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The long-term reproductive health consequences of female genital cutting in rural Gambia: a community-based survey

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Summary This paper examines the association between traditional practices of female genital cutting (FGC) and adult women's reproductive morbidity in rural Gambia. In 1999, we conducted a cross-sectional community survey of 1348 women aged 15–54 years, to estimate the prevalence of reproductive morbidity on the basis of women's reports, a gynaecological examination and laboratory analysis of specimens. Descriptive statistics and logistic regression were used to compare the prevalence of each morbidity between cut and uncut women adjusting for possible confounders. A total of 1157 women consented to gynaecological examination and 58% had signs of genital cutting. There was a high level of agreement between reported circumcision status and that found on examination (97% agreement). The majority of operations consisted of clitoridectomy and excision of the labia minora (WHO classification type II) and were performed between the ages of 4 and 7 years. The practice of genital cutting was highly associated with ethnic group for two of the three main ethnic groups, making the effects of ethnic group and cutting difficult to distinguish. Women who had undergone FGC had a significantly higher prevalence of bacterial vaginosis (BV) [adjusted odds ratio (OR) = 1.66; 95% confidence interval (CI) 1.25–2.18] and a substantially higher prevalence of herpes simplex virus 2 (HSV2) [adjusted OR = 4.71; 95% CI 3.46–6.42]. The higher prevalence of HSV2 suggests that cut women may be at increased risk of HIV infection. Commonly cited negative consequences of FGC such as damage to the perineum or anus, vulval tumours (such as Bartholin's cysts and excessive keloid formation), painful sex, infertility, prolapse and other reproductive tract infections (RTIs) were not significantly more common in cut women. The relationship between FGC and long-term reproductive morbidity remains unclear, especially in settings where type II cutting predominates. Efforts to eradicate the practice should incorporate a human rights approach rather than rely solely on the damaging health consequences.

keywords female genital cutting, female genital mutilation, female circumcision, Gambia, Africa, reproductive health

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Introduction

Female genital cutting (FGC) is a term used to describe traditional practices that involve the cutting of female genitalia. Other commonly used terms for these procedures are female circumcision, female genital mutilation (FGM) or female genital surgeries. It is estimated that around 130 million women worldwide have undergone FGC and that 2 million girls and women a year are subjected to these operations (Toubia 1996). Genital cutting is usually performed on children by traditional practitioners under non-sterile conditions.

The World Health Organization has classified these operations into four types (WHO 1995). Type I involves the partial or total removal of the clitoris. Type II refers to partial or total removal of the clitoris together with partial or total excision of the labia minora. Type III is partial or total removal of the external genitalia and stitching or narrowing of the vaginal opening. Type IV is relatively rare and refers to other traditional genital surgeries such as pricking or stretching the clitoris and/or surrounding tissues. An estimated 85% of cutting operations are type I or II; around 15% being the more severe type III (Toubia 1993). Female genital cutting tends to be practised in north-east Africa and in sub-Saharan Africa north of the equator. The practice and type of FGC is often specific to particular ethnic groups, so that prevalence of the operations varies widely from country to country. Type III operations occur predominantly in Sudan and Somalia.

These operations have evoked strong and emotive reactions in the 'West' and among some groups within communities where they are practised. FGC has become a major concern to policy makers, activists and professionals in various fields. It has been condemned as a violation of human rights; a manifestation of gender inequality and extremely damaging to sexuality and health. But evidence on how common and how serious the short- and long-term consequences are is lacking (Obermeyer *et al.* 1999). Hospital-based studies have catalogued types of cutting and morbidity, but give no indication of the prevalence of these problems. Community-based studies have examined associations between reported circumcision status and reported morbidity, but are unconvincing because both reported circumcision status and reported morbidity have shown poor agreement with clinical and laboratory diagnoses (Odujinrin *et al.* 1989; Adinma 1997; Filippi *et al.* 1997). A recent large multicentre hospital and clinic-based study in Mali and Burkino Faso (Jones *et al.* 1999) has suggested a positive association between the severity of genital cutting and the probability that a woman has a gynaecological or obstetric problem. But there still are no rigorous community-based studies on the rates of short- and long-term health consequences of genital cutting operations.

FGC is common in West Africa (Carr 1997) and practised by several large ethnic groups in The Gambia (Singhateh 1985). A national campaign to eliminate FGC in The Gambia was launched in 1997. In the same year, the government banned national radio and television from transmitting anti-FGC material, although this ban was lifted a few months later. Over the last few years, active campaigning against FGC has been mainly at the grass-root level by non-governmental organizations concerned with womens health.

