

# ACT CONSORTIUM GUIDANCE ON DATA COLLECTION IN THE FIELD FOR FACILITY COSTING

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## PURPOSE OF THE GUIDANCE

This guidance note has been prepared for ACT Consortium members. It is intended to provide an introduction to the data collection in the field for facility costing relevant to malaria supplemented by a numerical example and data collection tools.

The guidance note was prepared by: Kristian Schultz Hansen ([kristian.hansen@lshtm.ac.uk](mailto:kristian.hansen@lshtm.ac.uk)) and Shunmay Yeung ([shunmay.yeung@lshtm.ac.uk](mailto:shunmay.yeung@lshtm.ac.uk)).

## **1. Introduction.**

Estimating the costs of services performed in the health care sector is relevant for a number of different analyses. These include for instance comparing the costs of combating a health problem using different interventions (economic evaluation) or projecting the total costs of a new type of health service to the whole population (scaling up).

Several ACT Consortium projects have included a cost-effectiveness analysis as a component of their studies. This type of analysis aims at providing an answer to a specific research question: Given that we have decided to spend money on treating or preventing malaria (thereby forfeiting the opportunity to spend this money on other health problems) - which intervention among those included in the study is the most efficient? The meaning of the 'most efficient' is here the lowest cost per malaria case treated or averted. The research designs of ACT Consortium projects with economic components are similar in the sense that they are (cluster) randomised trials with current practice for combating malaria performed in one study arm and with a new intervention in the other arm or possibly two other arms if more than one new intervention is included. For instance, in one project the control arm consists of current practice of informing public health workers on national malaria treatment guidelines whereas the two intervention arms provide additional training of health workers and information to the community stressing the importance of adhering to rapid diagnostic test (RDT) results and appropriate use of antimalarials. Likewise, another study intends to compare community drug distributors (CDDs) treating community members with artemisinin combination therapy (ACT) presumptively in one arm and CDDs treating with ACT only in individuals with confirmed malaria according to an RDT. In addition, ACT Consortium projects follow study participants over a short or a long time in order to measure the effects of the interventions.

This design will also facilitate collection of data for the estimation of costs in the study arms. From a societal viewpoint<sup>1</sup>, there will be three main categories of costs in ACT Consortium studies.

**(1) Costs to the health service of offering the different interventions.** These costs include the value of all resources required to run a given intervention. For instance, in an intervention where CDDs are supplied with RDTs so that they may treat with ACT in RDT-positive community members only, the resources needed are drugs, time utilised by CDD, travelling expenses of CDDs, training of CDDs, supervision from Ministry of Health, transport of drugs and RDTs.

**(2) Costs related to the provision of health care services (facility costing).** During the treatment-seeking activities of households, it may be decided to visit a health centre for treatment (or in severe cases even a hospital for admission as an inpatient). The costs of treatment as an

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<sup>1</sup> See section 3.2 describing different perspectives of analysis in the ACT Consortium Guidance Note on Economic Evaluation (Mangham 2009).

outpatient at a health centre may not be incorporated as part of the household costs described below since these services are often free at delivery or the fee charged for an outpatient visit at a health centre does not reflect actual costs. It is therefore important to have information on the costs per service related to treating fever/malaria at the various health facilities that study members have visited. These costs per service include the value of the required inputs like personnel time, drugs, disposables, diagnostics and overhead for a single visit. Costs per service of a single visit are often referred to as *unit costs* in the literature.

(3) Costs borne by households related to fever episodes of family members. A fever episode of a family member may result in various treatment-seeking activities which will be an economic burden to a household. These costs include the out-of-pocket expenditure of treatment-seeking but also the value of lost time when the patient and family carers are not able to perform their normal activities.

It is relatively straightforward to understand why the costs of category (1) are relevant for estimating the costs of individual study arms corresponding to different interventions in ACT Consortium studies. The other two cost categories may warrant some justification. For instance, why would we include costs of visiting health centres (category (2)) and household costs (category (3)) if the intervention under study is about offering extra training for health workers at health centres? Or if the intervention involves having CDDs trained in using RDTs and ACTs – is it not enough to include costs of CDDs' time as well as the costs of RDTs and ACTs? Cost categories (2) and (3) may be important because current practice and new interventions may affect communities differently. If an intervention in one study arm is effective in preventing cases of malaria or if improved targeting and treatment leads to a lower number of repeat visits after the initial fever treatment, this may result not only in improved health among study members but also in lower household costs borne by families. Fewer visits to health care providers may be required among study members in intervention arms thus leading to a lower level of treatment-seeking activities or individual episodes of fever/malaria may be shorter among study members in one arm which is an economic benefit. Generally, an effective intervention in one study arm will tend to have lower costs from categories (2) and (3) than less effective intervention arms. In other words, an effective intervention will save resources (avoid costs) both among households and in the health care sector where there will be fewer visits for treatment of fever. This type of information is also relevant for decision making. Therefore, if divergent levels of success in terms of effectiveness are expected among intervention arms, the resulting differences in household costs and costs related to utilisation of health care services should also be captured as part of an ACT Consortium study.

