

Expanding access to voluntary HIV counselling and testing in sub-Saharan Africa: alternative approaches for improving uptake, 2001–2007

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Summary

The changing face of the HIV/AIDS epidemic has resulted in new opportunities to increase access to voluntary HIV counselling and testing (VCT), especially during the past 7 years (2001–2007). As access to HIV treatment becomes more widely available in sub-Saharan Africa, the need for enhanced access to VCT would become even greater. When given the opportunity, many more adults in sub-Saharan Africa would accept VCT, and many clearly express the desire to learn their HIV sero-status. However, in most parts of sub-Saharan Africa, fewer than one in 10 people know their HIV status. Stigma, fear of receiving an HIV-positive status, lack of confidentiality, long distances to VCT sites, and long delays in returning HIV test results limit people's access to traditional VCT systems. Alternative VCT delivery models, such as mobile VCT, routine offer of VCT and home-based VCT increase access to and uptake of VCT. We recommend that these alternative models be implemented in more settings and on a much larger scale in sub-Saharan Africa, where VCT uptake rates remain low.

keywords expansion, voluntary HIV counselling and testing, utilization, sub-Saharan Africa

Introduction

As access to anti-retroviral treatment is scaled up in sub-Saharan Africa, there is a critical opportunity to simultaneously expand access to HIV prevention, which continues to be the mainstay of the response to the HIV epidemic. Among the interventions which play a pivotal role in both treatment and prevention, voluntary HIV counselling and testing (VCT) is paramount (UNAIDS/WHO 2004). The effect of VCT on sexual risk behaviour and the risk of HIV infection has been well documented (UNAIDS 2001; Marks *et al.* 2006). In a meta-analysis of the effect of HIV counselling and testing on sexual risk behaviour, Weinhardt *et al.* (1999) found that HIV-positive individuals who underwent VCT had safer sex more frequently and reduced their risk behaviours, thereby decreasing their likelihood of infecting others or becoming infected with HIV or other STD.

Early diagnosis of HIV infection, through testing and counselling on a large scale, is increasingly understood as the critical gateway to providing individuals living with HIV with anti-retroviral treatment (ART) and effective prevention and care (Nieburg *et al.* 2005; Marks *et al.* 2006; WHO/UNAIDS/UNICEF 2007), but inadequate access to and uptake of these services continue to handicap

efforts to expand HIV prevention and ensure timely access to treatment (Creek *et al.* 2007). Recently completed demographic and health surveys in the 12 countries (Botswana, Cameroon, Ethiopia, Ghana, Kenya, Lesotho, Malawi, Mozambique, Nigeria, Democratic Republic of Congo, United Republic of Tanzania and Uganda), which account for 47% of adults and children living with HIV/AIDS in sub-Saharan Africa in 2005 showed that, among the general population, the median percentages of men and women who had been tested for HIV and had received their results were 12% and 10%, respectively (WHO/UNAIDS/UNICEF 2007). Population-based studies undertaken in the same countries revealed that the percentages of women and men living with HIV who knew their HIV sero-positive status were 12–25% and 8–24%, respectively (WHO/UNAIDS/UNICEF 2007). Traditional VCT-related barriers, such as low perceived risk for HIV infection and lack of access to free testing (Nakanjako *et al.* 2006), general negative perceptions of test services, stigmatizing beliefs coupled with fear of discrimination (Kalichman & Simbayi 2003), a shortage of counsellors, concerns about confidentiality and delays in returning HIV test results (Creek *et al.* 2007) continue to hamper effective access to and uptake of VCT in many sub-Saharan African countries (Kalichman & Simbayi 2003; Urassa *et al.* 2005;

Marum *et al.* 2006; Thior *et al.* 2006; Yoder *et al.* 2006; Creek *et al.* 2007).

As access to ART becomes increasingly available, there is an urgent need for increasing access to and the use of VCT, especially in sub-Saharan Africa, where an estimated 80% of the 24.7 million adults and children living with HIV are not aware of their HIV sero-status (UNAIDS 2004; WHO/UNAIDS 2007). Alternative approaches, such as finger-stick or saliva testing are being used, and services are being provided in innovative ways, including testing entire families and counselling and testing in people's homes (De Cock *et al.* 2006). Our aim was to identify the weaknesses of traditional VCT and how the access to and the uptake of VCT could be improved using alternative delivery models.

