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Manual for costing HIV facilities and services

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Acronyms

AIDS acquired immunodeficiency syndrome

HIV human immunodeficiency virus

IMCI Integrated Management of Childhood Illness

NASA National AIDS Spending Assessment

NHS National Health Service

PANCEA Prevent AIDS: Network for Cost–Effectiveness Analysis

SAFE Skilled Attendance for Everyone

UNAIDS Joint United Nations Programme on HIV/AIDS

WHO World Health Organization

Executive summary

E1. As part of scaling up HIV prevention, treatment, care and support services within the context of universal access, countries need up-to-date and robust strategic information.

E2. This information is required to monitor and evaluate the effectiveness, efficiency, equity and acceptability of the HIV services.

E3. Information on the efficiency of HIV services requires up-to-date and robust information on the cost and cost–effectiveness of these services. The way to obtain information on cost is to perform a costing study.

E4. Any costing study requires a specific focus, which needs to be explicitly defined. A costing exercise can focus at the level of a facility, household, community or programme of the health care system. Similarly, any costing exercise can have either a public-sector or societal focus.

E5. This manual was written for professionals interested in costing HIV services at the facility and programmatic levels, as the need was perceived for a manual that provides simple but standardized guidelines enabling professionals to perform costing exercises.

E6. It describes the methods for calculating the unit and total costs within a facility and includes the direct cost of providing the service, the cost of support provided within the same facility and the cost of support provided through other sites within the programme.

E7. Any facility comprises a number of ***service centres***. A service centre provides services either directly to individual users of services or to centres enabling the provision of these services. Care service centres provide services directly to individuals seeking the use of either preventive or therapeutic services. Support service centres provide services that support directly or indirectly the care service centres that provide services to individual users of services.

E8. The service centres are part of a ***service site***, which is the administrative unit that governs a number of service centres. In a hospital, the inpatient wards and outpatient clinics are service centres and the hospital or facility is the service site.

E9. External service centres and sites also often support service sites, and the service sites that are functionally connected form a ***service chain***. The service chain therefore comprises a number of service sites with a common function: to provide commodities for personal or support services in a service site, such as a drug procurement chain.

E10. A ***programme*** comprises a number of complementary service chains that interact with each other and form the basis of the programme.

E11. The underlying costing principles are similar for the service centres, sites, chains and programmes and include identical data requirements.

E12. Apart from a specific focus of the costing exercise, which needs to be agreed on, a specific ***time period*** or ***study period*** needs to be established.

E13. A number of different types of services sites can exist: for instance, major differences exist between primary, secondary, tertiary and quaternary care units. Each different type of service site needs its own costing exercise.

E14. Likewise, different service chains, which comprise and support the programme, each need to be costed. Adding the costs for various disease-specific programmes can provide the cost for the health care system as a whole, although one needs to be aware of potential double counting.

E15. The costing process in a service site consists of the following steps:

Level of the service site	1. Divide the service site into service centres
Costing within the service centre	2. Define and measure the services (output) provided by service centres 3. Define and measure the input used at service centres 4. Measure the cost and prices of input
Costing at the level of and across support service centres	5. Calculate the total cost of each support service centre 6. Calculate the unit cost of each support service centre
Costing at the level of and across care service centres	7. Allocate costs from support service centres to care service centres 8. Calculate the total cost of each care service centre 9. Calculate the unit cost of each care service centre
Level of the service site	10. Calculate the total cost of the service site

1. Introduction

1.1 Aim of the manual

The aim of this manual is to provide a simple guide on the process of gathering data to calculate the cost of HIV services provided at health facilities.

This manual provides specific guidance for calculating the unit costs and total costs for the following facility-based activities:

- an inpatient day;
- a day ward visit;
- an outpatient or clinic visit;
- the drugs dispensed by the pharmacy;
- the tests performed in laboratories;
- medical and surgical procedures performed; and
- support services within and external to the facility that support these activities.

The cost of providing a service includes both the direct costs of the service itself and the indirect costs of support services within the facility or provided from external sites as part of the programmatic support of the facility.

The costing methods described in this manual can be used for a wide range of services and programmes. The primary focus of this publication, however, is on costing the services provided at health facilities and includes prevention, treatment, care and support services for people living with HIV and people affected by HIV.

1.2 Role of information on the cost of services

Cost information constitutes an important part of strategic information. Estimating the efficiency of a particular service requires combining the information on the cost of the service with outcome measures to obtain cost–effectiveness ratios and other measures of efficiency (Beck et al., 2008). Information on the cost of services is also important in evaluating the equity of the services provided in terms of the quantities and types of resources spent on various groups or populations. It also provides the basis for estimating possible future resource needs. However, the number of cost studies and the reliable cost data produced, have been limited, especially in middle- and low-income countries (Beck et al., 2010).

1.1.1. Costing HIV services

HIV services cover a broad range of activities, including prevention services for uninfected people, treatment and care services for people living with HIV and support services for people affected by HIV. Apart from health services, HIV services also cover other sectors of the economy, such as social services. The aims and work of UNAIDS have reflected the need for countries to adopt a multi-sectoral approach since its inception in 1995.

The last decade has seen an increasing number of HIV programmes developed and implemented, such as the World Bank Multi-Country HIV/AIDS Program for Africa and Treatment Acceleration Project, the United States President’s Emergency Plan for AIDS Relief, the UNAIDS/WHO “3 by 5” Initiative and the universal access programme. They have all contributed towards scaling up HIV services in middle- and low-income countries. The increase in HIV services in countries has been possible due to increased external funding for countries, rising from US$ 2 billion in 2001 to US$ 15.6 billion by

2008 (Secretary-General of the United Nations, 2010). However, attaining the universal access targets, defined and set by countries, requires ongoing and increased funding. As the number of people living with HIV continues to increase, the need for HIV services and resources to maintain these services will also continue to grow (UNAIDS, 2007). The rapid increase in the demand for services has resulted in rising demands for additional funds. This highlights the need for evaluating the performance of existing services, including the cost of running them and their cost–effectiveness.

In January 2006, WHO recommended producing simple, standardized guidelines to assist professionals in countries in performing costing exercises at various levels of the health care system. This recommendation emerged from a workshop that developed country guidelines for collecting socioeconomic information on HIV services at the levels of households, health facilities, programmes and health care systems (Beck et al., 2006).

Cost analysis based on standardized guidelines can inform countries about the relative costs of the services provided and enable comparisons between the funds allocated to HIV-related services and the actual cost of running these services. At the international level, cost analysis based on standardized guidelines enables regional or global comparisons of costs and can contribute to more accurate international estimates of the resources needed for HIV programmes.

1.1.2. Approaches to costing services

The general principles underlying any costing exercise include the following steps:

- Estimate the cost per service unit provided: that is, the unit cost.
- Multiply the unit cost of the service by the number of times the service was used during a defined time period.

There are two general approaches to estimating the unit cost of any given service (Beck et al., 2008). The first is using the top-down costing method. This method determines the total cost of providing services based on accounts of past expenditure. This expenditure is then divided by the number of services provided during the period for which the expenditure was funded.

***Example**: If the annual expenditure for running a testing and counselling services is US$ 1000, and 100 people were seen during that period, the unit cost would be US$ 10 per person seen.*

The alternative method is the “bottom-up” or “ingredient-based” method. This approach begins by defining the type and quantity of input or ingredients used to produce the service output. The input may include physical goods or services, including investment of staff time. The price of each type of input (or ingredient) used is first calculated. Then the number of each input unit used is multiplied by the prices to obtain the overall cost of the input used. Finally, all the costs of all input are summed and divided by the number of products produced to obtain the unit cost for each product or “output” of that service. The product or “output” in this context refers to the service provided, such as an inpatient day or an outpatient visit.

***Example**: If a testing and counselling service saw 10 000 people in a year and the total cost for providing that service during that year was US$ 70 000, which included staff costs of US$ 50 000 per year, consumables of US$ 1000, equipment of US$ 2000 and catering, laundry, medical records, portering, administration, security and building maintenance of US$ 17 000 per year, then the unit cost would be US$ 7 per person served.*

The top-down approach is usually simpler to perform, since it relies on overall expenditure rather than on a detailed picture of all the input units that contribute towards providing a particular service and their respective costs. However, this approach equates expenditure with cost and tends to be less accurate. The specific contributions of different types of input towards the cost of a particular service may not be able to be identified (Tolley & Gyldmark, 1995). The use of the bottom-up or ingredient-based approach is therefore recommended as often as possible, bearing in mind that most effort should be put into collecting precise information on input and the costs of items that are most frequently used or are the most expensive.

1.1.3. Programmatic aspects of facility costing

Facility costing exercises usually consider only the services provided within the facility itself. As mentioned above, these facility services, however, are also supported by activities carried out by institutions external to the particular facility, which have their own costs and are part of a particular programme or of the health care system in general. Calculating the full cost of services provided at health facilities also requires including such programmatic costs.

Costing within a facility, let alone an entire HIV programme within a country, can be a complex undertaking. To simplify the task of facility costing, each organizational unit should be divided into its constituent parts, as defined by their function. This manual identifies four units of organization: (1) the service sites; (2) the service centres within the service site (Fig. 1); (3) service chains, each of which is made up of several service sites; and (4) the national HIV programme, which is composed of a number of service chains.

- In **service centres**, services are provided to people either directly – through personal or care services – or indirectly, in the form of necessary commodities and logistical support, the support services.
- Service centres are located within **service sites** or facilities, which include care and support service centres.
- Service sites are linked together through a common function into **service chains**. A chain begins at the level of the primary service site that provides personal services and is linked to other service sites that provide support services to the primary service site.
- **A programme** comprises a number of service chains, each performing different functions, but with the overall aim of providing and supporting HIV services (in this case).

Figure 1 shows how service sites are linked to each other and together constitute a service chain, such as a drug supply chain. Every programme comprises a number of service chains.

Using the bottom-up costing method within a facility, each service centre can be costed based on the services or output it provides and the quantity and cost of the input involved in providing these services. Once the service centre has been costed, it can be combined with the costs of other service centres within the facility to arrive at a cost for the facility or service site as a whole.

Similar costing methods can be used to cost external service sites that provide support services. These service site costs can be summed and added to the service sites providing personal services to reach a total cost for each service chain, combining the costs for both service sites providing personal services and those providing only support services. Finally, the costs for the service chains comprising the national programme can be combined to obtain the total cost of the national HIV programme.

Figure 1. Schematic representation of a national HIV service provision programme

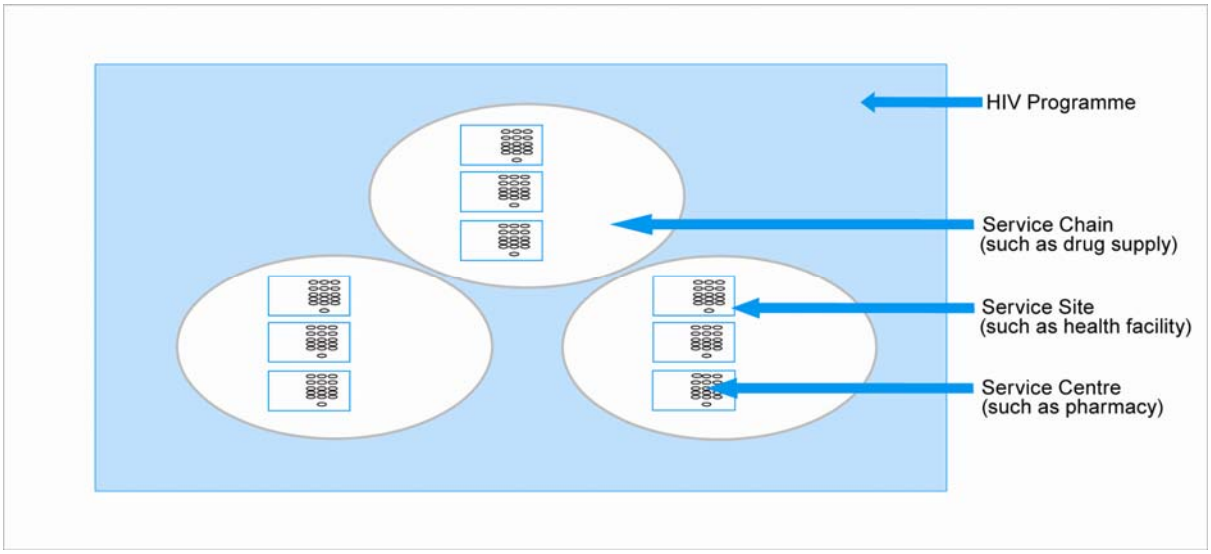
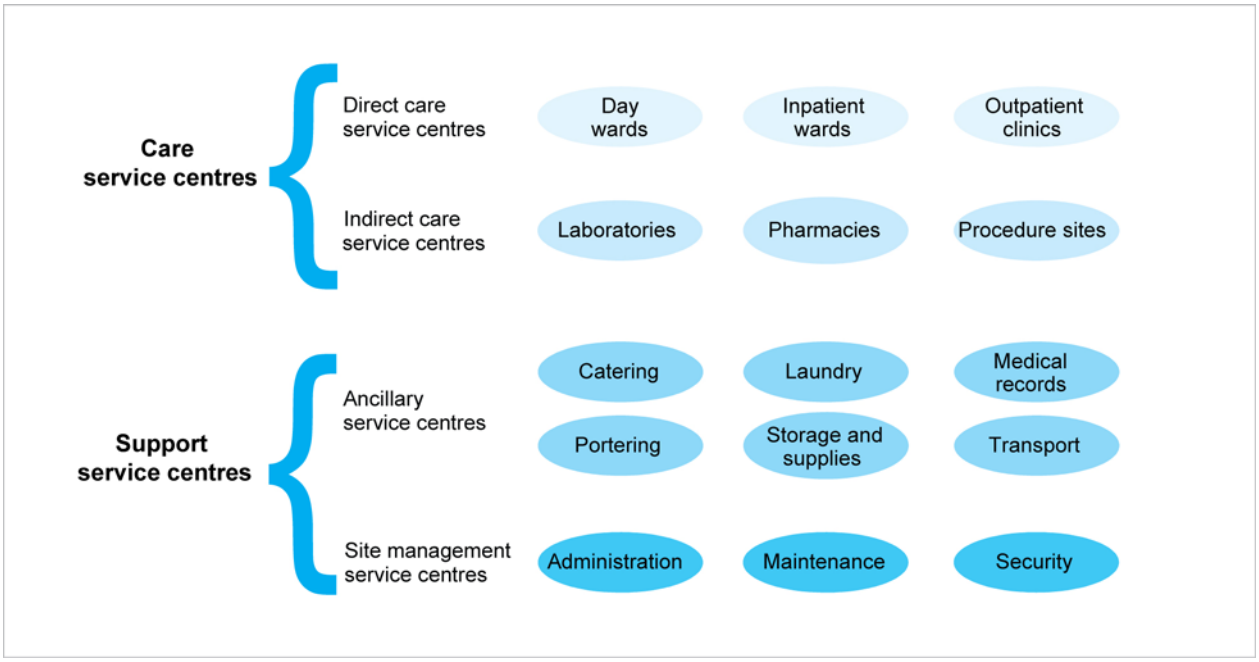


Figure 2 shows the types of service centres and their relationship within one service site, such as a hospital. Several types of service centres are involved in providing direct patient-based or personal services. In addition, several service centres provide the necessary support services that ultimately enable personal services to be provided.