This guidance note focuses on the costing component of ACT Consortium studies and includes some practical advice on actual cost data collection in the field. More details on cost data collection are available from standard cost manuals (Phillips et al 1993, Kumaranayake et al 2000, Creese and Parker 1994, Shepard et al 1998, World Health Organization 2002).

## **2. Objectives of the guidance note.**

The objectives of this guidance note are to provide some practical advice on data collection in the field for the second of the cost categories identified above (facility costing). Advice on collecting cost data for the first and the third categories may be found in two separate ACT Consortium guidance notes (Mangham (2009) and Hansen and Yeung (2009) respectively). These sets of practical advice include what type of information should be collected in the field in order to finalise the costing exercise and also how to collect this kind of information and where this information might be found. A further objective is to provide a set of cost data collection tools that ACT Consortium members may find useful for their field activities.

The process of cost data collection in the field is likely to be affected by a number of things including for instance how the health services are organised in a country, how individual health services are performed and where the required information may be kept. Consequently, cost data collection will differ from country to country so that some of the practical advice may seem less relevant (if for instance the relevant information is already computerised) or that the attached tools need to be adapted to a particular study setting. The ACT Consortium core team will be able to assist with the costing exercises at all stages including adapting tools, actual data collection and estimation of costs of health interventions.

## **3. Data collection in the field for facility costing.**

### *3.1. Costing methodology.*

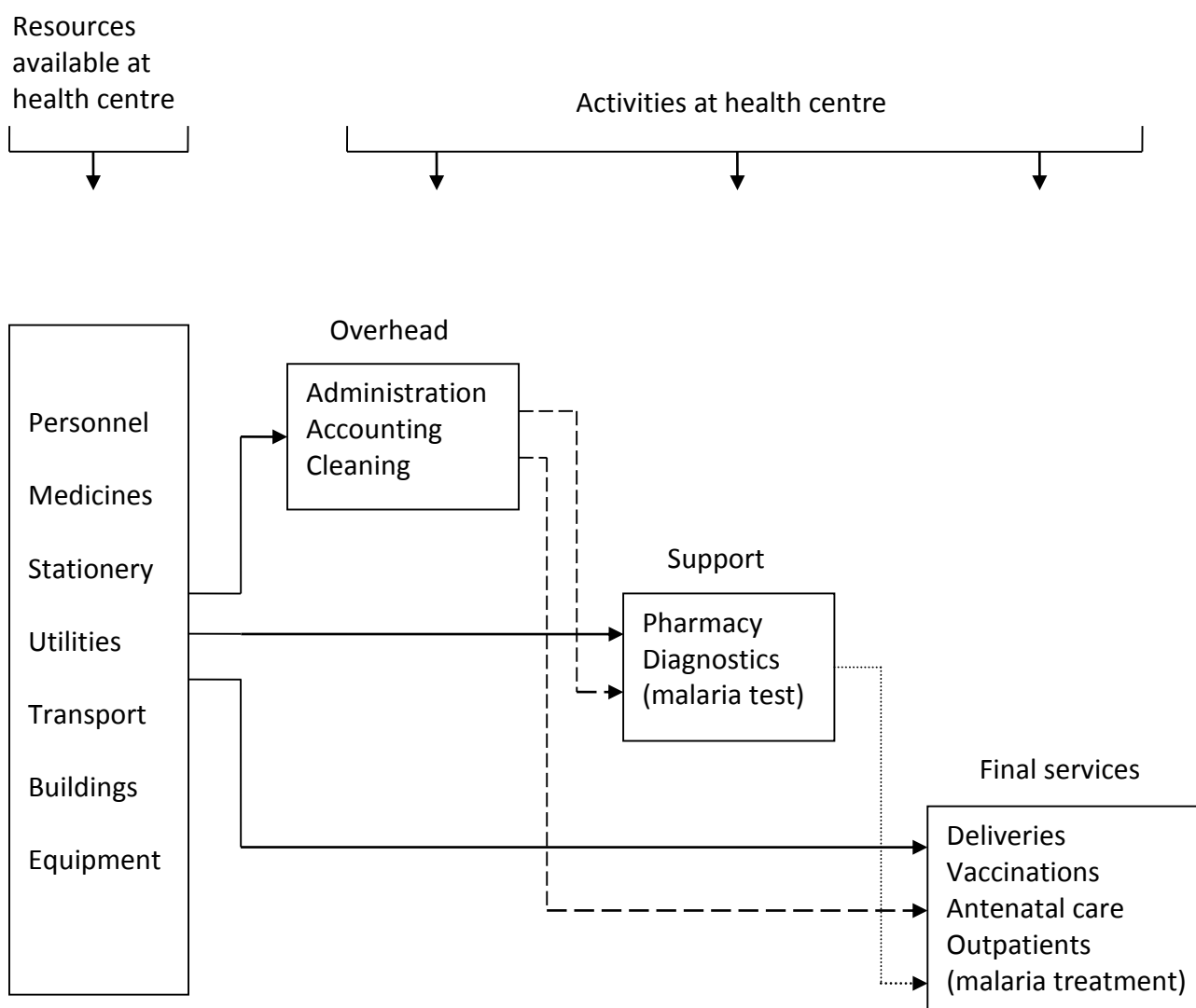
The relevant unit costs to be estimated will for most ACT Consortium studies be the costs per outpatient visit to treat a fever/malaria episode at health centre level or in hospital outpatient departments. If inpatient admissions are sufficiently common among individuals followed in the study arms, the costs per admission to treat severe malaria must also be estimated. For some studies, the costs per malaria microscopy test will also be relevant. Visiting a health centre or hospital outpatient department, information on these unit costs will not be immediately available in most health facilities. Estimates of unit costs must be pieced together from different sources and data collection in the field. The following describes the process of collecting information for estimation of unit costs of an outpatient visit for the treatment of malaria and a malaria microscopy test using a health centre as an example. The process of data collection at other types of health facilities will not be different in principle but may be more time consuming for instance in the case of a hospital.