Methods

We searched PubMed for articles related to voluntary counselling and testing using the search terms *HIV, testing, counselling, mobile VCT, routine offer of counselling and testing, provider-initiated testing and counselling, home-based VCT* and *door-to-door VCT*. All articles that met these inclusion criteria and described work conducted in sub-Saharan Africa were considered. Articles were reviewed for information pertaining to the type of VCT provided, when and where the VCT intervention was conducted (including whether or not the intervention was part of a research project), access to and uptake of VCT, in addition to any significant factors that hindered or facilitated the uptake rates reported. Articles describing alternative approaches to VCT delivery have only been published recently, and were reviewed for the period 2001–2007.

Traditional voluntary HIV counselling and testing

Traditional VCT (also called client-initiated VCT) involves individuals actively seeking HIV testing and counselling at a facility that offers these services (Fylkesnes & Siziya 2004; Creek *et al.* 2006; WHO/UNAIDS 2007). The approach, which remains the linchpin of HIV testing approaches, rests on: (i) governments and other care providers making HIV counselling and testing services available; (ii) public awareness of that availability; (iii) an individual's decision to seek out a facility providing VCT services; and (iv) the individual's subsequent conscious choice to return to receive test results along with associated post-test counselling and referral (Nieburg *et al.* 2005). Client-initiated VCT is conducted in a wide variety of settings, including health facilities, stand-alone facilities outside health institutions, through mobile services, in

community-based settings, and even in people's homes (WHO/UNAIDS 2007).

While client-initiated VCT remains the primary model in many sub-Saharan African countries, its coverage has remained largely inadequate. In many settings where health systems are weak and resources limited, its availability is constrained by shortages of skilled service providers, inadequate material resources, poor infrastructure and inadequate procurement and supply management systems (WHO/UNAIDS/UNICEF 2007). Individual attitudes and personal perceptions of risk also have a considerable effect on the uptake of VCT [Kalichman & Simbayi 2003; Ministry of Health (MoH) & ORC Macro 2006]; stigma and fear of negative reactions to disclosure create further barriers to testing (Kalichman & Simbayi 2003); gender inequalities contribute to delays in women learning their HIV status and increase the risk of discrimination and violence following disclosure of HIV-positive status (Pool *et al.* 2001; Urassa *et al.* 2005; Hutchinson & Mahlalela 2006; Msuya *et al.* 2006; Thior *et al.* 2006; WHO/UNAIDS/UNICEF 2007).

Alternative voluntary HIV counselling and testing models

Transport difficulties and the fear of being seen at healthcare facilities limit the number of people seeking VCT from established healthcare settings or at stand-alone VCT sites (Asingwire 2004; MoH & ORC Macro 2006; Morin *et al.* 2006; Yoder *et al.* 2006). As a result, many people, including those living with HIV, have not sought VCT and are not aware of their HIV status (WHO/UNAIDS/UNICEF 2007). This indicates a need for approaches that can increase access and overcome social barriers, such as mobile HIV counselling and testing services (Morin *et al.* 2006), routine offering of HIV counselling and testing (RCT) (Weiser *et al.* 2006; Creek *et al.* 2007) and providing VCT in people's homes (Matovu *et al.* 2006; Were *et al.* 2006).

Mobile voluntary HIV counselling and testing

Mobile VCT denotes the provision of HIV counselling and testing services by mobile teams from a van equipped with HIV-testing facilities (Asingwire 2004; Morin *et al.* 2006). The principle of mobile VCT is to take VCT to populations that are considered to be 'hard-to-reach', such as internally displaced populations, sex workers and truckers and employees at their workplace. Most mobile VCT services are provided in collaboration with local partners. South Africa and Swaziland work with churches and faith-based organizations, while Cote d'Ivoire and Rwanda provide VCT in military barracks and health facilities [Population

Services International (PSI) 2006]. In Zimbabwe, PSI/Zimbabwe provides VCT to over 18 000 clients per month, 40% of whom are reached through mobile VCT, often delivered in rural communities where counsellors set up tents for a few days, returning every 1–3 months, depending on the demand for services (PSI 2006).

