

Feasibility, acceptability and cost of home-based HIV testing in rural Kenya

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Summary

OBJECTIVE To demonstrate the feasibility, acceptability and cost of home-based HIV testing and to examine the applicability of the model to high HIV prevalence settings.

METHODS Quantitative, qualitative and cost data were collected during a home-based HIV testing program in a high-prevalence rural area of Kenya; data on age, gender and marital status along with HIV test results were collected. This was complemented with qualitative research including key informant interviews with counselors and program managers to highlight experiences and challenges. Direct costs of the interventions were estimated through the review of budgets and monthly expenditure sheets.

RESULTS Of 3180 15–49-year olds exposed to a community awareness campaign, 2033 (63.9%) agreed to be visited by counselors, of whom 1984 (97.6%) agreed to be tested and receive the results. Adult HIV prevalence was 8.2% and married women were 4.8 times more likely to be HIV-positive than those never married. Counselors reported feeling welcomed and noted the enthusiasm of the community towards testing. The total cost of the exercise was \$17 569. The program cost was \$2.60 for each of the 6750 community members, \$5.88 for each person tested, and \$84 per positive case detected.

CONCLUSION This study suggests that home-based HIV testing is feasible with high uptake, and has the potential to substantially expand access to HIV testing services. There is a strong economic case for the extension of such a screening program to other communities.

keywords HIV testing, community mobilization, home-based, feasibility, acceptability

Introduction

Human immunodeficiency virus (HIV) testing is central to the development of a comprehensive response to the acquired immunodeficiency syndrome (AIDS) epidemic. Testing is a critical first step to accessing treatment and is also considered a preventive measure (De Zoysa *et al.* 1995; The Voluntary HIV-1 Counseling and Testing Efficacy Study Group 2000; De Cock *et al.* 2002). A recent mathematical model by the World Health Organization (WHO) suggests that intensifying HIV testing, combined with antiretroviral therapy, has the potential to reduce new HIV infections by 95% within 10 years (Granich *et al.* 2009).

Voluntary counseling and testing (VCT) has been the cornerstone of testing policy around the world, particularly in sub-Saharan Africa (Matovu & Makumbi 2007). VCT consists of pre-test counseling by a trained counselor, followed by HIV antibody testing for consenting individuals and a counseling session during which results are given

(World Health Organization 2002). Those who test positive are referred for care and treatment.

In high-prevalence settings in sub-Saharan Africa, conventional approaches to VCT that rely on self-presentation do not reach enough people to meet public health goals. UNAIDS estimates that HIV testing is accessible to only 10% of those who need it (UNAIDS and WHO 2004). In Uganda, a country which has had a vigorous HIV/AIDS response over the past two decades, only 15% of the population has been tested while more than 70% would like to be tested (Kamya *et al.* 2007). A 2006 study in rural South Africa revealed that only 9% of women and 11% of men had ever been tested for HIV (Hutchinson & Mahlalela 2006), and data from Kenya and Zimbabwe reveal comparable figures (Kenya Demographic and Health Survey 2004; Sherr *et al.* 2007). More widely, in sub-Saharan Africa, a recent report from the WHO suggests that nearly 80% of HIV-infected adults are unaware of their status and more than 90% do not know whether their partner is infected with HIV (World Health Organization

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2008). In such a context, and more than two decades into the HIV epidemic, the public health benefits of prevailing HIV testing strategies have been limited.

The reasons behind the limited uptake of HIV testing are complex. A Zimbabwean study noted that inconvenience of clinic hours (25.6%), location (20.7%), and cost (8%) were the primary deterrents (Morin *et al.* 2006). In Kenya, 46% of young people who wanted to get tested could not do so because of the lack of proximity to a testing center (Centre for the Study of Adolescence 2003). However, other studies suggest that even once availability is improved, uptake may remain limited. Persistent concerns regarding stigma, discrimination and the fear of positive results remain barriers to VCT in many high-prevalence settings (Kalichman & Simbaya 2003; MacPhail *et al.* 2008).

