

## **The consequences of female circumcision for health and sexuality: An update on the evidence**

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### **Abstract**

This systematic review of published sources between 1997 and 2005 shows that female circumcision is associated with some health consequences but that no statistically significant associations are documented for a number of health conditions. This is in part a result of the difficulty of designing studies on the more extensive operations (infibulation). The findings of the analysis can be summarized as follows: statistically higher risks are documented for some but not all types of infections; the evidence regarding urinary symptoms is inconclusive; the evidence on obstetric and gynecological complications is mixed: increased risks have been reported for some complications of labour and delivery but not others, and for some symptoms such as abdominal pain and discharge, but not others such as infertility or increased mortality of mother or infant. Concerning sexuality, most of the existing studies suffer from conceptual and methodological shortcomings, and the available evidence does not support the hypotheses that circumcision destroys sexual function or precludes enjoyment of sexual relations. This review highlights the difficulties of research on the health and sexuality consequences of FGC, underscores the importance of distinguishing between more and less extensive operations, and emphasizes the need to go beyond simple inventories of physical harm or frequencies of sexual acts.

### **Résumé**

Cette revue systématique des sources publiées entre 1997 et 2005 montre que la circoncision féminine est associée avec certaines conséquences sur la santé, mais que pour nombre de maladies, l'on ne trouve pas de différences statistiquement significatives entre les femmes circoncises et non circoncises. Ceci est en partie le résultat des difficultés de formuler des recherches sur les opérations majeures (infibulation). Les résultats de l'analyse peuvent être résumés comme suit: des risques statistiquement plus élevés sont documentés pour certains, mais pas tous, les types d'infection; les résultats ayant trait aux infections urinaires ne sont pas concluants; certaines difficultés obstétriques et gynécologiques sont documentées, mais d'autres problèmes tels que la stérilité ou l'augmentation de la mortalité de la mère ou de l'enfant ne le sont pas. Quant à la sexualité, la plupart des études sont limitées par des problèmes conceptuels et méthodologiques, et les données disponibles ne soutiennent pas les hypothèses selon lesquelles la circoncision empêche l'activité ou le plaisir sexuels. Cette revue souligne les difficultés de la recherche sur les conséquences de la circoncision sur la santé et la sexualité, l'importance de distinguer entre les opérations plus ou moins extensives, et la nécessité d'aller au-delà de simples inventaires d'atteintes physiques ou d'actes sexuels.

### Resumen

Esta revisión sistemática sobre las repercusiones en la salud y la sexualidad de la circuncisión femenina se basa en fuentes publicadas entre 1997 y 2005. Los resultados de estudios más rigurosos son diversos. Algunos estudios indican que ciertas enfermedades son más frecuentes entre mujeres que han sufrido una circuncisión. No obstante, otros no presentan diferencias estadísticamente significantes. Los estudios sin un grupo de comparación muestran resultados muy diversos en cuanto al número de enfermedades informadas. Los estudios sobre efectos en la sexualidad presentan deficiencias con respecto a la metodología y la adaptación al contexto local. Las pruebas disponibles son inconcluyentes. En algunos estudios se presentan las consecuencias adversas para el disfrute de la sexualidad y otras no hallan diferencias significativas en las mujeres que han sufrido una circuncisión del resto de mujeres. Los resultados de esta revisión también destacan las dificultades de la investigación sobre las consecuencias en la salud y la sexualidad de la mutilación genital femenina y recalcan que son necesarias herramientas para ir más allá de simples inventarios sobre los daños físicos o la frecuencia de las relaciones sexuales.

**Keywords:** *Female circumcision, female genital mutilation, female genital cutting, harmful effects, health consequences, sexual consequences*

### Introduction

Until recently, the effects of female circumcision on health and sexuality were poorly documented, and the bulk of the literature consisted of general articles decrying the practice, discussions of policies, programmes and activities, and reports of personal experience. In the past few years, however, there has been an increase in research on the health effects of female circumcision, and an expansion of the scope of studies beyond strictly defined health complications, to include sexual effects. This is an opportune time to take stock of the available evidence.

The present analysis is designed to update the findings of an earlier review (Obermeyer, 1999). That review had found that, despite the vast volume of publications, relatively few studies were of reasonably good quality. They indicated that serious problems such as haemorrhage, shock or septicemia occurred in 0–3% of cases, that infections and urinary symptoms ranged from 0–15%, and various scars and cysts ranged from 0–12%. Concerning reproductive health problems, such as those connected with labour and delivery, infertility, and sexual function, there was much less evidence, reported frequencies ranged more widely, and it was difficult to gain a good understanding of the effect of the operations on reproductive health.

A word about terminology is useful at this point. Current practice shows a degree of diversity, reflecting the debates that have been ongoing for decades. In an earlier detailed discussion of terminology Obermeyer (1999) reported that all the terms used were unsatisfactory, and that the two most frequently used ones suffered from major shortcomings: circumcision because it appears to equate the operations performed on women with those performed on men, which are in fact considerably less extensive; and mutilation because it imputes to parents and practitioners motivations to inflict harm. Since that time, the expression female genital cutting has come into use, because it seems to provide a less specific and more neutral way of talking about the operation; it remains however awkward when talking about “cut” women. In this paper, multiple terms are used: circumcision and female genital cutting (FGC) are used to refer to the practice in general; female genital mutilation (FGM) is used in the context of discussing advocacy efforts; when a sentence needs to refer to women who have been subjected to the operations, the terms circumcise/circumcised are used. The deliberate use of multiple

terms underscores the difficulty of finding an adequate way to refer to these complicated practices.

Systematic searches were conducted of medical and social science databases (Medline and Sociofile), using the keywords of circumcision, female genital cutting, and female genital mutilation. For the period 1997 to February 2004, database searches produced about 500 titles; in order to cover the period between the time this paper was first submitted for review and the time a revised version was prepared, further searches were conducted, and produced approximately 100 more titles for the period February 2004 to March 2005. Additional sources were retrieved from conference abstracts, books, and monographs. In selecting sources for inclusion in this review, the main criterion was whether the source provided new data on the association between female circumcision and health and sexuality effects. Given the quality of much of the evidence, a meta-analysis with more complex criteria would have led to the exclusion of many of the studies. The objective here was to provide a careful assessment of the evidence and suggest ways to avoid the pitfalls of research on the subject. The retrieved abstracts and papers were closely reviewed, and 35 articles were retained as providing enough information about the sample, the method, and the results, to assess the type of evidence, the quality of the data, and the adequacy of the analyses. Critiques and comments are provided in both the text and the footnotes to the tables.

### **Designing studies of health complications**

Good quality research on the health consequences of female genital cutting has to overcome a number of difficulties, some of which are common to all epidemiological research – questions of variable definition, sampling, data collection – while others are specific to the problem of circumcision. It is useful to briefly review them here.

Documenting health effects requires that a statistically significant association be found between an exposure and an outcome, and epidemiological research has developed a number of approaches to the design of such studies and the selection of appropriate samples. The “gold standard” is represented by randomized controlled trials which follow an experimental design, something that is impossible in the case of socially prescribed customs. Prospective cohort studies, which establish “exposure” at baseline, follow individuals over time, and carefully measure adverse effects after a suitable interval are the most desirable way to conduct epidemiological research when trials are not feasible. To date, no such studies have been conducted on FGC however. This is due not only to the complexity of observation and follow-up especially in locations with limited health facilities, but also to ethical questions regarding whether it is acceptable, and for how long, to observe the potentially harmful effects of a given practice without intervening.