In Uganda, the AIDS Information Center (AIC), with support from Uganda Program for Human and Holistic Development (UPHOLD)/USAID, provides mobile VCT services to communities that cannot easily access VCT from established VCT sites (Nahamya *et al.* 2006). AIC works closely with the MoH, non-governmental organizations and community-based organizations that provide related services in the local communities (Nahamya *et al.* 2006). A preliminary evaluation of the AIC mobile van as a tool for promoting VCT suggests that 90% of clients were satisfied with the service (Asingwire 2004). In Zimbabwe, 98.8% of 1099 people using a same-day mobile HIV testing and counselling service between March 2002 and August 2003 chose to receive their HIV test results on the same day (Morin *et al.* 2006). In a separate qualitative assessment of why uptake rates had been low before mobile VCT, the cost of testing, the cost of transport to Harare (both less than US\$1) and the time to travel to Harare were cited as considerable barriers – despite the fact that most people wanted to know their HIV status (Morin *et al.* 2006). Women pointed out that community-based mobile VCT meant they did not have to ask men for money to go to urban testing sites, or for permission to seek VCT (Morin *et al.* 2006). Mobile HIV VCT has also been pioneered in Kenya among remote populations (Marum *et al.* 2006) and in rural Ethiopia using home-based care providers who provide support counselling and care at community level (Ali *et al.* 2006). In Zimbabwe, employees were randomized to receive VCT either at the workplace (on-site VCT) or at a chain of free-standing centres (off-site VCT). One thousand nine hundred and fifty-seven of the 3950 employees randomized to on-site VCT received their HIV test results and post-test counselling (mean uptake by site: 51.1%) as opposed to 586 of the 3532 employees allocated to off-site VCT (mean uptake by site: 19.2%), suggesting that convenience and accessibility are important determinants for use of community-based VCT (Corbett *et al.* 2006).

However, the cost of mobile VCT, at least in the initial stages, can be high and follow-up and support of clients tested may be difficult (Asingwire 2004). The strain of pre- and post-test counselling many clients on the same day can be considerable for the staff (Asingwire 2004). However, on the whole, mobile VCT programs are better suited for hard-to-reach areas, and can help increase uptake of VCT in these areas, given enough resources. The issue of high

costs in the short run can be overcome through economies of scale in the long run.

Routine offer of HIV counselling and testing

Routine offer of HIV counselling and testing (also known as provider-initiated VCT) refers to HIV testing and counselling which is recommended by healthcare providers to persons attending healthcare facilities as a standard component of medical care (Weiser *et al.* 2006; Creek *et al.* 2007; WHO/UNAIDS 2007). According to the recent WHO/UNAIDS guidelines (WHO/UNAIDS 2007), an HIV test is recommended for all patients, irrespective of the epidemic setting, whose clinical presentation might result from underlying HIV infection, as a standard part of medical care for all patients attending health facilities in generalized HIV epidemics and more selectively in concentrated and low-level epidemics. The purpose of such testing and counselling is to enable specific clinical decisions to be made and/or specific medical services to be provided that would not be possible without the knowledge of the person's HIV status (WHO/UNAIDS 2007). Under this approach, all persons receive group pre-test counselling and are informed that HIV testing will be performed as a part of the general screening unless they opt out. Those who opt to take the test and receive their HIV test results are provided with individual post-test counselling according to their HIV sero-status (Creek *et al.* 2007).

Routine offer of HIV counselling and testing reduces stigma and discrimination (Weiser *et al.* 2006), identifies previously undiagnosed HIV infection (Homsy *et al.* 2006), gives women the opportunity to use VCT without having to seek permission from male partners (Weiser *et al.* 2006), refers clients early to HIV prevention, treatment and care services (Creek *et al.* 2007), and as many pregnant women attend antenatal care (Jimoh 2003), it can increase the uptake among women (Homsy *et al.* 2006; Weiser *et al.* 2006). RCT has helped to improve access to and uptake of VCT in Botswana (Weiser *et al.* 2006; Creek *et al.* 2007), Zimbabwe (Perez *et al.* 2005), Malawi (Manzi *et al.* 2005) and Uganda (Homsy *et al.* 2006), among others. In Botswana, in a cross-sectional study to assess the knowledge of and attitudes to routine testing, correlates of HIV testing and barriers and facilitators to testing 11 months after its introduction, 81% were in favour of RCT. Clients believed it would lower barriers to testing (89%), reduce HIV-related stigma (60%) and violence towards women (55%), and increase access to ART (93%) (Weiser *et al.* 2006). Another study that assessed the uptake of HIV counselling and testing services before and after the introduction of RCT in Botswana found that the percentage of all HIV-infected women

delivering at Francistown regional hospital who knew their HIV sero-status increased from 47% to 78% after RCT was introduced; furthermore, the percentage of HIV-infected women participating in prevention of mother-to-child transmission (PMTCT) of HIV interventions increased from 29% to 56% (Creek *et al.* 2007).

