Excision	Partial or total removal of the clitoris and the labia minora, with or without excision of the labia majora
Type III	Infibulation	Narrowing of the vaginal orifice with creation of a covering seal by cutting and appositioning the labia minora and/or the labia majora, with or without excision of the clitoris
Type IV	Other	All other harmful procedures to the female genitalia for non-medical purposes, for example: nicking, pricking, piercing, incising, scraping and cauterization

As the classification shows, in FGM/C type I, II, and III some female genital tissue is excised (the external female genital anatomy is depicted in figure 1). In type IV, no genital tissue is removed. However, nicking involves cutting, and pricking and piercing break the skin. Type IV is included within the FGM/C terminology, in accordance with the WHO typology.

Figure 1: Female external genitalia



Prevalence of FGM/C

A recent UNICEF report provides comprehensive evidence of the prevalence of the practice (4). Using data from more than 70 nationally representative surveys covering a 20-year period, the report estimates prevalence and trends regarding FGM/C in all countries in Africa (27 countries) and the Middle East (2 countries) where FGM/C is concentrated. The report estimates prevalence of FGM/C from national, representative household surveys asking women aged 15-49 years if they have themselves been cut. There is wide variation in FGM/C prevalence across the 29 countries where the practice is concentrated. Data from UNICEF (4) show:

FGM/C	Country
≥80% prevalence	Somalia (98%), Guinea (96%), Djibouti (93%), Egypt (91%), Eritrea (89%), Mali (89%), Sierra Leone (88%), Sudan (88%)
51% - 80% prevalence	Gambia (76%), Burkina Faso (76%), Ethiopia (74%), Mauritania (69%), Liberia (66%)
26% - 50% prevalence	Guinea-Bissau (50%), Chad (44%), Ivory Coast (38%), Kenya (27%), Nigeria (27%), Senegal (26%)
10% - 25% prevalence	Central African Republic (24%), Yemen (23%), United Republic of Tanzania (15%), Benin (13%)
≤10% prevalence	Iraq (8%), Ghana (4%), Togo (4%), Niger (2%), Cameroon (1%), Uganda (1%)

As highlighted in the UNICEF report (4), there is great variation in prevalence of FGM/C not just across countries, but within countries. For example, in Burkina Faso, prevalence of FGM/C ranges from 55% to 90%. All in all, however, UNICEF estimates that FGM/C has been performed on more than 125 million girls and women

alive today in the 29 countries where the practice is concentrated. Trend analyses document an overall decline in the prevalence of FGM/C over the past two decades. UNICEF (4) writes that on average in the 29 countries where FGM/C is concentrated, the overall prevalence of the practice has declined across generations, from 54% in women aged 45–49 years to 36% in girls aged 15–19 years. The fall in prevalence is particularly pronounced in Kenya, but also in Benin, the Central African Republic, Iraq, Liberia, and Nigeria. Conversely, prevalence is virtually unchanged in a handful of other countries, such as Gambia, Mali, and Somalia.

There are variations across countries and communities in what type of FGM/C is practiced, when it is carried out, and who carries it out. According to a recent analysis (4), in most countries with reliable data, mothers report that most daughters have had their genitalia cut with some flesh removed; that is, they have been subjected to FGM/C type I or II. In Eritrea, Djibouti, Niger, Senegal, and Somalia over 20% have undergone FGM/C type III. In some countries, 'nick', which is a cut in the external female genitalia with no flesh removed, is commonly practiced. In the Central African Republic and in Eritrea, 24% and 52% of girls, respectively, have undergone 'nick'. Also the age at which girls experience FGM/C varies greatly. However, in half of the countries with available data, the majority of girls undergo FGM/C before the age of 5 and a substantial proportion between the ages 6-10. With regards to practitioner, in most of the countries where FGM/C is concentrated, the practice is carried out by a traditional circumciser. However, in Kenya, Sudan, and Egypt FGM/C is performed by a health-care provider in 40%, 55%, and 77% of the cases, respectively (4).

Reasons for FGM/C

FGM/C has been performed in various forms for millennia (5), likely perpetuated through largely social factors. Several reports note that FGM/C in many practicing communities is regarded as a customary rule of behavior (4;6). In effect, the practice continues due to social expectations: "The identification of FGM/C as a social norm implies that the practice is interdependent – that is, the behavior of an individual or family is conditioned by the behavior of others" (4)p19). At the same time, data suggest the practice is intertwined with ethnic identity (3;4), and rooted in religio-social beliefs within a frame of psycho-sexual and personal reasons that vary across cultural groups (6).

Programmatically, it is important to understand the forces underpinning FGM/C so that information, messages, and activities can be tailored to their audiences accordingly. Global campaigns and other intervention efforts to prevent the continuation of the practice have often focused on the adverse health consequences of the practice (4). Other approaches that have been used include training health workers, converting circumcisers, comprehensive social development, and human rights and legal mechanisms (7). Presently, 24 of the 29 countries where FGM/C is concentrated

have prohibited FGM/C by law or by constitutional decree. Such legislation varies in scope and there is ongoing debate regarding laws' efficacy in preventing FGM/C (4).

Consequences of FGM/C

The recent UNICEF report (4) estimated that over the next decade up to 30 million girls in the 29 countries where the practice is concentrated are at risk of FGM/C. Since FGM/C involves the cutting (or other modification) of sensitive genital tissue — typically with crude instruments and without anaesthetics — and considered a practice prejudicial to the health of girls (4), it is important to accurately determine the scope of adverse health consequences of FGM/C over the short-term and long-term. In previous systematic reviews, we established that women with FGM/C were more likely than women without FGM/C to experience pain during intercourse, reduced sexual satisfaction, reduced sexual desire (8;9) and possibly psychological disturbances (8). We also concluded that women who have undergone FGM/C are at greater risk of experiencing obstetric complications (1;10).

Other literature reviews on the complications of FGM/C for health, which are not systematic according to today's internationally recognized standards (11;12), include two by the researcher Obermeyer. Unfortunately, Obermeyer's reviews of the health consequences of FGM/C scarcely mentioned immediate complications. The first review noted that bleeding problems (hemorrhage/shock, bleeding, septicemia) was a major complication. However, there were only four studies included in the review that reported on this type of complication, with frequencies ranging from 0-13% (13). The second review showed that bleeding and unspecified infections were short-term complications reported in five included studies. In these studies, the frequency of bleeding was 81%, and for infections it was 8-37% (14). We note that there also exists a WHO literature report of the health complications from FGM/C, titled "A systematic review of the health complications of female genital mutilation including sequelae in childbirth" (15). As indicated by the title, this report emphasized childbirth complications. In the results chapter, immediate problems from FGM/C was stated as one of six types of outcomes found in the included papers, but no data on immediate consequences were summarized or systematically presented.

The lack of synthesized data on the immediate complications of FGM/C, and claims by scholars, physicians, and policy experts that medical complications associated with FGM/C occur only infrequently (16), indicate the need for a systematic review of the total body of empirical research on the immediate consequences of FGM/C.

Method

We conducted this systematic review of the immediate consequences of FGM/C in accordance with the NOKC Handbook for Summarizing Evidence (17) and the Cochrane Handbook for Systematic Reviews of Interventions (11). The methods were the same as for the systematic review on obstetric consequences (1).

Literature search

We systematically searched for literature in the following 15 international electronic literature databases:

- African Index Medicus
- British Nursing Index and Archive
- CINAHL
- The Cochrane Library:
    - Cochrane Central Register of Controlled Trials
    - Cochrane Database of Systematic Reviews
    - Database of Abstracts of Reviews of Effects
    - Health Technology Assessment Database
- EMBASE
- MEDLINE
- PILOTS
- POPLINE
- PsycINFO
- Social Services Abstracts
- Sociological Abstracts
- WHOLIS

Sari Ormstad, information retrieval specialist at the NOKC, designed the database search strategy in cooperation with the project group and commissioners. The complete search strategy is detailed in appendix 2. It shows that the search strategy incorporated both text words (in title and abstract) and subject headings (e.g. MeSH terms in

MEDLINE) relating to FGM/C and its analogues, such as the four classifications of FGM/C. To maximize the sensitivity of searches, we neither applied methodology search filters nor restricted the searches to any specific languages or publication dates. The last database search for studies was carried out by Sari Ormstad in January 2012. We note that a planned search in Anthropology Plus was not carried out, because NOKC did not have access to this database after 2011.

In addition, we searched reference lists of relevant reviews and all included studies, communicated with experts engaged in FGM/C related work, searched in sources for grey literature (OpenGrey, OpenSigle, OAIster), and browsed websites of six international organizations that are engaged in projects regarding FGM/C:

- Population Council: http://www.popcouncil.org/
- Population Reference Bureau (PRB): http://www.prb.org/
- The Centre for Development and Population Activities (CEDPA): http://www.cedpa.org/
- The United Nations Children's Fund (UNICEF): http://www.unicef.org/
- The United Nations Population Fund (UNFPA): http://www.unfpa.org/public/
- The World Health Organization (WHO): http://www.who.int/en/

Inclusion criteria

Study designs:

1. systematic reviews
2. cohort studies
3. case-control studies
4. cross-sectional studies
5. case series
6. case reports

As recommended by the Cochrane Handbook (11), we used study design features (as defined in the Cochrane glossary, http://www.cochrane.org/glossary) not study design labels to designate the studies. The reason for including non-randomized studies was to synthesize evidence of the effect (benefit or harm) of an exposure that cannot ethically be randomized. Methodological study quality was not a basis for inclusion/ exclusion.

Population: Girls and women who have been subjected to any type of FGM/C, as classified by WHO (2). We enforced no limitations on age, race/ethnicity, nationality or other participant characteristics.

Comparison: No FGM/C or a different type of FGM/C. We note that both studies with and without a comparison group were eligible for inclu-

sion. When the study reported a comparison group, the study had to compare either 1) a type of FGM/C vs no FGM/C, or 2) one type of FGM/C vs another type, e.g., type I vs type III, as defined by WHO.

Outcome: We included all types of physical consequences / complications following FGM/C, both short-term and long-term consequences experienced by girls or women. In this report, we summarize the immediate consequences of FGM/C. These included, but were not limited to: bleeding, pain, infection, swelling, fever. We emphasize that all physical outcomes were included, but outcomes not considered immediate are presented in separate reports published by the NOKC. One report about the obstetric consequences following FGM/C has been published (1) and one about the gynecological consequences following FGM/C is forthcoming.

Language: We included all publication languages. When considered likely to meet the inclusion criteria, studies in languages not mastered by the review team were translated to English by Google translator or multi-lingual colleagues at the NOKC. Professional translation was not necessary for any of the studies included in this report.

We had open inclusion criteria with respect to publication types: Unpublished reports, abstracts, brief and preliminary reports were considered for inclusion on the same basis as published reports. Further, although the outcomes had to be documented by health personnel/study investigators or self-reported by the girls/women having experienced the outcomes, when physical outcomes pertained to children, we accepted reports also by the girls' parents.

This report describes immediate physical outcomes or consequences following FGM/C. 'Immediate' is here understood as taking place during the cutting or alteration modification process and the short-term postoperative period. Judgment of whether the outcome was immediate was based on descriptions of the outcomes in the included studies and indicated by statements designating the outcomes as immediate, such as 'immediate complications', 'early complications', 'complications during or after the circumcision', 'immediate post-circumcision complications', 'immediate effect of the surgery', 'immediate consequences', 'acute complications', 'complications directly following the operation', and 'immediate post-FC complications'.

Exclusion criteria

Study design: Qualitative studies and all studies without a quantitative measure of a physical consequence of FGM/C.

Population: We excluded studies about FGM/C on populations where modifications of genital tissue were performed for medically indicated or purely cosmetic reasons. Although unlikely to be relevant with regards to immediate consequences, we note that consequences of a girl's or woman's FGM/C on other individuals were excluded.

Outcome: Psychological and social outcomes and any other outcomes that cannot be considered a physical outcome.

Article selection

The two reviewers Berg and Underland first independently read all titles/and or abstracts resulting from the literature searches. We compared our judgments regarding relevance and obtained full text copies of the studies that we deemed relevant. Independently of each other, we classified the studies read in full text as meeting all inclusion criteria or not. We compared our judgments and included studies that we agreed met all inclusion criteria while excluding all other studies. Appendix 3 shows the list of excluded studies formally considered in full text. Reasons for exclusion are provided.

For each of the two screening levels, the reviewers used pre-designed inclusion forms to guide their assessment. These forms contained questions regarding type of study, types of participants, type of FGM/C, and outcomes measured. There were few differences in opinion in the screening process. These differences were resolved by re-examining the record and discussing the study's relevance. If consensus had not been reached, we would have contacted the authors of the studies to aid the selection process and/or consulted a third reviewer at the NOKC.

Data extraction and analysis

The two reviewers Berg and Underland independently extracted data from the included studies in a systematic way using pre-designed data recording forms. The two reviewers then discussed and agreed upon the data extracted. The use of standard frameworks enabled consistency, and when differences in data extracted occurred, this was resolved by re-examination of the full text and subsequent discussion.

The first data extracted regarded methodological quality of included studies. For this assessment, we used checklists appropriate for each included study design. However, we did not assess the methodological quality of case reports. Case reports are descriptive studies that report observations on a single or a few individuals and are considered among the study designs with lowest validity for effect questions. Thus, a methodological quality assessment would not have added valuable information. For case series, cross-sectional descriptive studies, case-control, and cohort studies, we

used the respective NOKC checklists. Given our focus on consequences of exposure to FGM/C, the NOKC assessment tool for cross-sectional studies was used for analytic cross-sectional comparative studies (where two or more groups of women were compared with respect to consequences of FGM/C), but modified by the addition of five questions from the NOKC quality assessment tool for cohort studies. This modification was done to capture whether 1) the compared groups (women with FGM/C and women without FGM/C or women with different types of FGM/C) were selected from the same population; 2) the groups were comparable with respect to important backgrounds factors; 3) exposure and outcome were measured in the same way in the two groups; 4) the person who assessed the outcome was blind to whether participants were exposed or not; and 5) known, potentially important confounders had been considered in the study design and/or analyses. This resulted in an adapted checklist with 12 questions (this modified checklist was successfully used by us previously, in (1;8)). The paired reviewers' assessment of each checklist question of each study is provided in appendix 4.

To be able to describe the studies and analyze findings, we extracted the following core data from all included studies:

- Title, authors, year of publication, type of publication
- Study design (features of study)
- Sample characteristics (age of study participants, country of residency)
- FGM/C characteristics (type of cutting, age when FGM/C performed, type of practitioner, method of 'measurement' of FGM/C)
- Methods of outcome measurement (clinical, self-report, report by parent)
- Health consequences

From the included studies we extracted dichotomous and continuous data for all outcomes (health consequence/complication) meeting the inclusion criteria. We extracted crude data (sample sizes of each group and the number of events). If such data had been available, we would have extracted also unadjusted comparison (effect) estimates and adjusted effect estimates and their standard errors or confidence intervals. When sample sizes and/or the number of events for eligible outcomes were missing in the publication, we contacted the corresponding author(s) via e-mail and requested them to send us the data.

With respect to data analysis, when possible, we estimated effect on dichotomous variables by the relative risk (RR) and 95% confidence interval (95%CI). No continuous data were reported, but if they had been, we would have estimated effect on continuous variables by mean difference (or standardized mean difference when possible) and 95%CI. In this systematic review, we estimated effect based on crude data only. There were no studies that analyzed whether there were statistical differences in the frequency of immediate outcomes between groups of girls/women.

Thus, none of the included studies presented unadjusted effect estimates. It follows that no study presented adjusted outcome data, i.e. analyses that attempted to control for confounding. This means that all effect estimates presented in this systematic review are unadjusted and computed by the systematic review authors. We also note that no case-control studies were identified. If they had been, for studies where dichotomous variables were presented, we would have estimated effect by the odds ratio (OR) and 95%CI, because a case-control design involves the selection of research subjects on the basis of the outcome measurement rather than on the basis of the exposure.

We grouped the data according to outcomes across the studies, and present the results of these in text and tables. For transparency, readers will note that in the tables we have kept the FGM/C type and outcome categories or labels reported in each individual study. In line with recommendations in the Cochrane Handbook (11), we prioritized presenting results from those studies with highest internal validity (studies that compared groups of girls/women). We therefore placed results from studies with the lowest internal validity in appendix 5, while making reference to these in the results chapter. The results of descriptive cross-sectional studies, case series and case reports show the number of girls/women with FGM/C who experienced an immediate outcome, without comparisons with girls/women who have undergone a different FGM/C procedure.

According to the Cochrane Handbook (11), combing outcome data across studies is appropriate when the included studies are reasonable resistant to biases and relatively homogeneous in this respect. Further, for non-randomized studies, it is usually appropriate to analyze adjusted rather than unadjusted effect estimates (11). We planned to pool those studies that could be grouped together and use the statistical technique of meta-analysis to estimate risk, with RevMan v5.2. (Cochrane Collaboration meta-analysis software). Standard analysis procedures would have been used; i.e. Mantel-Haenzel random effects meta-analysis for dichotomous outcomes and inverse-variance random effects meta-analysis for continuous outcomes. We also planned to examine between-study heterogeneity, with the Chi-squared test (Chi^2) and I-squared statistic (I^2). A high I^2 value shows that most of the variability across studies is due to heterogeneity rather than to chance. When possible (i.e. there was a sufficient number of similar studies), we also planned to perform sensitivity analyses. In sum, to be statistically pooled, the same outcome had to be reasonably resistant to biases and assessed in similar populations across similar studies. In the current systematic review, no outcome qualified for statistical pooling (we are grateful for advice in this matter from senior researchers and our statistical expert at the NOKC). At the advice of the NOKC statistical expert, we decided to show the forest plots with no pooled effect estimate, in order to illustrate the direction of effect across studies. In the forest plots, we separated outcomes that were self-reported from outcomes that were reported by mothers, because bias may be different.

Lastly, we planned to grade the quality of evidence using the method Grading of Recommendations Assessment Development and Evaluation (GRADE) with GRADE-Profiler version 3.6 to assess the extent to which we can have confidence in the effect estimates (18). GRADE is a transparent and systematic approach to grading the level of evidence. However, we had decided for resource reasons to assess the quality of the evidence through GRADE only for outcomes which were eligible for meta-analysis. Since no studies were eligible for statistical pooling, we did not apply GRADE in this systematic review on the immediate consequences of FGM/C. For more details about the GRADE system, we refer to publications by the GRADE Working Group (gradeworkinggroup.org).

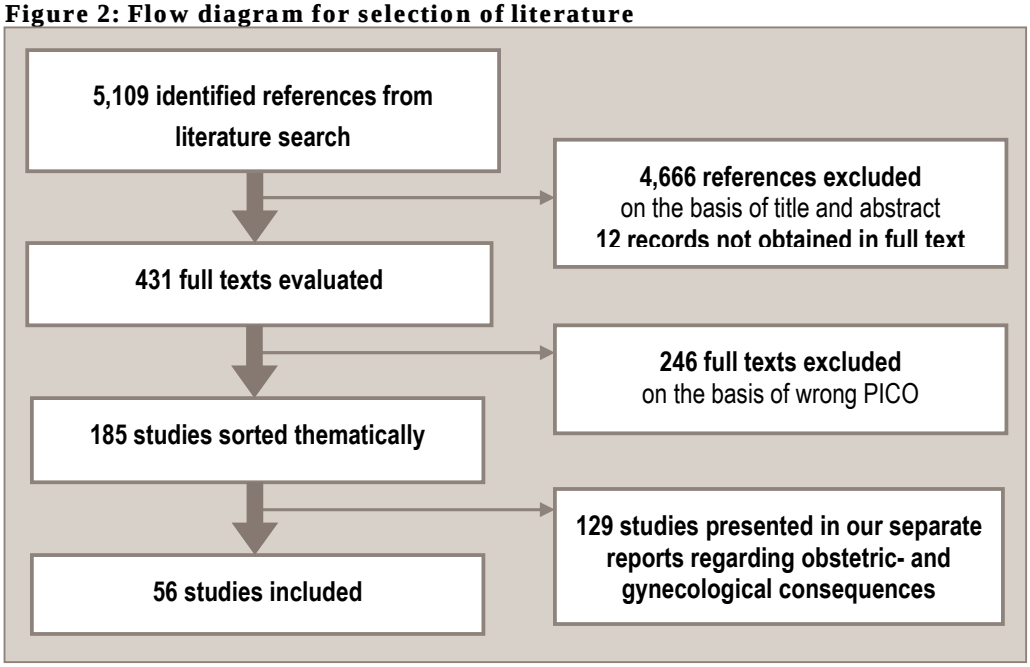
Results

Description of included literature

Results of the search

Based on the literature search, we screened 431 potentially relevant records in full text (figure 2). There were 12 records that could not be located in full text (19-30). We included 56 primary studies that reported on immediate outcomes of FGM/C.

Figure 2: Flow diagram for selection of literature



Description of included studies

We included 56 studies, presented in 55 publications, most of which were articles (n=37, 67%). There were also 15 reports (27%), one book (31), one book chapter (32), and one abstract (33) included. About half of the studies were published since 2000 (n=28, 51%), and the other studies were published in the 1990s (n=12), 1980s (n=11), 1970s (n=2), and 1960s (n=2). The oldest included study was a case-series from 1963 (34).

Among the 56 included studies, there were 14 comparative studies. That is, two or more groups of girls/women with different types of FGM/C were compared with re-

gards to one or more acute complication (table 1). As judged by the study features, these 14 studies employed a cross-sectional design. There were 42 non-comparative studies that presented acute complications from FGM/C (table 2). Across all the 56 included studies, about half (55%) were judged to have low methodological quality. Specifically, application of the checklist for comparative cross-sectional studies showed that among the 14 comparative studies, none were assessed to have high methodological study quality, the majority (79%) had moderate methodological study quality, and three (21%) had low methodological study quality.

Overall, the 56 studies included 133,515 participants (range= 1 – 38,816). Across the studies, the most frequently measured outcomes were bleeding/hemorrhage, infections, problems with urination, and swelling. Three quarters of the studies included outcomes that were self reported or where mothers reported on their daughters. That is, in this systematic review, most outcomes were self-reported by primarily adult women who were asked to recall circumstances surrounding the time they were subjected to FGM/C, which typically was an event occurring several decades in the past. Among the 14 comparative studies there was only one clinically measured outcome. Kaplan (35) reported on anaemia observed as females sought medical consultation.

Table 1: Included comparative studies (n=14)

Author, year (Ref)	Study quality	Population, Country	Outcomes (self-report, report by mother, or clinical verification)
Benin DHS 2001 (36)	Moderate	N=207, Benin	Bleeding, swelling, infections (mother)
Burkina Faso DHS 2003 (37)	Moderate	N=2312, Burkina Faso	Bleeding, swelling, infections, problems with urination (mother)
Chad DHS 2004 (38)	Moderate	N=3434, Chad	Bleeding, swelling, infections, problems with urination (mother, self-report)
El-Dareer 1983 (39)	Low	N=3102, Sudan	Bleeding, shock, swelling, fever, infection, problems with urination (self-report)
Guinea DHS 2005 (40)	Moderate	N=2761, Guinea	Bleeding, swelling, infections, problems with urination (mother)
Guinea DHS 1999 (41)	Moderate	N=2277, Guinea	Bleeding, swelling, infections, problems with urination (mother)
Kaplan 2011 (35)	Moderate	N=871, Gambia	Bleeding, infections (self-report), other (clinical)
Mali DHS 2006 (42)	Moderate	N=6090, Mali	Bleeding, swelling, infections, problems with urination (mother)
Mali DHS 2001 (43)	Moderate	N=5625, Mali	Bleeding, swelling, infections (mother)
Mandara 2004 (44)	Moderate	N=170, Nigeria	Bleeding, problems with urination, collapse (self-report)
Mauritania DHS 2001 (45)	Moderate	N=2453, Mauritania	Bleeding, swelling, infections, problems with urination (mother)
Rushwan 1983 (46)	Low	N=2308, Sudan	Bleeding, shock, swelling, fever, infections, problems with urination, other (self-report)
Senegal DHS 2005 (47)	Moderate	N=1392, Senegal	Bleeding, swelling, infections (mother)

Shandall 1967 (48)	Low	N=4283, Sudan	Bleeding, shock, infections (self-report)

There were 42 non-comparative studies, i.e. studies that described the frequency or nature of immediate complications following FGM/C for one or more girl/woman who had been subjected to the practice (table 2). These studies had the following designs: single group cross-sectional study (n=34), case series (n=5), case report (n=3).