In response to these challenges, the WHO and others have called for initiatives to increase access to innovative, ethical and practical models of HIV testing and counseling (World Health Organization 2002, 2003, De Cock *et al.* 2006). A number of alternative strategies have emerged including integration of HIV testing within primary care (Pronyk *et al.* 2002) and ante-natal care (Creek *et al.* 2007), routine provider-initiated testing in healthcare settings (Branson *et al.* 2006), and diagnostic counseling and testing (World Health Organization 2007). Additional strategies to increase access, such as HIV testing in the workplace (Corbett *et al.* 2006) and mobile VCT have also been piloted (Morin *et al.* 2006). Very low opt-out rates observed in these models suggest that there remains strong demand for testing that is not being met through traditional approaches (Bakari *et al.* 2000; Were *et al.* 2003; Steen *et al.* 2007; Waxman *et al.* 2007).

Home-based VCT (HBVCT) is a means of improving access to testing, while simultaneously reducing the potential stigma associated with facility-based testing. HBVCT generally involves the use of lay counselors or community health workers who provide door-to-door counseling and testing services. A recent review suggests that while HBVCT may indeed be an effective strategy for expanding access to HIV testing services, the experience and literature remain too limited to support its widespread implementation (Bateganya *et al.* 2007). Important areas where additional research is required include its feasibility in diverse cultural contexts; tailoring the model to rural versus urban settings; the need to adequately address the needs of couples; and weighing costs and benefits in relation to local HIV prevalence.

In response to a number of these issues, we conducted a study of HBVCT in rural Kenya. As of 2007, approximately 1.4 million Kenyan adults were living with HIV/AIDS. Four of five HIV-positive Kenyans are unaware

of their status and it is estimated that over 60% of those who need access to AIDS treatment have no knowledge of their HIV status (Kenyan Medical and Research Institute 2008). In this paper, we present an overview of the context and methodology used for HBVCT delivery in rural Kenya; examine the feasibility, uptake and cost of introducing the intervention at the village level; and explore implications for wider application within the sub-Saharan African context.

Methods

Setting

The HBVCT pilot study was conducted in Sauri village, in Nyanza Province, Kenya which is the site of a multisectoral health and development initiative called the Millennium Villages Project (MVP). MVP aims to accelerate progress towards the Millennium Development Goal targets in rural Africa by applying concurrent proven interventions at the village scale in agriculture, health, education and infrastructure (Earth Institute 2005; Sanchez *et al.* 2007). As of 2005, 90% of the population lived on or under US\$2 per day; agriculture was the major source of household income; and the average household size was 4.8 persons.

Until recently, Nyanza Province had the highest HIV prevalence of any of Kenya's provinces. As of 2006, the provincial adult HIV prevalence among 15- to 49-year olds was 7.8% (6.1% male, 9.6% female) against a national prevalence of 5.1% (National AIDS Control Council 2007). The nearest sentinel surveillance site to the study area had an antenatal HIV prevalence of 35% in 1998, 22% in 2002 and 8% in 2006 (National AIDS Control Council 2007). A village-level survey in 2005 revealed that while 81% of the population expressed a willingness to be tested and 78% knew a place where this could be done, only 18% of community members had ever been tested for HIV (Mutuo *et al.* 2006). At the time of the survey, the nearest VCT site was more than 10 km away. But shortly after the project started, testing became available at a sub-district hospital 4 km from the site.

HBVCT program

The HBVCT program was a partnership between the MVP and the District Department of Health. A local community-based organization, the Inuka Centre, was the provider of home-based counseling and testing services. The outreach method was developed through discussion between the partners alongside consultation with the local community.

Community health workers (CHWs) raised awareness about the HBVCT project during community outreach

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sessions. Initially, a general community meeting was held to inform people about the initiative. This was followed by smaller meetings in each sub-village conducted by the CHWs local to that area. After the sessions, individuals interested in being visited by an HIV counselor approached a CHW and were given appointments. Some approached the local CHW at the meeting itself while others did so in the days after the sub-village meetings. In all, it is estimated that approximately 60% of community members were informed about the HBVCT project.