The next best epidemiological design to ascertain health effects is to compare “exposed” and “unexposed” groups and to calculate the increased risk among those exposed compared to those who are not. Cross-sectional studies are easier and less costly than cohort studies, since data are collected at one point in time, but there are difficulties related to sampling. The serious complications of FGC, while they may be all too frequent from a public health point of view, are relatively rare events from a statistical point of view. Large population-based samples are needed in order to identify cases in sufficient numbers to carry out statistical tests of significance. It is for this reason that studies often select respondents at health facilities where individuals suffering from particular complications come to consult. The problem is that such individuals may not be representative of the

general population regarding the severity of their symptoms or their access to care, and special attention has to be directed to avoid the problem of sampling bias. Another sampling difficulty results from the prevalence of the practice in the population as a whole: if the near majority of women are subjected to the same operations, then appropriate comparison groups cannot be found. This explains in part the paucity of evidence on infibulation, compared to lesser operations: in those countries of East Africa where infibulation is practiced, its prevalence is also very high, and few women can be found who have not been infibulated.

Whatever the study design, the analysis of results on health effects has to take account of a very common problem in epidemiological studies, that of confounding. Confounders are factors that are associated with both exposure and outcome, and studies that ignore them cannot separate the effect of the confounder from that of the exposure. In the case of circumcision, the most frequent potential confounders are: ethnicity, whereby individuals from a given group may be more likely to both undergo the operations and receive suboptimal medical care; education, whereby individuals with more schooling are less likely to undergo the operations and also live in conditions that make adverse health outcomes less likely; and access to health care, which can be a marker of higher socioeconomic status and hence of the lower likelihood of circumcision, and at the same time be associated with better health outcomes. While confounding may be inevitable, collecting information about possible confounders makes it possible to adjust for them in the analysis.

### **Problems with “exposures” and “outcomes”**

Measuring “exposure” to female circumcision means ascertaining how much tissue was excised during the operation. The World Health Organization has helped develop a typology of operations from the least to the most severe; the less extensive operations are Type I and Type II, whereas infibulation is Type III, and other practices are Type IV (World Health Organization 1996). While standardization is desirable, such a classification requires trained observers, and even where those are available, some of the operations found in the different countries do not fall exactly in one or the other category. In addition, clinical observations are rarely feasible on large enough samples, and most often, exposure is based on women’s reports. The validity and reliability of these reports have been found to vary. A systematic comparison of women’s reports and clinical examinations has shown close correspondence between the two in Egypt, but studies in other settings have shown that women do not always know whether or not they have been circumcised, and rarely know the extent of tissue that was removed (Egyptian Fertility Care Society 1996, Snow et al. 2002, Klouman et al. 2005).

Measuring the health effects that represent “outcomes,” is also complicated. Observers’ reports can be biased due to the greater likelihood that complications will be noticed where the exposure is known (this sometimes requires that observers be “blinded” so that they can make objective observations). Assessing medical complications ideally should be based on laboratory examinations that can provide conclusive evidence on the presence or absence of an organism or condition, or if that is not possible, on clinical examination by an experienced health provider who records observations according to clear protocols. But the facilities and human resources needed for these assessments tend to be absent in those very settings where circumcision is prevalent. Even where such data collection methods can be used, it is not always possible to disentangle the effect of different factors. This is the case for most studies of complications of labour and delivery, where episiotomies are routinely

carried out on women who have been circumcised, or Caesarian sections are resorted to more frequently for circumcised women because medical personnel are concerned about assisting in their delivery. Such circumstances bring up the potential disjunction between the individual and the epidemiological perspective. While from the point of view of the individual who is subjected to additional surgeries in the course of delivery, it does not matter whether this is a direct or indirect consequence of FGC, from an epidemiological point of view, the evidence is weakened by the fact that if it is not possible to know whether one is measuring a true complication or the effect of hospital procedures.

Studies that are not conducted in medical settings tend to rely on women's reports of their experiences to measure complications, and while there may at times be no alternative to this approach, its limitations have to be taken into account. Self-reports of health symptoms or conditions are known to correspond only imperfectly to health professionals' assessments of morbidity, because perceptions of health vary a great deal with age, gender, and culture, and because socially defined expectations of health, pain, or discomfort influence the likelihood that women will report on what they feel (Khatab 1992, Lupton 1994, Turner 1995). Respondents may not have noted the connection between symptoms and their causes, and they may not recall events that happened years earlier – for example whether they had fever, how often they had to urinate, or whether an episiotomy was performed at delivery. Self-reports are especially unreliable given the numerous possible complications of FGC, and the lack of unified definitions to measure them. For example, some studies ask women about haemorrhage, others about severe bleeding, yet others simply about bleeding, but none report how they explained their question to respondents and made sure that all women understood it in the same manner. Similarly, studies that ask about acute urinary infection, recurrent infection, difficulty at micturition, or slow urination rarely provide clear definitions, and none give the local terms that are used to refer to these problems. Few of the available studies report on how they defined the complication, communicated it to the respondent, and made sure that standardized definitions were used. This means that studies are often not comparable, and the reported frequencies diverge widely.

Most of the challenges posed by research on the health effects of female genital cutting can be addressed by following all-purpose epidemiological guidelines regarding appropriate designs, careful data collection methods, and adequate analyses. Some of the complications of FGC, however, require more attention to the local context than the usual epidemiological study, and call for multi-disciplinary collaborations that would take into account local norms regarding pleasure and pain and patterns of communication about the body. Precise definition, appropriate communication, and use of locally understandable terms are especially important when trying to measure the effects of circumcision on sexual function and those related to pain. While it is theoretically possible for an outside observer to assess the presence and seriousness of most of the health complications of FGC, this is much more difficult in the case of pleasure or pain, where the central variable is the respondent's experience, and where such experience is socially mediated. Researchers have to be careful in eliciting responses, and be mindful of the influence of cultural factors on the meanings attached by the respondent to her experience. Pain may be valued as part of an initiation process into a special group, and some individuals may show a special endurance to it because it is meaningful as part of a ritual. It is therefore indispensable to develop systematic ways of eliciting comparable data about pain. Similarly, admitting to interest in sex or discussing sexual pleasure may, in some settings, be regarded as inappropriate with strangers, or there may be gendered notions of proper conversation, and modesty standards in responding to private questions. Data collection methods have therefore to be especially

careful with terminology, the phrasing of questions, the circumstances of the interview, and the quality of the conversation with the researcher. Attention to these aspects of the research and systematic reporting on the circumstances surrounding data collection can improve the reliability and validity of data. The work of Izzett and Toubia (1999) provides a set of practical guidelines for research on circumcision.

In order to convey the different types and levels of evidence of the available research, the findings of the studies reviewed here have been grouped into three sets. The first (Table 1) are studies that include a control or comparison group and provide information about the statistical significance of differences between the two groups, making it possible to estimate the increased risks associated with the operations, expressed as an odds ratio (OR). In the tables, ORs are provided for significant associations only. The second set are studies (Table 2) that present frequencies of complications as observed among participants, without comparisons with women who have been subjected to different operations or to none. Such studies can give a general sense of the range of frequencies of complications, but they provide no clues on the strength of the association between the operation and the complication. The third set (Table 3) are medical case reports from various health facilities, usually referring to individual cases or very small samples. Table 4 summarizes basic information on each study in terms of location, sample size and selection.

