ORIGINAL RESEARCH

DETERMINANTS OF PATHWAYS TO HIV TESTING IN RURAL AND URBAN KENYA: EVIDENCE FROM THE 2008 KENYA DEMOGRAPHIC AND HEALTH SURVEY

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ABSTRACT

Objectives: Existing evidence in sub-Saharan Africa indicates that less than 40% of people living with HIV are aware of their status. HIV testing and counselling (HTC) is one of the key national strategies for HIV prevention but rural-urban inequalities exist in the uptake of this service. The aim of this study was to determine the factors associated with the uptake of HIV testing and counselling through the provider-initiated testing and counselling (PITC) and client-initiated testing and counselling (CITC) pathways in rural and urban areas in Kenya. Methods: Retrospective cross-sectional data were derived from the 2008-2009 Kenya Demographic and Health Survey. Descriptive statistics and multinomial logistic regression analysis were used to describe the characteristics of the sample and to identify the determinants of pathways to HIV testing. Results: Overall, in the rural areas, 66.3% of respondents had never tested for HIV, 17.3% had been tested through CITC and 16.3% through PITC. In urban areas, 49.6% of respondents had never tested, 30.4% had been tested through CITC and 19.9% through PITC. In both rural and urban areas, men were significantly more likely to test for HIV through CITC, while women were significantly associated with PITC. Individuals aged 15 to 19 years, households in the poorest quintile, and rural and urban areas in the North Eastern Province were less likely to utilize CITC and PITC services. Conclusion: The findings highlight the need to increase testing coverage in rural areas where a greater proportion of people had never been tested. There is also need to address existing disparities in HIV testing across different groups and geographic provinces. Targeted efforts aimed at reaching individuals aged 15 to 19 years, the poorest households, and people residing in the North Eastern Province are critical for increasing HIV testing uptake.

Key Words: HIV diagnosis; Counselling; Rural; Urban; Kenya.

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INTRODUCTION

Globally, in 2008, there were 2.7 million new HIV infections and an estimated 33.4 million people were living with HIV (UNAIDS and WHO, 2009). In the same year, sub-Saharan Africa accounted for 67% of the global burden of HIV/AIDS and an estimated 1.9 million new infections (68% of global new HIV infections) occurred in the region. Existing evidence in sub-Saharan Africa shows that less than 40% of people living with HIV are aware of their status (WHO et al., 2010). In Kenya, low levels of HIV testing are still a major challenge. According to the 2007 Kenya AIDS Indicator Survey (KAIS), 84% of respondents who were found to be infected with HIV were not aware of their HIV status prior to the survey (National AIDS and STI Control Programme, 2009). In addition, the findings from the 2007 KAIS highlighted key gaps in HIV testing behaviour among various demographic groups and geographic areas. For example, a higher proportion of women (41%) than men (25%) had ever been tested for HIV, while testing rates among urban dwellers was higher (57.4% for women and 39.7% for men) compared to rural residents (35.4% for women and 20.6% for men).

HIV testing and counselling (HTC) is one of the key strategies for HIV prevention programmes. Knowing one's HIV status is important because it helps making informed decisions with regard to reducing risk and increasing safer sex practices. For those who are HIV-positive, HIV testing provides appropriate linkages to treatment and care interventions (UNAIDS and WHO, 2009). Globally, there have been concerted efforts aimed at increasing testing rates. In 2007, the WHO and UNAIDS introduced the provider-initiated testing and counselling (PITC) model to increase the opportunities for diagnosis of HIV in health facilities, especially in high prevalence countries (WHO and UNAIDS, 2007). Under this model, healthcare providers offer HTC routinely to persons attending healthcare facilities as part of standard medical care unless someone opts out if s/he does not want to be tested. The PITC model was initiated to supplement the traditional client-initiated testing and counselling (CITC) approach, which involves individuals actively seeking HTC services.

