



**Essential Information for Countries to Monitor &  
Evaluate the Economic Aspects of HIV Service  
Provision: proceedings from a workshop**

**Final Report Economic Section,  
WHO/TDR Generic Tools Workshop,  
16<sup>th</sup>-18<sup>th</sup> January 2006, Geneva Switzerland.**

## 1.0 Executive Summary

A multidisciplinary and multi-agency working group met in Geneva to discuss, which basic information can and should countries be collecting, in order to have reliable and contemporary information on the use, cost and outcome of scaling up HIV services over time, in health facilities and households and how, using which methods or tools, and at which intervals can and should the identified information be collected? The main recommendations were:

- 1.1 Health facilities need to monitor over time the use and outcome of HIV-services.
- 1.2 To facilitate this, users of HIV services need to be provided with a unique identifier.
- 1.3 Patient-based process information should be aggregated at the health facility level to calculate mean use of services per time period: (mean number of inpatient days, outpatient visits, tests and procedures performed, drugs prescribed).
- 1.4 Where possible these aggregate analyses should be stratified by gender, ethnic group, exposure category, WHO stage of HIV infection, type of opportunistic infection where appropriate, CD4 count or other relevant parameters.
- 1.5 Unit cost should be calculated for the services used, which should be obtained through the performance of costing studies. These are to be performed in sentinel sites, and their results to be inferred to similar type of health facilities across the country.
- 1.6 Process and cost data ought to be linked to relevant outcome data.
- 1.7 While some aspects of the economic impact on individuals or households can be obtained through special studies performed in health facilities, some of the data are best obtained through in-depth household surveys.
- 1.8 Combining information on direct costs from health facilities with indirect costs obtained through household studies, enables the overall economic impact of HIV infection and the country's response to be estimated.
- 1.9 Program and healthcare system costs also need to be estimated and added to the costs from health facilities and households
- 1.10 Simple guidelines for countries to perform HIV costing exercises in health facilities, households and HIV-related programs and healthcare systems should be produced and widely disseminated.

## **2.0 Aim**

The aim of the economic section of the Generic Tools Workshop was to provide countries, which are scaling-up HIV services, with guidelines to enable them to have access to robust and contemporary information on the use, cost and outcome of scaling up HIV services in health facilities and households with HIV-infected people for policy formulation, implementation and evaluation.

## **3.0 Background:**

### ***3.1 Generic Tools***

The development of generic tools is designed to facilitate the process of gathering and analyzing information in a timely manner in those countries involved with scaling-up HIV services. The notion of generic tools refers to standardized approaches to data collection and analysis. Tools are developed in light of global advances in research, and are designed to foster unified approaches to data collection and comparisons across settings. At the same time they take into account local circumstances and lend themselves to country-specific adaptation. The tools currently envisaged use information from routine sources, records, interviews, questionnaires and observations, at the household and health facility level. They combine quantitative and qualitative methods, and include core and country-specific sections. By developing such tools, the goal is to encourage countries to rapidly collect and analyze information to address fundamental operational research questions, identify obstacles and best practices, and improve policies and programs.

The number of middle- and lower-income countries, which have been involved with scaling up HIV services, have increased dramatically over the last few years. Successful scaling-up of HIV-services in these countries should be based on the existence of robust and contemporary information on the financial resources required for and available to all levels of the healthcare system, the economic impact on households and the broader economy of the countries involved. This information should be complemented by robust and contemporary information on the outcomes of these services for individuals, providing the basis for estimating the impact on populations of the respective countries.

### ***3.2 Tracking Resources in Countries***

A number of methods are being implemented to enable countries to track the flow of HIV-related resources within middle- and lower-income countries. National Health Accounts provide a general view of the allocation of resources but they are usually not as detailed as disease specific accounts. Under the aegis of UNAIDS, National AIDS Spending Assessments are being undertaken in increasing numbers of countries, while some organizations, like IDASA in South Africa, are tracking central government budgets, as they are devolved to the provinces [1].

Thus, the usual top-down approach provides useful information on broad HIV-related allocation and expenditure, many of these mechanisms don't reach health facility or household levels. They also don't provide information about the benefit of programmes or whether need is being met unless supplemented by additional information. These 'top-down' approaches therefore need to be complemented by 'bottom-up' approaches, which estimate the cost of services provided at health facility levels and the economic impact at household and community levels. Such information will provide health care professionals

with robust and contemporary information of the cost of services provided and enable them to match these with the resources, which are allocated and distributed from central administrative sources.

The National AIDS Spending Assessments (NASA) aim at the reconciliation of the estimations using top-down approaches, i.e. financing flows using administrative records, and the bottom-up approach, which uses costing tools to estimate the expenditures to provide services classified by strategic activities [2]. These NASA-activities are consistent with the classifications used to estimate resource needs in order to estimate the financing gap between actual spending and estimated needs.

Furthermore, linking cost information with outcomes would allow the cost-effectiveness of interventions or programs to be estimated. A recent example was a study performed in Cape Town, South Africa, in which the authors first estimated the direct cost of HIV-related service provision, and based on these data were able to estimate the cost-effectiveness of HAART [3]. This study established that HAART was a cost-effective intervention for people with WHO Stages 1-3 HIV-infection and cost-saving for people with WHO Stage 4 HIV-infection in Cape Town.