Table 2: Included cross-sectional, case series and case report studies (n=42)

Author, year (Ref)	Study design	Study quality	Population, Country	Outcome (self-report, report by mother, or clinical verification)
Abdalla 1982 (31)	Cross-sectional	Low	N=70, Somalia	Other (self-report)
Abor 2006 (49)	Cross-sectional	Low	N=34, Ghana	Swelling, problems with voiding, pain (self-report)
Adetoro 1986 (50)	Case report	NA	N=1, Nigeria	Infection/sepsis (clinical)
Agugua 1982 (51)	Case series	Low	N=55, Nigeria	Bleeding, infections, sepsis (clinical)
Al-Hussaini 2003 (52)	Cross-sectional	Moderate	N=254, Egypt	Primary complication (clinical)
Almroth 2005 (53)	Cross-sectional	High	N=255, Sudan	Problems with voiding, other (clinical)
Arbesman 1993 (54)	Cross-sectional	Low	N=12, USA	Bleeding, infections (self-report)
Assaad 1980 (55)	Cross-sectional	Low	N=54, Egypt	Other (self-report)
Asuen 1977 (56)	Case report	NA	N=1, Nigeria	Infection (clinical)
Aziz 1980 (57)	Cross-sectional	Low	N=7505, Sudan	Bleeding (clinical)
Badejo 1983 (58)	Case series	High	N=12, Nigeria	Bleeding, infections (death) (clinical)
Bayoudh 1995 (59)	Cross-sectional	Low	N=300, Somalia	Bleeding, infections (self-report)
Benin DHS 2006 (60)	Cross-sectional	Moderate	N=240, Benin	Bleeding, swelling, infection, diff. urinating/ retention of urine (reported by mother)
Briggs 1998 (61)	Cross-sectional	Low	N=100, Nigeria	Bleeding, fever, problems with voiding, pain (self-report)
CAR DHS 1995 (62)	Cross-sectional	Moderate	N=2555, CAR	Bleeding, fever, infections, problems with voiding, pain (self-report)
Chalmers 2000 (63)	Cross-sectional	Low	N=432, Canada	Bleeding, swelling, infections, problems with voiding, pain (self-report)
Dandash 2001a (64)	Cross-sectional	Low	N=315, Egypt	Suffered complications (report by mothers)
Dandash 2001b (65)	Cross-sectional	Moderate	N=282, Egypt	Bleeding, fever, problems with voiding (self-report)
Dare 2004 (66)	Cross-sectional	Low	N=522, Nigeria	Bleeding, fever, swelling, pain, other (self-report)
Dirie 1992 (67)	Cross-sectional	Low	N=290, Somalia	Bleeding, shock, swelling, infections, problems with voiding, sepsis (self-report)
Egwuatu 1981 (68)	Case series	Low	N=43, Nigeria	Bleeding, infections, sepsis (clinical)
Egypt DHS 1995 (69)	Cross-sectional	Moderate	N=19719	Had complications (self-report and mother)
El-Defrawi 2001 (70)	Cross-sectional	Low	N=200, Egypt	Bleeding, swelling, infections, pain (self-report)

Elgaali 2005 (71)	Cross-sectional	Moderate	N=220,Scandinavia	Immediate complications (self-report)
Hall 1963 (34)	Case series	Low	N=5, Kenya	Swelling, fever (clinical)
Ismail 1982 (72)	Cross-sectional	Low	N=290, Somalia	Bleeding, infections, problems with voiding, sepsis (self-report)
Jones 1999-I (73)	Cross-sectional	Low	N=1920, Burkina Faso	Bleeding (self-report)
Jones 1999-II (73)	Cross-sectional	Moderate	N=5337, Mali	Bleeding (self-report)
Leonard 1996 (74)	Cross-sectional	Low	N=104, Chad	Bleeding, infections (self-report)
Litorp 2008 (75)	Cross-sectional	Low	N=40, Sweden	Problems with voiding, pain (self-report)
Livermore 2007 (76)	Cross-sectional	Moderate	N=60, Kenya	Other (self-report)
Modawi 1974 (77)	Cross-sectional	Low	N=3000, Sudan	Bleeding, infections, problems with voiding, other (not stated)
Mohammed 2010 (78)	Case report	NA	N=1, Sudan	Other (clinical)
Momoh 2001 (79)	Cross-sectional	Low	N=66, England	Bleeding, infections, problems with voiding, pain, sepsis (self-report)
Mukoro 2004 (80)	Cross-sectional	Low	N=46, Nigeria	Bleeding, pain (self-report)
Myers 1985 (81)	Cross-sectional	Low	N=492, Nigeria	Bleeding, infections (reported by mother)
Osifo 2009 (82)	Case series	High	N=51, Nigeria	Bleeding, infections (clinical)
Saad 1998 (33)	Cross-sectional	Low	N=9006, Sudan	Bleeding, infections, problems with voiding, other (not stated)
Sayed 1996 (83)	Cross-sectional	Low	N=1079, Egypt	Bleeding, pain, other (reported by mother)
Shell-Duncan 2000 (32)	Cross-sectional	Low	N=900, Kenya	Bleeding, infections, pain (self-report)
Tag-Eldin 2008 (84)	Cross-sectional	High	N=38816, Egypt	Other (self-report)
Yemen DHS 1997 (85)	Cross-sectional	Moderate	N=1546, Yemen	Bleeding, swelling, infections, problems with voiding, pain, other (reported by mother)

Legend: NA= Not applicable (we did not assess the methodological study quality of the three case reports).

Study design

We identified no systematic reviews, cohort studies or case-control studies that reported on immediate consequences of FGM/C. As judged by the study features, 14 studies employed a cross-sectional design in which data from two or more groups of females with different types of FGM/C were reported separately. These studies presented and compared number of events in each group, but none analyzed whether there were statistical differences in the frequency of immediate outcomes among the groups. Thus, none of the included studies presented effect estimates (neither unadjusted nor adjusted). There were also 34 single-group cross-sectional studies, 5 case series, and 3 case reports. Each of these non-comparative studies presented the number of immediate complications experienced by one or more girl or woman who had undergone FGM/C.

Most of the included studies were non-random, non-representative. However, we included one representative household survey from Sudan (39). It used multistage

random sampling technique, with household as the unit of sampling, ending up with a sample of 3,102 women who had undergone FGM/C. We also included 13 Demographic and Health Survey (DHS) reports (36-38;40-43;45;47;60;62;69;85). These are nationally, representative household surveys providing data on a range of demographic and health variables for countries. Female genital cutting is one of many modules in the survey and has been included for a number of years in several countries. One of the included DHS reports provided self-reported immediate complications data from women age 15-49 (62). Two of the DHS reports presented both self-reported data by women age 15-49 and data on daughters provided by mothers (38;69). The other ten DHS reports presented immediate complications experienced by daughters as reported by mothers (36;37;40-43;45;47;60;85). Nine of the included DHS reports were classified as comparative (36-38;40-43;45;47). That is, they presented data from two or more groups of females with different types of FGM/C. With regards to these nine DHS studies, it is important to note that DHS up to 1999 asked female respondents who had at least one living daughter about the FGM/C circumstances of the eldest daughter. From 1999, DHS asked respondents whether any of their daughters had undergone FGM/C. Parents who answered in the affirmative were then asked a number of follow-up questions regarding the daughter most recently cut (4). What is more, in a few DHS reports the outcome data on daughters' FGM/C complications seemed to include only those daughters who had developed complications, excluding daughters who did not experience complications from the denominator. Thus, taken together these limitations mean that the DHS reports on daughters' complications related to the FGM/C procedure cannot be considered representative.

Population in the comparative studies

Understandably, none of the included studies compared females with and without FGM/C with regards to acute FGM/C complications. Rather, groups of females with various types of FGM/C were compared. All in all, the 14 studies classified as comparative involved 37,285 girls/women from ten different African countries: Benin, Burkina Faso, Chad, Gambia, Guinea, Mali, Mauritania, Nigeria, Senegal, and Sudan (table 3).

Nine of the studies were DHS reports in which mothers reported on immediate FGM/C complications experienced by their daughter most recently undergoing FGM/C (age not specified) (36-38;40-43;45;47). One study also provided adult (age 15-49) women's self-reported information on complications experienced at the time they were subjected to the practice (38). Three studies did not specify the age of the study participants, but they were described as women and girls (35), women (44), and teenage daughters and women (48). In the last two studies, the majority of the study participants were 15-34 years old (39;46).

With regards to FGM/C characteristics of the participants, most of them had type I or II (67.5%), about a third (28%) had type III, and 4.5% had type IV. FGM/C type

IV was described as 'nick' (no flesh removed) in all studies except one, which included nine women with Gishiri cut (44). A Gishiri cut is a posterior (or backward) cut from the vagina into the perineum. The information on type of FGM/C was derived from gynecological examination in three studies, self-report in two, and in the nine DHS reports mothers reported on their daughters' FGM/C status. Twelve studies described when the procedure had taken place. Typically, this was before age 10 and in two studies the majority of the girls had been subjected to FGM/C as infants. The person who performed the procedure was in most cases a traditional circumciser.

Table 3: Description of the population in included comparative studies (n=14)

Author, year	N	Country	Age	FGM/C characteristics
Benin DHS 2001	N= 207 (194 TIII, 13 TIV)	Benin	'daughters'	Type: 94% TI-III, 6% TIV= nick (reported by mother) Age cut/by: as infant / 92% tc
Burkina Faso DHS 2003	N=2312 (2226 TI-II, 86 TIII)	Burkina Faso	'daughters'	Type: 96% TI-II, 4% TIII (reported by mother) Age cut/by: 92% 0-9 yrs / 98% tc
Chad DHS 2004	N= 3434 (2629TI-II, 97 TIII, 708 TIV)	Chad	'daughters' & women 15-49 yrs	Type: 77% TI-II, 3% TIII, 20% TIV= nick (self-report and by mother) Age cut/by: 70% 0-9 yrs / 94% tc
El-Dareer 1983	N= 3102 (80 TI, 3022 TIII)	Sudan	70% 15-34 yrs	Type: 3% TI, 97% TIII (self-report) Age cut/by: mean 7 yrs (2-11) / 81% tc
Guinea DHS 2005	N= 2761 (2410 TI-II, 294 TIII, 57 TIV)	Guinea	'daughters'	Type: 87% TI-II, 11% TIII, 21% TIV= nick (reported by mother) Age cut/by: 83% 0-9 yrs / 72% tc
Guinea DHS 1999	N=2277 (1539 TI, 628 TII, 110 TIV)	Guinea	'daughters'	Type: 68% TI, 27% TII, 5% TIV= nick (reported by mother) Age cut/by: med 7 yrs / 69% tc
Kaplan 2011	N=871 (577 TI, 229 TII, 65 TIII)	Gambia	'women and girls'	Type: 66% TI, 26% TII (gyn exam) Age cut/by: ≤10 days prior to admission
Mali DHS 2006	N=6090 (4860 TI-II, 996 TIII, 234 TIV)	Mali	'daughters'	Type: 80% TI-II, 16% TIII, 4% TIV= nick (reported by mother) Age cut/by:23% infancy, 71% 0-9 yrs / 95% tc
Mali DHS 2001	N=5625 (5219 TI-II, 272 TIII, 137 TIV)	Mali	'daughters'	Type: 93% TI-II, 5% TIII, 2% TIV= nick (reported by mother) Age cut/by: 28% infancy, 68% 0-9 yrs / 94% tc
Mandara 2004	N= 170 (52 TI, 97 TII, 8 TIII, 13 TIV)	Nigeria	'women'	Type: 32% TI, 57% TII, 5% TII, 8% TIV= Gishiri cut (n=9) and other (gyn exam) Age cut/by: 35% childhood / 18% tc, 5% hcp
Mauritania DHS 2001	N= 2453 (2073 TI-II, 380 TIV)	Mauritania	'daughters'	Type: 85% TI-II, 15% TIV=nick (reported by mother) Age cut/by: 97% 0-1yrs / 95% tc, 4% hcp
Rushwan 1983	N=2308 (88 TI, 2203 TIII, 17 IV)	Sudan	60% 15-34 yrs	Type: 4% TI, 95% TIII, 1% IV= other (self-report) Age cut/by: not stated / 53% hcp
Senegal DHS 2005	N= 1392 (1245 TI-II, 139 TIII, 8 TIV)	Senegal	'daughters'	Type: 89% TI-II, 10% TIII, 1% TIV=nick (reported by mother) Age cut/by: 29% infancy, 58% 0-9 yrs / 96% tc
Shandall 1967	N=4283 (1034TI, 3249TIII)	Sudan	'teenage daughters and women'	Type: 24% TI, 76% TIII (gyn exam) Age cut/by: 5-10 yrs / not stated

Legend: TI= FGM/C type I; TII= FGM/C type II; TIII= FGM/C type III; TIV= FGM/C type IV; gyn exam= gynecological exam; yrs= years; tc= traditional circumciser; hcp= health care provider; med= median.

Population in the non-comparative studies

There were 96,230 girls/women included in the 42 non-comparative studies. These female study participants were largely from 11 countries in Africa (Benin, Burkina Faso, Central African Republic, Chad, Egypt, Ghana, Kenya, Mali, Nigeria, Somalia, Sudan), but there was also one study from Yemen, two from North America (Canada, USA), and three from Europe (England, Scandinavia, Sweden). The women in the North American and European studies were all originally from Africa.

The 42 studies included females of all ages, from infants to women in their 60s, and various types of FGM/C. Information about type of FGM/C was ascertained by gynecological examination in 43% of the studies, self-reported in 14 studies, and reported by mothers on behalf of their daughters in six studies. In the three case reports, the FGM/C procedure had taken place one or a few days prior to hospital admission for complications. The most frequently reported mean age for the procedure was 7 years. Participants from Ghana and Egypt appeared to be a bit older when FGM/C was carried out. In Somalia and Egypt it was common that the person who carried out the FGM/C procedure was a health care provider, but in general, this was done by a traditional circumciser.

Table 4: Description of the population in included non-comparative studies (n=42)

Author, year	N	Country (Origin)	Age (years)	FGM/C characteristics
Abdalla 1982	N=70	Somalia	20-60	Type: 6% TI, 13% TII, 81% TIII (gyn exam) Age cut/by: 5-13 yrs / 80% tc, 20% hcp
Abor 2006	N=34	Ghana	21-50	Type: 'have undergone FGM' (self-report) Age cut/by: 47% 0-10 yrs, 29% 11-15 yrs / 100% tc
Adetoro 1986	N=1	Nigeria	20	Type: TII (gyn exam) Age cut/by: 6 days before hospital admission / tc
Agugua 1982	N=55	Nigeria	≤12	Type: 'female circumcision' (gyn exam) Age cut/by: within 21 days of birth / not stated
Al-Hussaini 2003	N=254	Egypt	16-37	Type: 51% TI, 49% TII (gyn exam) Age cut/by: 47% 0-10 yrs, 29% 11-15 yrs / 100% tc
Almroth 2005	N=255	Sudan	Median 6	Type: 67% TIII (gyn exam) Age cut/by: not stated / 100% tc
Arbesman 1993	N=12	USA (Somalia)	Mean 32	Type: 33% TI-II, 58% TIII (self-report) Age cut/by: mean 7.4 yrs / 74% hcp
Assaad 1980	N=54	Egypt	20-60	Type: 'sunna' (gyn exam) Age cut/by: most before puberty / 18% hcp, 82% tc
Asuen 1977	N=1	Nigeria	23	Type: TII (gyn exam) Age cut/by: 1 day before hospital admission / not stated
Aziz 1980	N=7505	Sudan	'women'	Type: 100% TIII (not stated) Age cut/by:100% trained midwife

Badejo 1983	N=12	Nigeria	0-18 mo	Type: 'circumcised' (gyn exam) Age cut/by: not stated
Bayoudh 1995	N=300	Somalia	20-60	Type: 12% TI, 8% TII, 80% TIII (self-report) Age cut/by: most under 10 yrs / 83% tc
Benin DHS 2006	N=240	Benin	'daughters'	Type: 'circumcised' (reported by mother) Age cut/by: not stated
Briggs 1998	N=100	Nigeria	Mean 30	Type: 15% TI, 85% TII (self-report) Age cut/by: not stated / 17% hcp, 45% tc
CAR DHS 1995	N=2555	Central African Republic	15-49	Type: 'circumcision' (self-report) Age cut/by: 55% 0-10 yrs / not stated
Chalmers 2000	N=432	Canada (Somalia)	Mean 34.0	Type: 1% TI-II, 96%TIII (self-report) Age cut/by: mean 5.7 yrs / 58% tc, 10% hcp
Dandash 2001a	N=315	Egypt	14-16	Type: 'circumcised' (reported by mother) Age cut/by: 62% 8-11yrs, 38%12-16 yrs/ 35% hcp, 65% tc
Dandash 2001b	N=282	Egypt	'students'	Type: 'circumcised' (self-report) Age cut/by: 91% 8-11 yrs, 9% ≥12 yrs / 59% hcp, 41% tc
Dare 2004	N=522	Nigeria	Mean 26	Type: 69% TI, 31% TII (gyn exam) Age cut/by: mean 6.9 yrs / 89% tc, 11% hcp
Dirie 1992	N=290	Somalia	Mean 22	Type: 88%TIII (self-report) Age cut/by: mean 7 yrs / 48% hcp, 52% tc
Egwuatu 1981	N=43	Nigeria	≤ 12 yrs	Type: seems like 100% TI-II (gyn exam) Age cut/by: within 21 days of birth / 100% tc
Egypt DHS 1995	N=5389	Egypt	'daughters'	Type: 97% TI-II, 3% TIII (reported by mother) Age cut/by: mean 9 yrs / 32% tc, 55% hcp
El-defrawi 2001	N=200	Egypt	'women'	Type: 37% TI, 13% TII, 50% TIV= 'injury to clitoris' (gyn exam) Age cut/by: mean 11 yrs / 37% hcp, 49% tc
Elgaali 2005	N=220	'Scandinavia' (north Africa)	Median 21	Type: 57% TI, 32% TII, 11% TIII (self-report) Age cut/by: mean 7 yrs / not stated
Hall 1963	N=5	Kenya	10-11	Type: 100% TI (gyn exam) Age cut/by:13-21 days before hospital admission / not stated
Ismail 1982	N=290	Somalia	85% 18-35	Type: 9% TI, 6% TII, 85% TIII (self-report) Age cut/by: 1-15 yrs / 49% hcp, 51% tc
Jones 1999-I	N=1920	Burkina Faso	Mean 27	Type: 56% TI, 39% TII, 5% TIII (gyn exam) Age cut/by: median 10 yrs / not stated
Jones 1999-II	N=5337	Mali	Mean 25	Type: 21% TI, 74% TII, 5% TIII (gyn exam) Age cut/by: not stated
Leonard 1996	N=104	Chad	Mean 29	Type: seems like TI-II ('baya' / 'gàjá) (self-report) Age cut/by: mean 12 yrs / not stated
Litorp 2008	N=40	Sweden (Somalia, Eritrea)	Mean 32	Type: most type I or II (self-report) Age cut/by: mean 6 yrs / 38% tc
Livermore 2007	N=60	Kenya	Mean 39	Type: 'female genital mutilation' (self-report) Age cut/by: not stated
Modawi 1974	N=3000	Sudan	65% 21-35	Type: 2% TI, 85% TIII (unclear) Age cut/by: not stated
Mohammed 2010	N=1	Sudan	7	Type: 'female genital mutilation' (gyn exam) Age cut/by: 7 days before hospital admission / tc
Momoh 2001	N=66	England ('Africa')	Mean 27	Type: 22% TI, 3% TII, 75% TIII (gyn exam) Age cut/by: median 7 yrs / 28% hcp

Mukoro 2004	N=46	Nigeria	21-45	Type: 74% TI, 26% TII (self-report) Age cut/by: not stated
Myers 1985	N=492	Nigeria	'children'	Type: 85% TI, 15% TIII (reported by mother) Age cut/by: not stated / 26% hcp
Osifo 2009	N=51	Nigeria	Mean 5	Type: 41% TI, 59% TII (gyn exam) Age cut/by: not stated / 94% tc, 6% hcp
Saad 1998	N=9006	Sudan	not stated	Type: 63% TIII (not stated) Age cut/by: not stated
Sayed 1996	N=1079	Egypt	'children'	Type: 'circumcised' (reported by mother) Age cut/by: mean 8 yrs / 1% hcp, 98% tc
Shell-Duncan 2000	N=900	Kenya	15-76	Type: 100% TII (self-report) Age cut/by: mean 17 yrs / 87% tc
Tag-Eldin 2008	N=38816	Egypt	10-18	Type: seems like 100% TI-II (not stated) Age cut/by: mean 10 yrs / 68% hcp
Yemen DHS 1997	N=1546	Yemen	'daughters'	Type: 'circumcised' (reported by mother) Age cut/by: median 8 days / 9% hcp, 68% tc

Legend: TI= FGM/C type I; TII= FGM/C type II; TIII= FGM/C type III; TIV= FGM/C type IV; gyn exam= gynecological exam; yrs= years; tc= traditional circumciser; hcp= health care provider..

Outcomes

A range of outcomes were reported across the included studies. These could be classified into eight main types of immediate outcomes:

- Bleeding
- Shock
- Genital tissue swelling
- Fever
- Infection
- Problems with urination
- Problems with wound healing
- Other immediate complications

Table 5 shows the number and types of studies included with respect to immediate outcomes.

Table 5: Outcomes reported in comparative and non-comparative studies

Outcome	Nº of studies	Comparative studies	Non-comparative studies
Bleeding	42	Benin DHS 2001, Burkina Faso DHS 2003, Chad DHS 2004, El-Dareer 1983, Guinea DHS 2005, Guinea DHS 1999, Kaplan 2011, Mali DHS 2006, Mali DHS 2001, Mandara 2004, Mauritania DHS 2001, Rushwan 1983, Senegal DHS 2005, Shandall 1967.	Abor 2006, Agugua 1982, Arbesman 1993, Aziz 1980, Badejo 1983, Bayoudh 1995, Benin DHS 2006, Briggs 1998, CAR DHS 1995, Chalmers 2000, Dandash 2001b, Dare 2004, Dirie 1992, Egwuatu 1981, El-Defrawi 2001, Ismail 1982, Jones 1999a, Jones 1999b, Leonard 1996, Modawi 1974, Momoh 2001, Mukoro 2004, Myers 1985, Osifo 2009, Saad 1998, Sayed 1996, Shell-Duncan 2000, Yemen DHS 1997.

Shock	4	El-Dareer 1983, Rushwan 1983, Shandall 1967.	Dirie 1992.
Genital tissue swelling	18	Benin DHS 2001, Burkina Faso DHS 2003, Chad DHS 2004, El-Dareer 1983, Guinea DHS 2005, Guinea DHS 1999, Mali DHS 2006, Mali DHS 2001, Mauritania DHS 2001, Rushwan 1983, Senegal DHS 2005.	Abor 2006, Benin DHS 2006, Chalmers 2000, Dare 2004, El-Defrawi 2001, Hall 1963, Yemen DHS 1997.
Fever	7	El-Dareer 1983, Rushwan 1983.	Briggs 1998, CAR DHS 1995, Dandash 2001b, Dare 2004, Hall 1963.
Infections (including sepsis)	35	Benin DHS 2001, Burkina Faso DHS 2003, Chad DHS 2004, El-Dareer 1983, Guinea DHS 2005, Guinea DHS 1999, Kaplan 2011, Mali DHS 2006, Mali DHS 2001, Mauritania DHS 2001, Rushwan 1983, Senegal DHS 2005, Shandall 1967.	Adetoro 1986, Agugua 1982, Arbesman 1993, Asuen 1977, Badejo 1983, Bayoudh 1995, Benin DHS 2006, CAR DHS 1995, Chalmers 2000, Dirie 1992, Egwuatu 1981, El-Defrawi 2001, Ismail 1982, Leonard 1996, Modawi 1974, Mohammed 2010, Momoh 2001, Myers 1985, Osifo 2009, Saad 1998, Shell-Duncan 2000, Yemen DHS 1997.
Problems with urination and voiding	24	Burkina Faso DHS 2003, Chad DHS 2004, El-Dareer 1983, Guinea DHS 2005, Guinea DHS 1999, Mali DHS 2006, Mandara 2004, Mauritania DHS 2001, Rushwan 1983, Shandall 1967.	Abor 2006, Almroth 2005b, Benin DHS 2006, Briggs 1998, CAR DHS 1995, Chalmers 2000, Dandash 2001b, Dirie 1992, Ismail 1982, Litorp 2008, Modawi 1974, Momoh 2001, Saad 1998, Yemen DHS 1997.
Problems with wound healing	4	Chad DHS 2004, Guinea DHS 1999, Mauritania DHS 2001, Shandall 1967.	
Other:			
Pain	12		Abor 2006, Briggs 1998, CAR DHS 1995, Chalmers 2000, Dare 2004, El-Defrawi 2001, Litorp 2008, Momoh 2001, Mukoro 2004, Sayed 1996, Shell-Duncan 2000, Yemen DHS 1997.
Other	25	Benin DHS 2001, Guinea DHS 2005, Guinea DHS 1999, Kaplan 2011, Mali DHS 2006, Mali DHS 2001, Mandara 2004, Mauritania DHS 2001, Rushwan 1983, Senegal DHS 2005.	Abdalla 1982, Al-Hussaini 2003, Almroth 2005, Assaad 1980, Dandash 2001a, Dare 2004, Egypt DHS 1995, Elgaali 2005, Livermore 2007, Modawi 1974, Saad 1998, Sayed 1996, Tag-Eldin 2008, Yemen DHS 1997.