In rural Uganda, provision of routine intra-partum HIV counselling and testing using an opt-out strategy was well received and achieved high HIV counselling and testing coverage rates at a rural hospital. Ninety-seven per cent of women and 97% of men counselled in the ANC, and 86% of women and 98% of men counselled in the maternity ward-accepted VCT (Homsy *et al.* 2006). The proportion of women discharged from the maternity ward with documented HIV status increased from 39% before the intervention to 88% after (Homsy *et al.* 2006).

As access to ART and PMTCT programmes become a reality in much of Africa where HIV infection in women is disappointingly high (UNAIDS 2006), many HIV-infected women would need better access to VCT if they are to benefit from these initiatives. RCT would provide HIV-positive women with the means to enrol into treatment and care programmes as early as possible (WHO/UNAIDS 2007).

Home-based HIV counselling and testing

Under the home-based VCT approach, HIV counsellors offer HIV counselling and testing services in clients' homes (Matovu *et al.* 2002; Were *et al.* 2006; Yoder *et al.* 2006). Home-based VCT eliminates the cost of transport to the test site (Wolff *et al.* 2005) and increases uptake especially among women, as they do not need to seek permission for VCT or money for transport to VCT sites from male partners (Matovu *et al.* 2005; Msuya *et al.* 2006; Thior *et al.* 2006). This approach can also reduce stigma associated with being seen at the VCT clinic (Yoder *et al.* 2006).

Access to and uptake of VCT can increase with home-based VCT (Wolff *et al.* 2005; Were *et al.* 2006). In a Zambian study (Fylkesnes & Siziya 2004) of VCT acceptability of participants randomized to receive VCT either at the local clinic or at an optional location (i.e. home, local clinic or other venue of choice), 55.8% of participants allocated to an optional location took VCT, whereas only 11.8% of those allocated to the local clinic did. Eighty-four per cent of those allocated to an optional location opted to receive VCT at home.

In rural Rakai district, southwestern Uganda, in a VCT intervention implemented as a part of the Rakai Community Cohort Study, VCT is largely provided at home (Matovu *et al.* 2002) using community-resident VCT

counsellors. Home-based VCT increased uptake by 139%, from 33% in 1994/95 (Nyblade *et al.* 2001) to 79% in 2000/01 (Matovu *et al.* 2006). Earlier, uptake rates had never exceeded 13% overall (Nyblade *et al.* 2001). Similar results were achieved in the rural Masaka and Bushenyi districts of Uganda where, before home-based VCT, uptake rates were below 10% (Wolff *et al.* 2005; Nuwaha *et al.* 2006).

In a study that assessed the uptake of home-based VCT provided alongside a population-based survey in selected regions of Uganda (Yoder *et al.* 2006), 86% of participants received HIV test results and post-test counselling (83% of men and 88% of women); 93% chose to receive both at home. Home-based VCT reduced the cost in time and money to travel to a facility, and as one participant reported, '*no one can tell what is happening in your home so they cannot spread unnecessary rumours, but if they see you going to a health centre they begin to suspect that you might be sick and to ask you questions*' (Yoder *et al.* 2006).

The household members of HIV-positive persons often are also infected (Kabatesi *et al.* 2002), but unfortunately, are frequently unaware of their HIV status (Were *et al.* 2006). Home-based VCT provides family members with an opportunity to learn their HIV status and gain access to appropriate HIV prevention, treatment and care services and increases the uptake of these services (Weidle *et al.* 2006; Were *et al.* 2006).

The Centers for Disease Control (CDC) conducted an intervention as part of the Home-based AIDS Care (HBAC) Project in rural Uganda, whereby individuals starting ART and their household members were visited at home. Of the 2373 family members enrolled between May 2003 and December 2004, 99% accepted VCT, with 99% of those accepting VCT being tested in their homes. HIV prevalence was high (7.5%), and 74% of those testing positive had never been tested before (Were *et al.* 2006). Thirty-nine per cent of the HIV positives were clinically eligible for ART (Were *et al.* 2006) and would have missed the opportunity for early ART initiation if VCT had not been provided to their families. Of the 120 spouses of ART patients who were tested for HIV, 43% were HIV negative, and of these, 99% had not been previously tested (Were *et al.* 2006). Home-based VCT was well accepted, discovered previously undiagnosed HIV infections and discordant couples, and referred eligible patients to treatment and care (Weidle *et al.* 2006; Were *et al.* 2006).

Family-based VCT can be expensive, considering the cost of doing multiple home visits to provide VCT and ART. Home/family-based VCT can also be a source of discomfort in those areas where people do not want others to know or even suspect that they or their family members

could be infected with HIV (Matovu *et al.* 2002). Programme implementers therefore have to set aside enough resources to mobilize communities, to address stigma and discrimination and to ensure total confidentiality of HIV test results before a home/family-based VCT can be scaled up.