### ***3.3 Costing Principles***

The economic information required by countries includes both direct cost of healthcare provision and related indirect cost [4]. Direct cost in this context refers to the costs of service provision including health professionals, drugs, laboratory investigations and other costs incurred within relevant facilities, while indirect costs refer to travel and time costs incurred while seeking care, costs to other household members of caring for the ill person as well as production gains or losses through changes in health status. Each

economic analysis is performed from a particular perspective [5]; when only direct health service costs are included this comprises an *health system perspective*, whereas when indirect costs are also included this is said to provide a *societal perspective* [5].

For costing studies, the costs of treatment and care require the valuation of personnel, treatments, tests and care facilities such as the use of hospital beds or outpatient visits. Often routine *cost* data may not be available and *prices* or *charges* have to be used as the unit of valuation. It has long been recognised, however, that *prices* or *charges* of health care resources may not necessarily be synonymous with *costs*. While in the for-profit health sector, prices or charges may overestimate actual cost of service provision, in the public sector they may often seriously underestimate actual costs [6,7]. However, costing studies can be complex, difficult and time consuming to perform [8]. Two main obstacles include scarcity of resources to perform the costing exercise and the lack or inaccessibility of data [9].

Per patient and aggregate costs can be calculated using either a '*top-down*' or '*bottom-up*' approach [10]. *Top-down* costing, where total known expenditures are allocated to specific comparison units, is more easily administered and takes less time to perform. However, relationships between use of services, costs and patient characteristics are only weakly defined [11]. The *bottom-up* approach, in which all relevant resource inputs at the individual patient level are collected, allows greater flexibility in relating use of services to costs and patient characteristics, though the method can be time consuming and expensive to perform. Furthermore, some items, such as hospital overheads, can often not be exclusively attached to individual patients but either need to be averaged for all patients or identified as a separate cost. However, the bottom-up approach is generally regarded as the superior approach to cost estimation [11].

On theoretical grounds, opportunity costs should be used instead of financial costs [12]. Opportunity costs represent the value of resources in their next best use, but the accurate estimation of opportunity costs is in practice, an unrealistic objective and therefore economic costs are usually used as a reasonable proxy of opportunity costs [13].

A full cost of illness assessment should adopt a *societal perspective*, also taking into account indirect costs as a consequence of HIV infection. However, few studies calculate all these costs due to difficulties in valuation, so most studies focus on direct cost estimates and only provide a *health system perspective*. The estimated indirect costs of treatment and care of HIV infected individuals in England in the late 1990's ranged between 45% and 124% of the direct HIV treatment and care costs. This range depended on whether a societal or public sector perspective respectively was adopted and the type of antiretroviral therapy received [14].

In order to ascertain the efficiency of service provision, costs should be linked to individual outcome measures, as done through cost-effectiveness, cost-utility and cost-benefit studies. In cost-effectiveness studies, costs are linked to biological or clinical outcomes like life-years gained or lowered blood pressure respectively. In cost-minimization studies, the effectiveness of the interventions being compared are similar but the resources required to achieve a particular outcome may differ. In cost-utility studies, life years gained are converted into disability-adjusted-life-years (DALYs) or quality-adjusted-life-years (QALYs), which weight life expectancy by the value of the quality of disability or life, while in cost-benefit studies, the biological outcomes are translated into monetary terms, which allows the overall analysis to be expressed in monetary terms [4].

### ***3.4 Published Literature***

There is relatively little published information on the use and cost of HIV services in middle- or lower-income countries. A literature review performed up to the year 2000 [15] revealed that costing studies had only been published from 5 middle- or lower-income countries, while an updated literature review covering the years 2000 up to 2005 identified an additional 12 published costing studies from middle- or lower-income countries. While these reviews did not cover unpublished or ‘grey-literature’ studies, feedback from many middle- and lower-income countries indicates that a dearth of information on the cost of HIV service provision currently exists in middle- and lower-income countries.

When considering the performance and publication of cost-effectiveness studies, a recent review of 191 published cost-effectiveness studies for the period 1994-2004, indicated that 32 studies performed in middle- or lower-income countries had been published [16]. Again, while more studies may have been performed which have not been published, given the feedback received from the various informants from these countries suggest that such information is currently not widely available.

Limited information is also available on the economic impact of the HIV epidemic on households. A limited number of studies have been performed to date, mostly in Africa and relatively few in Asia, most of which were ad hoc cross-sectional studies with few longitudinal studies and usually involving small sample sizes. Most of the published studies were set in rural areas, few in urban and even fewer performed rural-urban comparisons. Again a strong need was identified for standardizing study methods as most published studies used different methods and therefore reduced their comparability [17].

## **4.0 Methods:**

A multidisciplinary Working Group was established to agree on some simple guidelines, which would be useful to countries involved with scaling up HIV services (Appendix 1).

