

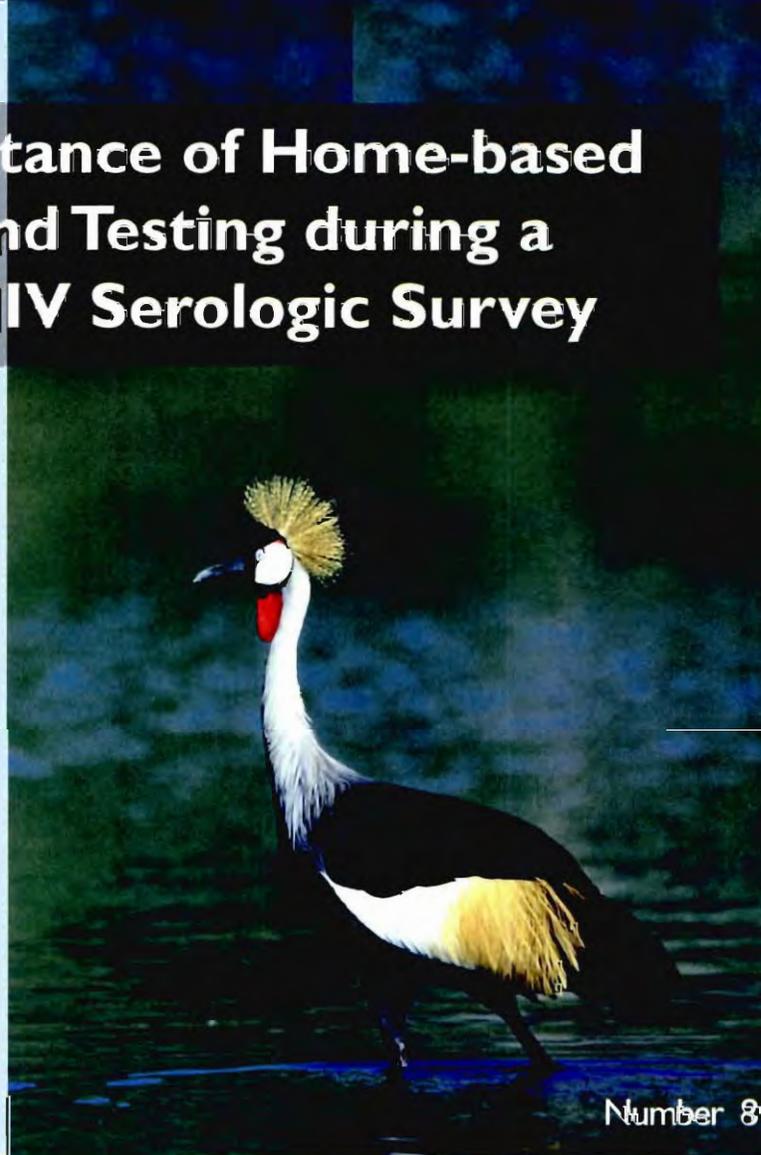


Ministry of Health

UGANDA MINISTRY OF HEALTH WORKING PAPERS

Feasibility and Acceptance of Home-based HIV Counseling and Testing during a Population-based HIV Serologic Survey

Frank Kaharuza
Zainab Akol
Jonathan H. Mermin
George W. Rutherford
Joshua Musinguzi
Wilford Kirungi
Edson Nuwagaba
Anne Cross
Vinod Mishra
Alex Opio
Rebecca Bunnell



Number 8



August 2008

Based on further analysis of the 2004-05 Uganda
HIV/AIDS Sero-Behavioural Survey

FOR INTERNAL USE
(NOT TO BE QUOTED)

The *Uganda Ministry of Health Working Papers* series is a prepublication series of papers reporting on work in progress. The papers are based on further analysis of data collected in the 2004-05 Uganda HIV/AIDS Sero-Behavioural Survey (UHSBS). The development of these working papers was supported by the United States Agency for International Development (USAID) and the President's Emergency Plan for AIDS Relief (PEPFAR) through the MEASURE DHS project (#GPO-C-00-03-00002-00). Additional support was provided by the Centers for Disease Control and Prevention (CDC). MEASURE DHS, Macro International, Calverton, MD provided technical support in the preparation of these working papers. The views expressed are those of the authors and do not necessarily represent the views of the Ministry of Health, Uganda, USAID, PEPFAR, CDC, the United States Government, or the organizations with which the authors are affiliated.