Since 1981 the Medical Research Council (MRC) has operated a continuous demographic surveillance system in 40 villages and hamlets in the Farafenni area of The Gambia, on the north bank of the river Gambia. This study area had a population of 16 203 as on 31 March 1999, with 3934 women aged 15–54 years (Hill *et al.* 2000). Most people live by subsistence farming and 45% have an income below US$150/year. Women marry for the first time at a mean age of 15 and subsequently average 6.8 births (Ratcliffe *et al.* 2000). Polygamy is common with 54% of women having one or more co-wives. Maternal mortality was recently estimated at 424/100 000 live births (Walraven *et al.* 2000). Use of modern family planning is uncommon (6%) and only 3.1% of women have attended primary school. Around 95% of women report farming and working in the household as their main occupation (Walraven *et al.* 2001). There has been no active campaign against FGC at the community level in the study area.

The results described in this paper are based on data collected as part of a comprehensive community-based survey of women's reproductive morbidity within this area (Walraven *et al.* 2001). The survey included questions about FGC and an assessment of genital cutting by a gynaecologist. The objective of the analysis described in this paper was to compare the rates of reproductive morbidity in cut women with those who were not cut. Thus this study aimed to provide data on the long-term reproductive health consequences associated with genital cutting.

Methods

We conducted a community-based reproductive morbidity survey of women between the ages 15 and 54 in the demographic surveillance area of Farafenni. The study was approved by the Ethics Committee of the Gambia Government/MRC Laboratories (SCC proposal 755). Details of the methods for the survey are described elsewhere (Walraven *et al.* 2001). Briefly, 20 villages were selected randomly for inclusion in the study, but three had to be replaced because of community-level reluctance to participate. The nature and rationale of the study was explained at meetings with village leaders (both men and women), where some study procedures were demonstrated, and great care was taken to address sensitive issues appropriately. At subsequent meetings for the whole village, further explanations were given and community-level permission sought to invite eligible women to participate. All women aged 15–54 years in the selected villages were considered eligible for participation. There were no specific exclusion criteria. Consent was obtained from individual women after further detailed individual explanation of each component by a fieldworker in the woman's language.

If they consented, women were interviewed by a female fieldworker and then a female gynaecologist using a structured questionnaire. Questionnaires were forward and back-translated into the three main local languages during interviewer training, and all women were interviewed in their language. Socio-demographic characteristics, obstetric and gynaecological history and symptoms of reproductive morbidity were included in the questionnaire. Women were also asked about whether they had been circumcised, at what age, and about their attitude to the continuation of this practice. Women with circumcised daughters were asked about the details of the operation for the most recently circumcised daughter. After the interviews, the women's height and weight were measured and then a gynaecologist conducted a thorough clinical examination. From inspection of the external genitalia, a detailed assessment of the type and extent of genital cutting was made. Women who reported not being virgins underwent speculum examination and bimanual pelvic palpation. Vaginal swabs were taken and tested for *Trichomonas vaginalis* (TV), bacterial vaginosis (BV defined as Nugent score of 7+) and *Candida albicans* (semiconfluent or confluent growth on culture). Cervical swabs were tested for gonorrhoea and Chlamydia infection (by PCR) and cervical smears were examined for abnormal cytology. Recent or untreated syphilis was defined as a positive RPR (rapid plasma reagent) and TPHA (*treponena pallidum* haemagglutination assay) test on a blood sample. Herpes simplex virus 2 (HSV2) seropositivity (Marsden *et al.* 1998) and haemoglobin levels were also ascertained from the blood samples. All blood samples were tested anonymously for HIV, but HIV testing with pre- and post-test counselling was also offered to each woman. The participants received syndromic treatment for any symptoms indicative of a reproductive tract infection (RTI) and, at the time of the study, treatment based on the results of field-laboratory tests. They were then followed up for treatment of reproductive health problems identified in subsequent laboratory analyses.

Conceptual framework for analysis

The mechanisms by which genital cutting might affect women's long-term reproductive health have not previously been comprehensively described. Figure 1 represents the possible mechanisms by which we think type I and II genital cutting might operate to produce reproductive morbidity. We collected data on all the variables shown, apart from the shaded box, either from the women's reports to the gynaecologist [infertility, painful sex, difficulty controlling urine and history of stillbirth], laboratory results [endogenous and sexually transmitted infections (STIs) and abnormal cytology] or from the clinical examination [all other variables]. These were the variables compared between cut and uncut women in the statistical analysis. We included some extra variables in the analysis

