



Article

Understanding the linkages between male circumcision and multiple sexual partnership among married Ghanaian men: Analysis of data from the 2014 Ghana demographic and health survey

Bright Opoku Ahinkorah ^a, John Elvis Hagan Jr. ^{b,f,*}, Abdul-Aziz Seidu ^{c,d}, Eric Torgbenu ^e, Eugene Budu ^c, Thomas Schack ^f

^a The Australian Centre for Public and Population Health Research (ACPPHR), Faculty of Health, University of Technology Sydney, Australia

^b Department of Health, Physical Education, and Recreation, University of Cape Coast, Cape Coast, Ghana

^c Department of Population and Health, University of Cape Coast, Cape Coast, Ghana

^d College of Public Health, Medical and Veterinary Sciences, James Cook University, Townsville, Queensland, Australia

^e Department of Physiotherapy and Rehabilitation Sciences, School of Allied Health Sciences, Ho, Ghana

^f Neurocognition and Action-Biomechanics-Research Group, Faculty of Psychology and Sport Sciences, Bielefeld University, Bielefeld, Germany



ARTICLE INFO

Keywords:

Circumcision

Ghana

Men

Multiple sexual partnership

ABSTRACT

Introduction: This current study sought to investigate the association between male circumcision status and engaging in multiple sexual partnership among men in Ghana.

Methods: Data from this study come from the men's file of the 2014 Ghana demographic and health survey. Both descriptive and inferential statistics were conducted among 1, 948 men and the level of statistical significance was pegged at $p < 0.05$.

Results: Results revealed that men who have been circumcised were more likely to engage in multiple sexual partnership (AOR = 3.36; CI:1.14–9.89), compared to those who have not been circumcised. With the covariates, men with primary level of education were more likely to have multiple sexual partners (AOR = 2.01; CI:1.10–3.69), compared to those with no education. With wealth status, men with richest (AOR = 2.27; CI:1.04–4.97), richer (AOR = 2.05; CI: 1.03–4.08), and middle wealth status (AOR = 1.83; CI:1.01–3.34) had the highest likelihood of having multiple sexual partners, compared to those with poorest wealth status. Conversely, men who professed the Islamic faith were less likely to engage in multiple sexual partnership (AOR = 0.58; CI: 0.36–0.94), compared to Christians. Similarly, men who resided in the Brong Ahafo (AOR = 0.51; CI: 0.26–0.99), Upper East (AOR = 0.41; CI:0.19–0.89), and Ashanti regions (AOR = 0.39; CI: 0.20–0.78) were less likely to engage in multiple sexual partnership.

Conclusion: Based on the current findings, educational campaigns by stakeholder groups (e.g., Ministry of Health in collaboration with the National Commission on Civic Education, civil society, educational institutions) should sensitize the sexually active population at the community level to consistently use condoms, especially when they have multiple sexual partners, even when a man is circumcised. Campaign messages must clearly emphasize that male circumcision should not substitute precautionary measures such as delay in the onset of sexual relationships, averting penetrative sex, reducing the number of sexual partners as well as correct and consistent use of male or female condoms regardless one's social standing.

1. Introduction

Circumcision is one of the ancient surgical procedures concerning the removal of some or all of the penile prepuce (foreskin) performed till

date and has remained a highly critical subject (Bossio et al., 2014; Hutcheson, 2004). Today, male circumcision has become a common medical procedure with improved anaesthetic, surgical, and antiseptic techniques (Hutcheson, 2004). Approximately, the global prevalence of

* Corresponding author. Neurocognition and Action-Biomechanics Research Group, Faculty of Psychology and Sport Sciences, Bielefeld University, Bielefeld, Germany.

E-mail address: elvis.hagan@ucc.edu.gh (J.E. Hagan).

<https://doi.org/10.1016/j.ssmph.2020.100622>

Received 20 March 2020; Received in revised form 22 June 2020; Accepted 23 June 2020

Available online 26 June 2020

2352-8273/© 2020 The Author(s).

Published by Elsevier Ltd.

This is an open access article under the CC BY-NC-ND license

(<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

male circumcision indicates that one-third of adult men worldwide are circumcised for medical, religious, social, and/or cultural reasons (UNAIDS, 2007; World Health Organization, 2008). Available evidence reveals that projected 665 million men (30% of all men) over 15 years of age worldwide are circumcised. Specifically, nearly two-thirds (69%) are Muslim (found mostly in Asia, the Middle East, and North Africa), 0.8% are Jewish, and 13% are men in the United States who are not Muslim or Jewish (World Health Organization, 2008). These purported figures have recently been challenged due to limitations (e.g., self-reported, among religious groups) from previous studies (see Morris et al., 2016 for details). Morris et al. (2016) noted that current estimates of male circumcision range between 36.7 and 38.7%, even though the actual percentage could be lower or higher than reported values.

Within Africa, male circumcision is common in many countries and is almost universal in North Africa and most parts of West Africa. Approximately 90% males are circumcised in West Africa and 95% in Ghana (Weiss et al., 2010). Comparatively, it is fewer in southern Africa, where reported prevalence is lowest, about 15% in several countries, including Namibia, Swaziland, Zambia, and Zimbabwe (Connolly et al., 2004; Drain et al., 2006; Langeni et al., 2005; Peltzer et al., 2007; Williams et al., 2006; World Health Organization, 2008), though higher in others such as Malawi (21%), Botswana (25%), South Africa (35%), Lesotho (48%), Mozambique (60%), and Angola as well as Madagascar (> 80%) (Drain et al., 2006; Connolly et al., 2004; Peltzer et al., 2007; Williams et al., 2006; World Health Organization, 2008). Prevalence in Central and East Africa varies from approximately 15% in Burundi and Rwanda to 70% in Tanzania, 84% in Kenya, and 93% in Ethiopia and Somalia (Demographic and health surveys, 2006; Peltzer et al., 2007; Williams et al., 2006; World Health Organization, 2008).