The working group on costing HIV services was asked to focus on three basic questions:

*4.1 Which basic information can and should countries be collecting, in order to have reliable and contemporary information on the use, cost and outcome of scaling up HIV services over time, in health facilities and households?*

*4.2 How, using which methods or tools, and at which intervals can and should the identified information be collected?*

*4.3 Who will analyze the data, how and how often, and to whom should this be fed back and at which intervals?*

It was recognized at the start of the meeting that, while the working group could provide detailed responses to questions 4.1 and 4.2, the third question would be contingent on the local country context in which the work was to be implemented and performed. Members of the Costing Working Group discussed the determinants of costs, more detailed questions they thought countries wanted to be able to answer, followed by discussions on which information should and could be collected routinely or through special studies, employing a variety of methods.

## **5.0 Findings**

### *5.1 Country Questions*

The Working Group first reviewed some of the determinants of direct costs. These included type and frequency of services used by patients, their demographic and disease characteristics, including stage and severity of HIV infection, characteristics of the service providers and the facilities in which these services are being provided, the quality

of care provided, the potential role of incentives and the characteristics of the healthcare system, including type and level of financing. On the basis of these discussions, a number of more detailed questions were identified (Box 1). This is not an exhaustive list but does cover some of the main questions, which members of the Working Group considered to be pertinent for countries and covered health facilities, households and other relevant aspects of the country's health care system, including methods of financing.

### ***5.2 Information to be collected***

The types of information, which participants agreed should be collected included

- a) demographic information;*
- b) information on the use of services;*
- c) the outcome of the use of services on the health of the individual;*
- d) cost information at health facility and economic information at household levels.*

Overlap exists in terms of the information, which is required to be collected at health facility and household levels. For both, demographic characteristics are required, as well as information on disease status, the use and cost of services, and information on outcomes. Furthermore, some of the information identified is also required for routine clinical management and monitoring of HIV-infected patients [18-20]. If these data are indeed routinely collected for patient management and monitoring, this will allow for the use of patient-level information for program monitoring and evaluation in primary, secondary and tertiary health facilities, district, regional, national or international levels.

## **BOX 1 Socio-Economic Questions Pertinent to Countries Scaling-Up HIV Services**

### **1.1) How much does it cost to treat a patient with HIV per year?**

- a) In terms of care costs (inpatient/outpatient); laboratory costs; drug-costs.
- b) For different services: preventive or therapeutic;
- c) At community or health facilities (primary, secondary or tertiary levels);
- d) At local, district, regional or national levels;
- e) For different levels of quality of care;
- d) For acute or chronic care, hospice or terminal care at different stages of HIV infection;
- e) In the public sector, private sector or non-governmental organizations;

### **1.2) How is the cost of care financed?**

- a) For community or health facility services (primary, secondary or tertiary levels)?
- b) Through public statutory sources, free-at-point-of delivery?
- c) Through insurance-based schemes, either social or private?
- d) Through foundations or other philanthropic sources?
- e) Through out-of-pocket payments?

### **1.3) What are the capital and recurrent costs of the universal access package of service provision?**

- a) At the community level?
- b) At the health facility level (primary, secondary or tertiary levels)?
- c) At the district, regional or national levels?

### **1.4) Do the financing mechanisms cover the operational budget required for covering the cost of care?**

- a) At the household level?
- b) At the community level?
- c) At the health facility level (primary, secondary or tertiary levels)?
- d) At the district, regional or national levels?

### **1.5) Who is able to access which preventive and therapeutic services at household, community, health facility (primary, secondary or tertiary levels), district, regional or national levels in terms of:**

- a) Age-groups?
- b) Gender?
- c) Educational, occupational and employment status?
- d) Urban and rural populations?
- e) Ethnic or linguistic groups
- f) Income groups
- g) Most-at-risk groups (injecting drug users, sex workers, men who have sex with men, refugees etcetera)?

### **1.6) To what extent are people who use these services able to maintain active social and economic lives (employment etc)?**

### **1.7) What is the average household expenditure on health as a percentage of household income?**

### 5.2.1 Health Facility

In addition to important demographic information, which focused on personal information and important HIV-related data (Box 2), it was stressed that countries need to develop unique individual identifiers, if they don't already exist. This would not only facilitate the clinical management and monitoring of HIV-infected people but would also enable the use of multiple services to be tracked over time. In addition to information on patient characteristics, the working group recommended that information ought to be collected on the use of services in health facilities, including inpatient, outpatient or day care facilities. This information should be linked to the dates when services were used, as well as the reason and outcome of using the service, the severity of HIV infection when using the services and the presence of relevant non-HIV co-morbidity. In addition information should routinely be collected on tests and procedures performed, by date and

#### **Box 2: Health Facility Patient-level Process and Outcome Information**

##### **2.1 Patient Characteristics**

- (a) Age (date of birth)
- (b) Gender
- (c) Ethnicity
- (d) Vulnerable groups
- (e) Exposure category
- (f) Date of HIV diagnosis
- (g) Date of death
- (h) Stage of illness when first diagnosed (WHO or CDC stage)
- (g) Educational level attained

##### **2.3 Outpatient Information**

- (a) Date of visit
- (b) Nature of visit
- (c) Stage of illness (WHO/CDC etc)
- (d) HIV Diagnosis
- (e) Non-HIV co-morbidity