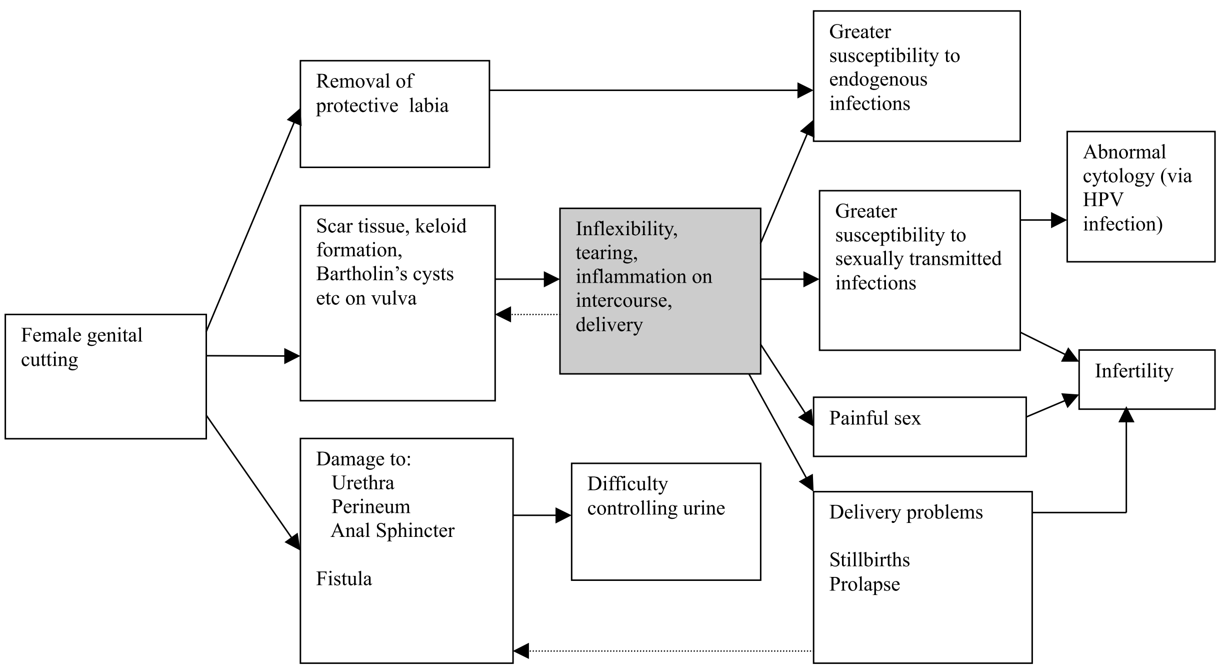

Figure 1 Conceptual framework for possible mechanisms by which type I and II genital cutting might affect reproductive morbidity.

[menstrual disorders, body mass index (BMI) and anaemia], although we could not hypothesize a mechanism through which they might operate.

Statistical analysis

Data were double-entered and validated using Epi-Info v6.4 (CDC, Atlanta, GA, USA). For subsequent analysis Stata v6.0 (Stata Corporation, TX, USA) was used. After the initial descriptive analysis, the data set was restricted to women from the three main ethnic groups who agreed to inspection of the vulva. For some morbidity variables the data was further restricted (for example, it was only sensible to examine stillbirths for women who have delivered a baby). There were missing values for some of the variables, e.g. prolapse, because women refused the internal examination. Different types of genital surgery were combined to make a binary variable of cut *vs*. uncut. Each morbidity variable was cross-tabulated with circumcision status. Logistic regression models were fitted for each morbidity variable (for which there were sufficient cases) to examine the effect of circumcision status adjusting for the possible confounders age, parity and marital status. Polygamy is common in the study area, so the marital status variable differentiated between monogamous and polygamous marriages.

The statistical analysis was complicated by the possible distortion of the association between cutting and morbidity caused by the almost perfect correlation between ethnic group and circumcision status in two of the three main ethnic groups. In Mandinkas, circumcision was virtually universal while in Wollofs it was extremely rare. Around a third of the Fulas were circumcised with cutting status thought to depend on the country or region the family or subgroup originated from. Besides influencing circumcision status, ethnic group might affect morbidity. There might be genetic differences which affect scarring; differences in willingness to report reproductive problems, differences in health-seeking behaviour and differences in childbirth practices (which in turn might influence delivery problems or childbirth-related damage to the genital area). There might also be differences in marriage patterns or sexual behaviour patterns which affect the risk of STIs. Ethnic group and circumcision status could not both be included in the logistic regression models because they were so highly correlated. While not ideal, an alternative way of trying to take into account ethnic group was to make a new variable which combined circumcision status and ethnic group. The analysis described above was repeated with this as an explanatory variable. We concluded that cutting was a significant factor affecting a morbidity variable if (i) the comparison between cut and uncut women was significant, and (ii) if prevalence was different in both Mandinkas and circumcised Fulas compared with both Wollofs and uncircumcised Fulas.