Public health implications

As access to ART becomes increasingly available, we need to raise the number of people who are aware of their HIV status, and to refer HIV positives to treatment and care. Till today, only a small proportion of HIV-infected individuals in sub-Saharan Africa are aware of their HIV status (Nieburg *et al.* 2005; WHO/UNAIDS 2007; WHO/UNAIDS/UNICEF 2007). Reasons for the low awareness of HIV status are fear of stigma and discrimination, lack of confidentiality, negative attitude towards HIV counselling and testing (Kalichman & Simbayi 2003), and long distances to VCT sites (Marum *et al.* 2006). However, there is now evidence that many people in sub-Saharan Africa are willing and ready to test for HIV and receive counselling, if these services are accessible in terms of cost and time (Matovu *et al.* 2002; Corbett *et al.* 2006; Morin *et al.* 2006; Weiser *et al.* 2006).

Home-based VCT was predictably preferred because it requires virtually no travel time and effort to obtain results. Homes were perceived as places where participants could receive their test results confidentially (Yoder *et al.* 2006). However, while home-based VCT seems to result in high VCT uptake rates in community-based settings, its applicability in urban areas is not well documented (Matovu *et al.* 2002). Furthermore, it is costly in terms of time and personnel required, and in terms of setting up and maintaining the infrastructure. Programme implementers would therefore need to assess the applicability of this model in other settings and conduct cost–benefit analyses to ascertain financial and logistical feasibility in sub-Saharan Africa.

In both industrialized and resource-constrained settings, many opportunities to diagnose and counsel individuals at health facilities are being missed. Provider-initiated HIV testing and counselling facilitates diagnosis and access to HIV-related services (Nakanjako *et al.* 2006; Wanyenze *et al.* 2006; Weiser *et al.* 2006; Creek *et al.* 2007; WHO/UNAIDS 2007). Arguments for RCT have been based on the fact that it helps to reduce barriers to testing, HIV-related stigma and violence towards women in addition to an increased uptake of pre-natal and post-natal care interventions (Weidle *et al.* 2006; Weiser *et al.* 2006). There have, however, been concerns about the ethics of RCT. RCT is based on the presumption that those who are

not willing to be tested would voluntarily opt out (CDC 2004; Weiser *et al.* 2006). However, the voluntary element of the consent may be compromised if patients are informed about the opt-out policy by healthcare professionals (Rennie & Behets 2006). Given the high social status of medical professionals, the scarcity of healthcare and the arguably universal psychological tendency to obey authority (Cassell 2005; Molyneux *et al.* 2005), patients may be unlikely to oppose the recommendation of physicians and healthcare institutions. In the Weiser *et al.* (2006) study, while RCT experiences were positive overall, approximately two-thirds of participants, who were tested through routine offer of counselling or traditional VCT, felt that they could not refuse the HIV test if it was recommended to them by healthcare workers. This underscores the importance of ensuring informed consent, protection of confidentiality and protection of women from gender-based violence.

Furthermore, as individual pre-test counselling is not undertaken in a routine opt-out HIV strategy (CDC 2004; Weiser *et al.* 2006; Creek *et al.* 2007), the quality of group pre-test counselling and individual post-testing counselling and guaranteed confidentiality are important. If this strategy is to be implemented on a large scale, it requires staff to train midwives and lay counsellors and revise guidelines to speed up rapid onsite HIV testing (Shetty *et al.* 2005; Weiser *et al.* 2006). This would reduce the number of clients who are tested but never receive results (Kassler *et al.* 1998; CDC 2004; WHO 2004; Creek *et al.* 2007). As fear of partners' reactions tends to inhibit VCT uptake among women, we need to design programmes that involve men in VCT and PMTCT interventions (Homsy *et al.* 2006).

Discussion

Evaluations of traditional VCT systems suggest low uptake of VCT even in places where access to VCT is unlimited (Kalichman & Simbayi 2003; Nieburg *et al.* 2005). As access to ART increases, there is an urgent need for alternative VCT delivery systems to increase access to and the utilization of VCT. These alternatives include mobile VCT, routine offer of counselling and testing and home-based VCT, among others. These models can increase access to and the uptake of VCT, especially when they are combined with same-day HIV test results (Kassler *et al.* 1998; WHO 2004; Corbett *et al.* 2006).