In Kenya, the government recognizes the critical role that HTC plays in reducing further spread of HIV infection. As a result, the PITC approach was included in the national guidelines for HIV testing and counselling (National AIDS and STI Control Programme, 2010). While various strategies have been instituted to increase the uptake of HTC services, existing evidence suggests that coverage levels of HIV testing and counselling in Kenya are still low, with only 34% of men and women having reported that they had been tested for HIV and received results at least once in their lifetime (National AIDS and STI Control Programme, 2009). One of the key objectives of the Kenya

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National AIDS Strategic Plan (2009 to 2013) is to scale up HIV prevention, treatment and care in order to ensure that the goal of universal access to services is achieved and hence contribute toward the attainment of the Millennium Development Goal on HIV/AIDS.

A better understanding of the factors associated with the uptake of PITC and CITC is important for informing the scale up of national HIV testing and counselling efforts. A number of studies have examined the factors that influence HIV testing behaviour in sub-Saharan Africa. HIV-related knowledge and perceived HIV risk have been cited as having an effect on HIV testing behaviour, however, the evidence has been mixed. Higher levels of knowledge about HIV/AIDS and perceived risk were shown to be positively associated with the likelihood of being tested for HIV (Bond et al., 2005; Gage and Ali, 2005; Kakoko et al., 2006; Maman et al., 2001; Obermeyer and Osborn, 2007; Stein and Nyamathi, 2000). However, evidence from other studies demonstrated that HIV-related knowledge and perceived risk for HIV were not significant predictors of HIV testing (Day et al., 2003; Meadows et al., 1993; Sambisa et al., 2010). A study conducted in Zambia found that respondents with low self-perceived risk were more likely to be tested for HIV (Thierman et al., 2006), while in Uganda those with a higher perceived risk for HIV were significantly associated with a decreased likelihood of HIV testing (Nyblade et al., 2001).

Previous research has also shown that a number of socio-demographic factors are significant predictors of HIV testing. Findings from population-based studies in Zimbabwe and Uganda showed that gender was an important predictor of HIV testing (Nyblade et al., 2001; Sambisa et al., 2010). Specifically, women were more likely than men to be tested through PITC, while men were significantly associated with CITC. These findings corroborate those from a study on individual and structural barriers to HIV testing which found that women who had given birth were significantly more likely to have taken an HIV test compared to women who had never given birth (Day et al., 2003). Age has also been shown to be associated with the uptake of HIV testing; however, the findings from previous studies were mixed. Some studies showed that the probability of having been tested was higher among people aged 24 to 39 years compared to those aged 23 years and younger (Hutchinson and Mahlalela, 2006; Renzi et al., 2001). However, other studies have suggested that individuals younger than 20 years were more likely to participate in HIV testing compared to those in older age categories (Admassu and Fitaw, 2006; Mugo et al., 2010; Sambisa et al., 2010; Thierman et al., 2006). In Uganda, a study conducted by Gage and Ali (2005) showed that older men were less likely to participate in HIV testing compared to younger men. Other factors that have been associated with the uptake of HIV testing are marital status, education, household wealth status and region of residence (Gage and Ali, 2005; Hutchinson and Mahlalela, 2006; Kakoko et al., 2006; Kenya National Bureau of Statistics (KNBS) and ICF Macro, 2010; Maman et al., 2001; Sambisa et al., 2010; Thierman et al., 2006). A review of the literature showed that little has previously been done in Kenya with regard to assessing the factors associated with the utilization of PITC and CITC in rural and urban settings.

The aim of this study was to determine factors associated with the uptake of HIV testing and counselling through the PITC and CITC pathways in rural and urban areas of Kenya. There is a need to explore the underlying geographical and regional differences in accessing HIV testing services to better understand the determinants of uptake of these services in order to guide targeted policies and programs aimed at increasing the levels of HIV testing in Kenya, as well as in sub-Saharan Africa. According to the 2007 KAIS, high HIV prevalence with regional variations and low levels of HIV testing were some of the challenges that the fight against HIV/AIDS faces in Kenya. The report further emphasized the need for a thorough understanding of access to and use of HIV testing in order to inform the scaling up of national HIV testing and counselling efforts (National AIDS and STI Control Programme, 2009). The issue of regional variation in HIV infection and low levels of HIV testing had also been highlighted as major challenges in the control of HIV infection by the 2008/09 Kenya Demographic and Health Survey Kenya National Bureau of Statistics (KNBS) and ICF Macro (2010).

