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ORIGINAL ARTICLE

Education attainment as a predictor of HIV risk in rural Uganda: results from a population-based study

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Summary: We examined the association between education and prevalent HIV-1 infection in the Rakai district, rural Uganda based on a cross-sectional analysis of a population-based cohort. In 1990, 1397 men and 1705 women aged 13 years and older, were enrolled in 31 randomly selected communities. Strata were comprised of main road trading centres, secondary road trading villages and rural villages. Sociodemographic and behavioural data were obtained by interview and serum for HIV serostatus were obtained in the home. The analysis examines the association between sex-specific prevalent HIV infection and educational attainment, categorized as secondary, primary or none. The odds ratios (ORs) and 95% confidence intervals (95% CIs) of HIV infection were estimated, using no education as the referent group. Higher levels of education were associated with a higher HIV seroprevalence in bivariate analyses (OR 2.7 for primary and 4.1 for secondary education, relative to no education). The strength of the association was diminished but remained statistically significant after multivariate adjustment for sociodemographic and behavioural variables (adjusted OR of HIV infection 1.6 (95% CI: 1.2–2.1)) for primary education and 1.5 (95% CI: 1.0–2.2) for secondary education. Stratified multivariate analyses by place of residence indicated that the association between education and HIV prevalence was statistically significant in the rural villages, but not in the main road trading centres and intermediate trading villages. Educational attainment is a significant predictor of HIV risk in rural Uganda, in part because of risk behaviours and other characteristics among better educated individuals. Preventive interventions need to focus on better educated adults and on school-aged populations.

Keywords: HIV-1, education, risk factors, Uganda, Africa, epidemiology, prevention/education

INTRODUCTION

Numerous epidemiological studies have examined risk factors for HIV in Africa. Several of these studies found that HIV rates are higher in urban than rural communities[1–4] and raised a concern that HIV infection differentially affects the 'urban high-income, skilled men and their partners'[5]. Macroeconomic models indicate that the negative impact of AIDS on the growth of per capita income will be greatest if HIV rates are higher among better educated workers[5]. Thus, the question of whether HIV-1 infection is higher among the more educated populations and what characteristics or behaviours might account for such an association merits further inquiry.

Data on the association of educational attainment and the risk of HIV infection remain inconclusive. Several unadjusted analyses indicate that higher

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levels of education are associated with an increased risk of HIV infection[6–12]; however, this is not a consistent finding[4,13,14]. Multivariate analyses suggest that the association of HIV prevalence with education is statistically significant after controlling for potential confounders in some, but not all studies[3,8–10,14,15]. However, information on the social or behavioural mechanisms through which education may affect HIV risk is sparse. This paper examines both the association between educational attainment and HIV-1 serostatus as well as the relationship between education and other HIV risk factors in Rakai district, Uganda.

METHODS

This cross-sectional analysis was conducted as part of a population-based cohort study in rural Rakai district in southwest Uganda[2,16,17]. In 1990, a total population of 3102 individuals aged 13 years and older from 31 randomly selected community clusters were enrolled into the study. The sample of community clusters was stratified into 3 strata: trading centres on main roads, intermediate trading villages on secondary roads, and rural agricultural villages with no roads or only minor road connections. In order to ensure sufficient representation of areas with higher HIV seroprevalence, main-road trading centres and intermediate trading villages were over sampled. Within each selected cluster, one randomly selected index household and the surrounding 59 contiguous households were enrolled into the study, for a total of 60 households per cluster.

All consenting residents of these selected households were visited annually by trained interviewers in their homes. A structured questionnaire was administered to obtain information on sociodemographic characteristics and other HIV-related risk behaviours including education, occupation, religion, residence, sexual behaviours and mobility. Information was also obtained on signs and symptoms of AIDS-defining illnesses (i.e. weight loss, chronic diarrhoea, cough, Kaposi's sarcoma, oral candidiasis, etc). A proxy variable for socioeconomic status (SES) was created using a compilation index based on household possessions, including the ownership of a radio, bicycle, motorcycle, car, the presence of a latrine, house construction materials and condition of the dwelling. Samples of venous blood were obtained from consenting individuals and sera were assayed for HIV-1 using double HIV-1 enzyme-linked immunosorbent assay (ELISA: Recombigen EIA, Cambridge BioTech, USA); all ELISA positive sera were confirmed by Western blot (Biorad, USA). Participants were offered HIV results and counselling on a voluntary basis.

