

Costs and outcomes of VCT delivery models in the context of scaling up services in Indonesia

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Summary

OBJECTIVE To evaluate costs and outcomes of voluntary counselling and testing (VCT) service delivery models in urban Indonesia.

METHODS We collected primary data on utilization, costs and outcomes of VCT services in a hospital clinic (568 clients), HIV community clinic (28 clients), sexually transmitted infection (STI) community clinic (784 clients) and prison clinic (574 clients) in Bandung, Indonesia, in the period January 2008–April 2009.

RESULTS The hospital clinic diagnosed the highest proportion and absolute number of HIV infections, but with the lowest average CD4 cell count and with the highest associated travelling and waiting time. The prison clinic detected fewer cases, but at an earlier stage, and all enrolled in HIV care. The community clinics detected the smallest number of cases, and only 0–8% enrolled in HIV care. The unit cost per VCT was highest in the hospital clinic (US\$74), followed by the STI community clinic (US\$65), the HIV community clinic (US\$39) and the prison (US\$23).

CONCLUSION We propose a reorientation of the delivery models for VCT and related HIV/AIDS treatment in this setting. We call for the scaling up of community clinics for VCT to improve access, promote earlier detection and to perform (early) treatment activities. This would reduce the burden of the hospital clinic to orient itself towards the treatment of AIDS patients. This is one of very few studies addressing this issue in Asia and the first of its kind in Indonesia, which has a rapidly growing HIV epidemic. The conceptual framework and overall conclusions may be relevant to other low-income settings.

keywords cost analysis, voluntary counselling and testing, injecting drug user, HIV/AIDS, Indonesia

Introduction

The HIV epidemic in Indonesia is among the fastest growing in Asia (UNAIDS 2007). It is concentrated among injecting drug users (IDUs) and their sexual partners in most parts of the country, with the exception of parts of Papua, where the epidemic is generalized. As of 2009, the cumulative Indonesian death toll of HIV/AIDS amounted to nearly 17 000, of which 42% were reported to be IDU-related, while hetero and homosexual transmission accounted for 48% and 4%, respectively (MOH-RI 2009). HIV/AIDS control efforts have increased considerably in Indonesia in recent years (Siregar *et al.* 2009), with voluntary counselling and testing (VCT) being a key component in the national strategic plan (Afriandi *et al.* 2009). VCT offers an entry point to treatment of HIV-

positive individuals and is instrumental to prevent further spread of the disease by reducing risk behaviour of tested individuals (UNAIDS 2001). VCT services are only accessed by approximately 30% of all high-risk groups (UNAIDS 2007), and scaling up of services is warranted.

Various delivery models of VCT exist, ranging from integration in primary health services, specialized STD clinics to tertiary-level hospital services. In Indonesia, VCT is typically delivered by tertiary level hospitals, as this is where most individuals present for testing, while it has been stressed that more efforts are needed to increase early testing at community level (Wisaksana *et al.* 2009). Integration of VCT in primary health care in Tanzania shows that this may lead to improved VCT uptake, reduced stigma and improvement of general health service delivery (Mmbando *et al.* 2004). However, it is not clear which

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delivery models are most appropriate in which context. Different aspects may be important, such as VCT costs, outcomes of services including the number of positive cases identified and follow-up with treatment, sustainability of the services, accessibility for clients, provider capacity to accommodate scaling up of services and the target population of the specific delivery model.

This paper concentrates on the former two aspects, and presents the costs and outcomes of four VCT delivery models – as delivered at the hospital clinic, the HIV community clinic, the STI community clinic, and the prison clinic – in an urban setting in Indonesia. It thereby responds to the almost complete paucity of evidence on the costs of VCT services in Asia (Walker 2003) – so far the evidence-base only comprises two studies on costs of VCT in Thailand (Teerawattananon *et al.* 2005; HITAP 2008), one study at the south-east Asian sub-regional level (Hogan *et al.* 2005), and one in India (Dandona *et al.* 2008). The present costing study is unique for three reasons. First, it provides the first costing study on VCT in Indonesia, which is an important input for rational decision-making on the scaling up of service delivery (Siregar *et al.* 2009). Second, the study does not only estimate costs of VCT service delivery, but also costs of implementing VCT as incurred at the more administrative level (so called programme costs) – these costs are typically ignored in economic analysis (Johns *et al.* 2003). Third, the study also estimates costs of clients of seeking and undergoing VCT. Both programme costs and patient costs are also important criteria when making decision on scaling up VCT services.