Results

Of 1871 women eligible for inclusion, 1348 (72%) participated in the survey, which took place between January and July 1999. Response rates were higher among Mandinkas (82%) than Fulas (72%) and Wollofs (61%). Response rates tended to be lowest in the youngest age group in all three main ethnic groups (75% among Mandinkas, 64% among Fulas and 55% among Wollofs aged 15–24 years) but were also low (53%) for the oldest age group (45–54 years) for Wollofs. Of the 1348 participating women, 1157 consented to a vulval examination by the gynaecologist. The rate of refusal for the vulval examination was higher among Wollofs (18%) than the other two ethnic groups (12% for both). Table 1 shows the distribution of age, marital status and parity by ethnic group for women who consented to a vulval examination. All three of these socio-demographic variables differed significantly between ethnic groups ($P < 0.001$ for all), emphasizing the importance of adjusting for them when examining associations between cutting status and morbidity. Very few of the women had primary or

Table 1 Distribution of socio-demographic characteristics by ethnic group for women who consented to vulval examination for circumcision status*

	Mandinka (n = 589)	Fula (n = 191)	Wollof (n = 358)
Age (years)			
15–24	35	33	30
25–34	24	31	30
35–44	23	24	31
45–54	19	12	9
Marital status			
Single	10	5	5
Monogamous marriage	32	53	33
Polygamous marriage	54	40	61
Divorced/widowed	4	2	1
Parity			
Nulliparous	16	14	10
Parity 1–3	28	34	30
Parity 4–7	34	38	51
Parity 8+	21	15	10

Values are given in percentages.
*Nineteen women from other ethnic groups were also included in the sample of women who consented for examination but not in the analysis comparing morbidity between cut and uncut women.

secondary level education (3% of Mandinkas, 6% of Fulas and 1% of Wollofs).

During interviews with a fieldworker 58% (779/1346) reported being circumcised. Three of these women reported being 'sealed' (WHO type III). Of the 1157 women who were examined by a gynaecologist 668 (58%) had signs of genital cutting. The frequency of the different types of operation performed are shown in Table 2. As expected, most fell into the WHO type II classification. Of 1156 women who had reported their circumcision status and were assessed by a gynaecologist, there was disagreement in 40 cases (3%). Twenty-one of these reported being circumcised but had no signs of the operation. A further 10 reported 'normal' (type II) circumcision but had evidence of closure (type III). Seven women who reported being uncircumcised had signs of type I or II operations and two women who reported being sealed had no signs of closure. Of the three main ethnic groups, 98% of Mandinkas, 4% of Wollofs and 32% of Fulas had signs of genital cutting. The socio-demographic characteristics of cut and uncut Fulas were similar (data not shown) except for age. Cut Fulas tended to be slightly younger that those uncut (Fisher's exact test: $P = 0.030$). The mean reported age at circumcision was 6.1 years with the median being 6 years. About 79% of circumcised women reported having been circumcised between 4 and 7 years of age, 7% were circumcised earlier and 15% later. The maximum age at circumcision was 16. When asked whether circumcision should be continued, 15% of women said it was not their decision or they did not know. Of the remainder, all except 38 of the 682 circumcised women said FGC should continue while all but four of the 473 uncircumcised women said it should not.

A total of 456 women said they had a circumcised daughter and gave us details of the most recent FGC operation any daughter had undergone. Eleven of these women were not aware that their daughter had gone to be circumcised until after the operation, and of these eight did not approve of their daughters' circumcision. Most operations (70%) were performed in 'the bush' but a substantial proportion (29%) took place in the woman's home. All operations were undertaken by traditional operators. In 85% of the operations, efforts were made to reduce the pain, although the question did not specify whether this was pain at the time of the operation or the period after. In 83% of the operations herbs or pastes had been applied, but 21% of daughters had also bathed in cold water, 9% took tablets and 2% had an injection. Another 16% used another method to reduce pain, mostly specified as 'ointment' or vaseline. A similar proportion (84%) of women who reported efforts to reduce pain also reported efforts to 'stop the wound going bad'. For 81% of the operations, the daughters had been bathed frequently; with 31% being bathed with hot water and 26% being bathed with salt water. Herbs or pastes were applied in 72% of cases. Other methods included spirit (five cases) and antiseptic powder (one case); 15% of women specified another method, with 'ointment' and vaseline again being the most commonly mentioned.