Where a study compares the frequencies of complications for the different types of operations, this information is included in the tables and detailed footnotes. Unfortunately, few studies provide such systematic comparisons. This means that it is rarely possible to assess whether the more extensive operations are associated with more serious outcomes. In general, most of the studies cited here have been conducted among populations where the less extensive operations are performed (Types I and II in the classification of the World Health Organization), with the exception of studies of immigrants from countries of the Horn of Africa where infibulation is practiced (Type III in the WHO classification). This information is highlighted in the tables.

### **Infections and anatomical damage**

The studies summarized in Table 1, which include systematic comparisons of circumcised/not circumcised women, indicate that circumcised women are at higher risk of anemia and some infections. In the Gambia, a study which obtained laboratory confirmation of infections (Morison et al. 2001) showed that bacterial vaginosis and herpes virus (HSV2) were more frequent among circumcised women but that syphilis was less so; there were no significant differences in the frequencies of candida, chlamydia, or trichomoniasis. Another controlled study in Tanzania (Klouman et al. 2005) showed no difference in pelvic inflammatory disease, candida, chlamydia, trichomoniasis or HIV, but found a higher though not statistically significant frequency of bacterial vaginosis. In Nigeria, a study based on women's reports and hence using less precise categories of complications (Okonofua et al. 2002) found that abdominal pain, discharge and genital ulcers were more frequent among circumcised women. Only one controlled study considered urinary symptoms (Morison et al. 2001), and it found no significant difference in urinary incontinence.

Those studies that simply report frequencies of complications (Table 2) show very wide ranges in the numbers reported for bleeding and infections. For example, swelling and edema are found to range from 2 to 50%, and urine retention from 12 to 70%. Such vague results underscore the difficulty of accurately measuring those complications such as bleeding and swelling, that

Table 1. Studies documenting differences in complication rate between circumcised and uncircumcised women☆

Complication	Complication (percent)		Odds ratios for significant associations	Study (see key)
	Operation	No operation		
<b>General Health</b>				
Anemia	55	49	1.31	24
BMI<18	16	16	–	24
<b>Infections</b>				
Bacterial vaginosis*	42	30	1.66	24
	Higher among cut women		–	17 <sup>∞</sup>
Candida	12	14	–	24
	No difference		–	17
Chlamydia	1	2	–	24
	No difference		–	17
Gonorrhoea	0	0	–	24
<b>Herpes virus (HSV2)</b>	45	18	4.71	24
Symptoms of infection*	42	43	–	24
Symptoms of infection **	–	19	1.72	16
Syphilis	2	5	0.47	24
	No difference		–	17
Trichomoniasis	7	5	–	24
	No difference		–	17
HIV Infection	No difference		–	17
Reproductive tract infections:				27
Abdominal pain	16.5	11.0	1.5	
Discharge	6.3–11.6	2.4–5.4	1.7–2.8	
Genital ulcers	2.1	0.5	4.4	
<b>Lesions, scars, cysts, and other anatomical damage</b>				
Damaged perineum	62	56	–	24
Squamous cell intraepithelial lesions	7	5	–	24
Vulval tumor (cysts, etc.)	3	2	–	24
<b>Vesico-vaginal fistula</b>	0	0	–	24
Insufficient anal sphincter	3	4	–	24
<b>Urinary problems</b>				
Urinary Incontinence	7	8	–	24
<b>Infertility</b>				
Childlessness after marriage 7+ years**	2–7	2–6	–	22
Trying to get pregnant for >1 year	10	10	–	24
Two or fewer children <sup>‡</sup>	–	–	Unclear	4*
Primary infertility	1.4–3.3	1.7	–	20*
Secondary infertility	12.7–17.3	15.5	–	20*
<b>Labour and delivery problems</b>				
Difficulty in delivery**	18–36	5	2.28	16
Perineal tears	1.8–3.5	1.6	1.43 (Type II/none)	21
Lacerations	38–48	26–57	–	14
Vaginal lacerations	14	11	–	28*
Complications of delivery <sup>◇</sup>			–	31
Tears	4	3	–	
Obstructed labour	3	2	–	
Haemorrhage	3	1	–	
Delivery problems				14
Episiotomy	43	25	Not provided	
Perinatal mortality (/100 births)	9.4	9.4	No difference	
Fetal loss	27–34	35–59	Not provided	

Table 1. (continued)

Complication	Complication (percent)		Odds ratios for significant associations	Study (see key)
	Operation	No operation		
Stillbirths	15 3.8–9.2	11 6.3	– _ <sup>Δ</sup>	24 21
Perinatal deaths	Figures not provided		No association with circumcision	12*
Perinatal complications <sup>ΔΔ</sup>				34*
Fetal distress	11.8	5.8	2.6	
Emergency cesarian	15.4	6.5	3	
Prelabour fetal death	1.4	0.6	2.5	
<b>Other reproductive problems</b>				
At least one gynecological complication <sup>**</sup>	14	–	2.45	16
Prolapse	5 46	– 52	2.43 0.72	16 24
<b>Pain</b>				
<b>Dysmenorrhea</b>	33 81	43 56	– Not reported	24 10
Sexual problems and sexual behaviours <sup>◊</sup>				
No sexual desire	42	16	Not reported	10
<b>No orgasm</b>	43	18	Not reported	10
No satisfaction	8	4	Unclear	1
Dyspareunia	16	14	–	24
Dryness during intercourse	49	30	Not reported	10
Coital frequency	No difference			32
Weekly intercourse	56	47	–	27
Arousal	33	35	–	27
Orgasm	66	59	–	27
“Defective sexuality” scores (higher scores better)	66–79	82	Type II significantly lower than controls; Type I and III not significantly different	33
Mean age at 1 <sup>st</sup> sexual intercourse	18	19	–	25
Frequency of sexual intercourse (%)>3/week	32	33	–	25

☆Most of the studies in this table refer to samples where the totality or vast majority of respondents were subjected to the lesser operations, corresponding to WHO Types I and II. Studies where the women in the sample were subjected to more extensive operations are marked in the table.

∞This study does not provide percentages for individual complications by FGC/no FGC, but calculates ORs based on comparisons.

\*Prevalence figures for two of the conditions reported in this study show small inconsistencies: the frequency of bacterial vaginosis in circumcised women is reported as 240/571. This corresponds to 42.03%, but Table 3 reports it as 52%. Symptoms of vaginal infection are found among 269 of the 645 circumcised women (or 41.71%) but the table reports the frequency as 41%. Assuming these were typographical errors, we have presented the corrected frequencies.

\*\* This study used different data collection methods in the two sites (Mali and Burkina Faso), and did not present frequencies and statistics in a unified way. The odds ratio for symptoms of infections is based comparing cut and uncut women in Burkina Faso, but only the frequency among uncut women is provided. The odds ratios for difficult delivery (1.8 in Mali, 2.3 in Burkina) are based on a comparison of Type II to Type I in Mali, and Type III to Type I in Burkina Faso. Frequencies of at least one gynaecological complication among circumcised women were 5 percent in Mali and 14 percent in Burkina Faso; frequencies among uncircumcised women were not reported. The odds ratios for at least one gynecological complication (2.4 in both countries) are based on comparing Type III to Type II.