Contemporary literature about circumcision is partially skewed (Bossio et al., 2014). According to Bossio et al. (2014), quite significant amount of research has been directed towards the medical benefits of circumcision. Emerging findings suggest that circumcision status has a significant influence on men's sexual partners. For instance, a reduction in HIV and other STD transmission rates among circumcised men on their partners have been reported in some studies (Auvert et al., 2005; Bailey et al., 2005; Gray et al., 2007). Female sexual partners of circumcised men seem to gain protective health benefits over female partners of non-circumcised men against STIs such as bacterial vaginosis (CDCP, 2010; Chernes et al., 2008; Gray et al., 2009), chlamydia (Castellsagué et al., 2005; Sobngwi-Tambekou et al., 2009), herpes (Chernes et al., 2003), and HPV (Wawer et al., 2011). Men who have sex with men (MSM) also seem to realize some protecting effects against HIV from having sexual intercourse with circumcised rather than non-circumcised partners (Boyle and Hill, 2012), although the reported impacts appear to be mediated by the nature of sexual intercourse they engaged in (i.e., receptive and insertive sex are related to diverse risks) (Koblin et al., 2006; Sidler et al., 2008; UN Joint Programme on HIV/AIDS, 2009).

Within sub-Saharan Africa, epidemiological evidence has shown a geographical connection between regions of higher prevalence of HIV and lower rates of male circumcision (Drain et al., 2006). Some randomized controlled studies on male circumcision have revealed a reduction of 60%–75% in the risk of female to male transmission of HIV-1 in circumcised men in South Africa (Auvert et al., 2005). Other studies conducted in Kenya and Uganda established a risk reduction of around 58% and 53% respectively (Bailey et al., 2007; Gray et al., 2007). Consequently, some reports (e.g., WHO/UNAIDS, 2007) and research (e.g., Caldwell & Caldwell, 1994; Kebaabetswe et al., 2003; Scott et al., 2005) endorsed male circumcision as a potential strategy to reduce the risk for HIV acquisition, particularly in high HIV prevalence and low male circumcision countries.

Available scholarly information indicates that traditional male role orientations (e.g., masculinity and power distance) and male sexual behaviour may heighten the risk of HIV and other STDs infection among sexually active men in Ghana (e.g., Adomako et al., 2009; Anarfi, 2006;

Tsikata, 2007). Specifically, cultural orientation allows men to be sexually domineering (i.e., have multiple sexual partners that increase their risk taking) (Anarfi, 2006; World Health Organization, 2007). Given the widespread sociocultural acceptance of men having multiple sexual partners in most sub-Saharan African societies, studies like this would provide a more comprehensive understanding of multifaceted indicators surrounding the circumcision debate toward public reproductive health policy and implementation of practical interventions. The current study prospectively investigates the association between male circumcision status and the choice of multiple sexual partners in Ghana, where there is limited empirical data on the subject.

2. Materials and methods

2.1. Data

Data for the study was obtained from the 2014 Demographic and Health Survey (DHS) of Ghana. DHS is a nationwide survey conducted every five-year period across low- and middle-income countries in Asia and Africa. It focuses on maternal and child health by interviewing women in their reproductive age (15–49 years) as well as men aged 15–64. The survey follows the same standard procedures—sampling, questionnaires, data collection, cleaning, coding and analysis—that allow for cross-country comparison. It employed a stratified two-stage sampling technique to make it nationally representative (Aliaga & Ren, 2006). The first-stage sampling frame consisted of a list of primary sampling units (PSUs) or enumeration areas (EAs) that covered the entire country and usually were obtained from the latest national census—when available. Each EA was further subdivided into standard size segments of about 100–500 households per segment. At this stage, a sample of predetermined segments was selected randomly with a probability proportional to the EA's measure of size (number of households in EA). For the second stage, the DHS survey personnel selected households systematically from a list of previously enumerated households in each selected EA segment, and in-person interviews were conducted in selected households to target populations: women aged 15–49, men aged 15–64, and children under 5. For the purpose of this study, only married men (15–64) for whom there was complete information on male circumcision and multiple sexual partnership were included for subsequent analysis (N = 1,958).

2.2. Measurement of variables

The outcome variable used for this study was multiple sexual partnership. To derive this variable, married men were asked about the number of sex partners they have had in the last 12 months, excluding their spouses. The responses ranged from 0 to 7. Those who gave 0 as a response were considered as those without multiple sexual partners and were coded as 0 = No, while those who said they have had 1 or more sex partners in the last 12 months preceding the survey were considered as having multiple sexual partners and were coded as 1 = Yes.

The key explanatory variable considered in this study was self-report of male circumcision status, based on the following question: “Some men are circumcised, that is, the foreskin is completely removed from the penis. Are you circumcised?” The responses were Yes = 1, No = 2, 8 = Don't know. For the purpose of the analysis, only men who provided confirmatory responses (either “Yes” or “No”) were included in the study, and those who did not know the answer were excluded. Since this question alone does not differentiate traditional circumcision from medical circumcision conducted in a clinical facility, the survey in Ghana collected additional information. For example, the questionnaires asked the age the respondent was circumcised, who performed the circumcision, and where was it done (Ghana Statistical Service [GSS], Ghana Health Service [GHS], and ICF International, 2015). These additional detailed questions revealed valuable information about the phenomenon, since traditional circumcision may be “partial” compared

to medical circumcision performed by trained clinicians (Glazier et al., 2006). Despite the difference between traditional and medical circumcision, we included all men who were circumcised irrespective of the type of circumcision. The reason being that, the sample size for men who had undergone medical circumcision was small in the dataset. Moreover, our interest was to find out if circumcision could lead to multiple sexual partnership, irrespective of the type. Previous studies on the association between male circumcision and risky sexual behaviour among men in sub-Saharan Africa did not differentiate between medical and traditional circumcision (e.g., Balekang & Dintwa, 2016; Friedrich, 2014; Mapoma & Bwalya, 2017).