##### **2.5 Tests & Procedures**

- (a) Date of test or procedure
- (b) Type of test or procedure (CD4 count/haemoglobin etc)
- (c) Result of test or procedure

##### **2.2 Inpatient Information**

- (a) Date of admission
- (b) Date of discharge
- (c) HIV Diagnosis
- (d) Outcome of episode
- (e) Stage of illness (WHO/CDC etc)
- (f) Non-HIV co-morbidity

##### **2.4 Day Case Information**

- (a) Date of visit
- (b) Nature of visit
- (c) Stage of illness (WHO/CDC etc)
- (d) HIV diagnosis
- (e) Non-HIV co-morbidity

##### **2.6 Drugs (HIV/non-HIV)**

- (a) Drug name
- (b) Date prescribed
- (c) Date stopped
- (d) Dose
- (e) Route

relevant results, and drugs prescribed, including both antiretroviral and other drugs (Box 2). Such patient-based information is fairly standard [18-20] and can be analyzed and aggregated at health facility level. This allows for the estimation of mean inpatient days, outpatient or day care visits per year or other time period, as well as linking this information to different stages of HIV infection, levels of CD4 count, different opportunistic infections or other non-HIV related co-morbidities [3]. Depending on the country and type of epidemic, such co-morbidities include *Hepatitis C* or *Mycobacterium tuberculosis*.

Linking process and outcome data to the relevant unit costs allows for the cost and cost-effectiveness of service provision to be calculated. Members of the working group discussed the paucity of reliable cost information in many middle- or lower-income countries. Different methods exist to estimate 'unit costs', ranging from top-down 'guesstimates' or estimates, charges set by those who fund services, be that government, insurance companies or the private sector, cost-adjusted charges or unit costs derived through specific costing exercises (Box 3). As described in section 3.3, different methods are being used by countries to track HIV expenditure. This would enable them calculate top-down 'cost' estimates. However, in order to obtain more precise cost figures, health facility unit costs need to be calculated (Box 3.2c and d; 3.3).

### ***5.2.2 Household Information.***

This includes similar demographic information relating to the informants, households and communities, including information about who is HIV-infected and severity of their illness at the time of data collection (Box 4).

### **Box 3: Health Facilities Types and Source of Costing Information**

#### **3.1 Different Types of 'Cost' Information**

- (a) Expert opinion estimates
- (b) Charges/prices
- (c) Cost-adjusted charges
- (d) Unit costs calculated through costing study

#### **3.2 Various Sources of Cost Data**

- (a) National health accounts/ general Diagnostic Related Groups
- (b) HIV health accounts/ HIV-specific Diagnostic Related Groups
- (c) Unit Costs derived from single health facility sites
- (d) Unit Costs derived from multiple health facility sites

#### **3.3 Components to be Included in Health Facility Unit Costing Exercises**

- (a) Staff numbers, training and time spent on HIV-related work.
- (b) Tests prices;
- (c) Procedures prices;
- (d) Drug prices;
- (e) Overheads.
- (f) Consumables

### **Box 4.0 Household and Community Information**

#### **4.1 Demographic Household Level Information**

- (a) Number of House Members
- (b) Age
- (c) Gender
- (d) Ethnicity
- (e) Vulnerable Populations

#### **4.2 Community Level Information**

- (a) Number of Households
- (b) Type of Community: Rural or Urban

#### **4.3 Disease Information**

- (a) HIV Infected
- (b) Severity of HIV Illness (WHO or CDC staging/CD4 etc)
- (c) Non-HIV Co-morbidity

#### **4.4 Use of Health Services**

- (a) Use of Hospital Services
- (b) Use of Community Medical Services
- (c) Use of Welfare/Social Services
- (d) Costs of Use of Hospital Medical Services
- (e) Costs of Use of Community Medical Services
- (f) Costs of Use of Welfare Services

To capture the use of medical or social/welfare services outside of health facilities, individual study participants or household members who are part of the study, could keep records of services they used over a particular time period. Mean use of services can be calculated for this time period and, when multiplied by the unit cost of the service, the use and cost of these services can be estimated for that time period.

In terms of the economic impact on households, ideally this would involve a comparison of the impact on those households with HIV-infected members with those households whose family members are not infected with HIV. Furthermore, as the HIV epidemic and the response to it evolves, this should be assessed over time. This should include detailed information on employment, household income and expenditure (Box 5).

### **Box 5. Household Economic Information**

#### **5.1 Economic Information**

- (a) Employment Status
- (b) Income
- (c) Expenditure
- (d) Savings
- (e) Debt
- (f) Assets
- (g) Borrowing

#### **5.2 Information on Household Incomes**

- (a) Employment Income
- (b) Non-Employment Income
- (c) Other Remittances

#### **5.3 Information on Household Expenditure**

- (a) Health Care
- (b) Food
- (c) Education
- (d) Transport
- (e) Clothing
- (f) Debt Repayments
- (g) Remittances Outside the Household

Some of this information is already collected through standard population-based surveys, while others (Box 4.4c-f and 5.1 to 5.3) are additional information, which will need to be collected.