**Feasibility and Acceptance of Home-based HIV Counseling and Testing
during a Population-based HIV Serologic Survey**

Frank Kaharuza¹

Zainab Akol²

Jonathan H. Mermin³

George W. Rutherford⁴

Joshua Musinguzi²

Wilford Kirungi²

Edson Nuwagaba²

Anne Cross⁴

Vinod Mishra⁴

Alex Opio²

Rebecca Bunnell¹

August 2008

Corresponding Author: Frank Kaharuza, Centers for Disease Control and Prevention [CDC] Uganda,
P.O.Box 49, Entebbe, Uganda; Telephone: +256 752 751 032; Fax: +256 41 321457; E-mail:
fck6@ug.cdc.gov.

¹Centers for Disease Control and Prevention

²Ministry of Health, Uganda

³Institute for Global Health, University of California, San Francisco

⁴Macro International Inc.

ABSTRACT

Background. National, population-based HIV serologic surveys are increasingly used for monitoring HIV epidemics and program planning. Receipt of HIV test results through referral of survey participants to voluntary counseling and testing (VCT) centers has been low. Home-based HIV counseling and testing (HBCT) is associated with high participation rates but has never been used in a national, population-based survey. We assessed participation, feasibility, and acceptability of offering HBCT in a population-based survey in Uganda.

Methods. In 2004-2005, the Uganda Ministry of Health conducted a nationally representative, population-based HIV sero-behavioral survey involving 19,656 participants age 15-59 years in 417 clusters. Respondents were given a voucher for free HIV testing and counseling service at a referral site. We randomly sampled an additional 33 clusters for a sub-study of HBCT conducted at the conclusion of the main study. Selected households were visited and eligible adults interviewed using the main survey questionnaire. The team included four counselors and one additional laboratory technician. Respondents were offered the option of receiving results at their home, a clinic, or an outreach site.

Results. In the sub-study, 1,686 respondents from the 33 clusters were eligible, and 1,535 (91%) were interviewed. Of these, 1,451 (95%) accepted a blood draw and 1,425 (98%) requested and received home-based HIV test results and counseling. Of 7,370 eligible adults in the main survey from the same geographic regions, 6,899 (94%) were

interviewed. Of those interviewed, 95% accepted a blood draw. Overall, of the 19,650 VCT vouchers distributed during the main survey, 4,121 (21%) were redeemed in the week following the survey.

Conclusion. HBCT is feasible and acceptable, did not affect response rates in a national population survey, but increased the proportion of participants who received HIV test results.

Keywords: HIV, counseling and testing, population surveys, Uganda

BACKGROUND

Knowledge of one's HIV status benefits prevention efforts (De Cock et al., 2006; WHO, 2003; De Cock et al., 2003) and is a prerequisite for accessing specific HIV care and treatment. WHO and UNAIDS identify four types of HIV testing: voluntary counseling and testing; diagnostic testing; routine testing; and mandatory testing (UNAIDS/WHO, 2004). Common strategies that have been used to increase counseling and testing include integration into current services, such as prevention-of-mother-to-child-transmission (PMTCT) programs; clinic-based counseling, including stand-alone voluntary counseling and testing (VCT) sites; and mobile services for hard-to-reach populations (De Cock et al., 2002). Other strategies advocated for increasing access to HIV testing include routine counseling and testing in healthcare settings (WHO, 2003; De Cock and Grubb, 2006) and home-based counseling and testing (HBCT), which brings VCT to households, provides family members with access to testing (De Cock et al., 2006) and has been associated with high rates of VCT uptake (Were et al., 2006).

The interest in knowing one's HIV status in Uganda is high. The 2000 Demographic and Health Survey (DHS) showed that over 72% of women and 77% of men wanted to be tested. However, less than 13% of men and women in the general population have been tested (UBOS/ORC Macro, 2001; MOH/ORC Macro, 2006). Previous studies done in Uganda show high acceptance of HIV testing among the general population ranging from 65% to 93% if results were offered at home (Matovu et al., 2002; Were et al., 2003; Wolff et al., 2005). Standard ethical research practice requires the provision of HIV test results to people who provide their blood for HIV testing as part

of research. Between 2001 and 2005, more than a dozen national serologic surveys implemented through the DHS program have utilized a VCT voucher referral system for participants who could visit local sites and receive traditional VCT after a blood draw (Mishra et al., 2006). Although voucher utilization is not always easy to estimate, it is generally believed to be low, ranging from 2%-30% (personal communication, Dr. Vinod Mishra, Macro International Inc., Calverton, Maryland, USA). Because of this, there has been increased interest in the feasibility of providing home-based VCT as a standard component of large population-based surveys. However, there is concern that offering VCT during a national survey might reduce participation rates and bias results.