However, while these alternative approaches increase access to and uptake of VCT, caution should be taken in interpreting their success rates. Most of these models have only been recently published (especially during the period 2001–2007), and it may therefore be too early to make any

concrete recommendations about their feasibility in increasing access to and the uptake of VCT in sub-Saharan Africa. In addition, many of these models were implemented as part of ongoing research projects in which VCT services were largely provided free of charge to study participants (Matovu *et al.* 2002; Were *et al.* 2006). As the cost of providing VCT could have been strongly subsidized by overall research funds, the actual costs and benefits associated with implementing these models in a real world, non-research context may not be known yet.

While sub-Saharan Africa bears the greatest burden of HIV/AIDS (UNAIDS 2006), access to VCT is still limited by traditional VCT-related barriers, including delays in returning HIV test results, lack of confidentiality and high VCT costs. As a result, many people remain unaware of their HIV sero-status. This further compromises any attempts to provide treatment and care to those that need it. However, many people in sub-Saharan Africa are ready and willing to learn their HIV status once voluntary HIV testing and counselling facilities become widely available and accessible – both in terms of cost and time (Matovu *et al.* 2006; Morin *et al.* 2006; Weiser *et al.* 2006). Thus, home-based VCT, routine offer of VCT and mobile VCT must now be implemented in more settings and on a much wider scale in a bid to increase access to VCT in sub-Saharan Africa where VCT uptake rates remain virtually low.

Disclaimer

The opinions and statements in this article are those of the authors and do not represent the official policy, endorsement, or views of the Rakai Health Sciences Program or any of its collaborating institutions.

References

- Ali MJ, Dawit DB, Fisseha T & Sarah H (2006) *Mobile HIV Voluntary Counselling and Testing with Community Home-Based Care Services: Reaching the Unserved Population in Rural Bugna District, Ethiopia*. Presented at the President's Emergency Plan for AIDS Relief Annual Meeting: The 2006 HIV/AIDS Implementers' Meeting, Durban, South Africa, 12–15 June 2006. Available at: <http://www.blsmmeetings.net/implementhiv2006/orals151-175.htm>. Last accessed 28 March 2007.
- Asingwire N (2004) *Feasibility Study of the Mobile Van for Voluntary Counselling and Testing for HIV/AIDS*. Final report submitted to the Uganda Program for Human and Holistic Development (UPHOLD), Kampala, Uganda. Available at: http://www.uphold.jsi.com/Docs/Mobile_Van_VCT.pdf. Last accessed 29 March 2007.
- Cassell EJ (2005) Consent or obedience? *Power and authority in medicine*. *New England Journal of Medicine* 352, 328–330.
- CDC (2004) Introduction of routine HIV testing in prenatal care – Botswana, 2004. *Morbidity and Mortality Weekly Report* 53, 1083–1086.
- Corbett EL, Dauya E, Matambo R *et al.* (2006) Uptake of workplace HIV counselling and testing: a cluster-randomized trial in Zimbabwe. *PLoS Medicine* 3(7), e238.
- Creek TL, Alwano MG, Molosiwa RR *et al.* (2006) Botswana's *Tebelopele* voluntary HIV counselling and testing network: use and client risk factors for HIV infection. *Journal of Acquired Immune Deficiency Syndrome* 43, 210–218.
- Creek TL, Ntummy R, Seipone K *et al.* (2007) Successful introduction of routine opt-out HIV testing in antenatal care in Botswana. *Journal of Acquired Immune Deficiency Syndrome* 45, 102–107.
- De Cock KM, Bunnell R & Mermin J (2006) Unfinished business – expanding HIV testing in developing countries. *New England Journal of Medicine* 354(5), 440–442.
- Fylkesnes K & Siziya S (2004) A randomized trial on acceptability of voluntary counselling and testing. *Tropical Medicine and International Health* 9, 566–572.
- Homsy JH, Kalamya JN, Obonyo J *et al.* (2006) Routine intrapartum HIV counselling and testing for prevention of mother-to-child transmission of HIV in a rural Ugandan hospital. *Journal of Acquired Immune Deficiency Syndrome* 42, 149–154.
- Hutchinson PL & Mahlalela X (2006) Utilization of voluntary counselling and testing services in the Eastern Cape, South Africa. *AIDS Care* 18(5), 446–455.
- Jimoh AA (2003) Utilisation of antenatal services at the Provincial Hospital, Mongomo, Guinea, Equatoria. *African Journal of Reproductive Health* 7(3), 44–54.
- Kabatesi D, Ransom R, Lule JR *et al.* (2002) *HIV Prevalence among Household Members of Persons Living with HIV in Rural Uganda*. XIV International AIDS Conference, Barcelona, Spain, 7 July 2002 (10BT5-1).
- Kalichman SC & Simbayi LC (2003) HIV testing attitudes, AIDS stigma, and voluntary HIV counselling and testing in a black township in Cape Town, South Africa. *Sexually Transmitted Infections* 79, 442–447.
- Kassler WJ, Alwano-Edyagu MG, Marum E, Biryahwaho B, Kataaha P & Dillion B (1998) Rapid HIV testing with same-day results: a field trial in Uganda. *International Journal of STD & AIDS* 9, 134–138.
- Manzi M, Zachariah R, Teck R *et al.* (2005) High acceptability of voluntary counselling and HIV testing but unacceptable loss to follow up in a prevention of mother-to-child HIV transmission programme in rural Malawi: scaling up requires a different way of acting. *Tropical Medicine and International Health* 10, 1242–1250.
- Marks G, Crepaz N & Janssen RS (2006) Estimating sexual transmission of HIV from persons aware and unaware that they are infected with the virus in the USA. *AIDS* 20, 1447–1450.
- Marum E, Taegtmeier M & Chebet K (2006) Scale-up of voluntary HIV counselling and testing in Kenya. *JAMA* 296(7), 859–862.
- Matovu JK, Kigozi G, Nalugoda F, Wabwire-Mangen F & Gray RH (2002) The Rakai Project counselling programme experi-