METHODS

The study was based on cross-sectional data from the 2008 to 2009 Kenya Demographic and Health Survey (KDHS) (Kenya National Bureau of Statistics (KNBS) and ICF Macro, 2010). The KDHS is a nationally representative survey which involved two-stage stratified sampling comprising 400 clusters across the country and household selection within each cluster. Interviews were conducted with women aged 15 to 49 years and men aged 15 to 54 years in each household. The analysis was based on the overall KDHS sample of 11,909 adults who were asked about HIV testing and the pathways to testing. A total of 11,888 responded and were included in the analysis while 21 individuals were excluded from the analysis due to absence of outcome data.

The outcome variable was a trichotomous variable based on a combination of the response to the question of whether the respondent had ever been tested for HIV and the response on the pathway to HIV testing. Respondents who had either never been tested or did not reveal the pathway to testing were coded 0. The three pathways were if they requested the test (client-initiated and coded 1), if the test had been offered and they accepted, or if it had been required for other reasons. The last two options were combined to reflect that the test was provider-initiated (coded 2). The independent variables were selected based on existing evidence, which showed associations between HIV testing and various social, attitudinal and cognitive factors such as HIV risk perception and knowledge of the transmission and prevention of HIV (Gage and Ali, 2005; Obermeyer and Osborn, 2007). The independent variables included comprehensive knowledge of HIV and perception of risk of HIV. The comprehensive knowledge of HIV was determined as a score and defined as correct knowledge of two methods of HIV prevention and rejection of three misconceptions about HIV. Each respondent was asked whether or not the following statements were correct: 1) consistent use of condoms during sexual intercourse prevents HIV; 2) having just one uninfected partner reduces the chance of getting the virus; 3) a healthy-looking person can have HIV; 4) a person can get infected with HIV by sharing a meal with an infected person; 5) a person can get infected with HIV from mosquito bites. The perceived risk of HIV infection was rated by the following

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responses: none, small, moderate and great. We also controlled for the following socio-demographic characteristics: age, region, educational attainment, marital status and household wealth. Given that the objective of the study was to compare the influence of these factors on HIV testing in urban and rural areas of Kenya, the data were analysed stratified by rural/urban.

Descriptive analysis was used to determine the frequencies of HIV testing and characteristics in the rural and urban sub-samples. From the bivariate analysis, all the selected variables were associated with the outcome at the 0.1% level of significance and, therefore, included in the multinomial logistic regression analysis. The multinomial logistic regression models were used to assess the effect of comprehensive HIV knowledge and HIV risk perception on pathways to HIV testing in rural and urban areas. Results of multinominal logistic regression analysis were presented as relative risk ratios (RRR) and 95% confidence intervals (95% CI). All analysis was done using Stata version 10 (StataCorp LP, College Station, TX, USA).

Ethical considerations

The study involved secondary analysis of data from the KDHS which excluded participant identifiers. The KDHS protocol was approved by the Scientific and Ethical Review Committee of the Kenya Medical Research Institute (KEMRI). The original ethical clearance from KEMRI provided a waiver for further clearance to use the data for secondary analysis since the KDHS datasets are publicly available and de-identified.

RESULTS

The study sample included respondents from rural areas (69%) and urban areas (31%). Overall, in the rural areas, 66.3% of respondents had never been tested for HIV, 17.3% had been tested through CITC and 16.3% through PITC. In urban areas, 49.6% of respondents had never been tested, 30.4% had been tested through CITC and 19.9% through PITC. Table 1 shows the frequencies of testing and the use of different pathways in urban and rural areas of Kenya. Gender differences in HIV testing showed a similar pattern for both rural and urban areas. More females than males had never been tested, and more males than females had initiated HIV testing themselves, in both areas. PITC was higher among females than males in both rural and urban areas. The lowest frequencies of CITC and PITC were seen in the age group 15 to 19 years and this was observed in both rural and urban areas. The range of values for CITC and PITC in the rural areas were relatively similar for ages 20 to 45 years, but in urban areas the frequency for CITC in these age groups was higher than that for PITC.