Figure 2. Types of service centre for a facility costing exercise



***Example**: The pharmacy within a hospital is a service centre, because the service it provides is the dispensing of drugs either for inpatients or outpatients. The hospital itself is considered a service site. The pharmacy, however, can only provide these services because it is supported by other service centres, both within the hospital (such as supplies and administration) and outside the hospital. For example, the hospital pharmacy receives its supply of drugs from a district pharmacy, which is therefore also a service site, since it provides the drugs the hospital pharmacy needs.*

The district pharmacy, in turn, gets its drugs from the regional distribution centre, which in turn may obtain its drugs from the central distribution centre. Each of these is a service site within a national drug procurement system. The national procurement system is therefore a service chain: a series of service sites linked together by the common function of delivering drugs. Each of the service sites in this chain plays a role in enabling the final service centre – the hospital pharmacy – to provide personal services.

1.1.4 The scope of a costing exercise

Any cost analysis needs to be performed from a clearly defined perspective, with a clear aim and specific objectives. This manual is written for those who wish to identify the current cost of providing services, rather than predicting future costs, although this might be possible based on such data. Cost analysis can be carried out from the perspective of an individual or payer, be it a user of services or a health insurance company, a national programme, the health care system as a whole or the society (Drummond et al., 2005). Each includes certain resources or types of expenditure or excludes others.

***Example:** Once the cost of all service centres within a hospital has been calculated, the costs of support service centres within the hospital are allocated to the pharmacy in proportion to the services consumed by the pharmacy – electricity, water, administrative support, cleaning services, etc. Thus the full cost of services provided by the pharmacy within the hospital is calculated. Adding this cost to the costs of laboratories, procedure sites, clinics and wards produces a total cost for the hospital as a whole.*

The costs of the drug supply service chain and other service chains providing support services to the facility can be added to the total cost of providing services at the hospital. This figure would reflect the total cost of personal services provided. Finally, adding the equivalent costs of all other health facilities providing HIV services to this total cost, which includes the costs of the service chains, produces the total cost of the national HIV programme.

In any costing exercise, the period of analysis should be specified. Collecting data for longer periods of time is more accurate than using shorter time periods. The time period depends on the purpose of the study, the quality of existing records and the financial resources and personnel available to conduct it. If existing records are comprehensive, costs may be evaluated retrospectively without

significant investment. However, in most cases the information may be difficult to obtain – if it exists at all – and getting such information may be very time-consuming (Beck et al., 1999).

This manual assumes that data are collected during a one-year period. If data collection during one year is not feasible because of limited resources, an efficient approach is to sample weeks or months from the year for which data can be collected prospectively. If shorter periods of time are analysed, it should be ensured that the data collected are representative. For example, the services used may vary by season, resulting in a facility being busier during some periods of the year than during others.

1.1.5 Services to be costed

The next step is to define the services to be costed. For instance, the initial focus may be on prevention and therapeutic services in health facilities that fall within the scope of a country's national strategic plan for HIV. This includes services provided to people living with HIV but also prevention and support services for those affected by HIV.

For most health facilities, whether involved in prevention or therapeutic services, final output measures will include the number of inpatient days, day ward visits and outpatient visits, the number of drugs dispensed, the number of laboratory tests performed and the number of medical and surgical procedures performed. This manual provides direct guidance on collecting data for these services. The principles described in this manual to obtain unit costs for each of these particular types of output can be applied to estimate the cost of other types of output as well.

1.3 Structure of this manual

This manual aims to determine which financial and resource data need to be collected to calculate unit costs for services provided through a facility that includes costs for the support services obtained through the national HIV programme or health care system.

Chapter 2 provides a guide for the process of costing a single service site, such as a health facility, explaining how to cost each service site and then allocate support service costs to care service centres.

Chapter 3 covers the costing of services from external service sites within service chains that support the facility.

Chapter 4 describes the methods to allow facility and programmatic costs to be combined to arrive at a cost for a national programme.

1.4 Workbook for the collection of cost information

A workbook has been produced as a companion publication (*Workbook for the collection of cost information on HIV facilities and services* (Beck et al., 2011)) and provides worksheets for people actively involved with costing services that can guide them in carrying this out systematically.

2. Costing services within a single service site

This chapter describes how to cost HIV services within a single service site such as a health facility. As previously described, a service site comprises a number of service centres: some provide either ***personal services*** directly to service users (care service centres), and others provide ***support services,*** which support the provision of personal services (support service centres).

Obtaining the overall cost of services provided at a service site requires:

- identifying all the service centres within the site;
- calculating the cost of the services provided by each service centre within the service site; and allocating the costs of services provided by support service centres based on the output by which they support care service centres.

This chapter also describes the steps needed to calculate the unit costs for a service centre. It then gives detailed examples of the data that need to be collected within each type of service centre and, finally, details the process of allocating costs from support centres to care service centres.

2.1. Defining service centres

A service site may contain a wide range of service centres, which can be classified into two broad categories: care centres and support centres (Box 1). The *care centres* include the service centres that provide direct and indirect care services to service users. The *direct care centres* provide direct care to service users, while the *indirect care centres* assist in providing care by performing tests or procedures or providing drugs. The *support centres* include centres that provide logistical support across the whole service site.

All care and support centres within the service site should be identified. The easiest service centres to miss are those that occupy only a part of a room or an area on a part-time basis. In particular, multiple clinics may use the same space during a week, but the use of input varies in terms of both personnel and equipment used, and they should therefore be costed as separate service centres.

2.2. The costing process

The process of costing any service site can be divided into 10 steps.

1. ***Defining care and support centres***. A list of all the service centres within the service site needs to be drawn up. Each service centre provides either personal care to individuals or support services to centres providing such personal care.

2. ***Defining and measuring services or output by service centre***. Each service centre produces a product or output, which needs to be identified.[1] For instance, the output of an inpatient ward is an inpatient day; similarly, the output of a laboratory is investigative and diagnostic tests. The output is less tangible for some service centres. For example, the service centres involved in site management provide the services of ensuring that buildings are secure and well maintained and that the site is well administered. Once an output unit has been defined, the quantity of output produced in a fixed time period at the service centre should be measured.

[1] For indirect care service centres, the disparities in resource use between different types of output may be great enough to justify costing each type of output separately. This process will add significantly to the resources needed to conduct a cost analysis and is discussed in section 2.5.

Box 1. Types of service centres within a service site

Care centres

Direct care centres. These centres provide the services direct to individuals in the facility and can include wards for inpatient or day ward care and outpatient clinics. Direct care service centres use services from all other service centres, including indirect care centres and support centres.

Indirect care centres. These centres provide diagnostic or therapeutic services to service users but are not primary points of care within a facility. They include laboratories, pharmacies and sites dedicated to performing diagnostic or curative procedures.

Support centres

Ancillary centres. These centres provide support services to the care centres. This category includes catering, laundry, medical records, portering, storage and supplies and transport.

Site management centres. These centres provide support services to care and ancillary centres. This category includes central administration, buildings and building maintenance and security services, all of which provide part of the infrastructure of the service site and centres within the site.

3. ***Define and measure the input used at the care centers***. Once service centres have been defined and the type of output determined, the input used to produce the output needs to be defined and measured. Input includes a wide range of resources and can be divided into capital and recurrent input. ***Capital resources*** require an initial outlay when bought but then can be used during several years. ***Recurrent resources*** are commodities consumed within one year and must be regularly replaced for them to be available.

   Recurrent resources can be subdivided into:
   - *Staff*. Paid and unpaid personnel who are administratively part of the service centre.
   - *Consumables*. Items consumed within one year and longer-lived resources of low value.
   - *Other recurrent input*. Any other resources consumed regularly, such as monthly payments for electricity.

   Capital resources can be subdivided into:
   - *Buildings*. These include the actual buildings where services are provided or support the provision of services.
   - *Equipment*. Items that have a useful life of more than one year.
   - *Other capital input*. Any other resources consumed on a one-off basis, such as consultants or specialists hired for a single project.

   Input needs to be identified and the quantity used by the service centres calculated.

4. ***Measuring the cost and prices of input at care centres.*** Once the list of the types and quantities of input has been drawn up, the monetary value of each item needs to be determined. The value sought is the **current financial price**: what it costs to provide this particular input in this particular facility. The cost of the input may have been borne locally or

externally. For instance, external sources, such as the health ministry, may have paid directly for some goods or staff employed within the facility.

Prices may either be those originally paid for the items, allowing for inflation between the date it was bought and today, or the current market price. Recorded payments should be used with care, especially if the item was bought long ago or if prices are rapidly changing, since they may no longer reflect current costs. If market prices are used, then the price should reflect how much the facility, or other payer, has to pay. For instance, in some countries the central government has negotiated with pharmaceutical companies to obtain national prices for drugs, whereas in other countries hospitals have to negotiate directly with pharmaceutical companies to get discounted drug prices.

Whereas the *cost* refers to the actual amount of money incurred by a service, a *price* refers to the amount of money a provider charges for the service.

5. ***Define, measure and cost the input used at the support centers***. Once support centres have been defined and their output determined, the input used to produce the output needs to be defined, measured and costed. All the input and the prices at a support centre should be determined, and then the annual cost of each type of input should be calculated by multiplying the unit price by the number of consumed for a given period of time. Finally, all calculated costs of input should be summed to obtain the total cost of the input of the support centres for the given time period.

6. ***Calculate the unit cost of each of type of output for each support centre***. Once the total cost of input during a given time period has been estimated, it should be divided by the number of output units provided by the support centre to generate the cost per output unit for each support centre.

7. ***Allocate costs from the support centres to care centres.*** Add the total cost for the various support centres to the costs for each care centre.

8. ***Calculate the total cost for each care centre***. This includes adding the total cost of the direct care centres with the relevant support centres and the relevant costs of the indirect care centres and the costs of their respective support services.

9. ***Calculate the unit costs for each care centre***. Once the total cost of input during a given time period has been estimated, it should be divided by the number of output units provided by the care centre to generate the cost per unit of output. For instance, in an inpatient ward in which the output unit is an inpatient day, once the costs for all input from indirect care and support centres have been added together, the cost per inpatient day can be calculated.

10. ***Calculate the total cost of providing services at a service site***. After the unit costs and overall costs have been calculated for each relevant care centre, these can be added together to produce the total cost of providing the services at the relevant service site.

2.3. Sources of data

Resources, including input, prices and output, should be ideally defined, measured and costed empirically. This category of information includes prospective systems for collecting data on the use and outcome of services. However, such detailed empirical information may not always be available, and less systematically collected empirical data may have to be used. In this case, the following sources of data can be used, in decreasing order of preference.

i. ***Routinely collected information***. This consists of recorded information that can be used for costing purposes but were not specifically collected for costing purposes. Such

information may be obtained retrospectively or prospectively from a variety of sources, ranging from medical records to registries.

ii. ***Collecting costing-specific data***. This involves staff working at the service site or members of a research team collecting specific costing information. Such information can be collected through time and motion studies but could also be based on maintaining diaries or registers or by a member of the research team interviewing staff members. Staff observations can differ from expert opinion, given that staff members regularly observe what actually happens at the service centre or site rather than what should happen. This distinction may not always be clear-cut.

iii. ***Expert opinion***. This is what an "expert" thinks occurs. Expert opinion relies on the judgement of people with experience working in a given area stating which resources they think are used. This may not require any empirical data and is usually based on judgement or impressions of what happens. An expert could be a recognized leader in the field but could also be a member of staff at a facility who has been working there for some time.

Although routinely and prospectively collected information on the use, cost and outcome of services provided is likely to be the most accurate source, these data may not be available and other methods (described above) may have to be used to obtain the relevant information.

2.4. Costing direct care service centres

The direct care centres within a health facility may include inpatient wards, day wards and outpatient clinics. These care centres are the primary point of care for individuals. A detailed description of data collection for inpatient wards is provided, with subsequent reference to day wards and outpatient clinics.

2.4.1. Inpatient wards

An inpatient ward is a place to which patients are admitted for at least one overnight stay to have diagnostic procedures or therapeutic interventions performed.

2.4.1.1. Output

The output measure of an inpatient ward is **an inpatient day of care** provided. The number of inpatient days provided during a fixed time period by each ward needs to be collected. Information on the number and length of admissions to the ward may be kept in a ward log or centralized hospital information system. Alternatively, data may need to be based on observational methods or expert opinion.

2.4.1.2. Input

All input used needs to be identified, listed and added. This includes input administered within the inpatient ward itself. Services provided to the ward by other service centres should be measured at the service centre by which they are administered. However, eventually they will be added to the inpatient costs.

2.4.1.2.1 Staff

All staff working on the ward should be identified, including their pay grade or job title. For unpaid people, the staff position most appropriate to the tasks they perform, rather than to their experience or qualifications, should be used. For each staff member, the amount of time spent on the ward with patients, or on preparations or paperwork relating to the ward, should be measured.

However, staff time for the inpatient ward should exclude pre- or postoperative visits to patients by clinical staff members who conduct tests or procedures, since their time relates to the indirect care centre at which the test or procedure is carried out.

The working hours used by staff members can be most reliably estimated through time and motion studies. However, these studies are very resource-intensive, and a more rapid way of obtaining such data is to have staff keep a work diary for a defined period of time, in which they record what they are doing at each point during their working day. A third approach that is less precise but more rapid is to ask staff to estimate the amount of time they spend working in each service centre in an average week or month.

Care should be taken to include any temporary staff, as they are often missed from such analysis. They may have been brought in to replace staff members on vacation or sick leave or to deal with seasonal variation in activity. Records or staff members can be used to determine whether any temporary staff members have been employed at the service centre in the past year.