Apart from the key explanatory variable, other variables were included in the analysis as covariates. These variables were age, employment status, level of education, place of residence, religious affiliation, wealth status, and region. They were extracted from the males' recode file of the 2014 Ghana DHS, and some of them were recoded. Residence was coded as urban = 1 and rural = 2; age was categorised into 15–24 = 1, 25–34 = 2, 35–44 = 3, 45–54 = 4, 55–64 = 5. Employment status was also categorised into two: unemployed = 1 and employed = 2. Level of education was classified into four categories: no formal education = 1, primary = 2, secondary = 3, and tertiary = 4. Wealth status was categorised as poorest = 1, poorer = 2, middle = 3, richer = 4, and richest = 5. Religious affiliation was recoded as Christian = 1, Islam = 2, 3 = Traditional religion, and No religion = 4. The choice of these explanatory variables was based on their association with multiple sexual partnership in previous studies (Dorina et al., 2014; Exavery et al., 2015; Maher et al., 2011).

2.3. Analytical procedure

Descriptive and inferential statistics were conducted. Descriptive analysis mainly focused on the presentation of frequencies and percentages for male circumcision and socio-demographic characteristics of the respondents. Again, the descriptive statistics looked at the distribution of multiple sexual partnership across male circumcision and socio-demographic characteristics of the respondents, using chi-square test of independence (see Table 1). The inferential statistics focused on a multivariable analysis of the influence of male circumcision on multiple sexual partnership while controlling for the effect of all the covariates that were significant at the chi-square level (see Table 2). The results were reported using adjusted odds ratios (AORs) and confidence intervals (CI). The statistical significance level was set at $p < 0.05$. All frequency distributions were weighted while the survey command (svy) in Stata was used to adjust for the complex sampling structure of the data in the regression analyses. Stata 14.1 (College Station, TX) statistical analysis tool was used for the analysis. This software has the advantage of directly including robust standard errors that account for the complex sample design (two-stage sample design). To test uncertainties of the multivariable logistic regression models, a further test was conducted using Poisson regression, with results showing no evidence of uncertainties since the significance of the predictors in the multivariable logistic regression models did not change (see Table 3).

2.4. Ethics approval

The men gave oral and written consent. Ethical approval was given by individual national institutional review boards and by ICF International institutional review board. Permission to use the data set was requested from MEASURE DHS. The data set is available to the public at www.measuredhs.org.

Table 1

Multiple sexual partnership across men's circumcision status and their background characteristics (weighted).

Variables	Frequency	Percentage	Multiple sexual partnership	
			Yes	No
Male circumcision ($\chi^2 = 14.07, p < 0.001$)				
No	101	5.1	2.5	97.6
Yes	1857	94.9	12.2	87.8
Age ($\chi^2 = 9.52, p < 0.001$)				
15–24	29	1.5	18.9	81.1
25–34	483	24.7	13.5	86.5
35–44	725	37.0	12.1	87.9
45–54	538	27.5	9.6	90.4
55–64	184	9.4	7.3	92.7
Employment status ($\chi^2 = 0.197, p > 0.05$)				
Unemployed	16	0.8	12.5	87.5
Employed	1942	99.2	11.4	88.6
Level of education ($\chi^2 = 31.63, p < 0.001$)				
No education	370	18.9	4.7	95.3
Primary	236	12.1	12.8	87.2
Secondary	1086	55.5	13.9	86.1
Higher	266	13.6	14.7	85.3
Place of residence ($\chi^2 = 13.08, p < 0.001$)				
Urban	957	48.9	14.3	85.7
Rural	1001	51.1	9.1	90.9
Religious affiliation ($\chi^2 = 21.6820, p < 0.001$)				
Christianity	1323	67.6	14.0	86.0
Islam	413	21.1	6.3	93.7
Traditional religion	118	6.0	9.1	90.9
No religion	104	5.3	9.4	90.7
Wealth status ($\chi^2 = 43.06, p < 0.001$)				
Poorest	395	20.2	5.2	94.9
Poorer	356	18.2	11.1	88.9
Middle	322	16.4	12.5	87.5
Richer	369	18.8	14.2	85.8
Richest	516	26.4	18.5	81.5
Region ($\chi^2 = 82.40, p < 0.001$)				
Western	198	10.1	16.6	83.4
Central	201	10.3	11.7	88.3
Greater Accra	383	19.6	26.0	74.1
Volta	158	8.1	19.1	80.9
Eastern	175	8.9	13.4	86.6
Ashanti	335	17.1	7.4	92.6
Brong Ahafo	157	8.0	7.3	92.7
Northern	209	10.7	6.6	93.4
Upper East	90	4.6	5.2	94.8
Upper West	52	2.7	4.9	95.1

Source: Computed from 2014 GDHS.

Multivariable logistic regression results of the association between male circumcision, socio-demographic characteristics and multiple sexual partnership.

3. Results

3.1. Descriptive statistics on multiple sexual partnership across Men's status circumcision and their background characteristics

Table 1 shows results on multiple sexual partnership across men's circumcision status and their background characteristics. The results show that most men who are circumcised engage in multiple sexual partnership (12.2%), compared to those who are not circumcised. Multiple sexual partnership was high among men aged 15–24 (18.9%), those who are unemployed (12.5%), those with higher education (14.7%), those in urban areas (14.3%), Christians (14.0%), those with richest wealth status (18.5%), and men who live in the Greater Accra region (26.0%). The results of the chi-square test showed that all the independent variables, except employment status, had statistically significant associations with multiple sexual partnership among men in Ghana.

