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Individual, household and community factors associated with HIV test refusal in rural Malawi

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Summary

OBJECTIVE To investigate individual, household and community factors associated with HIV test refusal in a counselling and testing programme offered at population level in rural Malawi.

METHODS HIV counselling and testing was offered to individuals aged 18–59 at their homes. Individual variables were collected by interviews and physical examinations. Household variables were determined as part of a previous census. Multivariate models allowing for household and community clustering were used to assess associations between HIV test refusal and explanatory variables.

RESULTS Of 2303 eligible adults, 2129 were found and 1443 agreed to HIV testing. Test refusal was less likely by those who were never married [adjusted odds ratio (aOR) 0.50 for men (95% CI 0.32; 0.80) and 0.44 (0.21; 0.91) for women] and by farmers [aOR 0.70 (0.52; 0.96) for men and 0.59 (0.40; 0.87) for women]. A 10% increase in cluster refusal rates increased the odds of refusal by 1.48 (1.32; 1.66) in men and 1.68 (1.32; 2.12) in women. Women counsellors increased the odds of refusal by 1.39 (1.00; 1.92) in men. Predictors of HIV test refusal in women were refusal of the husband as head of household [aOR 15.08 (9.39; 24.21)] and living close to the main road [aOR 6.07 (1.76; 20.98)]. Common reasons for refusal were fear of testing positive, previous HIV test, knowledge of HIV serostatus and the need for more time to think.

CONCLUSION Successful VCT strategies need to encourage couples counselling and should involve participation of men and communities.

keywords voluntary counselling and testing, human immuno virus, rural sub-Saharan Africa, Malawi

Introduction

Voluntary counselling and testing (VCT) services for HIV provide the opportunity for education and behaviour change and represent important entry points for prevention and care (UNAIDS 2000; Ammann 2003; De Cock *et al.* 2003). Studies investigating efficacy of VCT in promoting behaviour change show mixed results (Kamenga *et al.* 1991; Allen *et al.* 1992; Weinhardt *et al.* 1999; Matovu *et al.* 2007; Sherr *et al.* 2007) but more recently cost-effectiveness of VCT in reducing HIV transmission has been demonstrated (Sweat *et al.* 2000; VCT 2000; Thielman *et al.* 2006).

Concerns were raised about negative social consequences of VCT, including family and relationship disruption, sexual violence against women, stigma and discrimination (Keogh *et al.* 1994; Maman *et al.* 2000; Karamagi *et al.* 2006). Studies addressing this issue in developing countries reported low rates of HIV serostatus disclosure and negative outcomes of disclosure for women (Baingana *et al.* 1995; van der Straten *et al.* 1995; Temmerman *et al.* 1995). A randomised trial investigating the effect of VCT showed that HIV positive individuals were well supported by health care professionals, but are at greater risk of marital break-up and neglect by their families (Grinstead *et al.* 2001). Possible negative consequences of serostatus knowledge for some individuals have to be balanced against benefits for the majority, in view of available treatment.

The 2004 Malawi Demographic Health Survey (DHS) estimated 700 000–1000 000 HIV-positive individuals were living in Malawi (DHS 2005). Overall 83% of the adult population had never been tested for HIV. Testing was less common among rural residents, older age groups, married women and those with limited education. The roll-out of free antiretroviral therapy (ART) in Malawi started in 2004 (Libamba *et al.* 2007).

Understanding factors that influence VCT uptake is essential for success of these services. A counselling and testing (CT) programme introduced at a time when ART became available, and offered at the household level, thus removing issues of accessibility, offered a unique opportunity to investigate individual, household and community factors associated with HIV test refusal in rural Malawi.

Methods

Setting

Karonga District is a rural area in northern Malawi. HIV prevalence in adults was 2% in the late 1980s, and 13% in a district wide estimate in the late 1990s (Crampin *et al.* 2003). The Karonga demographic surveillance survey (DSS) was established in 2002 and covers a population of 32 000 in an area of 135 km^2 in the southern part of the district. At the time of this study, free ART were available (since June 2005) from the district hospital in Karonga which is 70 km from the DSS area. VCT services were available at two clinics within the DSS area. The DSS area is divided into 230 clusters, with an average of 30 households each (Jahn *et al.* 2007).