The analysis of costs and outcomes of VCT delivery models serves as a basis for a broader elaboration of scaling up the respective models – taking into account all other aspects as well. The objective of the paper is to inform policy makers on the options and limitations of scaling up alternative VCT delivery models in Indonesia.

Methods

Study setting

The study was conducted at four sites in Bandung, the capital of West Java. The first site is a hospital clinic located at Hasan Sadikin hospital, a teaching and provincial top-referral public hospital for West Java (with a population of approximately 40 million people). The clinic delivers HIV-related services such as VCT, anti retroviral treatment (ART), and STI services, and general medical services, and is frequented by both the general population and high risk groups, mostly IDUs. As this clinic resides at a top-referral hospital and it is one of the few clinics that deliver ART within the city, the number of HIV

service-related visits is very large and the clinic operates at full capacity. The clinic generates its own revenues through user-fees and otherwise relies on government, hospital and donor funding.

The second site is a newly established HIV community clinic that is integrated with a public community health centre, targeting both general and high-risk populations, but currently is mainly frequented by IDUs. The third site is an STI community clinic owned by an NGO. The clinic delivers mostly STI and VCT services and is visited by high-risk groups other than IDUs (e.g. female sex workers, transgenders and men having sex with men), as well as smaller numbers of the general population. The STI case load in this clinic is high (around 2000 cases within a year), and it is the only clinic with its own outreach team which also performs pretest counselling for VCT in Bandung. The clinic charges a highly discounted price for its services to improve access for high-risk groups from every income level. The funding for the clinic is mostly covered by donors with limited support from the government. The fourth site is an HIV clinic in a prison for drug users including IDUs. The VCT in this clinic is also performed as part of the screening test for new prisoners. At the moment, this clinic mostly relies on donor funding.

All clinics have their own complete VCT package, including pre- and post-test counselling and HIV testing, except for the prison clinic that sends all blood samples to the Hasan Sadikin Hospital laboratory. The HIV-community-based clinic refers samples for confirmatory tests at the hospital-clinic if the screening test is positive result. Each site has its own distinct characteristics of clients, VCT procedures, HIV-positive cases and settings (Table 1). HIV antibodies are measured by different commercially available rapid tests, the hospital laboratory also uses immunoassays, with external quality control showing 100% accuracy (National Serology Reference Laboratory, Australia). CD4 cell measurements are performed at the hospital laboratory using Facscount flowcytometry (BD Biosciences, Jakarta, Indonesia).

Data collection and cost estimation

We distinguished health-care costs (costs related to the consumption of resources in the health-care system), and non-health-care costs (costs falling on the patient for seeking and undergoing care). Health-care costs were estimated on the basis of service utilization and service cost data for each clinic (Table 1). We retrieved data on service utilization from each clinic's records including information on number of VCT and resources used. Service costs were estimated using a micro-costing approach (Drummond *et al.* 2005). All resources consumed and salaries were

Table 1 Overview of study sites

Variable	Hospital clinic	HIV community clinic	STI community clinic	Prison clinic
Number of VCT	568	28	784	574
Type of high-risk groups	All high-risk groups	Mostly IDUs	Mostly sex workers and transgenders	Prisoners
Service charge (US\$)	2.13	0.32	3.72	n/a
Type of VCT offered	Complete	Complete	Complete	Incomplete†
Period of study	January–December 2008	December 2008–September 2009	October 2007–September 2008	May 2008–April 2009
HIV (+) detected, no. (% of VCT conducted)	214 (38)	4 (14)	26 (3)	39 (7)
CD4 cell count on HIV (+), median (IQR)	129 (26–338)	n/a	292 (189–397)‡	290 (165–382)
Enrolled in HIV care (%)	88	0	8	100

VCT, voluntary counselling and testing; IDUs, injecting drug users.