The remainder of the results chapter is organized by type of immediate outcome. Results from comparative and non-comparative studies are presented separately. When considering the results presented, the reader should keep in mind the low quality of the data. As explained above, all included studies were observational, very few had high methodological study quality, exposure to FGM/C was self-reported or reported by the mother in the majority of the studies, and outcome measurement in three quarters of the studies included was based on self-report or mother's report of daughters. Furthermore, most immediate problems were self-reported by mainly adult women who were asked to recall circumstances surrounding the time they underwent FGM/C, which typically was an event occurring several decades in the past during childhood or even infancy, within cultural contexts where FGM/C is generally discouraged. These actualities (further detailed in the discussion chapter), as well as the data themselves, suggest under-reporting of immediate complications associated with FGM/C. Because not only study characteristics but also setting may affect how and what complications are assessed, we also note throughout the report the contexts of the studies. In sum, the low quality of the data means that all results are very uncertain.

Bleeding

As described in the introduction, FGM/C comprises a range of procedures that involve excision or alteration (e.g. pricking, piercing, incising) of the female genital organs. When tissue is cut or excised with a sharp instrument, there will be minor to major bleeding, depending on the degree and location of the cut.

Comparative studies

All the 14 included comparative studies provided information on bleeding experienced at the time of the FGM/C procedure (table 6). The frequency of bleeding or excessive bleeding varied, both within categories of FGM/C (type I= 1-61%, type II= 5-69%, type III= 0-76%) and between different types of FGM/C. These studies were from ten different African countries and were conducted between 1967 and 2011. In the representative studies (38;39), the average frequency of girls experiencing (excessive) bleeding at the time of the procedure was 62% in Chad and 5.4% in Sudan. The difference in frequency of reported bleeding in these two studies was considerable. It is likely that the study results from Chad (38) are more credible since this study had higher methodological quality.

Several factors, including the lack of a unified approach to measure the outcome, probably explain the great variability in frequency of bleeding across the studies, shown in table 6. We also believe there is under-reporting of bleeding in some of the included studies. This is because it is clinically unlikely – some may say impossible, given that genital tissue is cut away – that over 90% of girls undergoing FGM/C types I or II experienced no bleeding at all, as suggested in the studies by El-Dareer (39) and Rushwan and colleagues (46).

Table 6: Study outcomes and effect estimates for bleeding

Author, year	Outcome	FGM/C Type I-II	FGM/C Type III	FGM/C Type IV	Unadjusted results RR (95%CI)
Benin DHS 2001	Excessive bleeding [a]	17/194 (8.8%) TI-III		2/13 (15.4%)	0.57 (0.15, 2.20) TI-III vs TIV
Burkina Faso DHS 2003	Excessive bleeding [a]	387/2226 (17.4%)	17/86 (19.8%)		0.88 (0.57, 1.36) TI-II vs TIII
Chad DHS 2004a	Excessive bleeding [a]	329/586 (56.1%)	22/32 (68.8%)	134/177 (75.7%)	0.82 (0.64, 1.04) TI-II vs TIII 0.74 (0.66, 0.83) TI-II vs TIV 0.91 (0.71, 1.16) TIII vs TIV
Chad DHS 2004b	Excessive bleeding [b]	1258/2043 (61.6%)	35/65 (53.8%)	350/531 (65.9%)	1.14 (0.91, 1.44) TI-II vs TIII 0.93 (0.87, 1.00) TI-II vs TIV 0.82 (0.65, 1.03) TIII vs TIV
El-Dareer 1983	Bleeding [b]	5/80 (6.3%) TI	163/3022 (5.4%)		1.16 (0.49, 2.74) TI vs TIII
Guinea DHS 2005	Excessive bleeding [a]	330/2410 (13.7%)	111/294 (37.8%)	3/57 (5.3%)	0.36 (0.30, 0.43) TI-II vs TIII 2.60 (0.86, 7.86) TI-II vs TIV 7.17 (2.36, 21.79) TIII vs TIV

Guinea DHS 1999	Excessive bleeding [b]	903/1539 (58.7%) TI 235/628 (37.4%) TII		12/110 (10.9%)	1.57 (1.41, 1.75) TI vs TII 5.38 (3.15, 9.19) TI vs TIV 3.43 (1.99, 5.91) TII vs TIV
Kaplan 2011	Hemorrhage [b]	10/577 (1.7%) TI 23/229 (10.0%) TII	7/65 (10.8%)		0.17 (0.08, 0.36) TI vs TII 0.16 (0.06, 0.41) TI vs TIII 0.93 (0.42, 2.08) TII vs TIII
Mali DHS 2006	Excessive bleeding [a]	520/4860 (10.7%)	359/996 (36.0%)	47/234 (20.1%)	0.30 (0.26, 0.33) TI-II vs TIII 0.53 (0.41, 0.70) TI-II vs TIV 1.79 (1.37, 2.35) TIII vs TIV
Mali DHS 2001	Excessive bleeding [a]	892/5219 (17.1%)	44/272 (16.2%)	27/137 (19.7%)	1.06 (0.80, 1.39) TI-II vs TIII 0.87 (0.62, 1.22) TI-II vs TIV 0.82 (0.53, 1.27) TIII vs TIV
Mandara 2004	Excessive bleeding [b]	1/97 (1.0%) TII	5/8 (62.5%)	3/13 (23.1%)	0.02 (0.00, 0.12) TII vs TIII 0.04 (0.01, 0.40) TII vs TIV 2.71 (0.88, 8.37) TIII vs TIV
Mauritania DHS 2001	Excessive bleeding [a]	583/2073 (28.1%)		32/380 (8.4%)	3.34 (2.38, 4.69) TI-II vs TIV
Rushwan 1983	Bleeding [b]	4/88 (4.5%)		68/2203 (3.1%)	1.47 (0.55, 3.95) TI-II vs TIV
Senegal DHS 2005	Excessive bleeding [a]	90/1245 (7.2%)	24/139 (17.3%)		0.42 (0.28, 0.63) TI-II vs TIII
Shandall 1967	Hemorrhage (women) [b]	3/807 (0.4%) TI	81/3013 (2.7%)		0.14 (0.04, 0.44) TI vs TIII
Shandall 1967	Hemorrhage (daughters) [b]	1/227 (0.4%) TI	5/236 (2.1%)		0.21 (0.02, 1.77) TI vs TIII

Legend: RR= relative risk with 95% confidence interval (CI) computed by the SR authors; TI= FGM/C type I; TII= FGM/C type II; TIII= FGM/C type III; TIV= FGM/C type IV; a= mothers reporting on daughters; b=self-report by girls/women.

In figure 3, we show the ten studies that reported on bleeding (bleeding, excessive bleeding, hemorrhage) in girls who underwent either FGM/C types I-II or III. The results indicate that although there is considerable variation, there might be a trend for a lower risk of excessive bleeding at the time of the FGM/C procedure among girls who underwent FGM/C types I-II compared to type III.

Figure 3: Forest plot, bleeding (types I-II vs type III)

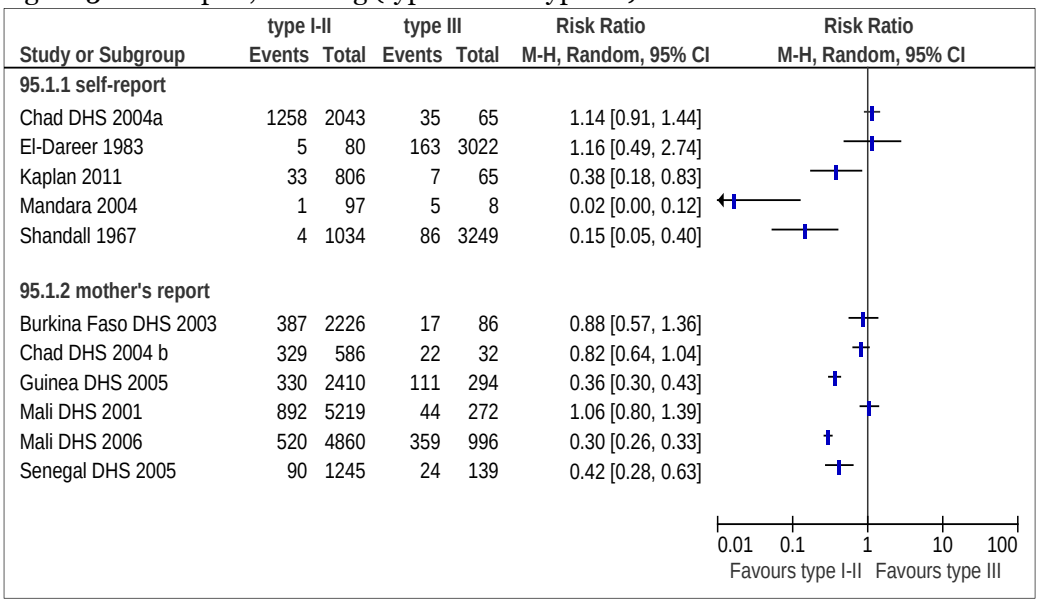


Figure 4 shows the nine studies that reported on bleeding (reported as bleeding, excessive bleeding, hemorrhage) in girls who underwent either FGM/C types I-II or type IV. The figure shows that the difference between girls with FGM/C types I-II and those with type IV in frequency of bleeding varied. There was no clear difference in risk of bleeding between girls who underwent FGM/C types I-II and those who had type IV.

Figure 4: Forest plot, bleeding (types I-II vs type IV)

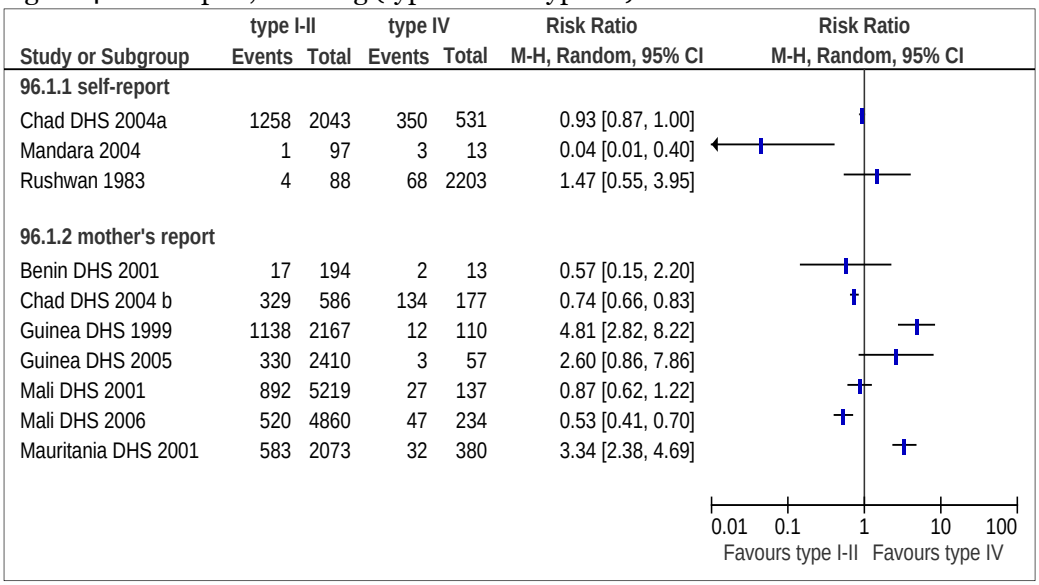
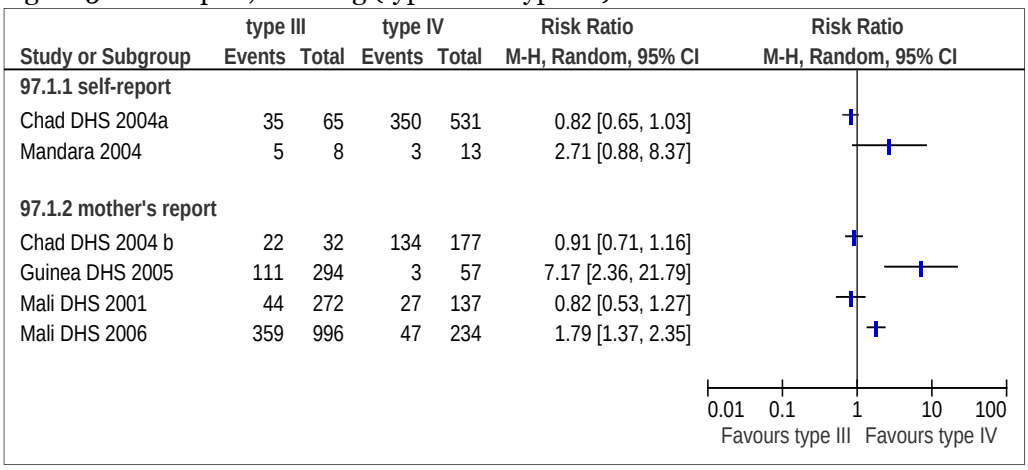


Figure 5 shows the five studies that reported on excessive bleeding in girls who underwent either FGM/C type III or IV. The figure shows that the difference between girls with FGM/C type III and those with type IV in frequency of bleeding varied.

Figure 5: Forest plot, bleeding (type III vs type IV)



Non-comparative studies

Twenty-eight of the non-comparative studies reported on bleeding experienced by the females at the time of the FGM/C procedure (appendix 5, table 5.1). The majority of these (n=25) were descriptive cross-sectional studies. They reported bleeding (or excessive bleeding, heavy bleeding, serious bleeding, severe bleeding) among 0.2-81%, and hemorrhage (or primary hemorrhage) among 0.2-47% of the participants included in the studies. In the representative DHS study from the Central African Republic (62), published in 1995, the proportion of women who recalled having experienced hemorrhage at the time of their FGM/C procedure was 17%.

There were four case series that reported on bleeding (51;58;68;82). These described that 4-33% of the girls in the patient series were brought to a clinic or hospital due to profuse bleeding after the FGM/C procedure.

Shock

An immediate complication related to FGM/C occasionally reported in the FGM/C literature is circulatory shock. Shock is a life-threatening condition that occurs when the body has insufficient blood flow. A number of conditions can reduce blood flow, such as heart problems and low blood volume due to heavy bleeding. Symptoms of shock can include one or several symptoms, including agitation, chest pain, confusion, dizziness, profuse sweating, shallow breathing, clammy skin, and rapid but weak pulse (86).

Comparative studies

There were three comparative studies that reported on shock in relation to the FGM/C procedure. The three studies were from Sudan, they were published 30-47 years ago, and concerned primarily women who had undergone FGM/C type III. As shown in table 7, the frequency of females who self-reported having experienced shock ranged from 0-1% among those who underwent FGM/C type I and 0.8-3.4%

among those who were subjected to FGM/C type III. Shock was consistently more frequent when FGM/C type III was performed, as opposed to type I or type II.

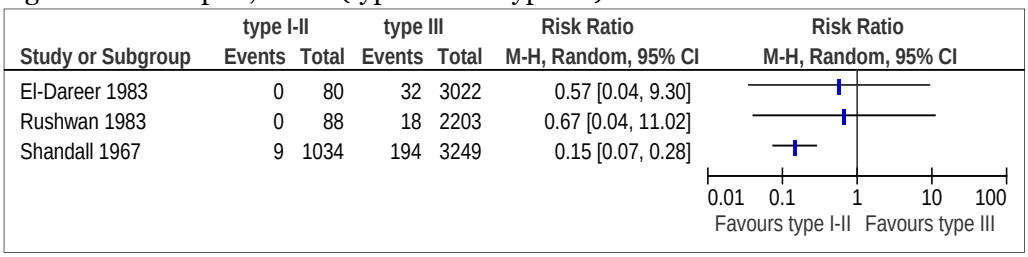
Table 7: Study outcomes and effect estimates for shock

Author, year	Outcome	FGM/C Type I	FGM/C Type III	Unadjusted results RR (95%CI)
El-Dareer 1983	Shock	0/80 (0%)	31/3022 (1.0%)	0.57 (0.04, 9.30) TI vs TIII
Rushwan 1983	Shock	0/88 (0%) TII	17/2203 (0.8%)	0.67 (0.04, 11.02) TII vs TIII
Shandall 1967	Shock (women)	8/807 (1.0%)	102/3013 (3.4%)	0.29 (0.14, 0.60) TI vs TIII
Shandall 1967	Shock (daughters)	1/227 (0.4%)	5/236 (2.1%)	0.21 (0.02, 1.77) TI vs TIII
Shandall 1967	Shock due to hemorrhage (women)	0/807 (0%)	84/3013 (2.8%)	0.02 (0.00, 0.36) TI vs TIII
Shandall 1967	Shock due to hemorrhage (daughters)	0/227 (0%)	3/236 (1.3%)	0.15 (0.01, 2.86) TI vs TIII

Legend: RR= relative risk with 95% confidence interval (CI) computed by the SR authors; TI= FGM/C type I; TII= FGM/C type II; TIII= FGM/C type III; TIV= FGM/C type IV. All outcomes are self-reported.

The results in figure 6 show that there might be a trend for a lower risk of shock among girls who underwent FGM/C types I-II compared to type III. All relative risks were smaller than 1.

Figure 6: Forest plot, shock (types I-II vs type III)



Non-comparative studies

There was one non-comparative study, a cross-sectional study, that provided information on shock in relation to the FGM/C procedure (67). It found that 5/112 (4.5%) of the Somali women had experienced shock due to hemorrhage following their FGM/C procedure, which was type III in 88% of the cases (appendix 5).

Genital tissue swelling

Acute complications or injuries are typically first recognized by pain and shortly after, swelling. Swelling is a normal reaction of the body to an injury, characterized by an abnormal enlargement of the injured body part (86).

Comparative studies

Table 8 shows the 11 studies that reported on genital swelling related to the FGM/C procedure. These studies were from eight African countries (Benin, Burkina-Faso,

Chad, Guinea, Mali, Mauritania, Senegal, Sudan) and were published between 1983 and 2006. These studies reported that a substantial number of girls experienced swelling of the genital area: up to 33% among those who were subjected to FGM/C type I, 1-31% of those with type III, and 0-18% among those who were subjected to FGM/C type IV.

In the representative studies (38;39), the proportion of girls/women having experienced genital tissue swelling following the FGM/C procedure in the study from Chad was 26.5%, and 1.6% in the study from Sudan. The difference in frequency of reported swelling in these two studies was considerable. It is likely that the study results from Chad (38) are more credible since this study had higher methodological quality. Nonetheless, as with bleeding, there seems to be under-reporting of swelling in some of the included studies that reported on swelling, possibly due to measurement problems. This is because it is clinically unlikely that over 90% of girls undergoing FGM/C type III experienced no swelling at all after the labia minora and/or the labia majora (possibly also the clitoris) were cut away and the edges stitched together, as suggested in some studies (39;46).

Table 8: Study outcomes and effect estimates for genital tissue swelling

Author, year	Outcome	FGM/C Types I-II	FGM/C Type III	FGM/C Type IV	Unadjusted results RR (95%CI)
Benin DHS 2001	Swelling [a]	12/194 (6.2%) TI-III		2/13 (15.4%)	0.40 (0.10, 1.61) TI-III vs TIV
Burkina Faso DHS 2003	Swelling [a]	145/2226 (6.5%)	11/86 (12.8%)		0.51 (0.29, 0.90) TI-II vs TIII
Chad DHS 2004a	Swelling [b]	674/2043 (33.0%)	15/65 (23.1%)	31/531 (5.8%)	1.43 (0.91, 2.24) TI-II vs TIII 5.65 (3.99, 8.00) TI-II vs TIV 3.95 (2.26, 6.92) TIII vs TIV
Chad DHS 2004b	Swelling [a]	163/586 (27.8%)	10/32 (31.2%)	17/177 (9.6%)	0.89 (0.52, 1.51) TI-II vs TIII 2.90 (1.81, 4.64) TI-II vs TIV 3.25 (1.64, 6.45) TIII vs TIV
El-Dareer 1983	Swelling [b]	0/80 (0%) TI	51/3022 (1.7%)		0.36 (0.02, 5.82) TI vs TIII
Guinea DHS 2005	Swelling [a]	50/2410 (2.1%)	27/294 (9.2%)	1/57 (1.8%)	0.23 (0.14, 0.36) TI-II vs TIII 1.18 (0.17, 8.41) TI-II vs TIV 5.23 (0.73, 37.75) TIII vs TIV
Guinea DHS 1999	Swelling [a]	112/1539 (7.3%) TI 45/628 (7.2%) TII		0/110 (0%)	1.02 (0.73, 1.42) TI vs TII 16.22 (1.01, 259.14) TI vs TIV 16.06 (1.00, 258.77) TII vs TIV
Mali DHS 2006	Swelling [a]	146/4860 (3.0%)	204/996 (20.5%)	14/234 (6.0%)	0.15 (0.12, 0.18) TI-II vs TIII 0.50 (0.29, 0.86) TI-II vs TIV 3.42 (2.03, 5.77) TIII vs TIV
Mali DHS 2001	Swelling [a]	219/5219 (4.2%)	15/272 (5.5%)	24/137 (17.5%)	0.76 (0.46, 1.27) TI-II vs TIII 0.24 (0.16, 0.35) TI-II vs TIV 0.31 (0.17, 0.58) TIII vs TIV
Mauritania DHS 2001	Swelling [a]	280/2073 (13.5%)		13/380 (3.4%)	3.95 (2.29, 6.81) TI-II vs TIV
Rushwan 1983	Swelling [b]	0/88 (0%)	26/2203 (1.2%)		0.47 (0.03, 7.61) TI-II vs TIII

Senegal DHS 2005	Swelling [a]	60/1245 (4.8%)	9/139 (6.5%)	0.74 (0.38, 1.47) TI-II vs TIII

Legend: RR= relative risk with 95% confidence interval (CI) computed by the SR authors; TI= FGM/C type I; TII= FGM/C type II; TIII= FGM/C type III; TIV= FGM/C type IV; a= mothers reporting on daughters; b=self-report by women.

Figure 7 shows the eight studies that reported on genital swelling in girls who underwent either FGM/C types I-II or type III. The results indicate that although there is considerable variation, there might be a trend for a lower risk of genital swelling at the time of the FGM/C procedure among girls who underwent FGM/C types I-II compared to type III.

Figure 7: Forest plot, genital tissue swelling (types I-II vs type III)

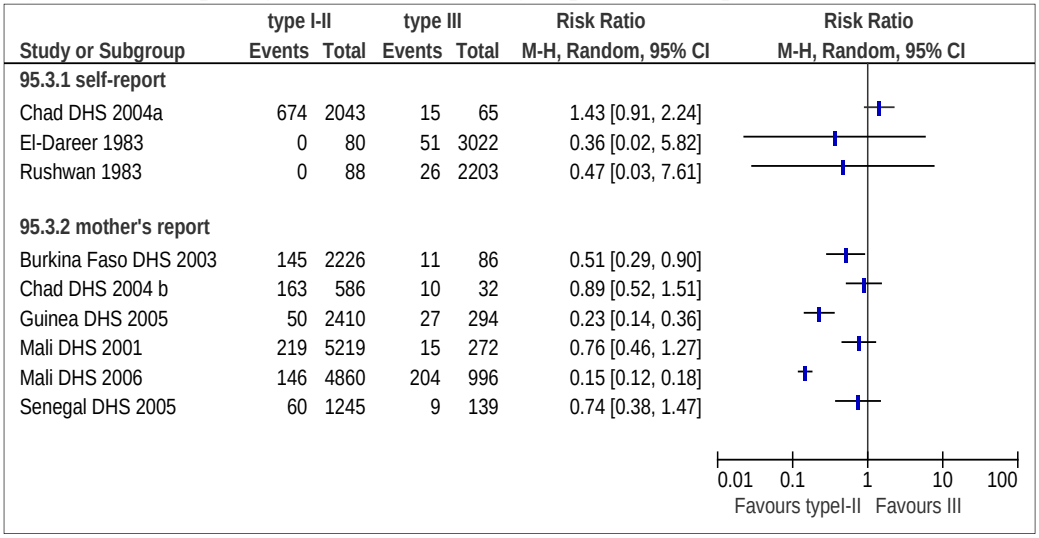


Figure 8 shows the seven studies that reported on swelling in girls who underwent either FGM/C types I-II or IV. The figure shows that the difference between the groups in frequency of swelling varied. There was no clear difference in swelling between girls with FGM/C types I-II and those with type IV.