Study population

Thirty-one clusters were sampled using a stratified random cluster method with deliberate oversampling of suspected high HIV-prevalence clusters (McGrath *et al.* 2007). All household members aged 18 to 59 and able to consent were eligible to participate in the study. Two individuals were excluded as they were confused and unable to provided informed consent, resulting in 2303 eligible individuals.

Data collection

Data collection took place from November 2005 through August 2006 as part of a survey assessing HIV prevalence and need for ART (McGrath *et al.* 2007). Study participants were visited at their homes. Repeated visits were made if the potential participant was temporarily out. Household members and neighbours were asked about the best day and time for repeated visits. At least 4 attempts were made to meet an individual. The study was introduced and explained to all eligible household members, and then each individual was asked privately for written informed consent. Consenting adults were interviewed and underwent a physical examination. A venous blood sample was collected from individuals who agreed to HIV testing.

HIV counselling and testing

All interviewers were Malawians living in the local community and trained in VCT in accordance with the standards of the Malawian Ministry of Health. Individuals considering HIV testing were given pre-test counselling. Participants could request to receive counselling and test results as individuals or as couples. Individuals who did not consent to CT were asked if they would explain why. Their answers were recorded as free text by the interviewers and later coded into 13 reasons for not consenting to CT.

Individuals tested and interested in receiving their test results received test cards containing their name and the laboratory number of their sample. Participants were advised to present their test card at the post-test counselling visit.

HIV results and post-test counselling were provided at people's homes or at mutually agreed venues within 2 weeks of the test. Confidentiality was ensured by using DSS identifiers and laboratory numbers on the result sheets. Interviewers travelled with a DSS register to confirm the individual's name and corresponding DSS identifier. Test cards were cross-checked with the result sheets and the DSS register before starting post-test counselling. Results were read to the respondent and no document slips were left with the respondent. If the respondents were not at home at the time of the counsellor's visit several repeat visits were made.

Blood samples for HIV testing were sent to the laboratory on the day of blood collection. HIV testing was conducted with parallel ELISA (Organon Durham, North Carolina) and particle agglutination (Edgware modification of Serodia) tests. Discordant samples were repeated in duplicate. A second sample was sought if assays on the original sample remained discordant. The same algorithm was applied to the second sample. Remaining unresolved samples were tested with Unigold and Determine rapid tests. We have previously reported that the HIV prevalence in this serosurvey was 11.4% (McGrath *et al.* 2007).

Ethics

Ethical approval for the serosurvey was given by the Malawi National Health Sciences Research Committee (2005, protocol 354), the London School of Hygiene & Tropical Medicine, UK (2005, protocol 3054), and the World Health Organization (2005, protocol RPC 130).

Analyses

All analyses were conducted in STATA 9.2. The associations between not consenting to HIV testing or not wanting to

receive the result, and individual, household and cluster-level variables were analysed using contingency tables and logistic regression.

Generalised estimating equations were used for age-adjusted univariate and mulitivariate models to allow for clustering in households and neighbourhoods. HIV test refusal rates in clusters were calculated excluding the individual for whom the odds of refusal were being estimated.

Analyses were performed separately for men and women. For the head of household variables a separate category was introduced if the individual was the head of household. For the multivariate analyses variables were dropped one at a time if inclusion did not significantly improve the fit of the model. Age was included in all models a priori.

Cut-offs for categories for HIV prevalence in clusters, age of head of household and distance from the main road were aimed at equal numbers in each category.

Results

Survey participation

Out of 2303 eligible adults, 2129 (92.4%) were found and 2047 (96.1% of those found) consented to participate in the study with at least an interview (Figure 1). Out of the 2047 individuals who participated 1387 (67.8%) consented to HIV testing and wished to receive the result. 23 individuals did not receive their HIV results because they had left the district or died.

Men and those aged under 25 years were less likely to be found than women and individuals older than 25 years of age. Women were less likely than men to refuse to participate. Participation did not differ across age groups. Among those who refused, reasons for not participating were family or community agreement to refuse (19.5%), fear of a positive HIV test result (12.2%) and, among women, husbands not allowing their wives to participate (11.2%). The remaining analysis is restricted to those who agreed to be interviewed for the study and assesses factors associated with not consenting to HIV testing or not wishing to receive the result.