Table 1. (continued)

\*\* Frequencies of childlessness among circumcised compared to uncircumcised women were 7% and 6% respectively in the Central African Republic, 2 % and 3% in Côte d'Ivoire, and 2% and 2% in Tanzania. Percentages of childless women married for 7 years and never using contraception also show no statistically significant difference between circumcised and uncircumcised.

‡The odds ratio for having two or fewer children was 2.06, but the difference was not significant after controlling for marital status

‡ Indicates that the totality or vast majority of respondents were subjected to infibulation/Type III.

◊The overall rate of complications is not clearly provided in the article. It is possible however to calculate it on the basis of other figures and it seems to come to 44% for cut women compared to 54% for uncut women.

△OR for Type I/none=1.45, significance borderline; OR for Type II/no operation=1.39, not significant

△△These figures have to be treated with great caution, because the study compares Somali immigrants with native Norwegians, and cannot establish whether the differences are due to infibulation, suboptimal care, or cultural factors

◊The Defrawi et al. study (#10) from which several of the figures for this section are taken suffers from problems of sampling, design, statistical analyses, and presentation of results (see detailed discussion in the text). We excluded results that were not clearly reported, or where inconsistencies were found among numbers or between frequencies and statistical significance. This was the case for effects pertaining to sexual enjoyment/satisfaction and dyspareunia. The Andinma study (#1) reports using a scale of satisfaction but it is not clear what the reported frequencies refer to, nor is the statistical significance clear.

^This study compares 4 groups of women: not circumcised, "minorly" circumcised, "mutilated" and women with clitoral cysts. The selection criteria are not explicit, and it is not clear how the instrument was administered.

happen close to the time of the operation, usually years before the research is conducted. They also reflect the lack of standardized definitions for the most common complications.

Regarding the anatomical damage associated with the operations, the studies in Table 2 provide some frequencies for the occurrence of cysts and perineal scarring, and the case reports in Table 3 list problems related to anatomical damage. But neither case studies nor frequency-only studies can provide estimates of increased risks, although they clearly suggest higher likelihoods of problems. The more rigorous study of the Gambia (Morison et al. 2001) included in Table 1 shows differences in the frequencies that are consistent with increased risks, but these are not statistically significant.

### **Reproductive health effects**

A remarkable change in the available literature on the health effects of circumcision over the past few years is the increase in the number of studies that have examined obstetric and gynecological consequences of the operations. In general, the evidence is mixed. As Table 1 shows, carefully controlled studies do not find a statistically significant increase in infertility, although a study cited in my earlier review (1999) had found higher odds ratios of infertility for more extensive operations (Inhorn and Buss 1993). Studies of labour and delivery problems indicate significantly higher risks of self-reported perineal tears (Larsen and Okonofua 2002), foetal distress (Vangen 2002) and general difficulties (Jones et al 1999). Other studies do not document significantly higher risks of complications of labour and delivery. None of the controlled studies find significant differences in rates of stillbirths or perinatal deaths (Essen et al. 2002, Hakim 2001, Morison et al. 2001), nor in lacerations (Rouzi et al. 2001b), obstructed labour, or haemorrhage (Slanger 2002).

Table 2. Studies documenting frequencies of health effects among circumcised women<sup>☆</sup> (no comparison group)

Complication	Frequency range (%)	Studies (see key)
<b>Bleeding</b>		
Heavy bleeding/haemorrhage	8–17	9;23;30;35
Short term bleeding	81	8*
<b>Infections</b>		
Unspecified (long or short term)	8–37	8*;18*;23;30;35
Swelling/Oedema	2–50	8*;9; 10 <sup>°</sup> ; 35
Chronic pelvic infections	22	8*
Tetanus	4	30
<b>Urinary</b>		
Pain at micturition	58–64	7*;23
Urine retention (acute or long term)	12–70	8*;23
UTI or recurrent UTI	2–38	7*; 10; 18*;23
Urinary incontinence	6	23
Urinary disturbance	4	9
Urinary symptoms unspecified	15–25	35
<b>Infertility</b>		
Difficulty in conceiving	4–9	9;23
<b>Labour and delivery</b>		
Caesarean section	51	8*
Excessive bleeding	20	30
Prolonged labour (>24 h.)	40	30
Perineal tears	62	8*
Lacerations or haemorrhage	26	26
<b>Reproductive</b>		
Gynaecological complications	16–86	10;16;23;30
<b>Lesions, scars, and cysts</b>		
Cysts	12–24	8*;23
Perineal scarring	54	8*
Keloid scar	21	23
Haematocolpos	7	23
<b>Pain</b>		
Pain	9–87	7*;8*;9;10; 23;30
Dysmenorrhoea	16–74	8*;18*;23
Remembered pain experience	Intolerable	15
<b>Sexual</b>		
Anorgasmia	12	26 <sup>§§</sup>
Apareunia	16	18 <sup>†</sup>
Dyspareunia	13–78	8*;18*;23;26 <sup>§§</sup>
Post-coital bleeding	5	26 <sup>§§</sup>
Pleasure during sex	91	7
Orgasm, often/always	86	7

<sup>☆</sup>Most of the studies in this table refer to samples where the totality or vast majority of respondents were subjected to the lesser operations, corresponding to WHO Types I and II.

\*Indicates that the totality or vast majority of respondents were subjected to infibulation/Type III.

<sup>§§</sup>This study refers to frequencies from a control group of uncircumcised women, but no analyses were carried out on the differences, and there is no information about the statistical significance of the results

<sup>†</sup>There is a discrepancy in this article in the reported prevalence for apareunia. It is given as 8/51 (which would correspond to 15.7%) but reported as 17.7%. Here we have re-calculated percentages based on the reported n and denominator rather than reported percentages. It is also unclear why this article uses a denominator of all women (n=51) rather than all circumcised women (n=50) in calculating the frequencies of health consequences. The study also reports that in 29% of cases surgery was performed before intercourse, but does not give the denominator for this frequency.

<sup>°</sup>This study is included in this table as well as Table 1 because parts of it provide simple frequencies of complications without a comparison group.

Table 3. Case reports of complications

Complication	Type of operation☆	Cases	Study
<b>Urinary Problems</b>			
Urine retention	NR	9	2
<b>Lesions, Scars and Cysts</b>			
Epidermal cyst	III	1	3*
Inclusion cysts	I	21	29*
	I	1	19*
Neuroma of clitoris	III	1	13
<b>Labour and delivery problems</b>			
Difficulty in delivery	III	1	3
	NR	5	2
Obstetric pathologies	III	4	5
<b>Gynecological problems</b>			
Gynaecological pathologies	III	5	5
<b>Sexual problems</b>			
Apareunia	NR	19	2
Dyspareunia	NR	11	2
Sexual difficulties	III	1	3
<b>Pain</b>			
Painful period	IV	1	6
<b>Other</b>			
Obstructive uropathy	I	1	11
Haematocolpos	NR	5	2

☆Most of the studies in this table refer to samples where the totality or vast majority of respondents were subjected to the lesser operations, corresponding to WHO Types I and II.