Figure 8: Forest plot, swelling (types I-II vs type IV)

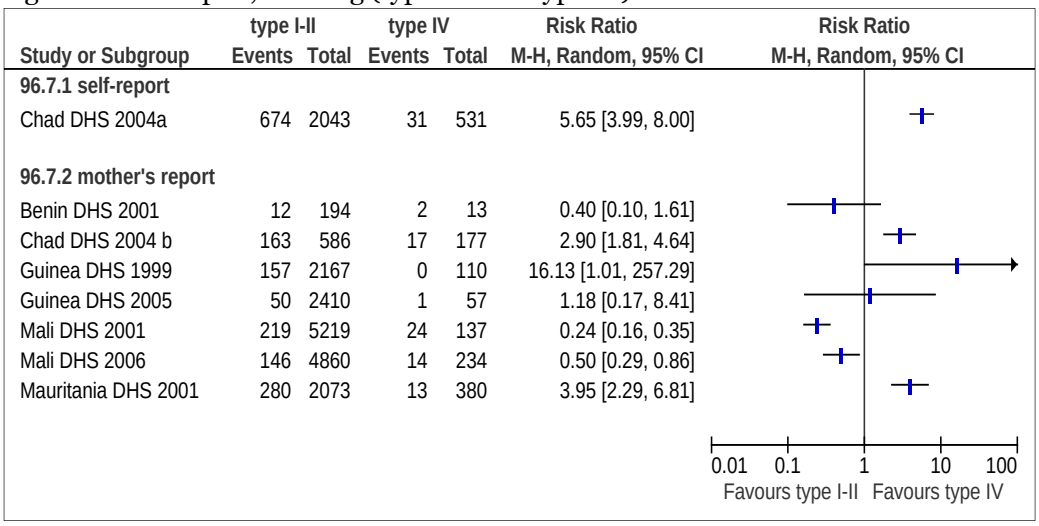
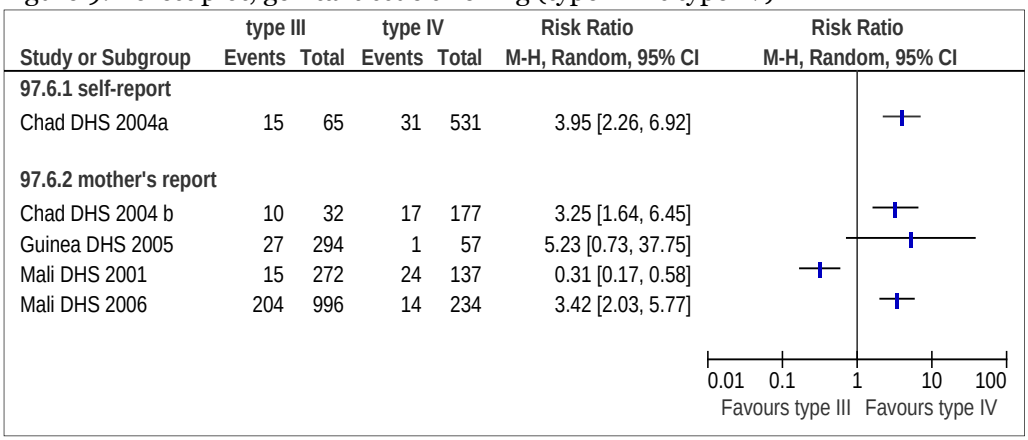


Figure 9 shows the four studies that reported on genital swelling in girls who underwent either FGM/C type III or IV. The results indicate that although there is considerable variation, there might be a trend for a lower risk of swelling among girls who underwent FGM/C type IV compared to type III.

Figure 9: Forest plot, genital tissue swelling (type III vs type IV)



Non-comparative studies

Genital tissue swelling following the FGM/C procedure was reported in six descriptive cross-sectional studies (49;60;63;66;70;85) and one case series (34). The frequency of experiencing swelling ranged from 0.7-50% across the cross-sectional studies (appendix 5). The case series by Hall (34) described swelling, pain, and fever in five Kikuyu girls aged 10-11 who had undergone FGM/C about one month prior to admission to the hospital.

Fever

The medical dictionary describes fever as a temporary increase in the body's temperature in response to some disease or illness. In total, six studies reported on fever related to the FGM/C procedure.

Comparative studies

Two of the comparative studies reported on fever at the time of the FGM/C procedure (39;46). Both studies included women who resided in Sudan and the data were collected in the early 1980s. Most of the women had undergone FGM/C type III. Table 9 shows that 0-4.4% of the women self-reported that they had suffered from fever (it is uncertain how 'fever' was defined, and a thermometer was likely not used).

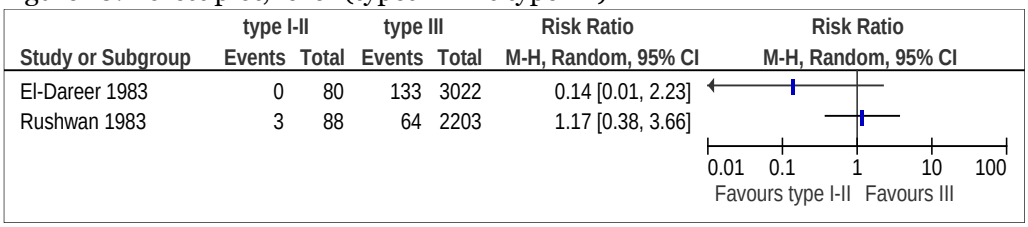
Table 9: Study outcomes and effect estimates for fever

Author, year	Outcome	FGM/C Type I	FGM/C Type III	Unadjusted results RR (95%CI)
El-Dareer 1983	Fever	0/80 (0%)	133/3022 (4.4%)	0.14 (0.01, 2.23) TI vs TIII
Rushwan 1983	Fever	3/88 (3.4%) TII	64/2203 (2.9%)	1.17 (0.38, 3.66) TII vs TIII

Legend: RR= relative risk with 95% confidence interval (CI) computed by the SR authors; TI= FGM/C type I; TII= FGM/C type II; TIII= FGM/C type III. All outcomes are self-reported.

Figure 10 shows that the difference between girls with FGM/C types I-II and those with type III in frequency of fever varied across the two included studies.

Figure 10: Forest plot, fever (types I-II vs type III)



Non-comparative studies

There were four descriptive cross-sectional studies (61;62;65;66) and one case series (34) that reported on fever related to the FGM/C procedure. Across the cross-sectional studies, 5-26% of the female participants self-reported having experienced fever after the FGM/C procedure (appendix 5). In the representative 1995 DHS study from the Central African Republic (62), the proportion of women who recalled having experienced fever was 5.4%.

Infections

Researchers explain that the injury to genital tissue caused by the FGM/C procedure carries inherent microbial contamination, thereby creating a risk of infections (87).

Comparative studies

Thirteen studies provided data on infections experienced shortly after the FGM/C procedure (table 10). The studies were from nine countries (Benin, Burkina Faso, Chad, Gambia, Guinea, Mali, Mauritania, Senegal, Sudan) and were published between 1967 and 2011. They represented a range of cultural and historical contexts and were of variable methodological quality. Self- or mother reported infections ranged between 0-22% among girls who were subjected to FGM/C types I-II, and up to 30% among those with type III. Across all studies, infections were generally more common among girls who underwent FGM/C type III compared to types I-II.

Table 10: Study outcomes and effect estimates for infections

Author, year	Outcome	FGM/C Types I-II	FGM/C Type III	FGM/C Type IV	Unadjusted results RR (95%CI)
Benin DHS 2001	Infection/prob with healing [b]	14/194 (7.2%) TI-III		6/13 (46.2%)	0.16 (0.07, 0.34) TI-III vs TIV
BF DHS 2003	Infection/prob with healing [a]	60/2226 (2.7%)	5/86 (5.8%)		0.46 (0.19, 1.13) TI-II vs TIII
Chad DHS 2004a	Infection [b]	284/2043 (13.9%)	11/65 (16.9%)	92/531 (17.3%)	0.82 (0.47, 1.42) TI-II vs TIII 0.80 (0.65, 0.99) TI-II vs TIV 0.98 (0.55, 1.73) TIII vs TIV
Chad DHS 2004b	Infection [a]	66/586 (11.3%)	3/32 (9.4%)	42/177 (23.7%)	1.20 (0.40, 3.61) TI-II vs TIII 0.47 (0.34, 0.67) TI-II vs TIV 0.40 (0.13, 1.20) TIII vs TIV
El-Dareer 1983	Infection [b]	0/80 (0%) TI	151/3022 (5.0%)		0.12 (0.01, 1.96) TI vs TIII
Guinea DHS 2005	Infection/prob with healing [a]	144/2410 (6.0%)	25/294 (8.5%)	0/57 (0%)	0.70 (0.47, 1.06) TI-II vs TIII 6.95 (0.44, 110.3) TI-II vs TIV 10.03 (0.62, 162.4) TIII vs TIV
Guinea DHS 1999	Infection [b]	331/1539 (21.5%) TI 103/628 (16.4%) TII		11/110 (10.0%)	1.31 (1.07, 1.60) TI vs TII 2.15 (1.22, 3.80) TI vs TIV 1.64 (0.91, 2.95) TII vs TIV
Kaplan 2011	Infections [b]	32/577 (5.5%) TI 48/229 (21.0%) TII	16/65 (24.6%)		0.26 (0.17, 0.40) TI vs TII 0.23 (0.13, 0.39) TI vs TIII 0.85 (0.52, 1.40) TII vs TIII
Mali DHS 2006	Infection/prob with healing [a]	452/4860 (9.3%)	302/996 (30.3%)	16/234 (6.8%)	0.31 (0.27, 0.35) TI-II vs TIII 1.36 (0.84, 2.20) TI-II vs TIV 4.43 (2.74, 7.18) TIII vs TIV
Mali DHS 2001	Infection/prob with healing [a]	423/5219 (8.1%)	17/272 (6.2%)	1/137 (0.7%)	1.30 (0.81, 2.07) TI-II vs TIII 11.10 (1.57, 78.43) TI-II vs TIV 8.56 (1.15, 63.67) TIII vs TIV
Mauritania DHS 2001	Infection [a]	423/2073 (20.4%)		13/380 (3.4%)	5.96 (3.47, 10.24) TI-II vs TIV
Rushwan 1983	Infection/failure to heal [b]	2/88 (2.3%)	57/2203 (2.6%)		0.88 (0.22, 3.54) TI-II vs TIII
Rushwan 1983	Tetanus [b]	0/88 (0%) TII	4/2203 (0.18%)		0.61 (0.00, 322.18)TII vs TIII [c]
Senegal DHS 2005	Infection/prob with healing [a]	77/1245 (6.2%)	8/139 (5.8%)		1.07 (0.53, 2.18) TI-II vs TIII
Shandall 1967	Infection (women) [b]	8/807 (1.0%) TI	207/3013 (6.9%)		0.14 (0.07, 0.29) TI vs TIII
Shandall 1967	Infection (daughters) [b]	1/227 (0.4%) TI	9/236 (3.8%)		0.12 (0.01, 0.90) TI vs TIII

Legend: RR= relative risk with 95% confidence interval (CI) computed by the SR authors; TI= FGM/C type I; TII= FGM/C type II; TIII= FGM/C type III; TIV= FGM/C type IV; a= mothers reporting on daughters; b=self-report by girls/women; c= manually computed due to low number of events and exceptionally different group sizes (that cannot be accurately computed by RevMan).

Figure 11 shows the ten studies that reported on infections, infections/failure to heal, and infections/problems with healing in girls who either underwent FGM/C types I-II or III. The results indicate that although there is considerable variation,

there might be a trend for a lower risk of infections shortly after the FGM/C procedure among girls who underwent FGM/C types I-II compared to type III.

Figure 11: Forest plot, infection (types I-II vs type III)

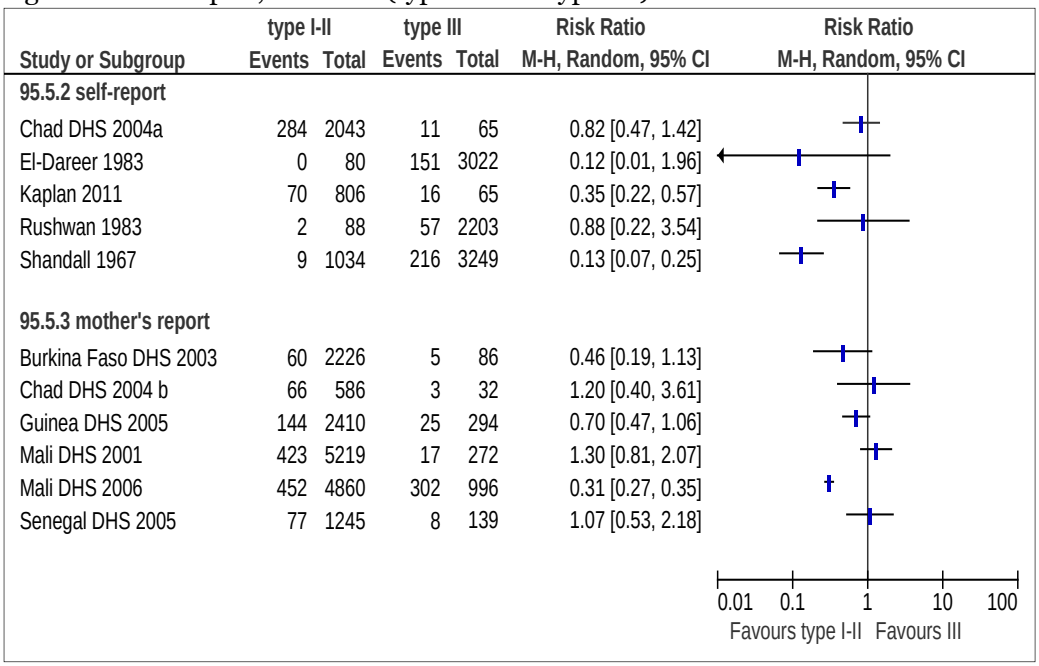
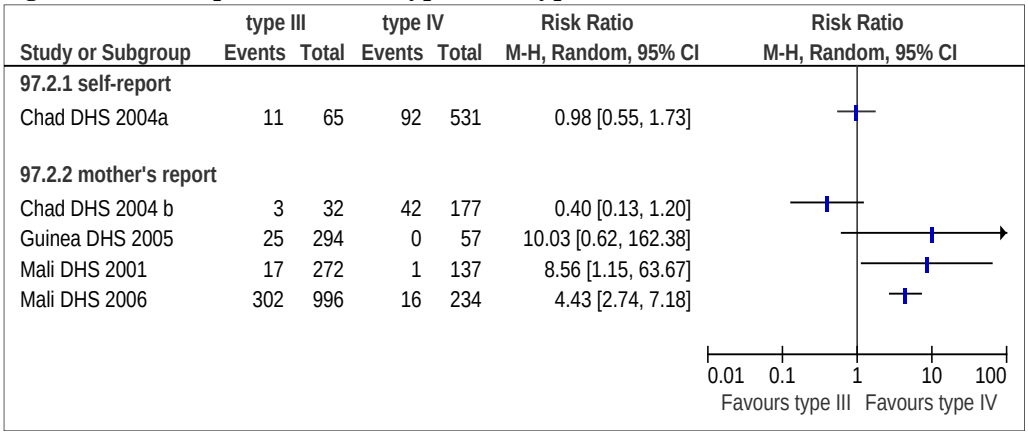


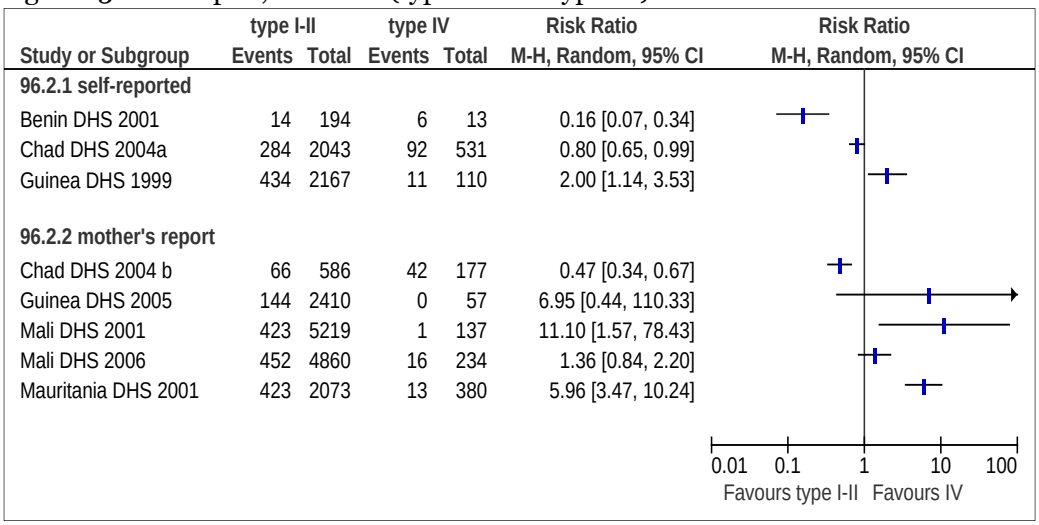
Figure 12 shows the four comparative studies that reported on infections in girls who either underwent FGM/C type III or IV. The figure shows that the difference between the groups of girls in frequency of infections varied.

Figure 12: Forest plot, infection (type III vs type IV)



In figure 13, we show the seven studies that reported on infections in girls shortly after either FGM/C types I-II or type IV. The figure shows that the difference between the groups in frequency of infections varied. There was no clear difference in the risk among girls who underwent FGM/C types I-II compared to type IV.

Figure 13: Forest plot, infection (types I-II vs type IV)



Non-comparative studies

We included 23 non-comparative studies that reported on infections following FGM/C (appendix 5). The infections included genital infection, sepsis, tetanus, Escherichia coli, urinary infection, necrotizing fasciitis, and infected scar. The frequency of experiencing such complications varied across types of infections and studies. In the representative 1995 DHS study from the Central African Republic (62), 1.5% of the women recalled having had an infection after the FGM/C procedure.

Five non-comparative studies provided data on sepsis or septicaemia: The three descriptive cross-sectional studies noted that 1.4%, 3.5%, and 7.6% of the girls and women self-reported sepsis from FGM/C (67;72;79). In the two case series (51;68), one girl in each study was clinically confirmed to have sepsis. In both studies, the researchers concluded that sepsis was a short-term complication of FGM/C. Four studies (32;51;68;82) reported tetanus among their study participants and one of these reported “one mortality due to tetanus infection” in a 3-month old baby girl (82)p179). Similarly, a case report from Nigeria documented death in a 23-year old pregnant woman who had Escherichia coli from FGM/C done one day prior to hospital admission (56). There was also one case report of a 20-year old Nigerian woman who had undergone FGM/C during pregnancy six days before admission to the hospital emergency ward. She had bled profusely during the procedure, her examination showed hemorrhagic oedematous vulva and vagina, and she was diagnosed with genital infection, sepsis and anaemia (50). Finally, the case report by Mohammed (78) noted that a 7-year old Sudanese girl presented at the hospital seven days after mass FGM/C with high fever. After resuscitation, she was diagnosed as having necrotizing fasciitis: “There was extensive perineal and anterior abdominal wall necrosis. The left labium majus, the lower three-quarters of the left labium minus and most of the mons pubis were eaten away” (78)p1).

Problems with urinating

An immediate FGM/C-related complication frequently reported in the literature is urination difficulties. Problems with urination can include dribbling (involuntary leakage of urine), difficulty emptying bladder, weak urine stream, and related difficulties in passing urine.

Comparative studies

Ten of the comparative studies reported on complications regarding urination in the immediate post-FGM/C period. Table 11 shows that the study authors generally referred to these problems as 'difficulty urinating' and 'retention of urine'. There was great variation in females' frequency of experiencing problems with urination, from 0% in one study to over 60% in another study. In the representative study from Chad, the proportion of women recalling urine retention was 53.4% (38). In the representative study from Sudan, the proportion of women recalling urine retention was 8.3% (39). The difference in frequency of reported urine retention in these two studies was considerable. It is likely that the study results from Chad are more credible since this study had higher methodological quality. Across all studies, the frequency of urination problems was consistently higher among those females who had undergone FGM/C type III compared to those with FGM/C types I-II.

Table 11: Study outcomes and effect estimates for problems urinating

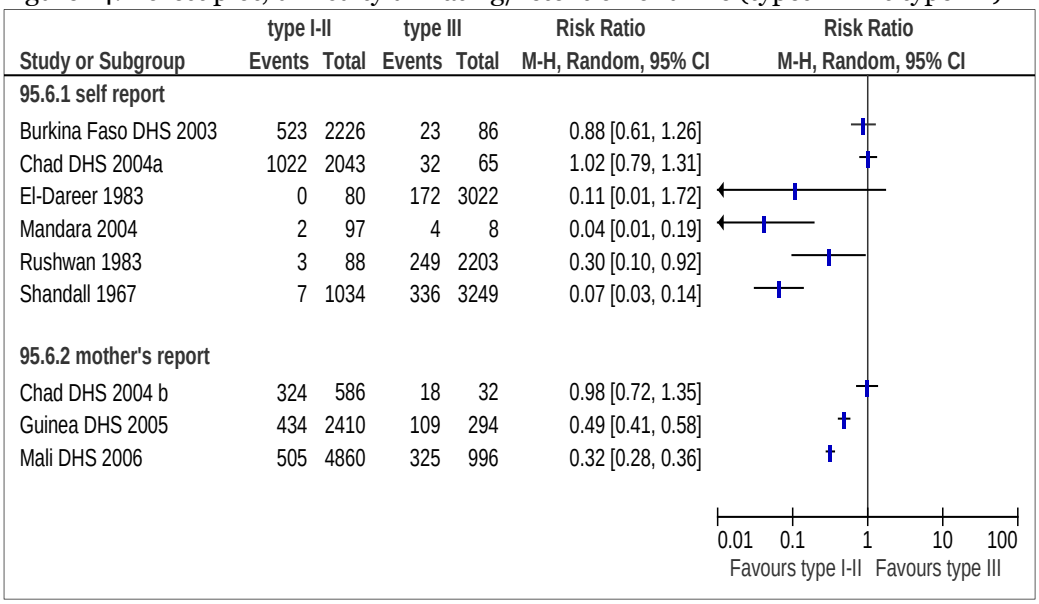
Author, year	Outcome	FGM/C Types I-II	FGM/C Type III	FGM/C Type IV	Unadjusted results RR (95%CI)
Burkina Faso DHS 2003	Difficulty urinating/ retention of urine [a]	523/2226 (23.5%)	23/86 (26.7%)		0.88 (0.61, 1.26) TI-II vs TIII
Chad DHS 2004a	Difficulty urinating/ retention [b]	1022/2043 (50.0%)	32/65 (49.2%)	325/531 (61.2%)	1.02 (0.79, 1.31) TI-II vs TIII 0.82 (0.75, 0.89) TI-II vs TIV 0.80 (0.62, 1.04) TIII vs TIV
Chad DHS 2004b	Difficulty urinating/ retention [a]	324/586 (55.3%)	18/32 (56.2%)	114/177 (64.4%)	0.98 (0.72, 1.35) TI-II vs TIII 0.86 (0.75, 0.98) TI-II vs TIV 0.87 (0.63, 1.21) TIII vs TIV
El-Dareer 1983	Difficulty passing urine [b]	0/80 (0%) TI	172/3022 (5.7%)		0.11 (0.01, 1.72) TI vs TIII
El-Dareer 1983	Urine retention [b]	2/80 (2.5%) TI	82/3022 (2.7%)		0.92 (0.23, 3.68) TI vs TIII
Guinea DHS 2005	Difficulty urinating/ retention of urine [a]	434/2410 (18.0%)	109/294 (37.1%)	6/57 (10.5%)	0.49 (0.41, 0.58) TI-II vs TIII 1.71 (0.80, 3.66) TI-II vs TIV 3.52 (1.63, 7.62) TIII vs TIV
Guinea DHS 1999	Difficulty with urination [a]	432/1539 (28.1%) TI 163/628 (26.0%) TII		12/110 (10.9%)	1.08 (0.93, 1.26) TI vs TII 2.57 (1.50, 4.42) TI vs TIV 2.38 (1.37, 4.12) TII vs TIV
Mali DHS 2006	Difficulty urinating/ retention of urine [a]	505/4860 (10.4%)	325/996 (32.6%)	24/234 (10.3%)	0.32 (0.28, 0.36) TI-II vs TIII 1.01 (0.69, 1.49) TI-II vs TIV 3.18 (2.16, 4.70) TIII vs TIV
Mandara 2004	Difficult urination	2/97 (2.1%) TII	4/8 (50.0%)	1/13	0.04 (0.01, 0.19) TII vs TIII

				(7.7%)	0.27 (0.03, 2.75) TII vs TIV 6.50 (0.87, 48.34) TIII vs TIV
Mauritania DHS 2001	Difficulty urinating/ retention of urine [a]	603/2073 (29.1%)		25/380 (6.6%)	4.42 (3.01, 6.50) TI-II vs TIV
Rushwan 1983	Difficulty in passing urine [b]	3/88 (3.4%)	183/2203 (8.3%)		0.41 (0.13, 1.26) TI-II vs TIII
Rushwan 1983	Urine retention [b]	0/88 (0%)	66/2203 (3.0%)		0.19 (0.01, 2.98) TI-II vs TIII
Shandall 1967	Retention of urine [b]	7/1034 (0.7%)	336/3249 (10.3%)		0.07 (0.03, 0.14) TI-II vs TIII

Legend: RR= relative risk with 95% confidence interval (CI) computed by the SR authors, TI= FGM/C type I; TII= FGM/C type II; TIII= FGM/C type III; TIV= FGM/C type IV; a= mothers reporting on daughters; b=self-report by women.