For the comparison of morbidity between cut and uncut women, the sample was restricted to participants who were examined for circumcision status and who were in one of the three main ethnic groups ($n = 1138$). Table 3(a) shows odds ratio (OR) for the comparison of cut and uncut women for all the variables excluding the endogenous and STIs and cytology. After adjusting for age, marital status and parity, significant differences were seen for prolapse ($P = 0.020$) which was lower in cut women and anaemia ($P = 0.033$) which was higher. Table 4 shows morbidities which were significantly different between cut and uncut women by ethnic group for Mandinkas (98% cut) and Wollofs (96% uncut) and circumcision status for Fulas. It shows that the observed difference in the prevalence of prolapse between cut and uncut women was the result of the high prevalence of prolapse in Wollofs rather than being consistent with an effect of cutting. The slightly

Table 2 Frequency of different cutting operation assessed by gynaecologist

Signs of genital surgery	WHO classification	Number of women	%
No signs of cutting		489	42
Partial clitoridectomy	Type I	1	<1
Full clitoridectomy	Type I	2	<1
Partial clitoridectomy and partial excision of labia minora	Type II	74	6
Partial clitoridectomy and complete excision of labia minora	Type II	31	3
Full clitoridectomy and partial excision of labia minora	Type II	176	15
Full clitoridectomy and complete excision of labia minora	Type II	374	32
Clitoridectomy, excision of labia minora and closure	Type III	10	1
Total		1157	100

Table 3 (a) Odds ratio (OR) for comparison of morbidity variables between cut and uncut women (excluding endogenous and sexually transmitted infections and cytology). (b) Odds ratio for comparison of endogenous and sexually transmitted infections and cytology between cut and uncut women

	Prevalence in women				Adjusted OR*	95% CI for OR	*P*-value†
	Uncut	%	Cut	%			
a							
Morbidity							
Vulval tumour (cysts, etc.‡	9/481	2	18/654	3	1.75	0.77–3.99	0.177
Damaged perineum	240/427	56	336/546	62	1.24	0.95–1.63	0.115
Insufficient anal sphincter‡	16/421	4	17/526	3	0.81	0.40–1.64	0.559
Vesico-vaginal fistula§	1/452	< 1	0/589	0	–	–	–
Difficulty controlling urine	36/458	8	41/597	7	0.80	0.48–1.33	0.408
Any stillbirths	48/427	11	81/549	15	1.16	0.78–1.73	0.460
Prolapse	223/426	52	253/548	46	0.72	0.55–0.95	0.020
Painful sex¶	47/329	14	62/394	16	1.09	0.71–1.66	0.680
Infertility**	35/356	10	43/420	10	1.20	0.70–2.07	0.511
Menstrual problems††	78/182	43	100/305	33	0.74	0.50–1.11	0.148
BMI weight/height^2 < 18	75/480	16	103/654	16	0.90	0.64–1.26	0.528
Anaemia‡‡	226/463	49	351/642	55	1.31	1.02–1.68	0.033
b							
Infection							
Endogenous infections							
Bacterial vaginosis	132/437	30	240/571	52	1.66	1.25–2.18	< 0.001
Candida	62/456	14	71/604	12	0.85	0.58–1.24	0.394
Sexually transmitted infections							
Syphilis§§	25/474	5	14/643	2	0.47	0.24–0.94	0.030
Herpes Simplex Virus 2	86/471	18	286/637	45	4.71	3.46–6.44	< 0.001
Gonorrhoea	0/443	0	0/573	0	–	–	–
Chlamydia¶¶	9/443	2	3/573	< 1	–	–	–
Trichomoniasis§§	24/450	5	41/586	7	1.31	0.77–2.22	0.314
Symptoms							
Abnormal vaginal discharge, itching, irritation or bad odour	205/481	43	269/645	41	0.94	0.74–1.21	0.651
Cytology							
Squamous cell intraepithelial lesions§§	22/453	5	39/586	7	1.42	0.81–2.46	0.213

Values in brackets denote percentages.
*Adjusted for age, marital status and parity.
†From likelihood ratio test adjusting for age, marital status and parity.
‡Adjusted for age and parity only as number of cases small.
§No OR as one case only.
¶For those who are currently sexually active.
**Trying to get pregnant for more than a year not breastfeeding and contacting husband at least once a week, no contraception and under 45 years old.
††For menstruating women not on hormonal contraception.
‡‡Hb < 12 g/dl in non-pregnant women, hb < 11 g/dl in pregnant women.
§§Adjusted for age and marital status only as number of cases small.
¶¶Too few cases to perform adjusted analysis.

higher prevalence of anaemia in cut women is still evident in Table 4 but the difference is no longer significant.