\*Indicates that the totality or vast majority of respondents were subjected to infibulation/Type III.

NR=Not Reported.

Less rigorous studies of obstetric and gynaecological complications (Table 2) that do not satisfactorily address basic methodological problems discussed above, provide observed frequencies for problems such as difficulty in conceiving, Caesarian sections, prolonged labour, excessive bleeding during delivery and various tears. It is, however, difficult from such available evidence to know the magnitude of the increased risks. No study could be found to measure whether circumcision is associated with maternal mortality.

Concerning gynaecological effects, controlled studies indicate increased risks of reporting abdominal pain, discharge and ulcers among circumcised women in Nigeria (Okonofua et al. 2002), and general gynaecological problems in Mali and Burkina (Jones et al. 1999), but lower risks of prolapse in the Gambia (Morison et al. 2001).

### Measuring the impact on sexual function

Many of the available studies of sexual effects are characterized by poor design, inadequate analysis, and unclear reporting of results. The el Defrawi et al. study (2001) exemplifies the difficulties that are found in researching this area. One of its weaknesses is that it does not address the question of how concepts related to sexuality are defined, translated, and communicated. In the absence of such information, and knowing the important social difference between patients and providers, it is not clear that patients could speak candidly about their sexual experience. Another shortcoming of the study is that it does not present

Table 4. Key to studies

Author	Study site	Sample size	Sample description
1 Adinma 1997	Southwest Nigeria	256	Pregnant women attending a neonatal clinic.
2 Akotionga et al. 2001	Ougadougou, Burkina Faso	case: 49 women and girls (<15)	Gynaecological consultations requiring surgery at a national hospital.
3 Baaij and Kagie 1999	The Netherlands (Somali immigrants)	case: 3 women	Women ages 22, 21, 28 reporting problem with female genital mutilation
4 Balk 2001	Sudan	5856	DHS survey
5 Bonessio et al 2001	Rome, Italy, obstetric and gynecology admissions	9 cases	4 with obstetric pathologies 5 with gynaecological pathologies
6 Brisson, Patel, and Feins 2001	USA	case: 1 woman	Reported painful menses. Age: 16.
7 Catania et al. 2004	Italy	137	Somali, Nigerian, Ethiopian, and Sudanese immigrants with female genital mutilation
8 Chalmers and Hashi 2000	Ontario, Canada (Somali immigrants)	432	Somali immigrants who gave birth in the five years preceding the study.
9 Dare et al. 2004	Nigeria	522	Women giving birth at hospital.
10 El-Defrawi et al. 2001	Egypt	250	Random sample from the patients of maternal and childhood centers in Ismailia.
11 Epstein, Graham, and Rimsza 2001	USA (college student)	case: 1 woman	Obstructive uropathy resulting in hydronephrosis.
12 Essen et al. 2002	Sweden hospital births 1990–96	63 perinatal deaths	Cohort study of perinatal deaths
13 Fernandez-Aguilar et al 2003	Brussels Hospital	1 case	Patient with pain
14 Hakim 2001	3 Kenya hospitals	1225 uncircumcised +256 circumcised	Deliveries
15 Johansen 2002	Norway, Somali immigrants	30	Convenience sample
16 Jones et al. 1999	Burkina Faso	1920	Clinic patients ages 15–55 whose consultation included a pelvic exam.
	Mali	5337	Clinic patients (no age restriction) whose consultation included a pelvic exam.
17 Klouman, Manongi, and Klepp 2005	Tanzania	1,678	Women from a community-based sample.
18 Knight et al. 1999	Australia (immigrants from Somalia, Eritrea, and Djibouti)	51	Patients with a past history of female genital mutilation attending the hospital for antenatal or gynaecological care.
19 Kroll and Miller 2000	USA (Eritrean immigrant)	case: 1 woman	Reported cyst. Age 19.
20 Larsen 2002	Sudan	>4,000	DHS survey, evermarried women
21 Larsen and Okonofua 2002	Southwest Nigeria hospitals	1861 patients	Women attending family planning or antenatal clinic; self-reported obstetric complications
22 Larsen and Yan 2000	CAR	4388	DHS survey, ever-married women
	Côte d'Ivoire	5930	DHS survey, ever-married women
	Tanzania	6043	DHS survey, ever-married women

Table 4. (continued)

Author	Study site	Sample size	Sample description
23 Momoh et al. 2001	London, England	108	Women referred to a specialist clinic for female genital mutilation. Mean age: 27.
24 Morison et al. 2001	Farafenni, Gambia	1348	All women, 15–54, in selected region
25 Nwajei and Otiono 2003	Nigeria	400	Students.
26 Odoi et al 1997	Rural Ghana	195	Women seen at antenatal clinic.
27 Okonofua et al 2002	Southwest Nigeria hospitals	1836 patients	Women at family planning or antenatal clinic; self-reported sexual and gynaecologic morbidity
28 Rouzi et al. 2001a	Jeddah, Saudi Arabia hospital	325	All Sudanese and Somali women who gave birth between Jan 1996 and Dec 1999.
29 Rouzi et al. 2001b	Jeddah, Saudi Arabia	case: 21 girls and women	Epidermal clitoral inclusion cysts. Ages 5 to 45 years, mean: 19.
30 Shell -Duncan, Obiero, and Muruli 2001	Rendille in Kenya	920	Random sample of women aged 15 or more in four communities.
31 Slinger et al 2002	Southwest Nigeria hospitals	1107 women	Self reports on first delivery
32 Stewart et al. 2002	Central African Republic	2188	DHS survey, married women
33 Thabet et al. 2003	Egypt hospital in Cairo	117	Circumcised patients with or without clitoral cysts (57 and 60)
34 Vangen et al. 2002	Somali immigrants in Norway	1733 immigrants 702,192 Norwegians	Medical birth registry of Norway
35 Yoder et al. 2004	Benin Guinea Mali Mauritania	246 2340 5999 2574	Daughters of women interviewed in DHS national sample surveys in the four countries.

information about the process of sampling and the characteristics of the sample: given that circumcision is near universal in Egypt, non-circumcised women are likely to be a special group, one would have to make sure they did not differ from circumcised women in other key factors besides circumcision such as age, education, marital status, or socioeconomic status. Another fundamental flaw of the study is the failure to provide any information on the age of respondents; matching on age is necessary when studying a phenomenon that clearly changes with age, namely interest in, and enjoyment of, sexual relations. There are, in addition, inconsistencies in the numbers as presented, and the frequencies do not always correspond to the reported statistical significance.

Other studies also suffer from problems. Adinma (1997) used a scale of sexual satisfaction without referring to how it was developed, how it was translated for use in the field, and how women responded to it; the results are also unclear regarding the numbers and their statistical significance. Odoi et al. (1997) reported using a control group of uncircumcised women, but no analyses were carried out on the differences and there is no information as to the statistical significance of the results. In the Knight et al. study (1999), there are inconsistencies in some of the numbers used in calculations of frequencies and in the reported prevalence for *apareunia*. The study also reports that in 29% of cases surgery was performed before intercourse, but it is unclear how this frequency was calculated. An article titled “Defective Sexuality” used a scale to ascertain women’s knowledge and satisfaction with sex, but gave no information about how the questionnaire was

administered (Thabet et al. 2003). The topics listed in the appendix appear quite complex – for example, one of the knowledge items is “awareness of involuntary pelvic muscular contractions” which is unlikely to be well communicated to women not familiar with such terminology. The instrument also makes assumptions about sexuality that do not hold across settings, for example “knows the anomalous sex (anal relation and homosexuality).” It is difficult to imagine how female patients were in fact answering such questions, and to what extent the scoring system that was then developed does in fact measure something related to sexual health.

