

Educational level is associated with condom use within non-spousal partnerships in four cities of sub-Saharan Africa

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Background: Rates of condom use in sub-Saharan Africa have remained too low to curb HIV/sexually transmitted disease (STD) epidemics. A better understanding of the main determinants of condom use would aid promotion.

Methods: Cross-sectional population surveys were conducted in four cities in sub-Saharan Africa: Yaoundé, Cameroon; Cotonou, Benin; Ndola, Zambia; and Kisumu, Kenya. In each city, the aim was to interview a random sample of 1000 men and 1000 women aged 15–49 years, including questions on characteristics of non-spousal partnerships in the past 12 months.

Results: Data on condom use were available for 4624 non-spousal partnerships. In the four cities, the proportion of partnerships in which condoms were used always or most of the time ranged from 23.8 to 33.5% when reported by men and from 10.7 to 25.9% when reported by women. Based on the reports from men, condom use was associated with higher educational level of the male partner in Yaoundé [adjusted odds ratio (aOR) = 1.76] and Ndola (aOR = 2.94) and with higher educational level of the female partner in Cotonou (aOR = 2.36) and Kisumu (aOR = 2.76). Based on the reports from women, condom use was associated with higher educational level of the female partner in Kisumu (aOR = 2.60) and Ndola (aOR = 4.50) and with higher educational level of the male partner in Yaoundé (aOR = 3.32). Associations with other determinants varied across cities and for men and women.

Conclusions: Education was found to be a key determinant of condom use in all four cities. This suggests that educational level increases response to condom promotion and highlights the need for special efforts to reach men and women with low educational attainment.

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Introduction

The efficacy of condoms in reducing the transmission of HIV and other sexually transmitted diseases (STDs)

is well established [1,2]. In the absence of an efficacious vaccine, the promotion of safer sexual behaviour, including condom use, remains one of the key weapons with which to tackle the epidemics.

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More than 70% of HIV-infected people in the world live in sub-Saharan Africa, but despite extensive condom promotion and availability campaigns, the level of condom use is still insufficient. For example, we found that in Cotonou, Benin, Kisumu, Kenya and Ndola, Zambia, only 27–31% of men and 11–17% of women reported having ever used condoms with one of their non-spousal partners in the last 12 months. In Yaoundé, Cameroon, 50% of men and 32% of women reported having ever used a condom. No protective impact of condoms against HIV was found in any of the four populations [3].

Many studies of determinants of condom use have been carried out [4–9], some in sub-Saharan Africa [10–14]. Factors associated with increased condom use ranged from type of partner, education, occupation, age, multiple sexual partners, being unmarried, travel and alcohol use. None of these factors were consistently found across those studies, but they are difficult to compare directly since they come from various populations (commercial sex workers, clients, general population, and teenagers) and different time periods.

This study is part of a comparative study aiming to identify factors explaining the heterogeneity of HIV epidemics in four African cities with different levels of HIV infection. In this paper, we describe predictors of condom use within non-spousal partnerships, considering factors related to respondents, their partners, and the characteristics of the partnership itself.

Methods

As part of the multicentre study on factors determining the differential spread of HIV, a standardized cross-sectional population survey was conducted in four cities in sub-Saharan Africa in 1997–1998, two (Yaoundé and Cotonou) with a relatively low level of HIV infection among adults (< 5%), and two (Ndola and Kisumu) with a high HIV prevalence (> 20%). Households were randomly selected by two-stage cluster sampling and all adults aged 15–49 years and present in the households were asked to participate in the study. After giving their consent, participants were interviewed by trained local interviewers using a standardized questionnaire on sexual behaviour and socio-demographic characteristics. Ethical approval for the study was obtained from the national ethical committee in each country, and from the ethical committees of the Institute of Tropical Medicine, Antwerp, the London School of Hygiene and Tropical Medicine and The Population Council. The detailed design and main results of this study are described elsewhere [15]. The overall response rate to the questionnaire was 95% in Cotonou, 81% in Yaoundé, 85%

in Kisumu and 81% in Ndola. Shortfalls in response were mainly due to failure to find people, despite repeat visits, rather than refusal to take part in the study. The HIV prevalence in the four cities was 3.4, 5.9, 25.9 and 28.4%, respectively.