J. K. B. Matovu & F. E. Makumbi **Voluntary HIV counselling and testing in sub-Saharan Africa**

- ence. *Tropical Medicine and International Health* 7, 1064–1067.
- Matovu JK, Gray RH, Makumbi F *et al.* (2005) Voluntary HIV counselling and testing acceptance, sexual risk behavior and HIV incidence in Rakai, Uganda. *AIDS* 19, 503–511.
- Matovu JK, Kigozi G, Nalugoda F, Lutalo T & Gray RH (2006) *Evaluation of a Community-Based VCT Program in Rakai, Uganda*. Paper presented at the 6th INDEPTH Annual General and Scientific Meeting, Ouagadougou, Burkina Faso, 18–22 September 2006.
- Ministry of Health (MOH) [Uganda] & ORC Macro (2006) *Uganda HIV/AIDS Sero-Behavioural Survey 2004–2005*. Ministry of Health and ORC Macro, Calverton, Maryland, USA.
- Molyneux CS, Wassenaar DR, Peshu N & Marsh K (2005) 'Even if they ask you to stand by a tree all day, you will have to do it (laughter)...!': Community voices on the notion and practice of informed consent for biomedical research in developing countries. *Social Science and Medicine* 61, 443–454.
- Morin SF, Khumalo-Sakutukwa G, Charlebois ED *et al.* (2006) Removing barriers to knowing HIV status: same-day mobile testing in Zimbabwe. *Journal of Acquired Immune Deficiency Syndrome* 24, 218–224.
- Msuya SE, Mbivzo E, Uriyo J *et al.* (2006) Predictors of failure to return for HIV test results among pregnant women in Moshi, Tanzania. *Journal of Acquired Immune Deficiency Syndrome* 43(1), 85–90.
- Nahamya F, Wasswa L, Muyita A & Mbirizi J (2006) *Mobile Voluntary Counselling and Testing Services: An Effective Tool for Access for All*. Presented at the President's Emergency Plan for AIDS Relief Annual Meeting: The 2006 HIV/AIDS Implementers' Meeting, Durban, South Africa, 12–15 June 2006. Available at: <http://www.blsmmeetings.net/implementhiv2006/orals151-175.htm>. Last accessed 28 March 2007.
- Nakanjako D, Kanya M, Kyabayinze D *et al.* (2006) Acceptance of routine testing for HIV among adult patients at the medical emergency unit at a national referral hospital in Kampala, Uganda. *AIDS and Behavior* 11, 753–758.
- Nieburg P, Cannell T & Morrison JS (2005) *Expanded HIV testing: critical gateway to HIV treatment and prevention requires major resources, effective protections*. Available at: <http://usinfo.state.gov/gi/img/assets/5096/expandedhivtesting.pdf>. Last accessed May 20, 2007.
- Nuwaha F, Muganzi E, Kasasa S *et al.* (2006) *Counselling and Testing in Rural Uganda*. Presentation at XVI International AIDS Conference, Toronto, Canada, 13–18 August 2006 (TUAC0101).
- Nyblade LC, Menken J, Wawer MJ *et al.* (2001) Population-based HIV testing and counselling in rural Uganda: participation and risk characteristics. *Journal of Acquired Immune Deficiency Syndrome* 28, 463–470.
- Perez F, Zvandaziva C, Engelsmann B & Dabis F (2005) Acceptability of routine HIV testing ('opt-out') in antenatal services in two rural districts of Zimbabwe. *Journal of Acquired Immune Deficiency Syndrome* 41(4), 514–520.
- Pool R, Nyanzi S & Whitworth JA (2001) Attitudes to voluntary counselling and testing for HIV among pregnant women in rural south-west Uganda. *AIDS Care* 13, 605–615.
- PSI (2006) *Taking It to the Streets: Reaching Truckers, Sex Workers, Rural Populations with Mobile VCT*. Available at: <http://www.psi.org/resources/pubs/mobile-VCT.pdf>. Last accessed March 27, 2007.