Table 3 shows results of the multivariable logistic regression analysis of the association between socio-demographic characteristics and

Table 2
Multivariable logistic regression results on the association between male circumcision and multiple sexual partnership among married men in Ghana.

Variables	COR	AOR 95% CI
Male circumcision		
No	Ref	Ref
Yes	5.52***[2.03–15.05]	3.36*[1.14–9.89]
Age		
15–24		Ref
25–34		0.69[0.261–83]
35–44		0.57[0.22–1.48]
45–54		0.43[0.16–1.13]
55–64		0.38[0.13–1.12]
Level of education		
No education		Ref
Primary		2.01*[1.10–3.69]
Secondary		1.53[0.85–2.74]
Higher		1.39[0.67–2.90]
Place of residence		
Urban		Ref
Rural		0.95[0.63–1.46]
Religion		
Christianity		Ref
Islam		0.58*[0.36–0.94]
Traditionalist		1.59[0.83–3.05]
No religion		0.95[0.48–1.87]
Wealth status		
Poorest		Ref
Poorer		1.75[0.98–3.12]
Middle		1.83*[1.01–3.34]
Richer		2.05*[1.03–4.08]
Richest		2.27*[1.04–4.97]
Region		
Western		Ref
Central		0.65[0.35–1.20]
Greater Accra		1.52[0.89–2.60]
Volta		1.15[0.64–2.06]
Eastern		0.81[0.45–1.46]
Ashanti		0.39**[0.20–0.78]
Brong Ahafo		0.51*[0.26–0.99]
Northern		0.82[0.38–1.77]
Upper East		0.41*[0.19–0.89]
Upper West		0.52[0.22–1.22]
N		1,958
Psuedo R ²		0.086

Exponentiated coefficients; 95% confidence intervals in brackets.
p* < 0.05, *p* < 0.01, ****p* < 0.001.
COR = Crude Odds Ratio AOR = Adjusted Odds Ratio CI = Confidence Interval; Ref = reference category.

multiple sexual partnership among married men in Ghana. The results indicate that men who have been circumcised are more likely to engage in multiple sexual partnership (AOR = 3.36; 95% CI: 1.14–9.89), compared to those who have not been circumcised. With the covariates, men with primary level of education were more likely to have multiple sexual partners (AOR = 2.01; 95% CI: 1.10–3.69), compared to those with no education. With wealth status, men with richest (AOR = 2.27; 95% CI: 1.04–4.97), richer (AOR = 2.05; 95% CI: 1.03–4.08), and middle wealth status (AOR = 1.83; 95% CI: 1.01–3.34) had the greatest likelihood of having multiple sexual partners, compared to those with poorest wealth status. Conversely, men who professed the Islamic faith were less likely to engage in multiple sexual partnership (AOR = 0.58; 95% CI: 0.36–0.94), compared to Christians. Similarly, men who resided in the Brong Ahafo (AOR = 0.51; 95% CI: 0.26–0.99), Upper East (AOR = 0.41; 95% CI: 0.19–0.89) and Ashanti regions (AOR = 0.39; 95% CI: 0.20–0.78) were less likely to engage in multiple sexual partnership.

4. Discussion

The purpose of the study was to establish the association between male circumcision and multiple sexual partnership among married men in Ghana. We found that men who have been circumcised are more

Table 3
Poisson regression results on the association between male circumcision and multiple sexual partnership among married men in Ghana.

Variables	IRR 95% CI
Male circumcision	
No	Ref
Yes	3.41*[1.20–9.74]
Age	
15–24	Ref
25–34	0.82[0.39–1.72]
35–44	0.61[0.29–1.28]
45–54	0.50[0.24–1.06]
55–64	0.60[0.26–1.39]
Level of education	
No education	Ref
Primary	2.25*[1.33–3.82]
Secondary	1.67*[1.01–2.75]
Higher	1.27[0.68–2.32]
Place of residence	
Urban	Ref
Rural	1.00[0.70–1.44]
Religion	
Christianity	Ref
Islam	0.59*[0.39–0.90]
Traditionalist	1.44[0.81–2.58]
No religion	1.18[0.68–2.06]
Wealth status	
Poorest	Ref
Poorer	1.74[1.03–2.93]
Middle	2.19**[1.26–3.80]
Richer	2.34**[1.27–4.31]
Richest	2.60**[1.31–5.15]
Region	
Western	Ref
Central	0.72[0.44–1.19]
Greater Accra	1.43[0.93–2.19]
Volta	1.06[0.65–1.75]
Eastern	0.76[0.46–1.25]
Ashanti	0.42**[0.24–0.76]
Brong Ahafo	0.51*[0.29–0.93]
Northern	0.94[0.50–1.77]
Upper East	0.44*[0.22–0.90]
Upper West	0.61[0.28–1.31]
N	1,958
Psuedo R ²	0.089

Exponentiated coefficients; 95% confidence intervals in brackets.
p* < 0.05, *p* < 0.01, ****p* < 0.001.
IRR = Incident Rate Ratios; CI = Confidence Interval; Ref = reference category.

likely to engage in multiple sexual partnership, compared to those who have not been circumcised, a finding that corroborates previous studies (e.g., Balekang & Dintwa, 2016; Kibira et al., 2015). For varied sexual experience from multiple partners, circumcised men could derive penile sensation caused by innervations from nerve endings around the glans penis (Halata & Munger, 1986). According to Cox et al. (2015), penile sexual sensation or sensitivity is higher in circumcised men because of greater access of genital corpuscles to sexual stimuli after removal of the prepuce. This sensation is centered on the distribution of these corpuscles located in the glans.