In both urban and rural areas, the lowest frequencies of CITC and PITC were seen among respondents with no education compared to those with higher levels of educational attainment. A substantial difference between the residential areas was seen in the proportion of respondents in the lowest wealth quintile that used PITC, with 14.0% in rural areas compared to 2.9% in urban areas. Those in this wealth quintile had the lowest levels of HIV testing in both residential areas. The frequency of testing was lowest among the never married respondents, but the proportion that used PITC (12.1%) appears closer to that which used CITC (15%) in the rural areas compared to difference in PITC (14.9%) and CITC (28.8%) levels in the urban areas. The highest proportion of respondents who had never tested was seen in North Eastern Province, where less than 10% had utilized CITC in both rural and urban areas. CITC levels were higher than PITC levels in the urban areas except in North Eastern Province, but this difference was not observed in the rural areas. In both rural and urban areas, the frequency of CITC was higher among respondents with higher level of comprehensive HIV knowledge compared with those with lower levels of knowledge, but the difference in the frequency of PITC between the two groups was much smaller. The frequencies of CITC and PITC in both rural and urban areas were not substantially different among the respondents with different levels of risk perception for HIV.

The results of the multinomial logistic regression analysis for determinants of pathways to HIV testing in rural and urban areas of Kenya are shown in Table 2. Males had a significantly ($p < 0.05$) higher likelihood of CITC in both areas compared to females, but the likelihood among males for PITC was lower in rural areas and not different from that for females in urban areas. In both rural and urban areas, the likelihood of CITC and PITC was significantly ($p < 0.05$) higher at ages 20 years and above compared to ages 15 to 19 years. Education was significantly ($p < 0.05$) associated with both CITC and PITC in the rural areas, with attainment of secondary or higher education associated with higher likelihood of testing compared to those with no formal education. In urban areas, respondents with higher education were more likely to use CITC, but no association between education attainment and PITC was observed. In rural areas, the possession of greater wealth was significantly ($p < 0.05$) associated with greater utilization of CITC, but this association was not seen with PITC except among those in the middle wealth quintile. This association with wealth was also not seen in urban areas. Respondents in both rural and urban areas who were currently married were more likely to use PITC compared to those never married, and CITC was also more likely among formerly married respondents in urban areas compared to those never married. Compared to rural areas in Central Province, rural areas in Coast and Nyanza Provinces were more likely to use CITC and PITC, but this association was not seen in the urban areas in these provinces. Also, the urban areas in North Eastern and Nairobi provinces were less likely to utilize CITC and PITC compared to the urban areas in Central Province. The likelihood of CITC was lower in the rural areas of Eastern and Rift Valley provinces compared to the rural areas in Central province. No significant associations were observed between comprehensive HIV knowledge or risk perception for HIV and the pathway to HIV testing in both rural and urban areas.

DISCUSSION

This study examined the factors associated with the uptake of PITC and CITC in rural and urban areas in Kenya. Our findings showed that a higher proportion of rural dwellers had never been tested for HIV compared to urban residents. In urban areas, the proportion of people who had tested through CITC and PITC was higher than in the rural areas. Our findings are consistent with those of other studies (Hutchinson and Mahlalela, 2006; Kenya National Bureau of Statistics (KNBS) and ICF Macro, 2010; National AIDS and STI Control Programme, 2009; Sambisa et al., 2010), which found similar rural-urban differentials with regard to

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the uptake of HIV testing. In both rural and urban areas, a higher proportion of women compared to men had been tested through PITC. The lowest proportion of utilization of both CITC and PITC pathways was found among individuals aged 15 to 19 years and those with no education. Among all the regions, the North Eastern Province had the highest proportion of individuals who had never been tested.

Table 1: Pathway to HIV testing and associations to independent characteristics stratified by living urban or rural.