All analyses were stratified by gender before examining results for both sexes combined. Univariate analyses were used to estimate ORs and 95% CIs to identify the associations between prevalent HIV-1 serostatus, educational attainment and other sociodemographic and behavioural characteristics. Stratified analyses were used to identify possible confounders and interactions; and multivariate logistic regression was used to adjust for potential confounding[18] (STATA, Stata Press, College Station, Texas, USA). This analysis examines the association between education and prevalent HIV status and explores intermediate behavioural mechanisms which may reflect the pathways through which education affects HIV risk. Tests of statistical significance were based on Chi-square tests for trend and the 95% CIs of ORs.

RESULTS

The cohort consisted of 1397 men and 1705 women who consented to participate, completed a questionnaire and provided blood samples. This total of 3102 respondents represents 90% of eligible subjects resident in the communities at the time of survey.

Table 1 shows the prevalence of HIV-1 by age and educational status. HIV prevalence increased with age in both sexes until age 30, but generally declined thereafter. In both sexes there was a

Table 1. HIV prevalence by age, gender and educational attainment

		Men		Women	
	Educational attainment	*n*	HIV prevalence %	*n*	HIV prevalence %
Age (years)					
13–19	None	24	0	57	8.8
	Primary	248	1.2	278	10.8
	Secondary	29	3.5	57	21.1
	All	297	1.3	392	12.0
20–29	None	42	11.9	121	23.1
	Primary	281	26.7	347	42.1
	Secondary	86	29.1	89	41.6
	All	409	25.7	557	37.9
30–44	None	55	14.6	127	12.6
	Primary	213	24.9	230	28.3
	Secondary	83	30.1	35	40.0
	All	351	24.5	392	24.2
⩾45	None	99	6.1	174	5.8
	Primary	178	9.6	99	6.1
	Secondary	22	18.2	3	0.0
	All	299	9.0	276	5.8
All ages	None	248	7.6	551	11.3
	Primary	929	16.3	969	25.5
	Secondary	220	25.0*	185	34.1*
	All	1397	16.1	1707	21.8
Mantel–Haenszel age-adjusted odds ratio (95%CI)	Primary	2.1 (1.2–3.6)		2.2 (1.5–3.0)	
	Secondary	2.8 (1.5–5.5)		2.8 (1.8–4.6)	
χ^2 test for trend		*χ^2=26.0 $P<0.0001$		*χ^2=58.3 $P<0.0001$	

marked trend of increasing HIV seroprevalence with each higher level of educational attainment in most age groups; the Chi-square trend in HIV seroprevalence by the level of educational attainment is statistically significant for both males and females (χ^2=26.0 and 58.3, respectively, $P<0.0001$).

The consistent association of increased HIV-1 infection and higher levels of educational attainment in Table 1 may reflect confounding by sociodemographic or behavioural variables that might be related to both education and to the risk of HIV. Therefore, stratified analyses were used to assess whether sociodemographic or behavioural characteristics of participants varied by level of education (Table 2). A higher proportion of males (83.8%) than females (70.4%) had received primary or secondary education, and for both sexes, younger individuals were more frequently educated. For men and women, higher education was more frequent among those living in main-road trading centres or intermediate trading villages, among Muslims or Catholics compared to Protestants, and among respondents with higher SES, as measured by the household SES index. Education was more

Table 2. Sociodemographic and behavioural characteristics by educational attainment