Table 3(b) shows OR for the endogenous and STIs and cytology. After adjusting for age, marital status and parity, BV and HSV2 were both significantly higher in cut women ($P < 0.001$ for both) whilst recent or untreated syphilis was significantly lower ($P = 0.030$). There were too few cases of Chlamydia ($n = 12$) to adjust for possible confounders, but the unadjusted analysis suggested a significantly lower prevalence in cut women (Fisher's exact test: $P = 0.038$).

Table 4 Comparison of morbidities which were significantly different between cut and uncut women by ethnic group for Mandinkas (98% cut) and Wollofs (96% uncut) and circumcision status for Fulas

Morbidity	Prevalence	%	Adjusted OR*	95% CI for OR	*P*-value†
Prolapse					
Mandinka	226/492	46	1		0.006
Cut Fula	22/50	44	1.17	0.63–2.15	
Fula uncut	48/113	42	0.93	0.60–1.43	
Wollof	180/319	56	1.65	1.22–2.24	
Anaemia					
Mandinka	317/578	55	1		0.113
Cut Fula	32/57	56	1.01	0.58–1.77	
Fula uncut	60/120	50	0.85	0.57–1.27	
Wollof	168/350	48	0.72	0.54–0.94	
Bacterial vaginosis					
Mandinka	218/515	42	1		0.001
Cut Fula	20/52	38	0.97	0.53–1.79	
Fula uncut	28/114	25	0.45	0.28–0.73	
Wollof	106/327	32	0.65	0.48–0.89	
Syphilis‡					
Mandinka	10/525	1.9	1		< 0.001
Cut Fula	5/54	9.3	5.71	1.83–17.86	
Fula uncut	19/118	16.1	9.35	4.09–21.40	
Wollof	3/339	0.9	0.48	0.13–1.77	
HSV2					
Mandinka	248/517	48	1		< 0.001
Cut Fula	20/55	55	0.69	0.38–1.26	
Fula uncut	33/118	28	0.39	0.25–0.63	
Wollof	56/336	17	0.17	0.12–0.24	
Chlamydia					
Mandinka	2/514	0.4	–	–	0.05§
Cut Fula	0/55	0			
Fula uncut	3/117	2.6			
Wollof	7/330	2.1			

Values in brackets denote percentages.
*Adjusted for age, marital status and parity.
†From likelihood ratio test adjusting for age, marital status and parity.
‡Adjusted for age and marital status only because number of cases small.
§From Fisher's exact test too few cases to do adjusted analysis.

Table 4 shows that the higher observed prevalence of syphilis in uncut women was because of very high prevalences among Fula women. The low prevalence of syphilis among Wollof women suggests that it is not an effect of cutting. The lower prevalence of Chlamydia in cut women is still evident from Table 4. BV and HSV2 show a pattern which is consistent with an increase in cut women (Table 4).

A final comparison was made for circumcised women to see if the prevalence of BV or HSV2 varied by severity of circumcision operation after adjustment for age, marital status and parity. There was no evidence that either BV or HSV2 were more prevalent in women who had full rather than partial clitoridectomy (adjusting for extent of excision). The OR for full clitoridectomy relative to partial was 0.88 (95% CI 0.54–1.45) for BV and 0.97 (95% CI 0.59–1.64) for HSV2. Similarly there was no evidence that BV or HSV2 were more prevalent in women who had full rather than partial excision of the labia minora (adjusting for extent of clitoridectomy). The OR for full excision relative to partial was 1.00 (95% CI 0.67–1.47) for BV and 0.75 (95% CI 0.50–1.11) for HSV2.

Discussion

In the study, 58% of women had signs of genital surgery. This had been predominantly performed during childhood. There was a high level of agreement (97%) between reported circumcision status and observed signs of surgery; a result similar to the 93% found in Egypt (EFCS 1996) but much higher than the 57% in Nigeria (Adinma 1997). The lower rate of agreement in Nigeria is perhaps because there is more variation in the type of circumcision performed there, including 'circumcision' that is symbolic rather than physically altering the genitals. Many operations in Nigeria are performed on infants, in which case a woman might have relied on the accounts of older family members to ascertain her circumcision status (Odujinrin *et al.* 1989). The operations in the Gambian study area are performed by traditional operators and little use is made of non-traditional antiseptics and anaesthetics. The type of surgeries we found were consistent with other studies in The Gambia (Singhateh 1985) and other parts of West Africa (Carr 1997; Jones *et al.* 1999) and were predominantly of clitoridectomy and excision of the labia minora (WHO classification type II).