Factors associated with HIV test refusal in women

Out of the 1110 women participating in the study, 355 (32%) refused HIV testing. There was no significant association between HIV test refusal and age. After adjusting for age, no association between HIV test refusal and education, type of marriage, profession, counsellor's sex, previous test experience, symptoms of advanced HIV disease, sex and education of the head of household, housing material or household possessions was found (Tables 1 and 2).

The odds of refusal of never married women was 0.54 compared to the odds of married women. Being the head of household increased the odds of refusal 1.68 times compared to household members. Women living in clusters with refusal rates of more than 39% had a 3.74 times increased odds of refusal compared to women living in clusters with less than 27% refusals. The odds of refusal increased 1.99 times for women living less than 1 km from the main road compared to women living further away.

In the age-adjusted model the main source of income and the occupation, age and acceptance of HIV testing by the head of household, and the relationship of the household head to the woman, were associated with HIV test refusal. Heads of household were husbands (726), mothers (55), fathers (71), sisters (3), brothers (8), aunts (3), uncles (4), grandmothers (15), grandfather (5) and sons (4) of female participants. For 116 women the relationship to the head of household could not be determined.

In the multivariate analysis the association between the acceptance of HIV testing by the head of household and that of the woman was only seen if the head was the woman's husband (Table 3). Women whose husband as head of household refused testing had 15 times higher odds of refusal than women living in households where the husband as head participated in CT. The acceptance or non-acceptance of CT by the head of household was not associated with HIV test refusal in women in households where the head was not the women's husband. Living in a household with a head older than 45 years or in a cluster with high HIV prevalence or being a farmer or never married decreased the odds of HIV test refusal by 0.60, 0.55, 0.56 and 0.44 respectively. An increase of cluster refusal rate of 10% increased the odds of refusal by 1.68. Women living less than 1 km from the main road had 6.07 times higher odds of refusal compared to women living further away. There was a significant interaction between distance from the main road and refusal rates in clusters for HIV test refusal. The individual refusal was not associated with cluster HIV test refusal in individuals living near the road, but only in those living more than 1 km from the main road. Refusal of CT was not associated with previous HIV testing and repeating the multivariate analysis excluding those who had previously been tested gave similar results.

Factors associated with HIV test refusal in men

Thirty three percent (305 of 937) of men refused HIV testing (Tables 1 and 2). In the age-adjusted analysis there