In figure 14, we show the eight studies that reported on difficulties in passing urine in girls who underwent either FGM/C types I-II or III. The figure shows that the risk of difficulties in passing urine after the FGM/C procedure was generally lower among girls who underwent FGM/C types I-II compared to type III.

Figure 14: Forest plot, difficulty urinating/retention of urine (types I-II vs type III)



In figure 15, we included the six studies that reported on difficulties with urination in girls who underwent either FGM/C types I-II or IV. The figure shows that the difference between the groups of girls in frequency of urination-related problems varied.

Figure 15: Forest plot, difficulty urinating/retention of urine (types I-II vs type IV)

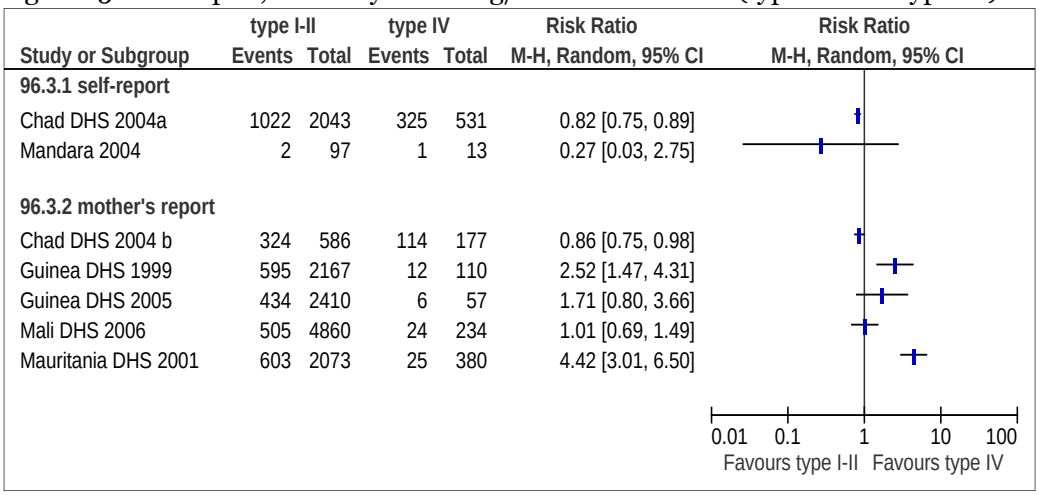
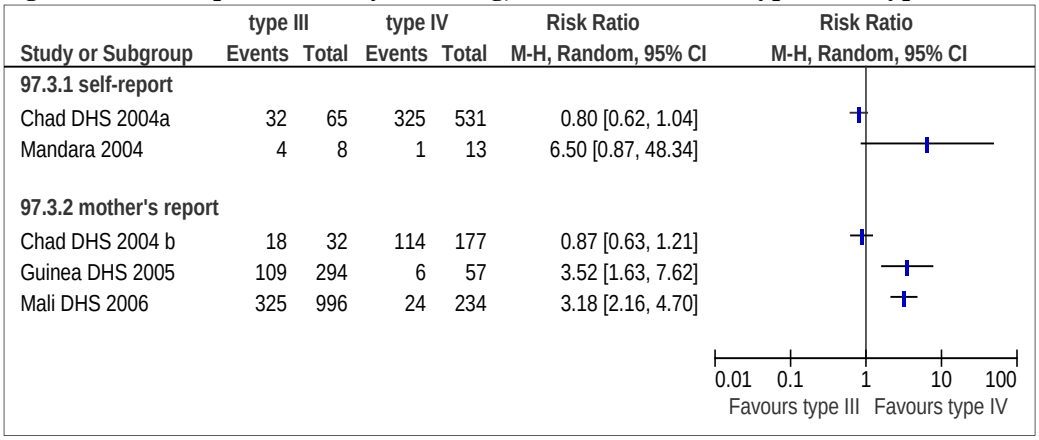


Figure 16 shows the four studies that reported on difficulties with urination in girls who underwent either FGM/C type III or IV. The figure shows that the difference between the groups of girls in frequency of urination-related problems varied.

Figure 16: Forest plot, difficulty urinating/retention of urine (type III vs type IV)



Non-comparative studies

With regards to problems related to voiding in the immediate post-FGM/C period, we included 15 descriptive cross-sectional studies (appendix 5). These voiding problems were described as urinary retention, difficulty with urination, vaginal or urinary fluid retention, urinary problems, retention of urine, and difficulty in passing urine. There was great variation in the frequency of experiencing problems with urination, from 0.1% in one study to 70% in another study. One study found that 2/37 (5.4%) of the women in their study had experienced defecation problems as an immediate consequence of FGM/C (75).

Problems with wound healing

There were four comparative studies, and no non-comparative studies, that reported problems with wound healing following the FGM/C procedure. As shown in table 12, the frequency of experiencing problems with healing varied across the comparative studies, from 0% to 54%. The four studies were from four different countries (Chad, Guinea, Mauritania, Sudan), were published between 1967-2004, and the majority of women had FGM/C types I-II. In the representative DHS study from Chad (38), the proportion of women self-reporting having had problems with wound healing following FGM/C was 13.2%.

Table 12: Study outcomes and effect estimates for problems with healing

Author, year	Outcome	FGM/C Types I-II	FGM/C Type III	FGM/C Type IV	Unadjusted results RR (95%CI)
Chad DHS 2004a	Prob with healing [b]	313/2043 (15.3%) TI-II	15/65 (23.1%)	21/531 (4.0%)	0.66 (0.42, 1.05) TI-II vs TIII 3.87 (2.52, 5.96) TI-II vs TIV 5.84 (3.17, 10.74) TIII vs TIV
Chad DHS 2004b	Prob with healing [a]	68/586 (11.6%) TI-II	6/32 (20.3%)	9/177 (5.2%)	0.62 (0.29, 1.32) TI-II vs TIII 2.28 (1.16, 4.48) TI-II vs TIV 3.69 (1.41, 9.65) TIII vs TIV
Guinea DHS 1999	Prob with healing [a]	165/1539 (10.7%) TI 151/628 (24.0%) TII		7/110 (6.4%)	0.45 (0.36, 0.54) TI vs TII 1.68 (0.81, 3.50) TI vs TIV 3.78 (1.82, 7.84) TII vs TIV
Mauritania DHS 2001	Prob with healing [a]	363/2073 (17.5%) TI-II		204/380 (53.7%)	0.33 (0.29, 0.37) TI-II vs TIV
Shandall 1967	Failure to heal (women) [b]	2/807 (0.2%) TI	63/3013 (2.1%)		0.12 (0.03, 0.48) TI vs TIII
Shandall 1967	Failure to heal (daughters) [b]	0/227 (0%) TI	5/236 (2.1%)		0.09 (0.01, 1.70) TI vs TIII

Legend: RR= relative risk with 95% confidence interval (CI) computed by the SR authors; TI= FGM/C type I; TII= FGM/C type II; TIII= FGM/C type III; TIV= FGM/C type IV; a= mothers reporting on daughters; b=self-report by girls/women.

In figure 17, we show the two studies that reported on problems with healing in girls who underwent either FGM/C types I-II or III. The figure shows that the risk of problems with healing after the FGM/C procedure was consistently lower among girls who underwent FGM/C types I-II compared to type III.

Figure 17: Forest plot, problems with healing (types I-II vs type III)

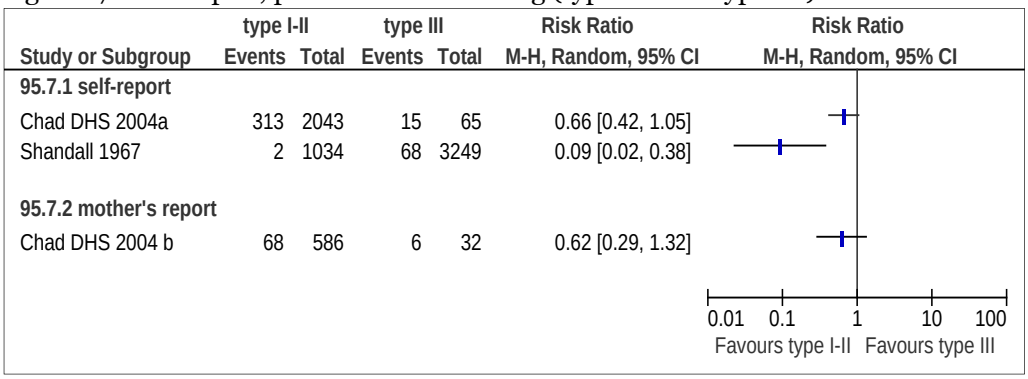
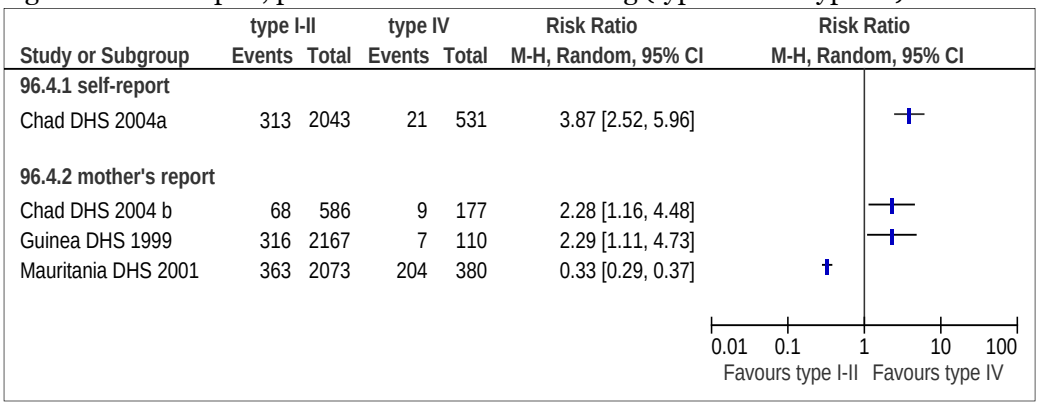


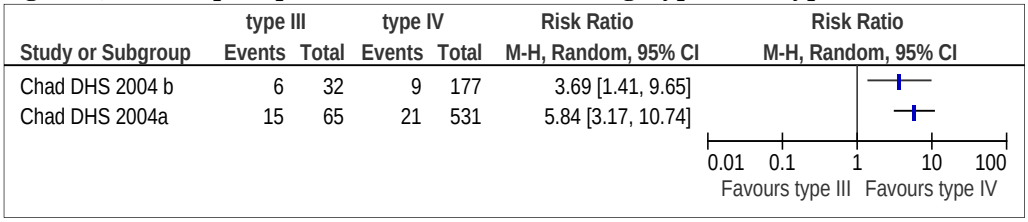
Figure 18 shows the three studies that reported on difficulties with wound healing in girls who underwent either FGM/C types I-II or type IV. The figure shows that the difference between the groups of girls in frequency of healing-related problems varied.

Figure 18: Forest plot, problems with wound healing (types I-II vs type IV)



The DHS study from Chad (38) reported on girls' problems with healing after FGM/C. Data were reported by adult women, who reported both for themselves and for the daughter most recently having undergone FGM/C. Figure 19 shows the results in those who underwent either FGM/C type III or type IV. The figure shows that in this study, the risk of healing problems was lower among females who underwent FGM/C type IV compared to type III.

Figure 19: Forest plot, problems with wound healing (type III vs type IV)



Other

Comparative studies

Eleven comparative studies reported various immediate complications that could not be classified among the seven earlier described outcomes. These outcomes were referred to as: at least one complication, two or more complications, any complication, anaemia, collapse, injury to other parts, bowel dysfunction. These outcomes are presented below.

At least one complication

Seven DHS reports presented data for the outcome labeled 'at least one complication' that girls experienced after FGM/C (table 13). The frequency of reporting at least one immediate post-FGM/C complication varied from 15% to 83% across these DHS studies, which were from Benin, Chad, Guinea, Mali, Mauritania, and Senegal. All were published between 2001-2006.

Table 13: Study outcomes and effect estimates for at least one complication

Author, year	Outcome	FGM/C Types I-II	FGM/C Type III	FGM/C Type IV	Unadjusted results RR (95%CI)
Benin DHS 2001	At least one complication [a]	29/194 (14.9%) TI-III		7/13 (54.1%)	0.28 (0.15, 0.51) TI-II vs TIV
Chad DHS 2004a	At least one complication [b]	1528/2043 (74.8%)	42/65 (64.9%)	395/531 (74.5%)	1.16 (0.97, 1.39) TI-II vs TIII 1.01 (0.95, 1.06) TI-II vs TIV 0.87 (0.72, 1.05) TIII vs TIV
Chad DHS 2004b	At least one complication [a]	407/586 (69.5%)	27/32 (86.1%)	147/177 (83.1%)	0.82 (0.70, 0.96) TI-II vs TIII 0.84 (0.77, 0.91) TI-II vs TIV 1.02 (0.86, 1.20) TIII vs TIV
Guinea DHS 2005	At least one complication [a]	663/2410 (27.5%)	145/294 (49.3%)	8/57 (14.6%)	0.56 (0.49, 0.64) TI-II vs TIII 1.96 (1.03, 3.74) TI-II vs TIV 3.51 (1.83, 6.75) TIII vs TIV
Mali DHS 2006	At least one complication [a]	1113/4860 (22.9%)	468/996 (47.0%)	61/234 (26.1%)	0.49 (0.45, 0.53) TI-II vs TIII 0.88 (0.70, 1.10) TI-II vs TIV 1.80 (1.44, 2.26) TIII vs TIV
Mali DHS 2001	At least one complication [a]	1164/5219 (22.3%)	55/272 (20.3%)	42/137 (30.4%)	1.10 (0.87, 1.40) TI-II vs TIII 0.73 (0.56, 0.94) TI-II vs TIV 0.66 (0.47, 0.93) TIII vs TIV
Mauritania DHS 2001	At least one complication [a]	1084/2073 (52.3%)		244/380 (64.2%)	0.81 (0.75, 0.89) TI-II vs TIV
Senegal DHS 2005	At least one complication [a]	180/1245 (14.5%)	30/139 (21.7%)		0.67 (0.47, 0.95) TI-II vs TIII

Legend: RR= relative risk with 95% confidence interval (CI) computed by the SR authors; TI= FGM/C type I; TII= FGM/C type II; TIII= FGM/C type III; TIV= FGM/C type IV; a= mothers reporting on daughters; b=self-report by women.

Figure 20 shows the five studies that reported the outcome 'at least one complication' in girls who underwent either FGM/C types I-II or type III. The figure shows

that the difference between the groups in frequency of at least one short-term complication varied.

Figure 20: Forest plot, at least one complication (types I-II vs type III)

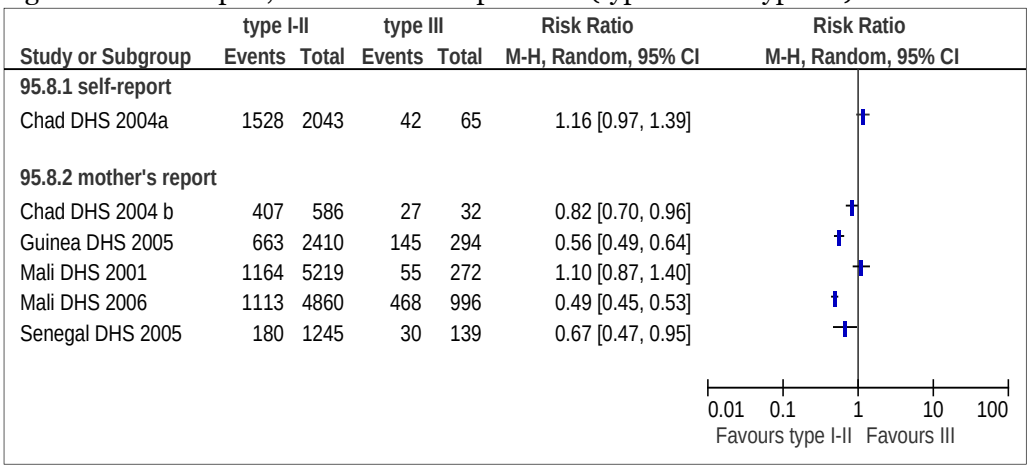


Figure 21 shows the six studies that reported the outcome 'at least one complication' in girls who underwent either FGM/C types I-II or type IV. The figure shows that the difference between the groups of girls in frequency of at least one short-term complication varied.

Figure 21: Forest plot, at least one complication (types I-II vs type IV)

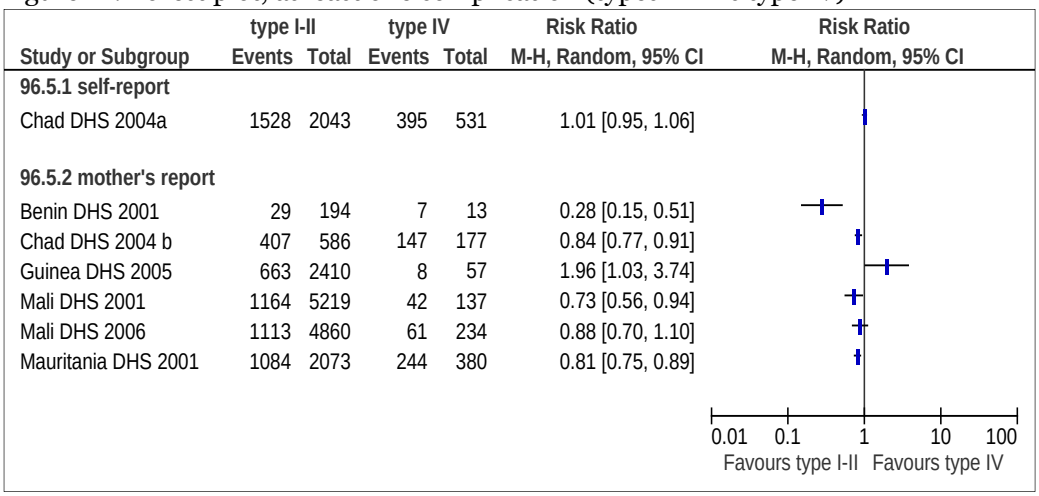
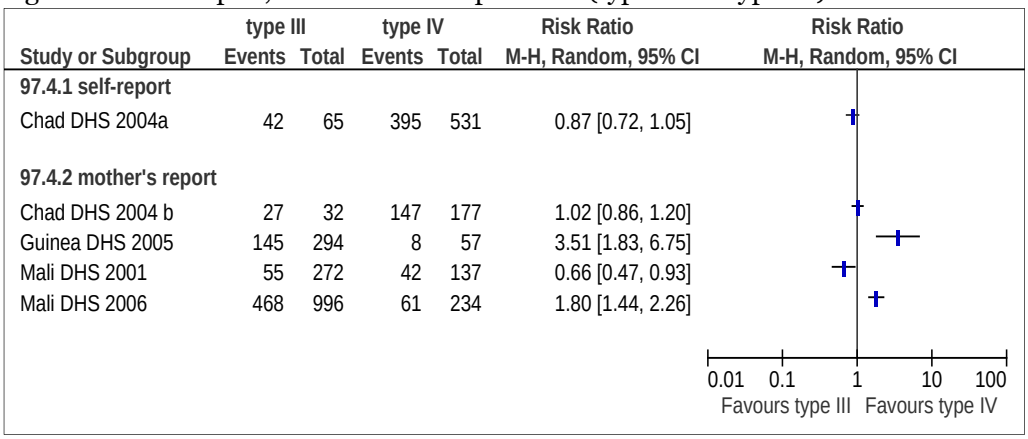


Figure 22 shows the four studies that reported the outcome 'at least one complication' in girls who underwent either FGM/C type III or IV. The figure shows that the difference between the groups of girls in frequency of at least one short-term complication varied.

Figure 22: Forest plot, at least one complication (type III vs type IV)



Two or more complications

Seven DHS reports presented data for the outcome labeled 'two or more complications' (table 14). The frequency of reporting two or more immediate post-FGM/C complications varied from 1% to 63% across the studies. The DHS reports were from Benin, Chad, Guinea, Mali, Mauritania, and Senegal. They were published between 2001 and 2006.

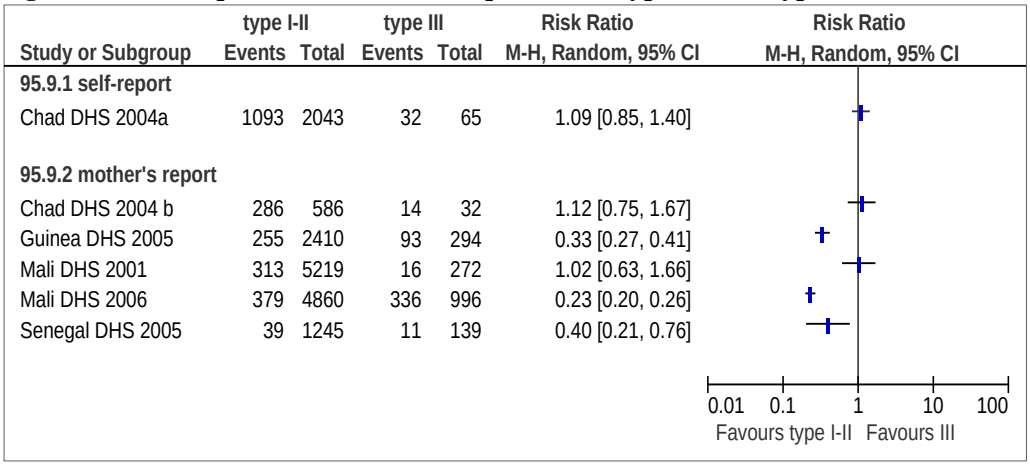
Table 14: Study outcomes and effect estimates for two or more complications

Author, year	Outcome	FGM/C Types I-II	FGM/C Type III	FGM/C Type IV	Unadjusted results RR (95%CI)
Benin DHS 2001	Two or more complications [a]	12/194 (6.0%) TI-III		2/13 (16.0%)	0.40 (0.10, 1.61) TI-II vs TIV
Chad DHS 2004a	Two or more complications [b]	1093/2043 (53.5%)	32/65 (48.8%)	314/531 (59.2%)	1.09 (0.85, 1.40) TI-II vs TIII 0.90(0.83, 0.98) TI-II vs TIV 0.83 (0.64, 1.08) TIII vs TIV
Chad DHS 2004b	Two or more complications [a]	286/586 (48.8%)	14/32 (44.4%)	113/177 (63.6%)	1.12 (0.75, 1. 67) TI-II vs TIII 0.76 (0.67, 0.88) TI-II vs TIV 0.69 (0.46, 1.03) TIII vs TIV
Guinea DHS 2005	Two or more complications [a]	255/2410 (10.6%)	93/294 (31.8%)	1/57 (1.3%)	0.33 (0.27, 0.41) TI-II vs TIII 6.03 (0.86, 42.2) TI-II vs TIV 18.03 (2.57, 126.7) TIII vs TIV
Mali DHS 2006	Two or more complications [a]	379/4860 (7.8%)	336/996 (33.7%)	24/234 (10.2%)	0.23 (0.20, 0.26) TI-II vs TIII 0.76 (0.51, 1.12) TI-II vs TIV 3.29 (2.23, 4.85) TIII vs TIV
Mali DHS 2001	Two or more complications [a]	313/5219 (6.0%)	16/272 (5.9%)	10/137 (7.0%)	1.02 (0.63, 1.66) TI-II vs TIII 0.82 (0.45, 1.51) TI-II vs TIV 0.81 (0.38, 1.73) TIII vs TIV
Mauritania DHS 2001	Two or more complications [a]	657/2073 (31.7%)		27/380 (7.2%)	4.46 (3.08, 6.45) TI-II vs TIV
Senegal DHS 2005	Two or more complications [a]	39/1245 (3.1%)	11/139 (7.6%)		0.40 (0.21, 0.76) TI-II vs TIII

Legend: RR= relative risk with 95% confidence interval (CI) computed by the SR authors; TI= FGM/C type I; TII= FGM/C type II; TIII= FGM/C type III; TIV= FGM/C type IV; a= mothers reporting on daughters; b=self-report by women.