At health centre level, some of the key challenges in costing an outpatient department visit to treat fever/malaria and a malaria microscopy test may be inferred from Figure 1 which is a schematic depiction of how a health centre may function or is organised. Resources are made available to the health centre in the form of personnel, drugs, utilities and other inputs (recurrent costs) and goods with a longer lifespan such as buildings and equipment (capital costs). With these

resources, it is possible to perform a range of services at the health centre including overall management of the health centre, offering pharmacy services (dispensing drugs) and outpatient services. A number of observations can be made based on this figure that must be kept in mind since these will influence cost data collection in important ways. Firstly, a health centre produces a range of health services to the benefit of population including antenatal care, outpatient treatment and vaccinations. However, only the costs per case of fever/malaria treated and costs per malaria parasite test will be of relevance to ACT Consortium projects. It is therefore important to separate the costs of all resources utilised for fever/malaria treatment and malaria parasite tests from the costs of all other final services. Secondly, reading the figure from the left to the right, outpatient treatment of malaria is at the end of the chain of the linked activities typically carried out at a health centre meaning that before malaria treatment can be provided, a range of other services will have to be performed including overhead services (i.e. administration of health centre) and support services (i.e. laboratory services). Since overhead and support activities are necessary for offering malaria outpatient care the former must be costed and a share of these allocated to malaria outpatient care. Similarly, a share of the costs of overhead activities must be allocated to laboratory services for the calculation of costs per malaria microscopy test. In broad terms, cost data collection in health centres will consist of collecting data on the total costs of running a health centre followed by allocating relevant costs to outpatient services for malaria episodes (and malaria microscopy tests) and not forgetting to allocate some of the costs of overhead and support services.

The costing methodology proposed here and the data collection derived from this will be a combination of two well-known costing procedures. As the first of these, the standard step-down costing methodology (Drummond et al 2005, Conteh and Walker 2004) initially identifies the most important activities performed at a health facility. There are typically many activities going on in a health facility so these are often divided into groups of activities which serve a similar purpose such as all diagnostic activities. These groups of activities are referred to as cost centres and these are often following the organisational structure of a health facility so that there will be an administration cost centre and a diagnostic cost centre – just to mention a few. For the purposes of the costing exercise, the various cost centres are organised in hierarchical manner as depicted in Figure 1 with three main categories of cost centres: overhead, support and final service cost centres. The basic idea of step-down costing is initially to determine the total costs by main category of running a health facility and then in the first step to allocate these to all cost centres (unbroken arrows in Figure 1) followed in the second step by allocating costs of overhead cost centres to support and final service cost centres (broken arrows) and in the third step to allocate costs of support cost centres to final service cost centres (dotted arrows). In other words, costs of resources must be allocated down in a step-wise fashion as indicated in Figure 1. At each step, costs are allocated using criteria believed to reflect actual resource consumption. For instance, the costs of the cleaning services may be allocated to other cost centres in proportion to the size of

**Figure 1: Schematic overview of the organisation of a health centre and the flow of resources.**



cost centres. At the end of this process, the total costs of final service cost centres have been estimated. Knowing the number of services performed in each final service cost centre, the unit costs may be obtained.