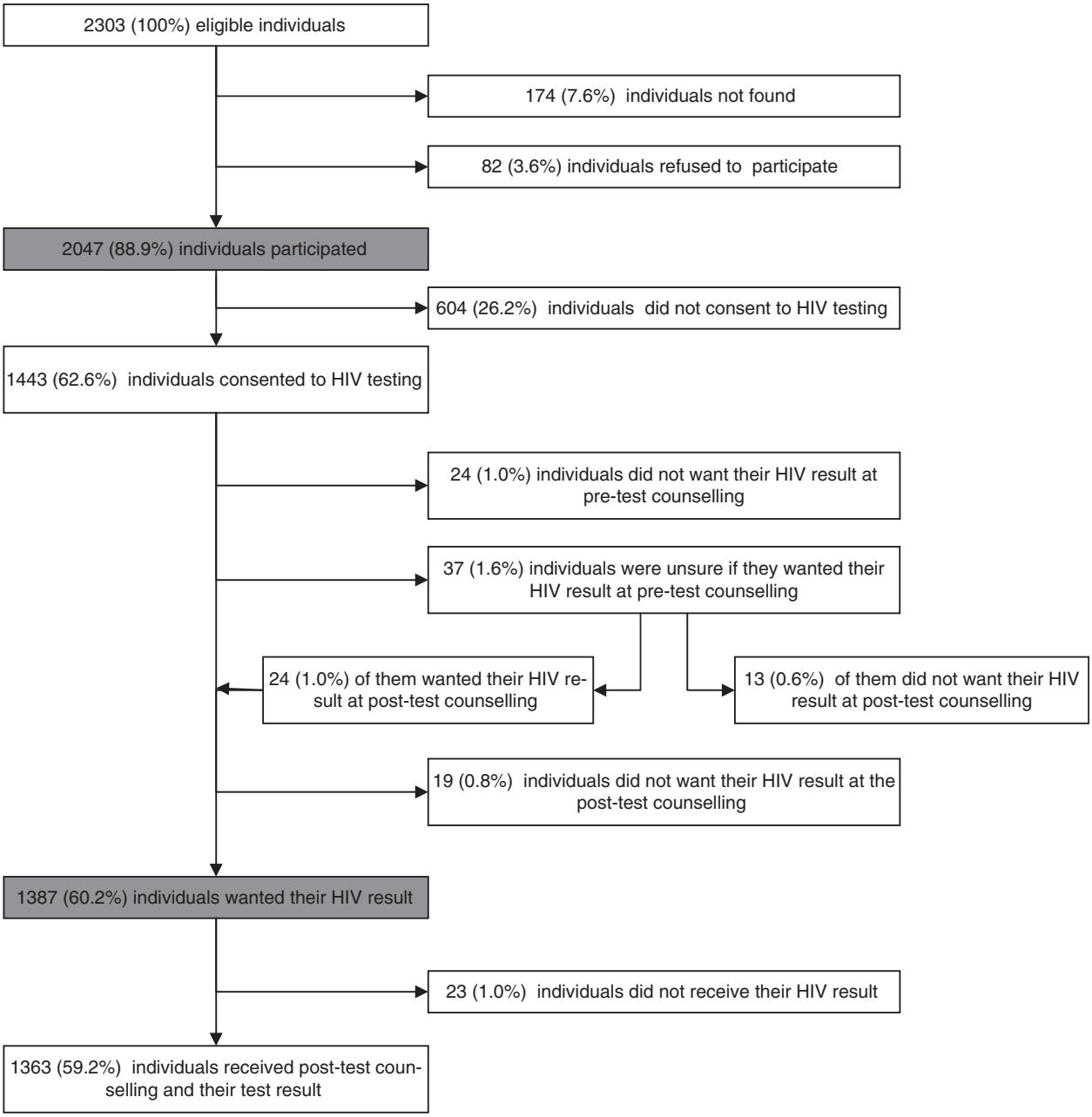

Figure 1 Individuals eligible, participating and consented to CT.

was no significant association between CT refusal and type of marriage, previous test experience, symptoms of advanced HIV disease, any characteristics of the head of household, house material or household possessions.

Being married, highly educated, non-farmers and a household head were significant predictors of refusal to test. Men aged 35–45 had 1.74 times higher odds of refusal than men under 25. Men counselled by women had 1.46 times higher odds of refusal than men counselled by men. High cluster refusal rate or living less than 1 km from the road increased the odds of HIV test refusal.

Marital status, profession, counsellor's sex and cluster refusal rate remained significant in the full multivariate model (Table 3). Unmarried men or farmers had 0.50 and