Figure 23 shows the five studies that reported the outcome 'two or more complications' in girls who underwent either FGM/C types I-II or type III. The figure shows that the difference between the groups of girls in frequency of two or more short-term complications varied.

Figure 23: Forest plot, two or more complications (types I-II vs type III)



In figure 24, we show the six studies that reported on two or more short-term complications in girls who underwent either FGM/C types I-II or type IV. The figure shows that the difference between the groups of girls in frequency of two or more short-term complications varied, with no clear difference between girls with FGM/C types I-II and those with type IV.

Figure 24: Forest plot, two or more complications (types I-II vs type IV)

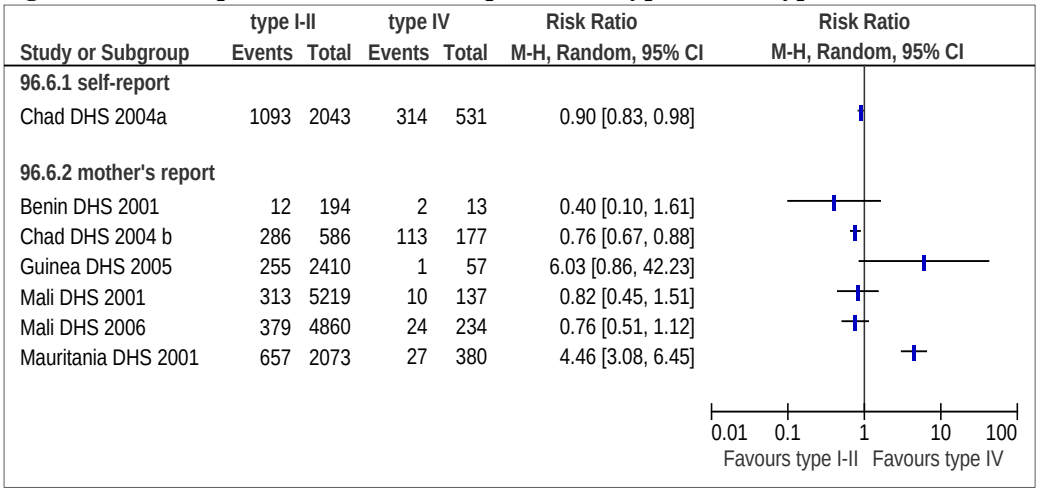
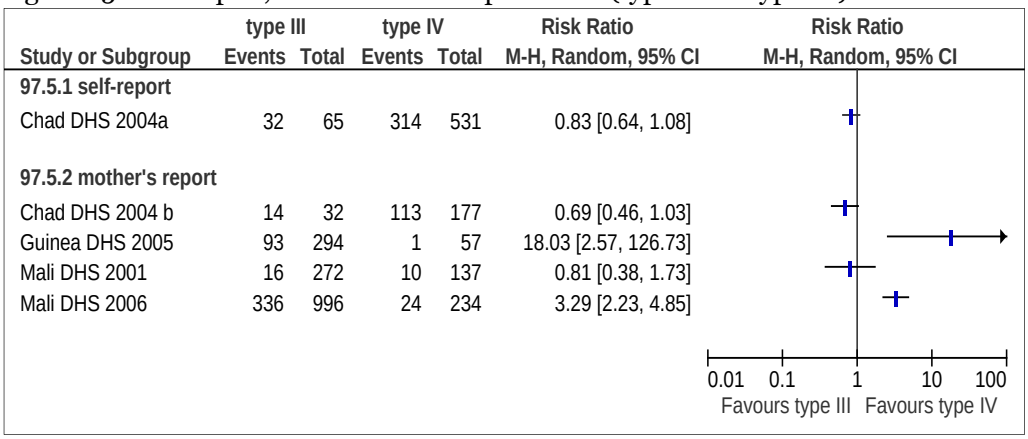


Figure 25 shows the four studies that reported the outcome 'two or more complication' in girls who underwent either FGM/C type III or IV. The figure shows that the difference between the groups of girls in frequency of two or more short-term complication varied. There seemed to be no clear difference between the groups.

Figure 25: Forest plot, two or more complications (type III vs type IV)



Other outcomes

Four comparative studies reported other outcomes that could not be classified among the earlier described outcomes. Each of these outcomes was only reported in one study. The outcomes were: any complication, anaemia, collapse, injury to other parts, bowel dysfunction (table 15). Two outcomes were self-reported (collapse, injury to other parts), 'any complication' was reported by mothers on their daughter, and anaemia was a clinically measured outcome. The studies showed that, on average, 39% of daughters experienced any complication, 8% experienced anaemia, 20% collapsed, and 0.3% had injury to other parts. There was one case of bowel dysfunction reported. Further, as seen in the table, there was a statistically higher risk with regards to 'any complication' among daughters with FGM/C type II, compared to daughters with type I and type IV. There was also a statistically higher risk with regards to anaemia among women with FGM/C type II, compared to women with type I, and among women with FGM/C type III, compared to type I. There was no significant difference between women with various types of FGM/C regarding collapse and injury to other parts.

Table 15: Study outcomes and effect estimates for other immediate outcomes

Author, year	Outcome	FGM/C Types I-II	FGM/C Type III	FGM/C Type IV	Unadjusted results RR (95%CI)
Guinea DHS 1999	Any complication [a]	586/1539 (38.1) TI 332/628 (52.8%) TII		29/110 (26.8%)	0.72 (0.65, 0.79) TI vs TII 1.44 (1.05, 1.99) TI vs TIV 2.01 (1.45, 2.76) TII vs TIV
Kaplan 2011	Anaemia [b]	15/577 (2.6%) TI 17/229 (7.4%) TII	10/65 (15.4%)		0.35 (0.18, 0.69) TI vs TII 0.17 (0.08, 0.36) TI vs TIII 0.48 (0.23, 1.00) TII vs TIII
Mandara 2004	Collapse [b]		2/8 (25.0%)	2/13 (15.4%)	1.63 (0.28, 9.36) TIII vs TIV
Rushwan 1983	Injury to other parts [b]	0/88 (0%) TII	6/2203 (0.27%)		0.41 (0.00, 211.30) [b]
Rushwan 1983	Bowel dysfunction [b]	0/88 (0%) TI-II	1/2203 (0.05%)		Non estimable [c]

Legend: RR= relative risk with 95% confidence interval (CI) computed by the SR authors; TI= FGM/C type I; TII= FGM/C type II; TIII= FGM/C type III; TIV= FGM/C type IV; a= mothers reporting on daughters; b= manually computed due to low number of events and exceptionally different group sizes (that cannot be accurately computed by RevMan); c= not possible to estimate due to low number of events and exceptionally different group sizes.

Non-comparative studies

Four of the 'other' immediate outcomes reported in the comparative studies were also reported in non-comparative studies. These outcomes were: at least one complication, two or more complications, injury to other parts, and tetanus (appendix 5). First, one DHS report stated that 39% of daughters (reported by mothers) experienced at least one complication (60). Second, the same DHS report stated that 22.5% of daughters experienced two or more complications. Third, Modawi (77) reported that 1/2526 (0.1%) of women with primarily FGM/C type III experienced injury to tissue. Lastly, two case series reported on tetanus. They reported that 2.3% (1/43) and 2.0% (1/51) of the girls, respectively, developed tetanus as a consequence of FGM/C (68;82). Both case series were from Nigeria and the girls were subjected to FGM/C types I-II. Shell-Duncan and colleagues' cross-sectional study (32) included women age 15-76 from Kenya who self-reported developing tetanus when they were subjected to FGM/C type II as young girls.

Other outcomes reported in the non-comparative studies (all except one were descriptive cross-sectional studies) included vesicovaginal fistula, inflammation, disfigurement, and pus (appendix 5). Each of these outcomes was only reported in one study. Additional reported outcomes were non-descriptive and labeled primary complications, significant complications, immediate complications, acute complications, and complications (appendix 5). In the representative DHS study from Egypt (69), 4.6% of the women self-reported that they had experienced immediate complications, and 3.1% reported that their daughter had experienced immediate complications from the FGM/C procedure.

Pain

No comparative studies reported on pain experienced during and after the FGM/C procedure, but 12 descriptive cross-sectional studies reported on pain, severe pain, and extreme pain (appendix 5). The frequency of females who self-reported experiencing pain ranged from 3% to 87% in the 12 studies. As with other outcomes, such as bleeding, this indicates under-reporting of pain in some of the included studies. In the representative DHS study from the Central African Republic (62), 10.8% of the women recalled having experienced pain at the time of the FGM/C procedure.

Discussion

This systematic review aimed to summarize empirical data assessing the physical health consequences of FGM/C occurring during the cutting or alteration modification process and the short-term postoperative period (immediate consequences). We included 56 studies, with immediate outcome data reported on 133,515 females of various ages and types of FGM/C. For all outcomes, the frequency of experiencing immediate complications varied greatly across the included studies. However, the most common immediate complications, which women with all forms of FGM/C reported experiencing, appeared to be urine retention, excessive bleeding, genital tissue swelling, problems with wound healing, and pain. The girls and women undergoing the FGM/C procedure often suffered more than one immediate complication. The estimates from the comparative studies indicated that there might be a greater risk of immediate complications for women with FGM/C type III compared to types I-II, and there were generally few differences in risk of immediate complications for girls/women with FGM/C types I-II compared to type IV. We identified no documentation of immediate health benefits from FGM/C.

Discussion of main results

Types of complications

This systematic review included 56 primary studies with over 133,000 girls and women who all had undergone the practice of FGM/C. The studies reported on eight main types of immediate medical outcomes: Bleeding, shock, genital tissue swelling, fever, infections including sepsis, problems with urination, and problems with wound healing. Other complications reported in one or a few studies were anaemia, collapse, injury to other parts, tetanus, and bowel dysfunction. A few outcomes were generically described as immediate complication, primary complication, and similar. Collectively, since the early 1960s, in an expansive research literature on FGM/C, over a dozen immediate complications have been examined and found to occur among girls and women with any form of FGM/C.

For all outcomes, which all can be considered immediate harms of FGM/C, the frequency of experiencing immediate complications varied greatly across the included studies. For example, in representative studies of moderate methodological quality, the frequency of experiencing excessive bleeding ranged from 17% to 62% and the

proportion of women who recalled having experienced an infection ranged from 2% to 15%. As suggested previously, there is likely under-reporting of complications associated with the procedure. Given the great variation across studies and the fact that these data are obtained retrospectively, precise estimation of frequency of complications is not possible. However, representative studies of moderate methodological quality indicate that the most common immediate complications of FGM/C are urine retention, excessive bleeding, swelling, problems with healing, and pain. The results suggest that each of these five immediate harms occur in more than 1 of every 10 girls and women who undergo FGM/C. More than half of the girls/women (53%) reported that urine retention was an immediate problem, 43% experienced excessive bleeding, 27% experienced swelling, 13% had problems with healing, and 11% of the women in representative studies of high methodological quality reported feeling pain when undergoing the FGM/C procedure. Also fever and infections were commonly experienced, by 5% and 2% of the girls and women, respectively. The type and degree of infections varied and included potentially fatal septicaemia and tetanus. These results substantiate statements regarding the impact of FGM/C on health by international organizations such as UNFPA (88), UNICEF (3), and WHO (89). They also challenge recent claims that medical complications associated with FGM/C occur only infrequently (16). It has to be noted that the female participants in these studies had FGM/C types I through IV, thus immediate complications such as bleeding and swelling occur in setting with all forms of FGM/C. Even FGM/C type I and type IV 'nick', the forms of FGM/C with least anatomical extent, presented complications.

Recent reports by UNICEF (4) and Yoder and Khan (90) estimate that every year, 3 million girls in the countries where the practice is concentrated are at risk of undergoing the practice. Consequently, our results suggest that every year about 1.5 million girls could suffer urine retention, 1.2 million could experience excessive bleeding, 800,000 could experience swelling, 400,000 could have healing problems, and 320,000 could suffer severe pain as they are subjected to FGM/C. Not only does the procedure cause unnecessary pain, suffering, and jeopardize the health of the girls who undergo the procedure, but it may also impose financial strain on families and the health system. A recent study from Nigeria observed that paying hospital bills to manage the FGM/C-related complications was difficult for many of the parents (82). In many cases, the immediate harms may not be considered severe enough for these girls and women to seek treatment, but we identified a number of studies which documented that immediate complications, from mild to severe life threatening complications, needed medical attention. For example, Osifo and Evbuomwan (82) reported on 51 girls with a mean age of 5 who were brought to the clinic due to complications such as bleeding and wound infections. We also identified a handful of clinical reports on deaths attributed to FGM/C (56;58;82). These were from Nigeria, a country where FGM/C types I and II predominate. It is difficult to determine the number of girls and women who die from FGM/C-related immediate complications, but even one or two cases can create awareness of the harms posed by the proce-

dure. In fact, Egypt instituted a ban on FGM/C following a highly publicized death from FGM/C in 2007. A 12-year-old girl died from an overdose of anaesthetic used for the FGM/C operation at a private clinic in Upper Egypt (91). Another case, of a 13-year-old girl who died after suffering an extreme loss of blood pressure resulting from shock trauma from FGM/C, received international attention a few years later (92). It should be remembered that in the current systematic review, results from a number of studies suggested that girls and women undergoing FGM/C often suffered more than one immediate complication. According to the most valid study, a DHS from Chad (38), which was a representative study of moderate methodological quality, three quarters of girls and women undergoing FGM/C suffered one or more immediate complications, and half of them reported experiencing two or more immediate complications.

As described in the introduction, in previous systematic reviews we established several long-term complications following FGM/C, including reduced sexual capacity (e.g. satisfaction, desire) (8;9), obstetric complications (1;10), and possibly mental health problems (8). It is important to keep in mind that the immediate complications are just a few of the range of FGM/C complications a woman may experience from the moment she goes through the procedure. Lack of knowledge regarding health consequences associated with FGM/C may be one factor implicated in the continuation and support for the practice, even among health professionals like nurses or midwifes. Presumably, if there was good knowledge and understanding about the health complications of FGM/C, motivation towards stopping the practice would be greater. Given the high proportion of immediate complications of the FGM/C procedure, one logical implication is to advocate for stopping the practice. To this end, health education messages about FGM/C could be used as a strategy to encourage individuals to discontinue the tradition.

Differences across FGM/C types

Among the 56 primary studies included, 14 were comparative, meaning that in these studies, data from two or more groups of females with different types of FGM/C were reported separately. Although none of the outcomes qualified for statistical pooling, we examined the overall direction of effect, which allowed an estimation of a potential difference in response between different types of FGM/C. It must be kept in mind that all outcomes except one was self- or mother reported and in 80% of the studies also exposure to FGM/C was self- or mother reported. Consequently, all differences in problems between types of FGM/C are very uncertain. However, the estimates indicated two possible main findings. First, we found that women with FGM/C type III might be at greater risk compared to women with types I-II with respect to experiencing excessive bleeding, shock, genital tissue swelling, infections, difficulties in passing urine, and problems with wound healing. Similarly, there might be a greater risk of genital swelling for women with FGM/C type III compared to type IV. Secondly, findings indicate that there is no palpable difference in the risk of experiencing bleeding, genital swelling, infections, urination-related problems,

and wound healing-related problems for women with FGM/C types I-II compared to type IV ('nick').

Two main tentative conclusions can be drawn from these results. One, it is possible that the risk of experiencing immediate complications is a function of the anatomical extent of the FGM/C procedure. That is, while the range of immediate complications associated with FGM/C types I-IV are similar, there might be a difference among types I through III whereby complications are more prevalent the more extensive the procedure. Physiologically, such a relationship is coherent, but the findings in this systematic review regarding a clear difference between types of FGM/C are tentative. However, the indicated gradual increase in risk of immediate complications associated with increasingly extensive FGM/C, with the greatest risk in girls and women with FGM/C type III, offer evidence in support of a causal relationship. The second conclusion is that 'nicking', classified as FGM/C type IV in the WHO typology, does not appear to involve any substantially smaller risk of immediate complications than types I-II. Some describe pricking, which involves no removal of flesh, as considerably less physically harmful than other forms of FGM/C (93;94) and, predictably, as a (harm-reduction) replacement for more invasive procedures (94-96). Indeed, nicking of the clitoris has been advocated within migrant communities in industrialized countries by reasons of it reducing the harm to girls (97). Also in several places in Africa a transition from severe to lesser forms of FGM/C has been observed (98). For example, Orubuloye and colleagues (99) report that in Nigeria, health professionals who perform FGM/C increasingly promote nicking instead of clitoridectomy (FGM/C type I) to reduce the risk of complications, along with attention to the practice. Our findings indicate that there is no evidence to support a shifting from FGM/C types I-II to nicking on the rationalization that it involves no immediate harm. Further, as UNICEF (3) emphasizes, such harm-reduction FGM/C neither addresses the gender-based inequality underpinning the practice nor makes it more acceptable from a human rights perspective.

Quality of the evidence

Of the 14 included comparative studies, the majority (79%) had moderate methodological study quality. We rated the methodological study quality of three studies as low and none as high. We planned to apply GRADE for outcomes which were eligible for meta-analysis. Since no studies were eligible for statistical pooling, we did not apply this method for assessing the quality of the documentation in the current systematic review. In GRADE, all observational studies start at low, which is defined as “Our confidence in the effect estimate is limited: The true effect may be substantially different from the estimate of the effect” (100)p404). It is unlikely that any outcomes would be upgraded. Most of the studies had methodological limitations, there were inconsistencies in the results, and effect estimates were imprecise.

The gold standard for drawing causal inferences between an exposure and an outcome (effect) is randomized controlled trials. Examination of the complications of a cultural practice like FGM/C does not lend itself to a randomized controlled trial. However, whereas confounding factors and moderators introduce uncertainty with regards to statistical associations found between FGM/C and long-term complications in observational designs, immediate complications of FGM/C are observably the result of the procedure with a clear temporal sequence. Although cross-sectional studies that simultaneously assess exposure and outcome cannot always ascertain that the complication followed the exposure and was in fact caused by it, this methodological point is mute in the case of immediate complications such as bleeding and swelling, which are clearly caused by the FGM/C procedure. It is clinically impossible that a girl has no bleeding when her clitoris and labia minora are cut away. Presently, the body of evidence on immediate complications of FGM/C consists of 56 studies, 14 of which are comparative. The latter allowed an examination of potential differences in risk between FGM/C 'exposed' girls and 'differently exposed' girls, which because of the dose-response relationship indicated, supports a causal relationship.

Nonetheless, there is considerable uncertainty about the validity of the findings, firstly, because of challenges in measurement of exposure to FGM/C, i.e. determination of the extent of genital tissue excised or altered. This issue is discussed in detail by authors of previous reviews on health complications following FGM/C (1;8;14) and others (101). In the present systematic review, we applied the WHO classification system for FGM/C (type I through IV) (2) and found that a similar classification system was applied in most of the included studies. Of the 14 comparative studies, information on classification and exposure to FGM/C was derived from gynecological examination in three studies, self-report in two, and in the nine DHS reports mothers reported on their daughters' FGM/C status. Information about type of FGM/C was ascertained by gynecological examination in 18 of the 42 non-comparative studies. Research shows that both validity and reliability of self-reporting of FGM/C are variable. Generally, most women can correctly say whether or not they have been genitally cut, but are less able to correctly determine the extent of their cutting (102-106). Validity may be particularly uncertain with regards to pricking and nicking. WHO reports that women who have self-reported pricking have in medical examinations been found to have undergone a variety of FGM/C practices, ranging from type I to III (2). As previously encouraged (1;8), while also gynaecological examination of FGM/C status is subject to variation (interindividual and intraindividual), it is at the present time the best classification method available for measurement of FGM/C status and exposure, thus future studies should base classification of FGM/C on gynaecological examination by trained personnel.

A second validity issue is that outcome measurement in three quarters of the studies included was based on self-report or mother's report of daughters. Among the 14 comparative studies there was only one clinically measured outcome. In effect, most

outcomes were self-reported by primarily adult women who recalled circumstances surrounding the time they were subjected to FGM/C, which typically was an event occurring several decades in the past during childhood or even infancy. Whether recalling own or daughters' complications, it may be difficult or impossible to remember details regarding the experience. Additionally, girls and women may fail to report complications in contexts where FGM/C is discouraged or even illegal or they may not themselves attribute the complication to the procedure of FGM/C, leading to under-reporting of complications from FGM/C. For example, a majority of parents who brought their daughters to a clinic in Benin City, Nigeria, attributed the immediate post-FGM/C complications to unseen, spiritual forces, not the FGM/C procedure (82).

A third and last challenge in this systematic review was the lack of a unified approach and standardized definitions to measure the outcomes. It was uncertain whether similarly labeled outcomes were identically defined and measured in each study. We recognize that also study design and setting affect what kind of complications are assessed and found, and that the severity of immediate complications is likely not just a function of the extent of cutting of genital tissue, but also factors such as the instrument used, the age of the girl, and the skills of the operator. Combined, the above factors explain why data on immediate complications of FGM/C are imprecise.

Strengths and limitations

As explained in the preface, this is one in a series of three reports mapping the physical health consequences of FGM/C. We followed the same, standard approach for conducting systematic reviews. Thus, in this section, we summarize strengths and limitations detailed in the systematic review on obstetric consequences already completed (1). With regards to strengths, the results rest on a comprehensive and systematic literature search and a systematic process for identifying relevant studies. We included all empirical research, while prioritizing the reporting of comparative studies. Concerning limitations, it is possible that there exists unpublished and other hard-to-obtain works, not identified through our search. Our search is more than one year old and we failed to obtain 12 relevant records in full text. Some caution is warranted in interpreting the results of this systematic review: There was great variation in the frequency of experiencing immediate complications across the included studies and precise estimation of frequency of complications is not possible.

Conclusion

The aim of this systematic review was to synthesize the research body on the immediate health complications of FGM/C. The evidence base, which covers over half a century of research from more than twenty countries in Africa and beyond, shows that girls and women who undergo any form of FGM/C suffer a range of, and typically several, complications during the FGM/C procedure and the short-term postoperative period. The frequency of experiencing immediate complications varied greatly across the included studies and there is likely under-reporting of complications. However, the most common, physical complications caused by the removal of, or damage to, healthy, normal female genital tissue during the alteration modification process and the short-term postoperative period include pain, excessive bleeding, genital tissue swelling, problems with wound healing, and urine retention. Each of these complications occurred in more than 1 of every 10 girls and women who undergo FGM/C. The evidence base from the comparative studies further shows that there were generally few differences in risk of immediate complications for girls and women who undergo different types of FGM/C.

While the exact frequency of complications is unclear, the data provide a clearer picture of the immediate medical complications that girls and women undergo as a result of the FGM/C procedure. We assess that the systematic review establishes beyond reasonable doubt that FGM/C of any type included here causes short-term harm to the girl or woman subjected to the practice. Thus, the precision and susceptibility to bias of the estimated harm are not critical (11). Together with our related works on the health consequences of FGM/C, which show a range of long-term complications (1;8), our documentation on immediate harms related to FGM/C form valuable background documentation for organizations that work with FGM/C issues, including the improvement of services related to the consequences of FGM/C. Because our results show that the FGM/C procedure unequivocally cause immediate health complications, they document the importance of continuing to raise awareness that ending FGM/C will avoid multiple short-term medical harms suffered by girls and women as they undergo FGM/C as well as preserve their human rights.

Need for further research

Similar to our systematic review on obstetric complications (1), the results of the present systematic review show evidence of a range of health complications from FGM/C. Although caution is required in interpreting the exact frequencies of immediate health complications from FGM/C, it is highly unlikely that further research would alter the conclusion. As stated previously (1), from a human rights and women's health standpoint, irrespective of the exact frequency of short-term complications from FGM/C – such as urine retention, excessive bleeding, swelling, problems with healing – even the lowest rates of complications are unacceptable. FGM/C is a non-medically prescribed procedure that has no health benefit and is hazardous because it is associated with considerable health risks and suffering.

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Appendix

Appendix 1: Glossary

The explanation for medical terms is taken from the MedlinePlus Medical Dictionary (http://www.nlm.nih.gov/medlineplus/mplusdictionary.html). The explanation of methodological and statistical terms is from the glossary of the Cochrane handbook (http://www.cochrane.org/glossary).