The second costing procedure is often referred to as bottom-up costing or micro-costing (Luce et al 1995, Jegers et al 2002) and the purpose of this is to capture the costs of resources used in direct patient contact such as drugs for individual patients, disposables, diagnostic tests and personnel time for individual patients. This costing methodology operates at the patient level (micro level) and often involves investigating medicines prescribed, diagnostic tests utilised etc in a sample of patients – in this case patients seeking outpatient care for fever/malaria.

The micro-costing methodology is used to estimate the costs of drugs, disposables and laboratory tests while the costs of the remaining resources are estimated using the standard step-down costing methodology. When combining the results of the two complementary methods, it is important to avoid double-counting. For instance, since the consumption of drugs during an outpatient visit should be captured through the micro-costing method, the costs of the drug component should be excluded from the step-down costing procedure.

### *3.2. Data collection for step-down costing.*

Following the description of the step-down costing methodology given above, the first type of information required is the value all resources available in total to a health centre corresponding to the box to the left in Figure 1. Data collection to identify, measure and value resources available to a health centre must refer to a specific period typically the most recent financial year. Possible cost categories relevant to a health centre may include those listed in Table 1. A good place to start searching for the value of resources by category is the head of the health centre who may have information on recurrent expenditure broken down by expenditure category for the financial year. Note that the relevant information will be the actual expenditure figures after the finalisation of the financial year and not budget figures. In some country settings the head of the health centre may not have the responsibility for the accounts of the health facility. Expenditure information may then be available from the Regional Office or the Headquarters of Ministry of Health or, in the case of a health centre owned by an NGO, the administrative officer in the main NGO office. Data capture sheet number 1 in the appendix may be used for recording recurrent expenditure as well as capital expenditure.

Often salaries are paid directly to health sector personnel from a central payments office in the capital so that information on total salary expenditure will not be available at individual facility level. It will then be necessary to compile a list of all personnel attached to a health centre including their job category, rank and grade (data capture sheet number 2 in the appendix may be used for this). The salaries including all allowances of the different personnel must later be obtained from the central payments office. The levels of costs for the remaining recurrent cost categories mentioned in Table 1 will in most settings be available from the accounting system in the form of for instance an expenditure book for the health centre. An important aspect to be aware of after having received information on actual expenditure from the person in charge of the accounts is that the expenditure book may not incorporate all resources available to a health centre. For instance, donated goods or resources paid for by another government entity than Ministry of Health may appear as if they had zero costs from the point of view of the health centre and therefore not recorded in the expenditure book. However, an inventory of these resources must still be captured as part of this costing exercise (data capture sheet number 3 in the appendix may be used) although the prices of these resources may not be available at the health centre but should be obtained later. Finally, it is necessary to ask the head of the health centre if there are any more resources available to the health centre not mentioned in the expenditure book or are captured among the donated goods for instance volunteer workers receiving no or very little remuneration. Having concluded this part of the data collection, the information on total recurrent expenditure by category should now have been captured.

**Table 1. Possible cost categories at health centres.**

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**Recurrent costs**

Salaries  
 Training  
 Medicines  
 Disposables  
 Stationery  
 Maintenance of buildings and compound  
 Post and communication  
 Utilities (electricity, water, sanitation)  
 Transport  
 Domestic expenses  
 Laundry

**Capital costs**

Buildings  
 Vehicles  
 Equipment  
 Furniture

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Capital costs in Table 1 refer to the value of using capital goods in a specified time period. Capital goods like buildings, vehicles, equipment and furniture are usually purchased at a specific point in time but the benefits of these will be enjoyed over several years. For instance, a vehicle is typically bought and cash paid at a given day while the vehicle may be used for 5-8 years. As mentioned above, recurrent costs will be collected for the most recent financial year but most of the capital goods available to the health centre may have been acquired outside this financial year. For capital goods, it is therefore standard procedure to calculate an annual value based on the current price and the useful lifespan of the capital good. This annual value, often referred to as an *annual equivalent cost*, may be calculated by dividing the price of the capital good by its expected life span, but slightly more sophisticated methods are favoured (Drummond et al 2005). These methods take into consideration the fact that there are opportunity costs of investing in capital goods. If funds are tied into capital goods, this means that these funds cannot be utilised for alternative beneficial activities or be put into a bank account earning an interest income. The annual equivalent costs are calculated using a formula in which the current price of a capital good, the expected lifespan and the discount rate are inserted. This formula is as follows:

[1] 
$$E = K * \frac{r}{1 - (1 + r)^{-n}}$$



where  $E$  is the annual equivalent costs,  $K$  is the current price of a capital good,  $n$  is the expected lifespan of the capital good and  $r$  is the discount rate<sup>2</sup>. However, for the data collection exercise at a health centre, the main focus should be on developing an inventory of all capital goods available at the health centre. The collection of current prices and the calculation of annual equivalents will typically be done at a later stage.