Table 1 Individual level factors associated with HIV test refusal

	Women					Men				
Variables	*n*†	*N*‡	%	Age adjusted odds ratio (95% CI)	*P*-value	*n*†	*N*‡	%	Age adjusted odds ratio (95% CI)	*P*-value
Age group (years)										
<25	111	359	30.9	1		85	298	28.6	1	
25–34.9	124	349	35.5	1.16 (0.85; 1.58)	0.36	110	326	33.7	1.26 (0.88; 1.80)	0.21
35–44.9	65	210	31.0	0.96 (0.67; 1.37)	0.82	68	166	41.0	1.74 (1.16; 2.62)	0.01
>45	55	192	28.5	0.86 (0.59; 1.25)	0.43	42	147	28.6	1.00 (0.65; 1.54)	0.98
Marital status										
Married	268	819	32.8	1		229	633	36.2	1	
Never married	18	84	21.2	0.54 (0.32; 0.91)	0.02	63	257	24.6	0.54 (0.35; 0.83)	0.01
Divorced/widowed	69	207	33.3	1.02 (0.73; 1.44)	0.89	13	47	27.7	0.71 (0.37; 1.33)	0.28
Marriage										
Monogamy	193	576	33.5	1		168	473	35.5	1	
Polygamy	65	216	30.4	0.84 (0.59; 1.20)	0.35	61	160	38.1	1.10 (0.76; 1.61)	0.61
Not applicable	97	318	30.3	0.87 (0.65; 1.17)	0.37	76	303	25.1	0.59 (0.40; 0.86)	<0.01
School										
Secondary/tertiary school	105	293	35.8	1		157	436	36.1	1	
8 years of primary school	109	343	31.8	0.83 (0.60; 1.14)	0.25	78	278	28.1	0.67 (0.48; 0.94)	0.02
<8 years	141	471	29.9	0.77 (0.56; 1.06)	0.11	70	221	31.7	0.81 (0.56; 1.15)	0.24
Profession										
Non-farmer	72	228	31.4	1		137	360	38.1	1	
Farmer	283	882	32.1	1.02 (0.76; 1.39)	0.88	168	577	29.2	0.65 (0.48; 0.87)	<0.01
Same sex counsellor										
Yes	195	643	30.3	1		209	690	30.3	1	
No	160	467	34.2	1.16 (0.90; 1.50)	0.25	96	247	38.9	1.46 (1.07; 1.99)	0.02
Previous test experience										
Never tested/result not received	195	632	30.9	1		220	685	32.1	1	
Tested and result received	160	477	33.5	1.13 (0.87; 1.47)	0.35	85	252	33.8	1.03 (0.75; 1.42)	0.86
Position in the household										
Member	313	1005	31.1	1		92	354	26.2	1	
Head	41	103	39.8	1.69 (1.09; 2.61)	0.02	213	583	36.4	1.68 (1.14; 2.48)	<0.01
Symptoms of Stage 3/4										
No	351	1086	32.3	1		303	925	32.8	1	
Yes	4	24	16.7	0.39 (0.13; 1.17)	0.09	2	12	16.7	0.31 (0.07; 1.38)	0.12

†Number of individuals refusing an HIV test.
‡Total number of individuals.

0.70 odds of refusal compared to married men or non-farmers. A female counsellor increased the odds of refusal 1.39 times. 10% increase in refusal rates in the cluster increased the odds of refusal by 1.48 times. Previous HIV testing was not associated with CT refusal. Repeating the analysis excluding those previously tested gave similar results, except that the association with sex of the counsellor was no longer significant.

Reasons for refusing HIV testing

Reasons for refusal were classified into thirteen categories (Table 4). People could give more than one reason. Of the 305 men refusing, 55 (18%) said they were afraid of a positive test result compared to 85 of 355 women who refused (24%).

Among those who refused HIV testing, similar percentages of men (10.2%) and women (11.9%) gave having been tested previously as a reason for refusal and 10.5% of men and 10.2% of women said they knew their status already. 77 men (25.3%) and 48 (13.6%) women needed more time to think. More men (9.2%) than women (4.8%) thought they were not at risk of being infected with HIV.

Family or community agreement to refuse HIV testing was stated by 5.9% of men and 8.8% of women. Other less frequent reasons were preference for VCT centres, fear of needles and anaemia and questioning the benefit of