This is the first community-based study in which clinical and laboratory-based reproductive morbidities have been compared between women who have had traditional genital surgeries and those who have not. We found a higher prevalence of BV, HSV2 and anaemia in cut women, but surprisingly a lower prevalence of Chlamydia (although this was based on only 12 cases). These results have to be interpreted with caution because of the almost complete association between ethnic group and circumcision status in two of the three main ethnic groups in the study area. Ethnic group could affect genetic and behavioural characteristics which could influence reproductive morbidity variables. We tried to minimize any bias by comparing morbidity across a variable which combined ethnic group and circumcision status. After this comparison, convincing differences associated with cutting status are still evident for BV and HSV2. However, it is still possible that there are differences between cut and uncut women besides cutting status which might account for any observed differences. Biases in participation might also have affected our results. The shame attached to problems relating to circumcision in this setting means that women might have avoided participation in the study if they had problems relating to circumcision. Participation rates were highest in the ethnic group which almost universally practices FGC, but it is still possible that hiding problems associated with circumcision was a reason for not participating. The cross-sectional design of the study means that a causal effect of cutting cannot necessarily be ascribed to any observed differences in prevalence between cut and uncut women. In addition to problems of residual confounding, mortality due to FGC (either at the time of the operation or during delivery) could introduce bias.

The hypothesized mechanisms by which cutting might affect long-term reproductive morbidity are shown in Figure 1. The higher levels of BV in cut women might be because of the removal of the protective labia minora which perhaps may help to maintain a healthy vaginal environment. However, the lack of any difference in prevalence of BV between those fully and partially excised weakens this hypothesis. Other confounding variables, such as differences in hygiene practices between cut and uncut women, might explain the observed result. Whatever the mechanism for the higher prevalences in cut women, the clinical importance of BV in this setting has yet to be proved. BV has been associated with HIV infection in Uganda (Sewankambo *et al.* 1997) although a causal link has yet to be established. BV has also been associated with low birthweight and pre-term deliveries (Kurki *et al.* 1992), although treatment of BV has not been shown to reduce the rate of pre-term babies in low-risk or asymptomatic women (Carey *et al.* 2000).

The prevalence of HSV2, an STI, was substantially higher in cut women. In order to examine whether the higher prevalences of HSV2 in cut women were due to increased biological susceptibility to infection or to differences in sexual behaviour patterns, data on sexual behaviour would have to be compared between cut and uncut women and would also be adjusted for in the analysis. However, sexual behaviour questions (for example number of sexual partners in lifetime) were not included as we feared that they might lower the participation rate in a study that was already sensitive because of the gynaecological examination. Therefore the only data collected pertaining to sexual behaviour were marital status (including number of co-wives) and the presence or absence of the hymen on examination. Polygamous rather than monogamous marriages were adjusted for in the comparison of cut and uncut women in the results for this paper. More detailed analysis adjusting for the exact number of co-wives did not reduce the OR for HSV2 (data not shown), suggesting that differences in marriage patterns do not explain the higher prevalence of HSV2 in cut women. Pre-marital sex appeared to be rare. Of the 88 single women examined, 76 had an intact hymen and in one it was not visible because of the circumcision scar. The proportion of single women with an intact hymen did not vary significantly between ethnic groups (Fisher's exact test: $P = 0.359$), suggesting that differences in pre-marital sex do not explain the higher prevalence of HSV2 in cut women. But other sexual behaviour variables may be confounding the association, so more research is needed to examine the association between cutting and HSV2.

Whatever the mechanism, the higher prevalence of HSV2 among cut women is of particular concern in a sub-Saharan setting because HSV2 is a known cofactor for HIV transmission (Ballard 1998; Weiss *et al.* 2001). If the higher levels of HSV2 in cut women are the result of increased biological susceptibility because of cutting, cut women might also be more susceptible to HIV infection (Kun 1997). If the higher prevalences are due to differences in sexual behaviour between communities which practice FGC and those which do not, it still suggests that cut women are likely to be at increased risk of HIV infection. We could not compare HIV prevalence between cut and uncut women in this study because the HIV results were unlinked and anonymous. At present, HIV prevalence in The Gambia is relatively low for sub-Saharan Africa: 1.7% in women tested in this study (Walraven *et al.* 2001), but recent rises in HIV-1 among antenatal women, sex workers and STI clinic attenders (S. van der Loeff, personal communication) give cause for concern.

Chlamydial infection was relatively rare in the study population with only 12 cases included in the analysis for this paper. Therefore, the observed lower prevalence of Chlamydia among cut women should be regarded with caution. Chlamydia is less important as a cofactor for the transmission of HIV than HSV2 but is important in this setting because of its potential to cause infertility. Infertility is greatly feared in this population, where both men and women acquire status and security through reproduction (Bledsoe *et al.* 1994). However, when infertility was compared between cut and uncut women there was little evidence of any difference. This finding is consistent with another study which found no association between circumcision and infertility in Cote D'Ivoire, Central African Republic and Tanzania (Larsen & Yan 2000).