†Only includes pre- and post-test counselling; HIV blood-testing is conducted at Hasan Sadikin hospital.

‡*n* = 9, HIV (+) clients with traceable CD4 cell count.

listed and estimated on the basis of clinical records, interviews with medical staff, government standard, or market price. Costs to the clinic consist of recurrent and capital costs. Personnel recurrent costs were estimated on the basis of their actual wage whenever possible, or estimated by using government salary scales (issued by the Ministry of Finance in 2007). Other recurrent costs such as the cost of medical and administration goods consumed during the 1-year period of observation were estimated using both actual and market prices. Laboratory cost was estimated using the current service charge. Capital costs included trainings and workshops attended by the clinic staff, and unit costs on organizing these activities were obtained from budget or government records. Market prices were used to estimate other capital costs, which comprise the cost of equipment, furniture and start-up costs (such as renovation cost, if applicable). Capital costs were subsequently annualized on the basis of the life time of the capital items, using a 3% discount rate (Drummond *et al.* 2005). We omitted the cost of utilities (i.e. water, electricity). Although HIV tests administered in the clinic were sent to a laboratory outside the prison for diagnosis, associated costs were included in the prison clinic costing analysis.

Non-health-care costs (i.e. patient costs) were estimated by conducting a survey among a sample of high-risk group clients utilizing the VCT service at the hospital and STI clinic between September and October 2009. For the HIV community clinic patient costs were obtained from another survey conducted between June and August 2009. We collected information on, among others, travel costs, travelling time, the monthly income of the client, the average number of daily working hours and monthly expenditures. Such study was not conducted at the prison.

All costs were measured in Rupiah and converted to US\$ using the 2008 exchange rate (World Bank 2009). Both the utilization and cost data were entered into and analysed with Microsoft Excel 2007.

In addition, we collected the data on the number of HIV-positive clients and their CD4 cell count from each site. We also interviewed the clinic managers to put the observed data in context.

Results

Number of patients and visits

The number of VCTs conducted varied considerably between settings. Most of the VCTs were conducted at the STI community, but most positive cases were found at the hospital clinic (Table 1). The median CD4 cell count at the time of HIV diagnosis was relatively low in the hospital clinic, higher in the STI community clinic and prison and unavailable for the HIV community clinic. In the hospital clinic and prison, most patients diagnosed through VCT enrolled in HIV care after VCT, whereas very few did so in the community clinics (Table 1). Table 2 provides the characteristics of the sampled clients for each of the clinic. Most clients were young and employed. Travelling and waiting time were the highest for the hospital clinic, lower for the community clinics and not applicable for the prison clinic.

Cost of VCT services from different clinic sites

Table 3 summarizes the results of VCT costing analysis. The unit cost per VCT was highest in the hospital clinic (US\$74), followed by the STI community clinic (US\$65),

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Variable/clinic	Hospital clinic (<i>n</i> = 66)	HIV community clinic (<i>n</i> = 57)	STI community clinic (<i>n</i> = 61)
Male, no. (%)	37 (56)	52 (91)	32 (53)
Age, mean	28	28	25
Occupation, no. (%)			
Employed	58 (93)	46 (81)	57 (93)
Unemployed and/or not in labour force	4 (7)	11 (19) (<i>n</i> = 22)	4 (7)
Mode of transportation to clinic, no. (%)			
Public transport	33 (50)	4 (18)	23 (38)
Motorcycle	29 (44)	17 (77)	24 (39)
Others	4 (6)	1 (5)	14 (23)
Travelling time to the clinic, minutes, mean	45	39 (<i>n</i> = 22)	20 (<i>n</i> = 60)
Spent time at the clinic, minutes, mean	94	n/a	38
Client's monthly estimated income, USD (median)	48 (36–72)	77 (36–128)	124 (52–246)

Table 2 Characteristics of sampled high-risk group clients getting voluntary counselling and testing (excluding inmates)

the HIV community clinic (US\$39) and the prison (US\$23). Personnel recurrent cost was the largest cost component for both hospital and STI community clinic (70% and 41%). At the HIV community clinic, equipment costs constituted the largest portion of costs (30%), while the estimated laboratory cost was the largest cost item for the prison clinic (34%). Non-health-care costs (i.e. patient costs) per VCT were lowest at the HIV community clinic, and approximately five times higher at the STI community clinic. Interviews with managers of the clinics reveal that the hospital clinic is operating at full capacity (i.e. cannot always treat clients promptly), the HIV community clinic is operating at low capacity and the STI community clinic is operating at a capacity between the previous two clinics.