Table 2 Household and cluster level factors associated with HIV test refusal

	Women					Men				
Variables	*n*†	*N*‡	%	Age adjusted odds ratio (95% CI)	*P*-value	*n*†	*N*‡	%	Age adjusted odds ratio (95% CI)	*P*-value
Acceptance of testing by head of household										
Tested	70	435	16.1	1		27	110	24.8	1	
Refused testing	134	189	70.9	13.02 (8.56; 19.82)	<0.01	15	49	30.6	1.33 (0.62; 2.87)	0.47
Not part of study	110	384	28.7	2.23 (1.57; 3.19)	<0.01	50	195	25.9	1.08 (0.61; 1.91)	0.79
Relationship with head of household										
Husband	241	728	33.1	1						
Other	73	280	26.1	1.42 (1.03; 1.95)	0.03					
Sex of head of household										
Male	277	873	31.7	1		63	231	27.3	1	
Female	35	131	26.7	0.78 (0.50; 1.21)	0.26	29	123	24.2	0.86 (0.50; 1.47)	0.58
School level of head of household										
Secondary/tertiary school	104	311	33.4	1		25	80	33.3	1	
Completed primary school	150	493	30.4	0.81 (0.59; 1.11)	0.19	44	159	28.8	0.85 (0.45; 1.61)	0.63
<8 years	50	166	30.1	0.80 (0.51; 1.23)	0.29	22	111	18.8	0.49 (0.25; 0.98)	0.04
Profession of head of household										
Non-farmer	148	416	35.6	1		40	139	28.6	1	
Farmer	166	591	28.1	0.70 (0.53; 0.93)	0.01	52	215	24.5	0.82 (0.49; 1.35)	0.43
Age group (years) of head of household										
<45	196	540	36.3	1		16	67	27.1	1	
≥45	116	464	25.0	0.57 (0.42; 0.79)	<0.01	76	287	25.9	0.99 (0.51; 1.92)	0.98
House material										
1 – best	88	237	37.1	1		80	208	38.5	1	
2	53	167	31.7	0.79 (0.51; 1.23)	0.30	39	125	31.2	0.70 (0.43; 1.14)	0.15
3	91	327	27.8	0.61 (0.42; 0.88)	<0.01	68	272	25	0.52 (0.35; 0.78)	<0.01
4 – worst	115	359	32.0	0.76 (0.53; 1.08)	0.13	109	314	34.7	0.84 (0.58; 1.21)	0.35
Possession score										
1 – lowest	64	221	28.8	1		57	169	33.7	1	
2	77	237	32.5	1.16 (0.77; 1.74)	0.48	64	198	32.3	0.93 (0.59; 1.47)	0.76
3	132	378	34.9	1.29 (0.89; 1.86)	0.19	101	302	33.4	0.97 (0.65; 1.46)	0.90
4	58	180	32.2	1.12 (0.72; 1.74)	0.61	60	164	36.6	1.20 (0.76; 1.90)	0.43
5 – highest	24	94	25.5	0.84 (0.48; 1.46)	0.53	23	103	22.3	0.59 (0.33; 1.07)	0.08
First source of income										
Non-farming	239	662	36.1	1		203	554	36.6	1	
Farming	113	432	26.2	0.62 (0.47; 0.82)	<0.01	99	374	26.4	0.62 (0.46; 0.83)	0.09
Cluster refusal rate										
<27%	70	394	17.8	1		62	342	18.4	1	
27%–38.9%	89	281	31.7	2.20 (1.52; 3.20)	<0.01	87	265	34.3	2.46 (1.67; 3.64)	<0.01
>39%	196	435	45.1	3.74 (2.68; 5.20)	<0.01	156	329	45.1	3.74 (2.62; 5.33)	<0.01
Cluster HIV prevalence										
<7%	115	334	34.3	1		94	312	30.1	1	
7%–14.9%	100	356	28.1	0.76 (0.54; 1.06)	0.11	79	286	27.6	0.89 (0.62; 1.27)	0.51
>15%	140	420	33.3	0.93 (0.68; 1.28)	0.67	132	338	39.1	1.44 (1.04; 2.01)	0.03
Distance of cluster from main road										
≥1 km	107	453	23.6	1		98	401	24.4	1	
<1 km	248	657	37.8	1.99 (1.51; 2.63)	<0.01	207	535	38.7	1.97 (1.47; 2.65)	<0.01

†Number of individuals refusing an HIV test.
‡Total number of individuals.

knowing their status. Fifty-eight (15.8%) women could not accept CT, as they their husbands would not allow them to be tested. The husbands of all of these women refused to be tested themselves.