Further, in many indigenous societies like Ghana, typical socio-cultural norms (e.g., power distance and masculinity orientation) could indirectly influence circumcised men to sexually explore with multiple partners to prove their prowess (i.e., virility), a characteristic of one's manliness could also account for the findings noted. Other cultural and social factors such as the stigma associated with uncircumcision may contribute to the current finding. Women may not be willing to engage in sexual intercourse with uncircumcised men due to health issues associated with the condition; hence, this perception might increase their vulnerability towards circumcised men (Grund et al., 2019; Morris et al., 2019). For some religions (e.g., Christians/Muslims) and ethnic

groups (e.g., Akan, Mole-Dagbon) in Ghana, male circumcision is compulsory for the male child and, therefore, women are more likely to see sexual intercourse with such men as “safe” (Adu-Gyamfi & Adjei, 2014). The proportionally reduced number of men who are uncircumcised among the Ghanaian populace may also contribute to this very finding. Future research could investigate risk compensation among circumcised men in ecological setting (e.g., using ecological momentary assessment) instead of the randomized control trials and/or other artificial contexts that currently dominate circumcision literature (Eaton & Kalichman, 2009). For example, further studies could target alterations in beliefs and perceptions among circumcised men on long-term sexual behaviour changes.

With the covariates, circumcised men with primary level of education were more likely to have multiple sexual partners, compared to those with no education. The finding is in line with the findings of previous studies, which established that men with some level of education are more likely to have multiple sexual partners (Dolcini et al., 1993, pp. 208–214; Ho-Foster et al., 2010). The authors explained that men with some level of education are more likely to have more wealth through employment and hence are able to afford additional sexual partners. Men with richest, richer, and middle wealth status had the highest likelihood of having multiple sexual partners, compared to those with poorest wealth status. Madise et al. (2007) confirm that poverty may prevent men from engaging in multiple sexual partners because they may not be able to take care of their partners’ financial and health needs. Additionally, the fear of pregnancy might be a factor which could deter men from engaging in multiple sexual behaviours (Doku, 2012). Additionally, linking the ability of men to afford contraceptive usage in Ghana may increase their chances of engaging in multiple sexual behaviours. These propositions confirm why men with richest, richer, and middle wealth status are more likely to have multiple sexual partners in Ghana.

Men who professed the Islamic faith were less likely to engage in multiple sexual partnership, compared to Christians. Despite both religions holding strong practices regarding sexuality, Agyei-Asabere (2016) indicates that the Islamic religion upholds stronger views, compared to their counterparts. Therefore, Islamic men are likely to defray from engaging in unaccustomed multiple sexual relations for the fear of ostracism. Another possible explanation is that heteronormative Christian sexual norms may really encourage Christian men to have multiple sexual partners, compared to their Muslim counterparts (Pan et al., 2016). Similarly, the current trend regarding moral degradation (e.g., casual sexual behaviour) across many developing societies has eroded the somewhat strong moral arguments on doctrinal position of some Christian denominations on sexuality. Therefore, it is unsurprising to see many Christian men having multiple sexual partners. Therefore, religious doctrines on sexual relations may play a major role in regulating the extent to which members of such affiliations may be predisposed to risky sexual behaviours (Malamba et al., 1994; Slaymaker et al., 2004). We admit that some of these explanations on the role of religion in multiple sexual partnership from previous studies could be biased by differences in study settings as well as issues related to over and under-reporting (i.e., social desirability).

Regarding residential location, men who resided in the Brong Ahafo, Upper East, and Ashanti regions were less likely to engage in multiple sexual partnership. This finding partially confirms the observation by Addai (1999) that the Ashantis, Bonos, and Ahafo as well as the Dagombas of Brong Ahafo and Upper East respectively, are less likely to engage in culturally untoward sexual behaviours such as having multiple sexual partnerships. These ethnic groups are more likely to hold sexual mischief as taboos. Therefore, this finding is consistent with the documentation regarding the role culture plays in shaping sexual behaviours among Ghanaian men (Anarfi & Awusabo, 1993). Future studies could explore reasons using qualitative designs to better understand the diverse roles that culture and ethnicity may play in multiple sexual partnership in Ghana.

4.1. Strength and limitations

The strengths of the study lies in the relatively large sample size and the multistage sampling technique employed (i.e., two stage), which makes the data nationally representative, hence the possibility to generalise these findings to men in Ghana. Admittedly, this study has various limitations. These limitations include our inability to claim cause-effect relationship between the explanatory and outcome variables in the study due to the cross-sectional nature of the data analysed. Similarly, the use of secondary data restricts the scope of this current study to measured variables within the dataset. The Ghana Demographic and Health Survey did not collect enough information on circumcision to allow in-depth analysis. Similar to most demographic surveys, the lack of qualitative data limits this in-depth understanding and explanation of patterns found within the quantitative analysis of this study. We also admit that collecting data on sexual behaviour sometimes is difficult, because it is considered private and intimate and has a link with self-image and personality. As most of the variables were also self-reported, the possibility of social desirability bias is high. Additionally, research evidence suggests that, in some instances, men tend to either under or over-report their number of sexual partners (e.g., Clark et al., 2011; Smith, 1992).