2.4.1.2.2. Consumables

All consumables used by the service centre should be identified and their quantity measured. Since each ward probably uses a large number of small items, interviews with ward staff members are recommended to ensure that all consumables are included. If central stores buy consumables in bulk and then distribute them to the various service centres, then consulting someone working in central stores may also be helpful. Generally, only items with a lifespan of less than one year should be counted as consumables. Longer-lasting items should be classified as equipment.

However, items with a longer lifespan that are replaced on a rolling basis can also be treated as consumables. This includes such items as bed linen. In this case, the annual quantity of each item that is replaced due to loss or wear approximates the annual use.

2.4.1.2.3. Equipment

A list of all equipment used on the ward should be made, including both medical and non-medical equipment. Medical equipment includes both diagnostic and therapeutic items, and non-medical items include beds and chairs for patients or staff members. For commercially available items, a record should be kept of the manufacturer and model of the equipment; for non–commercially available items, the material and measurements of the item should be recorded in detail to allow their price to be estimated. The number of all pieces of equipment present in the ward should be recorded. When an item is shared with other care centres at the site, it should be costed and registered in relation to the proportion of its use by the ward.

2.4.1.2.4. Other input

Finally, a list should be compiled of all other input related to the functioning of the inpatient ward that does not fall within the three categories stated above. An estimation should be made whether the input provided to the ward were used within a single year (*recurrent input*) or during multiple years (*capital input*). An example of recurrent input would be an expert consultation led by an external doctor on a single occasion, and capital input might include staff training.

2.4.1.3. Measuring costs or prices

2.4.1.3.1. Staff

Staff costs should be measured using the cost of their employment during a fixed time period. This needs to be established for each staff grade on the ward. Cost information should be available from the accounts of the facility, government records or directly from staff members themselves.

The cost of employing individuals to provide services often includes more than just their salary and may include any or all of the following.

- *Salary*. The hourly, weekly, monthly or annual amount of money paid to an individual in return for services provided.

- *Other financial benefits*. Any financial benefits paid directly to the individual, such as annual bonuses or payments for commuting costs, as well as indirect payroll costs such as pension contributions, private insurance contributions or social security payments to government.

- *Health care*. If health services are freely available to staff members through a staff clinic, this clinic should be costed as a separate service centre within the site, using full-time equivalent staff as its output. It should be treated like a site management service centre for allocation purposes.

- *Personal use of facility equipment*. The most common example would be staff using facility vehicles for private use. The price of this benefit will be the proportion of the vehicle's annual cost related to the staff member's personal use. The costs related to vehicle maintenance paid by the facility should also be included, but any costs paid by the staff member, such as fuel, should be excluded.

- *Volunteer time.* Staff members may choose to dedicate some hours of work through unpaid overtime or voluntary work. In a complete costing exercise, the value of these work hours should also be included, valuing the additional hours in accordance with the staff members' hourly salary.

However, if overtime is an expected element of the job, it should be covered by the salary and should therefore not be added to the cost. The question of whether overtime hours should be included or excluded should be assessed based on knowledge of the facility regulations, but the decision should always be explicitly stated.

2.4.1.3.2. Consumables

The prices of consumables and other recurrent input should be available from recent receipts or site accounts. When these are not available, market prices should be used.

2.4.1.3.3. Equipment

The equipment is costed based on the price at which the item was bought and the number of years of service. The first step is therefore to establish the current replacement cost of each item or the closest equivalent currently for sale. If the item was bought recently, the price can be taken from receipts or records. Alternatively, commercial price lists can be consulted. The next step is to determine the number of useful years of life of the item. A standard lifespan for some equipment may be set nationally by government policy, such as furniture being replaced every 10 years. Otherwise, a local estimate may be made by consulting with individuals in charge of procurement at the site.

Converting the total price of the equipment into an annual value requires dividing by the annualization factor. The annualization factor indicates the number of years of service of a certain piece of equipment and its value in successive years (see Annex 1 in *Workbook for the collection of cost information on HIV facilities and services* (Beck et al., 2011)).

2.4.2. Day wards

A day ward is a primary point of care to which patients are admitted to the facility for either diagnostic or therapeutic tests or procedures but are discharged on the same day of admission without spending the night at the facility. Such patients may undergo an elective medical procedure, with the day ward also acting as the site for providing pre- and post-procedure care.

2.4.2.1. Output

The output measure is a **day ward visit**. The number of patients attending each ward during a fixed time period needs to be collected. This number can be obtained either from a ward register or centralized information system. If neither of these is kept, data may need to be collected through observations conducted either by researchers or facility staff members.

2.4.2.2. Input

Input for day wards is similar to that for inpatient wards. This includes *staff, consumables* and *equipment* (see subsections 2.4.1.2 and 2.4.1.3). Again, including staff time spent on day ward–related activities is important, even if the staff member is not on the ward at the time. Any input involved in providing tests, drugs, medical procedures or other support services should be costed and related to the service centres that are administratively responsible for them.

2.4.2.3. Measuring prices

The prices for day ward inputs, including *staff, consumables* and *equipment* need to be collected in the same way as for inpatient wards (see subsections 2.4.1.2 and 2.4.1.3).

2.4.3. Outpatient clinics

A clinic is a facility in which ambulatory patients can obtain either preventive or therapeutic counselling and undergo testing or procedures. A clinic may be part of a larger institution, such as a hospital or a stand-alone facility.

2.4.3.1. Output

The output measure of an outpatient clinic is an **outpatient visit**. The number of individuals attending a clinic during a defined time period should be collected. These data may be available either from records kept in the clinic or as part of the clinic information system. In the absence of such records, data can be collected through observation conducted by either researchers or facility staff members.

2.4.3.2. Input

The types of input used in a clinic are likely to be similar to those in inpatient and day wards and include *staff, consumables* and *equipment* (see subsections 2.4.1.2 and 2.4.1.3). If items are shared between clinics that use the same physical space at different times, these items should solely be included in the outpatient clinic. They should be evaluated in accordance with the proportion of their use by that clinic.

Thus, if clinic A uses a space three days per week, and clinic B uses the same space during the other two days, 60% of the equipment permanently located within this space should be allocated to clinic A and 40% to clinic B.

2.4.3.3. Measuring prices

The prices for outpatient clinics, including *staff*, *consumables* and *equipment*, need to be collected in the same way as those for inpatient and day wards (subsections 2.4.1.2 and 2.4.1.3).

2.5. Costing indirect care service centres

Indirect care centres provide support services for patients' management but are not the primary points of service delivery for patients. These are the centres at which diagnostic tests or therapeutic procedures are performed or where drugs are provided to patients, and this can take place within an inpatient ward, day ward or outpatient clinic setting. These centres consume services from site management and other support service centres, enabling them to provide services to the direct care centres.

Costing these centres can be more complex than other service centres, since the output they provide is less homogeneous. Although tests, procedures and drugs can each be treated as a single type of output, the tests and procedures performed and drugs prescribed vary widely. This section describes data collection for laboratories in detail, focusing on how costing in these centres differs from that of direct care centres. It then describes similarities and differences in costing performed at pharmacies and at centres for procedures.

2.5.1. Laboratories

A laboratory is an area within a service site at which laboratory-based diagnostic tests are carried out. This includes a range of virological, haematological, immunological, biochemical and microbiological tests, each of which may be performed in separate departments or within the same department in smaller health facilities.

2.5.1.1. Output

The output of a laboratory is the **performance of a test**. Unit costs can be generated either for an average generic test or in more detail for the different types of tests, such as an HIV viral load test, routine liver function tests or full blood counts. The choice of whether to calculate the cost of an average test or to cost each specific type of test depends on the ultimate goal of the costing exercise. In some instances, only calculating the average cost is sufficient; in other circumstances, specific tests might need to be costed.

The extent to which different tests require different resources to be performed is an important deciding factor. The more tests vary in the time taken to perform or the type of equipment and consumables are used, the more benefit the detailed approach provides.

Regardless of the approach applied, the total annual number of tests performed at the laboratory should be measured. If a cost for each type of test is calculated, a list of all types of tests and the numbers performed during a fixed time period are needed. Information on tests performed should be available from laboratory records.

In addition, tests may need to be differentiated between those performed for patients from outpatient, inpatient or day wards. In this case, identifying which tests were performed for which patients is important when collecting output information.

2.5.1.2. Input

The input that needs to be measured at the laboratory service centres is similar to that at the direct care service centres (subsections 2.4.1.2 and 2.4.1.3). Regardless of the measured output, the total input also needs to be recorded. If the cost of each type of test needs to be calculated, additional detail is required on the specific input required to carry out each different test. This may require observation by a researcher or a detailed time and motion study by laboratory staff.

2.5.1.2.1. Staff

All staff members who work for the laboratory service centre should be considered for the time they spend working on laboratory HIV-related tasks, even if they spend time elsewhere in the service site, such as collecting samples on the wards. If the cost of each type of test is calculated, the time spent performing each test by all staff members needs to be measured and recorded by staff grade.

2.5.1.2.2. Consumables

Any consumables, such as test reagents, used within the laboratory centre should be identified. If a cost for each type of test is calculated, the consumables specifically used for each different type of test should be identified.

2.5.1.2.3. Equipment

Any equipment used in performing tests should be listed. If a cost for each type of test is being calculated, the amount of time each piece of equipment is used for performing each test also needs to be measured and the total expressed as a proportion of a full day's use.

2.5.1.2.4. Other input

If laboratories not based at the service site under investigation conduct some tests on behalf of the service site, the payments for services should be included as "other recurrent input". If a cost for each type of test is calculated, each payment should be linked to a specific type of test.

If the external laboratory is part of a national programme or health care system, it should be costed as a separate service centre and its input not included in that of the facility undergoing a costing exercise.

2.5.1.3. Measuring prices

The prices for laboratory input should be available from sources similar to those described in subsections 2.4.1.2 and 2.4.1.3. If a cost for each type of test is calculated, then the annual costs calculated for staff employment and equipment need to be divided by the number of working days per year devoted to performing the test in question.

2.5.2. Procedure sites

Diagnostic or therapeutic procedures are often carried out in specialized areas of a facility. They range from operating theatres, X-ray or endoscopy rooms to simple procedures performed in a day ward or outpatient setting. Once a procedure has been performed, some specimens may be sent to the relevant laboratory to undergo specific tests.

2.5.2.1. Output

The output constitutes the **procedures performed**. Similar to laboratory services, a unit cost for a procedure site could be calculated as a generic procedure or based on different types of procedures performed by the site. If there is only one type of procedure, such as X-rays, costing each type of X-ray within that category separately may not be worthwhile, and the use of generic costing is

recommended. If the site performs a wide range of procedures including operations, more detailed costing may be required.

2.5.2.2. Input

The input for a procedure site is likely to be similar to that of laboratory services. This will require information on the *staff*, *consumables* and *equipment* involved in performing procedures. Regardless of whether a generic or detailed unit cost is calculated, information on the total input at the service centre should be collected as described in subsections 2.4.1.2 and 2.4.1.3. If each procedure is being costed, then the information on the *staff*, *consumables* and *equipment* input specific to each procedure also needs to be collected.

2.5.2.3. Measuring prices

The prices for *staff*, *consumables* and *equipment* input at procedure site service centres should be available from the same sources as for laboratories.

2.5.3. Pharmacies

The main function of a pharmacy is to dispense drugs or other pharmaceutical products. If the site has multiple pharmacies, each should be costed separately. Pharmacy activities conducted outside the pharmacy, such as ward-based dispensing, should be included as part of this service centre if they are administered through the pharmacy.

2.5.3.1. Output

The output of a pharmacy is **dispensed drugs** or **the total number of prescriptions dispensed** during a given period of time. Similar to other indirect care service centres, a unit cost for a pharmacy can be calculated for a "generic" drug prescription. However, the prescription costs for each type of drugs could also be calculated, since the cost of the drug makes up a large proportion of the cost of dispensing it, and drug prices vary widely.

This may be done by generating a unit cost for each individual drug or class of drugs. For example, information may be sought on the cost per individual antiretroviral drug dispensed or the generic cost for nucleoside reverse-transcriptase inhibitors, non-nucleoside reverse-transcriptase inhibitors and protease inhibitors.

If a cost per type or class of drug prescription is required, information must be collected on the number of times each drug or class of drugs is dispensed during a fixed time period. If the drug is dispensed in different quantities for different conditions, the output data should reflect this and the dispensed quantity recorded in each case. The data can be collected from existing pharmacy, ward or medical records.

2.5.3.2. Input

The input for a pharmacy is likely to be similar to that for laboratories and should include the *staff* working for the centre, *consumables*, including the drugs, and *equipment*.

Regardless of the type of the cost that is calculated, information on the total input in the pharmacy should be collected. If a cost for each type of drug is calculated, then information on the input specific to each drug or class of drugs also needs to be collected. Since the input required to dispense prescriptions varies little except for the actual costs, the drug-specific input can be simplified to include only the quantity of the drug itself. This information should already have been captured in measuring the number of output units in the pharmacy.

2.5.3.3. Measuring prices

Most prices for drugs should be available from central drug supplies or from administrative records of the prices paid. If these do not exist, producer or retailer list prices can be used but should be adjusted for any government bulk discount offered. Prices for *staff*, other *consumables* and *equipment* should be available from the same sources as for inpatient wards (see subsections 2.4.1.2 and 2.4.1.3).

2.6. Costing ancillary service centres

Ancillary service centres do not provide personal services to patients but provide support services to the direct and indirect centres providing personal services. They can be differentiated from site management centres by the nature of their output and by the provision of support services to some parts of the service site.

This section of the manual describes data collection for the catering centre in detail as an example. It then describes other ancillary centres, including laundry services, medical records, portering services, storage and supplies and transport services and reviews how these differ from the catering service centre.

2.6.1. Catering

The catering services cover all activities involving the preparation and delivery of food within the service site. This centre may include kitchens, dining areas or food delivery to wards and day wards within the service site.

2.6.1.1. Output

The output of the catering service centre is **the number of meals provided** by the catering centre. As most facilities require staff members to pay for meals, staff meals should not be included in the number of meals provided.

However, if free meals are provided to staff members, they should be included as a staff benefit when calculating the price of employing a staff member.

The number of meals provided by the catering centre to the other service centres during a defined period of time needs to be determined. This can be done in a number of ways.

2.6.1.1.1. Estimate the number of meals provided to each service centre directly. Any records of the meals provided distributed by the wards and the clinics to which they are provided can be used.

2.6.1.1.2. Kitchen staff may be able to give an expert opinion on how many meals are prepared each day and the proportion provided to each ward.