Participants were asked to provide information on their non-spousal partnerships of the last 12 months, up to a maximum of eight partnerships. They were asked to estimate the frequency of condom use within each partnership (possible responses were: 'always'/'most of the time'/'rarely'/'never'). We have assessed predictors of 'frequent' condom use in each of the reported non-spousal partnerships, defined as 'always' or 'most of the time' as opposed to 'rarely' or 'never'. Because condom use may depend on both partners' characteristics, the unit of analysis was the partnership and not the respondent.

Potential predictors of condom use referred either to the respondent, to the partner or to the partnership itself. Variables related to the respondent were: age, sex, ethnic group, religion, place of birth, educational level, migration, occupation, marital status, alcohol use, number of partners before marriage, lifetime number of partners, age at first sex, number of non-spousal partners in the last 12 months, for female respondents only, sex during menstruation and dry sex practices, and for male respondents only, circumcision status. Variables related to partners (as reported by the respondent) were: educational level, age, age difference from respondent, and marital status. Respondents were also asked whether they thought their partner had sex with other partners in exchange for money. Variables related to the partnership were: duration, duration before having sexual intercourse, exchange of money, and contact with a commercial sex worker (for men). Men rarely described non-spousal partners as prostitutes, and exchange of money was not useful alone as an identifier of sex work contact [16]. Consequently, the following definition of contact with a commercial sex worker was used: partner described as a prostitute or it was a relationship where money was always or often exchanged and any one of the following: duration of relationship 1 day or less; sex on the day of meeting; female partner was reported to have 10 or more partners; female partner reported to exchange sex for money with others. Respondents were also asked to describe their relationship with the partner. We have defined regular partners as those referred to as 'girl/boyfriend', 'fiancée', 'lover', 'old timer' or 'wife/husband to be', and all others as non-regular.

Education level was recorded as: no education; primary not completed; primary; secondary; higher. Those categories were further grouped for the multivariate analysis to balance sample size in each group. Respon-

dents could answer 'I don't know' when asked about the educational level of their partners.

Analyses of the association between potential predictors and frequent condom use were performed city by city and among men and women separately. A single respondent could contribute to several records in the analysis and these cannot be considered to be independent of each other. The generalized estimating equations method [17] is a method to fit statistical models incorporating dependency, and allows the user to specify the type of dependency. The coefficients of the model can be interpreted as those from ordinary logistic regression analysis. We fitted the model using the GENMOD procedure from the SAS software package (SAS Institute, Cary, North Carolina, USA). We present results from a model in which the correlation coefficients between observations from a single respondent are identical ('exchangeable' in SAS terminology). We used a stepwise backward selection procedure: variables not associated with frequent condom use were excluded from the model step by step and we stopped the process when all variables were associated with frequent condom use at a 5% level of significance. In each city and for each gender, only variables associated ($P < 0.05$) with frequent condom use were submitted to the multivariate model. Age and ethnic group were kept in the model *a priori* even if not statistically significant. Interactions between variables of the model were subsequently assessed.

Results

The proportion of men aged 15–49 years reporting any non-spousal partnerships in the last 12 months was 51, 74, 48 and 37% in Cotonou, Yaoundé, Kisumu and Ndola respectively. Equivalent figures for women were 20, 49, 21 and 15%. Further analysis is restricted to those with at least one non-spousal partnership in the last 12 months. Men reported a mean (range) of 1.68 (range, 1–21) non-spousal partnerships in Cotonou, 2.63 (range, 1–50) in Yaoundé, 1.67 (range, 1–10) in Kisumu and 1.94 (range, 1–13) in Ndola. Women reported a mean (range) of 1.16 (range, 1–4) non-spousal partnerships in Cotonou, 1.48 (range, 1–8) in Yaoundé, 1.23 (range, 1–3) in Kisumu and 1.08 (range, 1–3) in Ndola.