To determine the participation, feasibility, and acceptability of implementing HBCT in the context of a national serosurvey, we conducted a nested study as part of the 2004-2005 Uganda HIV Sero-Behavioral Survey (UHSBS).

METHODS

Survey design

In 2004-2005, the Uganda Ministry of Health conducted a nationally representative, population-based HIV sero-behavioral survey involving 19,656 adult participants in 417 clusters. The survey's methodology has been presented elsewhere (Mishra et al. 2007). In brief, between August 2004 and February 2005, adults age 15-59 years residing in 10,437 randomly selected households in 417 enumeration areas were interviewed about their HIV/AIDS knowledge and sexual behavior using standardized AIDS indicator survey questionnaires. After the interview, venous blood samples were obtained from consenting adults for anonymous HIV testing, and testing for syphilis, herpes simplex virus type 2 (HSV-2), and hepatitis B infections. Respondents were provided a voucher for free HIV counseling and testing services at static and outreach counseling centers of their own choice. Counselors at these referral sites were trained to collect vouchers from all those who presented them for free VCT services.

The HBCT study was conducted one month after the end of the main survey. The sampling methodology used was identical to that of the main survey. To avoid sampling clusters visited during the main survey, all 417 clusters visited were excluded from the sampling frame. Three regions were purposively selected from the nine regions. Then, 33 new clusters were randomly selected from the Central, Western, and West Nile regions. Respondents were interviewed and blood was drawn from consenting adults. Tested respondents were offered post-test counseling for the following day either at home or at a place of their choice. Six data collection teams involved in the main survey conducted the

HBCT study. In addition, each field team included four counselors to offer HIV counseling and one additional laboratory technician to conduct HIV rapid testing at the field laboratory during the afternoon and evening of the interview day. The standard interview was conducted and blood drawn. Respondents who wanted to know their results had their results returned by the counselor at home the next day. Privacy and confidentiality were maintained during the interview and the counseling sessions. Couples were offered couples counseling sessions. Post-test counseling and prevention messages were given to all respondents regardless of test results, and HIV-positive respondents were referred for care to the nearest HIV care service as stipulated in the Uganda Ministry of Health HIV counseling guidelines. Those who did not want their test results were given a voucher for free HIV counseling and testing at the nearest VCT site at their own convenience. Counselors also completed VCT client cards in the same way as at a static or outreach VCT site and brought them to the survey office. Finger stick blood draws, with dried blood spot collection on filter paper, were performed on children. Dried blood spots were processed at the central laboratory and no results were offered to children in the main survey.

Laboratory methods

Venous blood was processed as in the main survey, and a small aliquot was removed for rapid HIV testing using a sequential three rapid test protocol at the field laboratory. Rapid tests used were Determine (Abbott Laboratories, Abbott Park, Ill) and Statpak (Chembio Diagnostics, Medford, NY); Unigold (Trinity Biotech, Ireland) was used as the tiebreaker. Syphilis testing was done using the rapid plasma reagin (RPR) test at a field

laboratory, but all other tests were carried out at the central laboratory at the Uganda Virus Research Institute (UVRI). HIV tests performed at the central laboratory used two enzyme immunoabsorbent (EIA) tests and Western blot for indeterminate results.

Statistical methods and data management

Data were entered into a computer using CPro (ORC Macro, Calverton, MD) and analyzed using Stata 9.1 (StataCorp, College Station, TX). Because the survey sample itself was the population of interest, non-weighted data were used to analyze and compare participation and response rates for the home-based survey to rates obtained in the main survey from the three regions from which the 33 clusters were drawn. Selected socio-demographic characteristics of participants analyzed to assess differences were age (in five-year age groups), sex, education (in four categories), wealth (in quintiles), and residence (rural or urban). Reasons for not having an HIV test at the time of survey and choice of where to receive HIV test results were expressed as a proportion of the eligible and interviewed adult population. Analyses for testing choices were performed using data from VCT cards. However, data were available for only 27 of the 33 clusters. To determine whether this led to bias, we used HBCT survey data to compare selected survey participant characteristics from the 27 clusters and the 6 missing clusters.

We used Chi-squared tests for difference in proportion and to test for trend. A p value < 0.05 was considered significant.

The Centers for Disease Control and Prevention (CDC) and Institutional Review Boards at UVRI and ORC Macro approved the survey protocols. Informed consent was obtained from the participants for survey participation, venous blood draw, use of stored sera, syphilis testing and treatment, and receipt of HIV test results.