2.6.1.1.3. Count meals provided during a sample period, either by interviewing staff after every meal to determine how many meals were delivered to which service centre or by directly observing the number of meals distributed to each service centre during a series of days.

2.6.1.1.4. If there is a standard policy on how many meals are provided to patients on inpatient wards, day wards and outpatients each day, these numbers can be multiplied by the number of inpatient days or patient visits at each service centre to arrive at a total number of meals provided.

2.6.1.2. Input

All *staff*, *consumables*, *equipment* and other input should be listed as for other service centres (see subsections 2.4.1.2 and 2.4.1.3).

2.6.1.2.1 Staff

Since the catering centre includes all activities related to food, staff members should therefore include not only the people who prepare the food but also those who serve it, either in a canteen or delivered to wards. Cleaning staff members who are dedicated to kitchen or canteen areas and are administered by the catering centre should also be included.

2.6.1.2.2. Consumables

Consumables at the catering centre include food. To simplify the costing process, measuring the total expenditure on food by the service site should be sufficient, rather than trying to list and price each type of food separately. Items such as cutlery and crockery, a small proportion of which is replaced every year, should be treated as consumables for costing following the same approach as with linen in inpatient wards.

2.6.1.2.3. Equipment

Equipment in the catering service centre includes all kitchen equipment bought by the facility, such as ovens, preparation tables, cupboards, refrigerators and freezers. It also includes tables, chairs and other furniture in dedicated eating areas, trolleys used for delivering meals and any communication equipment, such as telephones.

Double-counting of kitchen equipment built into the facility structure should be avoided. It should be attributed to this service centre only if it is not included in the buildings and maintenance service centre.

2.6.1.2.4. Other input

Other catering input may include regular or ad hoc payments for maintaining kitchen appliances. These payments should be included if administered through the kitchen or other catering department and if they relate solely to catering appliances. Broader maintenance contracts should be included in the buildings and maintenance service centre.

2.6.1.3. Measuring prices

Information on staff costs can be gathered in the same way as for other service centres (see subsections 2.4.1.2 and 2.4.1.3). Information on food should be available from receipts, or the cost can be based on market prices. Receipts for past payments for kitchen equipment may be harder to find, especially if it was purchased some time ago. In this case, the current replacement prices for items should be used.

The price of each input should be multiplied by the quantity used to arrive at a total cost for each type of input. For staff, the total cost is the number of full-time equivalent staff members by grade working in the catering service centre multiplied by the full cost of employing each person in that staff grade. For consumables, the total cost is the number of items consumed during a fixed time period multiplied by the cost per unit. For equipment, it is the annual equivalent value of each item multiplied by the number of such items used by the service centre.

If prices have been collected as payment receipts for regular deliveries, such as food, adding all the receipts for the year together to reach an annual cost for this input may be simpler rather than calculating a unit cost for each item and multiplying it to reach an annual figure.

The totals for all types of input can then be summed to reach a total cost for the catering service centre. This figure should be divided by the number of meals provided to service centres in the service site during a fixed time period to arrive at a cost per meal provided.

2.6.2. Laundry

Laundry services cover all aspects related to cleaning clothes, bedding and other related items. The primary location for the laundry service is the areas in which washing and drying occurs, though laundry storage sites may also exist.

2.6.2.1. Output

Given the variety of output from laundry services, the recommended output measure for the laundry service centre for this exercise is a **bed-day**. A bed-day is any day on which a patient occupies a bed within the service site. The number of bed-days supported at each care service centre by the laundry service during a fixed time period needs to be determined. Bed-days primarily consist of beds for patients' stays in inpatient wards or day wards but may also include beds in other settings, such as outpatient clinics. Annual figures for bed-days may be available from facility records, including those found on wards and clinics. Alternatively, a quick bed audit may be needed.

During an audit, the number of beds occupied should be recorded at the same time of the day during a period of a week or month and then multiplied to reflect the time period of analysis. If information on bed-days is too difficult to collect, it can be replaced by the number of beds in the facility if bed occupancy is roughly similar between service centres.

2.6.2.2. Input

2.6.2.2.1. Staff

All staff members cleaning and managing bedding and clothing should be counted in the laundry service centre. Staff members who remove and replace linen from beds around the facility should be included in this service centre if this is their primary role. If this is their general role on a ward or clinic, they should be included in the relevant direct care service centre. However, if other domestic services perform this task, these staff members should be included in the buildings and maintenance service centre.

2.6.2.2.2. Consumables

Consumables for this service centre are likely to include detergent and other cleaning materials. Bedding, work clothing and other items that are cleaned should not be included here but at the service centres where they are used or in storage and supplies.

2.6.2.2.3. Equipment

Equipment that is used for cleaning garments should be included as part of costing in this service centre. This may include washing and drying machines, irons and ironing boards as well as storage units if they are not permanent fixtures of the service site.

2.6.2.2.4. Other input

Other laundry service input may include maintenance contracts specific to cleaning and drying equipment.

2.6.2.3. Measuring prices

For most consumables, equipment and other input, facility receipts should be available, although, similar to kitchen equipment, some long-lived items of equipment may need to be costed using

current market prices. Staff costs can be calculated by applying the same approach as in other service centres (see subsections 2.4.1.2 and 2.4.1.3).

The price of each input should be multiplied by the quantity to obtain the total cost for laundry services. This figure should be divided by the number of bed-days recorded during a fixed time period or the number of beds in care service centres in the service site. The figure obtained represents the cost per bed-day of the laundry services provided.

2.6.3. Medical records

The medical records service centre covers the parts of the facility that maintain and store patient records. These records are usually kept within a medical records office.

2.6.3.1. Output

The output for this service centre is the **medical record** of a patient. Maintaining, storing, retrieving and replacing patient records usually represent the main workload of this service centre. The number of medical records processed by the service centre during a fixed time period needs to be determined. There are several methods of doing this.

1. If a record of the number of patient records retrieved is maintained and is linked to a particular service centre, the number of records maintained and retrieved per service centre should be recorded.

2. Staff members at the service centre could prospectively conduct a survey of the number of records maintained and retrieved for each service centre during a period of time.

3. If neither of these direct methods of measuring output is possible, the number of patient episodes – an inpatient stay, a day ward visit or an outpatient visit – seen at each service centre may be a reasonable proxy for the records retrieved. Patient episodes can be measured as either the number of visits or the number of inpatient days at a service centre during a given period of time.

4. Information on patient episodes is likely to already be recorded in the wards or clinics or a centralized health information system. Alternatively, staff members within each service centre can capture this by recording activity during a fixed time period.

2.6.3.2. Input

At some facilities, the medical record department shares space and staff with other administrative activities. In this case, input should be included only in proportion to its use for managing medical records.

> ***Example**. A staff member who manages both financial accounts and medical records and spends 50% of his or her time on each should be included as half time in this cost centre. The computer, telephone, desk and chair used should also be included at 50%. The storage units in which the medical records are kept should be included at 100% if they are only used for medical records.*

2.6.3.2.1. Staff

Staff members within the medical records centre are likely to include data clerks but also managers.

2.6.3.2.2. Consumables

Consumables at the medical records service are likely to include paper and other stationery products.

2.6.3.2.3. Equipment

The main items of equipment in this service centre include office equipment, such as computers, printers and telephones, and storage units, including filing cabinets, and relevant security equipment. Any storage units accounted for in the original building should be excluded here since they will be included in the buildings and maintenance service centre.

Electronic backup equipment also needs to be costed, especially if significant electronic data are collected. These backup facilities may not be physically present on site and may be shared with other health facilities.

If the public health care system provides these facilities, for instance through a regional data backup site, they should be excluded from the cost of the service site since they can be included as a programmatic support service. However, if private contractors provide these facilities in return for a regular payment, they should be included as an input at the medical records service centre.

2.6.3.3. Measuring prices

Costs for *staff* and prices for *consumables*, *equipment* and other relevant input need to be obtained. Most input is likely to be available from sources similar to those for inpatient wards (see subsections 2.4.1.2 and 2.4.1.3).

The price of each input unit should be multiplied by the quantity used to arrive at a total cost for the medical records service centre. This figure should be divided by the number of patient records maintained or retrieved or the number of patient episodes recorded at care service centres in the service site during a fixed time period to arrive at a cost per medical record provided.

2.6.4. Portering

The portering service covers transporting patients or items within the facility. This includes transporting patients unable to move by themselves between wards or clinics and within wards when bedridden patients need to be moved and when patients have tests or procedures performed and need to be moved.

2.6.4.1. Output

The output of portering services is the **number of patients or times transported during a fixed time period**.

If detailed registers or other records are maintained on whom or what is transported where, when and to which ward or clinic, then output can be measured directly.

If such records do not exist and resources are not available to measure them, then the number of inpatient, outpatient and procedure episodes during a fixed time period may be a reasonable proxy for portering activity.

2.6.4.2. Input

Staff working in the portering service centre includes all the porters who do not fall administratively under a single clinic or ward within the facility. The other resources used by the portering team depend largely on its size. At smaller facilities, the team may consist of only a few individuals with no office and little equipment of their own; at larger facilities, they may maintain a central space from which they coordinate the transport of patients.

Only items of equipment administered by the portering centre should be included in this service centre, such as trolleys or rolling chains. Items should be included in the service centre where they are being used.

2.6.4.3. Measuring prices

Costs for *staff* and prices for *consumables*, *equipment* and *other relevant input* need to be obtained. Most input is likely to be available from sources similar to those that provided information for inpatient wards (see subsections 2.4.1.2 and 2.4.1.3).

The price of each unit of input should be multiplied by the quantity used to obtain a total cost for the portering service centre. This total cost should be divided by the number of patients transported or the number of patient episodes recorded at each service centre in the service site during a fixed time period to arrive at a cost per patient transported.

2.6.5. Storage and supplies

The storage and supplies service centre covers all support services relating to the central purchasing, storage and distribution of relevant commodities within the facility.

2.6.5.1. Output

As the storage and supplies service centre deals with many commodities that need to be distributed across the service site, the recommended measure of output is the **number of full-time equivalent staff members working** in each care service centre. This should broadly reflect the ratio of support services provided by the storage and supplies centre to service centres providing personal services.

The number of full-time equivalent staff members at a service centre is equal to the number of staff hours spent in the service centre in a week divided by the hours in a standard working week.

At each service centre, a list of the staff members administered by the centre and the duration of the working week for each staff should be compiled and added to obtain the number of full-time equivalent staff members at each care service centre.

2.6.5.2. Input

The input to the storage and supplies service centre depends on the structure of the service site but can be divided into management, storage and supplies.

- *Management*. Some facilities may assign specific individuals to manage the purchase of supplies. In this case, the staff members should be included in the storage and supplies service centre. In other facilities, the central administration team manages supplies. In this case, the staff members can either be attributed to the administration service centre or allocated to the storage and supplies centre in proportion to their work on supply management. If the staff members managing supplies have a dedicated workspace, any equipment or consumables within this space should be included in the input list.

- *Storage*. Any input used in spaces dedicated to storing supplies should be included here. Any equipment used for storage, such as cupboards, desks, chairs and other office equipment, should be recorded.

- *Supplies*. Any consumables that are used by this centre, besides the consumables administered or distributed for consumption elsewhere in the service site, should be included here. This includes any supplies not included in any other service centre. Equipment administered by the

storage and supplies service centre and used to distribute supplies around the site should also be included here.

2.6.5.3. Measuring prices

Prices for all types of input, including costs for *staff* and prices for *consumables* and *equipment*, need to be identified. Such information is probably available from the same sources as for inpatient wards (see subsections 2.4.1.2 and 2.4.1.3).

The price of each input unit should be multiplied by the quantity used to determine the total cost for the storage and supplies service centre. To obtain the cost per staff member supported, this amount should be divided by the total number of full-time equivalent staff members working at care service centres in the service site.

2.6.6. Transport

The transport service centre covers the vehicles used and managed by the service site, maintaining and repairing them and any areas used to store or maintain these vehicles.

2.6.6.1. Output

The output of the transport service centre is a **kilometre travelled by the eligible vehicles**, which is a good proxy for the workload distribution within the transport centre. The annual number of kilometres travelled on behalf of each service centre needs to be determined. There are several methods for doing this.

The number of kilometres travelled in vehicles run by the facility may be available from existing vehicle logs. If not, a limited survey using a logbook could provide an estimate of how much travel is conducted on behalf of each service centre.

A less resource-intensive but also less accurate approach is to measure the full-time equivalent vehicle use by each service centre. To do so, record the proportion of the working week each vehicle spends in use at each service centre. Then add these proportions for each service centre to calculate the number of full-time equivalent vehicles at each centre.

An intermediate method is to measure the total distance travelled by each vehicle during a fixed time period and then use the full-time equivalent vehicle approach to divide the distance travelled by each vehicle between the various service centres that use it. This provides a closer approximation to the actual number of kilometres travelled.

2.6.6.2. Input

Three aspects of vehicle use should be considered for the transport service centre:

- *Management*. The staff members whose day-to-day activities include managing vehicles should be identified. If, however, these people are based within central administration then they should not be considered but included in the administration service centre instead. Management resources should also consider insurance, tax or other regular payments made for vehicles, all of which should be accounted for under other recurrent input.

- *Maintenance*. If vehicles are housed within a specific building or the individuals responsible for maintaining vehicles have an office from which they work, this space and all equipment found within it should be included in the service centre. Consumables, such as small tools, lubricants, oil and other maintenance products, should be counted. If a third party performs

vehicle maintenance off-site, such as a mechanic or external garage, then the bills should be accounted for in the service centre under "other recurrent items".

- *Vehicles*. All vehicles owned or administered by the service site should be included in the transport service centre. This may include vehicles rented by the facility. Each vehicle should be identified by a unique vehicle registration number and its manufacturer, model description and year of construction, and by the number of each model and year. Vehicles that deliver goods to other sites for processing should be included if the vehicle is administered by the facility, such as vehicles delivering samples for laboratory tests.

Vehicles that support the site and are used to deliver goods from other service sites should not be included here, since they fall within the scope of the programmatic or external support services. An example is vehicles from external laboratories that collect or drop-off samples or commodities at the service centre.

2.6.6.3. Measuring prices

Costs for *staff* and prices for *consumables*, *equipment* and *other input* relating to management and maintenance are probably available from sources similar to those for other service centres (see subsections 2.4.1.2 and 2.4.1.3).