Details of 4721 non-spousal partnerships were recorded from the interviews of 2717 respondents reporting at least one non-spousal partnership over the last 12 months. Data on condom use were available for 3286 of the 3365 non-spousal partnerships reported by men and for 1338 of the 1356 non-spousal partnerships reported by women. On the basis of reports from men, the proportion of partnerships in which condoms were

reported to be used 'always' or 'most of the time' (frequent use) was 23.8, 33.5, 25.7 and 30.3% in Cotonou, Yaoundé, Kisumu and Ndola, respectively. On the basis of reports from women, the proportion of partnerships in which condoms were reported to be used frequently was 10.7, 20.3, 22.0 and 25.9% in the same cities, respectively.

Factors associated with the proportion of partnerships in which the respondent reported frequent condom use are shown in Tables 1 and Table 2. Only those variables that were significantly associated with frequent condom use in at least one gender in one site were tabulated.

Age

Reports of frequent condom use did not vary with age of the male respondent but young women were more likely than older women to report frequent condom use in Yaoundé and Kisumu. When adjusted for other factors (Tables 3 and Table 4), being less than 30 years old was associated with frequent condom use among women from Kisumu and Ndola, but not in the other sites.

Ethnic groups

Much variation in the reports of frequent condom use was found according to ethnic group. After adjustment for other factors, men from the Goun ethnic group in Cotonou and women from the Bemba ethnic group in Ndola were less likely to report frequent condom use. Men from Kisumu not belonging to one of the two main ethnic groups (Luo and Luhya) were more likely to report frequent condom use.

Educational level

There was a significant increase in condom use by increasing educational status in all four sites in both men and women (Tables 1 and Table 2). In multivariate analysis, higher levels of education of at least one of the two partners in a given partnership were predictive of higher levels of condom use in all cities. In Yaoundé, the educational level of the male partner seemed to be more important: based on the answers from men, the respondent's educational level was associated with frequent condom use with an adjusted odds ratios (aOR) of 1.76. Answers from the women were consistent with these findings as the educational level of the partner of female respondents was associated with frequent condom use (aOR = 3.32).

The educational level of the female partner seemed to be more important in Cotonou and Kisumu: in Cotonou, the educational level of the female partner was associated with higher condom use based on reports from men (aOR = 2.36), and female respondents who were students were also more likely to report condom use (aOR = 3.25). In Kisumu, reports

Table 1. Predictors of frequent condom use^a with non-spousal partners. Percentage reporting frequent condom use (no. of partnerships): male respondents.

