



## The cost of a rapid-test VCT clinic in South Africa

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**Context.** Demand for HIV voluntary counselling and testing (VCT) will increase as HIV prevention and treatment scale up in South Africa. Understanding the cost of delivering VCT will inform funding decisions.

**Objective.** To determine the cost per client completing VCT (pre-test counselling, testing and post-test counselling) in a non-research-based programme using rapid-test technology.

**Design.** One year of expenditure and output data were collected retrospectively as part of the PANCEA (Prevent AIDS: Network for Cost-Effectiveness Analysis) study. Market prices were determined for donated resources.

**Setting.** An urban, church-based, non-profit organisation that offers rapid-test VCT services in KwaZulu-Natal, South Africa.

**Results.** Financial expenditure for the 2002/2003 fiscal year was \$39 761 (calculated using an average conversion rate for July 2003, which was 0.133). Using market prices for donated resources, the economic cost for the year was estimated at \$67 248. Six hundred and sixty-two clients completed VCT, resulting in financial expenditure of \$60.06 per client and an economic cost of \$101.58 per client. Financial expenditures and economic costs per client decreased over the year by 66% because expenses remained stable as more clients were served.

**Conclusions.** The cost of providing VCT services was higher than previously reported, but declined with expanding scale.

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Data on the cost-effectiveness of voluntary counselling and testing (VCT) in sub-Saharan Africa are extremely limited. Several cost estimates have been published.<sup>1-4</sup> However, all of these economic data are from research settings, use modelled VCT outputs, or have collected output data for no more than 3 months. In particular, the cost and predictors of efficiency of programmes operating in a non-research-based setting have not been analysed. One potentially important predictor is the use of rapid tests, which eliminate both the laboratory expenses for test processing and the need for clients to return days or weeks later for results and post-test counselling, thus increasing the number of clients who receive test results and post-test counselling.<sup>2,5</sup> We collected 1 year of cost and output data from a VCT clinic in South Africa to explore the costs of providing rapid-test VCT in a non-research-based setting.

In KwaZulu-Natal about 20% of VCT programmes are run by faith-based, non-governmental and community-based organisations. We examined one such non-profit organisation,

which offers VCT from a small clinic housed in the parent organisation's church building. We selected this organisation to do a preliminary analysis of VCT costs using the PANCEA (Prevent AIDS: Network for Cost-Effectiveness Analysis) project's methods (<http://www.HIVInSite.com>).<sup>6,7</sup>

This organisation uses a rapid HIV testing strategy, allowing clients to receive pre-test counselling, an HIV test, and test results in a post-test counselling session in less than 2 hours. Efoora rapid tests are used for initial tests. A second test, the Abbott Determine rapid test, is used to confirm initial positive test results. This strategy eliminates laboratory costs for processing tests. In addition to VCT (reported here), the organisation provides a wide range of support services including a feeding plan, care for AIDS orphans, wellness management services, treatment for sexually transmitted infections, and an annual HIV prevention campaign.

This organisation began serving clients in January 2001. It serves the general population, but tends to attract high-risk clients because of its location in an urban centre near a transportation hub. In addition, many clients who know their HIV-positive status seek support services. Clients are equally distributed by sex and include youth (age 15 - 30 years) and adults; approximately 50% of clients are employed.

We gathered expenditure and output data by month for 1 complete fiscal year (June 2002 - May 2003). Cost data (expenditures) were grouped in three standard categories: personnel, other recurrent goods and services, and capital. Since the organisation uses rapid tests for both initial and confirmatory HIV tests, there were no laboratory costs associated with processing tests.

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The organisation's administrator and director estimated the monthly compensation, benefits and training reimbursements received by each of the 21 staff members who worked at the site during the 2002/2003 fiscal year. These estimates were consistent with a fiscal year expenditure summary report. Fourteen (1.71 full-time equivalent (FTE) staff) of 21 (5.67 FTE) staff were volunteers, and other staff were paid below-average local wage rates for comparable job titles.

We gathered itemised expenditure information from fiscal year expenditure summary reports. We also asked the director and administrator for detailed information on a short list of pre-defined goods and services central to VCT service delivery. Recurrent goods and services expenditure included spending on staff and community training, annual HIV prevention campaign and publicity materials, utilities, and other miscellaneous office items. All HIV test kits and condoms were donated.

We generated a list of all capital items the VCT clinic used by asking the director and administrator whether the VCT intervention was currently using or had used any of the items contained in a predefined prompt list during the most recent fiscal year. Items included office equipment and the building mortgage. We amortised the market prices of capital goods, spreading purchase costs evenly over the useful life of each item, which was estimated at 5 years. As with personnel, we confirmed that respondents' recall-based responses matched the expenditure summary report. All items were donated.