### ***5.3 Data Collection Methods***

The data identified will need to be collected using different but complementary methods.

5.3.1 Information on the use of health facility services by patients and outcomes are best collected from the health facilities themselves. For optimum clinical management, health facilities should establish the use of longitudinal patient records, if not already in existence [18-20], and patient-level information could then be obtained from these records. If this information were available in electronic format, this would facilitate the regular download of such patient-based information [21]. However, not all sites will have records stored in an electronic medical record (EMR) and in such sites the relevant information may be collected prospectively using paper-based systems or through retrospective medical record reviews. Medical records are also the source for obtaining information on the stage of HIV infection of patients when using particular services, the severity of immunodeficiency, the presence or absence of opportunistic infections, the treatment they received and other relevant patient-based information.

5.3.2 Patient-based process and outcome information needs to be supplemented by appropriate cost information, which enable the direct cost of service provision to be estimated. The most accurate way of determining this is to perform costing studies in relevant sites. As already indicated, costing studies can be difficult exercises to be

performed even in situations where the resources are available to perform such studies, so one has to be fairly strategic where, when and how often to perform such studies. The working group recommended the performance of costing studies at regular intervals in those sites in order to see how average costs change through realised economies of scale and scope, which are representative of the various types of health facilities within the country's healthcare system, including primary, secondary and tertiary care facilities.

The amount of staff time spent on HIV-related activities will be important to document. The most detailed way of doing this would be through time-and-motion studies. Alternatively, one could interview staff and get them to estimate their HIV-related workload. One would perform the detailed time-and-motion studies less frequently to document HIV-related workload, as they are labour and resource intensive to perform.

Such detailed time-and-motion studies could be complemented with questionnaire-based studies to estimate the amount of time staff spends on HIV-related work. These questionnaires can be applied more easily, frequently and in a larger number of health facilities than the in-depth time-and-motion studies. Whichever method is employed, however, it is important that they include the representatives of the full range of health facilities, from primary care health outpost or its equivalent, to tertiary teaching hospital. While such costing exercises will capture expenditure of time and financial resources in these facilities, they do not necessarily capture some of the additional program costs or general health system costs (Section 5.3.4). Once estimated, the information obtained can then be inferred to other similar types of health facilities in the country. The different methods required to collect the different health facility level information is summarized in Table 1.

**Table 1 Summary table integrating type, method and timing of data collection and analysis for estimating the use, cost and outcome at health facility level for countries scaling-up HIV services.**

Health Facility Information		Type of data	Data collection method	Analyses
Demographic characteristics*	Patient-based information	Sex, exposure category, ethnic group etcetera	Medical records – paper or electronic	<p>Mean use of services per time period (mean inpatient days per patient-year etcetera) and stratified by demographic, exposure characteristics, stage and severity of HIV infection or opportunistic infections</p> <p>Aggregate analyses at health facility, district, regional, national or international levels on the use, cost and outcome of HIV service provision in health facilities</p> <p>Costing and efficiency studies.</p> <p>Aggregate analyses at health facility, district, regional, national or international levels and stratified by demographic and biological factors</p>
Utilization*	Patient-based process information	<ul style="list-style-type: none"> <li>- inpatient days</li> <li>- outpatient visits</li> <li>- dayward visits</li> <li>- tests &amp; procedures performed</li> <li>- drugs prescribed</li> </ul>	Longitudinal medical records: paper or electronic; prospective or retrospective	
Outcomes*	Patient-based outcome information	HIV stage; CD4 count; survival; quality-of-life; etcetera.		
Health Facility Costing**	Facility-based costs for providing services	Unit costs of inpatient day, outpatient & dayward visits; costs for tests, procedures, drugs; HIV-charges or HIV-cost estimates	Health facility costing studies (Staff training & HIV time, expenditure staff salaries, prices tests, procedures, drugs, overheads); charges or top-down estimates	
Special Clinic Studies**	Patients attending health facilities	Acceptability services used; out-of-pocket expenditure; employment status; use of other medical or social services.	Satisfaction or other special surveys performed in the clinic or exit surveys;	
	Staff working in clinics	Acceptability services provided; training; counselling; time spent on HIV-related work	time-and-motion studies or staff questionnaires.	

\* To be performed routinely in all sites where possible; \*\* Special studies to be performed in sentinel sites and results to be applied where applicable.

5.3.3 Household economic information can be obtained either through performing special surveys on clinic-based patients or through household surveys. One could routinely enquire about employment status of HIV-clinic attendees, though this may be better captured through special surveys held in the clinic. Similarly, through such surveys one could also learn about out-of-pocket expenditure on health. Such surveys could be performed on an ad hoc basis, or larger clinics could hold such surveys on a regular basis. However, if one wants to know in greater detail the impact of HIV infection on household income and expenditure, one would need to employ special household surveys [22]. These could be held separately or as part of a general household or other surveys, already being performed in the country.

For recording the use of medical or social welfare services and estimating associated costs, one could identify specific population or sub-populations and follow them longitudinally for a period of time. During this period of follow up, study participants document on a daily or weekly basis which services were used, for what reason and which outcome. Again this process data could be combined with relevant unit cost and outcome data, to estimate the use, cost and outcome of services used by HIV infected people at different stages of HIV infection over a defined period of time.