Discussion

There is a need to scale up VCT services in Indonesia, and a variety of service delivery models has been developed, each with its own characteristics in terms of its clients and services. The findings of this paper are summarized in Table 4 in dimensions of economic aspects (costs and accessibility), clinical aspects (VCT performed, % HIV positive, CD4 cell count, enrolment in HIV care) and other aspects (VCT target group), and lead to the following observations.

The hospital clinic does not seem the most appropriate venue for scaling up the delivery of its VCT services to the broader population. The costs per VCT performed at the hospital-based clinic (US\$74) are higher than those provided at the HIV and STI community clinics. Also, the clinic is operating at full capacity and thus further

economies of scale from scaling up services along with cost reductions may not be possible. The clinic is also less physically accessible than the other clinics as indicated by the relatively long travelling and waiting time. The role of the clinic merely seems to be that of a referral centre for treatment of late and/or complicated cases and for treatment of opportunistic infections, given that it is frequented by individuals presenting for testing with symptomatic and late-stage disease (as indicated by the relatively low CD4 count among HIV-positive-tested patients) (Wisaksana *et al.* 2009).

The HIV community clinic holds potential to function as an entry point to VCT for the broader population, and the following observations in the present study qualify this perspective. The clinic has the lowest costs per VCT performed (US\$39) compared with the hospital clinic and STI community clinic. Considering its recent establishment and currently low capacity utilization, cost reductions can be expected when these services are scaled up. Also, the HIV community clinic is relatively physically accessible as indicated by the short travelling time, and this holds potential for a high uptake of VCT when scaled up. However, as the present clinic is now mainly frequented by IDUs, more efforts are needed to target and also attract the (symptomatic and asymptomatic) population as a whole. Concerns are the (present) absence of HIV care or a good referral system to a clinic with HIV care, and its current inability to cover all costs by collecting fees (nor does it receive financial support from the government).

The STI community clinic could play an important role in scaling up VCT services, specifically by continuing its focus on high-risk groups as it does now. The clinic

Table 3 Annual cost of delivering VCT service for different settings (US\$, 2008 exchange rate)

Type of cost/clinic	Hospital clinic	HIV community clinic	STI community clinic	Prison clinic
Health care costs				
Capital costs (annualized)				
Personnel (trainings and workshops)	145	207	4220	4194
Building/space	657	181	266	1624
Equipments	657	298	351	30
Subtotal	1459	685	4837	5848
Capital costs per VCT	3	24	6	10
Recurrent costs				
Personnel	21 633	57	21 051	2116
Supplies	2591	263	10 007	539
Outreach team activities	–	–	6186	–
Laboratory	3255	31	‡	4439
Subtotal	27 479	351	37 244	7093
Recurrent cost per VCT	62	11	48	12
Non-health care costs				
Patient costs	2157	46	8862	n/a
Access costs per VCT	1	0.3	3	n/a
Estimated productivity loss per VCT†	4	1.3	8	n/a
Patient costs per VCT	5	2	11	n/a
Total annual cost	31 095	1083	50 942	12 941
Number of VCT	421	28	784	574
Unit costs per VCT	74	39	65	23
Unit costs per HIV positive case	178	271	1959	332

VCT, voluntary counselling and testing.

†Productivity losses signify income losses because of seeking and undergoing VCT.

‡Not costed separately, but included in the capital and recurrent cost items.