5. Conclusion and practical implications

Summarily, we found that men who have been circumcised are more likely to engage in multiple sexual relationships, compared to those who have not been circumcised. Additionally, men with primary level of education and those who belong to the middle, richer, and richest wealth are more likely to have multiple sexual partners. Likewise, men who professed the Islamic faith and men in Brong Ahafo, Upper East, and Ashanti regions are less likely to engage in multiple sexual partnership. Findings suggest that circumcised men in Ghana may continue to be exposed to high risky sexual behaviours (i.e., having multiple sexual partners and perhaps, unprotected sex). Based on the current findings, educational campaigns by stakeholder groups (e.g., Ministry of Health, in collaboration with the National Commission on Civic Education, educational institutions) should sensitize the sexually active population at the community level to consistently use condoms, especially when having multiple sexual partners, even when a man is circumcised. Although there are benefits of male circumcision (e.g., prevention method), educational messages must clearly emphasize that male circumcision should not substitute precautionary measures such as delay in the onset of sexual relationships, averting penetrative sex, reducing the number of sexual partners as well as correct and consistent use of male or female condoms regardless of one’s social standing. Women as sexual partners should also strongly negotiate for condom use with circumcised men with the clear understanding that they are not fully protected against sexually transmitted diseases, including HIV.

Declaration of competing interest

The authors declare that they have no competing interests.

CRedit authorship contribution statement

Bright Opoku Ahinkorah: Conceptualization, Methodology, Formal analysis, Writing - original draft, Supervision, Methodology, Writing - review & editing. **John Elvis Hagan:** Conceptualization, Methodology, Formal analysis, Writing - original draft, Supervision, Methodology, Writing - review & editing. **Abdul-Aziz Seidu:** Conceptualization, Methodology, Formal analysis, Writing - original draft, Supervision, Methodology, Writing - review & editing. **Eric Torgbenu:** Conceptualization, Methodology, Formal analysis, Writing - original draft, Supervision, Methodology, Writing - review & editing. **Eugene Budu:** Data curation, Writing - original draft, Writing - review & editing.

Thomas Schack: Conceptualization, Methodology, Formal analysis, Writing - original draft, Supervision, Methodology, Writing - review & editing.

Acknowledgements

We acknowledge Measure DHS for providing us with the data upon which the findings of this study were based. We sincerely thank the Neurocognition and Action-Biomechanics Research Group, Bielefeld University, Germany for providing financial support for the publication of this research.