RESULTS

Overall characteristics

Overall, 760 households were visited in the 33 clusters of the HBCT study. Of 4,102 persons found in these households, 2,206 were children and 1,686 were eligible adults. Of the eligible adults, 1,535 (91%) were interviewed. In the main UHSBS, 2,966 households from 138 clusters were visited in the three regions from which HBCT clusters were drawn. Of 17,052 persons in these households, there were 7,370 eligible adults, and 6,899 (94%) were interviewed.

Participation rates for the interview and blood draw among the home-based study and the UHSBS were similar and above 90% (Table 1). In both studies, men were less likely than women to participate in the interview and blood draw ($p < 0.001$). As with the main survey, acceptance of the blood draw was slightly lower than participation in the interview. Men with low levels of education and wealth, men from urban areas, and men from the Central region were less likely than women to participate in the HBCT survey ($p < 0.001$). Except for men from urban areas being somewhat less likely to participate in the HBCT study than in the main study, participation rates among men were similar in terms of other demographic and social variables.

Table 1. Survey participation and response rate for home-based survey and main UHSBS survey

Characteristics	Female						Men					
	Home Based (33 Clusters)			Three regions of Main survey			Home Based (33 Clusters)			Three regions of Main survey		
	Eligible N	Inter- viewed %	Blood draw* %	Eligible N	Inter- viewed %	Blood draw %	Eligible N	Inter- viewed %	Blood draw %	Eligible N	Inter- viewed %	Blood draw %
Overall	902	94	91	3,899	95	91	784	87	85	3,471	92	87
Age (Years)												
15 -19	196	87	83	838	94	90	202	78	77	869	91	86
20-24	154	94	93	725	95	91	105	87	86	506	89	86
25-29	143	98	97	696	95	91	109	91	88	506	92	87
30-34	105	99	92	499	97	94	105	86	83	478	93	88
35-39	105	94	92	376	97	94	73	93	88	342	91	88
40-44	77	99	96	289	94	91	70	93	90	281	94	89
45-49	55	96	89	210	97	93	56	95	95	181	97	93
50-54	36	100	81	158	91	89	35	86	83	173	94	94
55-59	31	97	94	108	98	93	29	100	100	135	95	93
Education												
No Education	222	96	93	1,072	94	92	61	79	82	293	90	86
Primary incomplete	464	95	92	1,933	96	93	386	91	89	1,786	93	89
Primary complete	88	94	92	336	96	92	132	80	77	464	92	89
Secondary	128	90	83	554	93	88	204	87	83	926	91	87
Wealth index												
Lowest	183	94	91	841	93	92	138	88	88	684	92	90
Middle	168	96	91	726	96	92	154	88	86	810	93	90
Second	189	95	93	899	96	93	151	86	84	623	93	90
Fourth	175	95	91	708	96	92	174	89	87	641	94	89
Highest	187	93	88	725	94	89	167	84	80	713	89	83
Residence												
Rural	761	94	90	3,575	95	92	679	88	86	3,185	92	89
Urban	141	97	94	324	93	90	105	83	77	286	87	79
Region												
Central	258	95	88	1,055	97	91	241	84	80	1,003	93	86
West Nile	346	94	93	1,669	93	91	290	86	85	1,391	90	89
Western	298	95	91	1,175	97	92	253	92	89	1,077	94	90

*Blood collected as a proportion of those eligible

Acceptance of HBCT

Of the 1,535 participants interviewed in the HBCT study, 1,451 (95%) accepted a blood draw, and 1,425 (93%) accepted home-based testing. The proportion who accepted the blood draw in the HBCT study (95%) was identical to that in the main UHSBS survey (95%) (Table 2). Eighty-five percent of participants were accessing HIV testing for the first time. Respondents not previously tested were asked about reasons for not getting an HIV test. Most reasons offered by respondents were knowledge and attitude-related. The most common reason was low risk perception (data not shown).

From 27 (82%) of the 33 clusters visited in the HBCT study, 1,179 client cards were completed by counselors during the survey. Of these, 1,133 (96%) of the respondents preferred to get the results at home and 35% (265/748) of married or cohabiting participants preferred to receive results as a couple. Selected demographic data from the six regions with missing client records were compared to 27 clusters to establish if they introduced a bias. There was no significant difference in age, HIV serostatus, gender, and wealth among participants from the 27 clusters and the 6 missing clusters.

In the main UHSBS, substantially fewer participants utilized the vouchers given to them for free VCT at the static or outreach sites of their choice. Complete data were only available for those who utilized their vouchers within a week of the survey. In all, 4,121 (21%) of 19,656 vouchers were collected.