Table 4 Economic, clinical and other aspects of VCT delivery models†

Service delivery model	Economic aspects			Clinical aspects				Other aspects		
	Unit cost per VCT (US\$)			Physical Accessibility	VCT performed	% HIV positive	CD4 count	Enrollment in HIV care	VCT target group	
	At present	If scaled up							At present	If scaled up
Hospital clinic	High	High	Low	Many	Many	Low	High	Symptomatic	Symptomatic	
HIV community clinic	Low	Low	High	Few	Few	NA	Low	Mostly IDU	All	
STI community clinic	High	High	High	Many	Few	High	Low	Mostly sex workers and transgenders	All	
Prison clinic	Low	NA	NA	Many	Few	High	High	Prisoners	Prisoners	

†Perceptions of these aspects as relative to other clinics. Perceptions relate to present situation, unless indicated otherwise. VCT, voluntary counselling and testing; IDU, injecting drug users.

appears to be able to detect HIV-positive cases in an early stage, as indicated by the relatively high CD4 cell count of HIV positive clients tested. The clinic's outreach activities and the resulting network with high-risk groups probably contribute to its success. The present clinic is located near the area of where the sex workers live and work, which

improves physical accessibility, as indicated by relatively low travel and waiting time. Moreover, the clinic's active campaign on delivering STI services gives it good access to other high-risk groups such as transgenders and male having sex with male. This holds potential for a high uptake of VCT when this decentralised service model is

Service delivery model	VCT	Uncomplicated ART	Complicated ART	Treatment of opportunistic infections
Hospital clinic	+/-	+/-	+	+
HIV community clinic	+	+	-	-
Community clinic	+	+	-	-
Prison clinic	+	+	-	-

Table 5 Recommendation on role of clinics in VCT and treatment†

VCT, voluntary counselling and testing; ART, anti retroviral treatment.

†‘+’ and ‘-’ denote respectively a role of high and low importance for the clinic in the specified activities in HIV/AIDS control.

scaled up. In relation, the focus of the clinic on the provision of STI services may also reduce HIV transmission (Kreiss *et al.* 1989; Schwandt *et al.* 2006). The absence of a good referral system to a clinic with HIV care is a matter of concern, and currently the discounted price charged cannot cover the full cost of delivering the services (the clinic relies heavily on donor funds).

The VCT services as delivered in the prison clinic hold potential to be scaled up to other prisons. During the period of study, both the number of VCT performed and the CD4 cell counts of the HIV-positive clients were relatively high, as was the enrolment in HIV care. This demonstrates the ability of the clinic to identify and treat HIV infection in prison at an early stage, although one should realize that HIV care for prisoners after release might pose a bigger challenge. Furthermore, the delivery of VCT in the prison clinic is relatively cheap (US\$23). Personnel costs are relatively low and patient cost of seeking and undergoing the service are absent. Currently, the prison clinic is relying on donor funding for its VCT services. Whether VCT services should also be implemented in other prisons targeting other groups is difficult to answer in the present study and warrants further investigation.

Based on our study findings we can make several recommendations (Table 5). VCT services may best be scaled up in community-based clinics to the broader population, to improve their uptake and hence early detection of HIV/AIDS. These clinics may also initiate treatment of early/uncomplicated cases. A system should be developed for referral of late cases and those with opportunistic infections to the hospital. The HIV clinic in the hospital should be less oriented towards conducting VCT. We also emphasize the need for measures that address the general barriers to VCT such as (travel) costs, lack of confidentiality of test results, and perceived lack of benefit of conducting HIV test (Suherman *et al.* 2009).

Our results should be interpreted with some caution. First, this study evaluated highly contextualised VCT service delivery models, which hampers their generalizability. Yet, the conceptual decision framework can be applied to other settings. Second, we estimated patient costs of seeking and undergoing care on the basis of (assumed) productivity losses – these may not be realized in practice and we may then have overestimated the total patient costs. Differences in these patient costs are related to income levels of the clinic’s clients and do therefore not necessarily reflect differences in access to the different clinics. Third, personnel costs in clinics may include inefficiencies in the delivery of VCT services, and we may have overestimated total costs – a time motion study is warranted to assess the required resources to scale up VCT services in further detail.

In conclusion, we propose a reorientation of the delivery models for VCT in Indonesia, which would improve access and promote earlier detection, and reduce the burden of the hospital clinic to orient itself towards the treatment of complicated HIV/AIDS cases. Whereas this study is specific to Bandung, Indonesia, the conceptual framework and overall conclusions may also hold relevance to other low-income settings.

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