In our study, the prevalence of anaemia was found to be slightly higher in cut women. When comparing across the combined ethnic group and circumcision variables, the pattern was still evident but was no longer statistically significant. We think it most unlikely that blood lost at the time of the operation in childhood would influence adult haemoglobin, and suggest that this result is due to chance. In the study area, diet and malaria are the main causes of anaemia and it is difficult to conceive how FGC would affect these. Another measure of nutritional status, BMI, was similar for cut and uncut women.

The type II genital cutting practised in the study area was not associated with significantly increased prevalences of damage to the perineum or anus, vulval tumours (such as Bartholin's cysts, excessive keloid formation), painful sex, infertility, prolapse, STI (apart from HSV2) or endogenous infections (apart from BV). However, future studies with higher sample sizes might demonstrate significant associations where we observed small differences in prevalence, such as for vulval tumours and damage to the perineum. The above morbidities are often cited as common long-term problems of FGC by activists against the practice and can undoubtedly occur as a consequence of FGC. The fact that they are not markedly associated with cutting at the community level implies that, at least in this study area, cutting is not a major factor in their occurrence. By basing health information on sound data rather than implying that severe long-term health consequences are common, activists are likely to make their claims more credible to practising communities and therefore more effective.

It is important to remember that this study has focused only on long-term reproductive morbidity found in the community and only on type II cutting. The consequences of genital cutting for maternal mortality and morbidity have not been examined apart from asking about stillbirths and examining for childbirth-related damage to the pelvic structures. Similarly, apart from comparing the prevalence of painful sex (as reported by women) between cut and uncut women, we have not touched on sexual functioning or well-being. Another possible health consequence of FGC that could not be examined in the present study is the parenteral transmission of HIV at the time of the operation because of the use of one cutting tool for a cohort of girls (Kun 1997). This merits further research, especially in areas where HIV prevalence is high.

Little is known about the prevalence of immediate complications of the operations performed in The Gambia or elsewhere. Anecdotal data from The Gambia describes extremely serious bleeding, infections and even death caused by FGC (Singhateh 1985). In the study area, we have used verbal autopsy to diagnose the cause of death for several hundred people and found that one girl aged 12 died of bleeding 1 day after circumcision (unpublished data). However, immediate complications of the operation are believed by the population to be caused by inadequate ceremonial preparations by the parents, or because of something shameful about the daughter (Singhateh 1985), so great efforts are made to keep them secretive. When women in our study were asked about the most recent circumcision operation undergone by a daughter, none reported any problem. It is difficult to conceive how data could be gathered on the short-term consequences of cutting in this setting.

The number of women with type III operations was too low to enable us to specifically examine their effect on morbidity. However, the severity of reduction and the closure of the vulva in type III operations mean that the immediate and long-term physical, psychological and sexual consequences are likely to be more common and more severe than for the type II surgeries studied here.

Advocacy against FGC based on damaging health consequences is less controversial in most practising communities than an approach based on human rights. However, the exaggeration by activists on the prevalence of death and serious damage to health can result in lack of credibility, especially in settings where FGC types I and II are practised. Our study suggests that in a population of rural Gambian women, the commonly cited long-term health consequences of FGC were not markedly more common in cut women, although the higher prevalence of HSV2 is a cause for concern. A focus on damaging health consequences is also vulnerable to the argument to medicalize the operation. The human rights-based approach argues that FGC must be abolished because it is a serious violation of bodily integrity usually inflicted on young girls who are not in a position to give informed consent (Snow 2001). In a human rights context, eradication of FGC is often considered as one component of the need to address many of the rights of women and girls, especially in societies where serious discrimination occurs. It also addresses the underlying societal structure which supports this discrimination. The main study from which our data were taken showed an enormous burden of reproductive disease in these Gambian women (Walraven *et al.* 2001). This supports the idea that FGC should be tackled as part of women's reproductive rights as a whole rather than narrowly focusing on the damaging health effects of FGC.

Conclusions

This is the first community-based study in which precisely defined reproductive morbidities have been compared between women who have had traditional genital surgeries and those who have not. The results must be treated with some caution because ethnic group determined circumcision status in two of the three main ethnic groups in the study area. The type II genital surgeries performed during childhood in this population were associated with significantly increased prevalences of BV and HSV2. The higher prevalence of HSV2 in cut women suggests that they may be more vulnerable to HIV infection. No other significant adverse associations with cutting were found. The relationship between FGC and long-term reproductive morbidity is still not clear, especially in settings where type II cutting predominates. Efforts to eradicate the practice should incorporate a human rights approach rather than rely solely on the damaging health consequences of FGC.

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