In order to estimate the capital costs of the buildings, it is necessary first to know the size in square metres of the health centre including the sizes of all individual rooms. This type of information can be captured from a plan of the health centre which may be available at the health centre itself or at a relevant government department such as the engineering office of the Ministry of Health. If the plan of a health centre cannot be found, the size of the health centre must be obtained manually using a tape measure. The construction costs per square metre of a health centre will be captured subsequently from the relevant engineering office in the Ministry of Health or Ministry of Public Construction or from a private quantity surveyor. In some countries, the estimation of annual capital expenditure for buildings may be much easier than described above. If the health facility is paying rent for the utilisation of the premises to an external owner, this may be used as an indicator of capital costs. With respect to equipment and furniture, an inventory must be developed containing all individual equipment and furniture with sufficient description on each item so that the current prices of these may be found subsequently. Health centre staff may keep an up-to-date inventory of all equipment and furniture which can be utilised for this cost exercise. If not – it will be necessary to develop this inventory by visiting each room of the health centre and record the available capital goods. Price lists of medical and other equipment may be available from Ministry of Health while prices of furniture may be found from the national statistical office (which needs this information for the consumer price index) or alternatively from conducting a small price survey of the relevant goods from a range of shops or manufacturers. It may be convenient to collect information on the size of the health centre and the available equipment and furniture by individual room/department at the same time so a data capture form including all these three types of capital goods has been included in the appendix (data capture sheet number 4). The expected lifespan of various capital goods may be discussed with the health centre staff, but for the purpose of the costing exercise often the same expected lifespan is assigned to a group of capital goods which could for instance be 30 years for building, 7 years for all equipment and 10 years for all furniture. Finally, information on other capital goods must be recorded including the type and make of vehicles available (data capture sheet number 5). In some countries, all government vehicles are owned and maintained by a designated government department which then charges all the government entities according to kilometres done in the vehicles. In this case, these charges may be used instead of the annual equivalent costs of the vehicles.

Having finalised the above described data collection, it should now be possible to calculate the total costs by category of running the health centre in a period of time corresponding to the financial year. As specified above in the description of the step-down costing methodology, the total costs of running health units must then be allocated to final service cost centres in a stepwise fashion using a series of allocation rules. The range of services and activities performed at the health centre may include those listed in Table 2. This type of information will be obtained

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<sup>2</sup> See Mangham (2009) for more details.

through interviews with the health staff working at the health centre and may be recorded in data capture sheet number 6. With respect to diagnostic services and final health services (outpatient visits, vaccinations), it is in addition necessary to know how many of these individual services have been performed in the same financial year for which expenditure information has been collected. Data capture sheets 7 and 8 of the appendix may be used for this task. This type of information may be available at individual health centres in various forms including books used for daily entries or computerised systems. Registering and compiling health information in a health centre will usually be the responsibility of one particular employee from whom this information can be obtained for the present costing exercise.

The remaining data collection will concentrate on obtaining information at the health centre that will enable the development of allocation criteria to be utilised in the step-down costing procedure for allocation of costs to the final services such as outpatient visits for malaria treatment. The first step involves allocating the total costs by category of running a health centre to overhead, support and final service cost centres (unbroken arrows in Figure 1). Personnel costs in the form of salaries are likely to constitute a large fraction of the costs of services performed at the health centre. It is therefore worthwhile to spend more time on developing good criteria for the allocation of this cost category than some of the other categories in Table 1. Determining personnel costs by cost centres at the health centre may be done using several different techniques. One possible method is to interview individual staff at the health centre and ask them to think about a normal week (or the previous week) and estimate how much of his/her time was spent on the activities identified earlier (Table 2). This information could be taken down in data capture sheet 9. Of particular importance is to find out how health personnel allocate their time among final services like for instance outpatient visits or vaccinations. Interviews with relevant staff asking them to estimate how much time will normally be utilised on each type of service may suggest such figures as 15 minutes per outpatient visit and 5 minutes per vaccination. Total time taken for outpatient services and vaccinations can then be estimated by multiplying time per service by the number of services in a year. Using the salary level for different employees, the total salary costs by final service cost centre can be calculated. Alternatively, time per type of service may be obtained by observing the health centre employees while they actually perform the services. In both cases, data capture sheet 10 may be utilised. Great care must be observed when collecting estimates of time utilisation by health centre personnel for various reasons. Questions on how time is allocated may be a sensitive issue possibly interpreted by some personnel that the interviewer is implying that they are not doing their job properly. In addition, it may be difficult for health centre staff to estimate how their time is spent. Attempting to avoid these problems by observing health personnel at work is also fraught with problems since the observed individuals may change their normal behaviour while being observed.