References

- Addai, I. (1999). Ethnicity and sexual behavior in Ghana. *Social Biology*, 46(1-2), 17-32.
- Adomako, A. A., Okyerefo, M. P. K., & Pervarah, M. (2009). Phallic competence: Fatherhood and the making of men in Ghana. *Cult Soc. Masc.*, 1(1), 59-78.
- Adu-Gyamfi, S., & Adjei, P. O.-W. (2014). Twentieth century wanzams among the asante people of Ghana: A historical study of the facts on male circumcision. *Open Journal of Preventive Medicine*, 4(9), 730.
- Ageyi-Asabere, C. (2016). *Multiple sexual partnerships and sexually transmitted infections*. Doctoral dissertation. University of Ghana.
- Aliaga, A., & Ren, R. (2006). Optimal sample sizes for two-stage cluster sampling in demographic and health surveys. *Demographics Health Res.*, 30.
- Anarfi, J. K. (2006). Talking and deciding about sex and contraception in Ashanti towns. In C. Oppong, M. Y. Oppong, & I. Odotei (Eds.), *Sex and gender in an era of AIDS: Ghana at the turn of the millennium*. Accra: Sub Saharan Publishers.
- Anarfi, J. K., & Awusabo-Asare, K. (1993). Experimental research on sexual networking in some selected areas of Ghana. *Health Trans. Rev.*, 29-43.
- Auvert, B., Taljaard, D., Lagarde, E., Sobngwi-Tambekou, J., Sitta, R., & Puren, A. (2005). Randomised, controlled intervention trial of male circumcision for reduction in HIV infection risk: The ANRS trial. *PLoS Medicine*, 2(11), e298.
- Bailey, R. C., Moses, S., Parker, C. B., Agot, K., Maclean, I., Krieger, J. N., Williams, C. F. M., Campbell, R. T., & Ndinya-Achola, J. O. (2005). Male circumcision for HIV prevention in young men in Kisumu, Kenya: A randomised controlled trial. *Lancet*, 369, 643-656.
- Bailey, R. C., Moses, S., Parker, C., Agot, K., Maclean, I., Krieger, J. N., Williams, C. F. M., Campbell, R. T., & Ndinya-Achola, J. O. (2007). Male circumcision for HIV prevention in young men in Kisumu, Kenya: A randomised controlled trial. *The Lancet*, 369, 643-656.
- Balekang, G. B., & Dintwa, K. F. (2016). A comparison of risky sexual behaviours between circumcised and uncircumcised men aged 30-44 years in Botswana. *African Health Sciences*, 16(1), 105-115.
- Bossio, J. A., Pukall, C. F., & Steele, S. (2014). A review of the current state of the male circumcision literature. *The Journal of Sexual Medicine*, 11(12), 2847-2864.
- Boyle, G. J., & Hill, G. (2012). Circumcision-generated emotions bias medical literature. *Brit J Urol Int*, 109, 11.
- Caldwell, J. C., & Caldwell, P. (1994). The neglect of an epidemiological explanation for the distribution of HIV/AIDS in sub-Saharan Africa: Exploring the male circumcision hypothesis. *Health Trans. Rev.*, 23-46.
- Castellsagué, Peeling, Rosanna W., Franceschi, Silvia, De Sanjosé, Silvia, Smith, Jennifer S., Albero, Ginesa, Díaz, Mireia, Herrero, Rolando, Munoz, Nubia, & Bosch, F. Xavier (2005). Chlamydia trachomatis infection in female partners of circumcised and uncircumcised adult men. *American journal of epidemiology*, 162(9), 907-916.
- Centers for Disease Control and Prevention. (2010). **Sexually transmitted diseases: Bacterial vaginosis**. CDC fact sheet. Atlanta, GA: Centers for disease control and prevention. Available at: <http://www.cdc.gov/std/bv/STDFact-BacterialVaginosis.htm>. (Accessed 4 February 2020).
- Cherpes, T. L., Hillier, S. L., Meyn, L. A., Busch, J. L., & Krohn, M. A. (2008). A delicate balance: Risk factors for acquisition of bacterial vaginosis include sexual activity, absence of hydrogen peroxide-producing lactobacilli, black race, and positive herpes simplex virus type 2 serology. *Sexually Transmitted Diseases*, 35, 78-83.
- Cherpes, T. L., Meyn, L. A., Krohn, M. A., & Hillier, S. L. (2003). Risk factors for infection with herpes simplex virus type 2: Role of smoking, douching, uncircumcised males, and vaginal flora. *Sexually Transmitted Diseases*, 30, 405-410.
- Clark, S., Kabiru, C., & Zulu, E. (2011). Do men and women report their sexual partnerships differently? Evidence from Kisumu, Kenya. *International Perspectives on Sexual and Reproductive Health*, 37(4), 181.
- Connolly, C. A., Shishana, O., Simbayi, L., & Colvin, M. (2004). HIV and circumcision in South Africa (Abstract No. MoPec3491). Bangkok, Thailand. In *15th International AIDS Conference, Bangkok, Thailand* (pp. 11-16).
- Cox, G., Krieger, J. N., & Morris, B. (2015). Histological correlates of penile sexual sensation: Does circumcision make a difference? *Sexual Medicine*, 3(2), 76-85.
- Demographic and health surveys. (2006). MEASURE DHS. <http://www.measuredhs.com>. (Accessed 21 September 2006).
- Doku, D. (2012). Substance use and risky sexual behaviours among sexually experienced Ghanaian youth. *BMC Public Health*, 12(1), 571.
- Dolcini, M. M., Catania, J. A., Coates, T. J., Stall, R., Hudes, E. S., Gagnon, J. H., & Pollack, L. M. (1993). *Demographic characteristics of heterosexuals with multiple partners: The national AIDS behavioral surveys*. Family planning perspectives.
- Dorina, O., Zuma, K., Zungu, N., Shisana, O., & Mehlokhulu, V. (2014). Determinants of Multiple sexual partnerships in South Africa 2014. *Journal of Public Health*, 1-10.
- Drain, P. K., Halperin, D. T., Hughes, J. P., Klausner, J. D., & Bailey, R. C. (2006). Male circumcision, religion, and infectious diseases: an ecologic analysis of 118 developing countries. *BMC Infectious Diseases*, 6(1), 172-179.
- Eaton, L., & Kalichman, S. C. (2009). Behavioral aspects of male circumcision for the prevention of HIV infection. *Current HIV*, 6(4), 187-193.
- Exavery, A., Kanté, A. M., Tani, K., Hingora, A., & Phillips, J. F. (2015). *Sociodemographic drivers of multiple sexual partnerships among women in three rural districts of Tanzania* (Vol. 7, p. 105). HIV/AIDS (Auckland, NZ).
- Friedrich, M. J. (2014). Adult male circumcision not associated with risky sexual behavior. *Journal of the American Medical Association*, 312(11), 1088-1088.
- Glazier, A., Gülmezoglu, A. M., Schmid, G. P., Moreno, C. G., & Van Look, P. F. (2006). Sexual and reproductive health: A matter of life and death. *The Lancet*, 368(9547), 1595-1607.
- Gray, R. H., Kigozi, G., Serwadda, D., Makumbi, F., Nalugoda, F., & Watya, S. (2009). The effects of male circumcision on female partners' genital tract symptoms and vaginal infections in a randomized trial in Rakai, Uganda. *American Journal of Obstetrics and Gynecology*, 200, 1-7.
- Gray, R. H., Kigozi, G., Serwadda, D., Makumbi, F., Watya, S., Nalugoda, F., Kiwanuka, N., Moulton, L. H., Chaudhary, M. A., Chen, M. Z., & Sewankambo, N. K. (2007). Male circumcision for HIV prevention in men in Rakai, Uganda: a randomised trial. *The Lancet*, 369(9562), 657-666.
- Grund, J. M., Bryant, T. S., Toledo, C., Jackson, I., Curran, K., Zhou, S., & Bock, N. (2019). Association of male circumcision with women's knowledge of its biomedical effects and with their sexual satisfaction and function: A systematic review. *AIDS and Behavior*, 23(5), 1104-1114.
- Halata, Z., & Munger, B. L. (1986). The neuroanatomical basis for the prostatic sensitivity of the human glans penis. *Brain Research*, 371(2), 205-230.
- Ho-Foster, A., Laetsang, D., Masisi, M., Anderson, M., Thloive, D., Cockcroft, A., & Andersson, N. (2010). Gender-specific patterns of multiple concurrent sexual partnerships: A national cross sectional survey in Botswana. *AIDS Care*, 22(8), 1006-1011.
- Hutcheson, J. C. (2004). Male neonatal circumcision: Indications, controversies and complications. *Urologic Clinics*, 31(3), 461-467.
- Kebaabetswe, P., Lockman, S., Mogwe, S., Mandevu, R., Thior, I., Essex, M., & Shapiro, R. L. (2003). MaleCircumcision: An acceptable strategy for HIV prevention in Botswana. *Sexually Transmitted Infections*, 79(3), 214-219.
- Kibira, S. P. S., Sandoy, I. F., Daniel, M., Atuyambe, L. M., & Makumbi, F. E. (2015). A comparison of sexual risk behaviours and HIV seroprevalence among circumcised and uncircumcised men before and after implementation of the safe male circumcision programme in Uganda. *BMC Public Health*, 16(1), 7.
- Koblin, B. A., Husnik, M. J., Colfax, G., Huang, Y., Madison, M., Mayer, K., & Buchbinder, S. (2006). Risk factors for HIV infection among men who have sex with men. *AIDS*, 20(5), 731-739.
- Madise, N., Zulu, E., & Ciera, J. (2007). Is poverty a driver for risky sexual behaviour? Evidence from national surveys of adolescents in four african countries. *African Journal of Reproductive Health*, 11(3), 83-98.
- Maher, D., Waswa, L., Karabarinde, A., & Baisley, K. (2011). Concurrent sexual partnerships and associated factors: A cross-sectional population-based survey in a rural community in Africa with a generalised HIV epidemic. *BMC Public Health*, 11(1), 651.
- Malamba, S. S., Nunn, A. J., Kengeya-Kayondo, J. F., Seeley, J. A., & Mulder, D. W. (1994). Risk factors for HIV-1 infection in adults in a rural Ugandan community: a population study. *AIDS*, 8(1), 81-86.
- Mapoma, C. C., & Bwalya, B. B. (2017). Does circumcision influence risky sexual behaviour among circumcised sexually active men in Zambia? Evidence from the 2013-14 Zambia demographic and health survey. *Sexually Transmitted Infections*, 3(4), 5.
- Morris, B. J., Hankins, C. A., Lumbers, E. R., Mindel, A., Klausner, J. D., Krieger, J. N., & Cox, G. (2019). Sex and male circumcision: Women's preferences across different cultures and countries: A systematic review. *Sexual Medicine*, 7(2), 145-161.
- Morris, B. J., Wamai, R. G., Henebeng, E. B., Tobian, A. A., Klausner, J. D., Banerjee, J., & Hankins, C. A. (2016). Estimation of country-specific and global prevalence of male circumcision. *Popul. Health Metrics*, 14(1), 4.
- Peltzer, K., Cheikh, I. N., Muula, A. S., Bowa, K., Okeke, L., Boiro, H., & Chimbwete, C. (2007). Editorial review: Male circumcision, gender and HIV prevention in sub-Saharan Africa: A (social science) research agenda. *Journal of Social Aspects of HIV/AIDS Research Alliance: J. Social Aspects HIV/AIDS*, 4(3), 658-667. <https://doi.org/10.1080/17290376.2007.9724889>.
- Scott, B. E., Weiss, H. A., & Viljoen, J. I. (2005). The acceptability of male circumcision as an HIV intervention measure among a rural Zulu population, Kwazulu Natal, South Africa. *AIDS Care*, 17(3), 304-313.
- Sidler, D., Smith, J., & Rode, H. (2008). Neonatal circumcision does not reduce HIV/AIDS infection rates. *South African Medical Journal*, 98(762-4), 766.
- Slymaker, E., Walker, N., Zaba, B., & Colliumben, M. (2004). Unsafe sex. In M. Ezzati, A. D. Lopez, A. Rodgers, & C. J. L. Murray (Eds.), *Comparative quantification of health risks: Global and regional burden of disease attributable to selected major risk factors volume 2*. Geneva: World Health Organisation.
- Smith, T. W. (1992). Discrepancies between men and women in reporting number of sexual partners: A summary from four countries. *Social Biology*, 39(3-4), 203-211.
- Sobngwi-Tambekou, J., Taljaard, D., Nieuwoudt, M., Lissouba, P., Puren, A., & Auvert, B. (2009). Male circumcision and *Neisseria gonorrhoeae*, *Chlamydia trachomatis* and *Trichomonas vaginalis*: Observations after a randomised controlled trial for HIV prevention. *Sexually Transmitted Infections*, 85, 116-120.
- Tsikata, D. (2007). Women in Ghana at 50: Still struggling to achieve full citizenship? *Ghana Stud*, 10, 163-206.