Discussion

In this survey, one third of those who agreed to interview refused HIV testing or post-test counselling. The strongest

Table 3 Multivariate analysis for HIV test refusal

	Female		Male	
Variables	Odds ratio (95% CI)	*P*-value	Odds ratio (95% CI)	*P*-value
Age group (years)				
<25	1		1	
25–34.9	1.07 (0.72; 1.58)	0.73	0.97 (0.61; 1.52)	0.88
35–44.9	0.86 (0.53; 1.40)	0.54	1.26 (0.76; 2.08)	0.38
>45	0.90 (0.53; 1.52)	0.69	0.71 (0.42; 1.23)	0.22
Marital status				
Married	1		1	
Never married	0.44 (0.21; 0.91)	0.03	0.50 (0.32; 0.80)	<0.01
Divorced/widowed	0.83 (0.48; 1.44)	0.54	0.76 (0.39; 1.47)	0.41
Same sex counsellor				
Yes	–		1	
No	–		1.39 (1.00; 1.92)	0.05
Profession				
Non-farmer	1		1	
Farmer	0.59 (0.40; 0.87)	0.01	0.70 (0.52; 0.96)	0.03
Head of household (relationship to women and acceptance of testing)				
Husband and tested	1			
Husband and refused testing	15.08 (9.39; 24.21)	<0.01	–	
Husband and not part of study	3.50 (2.18; 5.49)	<0.01	–	
Non-husband and tested	4.12 (1.90; 8.94)	<0.01		
Non-husband and refused testing	3.63 (1.27; 10.40)	0.02		
Non-husband and not part of study	3.39 (1.84; 6.23)	<0.01	–	
Age group (years) of head of household				
<45	1		–	
≥45	0.60 (0.39; 0.92)	0.02	–	
HIV prevalence in cluster				
<7%	1		–	
7%–14.9%	0.55 (0.34; 0.89)	0.01	–	
>15%	0.55 (0.35; 0.85)	0.01	–	
Refusal rate in cluster per 10% increase	1.68 (1.32; 2.12)	<0.01	1.48 (1.32; 1.66)	<0.01
Distance of cluster from main road				
≥1 km	1		–	
<1 km	6.07 (1.76; 20.98)	<0.01	–	
Interaction living distance from road and refusal rate in cluster	0.64 (0.45; 0.93)	0.02	–	

predictor for HIV test refusal in women was if the husband as head of household refused to be tested himself. Among women this accounted for 33% of refusals as estimated by using the formula for the population attributable fraction (PAF = $p' \times (RR - 1)/RR$) with p' representing the proportion of cases exposed to the risk factor and RR estimated by the adjusted odds ratio (Rockhill *et al.* 1998). Other significant predictors of CT refusal included occupation, marital status, cluster refusal rate and HIV prevalence, distance from the main road and age of the head of household. Among men, occupation, marital status, counsellor's sex and cluster refusal rates were associated with CT refusal.

This study was conducted in a population who experienced much higher CT exposure than reported in the Malawi DHS (DHS 2005), with 43% of women and 27% of men reporting previous testing. While other studies found increased VCT uptake among individuals with previous test experience (Matovu *et al.* 2005; Worku & Enquselassie 2007) we did not find any association between CT refusal and previous VCT.

Associations between HIV test refusal and age, education and marital status have been reported previously (Mpairwe *et al.* 2005; Thior *et al.* 2007). Several studies showed reduced VCT uptake among educated individuals (Matovu *et al.* 2005; Mpairwe *et al.* 2005; Thior *et al.* 2007), but others found no association between HIV testing and education (Kiarie *et al.* 2000; Nyblade *et al.* 2001) or increased VCT uptake among educated individuals (Gage & Ali 2005; Hutchinson & Mahlalela 2006;

Table 4 Reasons for HIV test refusal

Reason	Women†		Men‡	
	n§	%	*n*§	%
Individual did not want to give any reason	31	8.8	33	10.8
Husband did not allow the wife to participate	56	15.8	0	0.0
Family/community agreed to refuse to participate	31	8.8	18	5.9
Individual suffered from Vimbuza¶	4	1.1	2	0.7
Individual did not think he/she is at risk	17	4.8	28	9.2
Individual was afraid of a positive HIV test results	85	24.0	55	18.0
Individual had been tested for HIV previously	42	11.9	31	10.2
Individual needed more time to think	48	13.6	77	25.2
Individual knew his/her HIV status already	36	10.2	32	10.5
Individual thought he/she is HIV negative	11	3.1	15	4.9
Individual thought he/she is HIV positive	4	1.1	1	0.3
Individual questioned the benefit of knowing his/her HIV status	9	2.5	13	4.3
Individual prefered VCT centres	13	3.7	18	5.9
Individual wanted to receive results immediately	1	0.3	1	0.3
Individual was afraid of anaemia	18	5.1	8	2.6
Individual was afraid of needles	6	1.7	8	2.6
Individual was preoccupied with personal things	5	1.4	6	2.0