	Men				Women			
	n	No education (%)	Primary (%)	Secondary (%)	*n*	No education (%)	Primary (%)	Secondary (%)
Sociodemographic								
Age								
13–19	301	8.0	82.4	9.6	392	14.5	70.9	14.5
20–29	409	10.3	68.7	21.0	557	21.7	62.3	16.0
30–44	351	15.7	60.7	23.7	392	32.4	58.7	8.9
45+	299	33.1	59.5	7.4	276	63.0	35.9	1.1
Residence								
Main-road trading centre	279	3.6	64.2	32.3	441	11.3	64.2	24.5
Intermediate trading village	440	13.9	68.2	18.0	503	25.3	63.0	11.7
Rural village	675	26.0	66.4	7.6	760	49.1	48.6	2.4
Religion								
Catholic	869	14.5	70.0	15.5	1069	29.4	58.5	12.2
Protestant	341	25.0	61.9	13.2	412	43.5	50.2	6.3
Muslim	163	14.7	61.4	24.0	204	23.0	63.7	13.2
Household SES index								
Low	572	30.9	63.3	5.8	643	54.4	43.9	54.4
Medium	549	11.5	72.1	16.4	709	23.4	65.6	11.0
High	263	2.7	62.7	34.6	334	9.3	63.8	26.7
Marital status								
Monogamous	666	21.3	61.7	17.0	608	33.7	55.3	11.0
Polygamous	168	14.3	66.1	19.6	398	32.2	58.8	9.1
Non-marital relationships (casual and steady)	77	27.3	61.0	11.7	93	45.2	47.3	7.5
Divorced/separated/widowed	51	27.5	60.8	11.8	221	53.0	38.9	8.1
No relationship	247	9.3	72.5	18.2	182	11.5	66.5	22.0
Behavioural								
Condom ever use								
Yes	118	2.5	61.0	36.4	57	12.3	71.9	15.8
No	1279	19.2	67.0	13.8	1648	33.0	56.3	10.7
Sex partners (past 12 months)								
None	339	18.0	71.0	10.9	489	38.9	52.8	8.4
1	682	20.8	64.1	15.1	1097	30.5	57.5	12.0
2+	376	12.0	66.8	21.3	119	22.7	67.2	10.1
History of STD (past 12 months)								
Yes	246	9.4	68.3	22.4	318	28.0	65.1	6.9
No	1144	19.5	66.1	14.4	1384	33.2	55.0	11.8
Travel (last 12 months)								
International	33	6.1	75.8	18.2	26	38.5	42.3	19.2
Kampala	336	10.1	58.9	31.0	333	18.9	62.2	18.9
Masaka	242	10.7	70.3	19.0	342	18.4	65.5	16.1
Inside District	778	23.8	68.1	8.1	994	41.3	52.5	6.2
Male (circumcision)								
Yes	206	15.1	61.2	23.8		n/a		
No	1188	18.2	67.4	14.4				

SES=socioeconomic status, n/a=not applicable

common in men or women reporting behaviours such as condom use, multiple sex partners, a history of a sexually transmitted disease (STD), and travel internationally or to Kampala in the year preceding the interview. In addition, circumcised men were more often educated than uncircumcised men. Thus, for both sexes, education is linked to sociodemographic and behavioural characteristics which may affect HIV risk.

Table 3 shows the prevalence of HIV-1 by specific risk factors, stratified by gender. As noted previously, HIV prevalence was higher in the more educated and younger men and women. HIV prevalence was also increased in the trading centre and intermediate trading villages for both sexes. In males, HIV was lowest among Muslims, but this association was not observed in women, among whom Protestants had the lowest level of infection. Divorced, separated or widowed men had higher HIV risk, whereas in women, the absence of a relationship was the most important risk factor. Reported ever use of condoms, 2 or more sexual partners, self-reported STDs and travel were also associated with HIV in males and females. Uncircumcised males were at a higher risk for HIV, relative to circumcised men.