2.6.6.3.1. Vehicles

The methods for measuring prices for vehicles are slightly different from those for measuring equipment. Similar to equipment, the annual cost of each vehicle should be calculated, whether it has been bought or rented. If a vehicle is bought, the replacement cost of the vehicle should be established. This is typically the current price of replacing a vehicle of the same type. If, however, standard policy is to buy second-hand vehicles, then the price of second-hand vehicles should be used instead. If vehicles are usually sold off at the end of their useful life, the average amount recouped from such a sale should be deducted from the purchase price. The net cost of the vehicle should then be divided by the relevant *annualization factor*, based on the useful lifetime of the vehicle, to arrive at the vehicle's annual cost (see *Workbook for the collection of cost information on HIV facilities and services* (Beck et al., 2011)). The useful life of the vehicle should be the time between when it was bought by the service site until when it is sold.

The prices for vehicles can be taken from past expenditure records at the facility (adjusted for inflation during the intervening period) or from the current price list for the relevant models. Alternatively, the price of a new model can be used as a reference if the current vehicle was to be replaced today.

If vehicles are rented and not owned, the rental price should be used instead of costing the purchase price of the vehicle. All management and maintenance costs should still be calculated as for other vehicles.

Example: *If the current purchase price of a model of a vehicle is US$ 10 000 and similar vehicles owned by the facility have previously been sold for an average of US$ 1000 after an average of 10 years, then the cost to be included at the cost centre is US$ 9000, to be spread across 10 years based on the relevant annualization factor.*

The price of each input unit should be multiplied by its quantity to obtain the total cost of vehicles for the transport service centre. This figure should be divided by the total number of kilometres driven or the number of full-time equivalent vehicles used by the number of service centres in the service site

that directly used the vehicles to calculate the cost per kilometre driven or per full-time equivalent vehicle.

2.7. Costing site management service centres

Site management service centres provide administrative and non-medical logistical support services to the service site and, as such, provide and maintain the physical and support infrastructure for the service site. This section gives detailed guidance on data collection for the site management service centres.

2.7.1. Administration

The central administration centre covers all parts of the service site that carry out management and administration. During a costing exercise, the administration of individual service centres should be counted as part of the specific service centres unless the personnel involved are centrally managed and administered. For example, when a ward clerk provides administrative assistance only to a single ward, he or she should be part of the ward assessment and not be included in the central administration centre.

2.7.1.1. Output

The recommended measure of output is the **number of full-time equivalent administrative staff members working** in each care service centre at the service site (see subsection 2.4.1.1). This should broadly reflect the ratio of support services provided by the administration service centre.

2.7.1.2. Input

2.7.1.2.1. Staff

The staff of the administration service centre comprises three possible components, which in smaller service sites may be represented by the same individuals.

- *The central management team* includes site supervisor(s) and any deputies who provide overall managerial leadership to the service site as well as clerical staff supporting them at the central level.

- *Human resource administrators*: all personnel managing staff members and volunteers within the service site.

- *Financial administrators*: primarily accountants, but may also include other staff administering the procurement of equipment and consumables and managing financial relationships with outside contractors and payments.

All staff members that perform the roles described above and are part of the central administration centre need to be identified.

2.7.1.2.2. Consumables

Information on consumable input – stationery, phone services and others – should be gathered in as much detail as possible. The most likely sources of information on consumables are either the manager of the administration office or staff members in the central storage centre.

2.7.1.2.3. Equipment

All equipment within the service centre should be identified. This is likely to consist primarily of office equipment, including chairs, tables, storage units, telephones, computers, faxes and photocopiers.

2.7.1.2.4. Other input

Additional input includes payments for both recurrent and one-off services provided to the service site by others. These include charges levied for the provision of utilities, including gas, electricity, water, sewerage and communication services, including telephone and Internet access, and any payments to local government for general public services such as property taxes. Other input might also include payments for site insurance covering vehicle damage, theft and property damage including fire, flood or other hazards.

However, payments made on behalf of specific individuals, such as insurance to cover loss of life or earnings, or medical malpractice, should be included in the cost of employing staff at the respective service centres rather than in the central administration service centre.

2.7.1.3. Measuring prices

The costs for *staff* and prices for *equipment* and *consumables* are likely to be available from the same sources as for other service centres (see subsections 2.4.1.2 and 2.4.1.3). The prices for recurrent services should be taken from receipts for payments. For long-term services, the cost should be spread across the number of years services are provided to the service site.

The price of each input unit should be multiplied by the quantity to obtain the total cost for the administration service centre during a fixed time period. This figure should be divided by the total number of full-time equivalent staff members working in the care centres of the service site to establish the cost per staff member supported.

2.7.2. Security

The security service centre covers all security aspects of the facility site, including protecting the facility, users and staff.

2.7.2.1. Output

Since many of the roles of the security service centre relate to guarding the physical space of the service site, the recommended output measure is a **unit of floor space**, usually in square metres (m^2). The floor space of each care service centre needs to be measured either from available building plans or direct measurement undertaken by research staff. If a service centre occupies an area for only part of the working week, the floor space should be reduced proportionately.

For example, a clinic operating three of five days in a working week in a 100-m^2 room would have an equivalent floor space of 60 m^2.

2.7.2.2. Input

All staff members that protect or control access within the facility should be included in the security service centre. If these staff members have an office or other space in which they are based, any equipment in this space should be listed, including any equipment used for surveillance or access control outside of the office. This may include furniture and electronic surveillance equipment such as

cameras, viewing screens or electronic media on which to store the information. Any disposable items used by security staff should also be included in this service centre.

2.7.2.3. Measuring prices

The cost or price of each input used in the security service centre, including costs for *staff* and prices for *consumables*, *equipment* and *other items*, needs to be identified. Most of this input is probably available from the same sources as for other service centres (subsections 2.4.1.2 and 2.4.1.3).

The cost or price of each input unit should be multiplied by the number used during a fixed time period to arrive at a total cost for the security service centre. This figure should be divided by the total number of square metres (m^2) of care service centres in the service site to arrive at a cost per m^2 protected.

2.7.3. Buildings and maintenance

The buildings and maintenance service centre covers the fixed infrastructure of the service site as well as activities undertaken to ensure the physical upkeep of the site. The fixed infrastructure includes the buildings and any fixtures and fittings provided when the buildings were erected that are expected to last the lifetime of the building such as blinds, doors or built-in storage units. The upkeep activities include maintaining buildings and equipment at the service site and cleaning facilities.

2.7.3.1. Output

The output measure for the buildings and maintenance service centre is **a unit of floor space**, usually in square metres (m^2). Similar to the security service centre, floor space is likely to be the closest approximation to the proportions of support services provided by the buildings and maintenance service centre. The floor space of each care centre should be measured.

2.7.3.2. Input

The buildings and maintenance service centre includes buildings, upkeep of buildings and equipment and cleaning services.

1. *Buildings.* All buildings that are part of the service site need to be identified. The size of buildings and the materials used in their construction should be recorded as well as all other items that were part of the original building.

2. *Upkeep of buildings and equipment*. Staff members employed centrally at the service site to maintain the infrastructure or to mend faulty equipment as well as gardening staff members who maintain the external facility space should be counted. If these staff members have dedicated workspaces, they should be included in the input list, including any equipment and consumables used in performing their tasks.

3. *Cleaning services.* Staff members employed centrally within the facility to clean the service site should be included in this service centre. These do not include staff members employed to maintain a single area within the facility, such as in a ward, who are part of a location-specific service centre. Any equipment or consumables from dedicated storage spaces should also be included in this component.

2.7.3.3. Measuring prices

The cost and prices of the input listed above for building, upkeep of buildings and equipment and cleaning services, including the cost for *staff* and prices for *consumables* and *equipment*, are probably available from sources similar to those for other service centres (see subsections 2.4.1.2 and 2.4.1.3).

The price of the buildings could be established by estimating the cost of building the facilities as they stand today, which can be realized through one of the following three methods.

- Use an existing record, if available, of the actual cost of building the facility. The original cost should be adjusted for inflation during the years since it was built. The adjustment involves multiplying the original cost by $(1 + r)^n$, where n is the number of years passed since the facility was built and r is the average inflation rate during the intervening period. The inflation rate should be a construction-specific figure, if one exists within the country.

The simplest approach is to apply the national government's model for estimating the cost of investment projects. Such models are usually based on the type and size of the facility, either on physical size or on patient capacity.

If neither of these methods is possible, the market rental price per m^2 for buildings of similar size, location and age should be used. This price can then be multiplied by the size of the entire service site to obtain the annual cost for the services provided by the building infrastructure. A rental price that does not include furniture, utilities or any other costs is to be used.

The price of each input unit should be multiplied by the quantity to obtain the total cost for the buildings and maintenance service centre. This figure should be divided by the total number of m^2 of care service centres in the service site to obtain the cost per m^2 of maintenance provided.

If neither of these methods can be applied, the total cost of the buildings needs to be converted into an annual equivalent cost, as in the case of all other equipment (see *Workbook for the collection of cost information on HIV facilities and services* (Beck et al., 2011)).

2.8. Allocating support service centre costs to care service centres

This section provides guidance on the process of allocating costs from support centres to the relevant care centres, through the prism of each of the six types of care service centres.

2.8.1. Inpatient wards

2.8.1.1. Costing support services received

Inpatient wards receive support services from all the support service centres in the service site. Allocating the cost of these services to inpatient wards requires identifying which support service centres actually provided support to the wards and the nature and quantity of the support provided. This requires each of the following service centres to be considered in turn:

- **catering**: provides **patient meals**;
- **laundry**: services measured in terms of **bed-days** or **beds**;
- **medical records**: services measured in terms of **medical records maintained and retrieved** or **patient episodes**;
- **portering**: services measured in terms of **patients transported** or **patient episodes**;
- **storage and supplies**: services measured in terms of **full-time equivalent staff members** supported;
- **transport**: services measured as **kilometres travelled** or **full-time equivalent vehicles** supported;
- **administration**: services measured in terms of **full-time equivalent staff members** supported;
- **security**: services measured in terms of **floor space in m^2**; and
- **buildings and maintenance**: services measured in terms of **floor space in m^2**.

For each service centre that provided support services to inpatient wards, the quantity of services supplied to each ward should be identified. This information is collected by measuring output at relevant support centres (sections 2.6 and 2.7). The number of services provided to each ward should be multiplied by the unit cost in each support centre. The sum of these costs is the total cost of support services provided to the ward.

2.8.1.2. Calculating unit costs

The price of each input unit for each inpatient ward should be multiplied by the number of input units for a fixed time period. The sum of these values is the total cost of support services per inpatient ward. The total cost of support services provided to each ward should be added to the total cost of the inpatient ward to obtain the total cost for receiving support and providing personal services at the inpatient ward (Table 1).

Table 1. Items to be considered when costing inpatient stays

Cost of inpatient ward	Cost of inpatient ward support services
Direct ward costs Staff costs Equipment Consumables Others **Indirect ward costs** Cost of tests Cost of procedures Cost of drugs	Catering Laundry Medical records Portering Storage and supplies Transport Administration Security Building and maintenance (all related to the inpatient ward)

This amount should then be divided by the number of inpatient days provided by the ward in the time period of interest. This gives a total cost per inpatient day for that inpatient ward. To calculate a total cost per inpatient day for the whole service site, the total costs of providing services at all inpatient wards involved with a particular service should be summed and then divided by the total number of inpatient days of care provided by all inpatient wards (Figure 3).

2.8.2. Day wards

2.8.2.1. Costing support services received

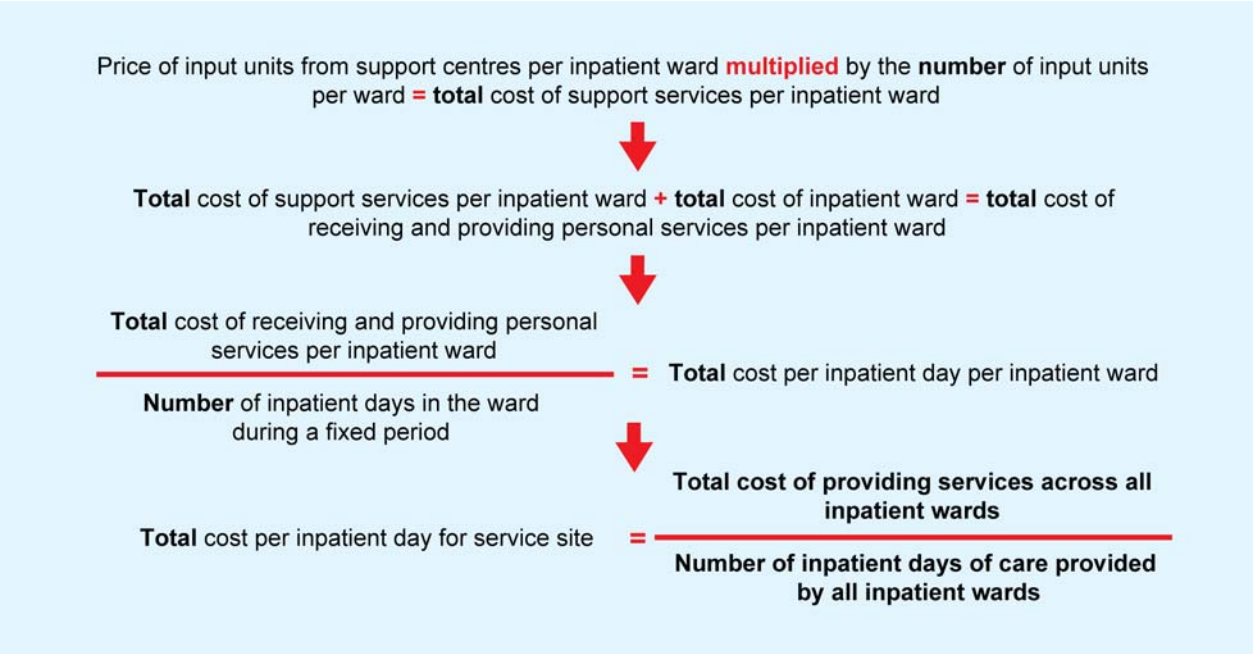
The allocation process for day wards differs very little from that for inpatient wards. Day wards can similarly receive support services from all the support service centres listed in subsection 2.8.1.1. The services each support centre provides to each day ward should be determined and the total cost of support services to each day ward calculated.

2.8.2.2. Calculating unit costs

Further on, each input unit at each day ward should be multiplied by its price and the total cost of all input units at each day ward calculated. This total can then be added to the total cost of support services, and this combined cost figure for service provision can be divided by the annual number of day ward attendances, providing a total cost per day ward visit, similar to inpatient costs (Table 1). To calculate a total cost per day ward visit for the whole service site, the total costs of providing services

across all day wards involved with a particular service should be summed and then divided by the total number of day ward visits.