The data collection on time utilisation by health centre staff described above aimed at being able to allocate total salary costs to the cost centres listed in Table 2. A list of proposed allocation criteria for the remaining cost categories of Table 1 has been incorporated in Table 3 below. These allocation criteria are meant to give an idea of how these may be developed and these criteria may vary from setting to setting. The training cost category may include the costs of various training workshops aimed at improving the skills of the personnel in a particular area including the

**Table 2. Services and activities performed at a health centre grouped into cost centres.**

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***Overhead cost centres***

Administration  
Accounting  
Compiling health information  
Cleaning of health centre  
Laundry

***Support cost centres***

Dispensary services  
Diagnostic services

***Final service cost centres***

Outpatient care  
Antenatal visits  
Postnatal care visits  
Vaccination  
Family planning services  
Maternity services

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national guidelines of fever/malaria management or a refresher course on accounting methods. Training costs should be allocated to cost centres based on the purpose of the training so that the costs of a workshop on the national guidelines of malaria management must be allocated to the outpatient cost centre. Some cost categories may be allocated directly to an individual cost centre so that no additional data collection is necessary for these during step 1. This will be the case for instance for medicines and disposables which can be allocated to the pharmacy services cost centre. Stationery is likely to be used mainly by selected overhead cost centres and final services where various paper sheets (outpatient cards, temperature sheets, maternity notes) are used to record the health problem of a patient and the treatment given. Interviews with relevant personnel may give a crude idea as to the level of consumption of stationery in the overhead cost centres whereas a possible criterion for allocating this cost category to individual final service cost centres may be the number of services performed by a particular final service cost centre – for instance the number of outpatient visits as a share of the total number of final services. This type of health information has already been collected (data capture sheet 8). The cost categories of Utilities and Buildings may be allocated to cost centres according to actual space utilisation within the health centre where the sizes of the overall health centre as well as individual rooms/departments have already been measured and with square metre costs to be captured later. Space utilisation by individual cost centres may require some additional data collection. For instance, there may be an office for the head of the health centre and a talk with the head will reveal what this office is mainly used for (ie administration half of the time and keeping the

**Table 3. Allocation criteria for distributing health centre level costs to individual overhead, support and final service cost centres (Step 1).**

<b>Cost category</b>	<b>Allocated to cost centres:</b>	<b>Allocation criterion:</b>
Salaries	All cost centres	Estimated value of time utilisation of individual employees by individual cost centre in proportion to total salary costs in the health centre
Training	All cost centres	According to purpose of training in individual cost centres
Medicines	Pharmacy services	All costs to this cost centre
Disposables	Pharmacy services	All costs to this cost centre
Stationery	Administration, accounts, health information, final services	A share of 10% each to administration, accounts and health information and remaining 70% to final services according to number of services in individual final service cost centres in proportion to total number of final services performed
Maintenance of buildings and compound	Administration	All costs to this cost centre
Post and communication	Administration	All costs to this cost centre
Utilities	All cost centres	Actual space of buildings utilised by individual cost centres in proportion to total space of the health centre
Transport	All cost centres	Actual kilometres done by the vehicles for individual cost centres in proportion to total kilometres done based on a log book review
Domestic expenses	Cleaning of health centre	All costs to this cost centre
Laundry	Laundry	All costs to this cost centre
Buildings	All cost centres	Actual space of buildings utilised by individual cost centres in proportion to total space of the health centre
Vehicles	All cost centres	Actual kilometres done by the vehicles for individual cost centres in proportion to total kilometres done based on a log book review
Equipment	All cost centres	Actual utilisation by individual cost centres
Furniture	All cost centres	Actual utilisation by individual cost centres

**Table 4. Allocation criteria for distributing costs of overhead cost centres to support and final service cost centres (Step 2).**

Overhead cost centre	Allocated to cost centres:	Allocation criterion:
Administration	All support and final service cost centres	According to costs allocated to individual cost centres at the end of step 1 in proportion to total costs allocated to support and final services cost centres during step 1
Accounting	All support and final service cost centres	According to costs allocated to individual cost centres at the end of step 1 in proportion to total costs allocated to support and final services cost centres during step 1
Compiling health information	All final service cost centres	Number of services performed by individual final cost centres in proportion to total number of final services performed at health centre
Cleaning of health centre	All support and final service cost centres	Actual space of buildings utilised by individual cost centres in proportion to total space of support and final service cost centres
Laundry	Outpatient and maternity service cost centres	Number of services performed by individual cost centres in proportion to total number of services of outpatient and maternity cost centres

accounts for the other half). Further, the outpatient department may be utilised both for outpatient treatment and vaccinations. The space of the outpatient department may then be divided between these two final services using the estimates calculated earlier on the total staff time utilised for these two types of services. The cost categories of Transport and Vehicles can be allocated to relevant cost centres through a review of the log book which typically incorporates information on kilometres covered and for what purpose for each trip made by the vehicle (data capture sheet 11 in the appendix).