Table 3. Prevalence of HIV-1 infection by risk factor in men and women

Risk factor	Male *n* (%)	OR (95% CI)	Female *n* (%)	OR (95% CI)
Sociodemographic				
Education				
None	248 (7.7)	1	551 (11.3)	1
Primary	929 (16.3)	2.4 (1.4–3.9)	969 (25.5)	2.7 (2.0–3.6)
Secondary	220 (25)	4.0 (2.3–7.0)	185 (34.1)	4.1 (2.7–6.1)
Age				
13–19	301 (1.3)	0.1 (0.1–0.4)	392 (12)	2.2 (1.2–4.0)
20-29	409 (25.7)	3.5 (2.2–5.5)	557 (37.9)	9.9 (5.8–16.9)
30–44	351 (24.5)	3.3 (2.1–5.2)	392 (24.2)	5.2 (3.0–9.1)
45+	299 (9.0)	1	276 (5.8)	1
Residence				
Rural village	675 (10.5)	1	760 (10.8)	1
Intermediate trading village	440 (18.4)	1.9 (1.4–2.7)	503 (23.5)	2.5 (1.9–3.4)
Main-road trading centre	279 (25.8)	3.0 (2.1–4.3)	441 (39)	5.3 (3.9–7.1)
Religion				
Muslim	163 (9.8)	1	204 (23.0)	1
Protestant	341 (13.5)	1.4 (0.8–2.6)	412 (14.3)	0.6 (0.4–0.9)
Catholic	869 (18.8)	2.1 (1.2–3.7)	1069 (24.2)	1.1 (0.8–1.5)
SES variable				
Low	572 (12.6)	1	643 (15.2)	1
Medium	549 (17.7)	1.5 (1.1–2.1)	709 (23.6)	1.7 (1.3–2.3)
High	263 (19.0)	1.6 (1.1–2.4)	334 (29.4)	2.3 (1.7–3.2)
Marital status				
Married	834 (19.4)	1	1006 (22.0)	1
No relationship	247 (12.6)	0.6 (0.4–0.9)	182 (39.0)	2.3 (1.6–3.2)
Non-marital relationships (casual and steady)	77 (16.9)	0.8 (0.5–1.6)	93 (29.0)	1.5 (0.9–2.3)
Divorced/separated/widowed	51 (33.3)	2.1 (1.1–3.8)	221 (21.3)	1.0 (0.7–1.4)
Behavioural				
Condom ever use				
No	1279 (15.6)	1	1648 (20.7)	1
Yes	118 (22)	1.5 (1.0–2.4)	57 (54.4)	4.6 (2.7–7.8)
Sex partners (past 12 months)				
None	339 (9.7)	1	489 (11.9)	1
1	682 (15.7)	1.7 (1.1–2.6)	1097 (23.3)	2.3 (1.7–3.1)
2+	376 (22.6)	2.7 (1.8–4.2)	119 (48.7)	7.1 (4.5–11.1)
History of STD (past 12 months)				
No	1144 (12.4)	1	1384 (18.6)	1
Yes	246 (32.9)	3.5 (2.5–4.8)	318 (35.5)	2.4 (1.8–3.1)
Travel (last 12 months)				
Local	495 (10.7)	1	769 (19.3)	1
Kampala/International	531 (21.1)	2.2 (1.6–3.2)	517 (27.3)	1.6 (1.2–2.0)
Male (circumcision)				
Yes	206 (11.2)	1		
No	1188 (17)	1.6 (1.0–2.6)		

SES=socioeconomic status, OR=odds ratio, CI=confidence interval

The majority of the risk factors for prevalent HIV (Table 3) and of characteristics associated with higher levels of education (Table 2) are thus similar, in both males and females. Therefore, higher educational attainment may be a distal determinant of other intermediate characteristics and behaviours which are more directly associated with the risk of HIV infection. For example, better-educated individuals are more likely to live in areas of higher HIV prevalence such as trading centres or to travel to high HIV prevalence areas such as Kampala than their less-educated peers. However, there are also noteworthy exceptions. For example, despite higher educational status, Muslim males are at lower risk for HIV. Similarly, among men, divorce is associated with lower education, but divorced and separated males have a higher risk of HIV.

To adjust for these complex associations, multiple logistic regression was used to estimate the ORs for prevalent HIV, after adjustment for variables found to be significantly associated with HIV in bivariate analyses (Table 4). Primary education was significantly associated with HIV, after controlling for the other sociodemographic and behavioural variables OR=1.6 (95% CI: 1.2–2.1), and secondary education was of borderline statistical significance after adjustment OR=1.5 (95% CI: 1.0–2.2). Men and women between ages 20–29 years had the highest risk of HIV. In both sexes, place of residence, non-Muslim religion and marital disruption and a history of STDs were significant risk factors for HIV infection. However, other risk factors were sex-specific. For example, women, but not men, who reported non-marital relationships or no relationship had a higher HIV risk when compared to married women. Also, the number of self-reported sexual partners in the past year was associated with an increased HIV risk in women (OR=3.1; 95% CI: 1.6–6.1), but not among men.