Table 2. Acceptability of HIV testing among respondents in home-based survey and main UHSBS survey

Characteristics	Female						Male				
	HBCT survey (33 Clusters)			Three regions of main survey			HBCT survey (33 Clusters)			Three regions of main survey	
	N	% tested	Accepted HB VCT*	N	% tested	N	% tested	Accepted HB VCT	N	% tested	
Overall	1,535	95	98	6,899	95						
Age (Years)											
15 -19	170	95	97	785	95	158	96	99	789	94	
20-24	144	95	98	687	95	91	98	100	450	97	
25-29	140	98	96	660	96	99	95	98	467	94	
30-34	104	88	100	486	96	90	90	99	444	95	
35-39	99	96	95	365	96	68	93	98	311	95	
40-44	76	97	97	273	96	65	94	98	263	94	
45-49	53	91	96	203	96	53	98	94	176	97	
50-54	36	81	97	143	97	30	97	100	163	98	
55-59	30	93	96	106	94	29	100	100	128	98	
Education											
No Education	212	94	98	1,009	97	48	96	100	263	94	
Primary incomplete	442	95	97	1,858	96	352	95	98	1,660	95	
Primary complete	83	96	95	324	95	106	95	97	428	96	
Secondary	115	90	97	517	93	177	95	98	840	94	
Wealth index											
Lowest	172	95	97	783	97	122	98	98	626	97	
Second	179	96	98	863	96	136	95	98	750	96	
Middle	161	93	97	696	96	130	96	100	582	95	
Fourth	166	95	96	681	94	155	94	99	601	95	
Highest	174	91	96	685	94	140	94	96	632	93	
Residence											
Rural	715	94	97	3,407	96	596	96	98	2,943	95	
Urban	137	94	96	301	97	87	92	100	248	90	
Region											
Central	244	90	96	1,023	93	203	93	97	929	92	
West Nile	324	97	97	1,550	98	248	97	100	1,255	97	
Western	284	94	97	1,135	95	232	95	98	1,007	95	

* As a proportion of the respondents tested in home based survey

HIV prevalence

Overall, unweighted HIV prevalence in the HBCT survey was 7%. HIV prevalence was highest among respondents age 35-59, those previously tested, females, and those from urban areas (Table 3). Women 35-59 years old who were repeat testers (22.3%) were about two times more likely to be HIV-infected (7.0%) (odds ratio [OR] 1.84, 95% confidence intervals [CI] 1.0-3.4, $p=0.05$) when stratified by age, and women age 35-59 were 4 times more likely to be HIV positive (OR 3.9, 95% CI 1.4-10.5). While the unweighted prevalence in the three regions (5.3%) was slightly lower than that of the main UHSBS (5.9%), the associations with selected demographic characteristics were similar.

Table 3. HIV prevalence by selected respondent characteristics in home-based survey and main UHSBS survey

Characteristics	Women								Men							
	Home Based (33 Clusters)				Three regions of main survey				Home Based (33 Clusters)				Three regions of main survey			
	First time tested		Previously tested		First time tested		Previously tested		First time tested		Previously tested		First time tested		Previously tested	
	N	%*	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Overall	679	7.1	122	12.3	3,064	5.3	473	11.4	548	5.8	102	6.9	2,680	4.2	336	6.0
Age (Years)																
15 -34	359	6.7	76	6.6	1,698	4.5	291	5.8	289	4.5	46	0.0	1,432	2.2	159	1.9
35-59	320	7.5	46	21.7	1,366	6.2	182	20.3	259	7.3	56	12.5	1,248	6.5	177	9.6
Residence																
Rural	577	6.6	95	13.7	2,861	5.0	385	10.1	482	4.8	88	6.8	2,522	3.9	283	5.3
Urban	102	9.8	27	7.4	203	8.8	88	17.1	66	13.6	14	7.1	170	8.2	53	9.4
Education																
No Education	184	6.5	15	13.3	900	3.7	72	9.7	36	2.8	10	0.0	220	7.3	24	8.3
Primary complete	60	8.3	20	15.0	245	6.9	63	22.2	81	6.2	20	15.0	364	4.9	45	11.1
Primary incomplete	364	6.0	55	7.3	1,562	5.5	213	10.3	305	5.9	30	6.7	1,470	3.9	104	8.7
Secondary	71	12.7	32	18.8	357	7.0	125	8.8	126	6.3	42	4.8	626	3.5	163	2.5
Wealth index																
Lowest	153	4.6	10	10.0	698	3.2	59	13.6	106	2.8	13	0.0	562	2.1	42	4.8
Second	144	9.0	27	14.8	750	4.0	80	5.0	119	5.9	10	0.0	644	3.4	70	4.3
Middle	132	3.8	18	11.1	593	5.6	72	8.3	106	7.5	19	0.0	496	5.2	51	2.0
Fourth	135	7.4	23	0.0	534	5.8	106	14.2	118	5.9	28	10.7	509	5.1	59	8.5
Highest	115	11.3	44	18.2	489	9.2	156	13.5	99	7.1	32	12.5	469	5.8	114	7.9
Region																
Central	163	12.9	56	21.4	782	8.7	170	14.7	139	11.5	50	8.0	729	6.4	121	7.4
West Nile	274	3.6	41	4.9	1,331	1.7	176	8.5	203	3.4	37	5.4	1,083	1.3	125	4.8
Western	242	7.0	25	4.0	951	7.4	127	11.0	206	4.4	15	6.7	868	6.0	90	5.6