When this step has been finalised, the costs by main category of running the health centre have been allocated down to all cost centres in the health facility. For instance, the costs of performing administrative activities include the costs of the estimated personnel time, communication, utilities, stationery, building space and furniture. The second step will be to allocate the costs of maintaining the different overhead cost centres to the support and final service cost centres (the broken arrows in Figure 1). Possible allocation criteria have been suggested in Table 4. On closer inspection of these criteria, there is no need to collect further data since the suggested criteria utilise information already collected. The administrative activities required for administering individual support and final service cost centres may be approximated by their size measured in costs as obtained during step 1. At the end of the first step, the costs of personnel, utilities, equipment etc have been estimated for each individual cost centre which may be an acceptable indicator of relative administrative burden of individual support and final service cost centres. As

another example, the resources of the health information cost centre may be allocated to individual final services cost centres according to the relative number of services performed in each final service cost centre. This will be a reasonable indicator of the workload of the health information cost centre by individual final service cost centres.

The third step consists of allocating the costs of running individual support cost centres to final service cost centres (the dotted arrow in Figure 1) and some suggestions for allocation criteria have been listed in Table 5. The suggested distribution key for the pharmacy services cost centre is the estimated costs of drugs and disposables in individual final services cost centres as a share of total costs of drugs and disposables. There may be several ways of capturing this kind of information at a health centre. Actual consumption of medicines and disposables by final service cost centre through the financial year may be available if health centre staff keeps a detailed dispensary book on the type of medicine prescribed, how much and which cost centre received it (for instance the outpatient cost centre). A review of the dispensary book, possibly using a systematic sample of entries into the book, will reveal the relative utilisation of medicines among final service cost centres (data capture sheet 12). Another alternative is to estimate the costs of medicines and disposables utilised for outpatient malaria treatment using micro-costing data collection which will capture patient level prescription of medicines (more about this in the following section). With respect to allocating the costs of the diagnostic services cost centre, there may be a register of all diagnostic tests performed during the financial year and with information on type of test, result of the test and who the test was for (outpatient, deliveries or antenatal care seekers). A review of the register of diagnostic tests will give an idea of the relative utilisation of tests among final service cost centres (data capture sheet 13 in the appendix). If a large number of tests have been performed over the financial year, a systematic sample of register entries may be recorded. For estimating a share of the diagnostic services cost centre to malaria treatment, it is also possible as an alternative to collect the relevant information using micro-costing data collection (more in the following section).

At the end of the third step of the step-down costing method, the costs of all resources available to the health centre have been allocated in a stepwise fashion to individual final service cost centres. As a result, the total costs of being able to offer final services such as outpatient visits will include the costs of a variety of resources like salaries of employees in contact with patients, medicines and stationery but also costs of resources not of immediate benefit to the patients like a share of utilities, transport as well as services from cleaning and administration cost centres. The unit costs per outpatient visit can be calculated by dividing the total costs of offering outpatient services during a financial year as described on the previous pages by the total number of outpatient visits in the same period. However, the aim of the costing exercise was to estimate the unit costs of an outpatient visit for treatment of malaria as well as the unit costs of a malaria microscopy test. This can be achieved by combining the results of the step-down costing data collection with some additional micro-costing data collection.

**Table 5. Allocation criteria for distributing costs of support cost centres to final service cost centres (Step 3).**

Support cost centre	Allocated to cost centres:	Allocation criterion:
Pharmacy services	All final service cost centres	Estimated costs of medicines and disposables in an individual cost centre as a proportion of total costs of medicines and disposables based on a review of dispensary book <sup>3</sup>
Diagnostic services	All final service cost centres	Estimated utilisation of diagnostic services in an individual cost centre as a proportion of total number of diagnostic services based on a review of diagnostic services register <sup>4</sup>

### 3.3. Data collection for micro-costing.

The step-down costing methodology described above will result in an estimate of the unit costs per outpatient department visit on average irrespective of the type of health problem. Likewise the step-down costing may be used to estimate the costs per test on average for all types of diagnostic procedure performed at a health centre. For ACT Consortium studies, the main interest will be the unit costs of malaria diagnosis (microscopy or RDT) and treatment of malaria as an outpatient. Therefore, more detailed and focused data collection for micro-costing are required to identify resources needed to offer malaria treatment and malaria testing as opposed to other treatment and diagnostic services.