In previous studies[16,17] we found that place of residence modified the HIV risk associated with sociodemographic characteristics or behaviours. Therefore, we examined the association between HIV and educational status within strata of residence (Table 5). Although persons with no education had the lowest rates of HIV infection in each strata, HIV differentials by education were modest and not statistically significant in the main road trading centres and secondary road trading villages where HIV prevalence was very high. However, in the rural communities, there were marked and statistically significant increased

Table 4. Results of the multivariate analysis by risk factor in men and women

Risk factor	Male OR (95% CI)	Female OR (95% CI)	Both sexes OR (95% CI)
Education			
None	1	1	1
Primary	1.5 (0.9–2.7)	1.7 (1.1–2.4)	1.6 (1.2–2.1)
Secondary	1.6 (0.8–2.9)	1.6 (0.9–2.6)	1.5 (1.0–2.2)
Age			
13–19	0.3 (0.1–1.1)	3.1 (1.5–6.4)	1.6 (1.0–2.7)
20–29	3.3 (2.0–5.5)	11.0 (5.8–21.1)	5.7 (3.9–8.4)
30–44	3.1 (1.9–5.0)	6.2 (3.3–11.9)	4.1 (2.8–6.1)
45+	1	1	1
Residence			
Rural village	1	1	1
Intermediate trading village	1.9 (1.3–2.8)	1.9 (1.3–2.7)	1.9 (1.5–2.4)
Main-road trading centre	2.7 (1.8–4.2)	3.4 (2.4–5.0)	3.3 (2.5–4.3)
Religion			
Muslim	1	1	1
Protestant	2.2 (1.1–4.2)	1.0 (0.6–1.6)	1.3 (0.9–2.0)
Catholic	3.1 (1.7–5.7)	1.6 (1.0–2.4)	2.0 (1.4–2.7)
Marital status			
Married	1	1	1
No relationship	0.7 (0.4–1.1)	1.5 (1.0–2.3)	1.0 (0.7–1.3)
Non-marital relationships (casual and steady)	0.9 (0.5–1.9)	3.2 (1.7–6.0)	1.8 (1.1–2.8)
Divorced/separated/widowed	2.5 (1.1–5.6)	3.0 (1.6–5.4)	2.7 (1.7–4.2)
Sex partners (past 12 months)			
None	1	1	1
1	0.6 (0.3–1.2)	1.1 (0.7–2.0)	1.0 (0.7–1.6)
2+	0.9 (0.4–1.6)	3.1 (1.6–6.1)	1.5 (1.0–2.3)
History of STD (past 12 months)			
Yes	2.1 (1.4–2.9)	1.8 (1.3–2.5)	1.9 (1.5–2.4)
No	1	1	1

OR=odds ratio, CI=confidence interval

Table 5. HIV prevalence, adjusted and unadjusted risks of HIV infection, stratified by place of residence

Place of residence/educational status	No. of subjects	HIV prevalence (%)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Main road trading centres				
No education	60	26.7	1.0	1.0
Primary	462	34.8	1.5 (0.8–2.8)	1.1 (0.5–2.3)
Secondary	198	33.8	1.4 (0.7–2.8)	0.8 (0.4–1.7)
Intermediate trading villages				
No education	188	17.0	1.0	1.0
Primary	617	21.1	1.3 (0.8–2.0)	1.1 (0.7–1.8)
Secondary	138	26.8	1.8 (1.0–3.2)	1.6 (0.8–2.9)
Rural villages				
No education	549	6.0	1.0	1.0
Primary	817	13.0	2.3 (1.5–3.6)	2.4 (1.6–4.0)
Secondary	69	20.3	4.0 (1.9–8.3)	3.5 (1.6–7.5)

OR=odds ratio, CI=confidence interval

risks of HIV infection, both in the unadjusted and adjusted analyses. The adjusted ORs were 2.4 (95% CI: 1.6–4.0) for primary education and 3.5 (95% CI: 1.6–7.5) for secondary education, and the Chi-square test for trend was highly significant (χ^2=25; $P<0.001$). It is possible that rural residents with more education could have contracted HIV in urban centres and subsequently moved back to their villages of origin due to AIDS-related illness. To assess this possibility that educated persons with AIDS might return to their villages to die, we examined AIDS symptoms and signs (i.e. weight loss, chronic diarrhoea or chronic respiratory symptoms, oral candida, Kaposi's sarcoma, lymphadenopathy, etc.) by educational status among rural villagers. In 119 HIV-infected persons with primary or secondary education, 17 (14.3%) reported symptoms suggestive of AIDS, whereas in 33 HIV-positive subjects with no education, 12 (36.3%) had more symptomatic illnesses. Thus, there was no excess of symptomatic illness in the better educated HIV-infected individuals which might suggest the return migration of more educated terminally ill individuals.