	Cotonou, Benin	Yaoundé, Cameroon	Kisumu, Kenya	Ndola, Zambia
Variables related to the respondent				
Age group of respondent				
15–29 years	24 (521)	35 (1082)	26 (462)	29 (339)
30–39 years	26 (144)	33 (336)	22 (92)	37 (76)
40–49 years	18 (49)	27 (146)	27 (22)	23 (17)
Ethnic group ^b				
1	29 (58)*	30 (786)**	24 (447)***	33 (134)*
2	27 (264)	37 (282)	14 (72)	26 (240)
3	11 (84)	47 (99)		
Other	24 (308)	34 (397)	54 (57)	43 (58)
Religion				
Protestant	12 (34)*	41 (308)***	26 (306)	23 (246)***
Catholic	26 (485)	29 (962)	25 (170)	39 (127)
Muslim	24 (89)	40 (179)	43 (28)	18 (11)
Other or no religion	16 (106)	37 (114)	22 (72)	50 (48)
Occupation				
Sales or office	23 (154)	30 (349)***	27 (97)	31 (116)**
Professional	22 (37)	37 (178)	27 (34)	61 (31)
Student	29 (197)	44 (378)	26 (106)	24 (62)
Others including manual and low skilled workers	24 (517)	34 (892)	25 (416)	27 (283)
Educational level of respondent				
No school education	8 (53)***	46 (35)***	40 (10)**	0 (7)***
Primary not completed	17 (174)	31 (61)	9 (117)	28 (88)
Primary	26 (368)	30 (961)	28 (236)	21 (207)
Secondary	31 (87)	33 (319)	32 (188)	44 (99)
Higher	38 (32)	51 (188)	24 (25)	61 (31)
Alcohol consumption during last 4 weeks				
More than once a week	25 (242)	29 (525)**	24 (150)	36 (260)**
Less than once a week	23 (472)	36 (1039)	26 (425)	22 (172)
Respondent is currently married				
No	25 (519)	36 (1185)**	23 (426)*	26 (325)
Yes	25 (195)	26 (379)	33 (150)	22 (107)
Had more than three trips in the last 12 months				
No	22 (476)	33 (959)	27 (399)	27 (381)***
Yes	27 (238)	34 (593)	24 (177)	55 (47)
More than one non-spousal partner in the last 12 months				
No	23 (272)	27 (209)*	25 (209)	31 (127)
Yes	25 (441)	35 (1355)	26 (367)	30 (300)
Variables related to the partner				
Educational level of partner				
No school education	14 (154)	32 (47)	0 (10)	20 (15)
Primary not completed	12 (111)	23 (44)	13 (93)	17 (64)
Primary	29 (312)	30 (959)	27 (245)	28 (170)
Secondary	35 (34)	42 (193)	28 (158)	45 (71)
Higher	33 (6)	54 (35)	44 (16)	46 (13)
Don't know	31 (95)	40 (286)	33 (54)	32 (98)
Description of partner				
Partner is regular	22 (577)**	32 (1144)*	25 (390)	27 (327)*
Partner is not regular	34 (137)	38 (420)	28 (186)	40 (105)
Knowledge of partner's characteristics				
Less than two questions with 'don't know' as response	24 (700)	33 (1499)***	24 (551)**	30 (361)
At least two questions with 'don't know' as response	36 (14)	57 (65)	56 (25)	31 (71)
Variables related to the partnership				
The partner is a commercial sex worker ^c				
No	23 (663)	32 (1330)*	26 (547)	29 (359)
Yes	31 (51)	42 (234)	26 (29)	37 (73)
Duration of partnership				
0 or 1 day	33 (84)*	46 (184)***	47 (45)**	54 (56)***
Between 2 and 183 days	27 (288)	33 (660)	25 (219)	27 (169)
More than 183 days	21 (276)	31 (710)	23 (302)	31 (117)
Days before sex				
0 day	33 (39)	40 (230)*	53 (19)*	34 (59)
1 day and more	23 (675)	32 (1327)	25 (556)	30 (370)

^a Frequent use of condom in a given partnership is defined as declaring using a condom 'always' or 'most of the time' as opposed to 'rarely' or 'never'. For one-off sexual partnerships, the use was considered as 'frequent' when the sole intercourse was protected. ^b Ethnic groups are in Cotonou: Mina (1) Fon (2) Goun (3); in Yaoundé: Pahouin (1) Bamiléké (2) Bassa-Bakoko (3); in Kisumu: Luo (1) Luhya (2); in Ndola: Nyanja (1) Bemba (2). ^c See text for definition of commercial sex worker. * $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$: trend test for age, educational level and duration of partnership. Overall comparison χ^2 for all other variables.

Table 2. Predictors of frequent condom use^a with non-spousal partners. Percentage reporting frequent condom use (no. of partnerships): female respondents.