Once the information has been obtained from special in-depth studies, the information could be applied to other similar settings. For instance, unit costs estimated in sentinel sites can subsequently be applied to other similar level health facilities, which can collect patient-based process and outcome indicators, enabling the cost of HIV-related care to be estimated in these sites. Table 2 provides a summary of how different types of household data can be collected and analyzed.

**Table 2 Methods, timing of data collection and analysis to estimate use, cost and outcome of HIV services at household level.**

Household Information		Type of data	Data collection method	Analyses
Demographic Characteristics ***	Household and community information	Sex, exposure category, ethnic group etcetera	Longitudinal record of services used. Obtained from health facility medical records (paper or electronic) if available, otherwise recorded prospectively on the use of medical and social services by household members through use of diaries, regular interviews or both	Mean use of services per time period (mean inpatient days per patient-year etcetera) and stratified by demographic, exposure characteristics, stage and severity of HIV infection or opportunistic infections  Aggregate analyses at household or community levels on the use, cost and outcome of HIV medical or welfare services  Costing and efficiency studies.
Utilization of medical or welfare or social security services***.	Household-based information on individuals	inpatient days, outpatient visits, dayward visits, tests & procedures performed, drugs prescribed		
Outcomes***	Household-based outcome information on individuals	HIV stage; CD4 count; survival; quality-of-life; etcetera.		
Cost data***	Costs of providing services used by household members	Unit costs of inpatient day, outpatient, dayward visits; costs for tests, procedures, drugs, counselling; HIV-charges or HIV-cost estimates	Costing studies of services used; charges or top-down estimates	
Economic household data***	Households	Employment status, income, expenditure, savings, debt, assets, borrowing. Household incomes including employment and non-employment income, and other remittances; Household expenditure, health care, food, education, transport clothing, debt repayments remittances outside the household	Household surveys, like <i>Living Standards Measurement Surveys</i>	Aggregate analyses at household or community levels and stratified by demographic and biological characteristics

\* To be performed routinely in all sites where possible; \*\* Special studies to be performed in sentinel sites and results to be applied where applicable; \*\*\* To be performed as special in-depth studies and results to be applied where applicable

**Table 3 Summary table integrating type, method and timing of data collection and analysis for estimating the cost at healthcare system level for countries scaling-up HIV services.**

<b><u>Healthcare System Information</u></b>		<b>Type of data</b>	<b>Data collection method</b>	<b>Analyses</b>
Financial implications at program or health-care system level***	<p>Programs costs: additional staff training, increased managerial requirements or increased time and efforts spend on monitoring and evaluation etcetera;</p> <p>Healthcare systems cost: existence and upkeep of healthcare facilities, staffing for these facilities, general drug regulatory and logistic systems, basic training and accreditation of healthcare staff etcetera.</p>	Direct and indirect cost information of program and healthcare system	direct and indirect cost exercises of program and healthcare system which sustain disease specific services	Combining disease specific services costs, with program costs and healthcare system costs

\* To be performed routinely in all sites where possible; \*\* Special studies to be performed in sentinel sites and results to be applied where applicable; \*\*\* To be performed as special in-depth studies and results to be applied where applicable.

5.3.4 As indicated, a need also exists for estimating program costs and healthcare systems costs to provide a more complete overview of the costs of providing HIV-related services in countries. In this context, program costs refer to those additional costs directly generated by the program, like additional staff training, increased managerial requirements or increased time and efforts spend on monitoring and evaluation, whereas general healthy system costs include the existence and upkeep of healthcare facilities, staffing for these facilities, general drug regulatory and logistic systems, basic training and accreditation of health care staff and others. Again, special studies will be required to determine these for the range of health facilities. Table 3 summarizes, the type of data to be collected and some potential methods to do this.

## **6.0 Discussion**

As indicated, different types of information, may need to be obtained from different sources and using different methods to collect them (Tables 1-3). Some methods can be used routinely, while other information can only be obtained through in-depth studies. While ideally information should be collected at all health facilities, because of the state of information collection, storage and analysis, this may not be possible in all sites. It is for this reason that the various methods were categorized as ‘routine’, ‘sentinel’ or ‘in-depth’. ‘Routine’ methods were those data collection methods, which could be employed routinely in most if not all sites. In ‘sentinel’ sites, additional information could be collected with relatively ease, although may require using special data collection methods, whereas ‘in-depth’ methods are time – and resource-intensive data collection

exercises, which because of their resource intense nature should only be employed in a focussed and limited fashion.

In the sentinel sites one would not only be able to obtain longitudinal patient-based information but also be able to perform costing studies. While one would be less inclined to frequently perform time-and-motion studies, one could use questionnaires more frequently to estimate staff involvement on HIV-related activities (Section 5.3.2). Once estimated, the unit cost calculated in the different type of health facility, could be used in similar type of health facilities where one can collect longitudinal patient-based information. The aggregated patient-based information combined with the unit costs then provides an estimate of the cost of HIV care. Similarly, most of the household studies, will, by necessity, need to be in-depth studies, which would only be performed on a cross-sectional, serial cross-sectional or longitudinal basis in a limited number of sites.