In addition to VCT services, the organisation operates a sexually transmitted infection clinic and provides ongoing support services. Therefore, to isolate VCT intervention costs we asked respondents to estimate the extent to which each input was used for the VCT intervention, using an iterative questioning process to verify reasonable allocations to VCT and other tasks. We allocated personnel costs based on the proportion of work time spent by each staff member on VCT tasks. We allocated other recurrent costs and capital costs based on the proportional use of each item during the intervention. Twenty per cent of the funds from a fundraising dinner were allocated to the VCT programme. Ten per cent of the funds from a walk associated with an annual prevention

campaign were allocated to the VCT programme, reflecting the proportion of campaign messages that advertised the organisation's VCT services.

We calculated intervention costs in two ways. First, we summed the intervention's actual financial expenditures. Second, we incorporated market prices for all donated or subsidised items, to estimate economic costs.

During on-site data collection we identified goods and services that were received free or at a reduced price. To assign economic cost, we performed market pricing, using the average of quoted prices for equivalent items from three local sources. For estimates of the economic cost of personnel, we asked the programme director to estimate the compensation required to hire someone on the open market to perform the indicated work, and verified the plausibility of these estimates from local wage schedules, taking into account the skill set and qualifications required for the position. We obtained market prices for non-personnel recurrent goods and services and for capital goods from local and internet-based merchants. Local realtors provided us with market rents for nearby buildings with similar dimensions and amenities.

We used South Africa's consumer price index (base year 2000) (<http://www.statssa.gov.za/>) to convert all expenditures to July 2003 prices. Inflation rates were applied to costs on a monthly basis. We then converted all costs, which had been initially recorded in South African rands, to US dollars, using a conversion rate of 0.133, which was an average conversion rate for July 2003 (<http://www.bankofcanada.ca/en/exchange-convert.htm>; <http://www.oanda.com>).

The costs of providing VCT services at the organisation were higher than expected. For the 2002/2003 fiscal year the total economic cost of providing VCT was \$67 248. In contrast, the organisation's actual financial expenditures totalled \$39 761, just 59% of total economic costs, because it received significant donations of time and resources. Eighty-nine per cent of the discrepancy between economic costs and financial expenditure is due to market pricing of staff time, i.e. staff were paid less than market rates. Expenses were stable across the period (Table I).

**Table I. Annual economic costs, financial expenditures, and efficiencies by quarter**

	2002/2003 financial year (June - May)				
	Total	First quarter	Second quarter	Third quarter	Fourth quarter
Total economic cost (US\$)	67 248	18 519	17 980	16 328	14 421
Total financial expenditure (US\$)	39 761	10 859	10 227	9 370	9 306
Clients who completed the VCT sequence	662	115	120	155	272
HIV+	335	64	76	64	131
HIV-	327	51	44	91	141
Economic cost per client who completed the VCT sequence (US\$)	101.58	161.03	149.83	105.34	53.02
Financial expenditure per client who completed the VCT sequence (US\$)	60.06	94.42	85.22	60.45	34.12



In line with the findings of Sweat *et al.*<sup>8</sup> we found that personnel costs accounted for the bulk of VCT expenditure. Salaries and benefits compensation comprised 80% of total economic costs, with the physician/director's salary comprising 30% of all personnel costs. The remaining 20% of economic costs went toward recurrent goods and services (17%) and capital goods (3%). Similarly, personnel salaries and benefits compensation composed 75% of total financial expenditures, with the physician/director's salary comprising 54% thereof. Recurrent goods and services spending made up the remaining 25% of actual expenditures.

Personnel costs were higher than expected because of substantial personnel investment relative to outputs. On average, only 9.74 VCT sequences (pre-test counselling, testing, post-test counselling) were completed each month, per FTE staff member (inclusive of administrators). This high staff-to-client ratio can be attributed to two factors. First, the organisation was not operating at maximum capacity during the 2002/2003 fiscal year. Second, the organisation maintains more staff than necessary to provide VCT services efficiently because the organisation values community building and on-the-job skills training. Personnel costs could be reduced by relying more on nurses and volunteer staff for HIV testing.

We compiled data on four outputs. These are the number of clients who received pre-test counselling and an HIV test, the number of clients who had a positive HIV test, and the number of clients who received post-test counselling (separately for HIV-positive and HIV-negative clients). Many HIV-positive clients receive ongoing counselling through the organisation's VCT intervention; we excluded these counselling sessions from our definition of VCT. With the aid of the organisation's director and administrator, we abstracted this information from daily client logs.

During the entire 2002/2003 fiscal year (June 2002 - May 2003), the organisation provided pre-test counselling and HIV testing to 693 clients, 335 (48%) of whom tested positive. Ninety-six per cent of all clients who were tested also received post-test counselling. These findings support existing research indicating that clients are more likely to receive their test results and post-test counselling in a rapid-test context, compared with a traditional (enzyme-linked immunosorbent assay (ELISA)) HIV testing strategy.<sup>2,5,9</sup> However, even with the elimination of laboratory costs to process HIV tests and reductions in client attrition, a rapid HIV testing strategy does not seem to guarantee low per-client costs.