The difficulties of selecting measures of sexual functioning are well illustrated in the debate that followed publication of the Okonofua et al. (2002) study of the association between genital cutting and sexual morbidity in Nigeria, which found that circumcision did not appear to affect sexual functioning and enjoyment. The measures selected to represent sexual health – frequency of sexual activity, initiation of sex with partner, and self-reported enjoyment of sexual relations – all make assumptions about women’s understandings and experiences, and also about the connection between sexual activity and sexual pleasure (Morison and Scherf 2003). Similar assumptions are made in the Nwajei and Otiono survey of students in Nigeria (2003). Although it is clear that no measure of sexual functioning is without problems, the choice of measures can be better justified if it is informed by local meanings and uses appropriate local equivalents. A strong conceptual framework can in turn suggest methodological improvements in data collection, beyond simply conducting the questionnaire in a health facility and by a health provider. The notion that discourse about sex is taboo is not always supported by the facts, and research on sexual health across cultures needs to develop locally appropriate ways of finding out about sexual experience (see Izzett and Toubia (1999) for helpful hints about conducting research in the field).

More generally, research on sexual behaviour and sexual meanings as conducted from a public health perspective tends to essentialize sexuality – to assume that organs, behaviours, and the experiences they are connected to are invariant across settings, whereas variations are in fact considerable in this area (Parker and Aggleton 1999). While it is not necessary to resolve the essentialist-constructionist debate about sexuality, some effort needs to be invested in formative research to select appropriate measures, terms, and ways of communicating about sex, and information about the context of the interview and the reactions of respondents need to be described in research reports in order to provide some assurance that the data do in fact represent appropriate measures.

Keeping in mind these limitations, the results of these studies can be summarized as follows: while one study (el Defrawi et al 2001) reports that circumcised women are significantly more likely to suffer adverse consequences for sexual enjoyment, other studies that measure sexual activity and pleasure find no significant difference between circumcised and uncircumcised women (Morison et al. 2001, Okonofua et al. 2002, Nwajei and Otiono 2003).

A more systematic investigation of the sexual effects of female genital cutting has been undertaken by a team in Florence, working with infibulated immigrants from the Horn of Africa. A structured interview was administered to respondents in order to ascertain sexual function and sexual enjoyment. It is most interesting to note that 91% of respondents say they get pleasure from sex, 73% find penetration pleasurable or very pleasurable, and 86% report having orgasms often or always. That women understood the meaning of orgasm is shown by their detailed descriptions, and the results of the interviews were replicated when other instruments were used – a standardized scale and a brief questionnaire about

function. These results are congruent with those of an ethnographic study of immigrants in Sweden. Based on their conversations with Somali women, Johnsdotter and Essen (2004) report that no one spontaneously spoke about the loss of their ability to enjoy sex due to circumcision, and that most of their respondents state that they do not have sexual problems and enjoy sexual relations.

Studies showing that women can continue to enjoy sexual relations despite having been subjected to female genital cutting represent a puzzle for cultures that do not endorse such operations. They raise the possibility of radically different views of pain and pleasure across cultures, and support a more constructivist approach than is usually taken in studies of health effects. Johnsdotter and Essen (2004) also suggest that immigrants' attitudes towards sexuality and circumcision are in flux, and that they are influenced by the host country's values. They report that some of the Ethiopian immigrants in Sweden included in their study seem to have adopted a more Western view of circumcision as mutilation, and express their sense of having lost something because of the operation.

The intolerable pain that some women suffer as a result of these operations is not systematically measured, though there are many individual reports about it. Often values of stoicism preclude expressing pain in the women's home culture, but migrants appear to be freer to talk about it (Johansen 2002). This underscores the need for tools that can go beyond simple inventories of physical harm or frequencies of sexual acts, and that are capable of eliciting deeply personal effects such as those on pleasure and pain, and thus better capturing the ideas, expectations, and experiences related to sexuality.

## **Discussion**

Most of the research on the health and sexuality consequences of FGM has been conducted on populations where the majority of women are subjected to the lesser operations – in Burkina Faso, the Central African Republic, Côte d'Ivoire, Egypt, the Gambia, Kenya, Mali, Nigeria, and Tanzania. If we assume what epidemiologists refer to as a dose-response relationship, i.e. the more extensive the operation, the more likely the complications, then it would be reasonable to expect that the harmful effects as measured in these countries are probably less serious than those that would have been found in countries where the more extensive operations are performed.

Unfortunately, there are few studies of health effects among infibulated women, and the only ones in this review are those conducted on immigrant populations – Somali immigrants to Canada, Horn of Africa immigrants to Italy, Australia and Scandinavian countries, and Sudanese/Somali women in Saudi Arabia. Few are controlled studies, and it is not clear whether the women in the samples are representative of the populations in the countries of origin. For reasons discussed above, controlled analyses of the effects of infibulation, using women with no operation or women with lesser operations as a comparison group, are difficult to make. But the issue is important enough to warrant special efforts, and future research should explicitly separate lesser operations from the more extensive ones. The dose-response hypothesis seems to be supported by the evidence regarding health effects, but sexual effects do not appear to be related to the extent of the operation, possibly because operations categorized as infibulation in fact preserve part of the clitoris. It is clear nevertheless that studies cannot conflate all practices under the heading of female genital mutilation.

The available evidence on health complications of female genital cutting needs to be considered in light of global trends in the prevalence of these practices. A review of

prevalence data suggests that there may be an increase in the proportion of operations that are carried out by trained medical personnel, as compared to those that are performed by traditional practitioners. Data from the Demographic and Health Surveys for countries where it is possible to infer changes over time by comparing reports by mothers and daughters suggest that while the majority of operations are still performed by traditional practitioners, the beginning of a trend towards medicalizing the practice may be discernible in Eritrea, Mali, and Mauritania (Carr 1997, Coulibaly et al. 1996; DHS Eritrea 1995, 1997; DHS Mauritania 2000–2001, 2001). The most dramatic changes are apparent from Egypt where, according to mother/daughter comparisons in 1995, the proportion of operations performed by medical personnel increased from 17% to 55%. Data from the 2000 Egypt DHS survey show an additional increase in the proportion of daughters who were circumcised by medical personnel, to 61%. (El-Zanaty et al. 1996; El-Zanaty and Way 2001). In Sudan, 35% of respondents are circumcised by a health professional; a similar proportion (34%) is found in Kenya. (Yoder 2004). There is also evidence from other studies that where efforts are made to provide traditional practitioners with alternative means of making a living, “modern” practitioners promptly replace them (Gosselin 2000).