	Cotonou, Benin	Yaoundé, Cameroon	Kisumu, Kenya	Ndola, Zambia
Variables related to the respondent				
Age group of respondent				
15–29 years	12 (182)	22 (555)*	25 (197)**	28 (110)
30–39 years	9 (22)	20 (116)	10 (30)	26 (27)
40–49 years	0 (11)	9 (64)	0 (14)	0 (10)
Ethnic group ^b				
1	13 (24)	17 (414)*	20 (196)	36 (36)**
2	9 (76)	26 (100)	30 (33)	15 (85)
3	4 (24)	29 (83)		
Other	13 (91)	21 (138)	25 (12)	46 (26)
Religion				
Protestant	0 (13)	24 (173)	22 (134)	28 (246)
Catholic	12 (149)	19 (518)	25 (61)	18 (127)
Muslim	17 (23)	31 (16)	50 (6)	– (0)
Other or no religion	3 (30)	22 (27)	13 (40)	43 (7)
Occupation				
Housewife	6 (17)*	16 (193)	7 (28)	4 (24)**
Sales or office	6 (87)	19 (172)	18 (66)	25 (40)
Professional	0	24 (25)	50 (2)	50 (8)
Student	20 (13)	26 (223)	24 (33)	50 (20)
Others including manual and low skilled workers	15 (111)	23 (345)	26 (145)	31 (75)
Educational level of respondent				
No school education	9 (55)*	18 (17)**	6 (18)***	30 (10)**
Primary not completed	5 (63)	10 (67)	14 (87)	8 (40)
Primary	13 (87)	19 (540)	23 (91)	27 (62)
Secondary	38 (8)	30 (90)	43 (44)	42 (24)
Higher	50 (2)	38 (21)	0 (1)	46 (11)
Alcohol consumption during last 4 weeks				
Less than once a week	12 (180)	23 (581)*	21 (213)	27 (117)
More than once a week	3 (32)	12 (153)	29 (28)	20 (30)
Respondent is currently married				
No	11 (210)	21 (644)	22 (220)	26 (138)
Yes	0 (5)	18 (89)	19 (21)	22 (9)
Had more than three trips in the last 12 months				
No	10 (174)	20 (564)	20 (208)	25 (128)
Yes	12 (41)	21 (170)	33 (33)	40 (15)
More than one non-spousal partner in the last 12 months				
No	12 (161)	21 (339)	23 (160)	25 (123)
Yes	6 (54)	20 (396)	21 (81)	33 (21)
Variables related to the partner				
Educational level of partner				
No school education	19 (16)	0 (8)***	0 (7)**	– (0)
Primary not completed	0 (8)	0 (4)	8 (12)	0 (4)
Primary	10 (82)	11 (272)	18 (63)	24 (37)
Secondary	16 (31)	23 (163)	25 (113)	32 (53)
Higher	22 (23)	34 (152)	67 (12)	40 (30)
Don't know	4 (55)	22 (136)	15 (34)	0 (23)
Description of partner				
Partner is regular	10 (208)	19 (670)*	23 (172)	25 (143)
Partner is not regular	29 (7)	32 (65)	20 (69)	50 (4)
Knowledge of partner's characteristics				
Less than two questions with 'don't know' as response	11 (207)	20 (715)	22 (228)	28 (138)
At least two questions with 'don't know' as response	0 (8)	25 (20)	15 (13)	0 (9)
Variables related to the partnership				
Duration of partnership				
0 or 1 day	0 (6)	34 (32)*	60 (5)*	43 (7)
Between 2 and 183 days	11 (91)	19 (241)	19 (95)	18 (49)
More than 183 days	10 (109)	20 (446)	22 (139)	33 (43)
Days before sex				
0 day	0 (1)	26 (39)	60 (5)	0 (2)
1 day and more	11 (214)	20 (695)	21 (236)	26 (145)

^a Frequent use of condom in a given partnership is defined as declaring using a condom 'always' or 'most of the time' as opposed to 'rarely' or 'never'. For one-off sexual partnerships, the use was considered as 'frequent' when the sole intercourse was protected. ^bEthnic groups are in Cotonou: Mina (1) Fon (2) Goun (3); in Yaoundé: Pahouin (1) Bamiléké (2) Bassa-Bakoko (3); in Kisumu: Luo (1) Luhya (2); in Ndola: Nyanja (1) Bemba (2). * $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$: trend test for age, educational level and duration of partnership. Overall comparison χ^2 for all other variables.

Table 3. Logistic regression^a analyses of determinants of frequent condom use^b using generalized estimating equations: men.