DISCUSSION

This analysis has shown a consistent association between higher levels of educational attainment and HIV-1 prevalence among men and women residents of this rural district. In contrast to most studies, the association between educational attainment and HIV seroprevalence remained statistically significant after adjusting for other sociodemographic and behavioural factors associated with HIV infection (Table 4), particularly in rural villages (Table 5).

Higher levels of educational attainment may represent a determinant of other sexual risk behaviours and characteristics which are more directly associated with HIV infection. For example, as indicated in Table 2, individuals with higher levels of education are more likely to live in communities with higher background HIV seroprevalence, have multiple sexual partners and travel to higher HIV prevalence areas than other less-educated residents. Thus, education, by providing greater economic resources, may facilitate behaviours that place individuals at greater risk. Adjusting for potential confounders in the multivariate analyses shown in Tables 4 and 5 reduced the magnitude, but did not eliminate the statistical significance of the association between education and HIV infection observed in the univariate analyses (Table 3). For example, the unadjusted ORs of 2.7 and 4.1 for primary and secondary education, respectively, remained significant after adjustment, but decreased to 1.6 for primary and 1.5 for secondary education (Tables 3 and 4). Such a marked change in the ORs suggests adjustment substantially reduced confounding[19]. Therefore, it is plausible that residual, uncontrolled confounding may explain this persistent association or alternatively, that education represents an independent risk factor for HIV infection.

Educational attainment was found to be a marker for the majority, but not all, of the risk factors for HIV infection in males and females (Tables 2 and 3). There are, however, noteworthy differences in the characteristics between individuals with higher education and higher levels of HIV seroprevalence. For example, Muslim males are generally circumcised in infancy, and early circumcision reduces HIV risk, but Muslims are also more likely to reside in high prevalence communities and to be more educated, which increases HIV risk. Similarly, divorce is associated with lower education in both sexes, but divorced or separated individuals have a higher risk of HIV. Thus, the association between educational attainment and HIV seroprevalence may not simply be explained by confounding.

After stratification by place of residence (Table 5), we observed marked and statistically significant differentials in HIV risk by level of education in

rural communities, but not in the higher prevalence main road or secondary road trading communities. This suggests an interaction between place of residence and HIV risk as has been observed in previous analyses of other sociodemographic and behavioural risk factors in this population[16,17]. It is possible that higher background HIV prevalence may obscure the effect of some risk factors due to high levels of exposure to HIV, or because the effects of certain risk factors may vary with the stage of the HIV epidemic. With regard to the latter argument, it is likely that HIV infection was introduced in the main-road trading centres and trading villages earlier than in the more distant and less accessible agrarian communities with poorer communication and transport. Thus, in rural communities with low endemic HIV levels, education may facilitate high-risk behaviours such as travel that increase potential for HIV exposure. However, in highly endemic roadside communities, both the educated and their less educated peers may have significant exposure to HIV and such behaviours may have only a minor impact on risk. If this conjecture is correct, it suggests that earlier in HIV epidemics, the more educated may have a significantly higher chance of acquiring HIV infection than their less-educated peers, but as the epidemic matures, the risk of HIV infection becomes more egalitarian with respect to educational status. Thus, the differential economic impact of the HIV epidemic may change over time.

Due to the cross-sectional nature of this study, we are unable to determine the temporal relationship between an individual's level of educational attainment, intermediate behaviours and acquisition of HIV. Clearly, for older individuals who completed their education at some time in the past, it is likely that educational attainment antedated HIV infection. However, among younger individuals, particularly under 19 years of age, it is possible that illness due to HIV infection may affect completion of schooling, truncating educational attainment. In this regard, it is striking that the prevalence of HIV is substantially higher among the more educated teenage women (Table 1). This suggests that better educated young women are at particular risk of HIV acquisition, and in need of early preventive interventions.

In summary, this analysis indicates that HIV prevention strategies should target intervention efforts at the more educated individuals, particularly in rural settings and among younger women. Higher levels of educational attainment have been shown to be associated with a significant number of other positive health outcomes, including reduced at-risk health behaviour and better health seeking behaviour[20,21], an increase in the utilization of family planning services[22], and a lower infant mortality[23]. It is likely that AIDS prevention education could have an impact on these groups who often represent influential opinion leaders in their communities.

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