* Prevalence as a proportion of the tested respondents

DISCUSSION

Home-based provision of HIV counseling and testing did not negatively affect the participation and response rates in a population-based survey. The high participation rates during the survey that provided home-based VCT were similar to those seen in research settings (Matovu et al., 2002; Were et al., 2003; Wolff et al., 2005).

Ninety-two percent of respondents wanted to know their HIV status, and almost all of them opted to receive their results at home. Of the respondents tested, 85% were learning their status for the first time, thus offering the opportunity for early diagnosis, referral, and motivation for seeking prevention and care. Successful HIV testing programs provide respectful and convenient service, confidentiality, accurate testing, full information, and effective referral (De Cock and Grubb, 2006). HBCT can include all of these components, most especially convenience for participants. In the UHSBS, the majority of respondents who had a blood draw were given a voucher for free HIV testing. However, in contrast to HBCT, the utilization of this opportunity was low.

There are several potential reasons that UHSBS participants did not use voucher referrals for VCT. An additional blood draw was required at the VCT site, clients may have limited motivation to travel to a clinic when they have low risk perception, the distance to a VCT site may still be several kilometers, and there is less privacy for testing at a public site than in the home. Findings from a qualitative study in central Uganda showed that reasons for not receiving test results from counselors stationed at nearby offices included fear of stigmatization, emotional vulnerability, long travel distance, and

inconvenience in getting results (Wolff et al., 2005). The voucher system, as currently used in population-based surveys, may be a missed opportunity for HIV testing and counseling, and ultimately access to care and prevention services.

One potential advantage of using a voucher system in the context of a population-based survey is that it could help to strengthen the national VCT system. However, the cost-effectiveness of the voucher system has not been evaluated. In addition, in our main study, the cost of the voucher system was increased with the purchase of nitrogen tanks and transportation of samples to the central laboratory. The principal advantages of vouchers are that people other than survey participants were likely to go for VCT at the outreach and mobile clinics, and as a result, more people might be counseled and tested. However, in Zambia, a randomized trial of acceptability of VCT showed that the acceptability of HBCT was 4.7 times higher than the group allocated to getting VCT at the local clinic (Fylkesnes and Siziya, 2004). The cost-effectiveness of HBCT has not been evaluated, but its inclusion within an existing national population-based survey that already pays for personnel, resources, home visits, and use of rapid testing technologies may lower the cost. In the future, it may be possible to conduct home-based VCT with rapid finger stick testing in the home during the initial survey visit to obviate the need for a return visit and result in lower costs. Home-based VCT with rapid testing has been successful in other settings in Uganda (Ekideit et al., 2006 ; Nuwaha et al., 2006).

Male participation in the HBCT was lower than female participation but still considerably higher than voucher coverage, and similar to other studies

(MOHSW/BOS/ORC Macro, 2005; CBS Kenya/MOH Kenya/ORC Macro, 2004; TACAIDS/NBS/ORC Macro, 2005; MSO Malawi/ORC Macro, 2004). Adolescents were less likely to accept HBCT than adults. This is also similar to another study in Central region of Uganda (Matovu et al., 2002). This may be due to adolescent fears of their results being known to their parents, aversion of domestic conflict (Wolff et al., 2005) or the small proportions of adolescents who have initiated sexual activity. Therefore, in application of HBCT in surveys, adolescent fears should be considered.