Overall, for the 2002/2003 fiscal year, the economic cost per client who received pre-test counselling and an HIV test was \$97.04, compared with \$57.38 in actual financial expenditure. The economic cost per

client who completed the VCT sequence was \$101.58; financial expenditure was \$60.06 (Table I).

These costs are substantially higher than the \$3.50 - \$48 range indicated in previously published studies.<sup>1-4,8,10,11</sup> In addition, 13 other VCT programmes that we studied in South Africa had unit financial costs ranging from \$10 to \$150, with most programmes in a \$20 - \$40 range, compared with \$60 for this programme. The costs of this programme are therefore among the more expensive of the 14 VCT sites in our project sample.

There was substantial month-to-month variation in the number of clients served, with an overall increase in the number of clients served across the period. Monthly output was lowest in December 2002. During this month the organisation provided pre-test counselling and HIV testing to 42 clients, 27 (64%) of whom were found to be positive. One hundred per cent of clients who had an HIV test also received post-test counselling during this month. In contrast, it provided pre-test counselling and HIV testing to 115 clients in March 2003, 53 (46%) of whom were found to be positive. Ninety-six per cent of these clients received post-test counselling (Fig. 1).

As a result, the economic cost per client who completed a VCT sequence decreased across the study period. The cost per completed VCT sequence ranged from a high of \$227.44 in

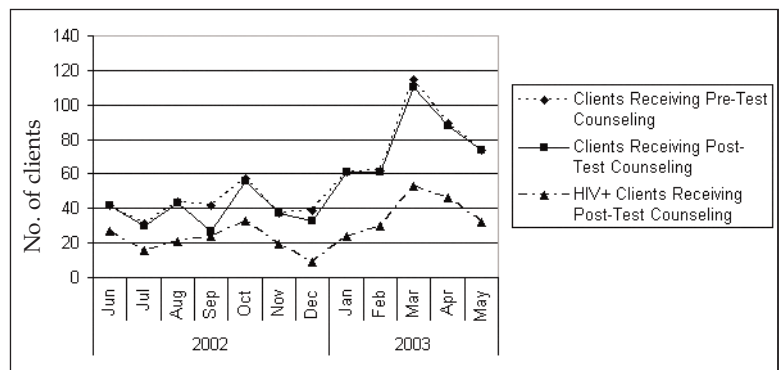


Fig. 1. VCT outputs across 12 months.

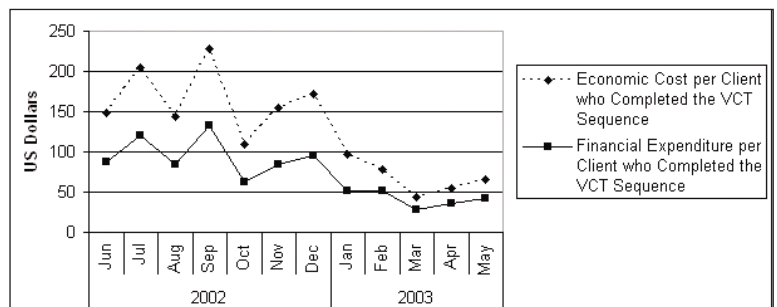


Fig. 2. Economic cost and financial expenditure per client who completed a VCT sequence, across 12 months.



September 2002 to a low of \$43.68 in March 2003 (financial expenditure was \$132.19 and \$28.22 respectively) (Fig. 2).

It is possible that the organisation was still developing its niche in the community during the 2002/2003 fiscal year. If the higher caseload observed during the end of the fiscal year persisted into the future, the long-term average unit cost might be closer to the \$65.63 reported for May than the \$101.58 annual average.

Nonetheless, output variation over time is an important consideration for VCT cost estimates. In our study, we uncovered a wide range of per-client VCT costs comparable to the \$3.50 - \$48 ten-fold range in per-client VCT cost estimates found in the existing literature for sub-Saharan Africa.<sup>1-4,8,10,11</sup> Output estimates in the existing literature may be inflated if calculations assume a constant output near 100% capacity or if outputs were collected during a brief, high-output time period.

Previous VCT cost estimates may not be entirely comparable with our estimate. Previous studies excluded costs that we included (e.g. recruitment costs), and either modelled output data or collected output data for no more than 3 months.<sup>10</sup> Inflation rates and factors used to convert foreign currencies to US dollars can also affect reported VCT costs. Estimates described here should be utilised with caution because they may not be generalisable to other settings and time periods.

Future research should explore the unit cost of physician-based, nurse-based and volunteer-based VCT staffing strategies to determine the context in which personnel resources are spent

most efficiently. In addition, researchers and policy makers should recognise that VCT cost estimates are fluid; they can vary substantially depending on characteristics of the organisation and clients, events in the community, and research methods.

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