The Inuka Centre's lay counselors were from a nearby community and had been through a 3-month HIV counseling and testing training curriculum. They were registered by the Government of Kenya National AIDS and STI Control Programme (NAS COP) to perform HIV testing as per Kenya's national policy. Counselors were instructed to provide pre-test group counseling to all members of visited households. Those who agreed to be tested signed the official NAS COP consent form. Rapid blood-based ELISA testing for HIV antibodies was conducted using Abbott Determine (Abbott Park, IL, USA) and Bionline (Standard Diagnostics, Kyonggi-do, South Korea). Where discordant results were obtained, a third test, Uni-Gold (Trinity Biotech, Wicklow, Ireland) was used.

Home-based VCT was offered to all interested household members. While those under age 15 years must obtain consent from a parent or guardian to undergo HIV testing, mature minors – teenagers under 18 but above 15 who are pregnant, have a baby, or are already sexually active – can consent to HIV testing as per Kenyan policy.

Tests were conducted independently for each individual except for couples who requested to be tested together. Post-test counseling was then provided depending on the results of the HIV tests. This was done individually or in pairs when couples were tested together. Individuals testing positive were referred to the nearest care and support services. CD4 staging and antiretroviral therapy (ART) was available at multiple locations in the district, including at the nearby sub-district hospital, at the time of the intervention.

Data collection and analysis

Basic socio-demographic information, without unique personal identifiers, was collected along with the results of HIV testing for all eligible household members. This information was entered into a database where analysis of basic frequencies was conducted in SPSS (SPSS Inc., Chicago, IL, USA) and Excel (Microsoft, Seattle, WA, USA) to assess feasibility and uptake of the intervention. Detailed demographic information was previously collected through repeated surveys of all households in the

village, generating detailed denominator data for the population in the study area (Mutuo *et al.* 2006). Program-related data were complemented with qualitative research including key-informant interviews with HBVCT counselors and program managers to highlight experiences, challenges and lessons learned during the intervention.

Direct costs of the interventions were estimated through the review of budgets and monthly expenditure sheets collected throughout the duration of the project. Costs were presented in terms of cost per capita based on coverage of the intervention and cost per positive case detected. Given that ART is available to this population and is cost-effective in similar settings (Cleary *et al.* 2006; Goldie *et al.* 2006), we did not factor into our analysis the costs or wider benefits associated with early access to care and support.

Results

The full intervention took 3 months to complete; 3–6 counselors and one supervisor always worked together in the community. The total village population of those aged 15–49 years was 3180 in early 2008 during the period of the HBVCT intervention. Of these, 2033 (63.9%) agreed to be visited by the counselors and 97.6% (1984) agreed to be tested (Figure 1). Another 399 people under the age of 15 years were tested after consent by parents or guardians, and 606 people aged at least 50 years were also tested.

In total, 2989 individuals were tested for HIV; 7% (209) tested positive. Among 15–49 year olds, 1984 were tested, with 8.2% (162) testing positive. Prevalence was highest among 35 to 49 year-olds and prevalence among women aged 15–49 was higher (9.1%) than that among men (7.0%) (Table 1). Women aged 15–49 who had ever been

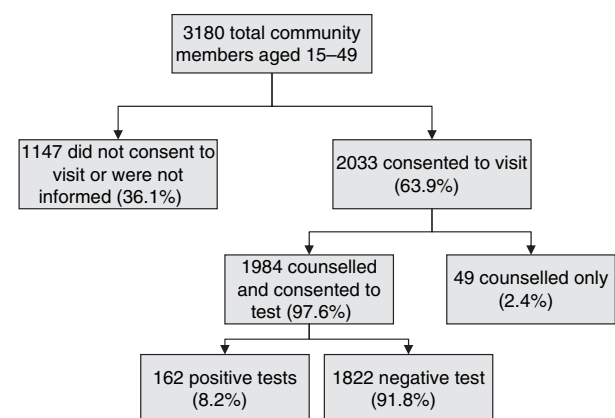


Figure 1 Uptake of home-based voluntary counseling and testing among 15–49-year olds.