- UN Joint Programme on HIV/AIDS. (2009). UNAIDS report on the global AIDS epidemic: 2009. Available at: http://www.unaids.org/en/media/unaids/.../unaids_global_report_2013.
- UNAIDS. (2007). *Voluntary medical male circumcision: Global trends and determinants of prevalence, safety, and acceptability*. Geneva: World Health Organization.
- Wawer, M. J., Tobian, A. A., Kigozi, G., Kong, X., Gravitt, P. E., Serwadda, D., Nalugoda, F., Makumbi, F., Ssempiija, V., Sewankambo, N., Watya, S., Eaton, B. S., Oliver, B. A., Chen, M. Z., Reynolds, S. V., Quinn, & Gray, R. H (2011). Effect of circumcision of HIV-negative men on transmission of human papillomavirus to HIV-negative women: a randomised trial in Rakai, Uganda. *The Lancet*, 377(9761), 209–218.
- Weiss, H., Larke, N., Halperin, D., & Schenker, I. (2010). *Neonatal and child male circumcision: A global review*. Geneva Switzerland: UNAIDS Technical Bulletin. UNAIDS.
- WHO/UNAIDS. (2007). Joint press release between WHO/UNAIDS issued on 28 March: WHO and UNAIDS announce recommendations from expert consultation on male circumcision HIV prevention. Retrieved at <http://www.who.int/mediacentre/news/releases/2007/pr10/en/index.html>.
- Williams, B. G., Lloyd-Smith, J. O., Gouws, E., Hankins, C., Getz, W. M., Hargrove, J., & Auvert, B. (2006). The potential impact of male circumcision on HIV in Sub-Saharan Africa. *PLoS Med*, 3(7), Article e262.
- World Health Organization. (2008). *Male circumcision: Global trends and determinants of prevalence, safety and acceptability (No. UNAIDS/07.29 E/JC1320E)*. Geneva: World Health Organization.
- World Health Organization (WHO). (2007). *A safer future: Global public health security in the 21st century* (Geneva, Switzerland).