The increased medicalization of these operations raises questions regarding the role that studies of health effects play in efforts to eliminate the practices. The most zealous advocacy efforts against female genital cutting disseminated information about their health effects, at a time when little evidence was available to document these effects. It is somewhat ironic that in a number of countries, parents appear to have heeded these warnings about risks and taken their daughters to “modern” practitioners in a harm-reduction strategy that many public health professionals would have decried. The evidence on health effects is slowly accumulating, and while it is documenting some harmful effects, it is unlikely that it will demonstrate increased risks for all the serious and less serious complications that have, at one time or another, been attributed to FGM. Advocacy efforts, in the meantime, are increasingly encouraging individuals and groups to abandon female genital mutilation, less on the grounds of health complications, but because it represents infringements of bodily integrity and of human rights.

## Conclusions

The studies summarized here show that there is a growing body of evidence on the health consequences of female genital cutting, and that a more diverse set of complications are now included in research. While some of the studies exemplify the difficulties of design, data collection, and analysis that are inherent in the topic, the more rigorous ones demonstrate that it is possible to gain a clearer understanding of the extent to which these practices are associated with adverse effects.

The difficulties of research on the health effects of female genital cutting are numerous. Some are shared with other epidemiological research, while others are specific to the particular exposures and complications related to these operations. It is not easy to carry out good research in contexts limited by the paucity of technical and financial resources – those very contexts where the practices are most common – but most of the obstacles could be reduced by closer attention to questions of study design, by the use of clear definitions and measurements, by more careful data collection and more transparent reporting on the process, and by thorough analyses to compare clearly defined groups that differ by the extent of exposure.

The available evidence indicates that female circumcision is associated with some health conditions but that for many of those that are investigated, no statistically significant associations are documented. A few studies show statistically higher risks for some but not all types of infections, but imprecise measurements and the limitations of research designs hamper the clear documentation of several of the consequences of the operations, in particular urinary infections. The evidence also suggests that circumcision is associated with some obstetric difficulties and gynecological problems, but it does not support a number of hypothesized associations with problems, such as infertility or increased mortality of mother or infant. More and better designed studies are needed to try and distinguish the complications themselves from hospital practices related to Caesarian sections and episiotomies. Concerning sexuality, the available evidence does not support the notion that circumcision precludes sexual activity or the enjoyment of sexual relations. Research on sexual effects however is often limited by designs that do not do justice to the complicated processes that mediate the experience of pleasure and pain, and much remains to be done to improve the quality of the studies by closer attention to the local meanings that are inextricably linked to sexual behaviour and sexual emotions.

The expansion of the scope of research on health consequences to include pain and sexual function is a welcome development. Research on health effects should continue to receive attention, even though the global mobilization against FGC appears to have shifted from a health to a human rights approach. The changing discourse on female genital mutilation and the complex situation that it reflects should actually provide further motivation to conduct thorough research that carefully documents consequences, precisely because, at a time of continuing debates, it is important to provide individuals with better bases for making their choices.

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### **References**

- Adinma, J. I. (1997) Current status of female circumcision among Nigerian Igbos. *West African Journal of Medicine*, 16, 227–231.
- Akotionga, M., Traore, O., Lakoande, J. and Kone, B. (2001) External genital excision sequelae at the Yalgado Ouedraogo national central hospital: epidemiology and surgical treatment. *Gynecologie, Obstetrique, and Fertilité*, 29, 295–300.
- Baaij, M. and Kagie, M. J. (1999) Female circumcision; histories of 3 patients. *Netherlands Tijdschrift Voorgeneeskunde*, 143, 1721–1724.
- Balk, D. (2000) To Marry and Bear Children? The Demographic Consequences of Infibulation in Sudan. In B. Shell-Duncan and Y. Hernlund (eds.) *Female Circumcision in Africa: Culture, Controversy, and Change* (Boulder: Lynne Rienner Publishers).
- Bonessio L., Bartucca, S., Berelli, F., Morini, V., Aleandri and V., Spina (2001) Female genital mutilation: FGM patients treated at the Umberto polyclinic of Rome 1985–1996. *Clinical Terapeutica*, 152, 171–7.
- Brisson, P., Patel, H. and Feins, N. (2001) Female circumcision. *Journal of Pediatric Surgery*, 36, 1068–1069.
- Carr, D. (1997) *Female Genital Cutting: Findings from the Demographic and Health Surveys Program* (Calverton, MD: Macro International).

- Catania, L., Verde, J. B., Sirigatti, S., Casale, S. and Hussen, A. O. (2004) *Preliminary results about 137 women's sexuality with female genital mutilation/cutting (FGM/C)*. Paper presented at INTACT Conference on Advancing Knowledge on Psycho-sexual effects of FGM/C: Assessing the Evidence, Alexandria, Egypt, 10–12 October.
- Chalmers, B. and Hashi, K. O. (2000) 432 Somali women's birth experiences in Canada after earlier female genital mutilation. *Birth*, 27, 227–234.
- Coulibaly, S., Dicko, F., Traoré, S. M., Sidibé, O., Seroussi, M. and Barrère, B. (1996) *Enquête démographique et de santé: Mali, 1995–1996* (Bamako, Mali and Calverton, MD: Cellule de planification et de statistique, Ministère de la Santé and Macro International).
- Dare, F. O., Oboro, V. O., Fadiora, S. O., Orji, E. O., Sule-Odu, A. O. and Olabode, T. O. (2004) Female genital mutilation: an analysis of 522 cases in South-Western Nigeria. *Journal of Obstetrics and Gynaecology*, 24, 281–283.
- DHS Eritrea 1995 (1997) *Eritrea Demographic and Health Survey 1995* (Asmara, Eritrea and Calverton, MD: Asmara National Statistics Office and Macro International).
- DHS Mauritania 2000–2001 (2001) *Enquête Démographique et de Santé Mauritanie 2000–2001* (Nouakchott, Mauritania and Calverton, MD: Office National de la Statistique and ORC Macro).
- Egyptian Fertility Care Society (1996) *Clinic-based investigation of typology and self-reporting of FGM in Egypt* (Cairo: The Population Council).
- Essen, B., Bodker, B., Sjöberg, N., Gudmundsson, S., Ostergren, P. and Langhoff-Roos, J. (2002) Is there an association between female circumcision and perinatal death? *Bulletin of the World Health Organization*, 80, 629–32.
- El-Zanaty, F., Hussein, E. M., Shawky, G. A., Way, A. A. and Kishor, S. (1996) *Egypt Demographic and Health Survey 1995* (Cairo, Egypt and Calverton, MD: National Population Council and Macro International).
- El-Zanaty, F. and Way, A. A. (2001) *Egypt Demographic and Health Survey 2000* (Cairo, Egypt, and Calverton, MD: Ministry of Health and Population, National Populations Council, and ORC Macro).
- el Defrawi, M. H., Lotfy, G., Dandash, K. F., A.H. Refaat, A. H. and Eyada, M. (2001) Female genital mutilation and its psychosexual impact. *Journal of Sex and Marital Therapy*, 27, 465–473.
- Epstein, D., Graham, P. and Rimsza, M. (2001) Medical complications of female genital mutilation. *Journal of American College Health*, 49, no. 6:275–280.
- Fernandez-Aguilar, S. and Noel, J. (2003) Neuroma of the clitoris after female genital cutting. *Obstetrics and Gynaecology*, 101, 1–4.
- Gosselin, C. (2000) Handing over the Knife: Numu Women and the Campaign Against Excision in Mali. In B. Shell-Duncan and Y. Hernlund (eds.) *Female "Circumcision" in Africa: Culture, Controversy, and Change* (Boulder, CO: Lynne Rienner Publishers).
- Hakim, L. (2001) Impact of female genital mutilation of maternal and neonatal outcomes during parturition. *East African Medical Journal*, 78, 255–8.
- Inhorn, M. C. and Buss, K. A. (1993) Infertility, infection, and iatrogenesis in Egypt: the anthropological epidemiology of blocked tubes. *Medical Anthropology*, 15, 217–244.
- Izzett, S. and Toubia, N. (1999) *Learning about Social Change: A Research and Evaluation Guidebook using Female Circumcision as a Case Study*. New York: Rainbo Publications.
- Johansen, R. E. (2002) Pain as a counterpoint to culture: toward an analysis of pain associated with infibulation among Somali immigrants in Norway. *Medical Anthropology Quarterly*, 16, 312–40.
- Johnsdotter, S. and Essen, B. (2004) *Sexual health among young Somali women in Sweden: living with conflicting culturally determined sexual ideologies*. Paper presented at INTACT Conference on Advancing Knowledge on Psycho-sexual effects of FGM/C: Assessing the Evidence, Alexandria, Egypt, 10–12 October.
- Jones, H., Diop, N., Ashew, I. and Kabore, I. (1999) Female genital cutting practices in Burkina Faso and Mali and their negative health outcomes. *Studies in Family Planning*, 30, 219–230.
- Khattab, H. (1992) *The Silent Endurance: Social Conditions of Women's Reproductive Health in Egypt* (Amman: UNICEF, and Cairo: The Population Council).
- Klouman, E., Manongi, R. and Klepp, K. (2005) Self-reported and observed female genital cutting in rural Tanzania: associated demographic factors, HIV and sexually transmitted infections. *Tropical Medicine and International Health*, 10, 105–115.
- Knight, R., Hotchin, A., Bayly, C. and Grover, S. (1999) Female genital mutilation—experience of The Royal Women's Hospital, Melbourne. *The Australian and New Zealand Journal of Obstetrics and Gynaecology*, 39, 50–54.
- Kroll, G. L. and Miller, L. (2000) Vulvar epithelial inclusion cyst as a late complication of childhood female traditional genital surgery. *American Journal of Obstetrics and Gynecology*, 183, 509–510.
- Larsen, U. and Yan, S. (2000) Does female circumcision affect infertility and fertility? A study of the central African Republic, Cote d'Ivoire, and Tanzania. *Demography*, 37, 313–321.