Table 1 HIV prevalence among 15–49-year-old HBVCT participants in Sauri, Kenya

	Males		Females		Odds ratio (95% CI)
	Number tested	HIV prevalence	Number tested	HIV prevalence	
Age group					
15–24	481	1.9%	566	5.3%	0.341 (0.160, 0.725)
25–34	185	10.3%	308	12.0%	0.838 (0.467, 1.506)
35–49	181	17.1%	263	13.7%	1.303 (0.773, 2.198)
all (15–49)	847	7.0%	1137	9.1%	0.752 (0.539, 1.049)
Ever married	384	12.0%	749	12.4%	0.963 (0.661, 1.404)
Never married	463	2.8%	388	2.6%	1.089 (0.679, 4.803)
Polygamous	33	24.2%	93	15.1%	1.806 (0.679, 4.803)
Monogamous	331	10.0%	554	10.5%	0.951 (0.606, 1.492)

married were 4.8 times more likely to be HIV-positive than those 15–49 who had never been married and those in polygamous marriages were also more likely to be HIV-positive than those in monogamous marriages.

Interviews with HBVCT counselors and supervisors

During the recruitment period, counselors and CHWs noted that word-of-mouth resulted in substantial numbers of people requesting to be visited despite not having attended mobilization sessions. Conversely, CHWs noted that some individuals and households declined to be visited for the counseling and testing sessions due to religious beliefs and concerns about stigma. CHWs also stated that some of those who had recently been tested or already knew their status did not request further testing.

During the course of the intervention, counselors reported feeling safe and welcomed within the community and noted that the enthusiasm of the community towards testing was a little unexpected given assumed negative attitudes towards testing. Counselors also noted some challenges in reaching the households that had agreed to test, as cost constraints required counselors to walk. Counselors took bicycle taxis to their areas of operation for the day and typically walked 1–3 km per day. Supervisors did report some burnout among counselors, and two counselors were withdrawn and replaced during the intervention period.

Although most participants stated that this was their first test, it was later revealed that approximately 15 had known their HIV status before the home-based test. Counselors suggested that repeat testing was still useful in these individuals as it provided them with an opportunity to disclose their HIV status to their partners. In a number of cases, both partners knew their HIV status and withheld it from each other. In two cases, both partners were

actually already on ART. Providing an opportunity for disclosure was not foreseen but is an additional advantage to such a model.

More difficulties arose in polygamous families where the counseling encounters were particularly time consuming. Counselors reported that getting a number of members of the household to sit together and agree to testing required extra time and it was noted that there is often tension between co-wives. Counseling sessions with children was also more time consuming and required a different set of skills which not all counselors felt they had.

Cost analysis

The total cost of the exercise was \$17 569; 60% was spent on human resources for delivery of the intervention and its supervision, and 40% on test kits (Table 2). The costing includes a daily stipend of \$15 for each counselor, \$30 for the supervisor and \$4.60 for the CHWs for each of the 78 working days that it took to complete the project. Counselors had been trained previously as part of the Inuka Centre's standard work and therefore those training

Table 2 Cost of HBVCT exercise

Item	US\$
Training	154
Stipends	
Counselors	4680
Supervisor	2340
CHWs	2880
Transport	240
Consumables	
Test kits	7275
Total	17 569

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costs were not included, though the cost of 3 extra days of specific training on HBVCT has been included. Counselors were given \$0.77 per day for bicycle taxis to reach the area of the village in which they were to work. This translates to a per capita figure of \$2.60 for each of the 6750 community members, \$5.88 for each person tested, and \$84 per positive case detected.