†N = 355 women refused HIV testing.
‡N = 305 men refused HIV testing.
§n = number of individual stating the reason.
¶Vimbuza is a spiritual condition provoked by a range of factors, which can include needles and injections.
Some individuals stated two reasons for refusing HIV testing and thus the percentages add up to more than 100%.

Perez *et al.* 2006; Sherr *et al.* 2007). Similarly conflicting associations with VCT uptake rates have been reported in relation to marriage for women (Matovu *et al.* 2005; Thior *et al.* 2007). Inconsistencies in these studies might be due to differences in target populations, service delivery and adjustment for confounding. None of these studies investigated associations between HIV test refusal and characteristics of partners, households or communities.

The reasons given for HIV test refusal in this study were similar to those found elsewhere, and included low risk perception (Maman *et al.* 2001; Morin *et al.* 2006), fear of a positive test result (Morin *et al.* 2006; Perez *et al.* 2006; Homsy *et al.* 2007; Thior *et al.* 2007), previous HIV test and need of partner's consent (Yoder & Matinga 2004; Morin *et al.* 2006; Perez *et al.* 2006; Homsy *et al.* 2007; Thior *et al.* 2007).

This study adds to the evidence that in many settings women cannot or do not want to decide independently if they want to be tested or not. In a study in Zimbabwe women wanted to speak to their partner before pre-test counselling and thus did not favour an opt-out VCT strategy in ANC clinics (Baiden *et al.* 2005; Perez *et al.* 2006). In northern Ghana predictors of a women's willingness to get tested were planned disclosure of test result to the husband and perceived willingness of the husband to accompany his wife to ANC clinics.

Despite trying to encourage couples' counselling in our study, uptake was very low. Several studies show that couples' counselling increases HIV test acceptance (Nebie *et al.* 2001; Mullick *et al.* 2005; Semrau *et al.* 2005; Chomba *et al.* 2007; Kakimoto *et al.* 2007) but couples agreeing to such counselling are probably not representative of the general population. These findings suggest that interventions focusing on male and community participation, as well as couples' counselling are necessary if VCT is to succeed.

For men there was some evidence of outside influence, as shown by the association with cluster-level refusal rates. Insufficient power might explain the lack of association between male refusals and head of household variables. The majority of men in this study were heads of households themselves, thus only 354 male household members contributed information for investigation of this association. As in other studies, this study found associations between HIV test refusal and marital status and occupation (Matovu *et al.* 2005; Sherr *et al.* 2007). Interestingly, men's decision for HIV testing was influenced by the sex of the counsellor. With African community-level health services predominantly staffed by women (Munjanja *et al.* 2005), interventions ensuring same sex counsellors might be successful in increasing VCT uptake in men.

The study was conducted within the context of a long-running research programme with good community relations, contributing to the high participation rates. Since those (7.6%) individuals who were not found differed from those who were found selection bias due to absenteeism is possible. Reasons for refusal were determined by open questions without detailed probing, so underlying reasons may have been missed. At the time of the study ART had just started to become available, but only in the north of the district, 70 km away, thus although treatment was free, transport costs were a deterrent to some, and may have lowered acceptance of CT. However this is in contrast with the finding of higher refusal rates near main roads.

Conclusion

The findings of this community-based CT programme in rural Malawi suggest that a woman' s decision to accept or refuse an HIV test is determined by her husband and the community she lives in and to a lesser extent by her occupation and marital status. In contrast CT refusal in men is associated with marital status, profession, counsellor's sex, and by the refusal rate in the neighbourhood. With one third of the population refusing HIV testing and common reasons for test refusal being fear of positive test results and low risk perception there is a necessity to improve VCT strategies. New interventions aiming at participation of men, couples and communities are needed to increase VCT uptake.

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