Over 90% of the respondents participated in the HBCT. It offered an opportunity not only for individuals to receive their test results, but also for couples counseling, as more than one-third of married respondents received couples counseling. Specially designed counseling protocols for couples are useful (Bunnell et al., 2005), particularly for discussing HIV discordance. In rural Uganda, the age-specific rate of HIV infection in seronegative women married to HIV-infected men was 106 times the rate among HIV negative seroconcordant couples (Carpenter et al., 1999). In urban Uganda, about 20% of the married couples were in a discordant relationship (Malamba et al., 2005). In Zambia, women who attended PMTCT and were counseled with their partner as a couple did not experience significant differences in adverse social events, including physical violence, verbal abuse, divorce, or separation (Semrau et al., 2005; Yoder et al., 2006). Similar findings were seen among women with HIV whose families received home-based VCT (Were et al., 2006).

We may have underestimated the use of vouchers, as they were officially valid for a period of six months following the survey. Anecdotal information from counselors suggested that some participants who accessed VCT did not want to surrender the vouchers to the counselors, potentially artificially lowering VCT rates. However, this appeared to be rare. Even if utilization of vouchers was underestimated, it was unlikely to exceed the more than four-fold differential between voucher and HBCT uptake.

While data from 6 missing clusters may have biased the result on the preference of where to receive HIV test results, we believe this bias is minimal because the respondents' characteristics in the 6 clusters were similar to those from the 27 clusters with data.

We did not include large urban populations, which potentially limits the ability to generalize the results. However, 14% of the respondents were from urban areas, and uptake was similar. Concerns have been raised regarding the ability to maintain confidentiality in a home setting and about potential negative social outcomes resulting from HBCT. However, a companion qualitative study documented many positive outcomes and few negative effects, and previous research has documented significant increases in positive social outcomes following HBCT (Apondi et al., 2007).

The cost effectiveness of HBCT offered as an independent activity (Matovu et al., 2002; Were et al., 2003) or included in an existing survey has not been well documented. We did not conduct a cost-effectiveness analysis for the HBCT survey or the voucher

retrieval system. However, HBCT was included in an existing survey and the only extra costs incurred were for extra staff and one extra day in the field while providing HBCT to individuals or couples that requested it. This might be less expensive per person receiving results than the voucher-based system, if household as well as health system costs are included, and numbers of newly diagnosed HIV infections and discordant couples are included as outcome measures. Costs were incurred in the main survey involving the training of counselors and provision of vehicles and supplies, and although not necessary for HBCT, they might have strengthened the VCT system in the country. However, some of these strategies may not be sustainable at the end of the survey period.

While national surveys are conducted primarily for surveillance purposes, they can offer opportunities for provision of HIV results to participants. HBCT is an efficient and feasible way to provide test results to survey participants and reduces participants' burden of accessing VCT.

REFERENCES

- Apondi, R., Bunnell, R., Awor, A., et al. 2006. Home-based antiretroviral care is associated with positive social outcomes in a prospective cohort in Uganda. *Journal of Acquired Deficiency Syndrome* 44: 71-76.
- Bunnell, R.E., Nassozi, J., Marum, E., Mubangizi, J., Malamba, S., Dillon, B., et al. 2005. Living with discordance: knowledge, challenges, and prevention strategies of HIV-discordant couples in Uganda. *AIDS Care* 17: 999-1012.
- Carpenter, L.M., Kamali, A., Ruberantwari, A., Malamba, S., and J.A.G. Whitworth. 1999. Rates of HIV-1 transmission within marriage in rural Uganda in relation to the HIV sero-status of the partners. *AIDS* 13: 1083-1089.
- Central Bureau of Statistics (CBS) Kenya, Ministry of Health (MOH) Kenya, ORC Macro. 2004. Kenya Demographic and Health Survey 2003. Calverton, Maryland: CBS, MOH, and ORC Macro. Found at: http://www.cbs.go.ke/downloads/pdf/Kenya_Demographic_and_Health_Survey_2003_Preliminary_Report.pdf
- De Cock, K.M., Bunnell, R., and J. Mermin. 2006. Unfinished business--expanding HIV testing in developing countries. *New England Journal of Medicine* 354: 440-442.

De Cock, K.M., and I. Grubb. 2006. Towards universal access: WHO's role in HIV prevention, treatment and care. *Bulletin of the World Health Organization* 84: 506-507.

De Cock, K.M., Marum, E., D. Mbori-Ngacha. 2003. A serostatus-based approach to HIV/AIDS prevention and care in Africa. *Lancet* 362: 1847-1849.

De Cock K.M., Mbori-Ngacha, D., and E. Marum. 2002. Shadow on the continent: public health and HIV/AIDS in Africa in the 21st century. *Lancet* 360: 67-72.