Figure 3. Calculating unit costs per inpatient ward: formula for a fixed time period



2.8.3. Outpatient clinics

2.8.3.1. Costing support services received

The allocation process for outpatient clinics differs little from that for inpatient wards. Outpatient clinics can receive support services from all the support service centres listed in subsection 2.8.1.1. The services provided by each support service centre to each outpatient clinic service centre should be listed and multiplied by the unit cost for that support service centre to generate the total cost of support services in each outpatient clinic.

2.8.3.2. Calculating unit costs

The number and type of input units used by each outpatient clinic should be multiplied by their unit prices. The sum of all input costs at each outpatient clinic can then be calculated and added to the total cost of support services. This total cost for providing services should be divided by the annual number of outpatient visits to estimate the total cost per clinic visit. The total cost can be calculated by summing the total costs of each outpatient clinic, including indirect and support service costs. The unit cost can be calculated by dividing the total cost by the total number of outpatient visits made across the service site during a fixed time period.

2.8.4. Laboratories

2.8.4.1. Costing support services received

The process of costing laboratory support services is the same as for inpatient wards. It includes defining the type and quantity of input for a defined period of time, as well as consumables and equipment used, and other types of input such as portering, cleaning and utility services, buildings and estate management. Laboratories also receive support from all site management service centres,

storage and supplies and may receive services from the transport service centre if site vehicles are used to transport samples to or from laboratories. The value of all these support services should be calculated similarly to that for inpatient wards to obtain the total cost for support services for each laboratory.

2.8.4.2. Calculating unit costs

The process of calculating unit costs at a laboratory depends on the unit of output, product or service. If a cost per generic test is calculated (subsection 2.5.1), the method is the same as for inpatient wards (subsection 2.8.1). Adding the cost of support services to the cost of the laboratory itself and then dividing it by the number of tests provided in a fixed time period produces a unit cost for a generic test. If the service site has more than one laboratory, the cost per generic test for the whole site is calculated by adding together the total cost of all laboratories, including support service costs, and dividing this figure by the total number of tests performed across the service site.

If the cost of a specific type of test is required, the process is more complex than that for direct care service centres. To arrive at this unit cost, the input at the service centre needs to be divided into the components that are **specific** to a single test and those that are **general** to the whole laboratory and then allocated to the relevant test. The process involves five steps.

1. ***Identify the common steps and input for all tests performed in the laboratory***. All laboratories use a common number of services or types of input, including obtaining the samples, transporting them from care centres where the test samples were obtained to the laboratory, registering them and sending the results back to the respective service provider who requested the test. These input units should be calculated in the same manner as the cost per generic test and should include both the direct costs of running the laboratory and the support costs from supporting service centres.

2. ***Calculate the total cost for the common steps***. The total cost for performing these common steps should be calculated for the period under consideration.

3. ***Identify the additional input and test-specific costs***. The additional input for performing the specific test should be identified and the additional cost of performing the specific tests should be calculated by multiplying each additional specific input unit involved by the costs involved.

4. ***The specific cost of a specific test.*** These can be obtained by adding the common costs for the common steps to the specific costs for the specific tests. Adding the common component to the additional costs for performing the specific tests provides the overall cost for the specific test at the laboratory during a fixed time period.

5. ***Unit costs for specific tests***. The overall costs for performing the specific tests during a fixed time period should then be divided by the number of specific tests performed during that time period and to obtain the unit cost for that specific test.

Again, if multiple laboratories at the service site process the same type of test, the site-wide unit costs for each type of test can be calculated. For each laboratory service centre, the unit cost for each test should be multiplied by the number of times the centre performed the test. These figures should be summed across all laboratory services and then divided by the number of the specific test performed at all service centres to obtain a site-wide unit cost.

2.8.5. Procedures

Similar questions arise for costing procedures as for laboratory test: is the interest only in obtaining unit costs for a *generic* procedure or also in getting specific costs for *specific* procedures? Given the

wide range of procedures performed in service centres, specific costs for each procedure are more likely to be needed. For instances, the input and costs for performing a lumbar puncture on the wards completely differ from those for performing a lymph node biopsy in a day ward theatre. However, the principles for costing these services are similar to those described in subsection 2.8.4.

2.8.5.1. Costing support services received

The process of costing procedures is the same as for laboratory services but may involve more support services. In addition to costing the services of the support service centres, laundry services are included if the procedure site has beds, and portering services are considered if porters move patients to and from the procedure site. The value of all support services should be calculated similarly to those of other support centres to generate a total cost for support services for each procedure centre.

2.8.5.2. Calculating unit costs

The process of calculating unit costs for procedures is identical to that for laboratory tests (subsection 2.8.4) and involves calculating the total cost for procedures performed and then adding support costs. Similar to laboratory tests, the cost of a "generic" procedure or of specific procedures may be calculated. This is particularly relevant for large procedure centres such as operating theatres or endoscopy centres.

2.8.6. Pharmacies

2.8.6.1. Costing support services received

The process for costing support services for pharmacies is the same as for laboratories, as they need to incorporate the cost of support services provided by administration, security, buildings and maintenance, storage and supplies and possibly transport service centres. Each of these support services should be measured, valued and summed to reach a total cost for support services for each pharmacy.

2.8.6.2. Calculating unit costs

The process for calculating unit costs for drugs and other services provided through the pharmacy is very similar to that for laboratory tests. However, given the range of costs for drugs themselves, calculating a cost per generic drug dispensed is often not very useful. As a result, a cost per specific drug or class of drugs is recommended to be calculated. The methods for this are the same as those described in subsection 2.8.4.

2.9 Calculating the total cost of the service site

This manual has provided a method for costing services within a single service site, as outlined below (Table 2). This can be achieved by first dividing the site into a number of service centres, some of which provide clinical services directly to patients (direct care service centres) or diagnostic services and procedures (indirect care service centres), while other services support the provision of these direct and indirect clinical services (support service centres).

For each service centre, a specific output, product or service needs to be specified and the number of such services provided measured during a fixed time period. All input used in providing these services during a certain time period needs to be measured and a price for each input unit calculated. Based on the input and price information, a total cost for each support service centre can be calculated. Dividing this cost by the number of output, product or services provided produces a unit cost for each output from a support centre.

The costs of the support service centres then need to be allocated to the care service centres, reflecting the number of support services provided to the care service centres. Adding these support service costs to the direct costs at the care service centres calculates a total cost for each care service centre that includes the costs of support services received. The unit costs for each patient service received can then be calculated by dividing these total care service centre costs by the number of clinical services provided.

2.9.1 Adding direct costs to indirect costs

The information gathered during this process allows the total cost of providing services at this service site to be calculated by adding the total costs from all the support service centres to the total costs from the direct and indirect care centres. The final step is then to add the costs of inpatient, day ward and outpatient care to the costs of relevant laboratory tests, procedures and drugs to calculate the total cost of providing services at the service site for a fixed time period (Table 2).

Table 2. Ten steps in costing a single service site

Level of the service site	1. Divide the service site into service centres
Costing within the service centre	2. Define and measure the services (output) provided by service centres 3. Define and measure the input used at service centres 4. Measure the cost and prices of input
Costing at the level of and across support service centres	5. Calculate the total cost of each support service centre 6. Calculate the unit cost of each support service centre
Costing at the level of and across care service centres	7. Allocate costs from support service centres to care service centres 8. Calculate the total cost of each care service centre 9. Calculate the unit cost of each care service centre
Level of the service site	10. Calculate the total cost of the service site

3. Costing programmatic support services to a service site

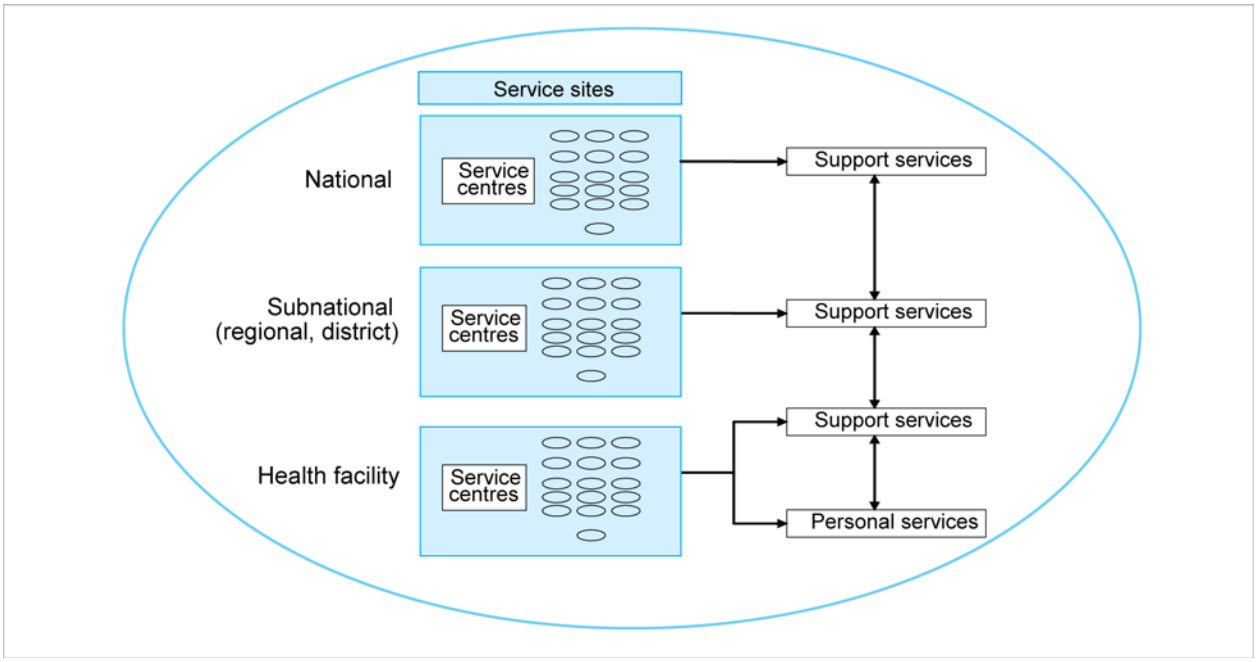
Chapter 2 provided a method for calculating total and unit costs for personal services at a single service site or the primary site. These unit costs include the costs of support services provided from within the primary site. However, support services are also provided to other service sites, and these should also be considered in any full costing of service provision. A broad range of external support services can be provided to sites providing personal care services. Each site that provides support services to these primary sites is often one of a number of sites linked in a service chain (Figure 4).

For instance, if the primary site is a health facility, district distribution centres may provide support services to the primary site. This district distribution centre may then itself obtain support services from a regional distribution site, which in turn may receive support services from a central, national distribution centre; together they comprise the service chain.

The process of costing programmatic service chains is a significantly larger undertaking than costing a single service site but consists of the steps similar to those outlined for costing a facility (Chapter 2). The objectives of this chapter are:

- to outline the steps that need to be taken calculate programmatic support service costs for service sites providing personal care services;
- to provide a detailed example of the information needed at different types of service chain; and
- to describe the process of allocating programmatic support costs from the various service chains to the service site providing personal care services.

Figure 4. A single service chain



3.1. The costing process

The process of costing programmatic services can be divided into eight steps, which are similar to those described for costing a facility. The first step is completed from the perspective of the primary site. The next four steps then obtain costs for each service site providing programmatic support services. The final three steps relate these costs back to the primary site.

1. ***Defining service chains***. All the supporting services provided by other parts of the national programme to the primary site need to be identified.

2. ***Defining service sites within the service chain***. For each service chain identified in step 1, the services provided to the primary site need to be specified. These include external support service sites that supply the primary site directly and the sites that, in turn, supply the external support services. At each level, it is crucial to identify which sections of each site are involved in providing the external support services of the service chain under consideration and to exclude all other personal or support services that may be provided there but are not part of the specific programmes being costed.

3. ***Measuring programmatic output***. The nature and amount of support provided by each service chain to the primary site needs to be documented. Similar to service centres within a service site, other service sites within the service chains may produce tangible output or provide services in a format that may not be so easily enumerated. An output measure needs to be chosen for each service site within the service chain that best reflects how its services are distributed among the service sites it supports. Once an output measure has been chosen, the number of units of this output produced during a fixed time period by each service site in the service chain should be measured.

4. ***Measuring programmatic input and prices***. The cost of each external support provided by the service site within the service chain needs to be calculated. This can be done by costing the relevant parts of each service site as a single service centre. Alternatively, it can be done by costing each site as a combination of service centres, focusing on generating a total cost for all parts of the site relevant to the service chain in question. In either case, the methods described in Chapter 2 can be used to measure input and prices, and by combining them a total cost for each programmatic site can be calculated.

5. ***Calculating programmatic unit costs***. The unit costs of external support output from each service site in the service chain need to be calculated. This can be done by dividing the total cost of each external support service site by the annual number of output units it produces.

6. ***Calculating the cost of programmatic support to a single service site from a single service chain***. The costs of programmatic support services from the service chain need to be allocated to the primary site. This can be done by multiplying the unit cost of each support service site by the number of output units the service chain supplied to the primary site.

7. ***Calculating the total cost of a service chain***. The total costs of each site in the service chain can be added together to reach a total cost for programmatic support services provided by the service chain.

8. ***Calculating the cost of programmatic support to a single service site from all service chains***. Finally, a total programmatic support service cost for the primary site can be obtained by summing the programmatic external support service costs for all the service chains.

3.2. Defining service chains

The range of possible programmatic external support services provided to a service site such as a health facility is very broad, and several service chains can be identified. The defining characteristic of a service chain is **a clear management hierarchy** extending from the central, national location down to service sites that provide the personal services.

Although the following categories are intended to guide the process of defining service chains, the recommended approach for identifying service chains is to observe the service site and interview a wide range of staff to discover what external support systems are used at the primary site. Note that some of these services are directly observable, such as the delivery of goods, whereas others provide less tangible services, such as programme management. Referring to the HIV national strategic plan of a country may be useful in understanding the types of services falling within the national programme. Service chains should only be included in this costing, however, if they provide services to the primary site of study.

Five categories of service chain are likely to be relevant to almost any service site providing personal services.

- ***Commodities***. Provides services that maintain a supply of goods and services to sites providing personal services.

- ***Operational research***. Provides services that aim to increase understanding of which services are currently being provided, how successful they are, which additional services are required and how new services are being implemented. This may be related to ad hoc studies or to developing and maintaining a country's monitoring and evaluation system.