- Larsen, U. (2002) The effects of type of female circumcision on infertility and fertility in Sudan. *Journal of Biosocial Science*, 34, 363–77.
- Larsen, U. and Okonofua, F. (2002) Female circumcision and obstetric complications. *International Journal of Gynaecology & Obstetrics*, 77, 255–65.
- Lupton, D. (1994) *Medicine as Culture: Illness, Disease and the Body in Western Societies* (London: Sage Publications).
- Measure DHS+, (2002) “Measure DHS+.” <http://www.measuredhs.com>
- Momoh, C., Ladhani, S., Lochrie, D. P. and Rymer, J. (2001) Female genital mutilation: analysis of the first twelve months of a Southeast London specialist clinic. *British Journal of Obstetrics and Gynaecology*, 108, 186–191.
- Morison, L., Scherf, C., Ekpo, G., Paine, K., West, B., Coleman, R. and Walraven, G. (2001) The long-term reproductive health consequences of female genital cutting in rural Gambia: a community-based survey. *Tropical Medicine and International Health*, 6, 643–653.
- Morison, L. and Scherf, C. (2003) The association between female genital cutting and correlates of sexual and gynaecological morbidity: Comment and author’s reply. *British Journal of Obstetrics and Gynaecology*, 11, 1137–1140.
- Nwajei, S. D. and Otiono, A. I. (2003) Female genital mutilation: implications for female sexuality. *Women’s Studies International Forum*, 26, 575–580.
- Obermeyer, C. M. (1999) Female genital surgeries: the known, the unknown, and the unknowable. *Medical Anthropology Quarterly*, 13, 79–106.
- Obermeyer, C. M. (2001) Complexities of a controversial practice. *Science*, 292, 1305–1306.
- Odoi, A., Brody, S. P. and Elkins, T. E. (1997) Female genital mutilation in rural Ghana, west Africa. *International Journal of Gynaecology and Obstetrics*, 56, 179–180.
- Okonofua, F., Larsen, U., Oronsaye, F., Snow, R. and Slanger, T. (2002) The association between female genital cutting and correlates of sexual and gynaecological morbidity in Edo State, Nigeria. *British Journal of Obstetrics & Gynaecology*, 109, 1089–96.
- Parker, R. G. and Aggleton, P. (1999) *Culture, Society and Sexuality: A Reader* (London: UCL Press).
- Rouzi, A. A., Aljhadali, E. A., Amarin, Z. O. and Abduljabbar, H. S. (2001a) The use of intrapartum defibulation in women with female genital mutilation. *British Journal of Obstetrics and Gynaecology*, 108, 949–951.
- Rouzi, A. A., Sindi, O., Radhan, B. and Ba’aqeel, H. (2001b) Epidermal clitoral inclusion cyst after type I female genital mutilation. *American Journal of Obstetrics and Gynaecology*, 185, 569–571.
- Shell-Duncan, B., Obiero, W. O. and Muruli, L. A. (2000) Women Without Choices: The Debate over Medicalization of Female Genital Cutting and Its Impact on a Northern Kenyan Community. In B. Shell-Duncan and Y. Hernlund (eds.) *Female “Circumcision” in Africa: Culture, Controversy, and Change* (Boulder: Lynne Rienner Publishers).
- Slanger, T. E., Snow, R. C. and Okonofua, F. E. (2002) The impact of female genital cutting on first delivery in southwest Nigeria. *Studies in Family Planning*, 33, 173–84.
- Snow, R. C., Slanger, T. E., Okonofua, F. E., Oronsaye, F. and Wacker, F. (2002) Female genital cutting in southern urban and peri-urban Nigeria: self-reported validity, social determinants, and secular decline. *Tropical Medicine and International Health*, 7, 91–100.
- Stewart, H., Morison, L. and White, R. (2002) Determinants of coital frequency among married women in Central African Republic: the role of female genital cutting. *Journal of Biosocial Science*, 34, 525–39.
- Turner, B. (1995) *Medical Power and Social Knowledge* (London: Sage Publications).
- Thabet, S. (2003) Defective sexuality and female circumcision: the cause and the possible management. *Journal of Obstetrics and Gynaecology Research*, 29, 12–9.
- Vangen, S., Stoltenberg, C., Johansen, R. E., Sundby, J. and Stray-Pedersen, B. (2002) Perinatal complications among ethnic Somalis in Norway. *Acta Obstetrica et Gynecologica Scandinavica*, 81, 317–22.
- World Health Organization (WHO) (1996) *FGM: Report of a World Health Organization Technical Working Group* (Geneva: World Health Organization).
- WHO website: <http://www.who.int/firh-whd/FGM/FGM%20prev%20update.html>
- Yoder, P. S., Abderrahim, N. and Zhuzhuni, A. (2004) *Female Genital Cutting in the Demographic and Health Surveys: A Critical and Comparative Analysis*. DHS Comparative reports No 7 (Calverton, Maryland: ORC Macro).