Ekideit, H., Kasozi, V., and T. Chimulwa. HBHCT in Ugandan urban setting - the experience of TASO Mulago. XVI International AIDS Conference. Toronto, Canada, Abstract No. CDB0186 2006

Fylkesnes, K., and S. Siziya. 2004 A randomized trial on acceptability of voluntary HIV counselling and testing. *Tropical Medicine and International Health* 9: 566-572.

Malamba, S.S., Mermin, J.H., Bunnell, R., Mubangizi, J., Kalule, J., Marum, E., et al. 2005. Couples at risk: HIV-1 concordance and discordance among sexual partners receiving voluntary counseling and testing in Uganda. *Journal of Acquired Deficiency Syndrome* 39: 576-580.

- Matovu, J.K.B., Kigozi, G., Nalugoda, F., Wabwire-Mangen, F., and R.H. Gray. 2002. The Rakai Project counselling programme experience. *Tropical Medicine and International Health* 7:1064-1067.
- Ministry of Health (MOH) Kampala, ORC Macro. 2006. Uganda HIV/AIDS Sero-Behavioural Survey 2004-5.
- Ministry of Health and Social Welfare (MOHSW) Lesotho, Bureau of Statistics (BOS) Lesotho, ORC Macro. 2005. Lesotho Demographic and Health Survey 2004. MOH, BOS, and ORC Macro.
- Mishra, V., Vaessen, M., Boerma, J.T., Arnold, F., Way, A., Barrere, B., et al. 2006. HIV testing in national population-based surveys: experience from the Demographic and Health Surveys. *Bulletin of the World Health Organization* 84: 537-545.
- Mishra, V., Musinguzi, J., Cross, A., Opio, A., Hong, R., Kirungi, W., et al. 2007. The 2004-05 Uganda HIV/AIDS Sero-Behavioural Survey: Methods and Impact of Non-response Bias. Uganda Ministry of Health Working Papers, No. 1. Kampala: Ministry of Health.
- National Statistical Office (NSO) Malawi, ORC Macro. 2005. Malawi Demographic and Health Survey 2004. NSO and ORC Macro.
- Nuwaha, F., Muganzi, E., Kasasa, S., Achom, M., Bunnell, R., Kabatesi, D., Mermin, J., and E. Tumwesigye. District-wide, door to door, home-based HIV voluntary counselling and testing in rural Uganda. XVI International AIDS Conference. Toronto, Canada, Abstract No. TUAC0101.2006

- Semrau, K., Kuhn, L., Vwalika, C., Kasonde, P., Sinkala, M., Kankasa, C., et al. 2005. Women in couples antenatal HIV counseling and testing are not more likely to report adverse social events. *AIDS* 19: 603-609.
- Tanzania Commission for AIDS (TACAIDS), National Bureau of Statistics (NBS), ORC Macro. 2005. Tanzania HIV/AIDS Indicator Survey 2003-2004. TACAIDS, NBS, and ORC Macro.
- Uganda Bureau of Statistics (UBOS), and ORC Macro. 2001. Uganda Demographic and Health Survey 2000-2001. Calverton, Maryland: UBOS and ORC Macro.
- UNAIDS/WHO. 2004. UNAIDS/WHO policy statement on HIV testing. Found at: www.who.int/rpc/research_ethics/hivtestingpolicy_en_pdf.pdf
- Were, W., Mermin, J., Bunnell, R., Ekwaru, J.P., and F. Kaharuza. 2003. Home-based model for HIV voluntary counselling and testing. *Lancet* 361: 1569.
- Were, W., Mermin, J.H., Wamai, N., Awor, A.C., Bechange, S., Moss, S., et al. 2006. Undiagnosed HIV infection and couple HIV discordance among household members of HIV-infected people receiving antiretroviral therapy in Uganda. *Journal of Acquired Deficiency Syndrome* 43:1-5.
- Wolff, B., Nyanzi, B., Katongole, G., Ssesanga, D., Ruberantwari, A., and J. Whitworth. 2005. Evaluation of a home-based voluntary counselling and testing intervention in rural Uganda. *Health Policy and Planning* 20: 109-116.

World Health Organization. 2003. The right to know: New approaches to HIV testing and counselling. WHO/HIV/2003.08. Found at: <http://www.who.int/hiv/en>.

Yoder, P.S., Katahoire, A.R., Kyaddondo, D., Akol, Z., Bunnell, R., and F. Kaharuza. 2006. Home-based HIV testing and counseling in a survey context in Uganda. DHS Qualitative Research Studies 12. Calverton, Maryland: ORC Macro.