	Rural				Urban			
	NT*	CITC**	PITC***	Total	NT	CITC	PITC	Total
	%	%	%	N	%	%	%	N
Gender								
Female	67.2	15.5	17.2	5812	51.0	28.5	20.5	2611
Male	64.1	21.7	14.2	2381	46.3	35.0	18.7	1084
Age								
15-19	79.9	9.8	10.4	1957	72.9	15.2	11.9	573
20-24	62.3	19.4	18.2	1481	48.4	33.8	17.8	874
25-29	60.9	22.2	16.8	1160	45.1	34.3	20.6	747
30-34	62.0	18.8	19.2	1126	43.1	32.8	24.2	534
35-39	61.7	17.2	21.1	880	40.2	34.2	25.6	403
40-44	58.0	23.4	18.7	745	45.7	31.2	23.2	276
45+	67.3	17.3	15.4	844	47.9	30.2	21.9	288
Education								
None	77.5	7.7	14.8	1227	67.3	15.2	17.5	223
Primary	67.6	16.8	15.6	4791	56.5	26.3	17.2	1386
Secondary	59.5	22.0	18.5	1868	48.0	30.6	21.4	1297
Higher	43.3	35.8	20.8	307	35.4	41.7	22.9	789
Wealth								
Poorest	75.6	10.3	14.0	2252	80.0	17.1	2.9	35
Poorer	65.3	17.6	17.1	1777	60.0	24.0	16.0	75
Middle	63.9	18.6	17.4	1922	58.4	24.8	16.8	113
Richer	62.2	21.2	16.5	1723	56.3	24.3	19.4	608
Richest	51.8	29.1	19.1	519	47.2	32.3	20.5	2864
Marital Status								
Never married	72.9	15.0	12.1	2728	56.3	28.8	14.9	1314
Currently married	63.5	17.9	18.6	4779	46.3	30.2	23.5	2067
Formerly married	59.5	22.9	17.6	686	43.6	38.9	17.5	314
Region								
Central	62.7	21.8	15.5	1142	54.9	26.8	18.3	213
Coast	62.0	18.3	19.7	792	48.6	28.0	23.5	805
Eastern	71.5	12.3	16.2	1468	50.5	33.0	16.5	109
Nyanza	56.5	25.2	18.3	1452	51.0	30.2	18.8	398
Rift valley	74.0	12.5	13.5	1558	48.7	31.9	19.4	263
Western	60.4	20.8	18.8	1172	59.5	24.7	15.8	316
North Eastern	81.4	6.9	11.7	609	79.4	8.3	12.4	218
Nairobi	-	-	-	-	42.2	36.9	21.0	1373
Comprehensive HIV knowledge								
Low	67.5	16.5	16.0	2889	53.8	26.8	19.4	992
High	61.0	21.3	17.7	3415	44.0	34.7	21.3	2150
Perceived risk for HIV								
No risk at all	59.8	22.5	17.6	510	50.9	29.7	19.4	232
Small	70.6	14.5	15.0	3647	56.5	24.6	18.9	1401
Moderate	64.0	18.9	17.0	2915	44.5	34.7	20.8	1514
Great	60.3	20.3	19.4	1004	45.3	33.8	20.9	512

*NT: Never tested/No information; **CITC: client-initiated testing and counselling; ***PITC: provider-initiated testing and counselling.

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Table 2: Multinomial logistic regression of determinants of pathways to HIV testing in rural and urban Kenya.