TERM	EXPLANATION
Anaemia	A condition in which the blood is deficient (in red blood cells, hemoglobin, or total volume).
Case-control study	A study that compares people with a specific disease or outcome of interest (cases) to people from the same population without that disease or outcome (controls), and which seeks to find associations between the outcome and prior exposure to particular risk factors. This design is particularly useful where the outcome is rare and past exposure can be reliably measured. Case-control studies are usually retrospective, but not always.
Case report	A study reporting observations on a single individual. (Also called anecdote, case history, or case study).
Case series	A study reporting observations on a series of individuals, usually all receiving the same intervention, with no control group.
Chi²	A statistic used to express heterogeneity. A small p-value is often used to indicate evidence of heterogeneity. As it applies to Cochrane reviews, the test is of somewhat limited value. This is because most meta-analyses in Cochrane reviews have very few studies in them. When there are few studies, the test is not very good at detecting heterogeneity if it is present (it has 'low power'). For this reason, a p-value of less than 0.10 is often used to indicate heterogeneity rather than the conven-

	tional cut point of p= 0.05.
CI	Confidence interval. A measure of the uncertainty around the main finding of a statistical analysis. Estimates of unknown quantities, such as the odds ratio comparing an experimental intervention with a control, are usually presented as a point estimate and a 95% confidence interval. This means that if someone were to keep repeating a study in other samples from the same population, 95% of the confidence intervals from those studies would contain the true value of the unknown quantity. Alternatives to 95%, such as 90% and 99% confidence intervals, are sometimes used. Wider intervals indicate lower precision; narrow intervals, greater precision.
Cohort study	An observational study in which a defined group of people (the cohort) is followed over time. The outcomes of people in subsets of this cohort are compared, to examine people who were exposed or not exposed (or exposed at different levels) to a particular intervention or other factor of interest. A prospective cohort study assembles participants and follows them into the future. A retrospective (or historical) cohort study identifies subjects from past records and follows them from the time of those records to the present. Because subjects are not allocated by the investigator to different interventions or other exposures, adjusted analysis is usually required to minimize the influence of other factors (confounders).
Cross-sectional study	A study measuring the distribution of some characteristic(s) in a population at a particular point in time.
Cyst	A closed sac. It has a distinct membrane and develops abnormally in a body cavity or structure, anywhere on the body.
Escherichia coli	E. coli. A bacterium that is commonly found in the lower intestine, and that can cause disease.
FGM/C	Female genital mutilation/cutting.
Fistula	An abnormal passage that leads from an abscess or hollow organ or part to the body surface or from one hollow organ or part to another. E.g., vesicovaginal fistula (urinary bladder and vagina).
Hemorrhage	A profuse loss of blood.
I^2	A measure used to quantify heterogeneity. It describes the percentage of the variability in effect estimates that is due to heterogeneity rather than sampling error (chance). A value

	greater than 50% may be considered to represent substantial heterogeneity.
Infection	The presence of infective agent in or on a suitable host. E.g., urinary infection.
Meta-analysis	The use of statistical techniques in a systematic review to integrate (pool) the results of included studies.
Necrotizing faciitis	A severe soft tissue infection. It is marked by edema, necrosis of subcutaneous tissues, painful red swollen skin. It usually occurs as a complication of surgery, injury, or infection.
Observational study	A study in which the investigators do not seek to intervene, and simply observe the course of events. Changes or differences in one characteristic (e.g. whether or not people received the intervention of interest) are studied in relation to changes or differences in other characteristic(s) (e.g. whether or not they died), without action by the investigator. There is a greater risk of selection bias than in experimental studies (also called nonexperimental study).
OR	Odds ratio. The ratio of the odds of an event in one group to the odds of an event in another group. In studies of treatment effect, the odds in the treatment group are usually divided by the odds in the control group. An odds ratio of one indicates no difference between comparison groups. For undesirable outcomes an OR that is less than one indicates that the intervention was effective in reducing the risk of that outcome. When the risk is small, odds ratios are very similar to risk ratios.
Perineum	The area between the anus and the posterior part of the external genitalia.
RR	Relative risk or Risk ratio. The ratio of risks in two groups. In intervention studies, it is the ratio of the risk in the intervention group to the risk in the control group. A risk ratio of one indicates no difference between comparison groups. For undesirable outcomes, a risk ratio that is less than one indicates that the intervention was effective in reducing the risk of that outcome.
Sepsis	Also called septicaemia. A systemic inflammatory response syndrome caused by an infection. It is usually characterized by abnormal body temperature and white blood cell count, rapid heart rate. Potentially deadly.

Shock (circulatory)	A life-threatening medical emergency caused by excessive blood loss, which leads to sudden or violent disturbance in the mental or emotional faculties. Characterized by a profound depression of the vital processes of the body: pallor, rapid but weak pulse, rapid and shallow respiration, reduced total blood volume, low blood pressure. Usually caused by severe injury.
Tetanus	An acute infectious disease. It is characterized by tonic spasm of voluntary muscles, especially of the muscles of the jaw. It is caused by a bacterium (Clostridium) which is usually introduced through a wound.
UNFPA	United Nations Population Fund.
UNICEF	United Nations Children's Fund.
Urinary retention	Also called ischuria. It is the inability to urinate. It is characterized by poor urinary stream with intermittent flow, straining, a sense of incomplete voiding, and hesitancy.

Appendix 2: Search for literature

African Index Medicus
Database: African Index Medicus
Date: 22.12.2011
Number of records: 14
Search:
"CIRCUMCISION" [Descriptor] or "CIRCUMCISION, FEMALE" [Descriptor] or "INFIBULATION" [Descriptor]

British Nursing Index and Archive
Database: Ovid British Nursing Index and Archive 1985 to January 2012
Date: 20.01.2012
Number of records: 177
Search:
1. Circumcision/
2. ((female$ or wom#n or girl$1) adj3 (mutilation$ or infibulat$ or cutting$)).tw.
3. "fgm/c".tw.
4. ((removal$ or alteration$ or excision$) adj6 female genital$).tw.
5. pharaonic circumcision$.tw.
6. sunna.tw.
7. (clitoridectom$ or clitorectom$).tw.
8. (infibulat$ or reinfibulat$ or deinfibulat$).tw.
9. or/1-8

CINAHL

Database: EBSCO Host CINAHL 1981-Present

Date: 16.01.2012

Number of records: 443

Search:

#	Query	Limiters/Expanders	Last Run Via	Results	
S7	S1 or S2 or S3 or S4 or S5 or S6	Search modes – Boolean/Phrase	Interface – EBSCOhost Search Screen – Advanced Search Database – CINAHL	534	Edit S7
S6	TI (sunna or clitoridectom* or clitorectom* or 94ysmenorrh* reinfibulat* or deinfibulat*) OR AB (sunna or clitoridectom* or clitorectom* or infibulat* reinfibulat* or deinfibulat*)	Search modes – Boolean/Phrase	Interface – EBSCOhost Search Screen – Advanced Search Database – CINAHL	4	Edit S6
S5	TI pharaonic W0 circumcision* OR AB pharaonic W0 circumcision*	Search modes – Boolean/Phrase	Interface – EBSCOhost Search Screen – Advanced Search Database – CINAHL	2	Edit S5
S4	TI ((removal* or alteration* or excision*) N6 (female W0 genital*)) OR AB ((removal* or alteration* or excision*) N6 (female W0 genital*))	Search modes – Boolean/Phrase	Interface – EBSCOhost Search Screen – Advanced Search Database – CINAHL	4	Edit S4
S3	TI "fgm/c" OR AB "fgm/c"	Search modes – Boolean/Phrase	Interface – EBSCOhost Search Screen – Advanced Search Database – CINAHL	1	Edit S3
S2	TI ((female* or wom#n or girl*) N3 (mutilation* or circumcis* or cutting*)) OR AB ((female* or wom#n or girl*) N3 (mutilation* or circumcis* or cutting*))	Search modes – Boolean/Phrase	Interface – EBSCOhost Search Screen – Advanced Search Database – CINAHL	345	Edit S2
S1	(MH "Circumcision, Female")	Search modes – Boolean/Phrase	Interface – EBSCOhost Search Screen – Advanced Search Database – CINAHL	443	Edit S1

The Cochrane Library

Databases in The Cochrane Library:

- Cochrane Database of Systematic Reviews (CDSR): Issue 12 of 12, Dec 2011
- Cochrane Central Register of Controlled Trials (CENTRAL),
- Database of Abstracts of Reviews of Effects (DARE)
- Health Technology Assessment Database (HTA): Issue 4 of 4 Oct 2011

Date: 09.01.2012
Number of records: CDSR: 1; CENTRAL: 12; DARE: 0; HTA: 3
Search:

#1 MeSH descriptor Circumcision, Female, this term only

#2 ((female* or woman or women or girl or girls) near/3 (mutilation* or circumcis* or cutting*)) or "fgm/c" or ((removal* or alteration* or excision*) near/6 (female next genital*)) or (pharaonic next circumcision*) or sunna or clitoridectom* or clitorectom* or infibulat* or reinfibulat* or deinfibulat*:ti or ((female* or woman or women or girl or girls) near/3 (mutilation* or circumcis* or cutting*)) or "fgm/c" or ((removal* or alteration* or excision*) near/6 (female next genital*)) or (pharaonic next circumcision*) or sunna or clitoridectom* or clitorectom* or infibulat* or reinfibulat* or deinfibulat*:ab

#3 (#1 OR #2)

EMBASE
Database: Ovid Embase 1980 to 2012 Week 02
Date: 20.01.2012
Number of records: 1442
Search:
1. female circumcision/ or female genital mutilation/ or female genital cutting/ or infibulate/
2. ((female$ or wom#n or girl$1) adj3 (mutilation$ or infibulat$ or cutting$)).tw.
3. "fgm/c".tw.
4. ((removal$ or alteration$ or excision$) adj6 female genital$).tw.
5. pharaonic circumcision$.tw.
6. sunna.tw.
7. (clitoridectom$ or clitorectom$).tw.
8. infibulat$ or reinfibulat$ or deinfibulat$).tw.
9. or/1-8

MEDLINE® In-Process & Other Non-Indexed Citations
Database: Ovid MEDLINE® In-Process & Other Non-Indexed Citations and Ovid MEDLINE® 1946 to Present (1946 to January Week 2 2012; January 19, 2012)
Date: 20.01.2012
Number of records: 1299
Search:

1. Circumcision, Female/
2. ((female$ or wom#n or girl$1) adj3 (mutilation$ or infibulat$ or cutting$)).tw.
3. “fgm/c”.tw.
4. ((removal$ or alteration$ or excision$) adj6 female genital$).tw.
5. pharaonic circumcision$.tw.
6. sunna.tw.
7. (clitoridectom$ or clitorectom$).tw.
8. (infibulat$ or reinfibulat$ or deinfibulat$).tw.
9. or/1-8

PILOTS
Database: CSA Illumina: PILOTS database (1871-Current)
Date: 02.03.2011
Number of records: 17
Search:
((DE=(“genital mutilation”)) or (TI=(((female* or woman or women or girl or girls) within 3 (mutilation* or infibulat* or cutting*)) or fgm or ((removal* or alteration* or excision*) within 6 female genital*) or pharaonic circumcision* or sunna or clitoridectom* or clitorectom* or infibulat* or reinfibulat* or deinfibulat*)) or (AB=(((female* or woman or women or girl or girls) within 3 (mutilation* or circumcis* or cutting*)) or fgm or ((removal* or alteration* or excision*) within 6 female genital*) or pharaonic circumcision* or sunna or clitoridectom* or clitorectom* or infibulat* or reinfibulat* or deinfibulat*)))

POPLINE
Database: POPLINE® (POPulation information 96ysmen)
Date: 03.03.2011
Number of records: 1331
Search:
KEYWORDS:
FEMALE GENITAL CUTTING

PsycINFO
Database: Ovid PsycINFO 1806 to January Week 3 2012
Date: 20.01.2012
Number of records: 574
Search:
1. Circumcision/
2. ((female$ or wom#n or girl$1) adj3 (mutilation$ or infibulat$ or cutting$)).tw.
3. “fgm/c”.tw.
4. ((removal$ or alteration$ or excision$) adj6 female genital$).tw.
5. pharaonic circumcision$.tw.
6. sunna.tw.

7. (clitoridectom$ or clitorectom$).tw.
8. (infibulat$ or reinfibulat$ or deinfibulat$).tw.
9. or/1-8

Social Services Abstracts
Database: ProQuest: Social Services Abstracts (1979-Current)
Date: 25.01.2012
Number of records: 94
Search:
su.EXACT("Genital Mutilation" OR "Circumcision") OR ti((female* NEAR/3 (mutilation* OR infibulat* OR cutting*))) OR ab((female* NEAR/3 (mutilation* OR infibulat* OR cutting*)))

Sociological Abstracts
Database: ProQuest: Sociological Abstracts (1952-Current)
Date: 25.01.2012
Number of records: 436
Search:
su.EXACT("Genital Mutilation" OR "Circumcision") OR ti((female* NEAR/3 (mutilation* OR circumcis* OR cutting*))) OR ab((female* NEAR/3 (mutilation* OR infibulat* OR cutting*)))

WHOLIS
Database: WHO Library & Information Networks for Knowledge Database (WHOLIS)
Date: 03.03.2011
Number of records: 72
Search:
words or phrase "((female$ or wom?n or girl or girls) near3 (mutilation$ or circumcis$ or cutting$))"
OR
words or phrase ""fgm/c""
OR
words or phrase "((removal$ or alteration$ or excision$) near6 (female adj genital$))"
OR
words or phrase "(pharaonic adj circumcision$)"
OR
words or phrase "sunna"
OR
words or phrase "(clitoridectom$ or clitorectom$)"
OR
words or phrase infibulat$ or reinfibulat$ or deinfibulat$)"

Appendix 3: Excluded studies

Table 1.1: Excluded studies read in full text and reason for exclusion

Study first author (ref no.)	Cause for exclusion of study
NN 1994 (107)	Not empirical study
NN 2007 (108)	Not empirical study
NN 1996 (109)	Not empirical study
NN 1997 (110)	Not empirical study
Abariga 2009 (111)	No physical consequences/complications following FGM/C were reported
Abubakar 2004 (112)	No physical consequences/complications following FGM/C were reported
Abu-Shamma 1949 (113)	Not empirical study
Adanu 2005 (114)	Population not girls/women subjected to FGM/C
Adelusi 1975 (115)	No physical consequences/complications following FGM/C were reported
Adeneye 2006 (116)	No physical consequences/complications following FGM/C were reported
Adeokun 2006 (117)	No physical consequences/complications following FGM/C were reported
Adeyinka 2009 (118)	No physical consequences/complications following FGM/C were reported
Adinma 1999 (119)	No physical consequences/complications following FGM/C were reported
Afifi 2007 (120)	No physical consequences/complications following FGM/C were reported
Ahmed 2000 (121)	Not empirical study
Ahmed 2005 (122)	Not empirical study
Ahnaimugan 1978 (123)	No physical consequences/complications following FGM/C were reported
Al-Krenawi 1999 (124)	No physical consequences/complications following FGM/C were reported
Al-Krenawi 1999 (125)	No physical consequences/complications following FGM/C were reported
Allag 2001 (126)	No physical consequences/complications following FGM/C were reported
Ahmed Allam 1999 (127)	Population not girls/women subjected to FGM/C
Allam 2001 (128)	Population not girls/women subjected to FGM/C
Almroth-Berggren 2001 (129)	No physical consequences/complications following FGM/C were reported
Amusan 2006 (130)	No physical consequences/complications following FGM/C were reported
Anderson 1929 (131)	No extractable physical consequences following FGM/C were reported
Applebaum 2008 (132)	No physical consequences/complications following FGM/C were reported
Archibong 1987 (133)	No physical consequences/complications following FGM/C were reported
Arthur 1942 (134)	Not empirical study
Asali 1995 (135)	No physical consequences/complications following FGM/C were reported
Azadeh 1997 (136)	Not empirical study
Baasher 1982 (137)	Not empirical study
Badri 1992 (138)	Not empirical study

Study first author (ref no.)	Cause for exclusion of study
Badri 1984 (139)	Not empirical study (non-systematic review paper)
Baido 2004 (140)	No physical consequences/complications following FGM/C were reported
Baido 2007 (141)	No physical consequences/complications following FGM/C were reported
Baker 1993 (142)	No physical consequences/complications following FGM/C were reported
Bakr 1985 (143)	Not empirical study
Balogun 2001 (144)	Not empirical study
Barber 2010 (145)	Not empirical study
Beck 2008 (146)	Not empirical study
Behrendt 2005 (147)	No physical consequences/complications following FGM/C were reported
Belmaker 2011 (148)	No physical consequences/complications following FGM/C were reported
Bender 1999 (149)	Not empirical study
Bikoo 2008 (150)	Not empirical study
Boddy 1982 (151)	No physical consequences/complications following FGM/C were reported
Bonilla 1997 (152)	Not empirical study
Brady 1999 (153)	Not empirical study
Briggs 2002 (154)	No physical consequences/complications following FGM/C were reported
Brotmacher 1955 (155)	Not empirical study
Burkina Faso DHS 1999 (156)	No physical consequences/complications following FGM/C were reported
Caldwell 1983 (157)	No physical consequences/complications following FGM/C were reported
Campbell 1995 (158)	No physical consequences/complications following FGM/C were reported
Cameron DHS 2004 (159)	No physical consequences/complications following FGM/C were reported
Cannon 1964 (160)	No physical consequences/complications following FGM/C were reported
Capraro 1972 (161)	No physical consequences/complications following FGM/C were reported
Carton 2008 (162)	Not empirical study
Certinkurşun 2009 (163)	No physical consequences/complications following FGM/C were reported
Cohen 1992 (164)	Population not girls/women subjected to FGM/C
Coker 1998 (165)	No physical consequences/complications following FGM/C were reported
Cook 1979 (166)	Not empirical study
Damas 1972 (167)	No physical consequences/complications following FGM/C were reported
Dattijo 2010 (168)	No physical consequences/complications following FGM/C r were eported
Davis 1999 (169)	No physical consequences/complications following FGM/C were reported
Daw 1970 (170)	No physical consequences/complications following FGM/C were reported
Dekou 2002 (171)	Population not girls/women subjected to FGM/C
De Villeneuve 1937 (172)	Not empirical study
Dirie 1991 (173)	No physical consequences/complications following FGM/C were reported
Ebomoyi 1987 (174)	No physical consequences/complications following FGM/C were reported

Study first author (ref no.)	Cause for exclusion of study
Ebong 1997 (175)	No physical consequences/complications following FGM/C r were eported
Egypt DHS 2008 (176)	No physical consequences/complications following FGM/C were reported
Egypt DHS 2005 (177)	No physical consequences/complications following FGM/C were reported
Egypt DHS 2003 (178)	No physical consequences/complications following FGM/C were reported
Egypt DHS 2000 (179)	No physical consequences/complications following FGM/C were reported
Ehigiegba 1998 (180)	No physical consequences/complications following FGM/C were reported
Eke 2006 (181)	Not empirical study
Ekwueme 2010 (182)	No physical consequences/complications following FGM/C were reported
Elmusharaf 2009 (183)	No physical consequences/complications following FGM/C were reported
Elmusharaf 2006 (104)	No physical consequences/complications following FGM/C were reported
Elnashar 2007 (184)	No physical consequences/complications following FGM/C r were eported
Epelboin 1979 (185)	No physical consequences/complications following FGM/C were reported
Ericksen 1995 (186)	No physical consequences/complications following FGM/C were reported
Essen 2002 (187)	Consequences/complications following FGM/C not reported for women
Ethiopia DHS 2005 (188)	No physical consequences/complications following FGM/C were reported
Ethiopia DHS 2000 (189)	No physical consequences/complications following FGM/C were reported
Fahmy 2010 (190)	No physical consequences/complications following FGM/C were reported
Feyi-Waboso 2006 (191)	No physical consequences/complications following FGM/C were reported
Fleischer 1975 (192)	No physical consequences/complications following FGM/C were reported
Gage 2006 (193)	No physical consequences/complications following FGM/C were reported
Gallo 1985 (194)	No physical consequences/complications following FGM/C were reported
Gallo 1985 (195)	No physical consequences/complications following FGM/C were reported
Ghana DHS 2003 (196)	No physical consequences/complications following FGM/C were reported
Gillian 1929 (197)	Not empirical study
Gilson 1995 (198)	Not empirical study
Githiora 2011 (199)	No physical consequences/complications following FGM/C were reported
Gordon 2007 (200)	Not empirical study
Grisaru 1997 (201)	No physical consequences/complications following FGM/C were reported
Gruenbaum 2006 (202)	No physical consequences/complications following FGM/C were reported
Gurunluoglu 1999 (203)	Population not girls/women subjected to FGM/C
Hanselmann 2011 (204)	No physical consequences/complications following FGM/C were reported
Harris 1951 (205)	No physical consequences/complications following FGM/C were reported
Harrison 1983 (206)	Not empirical study
Hassan 1995 (207)	Not empirical study
Hassanin 2008 (208)	No physical consequences/complications following FGM/C were reported
Henrion 2007 (209)	Not empirical study

Study first author (ref no.)	Cause for exclusion of study
Herieka 2003 (210)	No physical consequences/complications following FGM/C were reported
Hezekiah 1989 (211)	Not empirical study
Hosken 1978 (212)	Not empirical study
Hosken 1993 (213)	Not empirical study (non-systematic review paper)
Hrdy 1987 (214)	Not empirical study
Huber 1966 (215)	Not empirical study
Hulverscheidt 2009 (216)	Not empirical study
Igwegbe 2000 (217)	No physical consequences/complications following FGM/C were reported
Isa 1999 (218)	No physical consequences/complications following FGM/C were reported
Ismail 2009 (219)	No physical consequences/complications following FGM/C were reported
Ivory Coast DHS 1999 (220)	No physical consequences/complications following FGM/C were reported
Jackson 2003 (221)	No physical consequences/complications following FGM/C were reported
Jaffer 2006 (222)	No physical consequences/complications following FGM/C were reported
Jirovsky 2010 (223)	No physical consequences/complications following FGM/C were reported
Johansen 2002 (224)	No physical consequences/complications following FGM/C were reported
Junaid 1981 (225)	Population not girls/women subjected to FGM/C
Kangoum 2004 (226)	No physical consequences/complications following FGM/C were reported
Karmaker 2011 (227)	No physical consequences/complications following FGM/C were reported
Kassegne 2010 (228)	No physical consequences/complications following FGM/C were reported
Kästner 2005 (229)	Not empirical study
Keita 2001 (230)	No physical consequences/complications following FGM/C were reported
Kenya DHS 2009 (231)	No physical consequences/complications following FGM/C were reported
Kenya DHS 2003 (232)	No physical consequences/complications following FGM/C were reported
Kenya DHS 1998 (233)	No physical consequences/complications following FGM/C were reported
Khadivzadeh 2009 (234)	No physical consequences/complications following FGM/C were reported
Khan 1997 (235)	No physical consequences/complications following FGM/C were reported
Khanam 1977 (236)	Population not girls/women subjected to FGM/C
Khisa 2011 (237)	No physical consequences/complications following FGM/C were reported
Kingston 1957 (238)	Not empirical study
Kiragu 1995 (239)	Not empirical study
Kun 1997 (240)	Not empirical study
Lagarde 2003 (241)	No physical consequences/complications following FGM/C were reported
Lax 2000 (242)	Not empirical study
Levin 1980 (243)	Not empirical study
Liberia DHS 2007 (244)	No physical consequences/complications following FGM/C were reported
Lightfoot-Klein 1983 (245)	No physical consequences/complications following FGM/C were reported

Study first author (ref no.)	Cause for exclusion of study
Lightfoot-Klein 1989 (246)	No physical consequences/complications following FGM/C were reported
Lightfoot-Klein 1989 (247)	No physical consequences/complications following FGM/C were reported
Lightfoot-Klein 1993 (248)	Not empirical study
Lister 1960 (249)	No physical consequences/complications following FGM/C were reported
Longo 1964 (250)	Not empirical study
Lowenstein 1978 (251)	No physical consequences/complications following FGM/C were reported
Lundberg 2008 (252)	No physical consequences/complications following FGM/C were reported
Mahran 1981 (253)	Not empirical study
Mali DHS 1996 (254)	No physical consequences/complications following FGM/C were reported
Marin 1980 (255)	Not empirical study
Marinho 2009 (256)	Population not girls/women subjected to FGM/C
Masho 2009 (257)	No physical consequences/complications following FGM/C were reported
Mboto 2010 (258)	No physical consequences/complications following FGM/C were reported
McLintock 1985 (259)	Population not girls/women subjected to FGM/C
Melhado 2006 (260)	Not empirical study
Menage 2006 (261)	Not empirical study
Meniru 1994 (262)	Not empirical study
Missailidis 2000 (263)	No physical consequences/complications following FGM/C were reported
Mitike 2009 (264)	No physical consequences/complications following FGM/C were reported
Mohamud 1991 (265)	Consequences/complications following FGM/C not reported for women
Momoh 2004 (266)	No physical consequences/complications following FGM/C were reported
Momoh 2010 (267)	Not empirical study
Momoh 2011 (268)	Not empirical study
Monjok 2007 (269)	Not empirical study
Morgan 2006 (270)	Not empirical study
Morison 2003 (271)	Not empirical study
Morris 1996 (272)	No physical consequences/complications following FGM/C were reported
Morris 1999 (273)	Not empirical study
Mseddi 2007 (274)	No physical consequences/complications following FGM/C were reported
Mustafa 1972 (275)	No physical consequences/complications following FGM/C were reported
Ncayiyana 2003 (276)	Not empirical study
Ng 2000 (277)	Not empirical study
Niger DHS 2006 (278)	No physical consequences/complications following FGM/C were reported
Niger DHS 1998 (279)	No physical consequences/complications following FGM/C were reported
Nigeria DHS 2008 (280)	No physical consequences/complications following FGM/C were reported
Nigeria DHS 2003 (281)	No physical consequences/complications following FGM/C were reported