Members of the working group highlighted the need for a simple HIV facility-based costing guide to be written and made widely available and accessible to enable professionals in middle- and lower-income countries to perform costing exercises using standardized methods. While such a guide exists for costing HIV prevention programs [23], such a guide is lacking for treatment and care facilities and household studies. While facility based costing studies will provide estimates of the cost of services at health facility level, such studies usually do not incorporate program or broader health system costs, which would also need to be estimated and incorporated.

## **7.0 Recommendations**

7.1 To improve clinical care, health facilities need to monitor over time the use and outcome of HIV-related services.

7.2 To facilitate this, users of HIV services need to be provided with a unique identifier.

7.3 Patient-based process information should be aggregated at the health facility level to calculate mean use of services per time period: (mean number of inpatient days, outpatient visits, tests and procedures performed, drugs prescribed).

7.4 Where possible these aggregate analyses should be stratified by gender, ethnic group, exposure category, WHO stage of HIV infection, type of opportunistic infection where appropriate, CD4 count or other relevant parameters.

7.5 Unit cost should be calculated for each of the services used. Ideally these should be obtained through the performance of costing studies. These are to be performed in sentinel sites, and their results to be inferred to similar type of health facilities across the country.

7.6 Process and cost data ought to be linked to relevant outcome data.

7.7 While some aspects of the economic impact on individuals or households can be obtained through special studies performed in health facilities, the data are usually better obtained through in-depth household surveys.

7.8 Combining information of direct costs from health facilities with indirect costs obtained through household studies, enables the overall economic impact of HIV infection and the country's response to be estimated.

7.9 Program and healthcare system costs also need to be estimated and added to the costs from health facilities and households

7.10 Simple guidelines for countries to perform HIV costing exercises should be produced for:

- a) health facilities,
- b) households,
- c) HIV-related programs and healthcare systems.

## Acknowledgement:

We would like to thank all those involved with the preparation and implementation of the Work Shop, in particular Sebastian Kevany, Joann Sy, Guy Harling, Paul Verboom as well as Cyril Pervilhac, George Schmid and Paul Verboom for commenting on previous drafts.

## 8.0 References

1. Roberts RA, Hickey A, Rosner Z. *The Role of Community Involvement in HIV Programmes in South Africa* in Beck EJ, Mays N, Whiteside A and Zugina J (eds). *The HIV Pandemic: local and global implications*. Oxford University Press, Oxford UK 2006: 720-736.
2. National AIDS Spending Assessments. A notebook on methods, definitions and procedures for the measurement of HIV and AIDS financing flows and expenditures at country level. Unpublished Manuscript/Beta version. UNAIDS/Resource Tracking and Projections unit: (May, 2006).
3. Badri M, Maartens G, Mandalia S, et al. Cost-effectiveness of Highly Active Antiretroviral Therapy in South Africa. *Plos Medicine* January 2006; 3: e4
4. Beck EJ and Miners AH. *Effectiveness and Efficiency in the Delivery of HIV Services: economic and related considerations* in *The Effective Management of HIV Disease*, Gazzard B, Johnson M and Miles A. (eds), Aesculapius Medical Press, London 2001,113-38.
5. Drummond, M.F., O'Brien, B., Stoddart, G.L., and Torrance, G.W. *Methods for the economic evaluation of health care programmes - 2<sup>nd</sup> Edition*, Oxford: Oxford University Press, 1997:52-3.
6. Finkler, S.A. The distinction between costs and charges. *Annals of Internal Medicine* 1982; **96**: 102-109.
7. Beck EJ, Beecham J, Mandalia S, Griffith R, Walters MDS, Boulton M, Miller DL. What is the Cost of Getting the Price Wrong? *Journal of Public Health Medicine*, 1999;21:311-7.
8. Chancellor, J.V., Hill, A.M., Sabin, C.A., Simpson, K.N., and Youle, M. Modelling the cost effectiveness of lamivudine/zidovudine combination therapy in HIV infection. *PharmacoEconomics* 1997; **12**: 54-66.
9. Drummond, M.F. *Economic analysis alongside controlled trials*. Department of Health, London, 1994.

10. Drummond, M.F., Richardson, W.S., O'Brien, B.J., Levine, M., and Heyland, D. Users' guides to the medical literature. XIII. How to use an article on economic analysis of clinical practice. A. Are the results of the study valid? Evidence-Based Medicine Working Group. *JAMA* 1997; **277**: 1552-1557.
11. Buxton, M.J., Dubois, D.J., Turner, R.R., Sculpher, M.J., Robinson, P.A., and Searcy, C. Cost implications of alternative treatments for AIDS patients with cryptococcal meningitis. Comparison of fluconazole and amphotericin B-based therapies. *Journal of Infection* 1991; **23**: 17-31.
12. Sculpher, M., Drummond, M.F., and Buxton, M. *Economic Evaluation in health care research and development: undertake it early and often*. HERG Discussion Paper no. 12. Uxbridge: Brunel University, 1995.
13. Tolley K and Gyldmark M. *Towards a standardized framework for costing HIV and AIDS treatment and care in Europe*, in Fitzsimons D, Hardy V and Tolley K (eds) *The economic and social impact of AIDS in Europe*, Cassell, London, 1995:25-39.
14. Mullins CD, Whitelaw G, Cooke JL, Beck EJ. The indirect cost of HIV infection in England. *Clinical Therapeutics* 2000;22:1333-45.
15. Beck EJ, Miners AH, Tolley K. 'The Cost of HIV Treatment and Care: a global review' *PharmacoEconomics*, 2001;19:13-39.
16. Harling G, Wood R and Beck EJ. Efficiency of Interventions in HIV Infection, 1994-2004. *Disease Management and Health Outcomes* 2005; 13: 371-394.