	aOR	95% CI	P
Cotonou, Benin			
Partner's educational level	1		
No education or primary not completed	2.36	1.55–3.60	0.0001
Primary, secondary or higher	2.15	1.19–3.88	0.01
Don't know			
Kind of partner	1		
Partner is regular	2.00	1.20–3.34	0.008
Partner is non-regular			
Ethnic group	1		
Other	0.38	0.17–0.88	0.02
Goun			
Yaoundé, Cameroon			
Respondent's educational level	1		
No education, primary not completed or primary	1.76	1.24–2.48	0.001
Secondary or higher			
Occupation	1		
Other	2.02	1.39–2.94	0.0003
Student			
Duration of partnership	1		
More than 1 day	1.65	1.14–2.40	0.009
1 day or less			
The partner is a commercial sex worker ^c	1		
No	2.15	1.34–3.43	0.001
Yes			
Partner's educational level	1		
No education or primary not completed	1.09	0.75–1.58	NS
Primary, secondary or higher	1.67	1.05–2.64	0.03
Don't know			
Interaction term (education*commercial sex worker) ^d	0.41	0.20–0.85	0.02
Kisumu, Kenya			
Partner's educational level	1		
No education or primary not completed	2.76	1.62–4.72	0.0002
Primary, secondary or higher	2.26	0.99–5.19	0.05
Don't know			
Duration of partnership	1		
More than 1 day	2.48	1.25–4.92	0.01
1 day or less			
Ethnic group	1		
Luo or Luhya	5.95	2.25–16	0.0003
Other			
Ndola, Zambia			
Respondent's educational level	1		
No education, primary not completed or primary	2.94	1.53–5.63	0.001
Secondary or higher			
Occupation	1		
Other	27	5.47–132	0.0001
Professional, managerial or administrative			
Duration of partnership	1		
More than 1 day	3.43	1.69–6.97	0.0007
1 day or less			
Religion	1		
Other religion or no religion	0.52	0.27–0.99	0.05
Protestant	0.06	0.01–0.43	0.005
Interaction term (protestant*professional) ^d			

^aIn each city the odds ratio (OR) is adjusted (aOR) for the factors listed for that city and for age and ethnic group. The associations of age and ethnic group with condom use are shown only when statistically significant.

^bFrequent use of condom in a given partnership is defined as declaring using a condom 'always' or 'most of the time' as opposed to 'rarely' or 'never'. For one-off sexual partnerships, the use was considered as 'frequent' when the sole intercourse was protected. ^cSee text for definition of commercial sex workers. ^dInteractions are detailed in text. CI, confidence interval.

of men and women were consistent: the educational level of the female partner was associated with higher condom use, both when based on reports from men about their partners (aOR = 2.76) and on reports from

women about themselves (aOR = 2.60). The results were not as consistent in Ndola where the respondent's own higher education level was associated with frequent condom use, for both men (aOR = 2.94) and

Table 4. Logistic regression^a analyses of determinants of frequent condom use^b using generalized estimating equations: women.

	aOR	95% CI	P
Cotonou, Benin			
Occupation			
Other	1		
Student	3.25	1.25–8.42	0.02
Yaoundé, Cameroon			
Partner's educational level			
No education, primary not completed or primary	1		
Secondary or higher	3.32	2.11–5.53	< 10 ⁻⁴
Don't know	0.44	0.24–0.79	0.006
Kind of partner			
Partner is regular	1		
Partner is non-regular	2.77	1.38–5.55	0.004
Alcohol consumption in the last 4 weeks			
Less than once a week	1		
More than once a week	0.45	0.23–0.86	0.01
Kisumu, Kenya			
Respondent's educational level			
No education or primary not completed	1		
Primary, secondary or higher	2.60	1.20–5.67	0.02
Age group			
30 years old and more	1		
Less than 30 years old	4.76	1.45–14	0.01
Duration of partnership			
More than 1 day	1		
1 day or less	8.56	1.47–50	0.02
Respondent knew partner			
1 day and more before having sex	1		
less than 1 day before having sex	9.09	1.54–50	0.02
Ndola, Zambia			
Respondent's educational level			
No education or primary not completed	1		
Primary, secondary or higher	4.50	1.67–12	0.003
Age group			
30 years old and more	1		
Less than 30 years old	3.33	1.10–5.56	0.03
Ethnic group			
Other ethnic group	1		
Bemba	0.22	0.08–0.61	0.004

^aIn each city the odds ratio (OR) is adjusted (aOR) for the factors listed for that city and for age and ethnic group. The associations of age and ethnic group with condom use are shown only when statistically significant. ^bFrequent use of condom in a given partnership is defined as declaring using a condom 'always' or 'most of the time' as opposed to 'rarely' or 'never'. For one-off sexual partnerships, the use was considered as 'frequent' when the sole intercourse was protected. CI, confidence interval.

women (aOR = 4.50), but after adjustment for other factors there was no association with the partner's education level for either men or women.