- Rennie S & Behets F (2006) Desperately seeking targets: the ethics of routine HIV testing in low-income countries. *Bulletin of the World Health Organization* 84, 52–57.
- Shetty AK, Mhazo M, Moyo S *et al.* (2005) The feasibility of voluntary counselling and HIV testing for pregnant women using community volunteers in Zimbabwe. *International Journal of STD and AIDS* 16, 755–759.
- Thior I, Gabaitiri L, Grimes J *et al.* (2006) Voluntary counselling and testing among post-partum women in Botswana. *Patient Education and Counselling* 65, 296–302.
- UNAIDS (2001) *The impact of voluntary counselling and testing: a global review of the benefits and challenges*. UNAIDS/01.32E.
- UNAIDS (2004) *2004 report on the global HIV/AIDS epidemic: 4th global report*. UNAIDS/04.16E.
- UNAIDS (2006) *AIDS epidemic update: special report on HIV/AIDS: December 2006*. UNAIDS/06.29E.
- UNAIDS/WHO (2004) *UNAIDS/WHO Policy Statement on HIV Testing*. UNAIDS/WHO, Geneva, Switzerland. Available at: <http://www.who.int/hiv/pub/vct/statement/en/>. Last accessed 20 May 2007.
- Urassa P, Gosling R, Pool R & Reyburn H (2005) Attitudes to voluntary counselling and testing prior to the offer of Nevirapine to prevent vertical transmission of HIV in northern Tanzania. *AIDS Care* 17(7), 842–852.
- Wanyenze R, Kanya M, Liechty CA *et al.* (2006) HIV counselling and testing practices at an urban hospital in Kampala, Uganda. *AIDS and Behavior* 10, 361–367.
- Weidle PJ, Wamai N, Solberg P *et al.* (2006) Adherence to anti-retroviral therapy in a home-based AIDS care programme in rural Uganda. *Lancet* 368, 1587–1594.
- Weinhardt LS, Carey MP, Johnson BT & Bickham NL (1999) Effects of HIV counselling and testing on sexual risk behavior: a meta-analytic review of published research, 1985–1997. *American Journal of Public Health* 89, 1397–1405.
- Weiser SD, Heisler M, Leiter K *et al.* (2006) Routine HIV testing in Botswana: a population-based study on attitudes, practices and human rights concerns. *PLoS Medicine* 3(7), e261.
- Were WA, Mermin JH, Wamai N *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 Immune Deficiency Syndrome* 43, 91–95.
- WHO/UNAIDS (2007) *Guidance on provider-initiated HIV testing and counselling in health facilities*. Available at: http://www.who.int/hiv/who_pitc_guidelines.pdf. Last accessed 4 June 2007.
- WHO/UNAIDS/UNICEF (2007) *Towards universal access: scaling up priority HIV/AIDS interventions in the health sector*.

J. K. B. Matovu & F. E. Makumbi **Voluntary HIV counselling and testing in sub-Saharan Africa**

Progress Report, April 2007. Available at: http://www.who.int/hiv/mediacentre/universal_access_progress_report_en.pdf. Last accessed 20 April 2007.

Wolff B, Nyanzi B, Katongole G *et al.* (2005) Evaluation of a home-based voluntary counselling and testing intervention in rural Uganda. *Health Policy and Planning* 20, 109-116.

World Health Organization (WHO) (2004) *Rapid Tests: Guidelines for Use in HIV Testing and Counselling Services in Resource-Constrained Settings*. WHO, Geneva, Switzerland.

Yoder PS, Katahoire AR, Akol Z, Bunnell R & Kaharuza F (2006) *Home-Based HIV Testing and Counselling in a Survey Context in Uganda*. ORC Macro, Calverton, Maryland, USA.

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