Supplementary Tables:

[http://pt.wkhealth.com/pt/re/dmo/aplus.htm;jsessionid=DDjEs3AUIRCyyia2yIqrhoizKC8kk2ppLHPLSuPPdK2Du1br4csm!600736187!-949856144!9001!-1?idx=3&cursorname=S.sh.2.14.15.17.18&fieldname=sl\\_100&an=00115677-200513060-00003](http://pt.wkhealth.com/pt/re/dmo/aplus.htm;jsessionid=DDjEs3AUIRCyyia2yIqrhoizKC8kk2ppLHPLSuPPdK2Du1br4csm!600736187!-949856144!9001!-1?idx=3&cursorname=S.sh.2.14.15.17.18&fieldname=sl_100&an=00115677-200513060-00003)

17. Le R Booyesen F & Arntz T The Methodology of HIV/AIDS impact studies. *Soc Sci Med* 2003; 56: 2391-2405
18. WHO. *HIV Monitoring Guidelines for HIV Care and Antiretroviral Therapy (ART)* Geneva, November 2005. - <http://www.who.int/hiv/pub/guidelines/patientmonitoring.pdf>
19. Bussman H, Wester CW, Ndapi Net al. Hybrid data capture for monitoring patients on highly active antiretroviral therapy (HAART) in urban Botswana. *Bull WHO* 2006; 84: 127-131
20. Tierney WM, Beck EJ, Gardner RM, et al. Viewpoint: A Pragmatic Approach to Constructing a Minimum Dataset for Care of Patients with HIV in Developing Countries. *J. Am. Med. Inform* (in press).

21. Beck EJ, Bailey C, Boucher P, Travers P *WHO - Electronic Medical Record Meeting, Stanley Hotel, Nairobi Kenya, 30 & 31<sup>st</sup> August 2004*. WHO Geneva November 2004. - [http://www.who.int/kms/initiatives/EMR\\_Meeting\\_Report\\_2004.pdf](http://www.who.int/kms/initiatives/EMR_Meeting_Report_2004.pdf)

22. UN Department of Economics and Social Affairs. *Household Sample Surveys in Developing and Transition Countries. Studies in Methods Series F no.96*, UN, New York 2005.

23. UNAIDS. *Costing Guidelines for HIV Preventions Strategies*. Geneva 2004

[http://data.unaids.org/Publications/IRC-pub05/JC412-CostGuidel\\_en.pdf?preview=true](http://data.unaids.org/Publications/IRC-pub05/JC412-CostGuidel_en.pdf?preview=true)

## Appendix 1: Economic Working Group Composition

John Blandford <a href="mailto:jblandford@cdc.gov">jblandford@cdc.gov</a>	CDC Atlanta	Jose Antonio Izazola-Licea <a href="mailto:izazolaj@unaids.org">izazolaj@unaids.org</a>	UNAIDS, EVA
Andrew Boulle <a href="mailto:aboullle@cormack.uct.ac.za">aboullle@cormack.uct.ac.za</a>	University of Cape Town, South Africa	Barbara McPake <a href="mailto:bmcpike@qmuc.ac.uk">bmcpike@qmuc.ac.uk</a>	Queen Margaret University College, Scotland
Linda Carr <a href="mailto:lac0@cdc.gov">lac0@cdc.gov</a>	CDC Atlanta	Mead Over <a href="mailto:Meadover@worldbank.org">Meadover@worldbank.org</a>	World Bank
Susan Cleary <a href="mailto:scleary@heu.uct.ac.za">scleary@heu.uct.ac.za</a>	University of Cape Town, South Africa	Mark Shields <a href="mailto:mark@healthyafrika.net">mark@healthyafrika.net</a> <a href="mailto:shields@zamnet.zm">shields@zamnet.zm</a>	CDC Zambia
Serge Eholié <a href="mailto:speholie@globeaccess.net">speholie@globeaccess.net</a>	Treichville Hospital, Abidjan, Cote D'Ivoire	Tessa Tan Torres <a href="mailto:tantorrest@who.int">tantorrest@who.int</a>	WHO-EIP Department Geneva
Robert Greener <a href="mailto:GreenerR@unaids.org">GreenerR@unaids.org</a>	UNAIDS, PEP	Eddy Beck <a href="mailto:becke@unaids.org">becke@unaids.org</a>	WHO-HIV Department Geneva