Men who did not know the educational level of their partner were more likely to report frequent condom use with that partner in Cotonou, Yaoundé and Kisumu, but in Yaoundé, women who did not know the educational level of their partner were less likely to report frequent condom use with that partner.

Type of partner

One-quarter of partners reported by men and one-tenth of partners reported by women were defined as not regular, and frequent condom use was more

common with non-regular partners (Tables 1 and Table 2). After adjustment for other factors, the association between the type of partner and frequent condom use was significant for male respondents in Cotonou (aOR = 2.00) and female respondents in Yaoundé (aOR = 2.77). Frequent condom use was more likely to be reported by men for commercial partnerships in Yaoundé (aOR = 2.15).

Occupation

Being a student was associated with reports of frequent condom use in several settings. When adjusted, including adjustment for educational level, being a student was still significantly associated with frequent condom use in Yaoundé according to reports from men

(aOR = 2.02). In Cotonou, being a student was the only factor associated with frequent condom use based on reports from women (aOR = 3.25) and this was a better predictor than educational level. Male respondents with a professional, managerial or administrative occupation were much more likely to report frequent condom use in Ndola (aOR = 27).

Duration of the partnership

On the basis of reports from men, frequent condom use was significantly more likely in short-duration partnerships, with the highest probability of frequent condom use in partnerships of 1 day or less. In multivariate analysis, frequent condom use remained significantly more common within partnerships of 1 day or less in Kisumu (aOR = 2.48) and Ndola (aOR = 3.43) according to male respondents, and in Kisumu (aOR = 8.56) according to female respondents. In addition, an interval between the time when partners met and the time of the first sexual act of less than 1 day was strongly associated with frequent condom use among women in Kisumu, although only five women reported such partnerships.

Alcohol consumption

When adjusted for other significant variables, alcohol consumption was not found to be associated with condom use for men. For women, having drunk alcohol more than once a week was associated with a decreased rate of frequent condom use in Yaoundé (aOR = 0.45).

Other factors

In Ndola, Protestant men were less likely to report frequent condom use. An interaction was found between occupation and religion in men from Ndola: the association between being a professional and condom use was much stronger among non-protestant men. An interaction was also found between commercial partnerships and educational level of men in Yaoundé: if the female partner was a commercial sex worker, men with a lower educational level were more likely to have reported frequent condom use whereas if the female partner was not a commercial sex worker, men with a higher educational level were more likely to have reported frequent condom use. There were no significant associations after adjustment for other factors in any of the four cities between frequent condom use and place of birth, number of partners before marriage, number of lifetime partners, age at first sex, number of non-spousal partners in the last 12 months, sex during menstruation, dry sex practices or the marital status of the partner. No interactions were found with age or ethnic group.

Discussion

In four cities of sub-Saharan Africa, of a large number of factors examined, education was found to be the most consistent determinant of condom use in non-spousal partnerships. Two surveys in Tanzania also identified educational level as a determinant of condom use. In both Arusha region, and Dar-es-Salaam the proportion of respondents who had ever used condoms increased with educational level [10,12]. Occupation as a marker of economic status has been suggested as a predictor of condom use [14]. Economic status may partly explain the link we found with education, but inclusion of occupation in the multivariate models did not affect the association between frequent condom use and educational level.

There was some evidence that people adapt their condom use to the type of partner and the duration of the partnership. Similarly, in rural Tanzania use of condoms was higher when the partner was casual or non-regular [18], and among commercial sex workers in the Gambia condom use decreased with regular clients [13]. This adaptation to the type of the partner has also been found in studies outside sub-Saharan Africa [6,7,19–21].