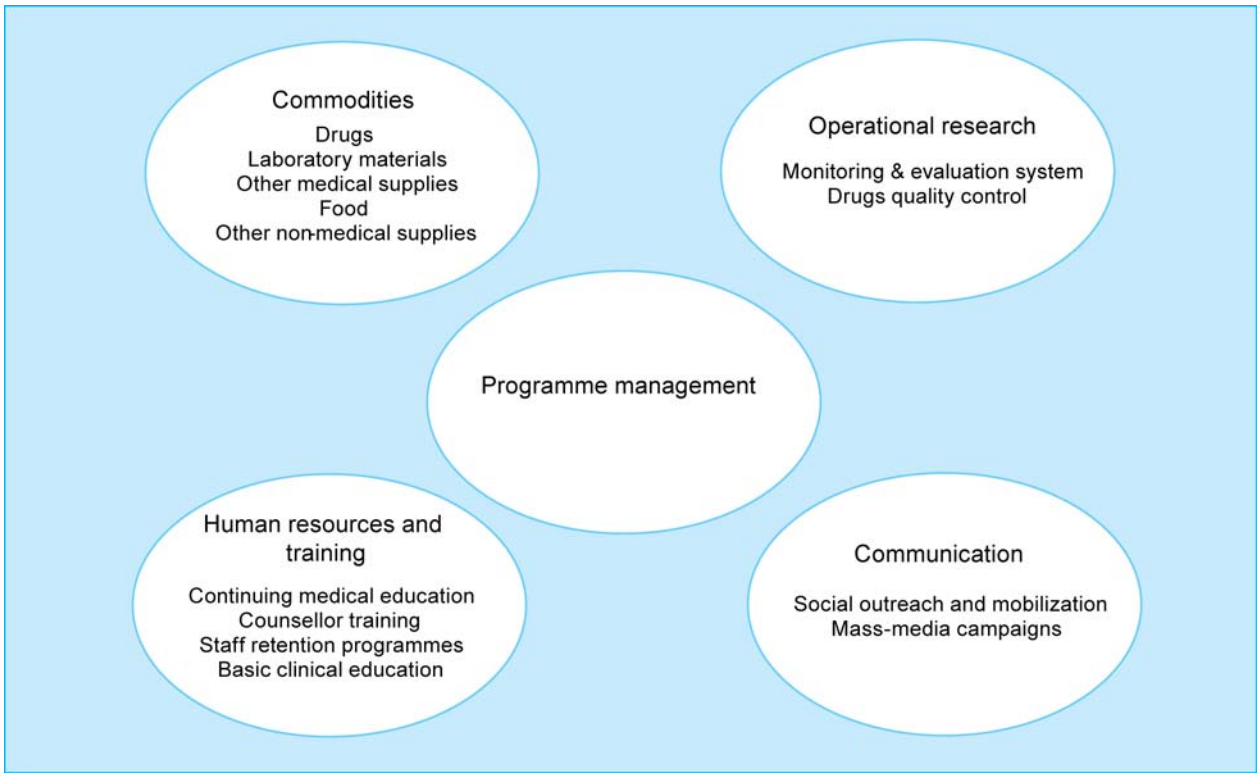
- ***Human resources and training***. Provides services that aim to improve the quantity and quality of staff members involved in providing services.

- ***Communication***. Provides services that communicate messages related to the programme to people not directly involved with it at present, either through mass media or personalized messages.

- ***Programme management***. Provides general oversight and coordination of the provision of services and the programme as a whole.

Except for the programme management service, multiple service chains can exist within each of these categories (Figure 5). A national drug procurement service chain is used to detail the steps needed to cost a service chain. These methods equally apply to other service chains and should be used to evaluate the programmatic support costs of services supplied by all service chains connected to the primary service site.

Figure 5. Examples of programmatic service chains in a national HIV programme



3.3. Costing commodity service chains

Smooth operations for a service site providing personal services require regular deliveries of numerous goods and services. These may be provided through a single commodity supply chain or through multiple independent chains. At least five types of service chains relating to commodities can be identified as they relate to the primary site (Figure 5).

All independent commodity service chains should be identified and the distribution centres within these chains documented and each costed. The number of different commodity service chains providing external support services depends on how supply processes are organized nationally.

If there is a single integrated delivery system for all goods and services, then all commodities should be costed together. If they are sent through separate distribution centres and vehicles, they need to be costed separately. Laboratory materials, pharmaceuticals and food are particularly likely to have individual service chains.

3.3.1. The drug procurement service chain

3.3.1.1. Defining service sites within the service chain

A drug procurement service chain covers the distribution of pharmaceutical products within a country. The first link in this chain above the facility level is the service site from which drugs are delivered to the facility. This site may be dedicated to drug distribution only or may also provide other support or personal services. If the service site does not solely provide drug procurement services, identifying which parts of the site are related to drug delivery is crucial. The main components of a distribution

centre are probably storage space, vehicles used for delivery and perhaps an office from which to organize the distribution.

Once this first distribution centre has been clearly defined, the distribution centres that supply this centre need to be identified. If these distribution centres are at sites at which other, non-drug procurement activities take place, the drug procurement service site needs to be carefully defined. This process of identifying and defining service sites should be repeated until the national distribution centre has been reached.

Consultation with someone involved in managing the drug procurement process, either from within the primary site or more centrally, is probably an efficient way of identifying drug procurement service sites, particularly those at central levels.

3.3.1.2. Measuring output

The most precise measure of the services provided by the drug procurement service chain is **a measure of the quantity** of drugs delivered to each supported service site. The most effective measures of quantity that can be used by all distribution centres in the service chain are the quantity of supplies delivered to each supported service centre. This may include the number of prescriptions, bottles delivered, tablets or other relevant quantities. Information on measures may be available from management records of the drug procurement service chain or may require observation by researchers or the maintenance of a logbook by staff members at distribution centres.

3.3.1.3. Measuring input and prices

The input and prices for each service site in the drug procurement service chain should be measured using the methods described in Chapter 2.

When input is measured at any distribution centre, care should be taken to exclude the drugs being delivered to the service sites providing personal care services, since the value of these drugs has already been included in the cost of the primary site where they were actually used. This avoids double counting.

The input included at a distribution centre should include all staff, consumables, equipment and other resources that are involved in providing drug procurement services. In addition, any vehicles administered by the distribution centre that are used to deliver drugs to other service sites should be included. A proportion of infrastructure costs, such as the building and general administration, should be included, although this is particularly easy to miss if the distribution site provides services other than drug procurement.

3.3.1.4. Calculating unit costs

To calculate a total cost for each distribution site, the total number of input units should be multiplied by their respective prices, as described in Chapter 2. This figure can then be divided by the number of deliveries, or the total weight of drugs, supplied by the distribution site during a fixed time period to arrive at a unit cost for the distribution centre. The unit cost of each distribution site in the service chain should be calculated similarly.

3.3.1.5. Allocating service chain support costs to service sites providing personal services

Once the unit costs have been calculated for each distribution site in a service chain, the proportion of each distribution site's support that is related to the primary site needs to be calculated. For this purpose, the type and number of drugs delivered to the primary site should be determined. This information may be available from the records used to measure the total output provided by

distribution centres or from records at the service site itself or may require collecting data prospectively.

To calculate the relevant drug procurement support cost from each distribution site, the unit cost calculated in subsection 3.3.1.4 should be multiplied by the number of drugs prescribed at the primary site. These costs should then be added together to arrive at a total programmatic support cost for the drug procurement service chain for that facility.

3.3.2. Other service chains

To cost each service chain that provide programmatic support services to the primary site, the steps outlined in subsection 3.3.1 need to be followed. This involves defining sites providing support services in the chain, defining and measuring the output they produce, measuring the input used to produce the output and the price of this input, calculating the unit cost of each site in the service chain and finally allocating these unit costs back to the primary site.

The greatest difference between the different service chains is their respective output measures. Since many of the service chains provide less tangible benefits, in several cases the most appropriate measure may be a proxy for actual services provided. Table 3 provides a list of suggested output measures for the service chains.

3.4. Calculating the total cost of service sites providing personal services

Chapter 2 described how to calculate the total cost of a primary service site providing personal services by calculating the cost of each service centre within the site and then allocating costs from support services to centres where personal services are provided. This estimates the cost of providing services at that site.

This chapter has described how to calculate the costs relating to programmatic external support to the primary site. This can be done by identifying which external support services are provided to the primary site and then identifying which external sites provide these services. Each of these sites should then be evaluated, including measuring their output and input and the prices of the input units. This information can be used to allocate to the primary site the proportion of the support sites' costs that relate to services provided to the primary site. The result of this process is a programmatic support cost for each external support service provided. These can be added together to obtain a total cost for programmatic support services provided to the primary site.

A final step in the costing process for a single service site is then to add this total cost for programmatic support services to the cost of providing services at the primary site itself using the methods described in Chapter 2. The sum of these two figures is the total cost for providing services through the primary service site, including programmatic support service costs.

Table 3. Suggested measures for allocating output for programmatic support service chains

Programmatic service chain	Possible output measures[a]
Commodities	
Drug procurement	Quantity of drugs received, number of deliveries received, pharmacy budget or full-time equivalent staff members in pharmacies
Laboratory materials	Quantity of materials received, number of deliveries received, laboratory budget or full-time equivalent staff members in laboratories
Other medical supplies	Quantity of supplies received, number of deliveries received, site budget
Food	Quantity of food received, number of deliveries received, catering budget
Other non-medical supplies	Quantity of supplies received, number of deliveries received, site budget
Operational research	
Monitoring and evaluation system	Number of patients enrolled, patient-days or episodes of care at the site
Control of drug quality	Quantity of drugs received or full-time equivalent staff members in laboratories
Human resources and training	
Continuing medical education Counsellor training Staff retention programmes	Number of full-time equivalent staff members relevant to each programme at the site
Basic clinical education	Site budget, full-time equivalent staff members at site, patient-days or episodes of care at the site
Communication	
Social outreach and mobilization	Site budget, full-time equivalent staff members at site, patient-days or episodes of care at the site
Mass-media campaigns	Site budget, full-time equivalent staff members at site, patient-days or episodes of care at the site
Programme management	Site budget, full-time equivalent staff members at site, patient-days or episodes of care at the site

[a]All output measures relate to the number present at each site where services are provided: that is, the sites providing personal services.

4. Costing national programmes

Chapter 3 described how to calculate the cost of the programmatic external services that support service provision at a single service site, building on the methods used to calculate the cost of HIV services provided in a single facility. The sum of these two costs amounts to the total cost of providing HIV-related services at a single service site.

4.1. Costing a national HIV programme

Costing a country's national HIV programme, however, requires calculating and adding the cost of providing HIV services at all service sites in the country. This process can be again be divided into the following steps.

1. ***Count service sites***. Identify all the types of service sites that provide personal HIV services within the country. These can vary from health facilities or primary care centres to secondary hospitals, such as district or regional hospitals, to tertiary or quaternary hospitals, which are usually located in major cities or the capital (Beck et al., 2006). The number of each type of service site providing personal HIV services then needs to be counted.

2. ***Cost per service site***. Repeat the costing processes described in Chapters 2 and 3 for at least one of each type of service site providing personal services. The result of this should be a total estimate of the costs for personal, support and programmatic support services provided by each type of service site.

3. ***Cost per type of service site***. Each of the total costs for a type of service site should be multiplied by the number of service sites of the same kind to obtain the total cost of providing HIV services in the country through this type of service site.

4. ***Cost of national HIV programme***. The total cost of providing HIV services through each type of service site should be added together to obtain a total national cost for HIV services.

Example: *Assume that a country has 20 health facilities, 10 secondary hospitals and 1 tertiary centre providing HIV care. Further, assume that the annual cost for providing HIV prevention and therapeutic services was calculated as being US$ 500 per year for a health facility, US$ 2000 per year for a secondary hospital and US$ 30 000 per year for a tertiary centre. Then the overall annual cost for providing HIV prevention and therapeutic services in that country would amount to:*

$$(20 \times \text{US\$ } 500) + (10 \times \text{US\$ } 2000) + \text{US\$ } 30\,000 =$$

$$\text{US\$ } 10\,000 + \text{US\$ } 20\,000 + \text{US\$ } 30\,000 = \text{US\$ } \$60\,000$$

4.2. Costing other disease-specific programmes

This manual focuses on costing HIV services. However, the methods provided are equally applicable to any other health care services, particularly the vertical programmes that focus on specific diseases. Other disease-specific programmes can be costed similarly to the national HIV programme. This

would require measuring the costs for each type of service site providing personal services relating to the disease in question using the methods set out in Chapters 2 and 3 and section 4.1. These costs would then have to be multiplied by the number of such sites present nationally, as described in section 4.1.

4.3. Costing a national health care system

A national health care system is likely to consist of numerous disease-specific programmes. These individual programmes are held together by a common core of support services that underpin the disease-specific work of the programmes.

Estimating the cost of an entire national health care system requires summing the cost estimates for all the disease-specific programmes, including the HIV programme, to arrive at a single cost figure. In theory, all the common core activities should have been divided up during the costing of the disease-specific programmes, since each programme draws on these common support services to some degree. However, care should be taken when combining the costs of disease-specific programmes to ensure that none of these common core activities have been either double-counted into more than one disease-specific programme or missed completely by all programmes.

5. Summary and conclusions

Context.

Recent and ongoing scaling up of HIV services has involved a significant increase in funding requirements and focus on evaluating performance, including effectiveness, efficiency, equity and acceptability of service provision. In terms of efficiency, both robust and contemporary strategic information on the cost and cost–effectiveness of services is required. The limited existing guidance on costing HIV services and the recommended development of simple, standardized guidelines to assist local professionals in performing costing exercises has been highlighted. This is considered beneficial for both local understanding of service provision and international comparisons of resource use and efficiency (Beck et al., 2006).

Theoretical framework of the manual.

This manual aims to provide a guide to costing HIV services for people living with HIV and those affected by the disease at the facility and programmatic level. To achieve this, the health care system is divided into five levels.

A facility or **service site** consists of different service centres, each of which needs to identified when costing a facility.

Within a facility or service site, **service centres** provide services. The services provided at these centres include personal or care services, which are provided directly to patients, and support services, which provide commodities or logistical support for the provision of personal services but are located within the facility.

Service sites that provide personal services are also supported by external sites that provide supporting services from outside the facility. Several service sites providing a common external support function form a **service chain**.

Service sites providing services may be supported by various service chains. All the service chains providing services related to HIV services form a **programme**.

There are many programmes, each dealing with different aspects of health care. These programmes, in combination with certain common core functions, jointly form the **health care system**.