Study first author (ref no.)	Cause for exclusion of study
Nigeria DHS 1999 (282)	No physical consequences/complications following FGM/C were reported
Nkrumah 1999 (283)	Not empirical study
Nnodum 2002 (284)	Only sexual and psychological consequences following FGM/C were reported
No 2004 (285)	Not empirical study
Nour 2004 (286)	Not empirical study
Nour 2006 (287)	Reports on effect of defibulation
Nour 2008 (288)	Not empirical study
Ntiri 1993 (289)	No physical consequences/complications following FGM/C were reported
Obermeyer 1999 (290)	Not empirical study (non-systematic review paper)
Obermeyer 1999 (291)	Not empirical study (non-systematic review paper)
Obermeyer 2005 (14)	Not empirical study (non-systematic review paper)
Odimegwu 2001 (292)	No physical consequences/complications following FGM/C were reported
Odimegwu 2000 (293)	No physical consequences/complications following FGM/C were reported
Odu 2008 (294)	No physical consequences/complications following FGM/C were reported
Odujinrin 1989 (295)	No physical consequences/complications following FGM/C were reported
Ogunlola 2003 (296)	No physical consequences/complications following FGM/C were reported
Olamijulo 1983 (297)	No physical consequences/complications following FGM/C were reported
Onuigbo 1976 (298)	No physical consequences/complications following FGM/C were reported
Osinowo 2003 (299)	No physical consequences/complications following FGM/C were reported
Oyeledun 1997 (300)	No data for physical consequences following FGM/C were reported
Paul 1993 (301)	No physical consequences/complications following FGM/C r were eported
Penna 2002 (302)	Reports on effect of defibulation with laser surgery
Peterman 2009 (303)	No data for physical consequences following FGM/C were reported
Philp 1925 (304)	Not empirical study
Preston 1942 (305)	Population not girls/women subjected to FGM/C
Preston 1951 (306)	No physical consequences/complications following FGM/C were reported
Preston 1954 (307)	Not empirical study
Rasheed 2011 (308)	No physical consequences/complications following FGM/C were reported
Renaud 1968 (309)	Not empirical study
Reyners 2004 (310)	Not empirical study
Roberts 1944 (311)	Population seems not to be girls/women subjected to FGM/C
Roles 1966 (312)	Not empirical study
Ronge 2006 (313)	Not empirical study
Rouzi 2001 (314)	Reports on effect of defibulation
Satti 2006 (315)	No physical consequences/complications following FGM/C were reported

Study first author (ref no.)	Cause for exclusion of study
Senegal DHS 2011 (316)	No physical consequences/complications following FGM/C were reported
Sequeira 1931(317)	Not empirical study
Shah 2009 (318)	Not empirical study
Shay 2010 (319)	No physical consequences/complications following FGM/C were reported
Sierra Leone DHS 2008 (320)	No physical consequences/complications following FGM/C were reported
Silberstein 1977 (321)	Not empirical study (non-systematic review paper)
Snow 2002 (106)	No physical consequences/complications following FGM/C were reported
Stewart 2002 (322)	No physical consequences/complications following FGM/C were reported
Suardi 2010 (323)	No physical consequences/complications following FGM/C were reported
Sudan DHS 1990 (324)	No physical consequences/complications following FGM/C were reported
Tanganelli 1989 (325)	Not empirical study
Tanzania DHS 2010 (326)	No physical consequences/complications following FGM/C were reported
Tanzania DHS 2004 (327)	No physical consequences/complications following FGM/C were reported
Tanzania DHS 1996 (328)	No physical consequences/complications following FGM/C were reported
Tegman 1990 (329)	Not empirical study
Thabet 2003 (330)	Only sexual consequences/complications following FGM/C were reported
Thabet 2009 (331)	No physical consequences/complications following FGM/C were reported
Thomas 2010 (332)	No physical consequences/complications following FGM/C were reported
Ugboma 2004 (333)	No physical consequences/complications following FGM/C were reported
Utz-Billing 2008 (334)	Not empirical study
Vaizey 1955 (335)	Not empirical study
Van Roosmalen 2000 (336)	Not empirical study
Van Rossem 2009 (337)	No physical consequences/complications following FGM/C were reported
Vangen 2006 (338)	Not empirical study
Verzin 1975 (339)	Not empirical study
Wagner 2000 (340)	Not empirical study
WHO 2000 (15)	Not empirical study (non-systematic review paper)
Williams 1999 (341)	Not empirical study
Wilson 1955 (342)	No physical consequences/complications following FGM/C were reported
Worsley 1938 (343)	Not empirical study
Yemen DHS 1992 (344)	No physical consequences/complications following FGM/C were reported
Yoder 2004 (101)	Not empirical study
Yoong 2005 (345)	Population mix of girls/women subjected to FGM/C and not
Young 1949 (346)	Not empirical study
Yount 2004 (347)	Not empirical study

Appendix 4: Quality assessment

Description of assessment of study quality for all studies:

High quality (few limitations): All or almost all of the criteria from the checklist are met. If some of the criteria are not met, it must be unlikely that the study conclusions will change.

Moderate quality (some limitations): Some of the criteria are not met and/or the study does not adequately address the criteria. It is unlikely that the study conclusions will change.

Low quality (serious limitations): Few or no criteria are met and/or the study does not adequately address the criteria. It is likely that the study conclusions will change.

Quality assessment of comparative studies

Quality assessment questions for comparative cross-sectional studies.
All questions are answered 'yes', 'unclear/somewhat', or 'no' (na= not applicable):

1. Was the population from which the sample was drawn clearly defined?
2. Was the sample representative of the population?
3. Is it explained whether (and how) the participants who agreed to participate are different from those who refused to participate?
4. Is the response rate adequate?
5. Were standardized data collection methods used?
6. Were measures shown to be reliable and valid?
7. Were the statistical methods appropriate?
8. Was the non-exposed group selected from the same population as the exposed group?
9. Were the groups comparable with respect to important background factors?
10. Were exposure and outcome measured in the same way and reliably in the two groups?
11. Was the person who assessed the outcome blind to whether participants were exposed or not?
12. Have known, potential confounders been considered in the study design and/or analyses?

Table 2.1: Results of quality assessment of comparative studies

Study	1	2	3	4	5	6	7	8	9	10	11	12	Assessment
Benin DHS 2001	yes	yes	na	yes	yes	unclear	yes	yes	unclear	unclear	no	unclear	Moderate
Burkina Faso DHS 2003	yes	no	na	yes	yes	unclear	yes	yes	unclear	unclear	no	unclear	Moderate
Chad DHS 2004	yes	unclear	na	yes	yes	unclear	yes	yes	unclear	yes	no	unclear	Moderate
El-Dareer 1983	yes	unclear	no	no	yes	no	yes	yes	unclear	unclear	no	unclear	Low
Guinea DHS 2005	yes	no	na	yes	yes	unclear	yes	yes	unclear	unclear	no	unclear	Moderate
Guinea DHS 1999	yes	no	na	yes	yes	unclear	yes	yes	unclear	unclear	no	unclear	Moderate
Kaplan 2011	yes	unclear	no	unclear	yes	yes	yes	yes	unclear	yes	unclear	unclear	Moderate
Mali DHS 2006	yes	no	na	yes	yes	unclear	yes	yes	unclear	unclear	no	unclear	Moderate
Mali DHS 2001	yes	no	na	yes	yes	unclear	yes	yes	unclear	unclear	no	unclear	Moderate
Mandara 2004	unclear	yes	no	unclear	yes	yes	yes	yes	unclear	yes	unclear	no	Moderate
Mauritania DHS 2001	yes	no	na	yes	yes	unclear	yes	yes	unclear	unclear	no	unclear	Moderate
Rushwan 1983	yes	no	no	unclear	yes	no	yes	yes	no	unclear	no	no	Low
Senegal DHS 2005	yes	no	na	yes	yes	no	yes	yes	unclear	unclear	no	unclear	Moderate
Shandall 1967	yes	unclear	no	yes	unclear	unclear	unclear	yes	unclear	yes	unclear	unclear	Low

Quality assessment of cross-sectional descriptive studies (one group)

Quality assessment questions for cross-sectional studies.
All questions are answered 'yes', 'unclear/somewhat', or 'no' (na= not applicable):

1. Was the population from which the sample was drawn clearly defined?
2. Was the sample representative of the population?
3. Is it explained whether (and how) the participants who agreed to participate are different from those who refused to participate?
4. Is the response rate adequate?
5. Were standardized data collection methods used?
6. Were measures shown to be reliable and valid?
7. Were the statistical methods appropriate?

Table 3.1: Results of quality assessment of cross-sectional descriptive studies

Study	1	2	3	4	5	6	7	Assessment
Abdalla 1982	yes	no	no	unclear	yes	no	yes	Low
Abor 2006	yes	no	no	yes	yes	no	yes	Low
Al-Hussain 2003	yes	unclear	unclear	no	yes	yes	yes	Moderate
Almroth 2005	yes	unclear	yes	yes	na	yes	yes	High
Arbesman 1993	unclear	unclear	no	unclear	unclear	no	yes	Low
Assaad 1980	no	no	no	unclear	unclear	no	yes	Low
Aziz 1980	no	unclear	no	unclear	unclear	no	unclear	Low
Bayoudh 1995	no	no	no	unclear	yes	no	yes	Low
Benin DHS 2006	yes	no	na	yes	yes	no	yes	Moderate
Briggs 1998	no	unclear	no	unclear	yes	no	yes	Low
CAR DHS 1995	yes	yes	na	yes	yes	no	yes	Moderate
Chalmers 2000	yes	unclear	no	unclear	yes	no	yes	Low
Dandash 2001a	unclear	unclear	no	yes	yes	no	yes	Low
Dandash 2001b	yes	unclear	no	yes	yes	no	yes	Moderate
Dare 2004	yes	unclear	no	unclear	yes	unclear	yes	Low
Dirie 1992	yes	unclear	no	unclear	yes	no	yes	Low
Egypt DHS 1995	yes	unclear	na	yes	yes	no	yes	Moderate
El-Defrawi 2001	yes	unclear	no	unclear	yes	yes	unclear	Low
Elgaali 2005	yes	unclear	na	yes	yes	no	yes	Moderate
Ismail 1982	no	unclear	no	unclear	unclear	no	yes	Low
Jones 1999-I	yes	unclear	no	unclear	yes	no	yes	Low
Jones 1999-II	yes	unclear	na	yes	yes	no	yes	Moderate
Leonard 1996	yes	unclear	no	unclear	yes	no	yes	Low
Litorp 2008	yes	unclear	no	yes	yes	no	yes	Low

Livermore 2007	yes	unclear	no	yes	yes	no	yes	Moderate
Modawi 1974	no	unclear	na	na	unclear	no	unclear	Low
Momoh 2001	yes	unclear	na	na	unclear	unclear	yes	Low
Mukoro 2004	unclear	unclear	no	unclear	unclear	no	yes	Low
Myers 1985	yes	unclear	no	unclear	unclear	no	yes	Low
Saad 1998	no	unclear	no	na	unclear	no	unclear	Low
Sayed 1996	yes	unclear	no	unclear	unclear	no	yes	Low
Shell-Duncan 2000	yes	unclear	no	unclear	unclear	no	yes	Low
Tag-Eldin 2008	yes	yes	unclear	yes	yes	no	yes	High
Yemen DHS 1997	yes	no	na	yes	yes	no	yes	Moderate

Quality assessment of case series

Quality assessment questions for case series.
All questions are answered 'yes', 'unclear/somewhat', or 'no' (na= not applicable):

1. Was the study based on a series of individuals from a suitable group of patients?
2. Were measures taken to ensure that the sample was not too selective?
3. Were the inclusion criteria for the sample clearly defined?
4. Is the response rate adequate?
5. Were all included patients at the same stage of disease progression?
6. Was the follow-up adequate (type/extent/time) to account for outcomes?
7. Were objective criteria used to assess the outcome?
8. If case series are compared, were the series adequately described and was the distribution of prognostic factors described?
9. Was registration of data prospective?

Table 4.1: Results of quality assessment of case series

Study	1	2	3	4	5	6	7	8	9	Assessment
Agugua 1982	yes	yes	no	na	unclear	na	yes	na	no	Low
Badejo 1983	yes	yes	no	unclear	yes	yes	yes	na	unclear	High
Eguwatu 1981	yes	unclear	no	unclear	unclear	yes	yes	na	no	Low
Hall 1963	unclear	no	no	unclear	yes	yes	yes	na	no	Low
Osifo 2009	yes	unclear	yes	unclear	no	yes	yes	na	yes	High

Appendix 5: Outcome tables on immediate consequences

The following outcome tables present results of immediate health complications from the non-comparative studies. The tables are organized according to outcomes, in line with the results chapter.

Bleeding

Table 5.1: Non-comparative studies – study outcomes for bleeding

Author	Study design	Outcome	Result
Abor 2006	Cross-sectional	Bleeding	10/34 (29.4%)
Agugua 1982	Case series	Hemorrhage	2/55 (3.6%)
Arbesman 1993	Cross-sectional	Post-FGM bleeding heavy	5/11 (45.5%)
Aziz 1980	Cross-sectional	Hemorrhage	17/7505 (0.2%)
Badejo 1983	Case series	Hemorrhage	4/12 (33.3%)
Bayoudh 1995	Cross-sectional	Hemorrhage	20/300 (6.7%)
Benin DHS 2006	Cross-sectional	Excessive bleeding	40/240 (16.6%)
Briggs 1998	Cross-sectional	Excessive bleeding	18/100 (18.0%)
CAR DHS 1995	Cross-sectional	Hemorrhage	436/2555 (17.1%)
Chalmers 2000	Cross-sectional	Bleeding	351/432 (81.3%)
Dandash 2001b	Cross-sectional	Hemorrhage	11/282 (3.9%)
Dare 2004	Cross-sectional	Heavy bleeding	88/522 (16.8)
Dirie 1992	Cross-sectional	Hemorrhage	53/112 (47.3%)
Egwuatu 1981	Case series	Hemorrhage	2/43 (4.7%)
El-defrawi 2001	Cross-sectional	Bleeding	21/200 (10.5%)
Ismail 1982	Cross-sectional	Hemorrhage	53/290 (18.3%)
Jones 1999a	Cross-sectional	Hemorrhage	8/1787 (0.3%)
Jones 1999b	Cross-sectional	Hemorrhage	116/4826 (2.4%)
Leonard 1996	Cross-sectional	Excessive bleeding/hemorrhage	12/91 (13.2%)
Modawi 1974	Cross-sectional	Primary hemorrhage	4/2526 (0.2%)
Momoh 2001	Cross-sectional	Heavy bleeding	10/66 (15.2%)
Mukoro 2004	Cross-sectional	Hemorrhage	13/46 (28.3%)
Myers 1985	Cross-sectional	Excessive bleeding [a]	9/492 (1.8%)
Osifo 2009	Case series	Bleeding/hemorrhage	6/51 (11.8%)
Saad 1998	Cross-sectional	Severe bleeding	18/9006 (0.2%)
Sayed 1996	Cross-sectional	Serious bleeding	65/1079 (6.0%)
Shell-Duncan 2000	Cross-sectional	Hemorrhage	73/880 (8.1%)
Yemen DHS 1997	Cross-sectional	Bleeding [a]	122/1546 (7.9%)

Legend: a= mothers reporting on daughters.

Shock

Table 6.1: Non-comparative study - study outcomes for shock

Author	Study design	Outcome	Result
Dirie 1992	Cross-sectional	Shock due to FGM/C hemorrhage	5/112 (4.5%)

Swelling

Table 7.1: Non-comparative studies - study outcomes for swelling

Author	Study design	Outcome	Result
Abor 2006	Cross-sectional	Edema/swelling	2/34 (5.9%)
Benin DHS 2006	Cross-sectional	Swelling	29/240 (12.2%)
Chalmers 2000	Cross-sectional	Edema/ swelling	215/432 (49.8%)
Dare 2004	Cross-sectional	Swelling	71/522 (13.6%)
El-defrawi 2001	Cross-sectional	Swelling (of clitoris)	4/200 (2.0%)
Hall 1963	Case series	Swelling and pain of various joints	5/5 (100%)
Rushwan 1983	Cross-sectional	Swelling	29/2308 (1.3%)
Yemen DHS 1997	Cross-sectional	Swelling [a]	11/1546 (0.7%)

Legend: a= mothers reporting on daughters.

Fever

Table 8.1: Non-comparative studies - study outcomes for fever

Author	Study design	Outcome	Result
Briggs 1998	Cross-sectional	Fever	11/100 (11.0%)
CAR DHS 1995	Cross-sectional	Fever	139/2555 (5.4%)
Dandash 2001b	Cross-sectional	Fever	73/282 (25.9%)
Dare 2004	Cross-sectional	Fever	55/522 (10.5%)
Hall 1963	Case series	Fever	5/5 (100%)

Infection

Table 9.1: Non-comparative studies - study outcomes for infection

Author	Study design	Outcome	Result
Adetoro 1986	Case report	Genital infection (sepsis)	1 case
Agugua 1982	Case series (children)	Tetanus Septicaemia	1/55 (1.8%) 1/55 (1.8%)
Arbesman 1993	Cross-sectional	Infection	1/11 (9.1%)
Asuen 1977	Case report	Escherichia coli (E.coli)→death	1 case
Badejo 1983	Case series	Infection	2/12 (16.7%)
Bayoudh 1995	Cross-sectional	Infection	60/300 (20.0%)
Benin DHS 2006	Cross-sectional	Infection/problem with healing	27/240 (11.4%)
CAR DHS 1995	Cross-sectional	Infection	37/2555 (1.5%)
Chalmers 2000	Cross-sectional	Infection	158/432 (36.6%)
Dirie 1992	Cross-sectional	Local infection Septicaemia	43/112 (38.4%) 4/112 (3.5%)
Egwuatu 1981	Case series	Urinary infection Septicaemia	2/43 (4.7%) 1/43 (2.3%)

Egwuatu 1981	Case series	Tetanus	1/43 (2.3%)
El-defrawi 2001	Cross-sectional	Infection	24/200 (12.0%)
Ismail 1982	Cross-sectional	Local infection General sepsis	43/290 (14.8%) 4/290 (1.4%)
Leonard 1996	Cross-sectional	Infection/high fever/similar	7/91 (7.2%)
Modawi 1974	Cross-sectional	Acute infection	3/2526 (0.1%)
Mohammed 2010	Case report	Necrotizing fasciitis	1 case
Momoh 2001	Cross-sectional	Localised infection Septicaemia	11/66 (16.7%) 5/66 (7.6%)
Myers 1985	Cross-sectional	Infection [a]	3/492 (0.6%)
Osifo 2009	Case series	Wound infection	4/51 (7.8%)
Osifo 2009	Case series	Tetanus →death	1/51 (2.0%)
Saad 1998	Cross-sectional	Infected scar	14/9006 (0.1%)
Shell-Duncan 2000	Cross-sectional	Infection	89/880 (9.9%)
Shell-Duncan 2000	Cross-sectional	Tetanus	39/880 (4.2%)
Yemen DHS 1997	Cross-sectional	Infection/fever [a]	23/1546 (1.5%)

Legend: a= mothers reporting on daughters.

Problems with urination and voiding

Table 10.1: Non-comparative studies - study outcomes for problems with urination and voiding

Author	Study design	Outcome	Result
Abor 2006	Cross-sectional	Urinary retention	4/34 (11.8%)
Almroth 2005b	Cross-sectional+	Urine retention and fever	1/52 (1.9%)
Benin DHS 2006	Cross-sectional	Difficulty urinating/retention of urine	74/240 (30.7%)
Briggs 1998	Cross-sectional	Difficulty with urination	20/100 (20.0%)
CAR DHS 1995	Cross-sectional	Difficulty urinating	34/2555 (1.3%)
Chalmers 2000	Cross-sectional	Vaginal or urinary fluid retention	303/432 (70.1%)
Dandash 2001b	Cross-sectional	Urinary problems	17/282 (6.0%)
Dirie 1992	Cross-sectional	Urinary retention	12/112 (10.7%)
Ismail 1982	Cross-sectional	Urinary retention	12/290 (4.1%)
Litorp 2008	Cross-sectional	Urinary problems	8/37 (21.6%)
Litorp 2008	Cross-sectional	Defecation problems	2/37 (5.4%)
Modawi 1974	Cross-sectional	Retention of urine	1/2526 (0.1%)
Momoh 2001	Cross-sectional	Acute urinary retention	8/66 (12.1%)
Rushwan 1983	Cross-sectional	Difficulty in passing urine	190/2308 (8.2%)
Rushwan 1983	Cross-sectional	Urine retention	66/2308 (2.9%)
Rushwan 1983	Cross-sectional	Bowel disfunction	1/2308 (0.1%)
Saad 1998	Cross-sectional	Urinary retention	20/9006 (0.2%)

Yemen DHS 1997	Cross-sectional	Difficulty in passing urine [a]	17/1546 (1.1%)

Legend: a= mothers reporting on daughters.

Other

Table 11.1: Non-comparative studies – other study outcomes

Author	Study design	Outcome	Result
Abdalla 1982	Cross-sectional	Experienced significant complications	40/70 (57.1%)
Al-Hussaini 2003	Cross-sectional	Primary complication [a]	71/254 (28.0%)
Almroth 2005b	Cross-sectional+	Bedridden ≥1wk following FGM	38/52 (73.1%)
Almroth 2005b	Cross-sectional+	Immediate complications	5/52 (9.6%)
Assaad 1980	Cross-sectinal	Immediate complications [b]	43/49 (87.8%)
Benin DHS 2006	Cross-sectional	At least one complication [c]	94/240 (39.0%)
Benin DHS 2006	Cross-sectional	Two or more complications [c]	54/240 (22.5%)
Dandash 20001a	Cross-sectional	Suffered complications	83/315 (26.3%)
Dare 2004	Cross-sectional	Other acute complications	48/522 (9.2%)
Egypt DHS 1995	Cross-sectional	Had complications	659/14330 (4.6%)
Egypt DHS 1995	Cross-sectional	Had complications [c]	167/5389 (3.1%)
Elgaali 2005	Cross-sectional	Immediate complications	22/220 (10.0%)
Livermore 2007	Cross-sectional	Complications [d]	10/26 (38.5%)
Modawi 1974	Cross-sectional	Injury to tissue	1/2526 (0.1%)
Saad 1998	Cross-sectional	Vesicovaginal fistula	1/9006 (0.1%)
Sayed 1996	Cross-sectional	Inflammation	10/1079 (0.1%)
Sayed 1996	Cross-sectional	Disfigurement	10/1079 (0.1%)
Tag-Eldin 2008	Cross-sectional	Severe complications (bleeding)	293/19543 (1.5%)
Tag-Eldin 2008	Cross-sectional	Mild complications (pain)	4260 /19543 (21.8%)
Yemen DHS 1997	Cross-sectional	Pus [c]	2/1546 (0.1%)

Legend: a= pain, urinary problems, bleeding; b=had experienced fear, severe pain, bleeding, inflammation, and urinary disturbances; c= mothers reporting on daughters; d= bleeding most common, followed by infection.

Pain

Table 12.1: Non-comparative studies – study outcomes for pain

Author	Study design	Outcome	Result
Abor 2006	Cross-sectional	Severe pain	18/34 (52.9%)
Briggs 1998	Cross-sectional	Severe pains	51/100 (51.0%)
CAR DHS 1995	Cross-sectional	Pain	276/2555 (10.8%)
Chalmers 2000	Cross-sectional	Extreme pain	377/432 (87.3%)
Dare 2004	Cross-sectional	Severe pain	272/522 (52.1%)
El-defrawi 2001	Cross-sectional	Pain	58/200 (29.0%)
Litorp 2008	Cross-sectional	Pain	8/37 (21.6%)

Momoh 2001	Cross-sectional	Severe pain	48/66 (72.7%)
Mukoro 2004	Cross-sectional	Severe pain	29/46 (63.0%)
Sayed 1996	Cross-sectional	Severe pain	32/1079 (3.0%)
Shell-Duncan 2000	Cross-sectional	Pain	82/880 (9.1%)
Yemen DHS 1997	Cross-sectional	Pain [a]	56/1546 (3.6%)