Discussion

This study suggests that in rural Kenya, HBVCT is both feasible and potentially capable of substantially expanding access to HIV testing services. By employing a recruitment strategy of community meetings and scheduled household visits, nearly two-thirds of eligible adults aged 15–49 years were visited, almost all of whom took the HIV test and received their results. Our findings are similar to the few previous studies in sub-Saharan Africa, where acceptance levels were consistently higher through HBVCT than at facility-based VCT (Fylkesnes & Siziya 2004; Wolff *et al.* 2005; Tumwesigye *et al.* 2008). As those who had recently been tested and those who already knew their HIV-positive status may have been less likely to agree to participate, this coverage figure may underrepresent the proportion of community members accessing HIV testing services.

Qualitative data suggest that counselors were surprisingly well received by the villagers, with substantial word-of-mouth recruitment taking place over the course of the intervention period. Opportunities for repeat testing and disclosure by couples and family members were reported as unintended positive effects of the intervention. Challenges encountered in this traditional rural setting included the counseling environment in complex polygamous households, meeting the specific needs of young clients, and compassion fatigue associated with testing entire families leading to burnout reported in some instances – highlighting the importance for continuous supervision and support for counselors.

The prevalence data as regards HIV from our HBVCT intervention (7% overall and 8.2% among those aged 15–49) broadly reflect data from a recent national population-based survey – where 7.8% of 15- to 64-year olds tested HIV-positive (KEMRI 2008). As has been seen elsewhere in Africa, HIV prevalence among women aged 15–24 years in our study was considerably higher than among men of the same age (Hargreaves *et al.* 2007; National AIDS Control Council 2007; UNAIDS 2007). Furthermore, as documented elsewhere, marriage was identified as a significant risk factor for young women (Carpenter *et al.* 1999; Newmann *et al.* 2000; Glynn *et al.* 2001). Finally, we found that polygamous men have a substantially higher prevalence of HIV than men in monogamous marriages,

which confirms polygamy as a possible important risk factor for HIV transmission in the region (Kenya Demographic and Health Survey 2004).

The findings of this study also provide a strong economic case for the extension of such a screening program to other communities. At a cost of \$17 569 or \$2.60 per head, the intervention was effective in screening and testing 3000 individuals at a cost of \$5.88 per person and identifying 209 cases of HIV at a cost of \$84 per case detected. The HBVCT model is of a lower cost per person tested than facility-based interventions documented in comparable parts of sub-Saharan Africa (McConnel *et al.* 2005; Hausler *et al.* 2006; Thielman *et al.* 2006). Recent evidence indicates that ART is cost-effective in this setting, and this type of intervention can be seen as a low-cost and well-accepted means of setting individual patients on a path to receiving such treatment (Cleary *et al.* 2006; Goldie *et al.* 2006). Studies that integrate cost data with the multiplicity of potential benefits including effects on prevention and accelerated entry into care and support services are clearly required.

In summary, evidence from this and other studies suggest that HBVCT presents numerous complex advantages and challenges compared to facility-based testing. By reducing logistical barriers to clients and the stigma associated with highly visible clinic contexts, it carries the potential to rapidly expand HIV testing coverage to populations in high-risk settings. Other approaches to fostering higher rates of testing such as ‘routine testing’ employed in Botswana still run the risk of failing to reach healthy young people or those who are not regular users of the health service (Weiser *et al.* 2006). HBVCT also has the potential to stimulate intra-household and inter-generational communication about HIV while also fostering awareness and collective engagement at the level of entire communities. Stimulating social mobilization around HIV/AIDS seems to play an important role in contributing to population-level reductions in HIV prevalence in diverse settings (Wohlfeiler 2002; Stoneburner & Low-Beer 2004; Epstein 2007; Khumalo-Sakutukwa *et al.* 2008; Pronyk *et al.* 2008).

As care and support services become more widely available, the global community needs to ensure that all who need them have access to these services. The bottleneck of testing is one area where innovation is urgently required. As Kenya and other high-prevalence countries seek to increase the number of people tested and treated, HBVCT is a promising avenue for further exploration.

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