Calculating the total cost of providing personal services requires including the costs relating to:

- the service centre where personal services are provided;
- support services provided by other service centres within the same service site; and
- support services provided by external support sites elsewhere in service chains.

Measuring costs within a service centre. Measuring costs within a service centre requires identifying the input involved in providing the service, the price of the input and the output or services provided by the centre. ***Input*** includes recurrent items such as *staff time* and *consumables* that must be repurchased regularly and capital items that have longer useful lives, including *equipment*, *vehicles* and *buildings*. ***Prices*** should be based on current costs: if items have been bought recently, receipts can be used to identify costs; otherwise the market price of replacing the item should be used. For capital input, costs should be spread across their useful lifetime based on a discount rate. ***Output*** at service centres providing personal services is the patient care services provided. Output at support service centres is either the services provided to care service centres or proxy measures that reflect the distribution of services provided.

Calculating costs within a service centre. The **total cost** for a service centre can be calculated by multiplying the number of input units by their respective prices. The **unit cost** for a service centre can be calculated by adding the costs for the total number of input units and dividing this total cost by the number of output units provided. Unit costs can then be allocated from support service centres to service centres providing personal care services, based on the support services received. The total cost of each service centre providing personal services plus all costs from supporting service centres can then be divided by the number of personal services provided by the care centre to obtain a unit cost for each personal service that includes support services received from within the service site.

Calculating total costs within a service site. The sum of each personal service unit cost multiplied by the number of personal services of the same kind provided gives the total cost for providing personal services at the service site.

Calculating costs within a service chain. The cost of providing support services from elsewhere in a service chain to a site providing personal services can be calculated. Output measures for the service sites within the service chain need to be identified. Then all the external service sites in the chain that provide services to the site providing personal services can be identified. Each identified support site can be costed using the methods for a single site and measuring the number of support output units it provides. This allows a total cost and a unit cost for each site to be calculated. The unit cost for each site can then be multiplied by the number of support output units it provides to the primary service site. The sum of these external support costs should then be added to the total costs relating to personal and support services from within the primary service site. The resulting figure is the total cost, including programmatic support for providing personal services at the service site.

Calculating the cost of an HIV programme. The total cost of an HIV programme can be calculated by repeating the previous steps for examples of each type of facility providing personal HIV services within the country. This may include primary, secondary and tertiary hospitals as well as health posts and specialist institutions. The total cost including programmatic support for providing personal services at each type of service site can be multiplied by the number of sites of the relevant type present nationally and these totals then summed to obtain a total cost for the national HIV programme.

Calculating the cost of the health care system. The total cost of a national health care system can be calculated by costing each programme organized within the country and adding these together, taking care to avoid double-counting or excluding core common functions.

6. References

Beck EJ et al. (1999). What is the cost of getting the price wrong? *Journal of Public Health Medicine*, 21:311–317.

Beck EJ et al. (2006). *Essential information for countries to monitor & evaluate the economic aspects of HIV service provision: proceedings from a workshop (2004)*. Geneva, World Health Organization

http://www.who.int/hiv/events/GenericToolsWorkshop.pdf (accessed 15 January 2011).

Beck EJ, Santas X, DeLay P (2008). Why and how to monitor the cost and evaluate the cost-effectiveness of HIV services in countries. *AIDS*, 22(Suppl 1):S75–S85.

Beck EJ et al. (2010). The cost of treatment and care for people living with HIV infection: implications of published studies, 1999–2008. *Current Opinion in HIV and AIDS*, 5:215–224.

Beck EJ et al. (2011). *Workbook for collection of cost information in HIV facilities and services*. Geneva, UNAIDS

http://www.unaids.org/ (accessed 15 January 2011).

Drummond MF et al. (2005). *Methods for the economic evaluation of health care programmes*. Oxford, Oxford University Press.

Secretary-General of the United Nations (2010). *Report of the Secretary-General 2010: progress made in the implementation of the Declaration of Commitment on HIV/AIDS and the Political Declaration on HIV/AIDS*. New York, United Nations.

Tolley K, Gyldmark M (1995). Towards a standardized framework for costing HIV and AIDS treatment and care in Europe. In: Fitzsimons D, Hardy V, Tolley K, eds. *The economic and social impact of AIDS in Europe.* London, Cassell:25–39.

UNAIDS (2009). What countries need: Investments needed for 2010 targets, Geneva

http://data.unaids.org/pub/Report/2009/jc1681_what_countries_need_en.pdf (accessed 15 January 2011)

7. Selected bibliography

Costing HIV services: a review of the technical literature

This review summarizes some of the documents that directly address the costing of HIV programmes or services but also refers to a selection of non-HIV publications. Three types of costing documents exist, including *costing guides*, *costing manuals* and *costing models*. Unfortunately, the terms are used interspersed, potentially giving rise to confusion. To avoid such confusion, the differences between these three types of documents are discussed and examples are provided of each.

• Costing guides

These are general documents that provide theoretical advice and describe methods on performing economic appraisals. They range from the highly theoretical and generic to those considering a single type of health care facility or service type, such as a hospital or mental health services.

General costing guides

Drummond MF et al. (2005). *Methods for the economic evaluation of health care programmes*. Oxford, Oxford University Press.

This book considers which resources to collect and how to valuate them. It begins by categorizing costs for a cost analysis into: health care sector resources; resources used by patient and family; non–health care resources, and productivity changes. The authors discuss which of these resources should be included in a given study, based on its intended perspective and the likely magnitude of the effects of including each resource item on the final cost result. The book describes two methods for measuring how an intervention affects workplace productivity: the human capital and friction approaches. It recommends that, whichever method is used, the results be reported separately from the main analysis.

Gold MR et al. (1996). *Cost-effectiveness in health and medicine*. Oxford, Oxford University Press.

This book is based on the published findings of the Panel on Cost–Effectiveness in Health and Medicine, appointed by the United States Government in 1993 to generate common standards for performing economic evaluation in the United States of America. The two chapters on costing and discounting of costs provide an overview of the issues faced in performing cost analysis and make recommendations on best practices.

Mogyorosy Z, Smith P (2005). *The main methodological issues in costing health care services: a literature review*. York, Centre for Health Economics, University of York (CHE Research Paper 7).

This review discusses key theoretical points, including difference between accounting cost and economic cost, the relative benefits of conducting average and marginal cost analysis, dealing with economies of scale and the perspective of a study. It also provides key references from the empirical literature and a summary of existing national recommendations within the European Union.

Costing guides not specific to HIV services

Department of Health (1997). *NHS costing manual*. London, Department of Health

http://www.dh.gov.uk/prod_consum_dh/idcplg?IdcService=GET_FILE&dID=139426&Rendition=Web (accessed 15 January 2011).

The National Health Service (NHS) in the United Kingdom regularly produces a National Schedule of Reference Costs and Costing Manual to standardize the calculation of these costs. This document begins by reiterating some of the theoretical principles as well as providing advice for costing and allocation at different levels of care.

Dickey B et al. (1999). *Estimating per unit treatment costs for mental health and substance abuse programs*. Cambridge, MA, Evaluation Center@HSRI (PN-37;

http://www.tecathsri.org/products_list.asp (accessed 15 January 2011).

This publication provides a toolkit to generating cost estimates for mental health services in the United States of America in contexts in which cost accounts are limited or of variable quality. The work first generates a service taxonomy and then defines each service in terms of the input used and then valuing it. The authors provide a brief overview of technical issues related to defining resources and collecting information on costs. Each area of mental health care is then explored in detail, including the advantages and disadvantages of cost data sources for some.

Adam T et al. (2004). *Methods for the costing component of the multi-country evaluation of IMCI*. Geneva, World Health Organization

http://www.who.int/imci-mce/Methods/Measuring_costs.htm (accessed 15 January 2011).

As part of its Integrated Management of Childhood Illness (IMCI) initiative, the Department of Child and Adolescent Health and Development of WHO developed a framework to conduct a multi-country evaluation of the IMCI's effectiveness, cost and impact. Public health researchers implemented this evaluation rather than local managers. The methods document lays out the costing aspect of the IMCE.

Creese A, Parker D (1994). *Cost analysis in primary health care: a training manual for programme managers*. Geneva, World Health Organization

http://whqlibdoc.who.int/publications/9241544708 (accessed 15 January 2011).

This publication focuses exclusively on primary health care and aims to be a training document for the conduct of a general cost analysis generally, rather than a step-by-step guide, including explaining basic principles. Each chapter is accompanied by exercises to reinforce the points made.

Shepard DS, Hodgkin D, Anthony YE (2000). *Analysis of hospital costs: a manual for managers*. Geneva, World Health Organization

http://whqlibdoc.who.int/publications/9241545283 (accessed 15 January 2011).

This manual for evaluating and analysing costs in hospitals is written with the aim of sensitizing managers to the possibility of measuring and appraising their expenditure. National strategies for costing could be developed from this manual, with three chapters covering the calculation of unit costs and their use to improve management at the level of individual hospitals and the health care system as a whole.

HIV-specific costing guides

Bebbington A, Beecham J (1989). *Hospital service provision for people with AIDS and HIV infection: a basis for costing*. Canterbury, University of Kent (PSSRU Discussion Paper 684).

This document proposes methods for costing services provided to people living with HIV within a hospital in the United Kingdom. It defines the perspective of the study as focusing on lifetime costs at a single hospital, based on cost centres as set out in the management accounts.

• Costing manuals

These documents provide detailed guidelines for the collection of basic cost data. They range from teaching guides to providing step-by-step instructions to guide the reader through the process of data collection. These manuals vary in terms of the details they present but aim to enable professionals to collect the data required to calculate unit costs and total facility costs.

Costing manuals not specific to HIV

Hanson K, Gilson L (1996). *Cost, resource use and financing methodology for district health services: a practical manual*. 2nd ed. New York, United Nations Children's Fund (Bamako Initiative Technical Report Series, No. 34).

This manual focuses on primary health care programmes. It is not so theoretical and provides some useful tools. A step-by-step guide to cost calculation is provided, including some sample tables and a health centre questionnaire. It also provides a method for collecting data on primary health care services when they are provided within a district hospital and guidance on defining service packages and utilizing cost data to evaluate resource adequacy and use.

World Health Organization (2002). *Guidelines for cost and cost–effectiveness analysis of tuberculosis control*. WHO/CDS/TB/2002.305. Geneva, WHO

http://www.who.int/tb/publications/2002/en/index1.html (accessed 15 January 2011).

WHO's tuberculosis costing guidelines were created in response to a perceived need for guidance on the costing of existing tuberculosis diagnosis and treatment strategies and cover cost and cost–effectiveness evaluation.

SAFE International Research Partnership (2003). *Costing manual for the SAFE Strategy Development Tool: a guide for developing strategies to improve skilled attendance at delivery*. Aberdeen, Dugald Baird Centre for Research on Women's Health, University of Aberdeen

http://www.abdn.ac.uk/dugaldbairdcentre/safe/pdfs/costing_manual.pdf (accessed 15 January 2011).

The Skilled Attendance For Everyone (SAFE) research partnership developed a manual to evaluate the cost of field-testing of various strategies to improve birth attendance practices using their Strategy Development Tool.

HIV costing manuals

Kumaranayake L et al. (2000). *Costing guidelines for HIV prevention strategies*. Geneva, UNAIDS

http://data.unaids.org/Publications/IRC-pub05/jc412-costguidel_en.pdf (accessed 15 January 2011).

These guidelines were drawn up to assist in costing a range of HIV prevention activities and are explicitly based on the principles set out in Creese & Parker (1994). They provide a narrative text and worksheets for calculating the unit cost of stand-alone prevention programmes. They detail the

process of allocating shared costs and the collection of outcome data but they do not cover treatment and care activities generally and facility-based programmes specifically.

Marseille E et al. (2004). Assessing the efficiency of HIV prevention around the world: methods of the PANCEA project. *Health Services Research*, 39:1993–2012.

Data collection instruments [web site]. HIV InSite, University of California at San Francisco, 2011

http://hivinsite.ucsf.edu/global?page=pan-05-01#S2.1X (accessed 15 January 2011).

The PANCEA (Prevent AIDS: Network for Cost-Effectiveness Analysis) project was created to collect cost and output data on a wide range of HIV prevention projects at 200 sites across five countries. Part of this project involved creating two costing instruments and a manual to explain their use to site investigators. Both instruments collect information on a single service facility, one focusing on the current fiscal year and the other on a longer time period. The instruments were adapted from the earlier work of Kumaranayake et al. (2000).

United States Government Accountability Office. *Global health. Trends in U.S. spending for global HIV/AIDS and other health assistance in fiscal years 2001–2008*. Washington, DC, United States Government Accountability Office, 2010

http://www.gao.gov/new.items/d1164.pdf (accessed 15 January 2011).

This report examines disbursements by the United States Government (referred to as spending) for global HIV/AIDS and other health-related bilateral foreign assistance programmes, including basic health and population and reproductive health programmes in the fiscal years 2001–2008. The report also provides information on the models used to estimate the costs of antiretroviral therapy.

• Costing models

These models provide methods or software programs for calculating programmatic costs once the basic cost data, and other relevant data, have been collected. They use unit costs as input, in conjunction with other relevant data on the size and scope of the programme, to arrive at total costs for interventions at the facility, subnational, national or global levels.

Bollinger L et al. (2006). *Resource needs for HIV/AIDS: model for estimating resource needs for prevention, care and mitigation*. Glastonbury, CT, Futures Institute.

The resource needs model has been developed during the past decade to provide a framework for estimating resource requirements at the national level for HIV.

World Bank. *ASAP HIV/AIDS costing tool v1.2*. Washington, DC, World Bank, 2008

http://siteresources.worldbank.org/INTHIVAIDS/Resources/375798-1098987393985/ASAPHIVAIDSCostingModelv1.2.xls (accessed 15 January 2011).

The World Bank developed this costing model to enable countries to cost their national strategic plans.

UNAIDS and Asian Development Bank (2004). *Costing guidelines for HIV/AIDS intervention strategies*. Geneva, UNAIDS and Manila, ADB (ADB-UNAIDS Study Series: Tool 1;

http://data.unaids.org/publications/irc-pub06/jc997-costing-guidelines_en.pdf (accessed 15 January 2011).

This document provides some advice on gathering unit cost data for interventions, but its primary function is to calculate national programme costs for interventions by programme type and target population, in order to aid national priority-setting for resource allocation.

http://www.unaids.org/en/KnowledgeCentre/HIVData/Tracking/Nasa.asp (accessed 15 January 2011).

The National AIDS Spending Assessment (NASA) resource-tracking method is designed to describe the financial flows and expenditure using the same categories as the globally estimated resource needs.