	Rural				Urban			
	NT[#] vs. CITC[##]		NT vs. PITC[###]		NT vs. CITC		NT vs. PITC	
	RRR[$]	95% CI[$$]	RRR	95% CI	RRR	95% CI	RRR	95% CI
Gender (ref: Female)								
Male	1.39***	1.20, 1.61	0.83*	0.71, 0.98	1.26*	1.05, 1.53	0.91	0.73, 1.13
Age (ref: 15-19 years)								
20-24	2.62***	2.07, 3.33	1.95***	1.53, 2.49	2.62***	1.93, 3.56	1.95***	1.36, 2.80
25-29	3.36***	2.54, 4.46	1.67**	1.24, 2.26	2.66***	1.90, 3.72	2.08***	1.41, 3.07
30-34	2.65***	1.96, 3.60	1.83***	1.35, 2.49	2.42***	1.67, 3.51	2.38***	1.56, 3.62
35-39	2.40***	1.72, 3.35	2.18***	1.59, 3.01	2.76***	1.84, 4.15	2.80***	1.78, 4.39
40-44	3.69***	2.66, 5.14	1.96***	1.39, 2.77	2.37***	1.53, 3.69	2.17**	1.33, 3.57
45+	2.35***	1.68, 3.31	1.48*	1.05, 2.11	1.84**	1.17, 2.91	2.05**	1.24, 3.38
Education (ref: None)								
Primary	1.32	0.95, 1.85	1.22	0.90, 1.65	1.36	0.76, 2.42	0.70	0.41, 1.21
Secondary	1.74***	1.22, 2.48	1.61***	1.16, 2.24	1.72	0.96, 3.09	1.13	0.65, 1.94
Higher	3.11***	2.02, 4.81	2.22***	1.43, 3.46	2.47***	1.36, 4.50	1.35	0.76, 2.38
Wealth (ref: Poorest)								
Poorer	1.30*	1.04, 1.64	1.16	0.93, 1.45	1.71	0.51, 5.72	7.33	0.81, 65.88
Middle	1.47***	1.18, 1.85	1.25*	1.01, 1.56	1.25	0.40, 3.85	7.70	0.92, 64.41
Richer	1.60***	1.27, 2.03	1.21	0.96, 1.53	1.04	0.37, 2.89	7.86	1.00, 61.72
Richest	1.95***	1.45, 2.65	1.27	0.91, 1.76	1.02	0.37, 2.82	6.24	0.80, 48.86
Marital Status (ref: Never married)								
Currently married	0.96	0.77, 1.19	1.32*	1.05, 1.66	1.02	0.82, 1.27	1.51***	1.17, 1.96
Formerly married	1.22	0.90, 1.65	1.27	0.91, 1.77	1.61**	1.12, 2.30	1.20	0.77, 1.88
Region (ref: Central)								
Coast	1.49**	1.13, 1.98	1.67***	1.23, 2.26	0.61**	0.42, 0.89	0.68	0.44, 1.05
Eastern	0.61***	0.48, 0.77	1.07	0.84, 1.38	0.81	0.63, 1.03	1.04	0.80, 1.36
Nyanza	1.67***	1.34, 2.09	1.66***	1.30, 2.13	0.95	0.58, 1.56	0.70	0.38, 1.31
Rift valley	0.69***	0.55, 0.88	0.93	0.71, 1.20	0.78	0.58, 1.04	0.72	0.51, 1.01
Western	1.22	0.96, 1.54	1.62***	1.25, 2.09	0.88	0.62, 1.25	0.88	0.59, 1.31
North Eastern	0.58	0.33, 1.02	1.34	0.86, 2.09	0.61**	0.43, 0.87	0.60*	0.40, 0.91
Nairobi					0.23***	0.13, 0.41	0.40***	0.23, 0.68
Comprehensive HIV knowledge (ref: Low)								
High	1.11	0.96, 1.28	1.10	0.95, 1.27	1.16	0.96, 1.40	1.01	0.82, 1.25
Perceived risk (ref: No risk)								
Small	0.78	0.60, 1.02	0.98	0.74, 1.31	0.79	0.55, 1.13	1.10	0.71, 1.70
Moderate	0.85	0.65, 1.11	1.06	0.80, 1.41	1.05	0.73, 1.50	1.24	0.81, 1.91
Great	0.81	0.61, 1.09	0.99	0.72, 1.35	1.01	0.68, 1.49	1.17	0.73, 1.87

[#]NT: Never tested/No information; [##]CITC: client-initiated testing and counselling; [###]PITC: provider-initiated testing and counselling; [$]RRR: Relative risk ratio; [$$]95% CI: 95% confidence interval; *p<0.05, **p<0.01, ***p<0.001