Alcohol use has been reported to reduce condom use in all types of partnership in urban minority youth in the USA [9]. This could be due to alcohol causing a loss of control over behaviour but alcohol consumption could also be part of an overall risk-taking lifestyle, including lack of condom use. The association of alcohol consumption with lack of condom use was found in our study only among women in Yaoundé. We did not find risk behaviour – in terms of number of partners – to be a predictor of condom use, although that has been found in other studies [10,12,14]. Recent papers have pointed out the different rates of condom use between migrants and non-migrants in sub-Saharan Africa [12,14]. Having travelled outside the city in the last 12 months was not significantly associated with increased use of condoms in our study when adjusted for other factors.

Variation in the reports of frequent condom use was seen according to ethnic group. Although it was beyond the scope of this study to explore the cultural reasons for this, these will be important for planning prevention programmes.

The validity of reports on sexual behaviour, including condom use, is always a concern. In all sites men reported more partnerships than women, and a higher proportion of short duration partnerships. This could suggest misreporting, with women under-reporting partnerships, especially those of short duration, and over-reporting the duration of partnerships, or men

under-reporting the duration and over-reporting the number, but it could also be explained by men having sex with a population not included in the sample, such as commercial sex workers [22]. Social desirability towards interviewers who are known to work on a project centred on AIDS and its prevention could have led to over-reporting of condom use. If this over-reporting had been more frequent among the well-educated, this could partly explain the observed effect of education on condom use.

We published elsewhere a study of validity of reports of condom use based on the same data set [3]. We assessed internal consistency of reports using a question on condom use during the last sexual intercourse with each non-spousal partner. For each non-spousal partnership, the proportion in which last intercourse was protected increased with reported overall frequency ('always', 'most of the time', 'rarely' and 'never') of condom use for male and female respondents in all four cities. All trends were highly significant. Inconsistent answers (i.e. reports of 'always' use and unprotected last sexual intercourse; or 'never' use and protected last sexual intercourse) were rare, (0 to 2.4 per 100 partnerships). However, the proportion who used a condom during the last contact was not much higher in those reporting use 'most of the time' than in those reporting 'rarely' among men from Cotonou and Ndola and among men and women from Kisumu. There is a large gap between 'rarely' and 'most of the time' and those who would have answered 'sometimes' may have veered towards 'most of the time'. It is difficult to predict whether this potential misclassification could be linked with the education level of respondents. If not, it would only tend to dilute any association with condom use. We also assessed reliability of condom use reports among married couples where both were interviewed. Concordance between spouses in reported frequency of condom use within spousal partnerships (as measured by the kappa index) was good in Yaoundé (0.65) and Cotonou (0.63) but relatively low in Kisumu (0.28) and Ndola (0.17). However, reporting of condom use in spousal and non-spousal partnerships may differ.

Another concern is that details were only recorded on a maximum of eight non-spousal partners, and respondents did not always give partner characteristics for the full number of partners they did report when it was less than eight (1% of men in Yaoundé, 1.5% in Ndola and < 1% in the other cities omitted to give any details for some partners). The combined effect of limiting the detailed data to eight partners, and of men omitting to give the data for some partners means that some of the reported partnerships of the last 12 months were not included in the analysis. For men, these account for 4% of the non-spousal partnerships in Cotonou, 8% in Yaoundé, 0.5% in Kisumu and 15% in Ndola. For women the loss of information was negligible.

Across the four cities, education was found to be the most consistent determinant of condom use. An association of condom use with education could reflect increased exposure to condom prevention campaigns, increased receptiveness to these campaigns or greater skills in negotiating condom use. Several studies have shown that educated people are more exposed to media, discuss AIDS more often, have a better knowledge of modes of transmission of HIV, fewer misconceptions about AIDS, more favourable opinions about condoms, and have a better perception of their personal sexual risk [23–25].

The main result is a considerable challenge for African countries where a very large proportion of the population achieves no or low levels of education. Nonetheless, our findings suggest that there is a communication and a targeting problem with condom promotion and that special efforts are needed to reach men and women with low educational attainment. An analogy could be made with child survival in Africa, which has been shown to depend on mother's education. Our findings emphasize the need for a better educational system as part of the overall public health strategy to combat the AIDS and STDs epidemics. However, even among the more educated condom use is still too low, with many unprotected high risk partnerships reported.

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Appendix

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