The multinomial logistic regression analysis supported the bivariate results showing that a number of factors were important predictors of uptake of CITC and PITC. Gender was associated with the likelihood of having been tested through CITC or PITC. Specifically, in both rural and urban areas, men were more likely to have utilized CITC compared to women. In contrast, women were significantly associated with PITC compared to men. This is consistent with other studies (Bond et al., 2005; Day et al., 2003; Nyblade et al., 2001; Sambisa et al., 2010) and might reflect women's participation in antenatal clinics which may account for the increased utilization of provider-initiated testing among women than men. Our study findings are consistent with previous research (Hutchinson and Mahlalela, 2006; Renzi et al., 2001) which also demonstrated that age is an important predictor of HIV testing. In both rural and urban areas, individuals aged 15 to 19 years were less likely to utilize CITC and PITC services compared to those aged 20 years and above. The likelihood of utilizing HIV testing services was also significantly associated with household wealth, particularly in rural areas where households in the poorest quintile were less likely to use CITC or PITC compared to households with greater wealth. This indicates that the disparities in wealth have a greater bearing on the utilization of HIV testing services in rural areas compared to urban areas.

Consistent with previous studies (Maman et al., 2001; Porter et al., 2004; Sambisa et al., 2010), our findings show that marital status was also significantly associated with HIV testing through the CITC and PITC pathways. Married and formerly married

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individuals had a higher likelihood of using PITC and CITC, respectively, compared to never married individuals. One of the plausible reasons for utilization of PITC services among married individuals maybe the need to know each other's HIV status prior to marriage. Among formerly married individuals, the decision to test for HIV maybe driven by the sickness or death of a spouse from suspected AIDS. The uptake of CITC and PITC was also associated with the region of residence. Overall, compared to other provinces, the rural and urban areas in the North Eastern Province had a lower likelihood of testing through CITC and PITC. These geographical differences in the use of HIV testing services have been observed in other studies (Kenya National Bureau of Statistics (KNBS) and ICF Macro, 2010; National AIDS and STI Control Programme, 2009). We did not find that comprehensive knowledge about AIDS and self-perceived HIV risk were significant predictors of utilization of CITC and PITC. Our study results on AIDS-related knowledge corroborate those from a study by Sambisa et al. (2010). Contrary to our study, previous studies (Bond et al., 2005; Kakoko et al., 2006; Maman et al., 2001; Nyblade et al., 2001; Sambisa et al., 2010; Stein and Nyamathi, 2000; Thierman et al., 2006) suggested that self-perceived HIV risk was a significant predictor of HIV testing.

This study has relevant implications for HIV testing services and prevention efforts in Kenya and in sub-Saharan Africa. The findings highlight the need to increase testing coverage in rural areas where a greater proportion of people indicated they had never been tested. There is also need to address existing disparities in HIV testing across different groups and geographic provinces. Targeted efforts aimed at reaching individuals aged 15 to 19 years, the poorest households, people residing in the North Eastern Province and rural areas of the Western and Rift Valley provinces are critical for increasing HIV testing uptake.

Our study has a number of limitations that need to be mentioned. Firstly, the data are cross-sectional which limits our ability of making causal inferences between the pathways to HIV testing and the covariates included in our analyses. Secondly, our study findings are likely to be affected by inherent biases associated with self-reported data on sensitive issues, such as HIV testing, perceived HIV risk and sexual behaviours, which might have led to under- or over-reporting.

In conclusion, this study contributes to the understanding of factors associated with the uptake of HIV testing in rural and urban areas in Kenya. HIV testing and counselling forms part of the national HIV prevention strategy and a better understanding of determinants influencing the uptake of testing services in rural and urban areas are important to inform the development and implementation of effective HIV testing services and preventive interventions. Although existing studies provide useful insights on uptake of HIV testing in Kenya, no previous study has examined in the same analysis, the most important factors associated with the uptake of HIV testing through the CITC and PITC pathways in urban and rural areas. The key finding in this study is the previously unknown significant variation among Kenyan regions in the rural-urban differentials in the pathways to HIV testing. This evidence is essential in guiding the development and implementation of targeted policy and programme initiatives aimed at increasing HIV testing in these regions.

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