Starting with the malaria microscopy test, it is a good idea to begin with interviewing the individual staff responsible for performing these tests at the health centre. If possible the staff member could describe and show how the malaria microscopy test is done including taking the blood, use of different staining liquids and inspecting the blood for parasites using the microscope. This will give a good initial idea of time and resources involved in performing a malaria microscopy test. The capital goods will probably include the area of the health centre dedicated to diagnostic procedures, equipment (microscope) and furniture. An annual equivalent value of all capital goods must be calculated. Additional information to be collected will be the total number of malaria microscopy tests over the financial year. If also other tests are performed using the microscope, information on the total number over the financial year of these other tests must be captured so that not all capital costs of the microscope will be allocated to malaria microscopy tests. Data capture sheet 14 in the appendix has been designed to capture the above described information. Further information for the micro-costing component includes the personnel available specifically for malaria microscopy testing and the time utilised per individual test which may be obtained

<sup>3</sup> If it is decided to do micro-costing data collection, the review of the dispensary book may not be necessary.

<sup>4</sup> Again, if it is decided to do micro-costing data collection, the review of the diagnostic services register may not be necessary.

through interviewing the staff responsible for malaria testing. Consumables for malaria microscopy may include various liquids, staining reagents, needles, and cotton wool. The responsible staff should know what consumables are required as well as how much is used per test. However, asking about the utilisation of these consumables per test may not capture wastage arising for instance if reagents are not used before the expiry date. It is therefore worthwhile to explore if there is a register of total usage of some or all of the consumables over full financial year. Some inputs may be re-used a number of times such as glassware like microscope slides and tubes. For these items it will be necessary to inquire how many times these are normally re-used. Data capture sheet 15 may be utilised for the above type of information. Having finalised the above described data collection, this will be sufficient for estimating the costs specific to a malaria parasite test using a microscope as opposed to other diagnostic tests performed at a health centre.

Malaria treatment will in most health centres be done in the outpatient department. A good starting point will be to interview one of the staff members working in the outpatient department offering malaria treatment in order to find out how this is normally done, whether it is always possible to follow national guidelines on first-line drug and dosage and if diagnosis is normally based on a microscopy or biological test or is done presumptively. Again the main purpose of this interview is to gain an impression of the resources utilised specific to malaria treatment. As is the case of microscopy testing, capital goods for malaria treatment will be used like buildings, equipment and furniture. However, it is important to capture how large a percentage of all outpatient visits is diagnosed as malaria so that only a share of the annual equivalent value of capital goods are allocated to malaria treatment. These may be obtained from patient registers in which data on the number of outpatient visits is recorded according to presumed or confirmed diagnosis. If this information is not recorded in patient registers, talks with the nurses will have to be relied on to estimate the share of malaria among all outpatient visits. For the micro-costing methodology, it is also important to find out how long time an outpatient session for treating for malaria normally takes. This type of information may be obtained by interviewing nurses or through observation. This data and other information described above may be captured using data capture sheet 16. It is also important to capture what medicines and dosages are actually given to fever and malaria patients and if diagnostic procedures are ordered. This type of information may be available in the outpatient treatment register if such a system is in existence in a health centre. A systematic sample of all fever or malaria entries covering the financial year should be developed from which patient specific medicine prescription and diagnostic tests can be captured. (see data capture sheet 17 in the appendix). If such a recording system is not maintained at the health centre, this information may be available from patients' outpatient cards which may be obtained through exit interviews. In this case, interviewers must approach patients and ask permission to see their outpatient cards and capture information like the name of drug, number of pills prescribed and diagnostic procedures performed. A data capture sheet is available for recording information from outpatient registers or outpatient cards (see data capture sheet 17 in the appendix). Collecting the type of information described above will enable the estimation of the costs per malaria treatment as an outpatient at a health centre which will be different than the average costs of all diagnoses.



### **3.4. Combining two methodologies.**

There are advantages of collecting data for two different costing methodologies. These are likely to complement each other well and decrease the risk of leaving out cost categories. The step-down costing methodology focuses on capturing all resources available to a health facility and allocates appropriate shares of costs to final services like outpatient visits and vaccinations. This methodology will for instance estimate the costs of overhead activities which otherwise tend to be forgotten in some studies. However, the step-down costing method as specified above will not capture disease specific costs like consumption of drugs for a particular health problem. Contrary to this, data collection for micro-costing will give detailed information on disease specific costs for a sample of patients. However, the focus on disease specific information in this methodology may lead to a risk of forgetting some costs. For instance, doing a review of the outpatient register will give an impression of the type and amount of medicines actually prescribed for a health problem but may not capture if say 10 percent of the drugs utilised must be destroyed at the health facility because these have not been used before the expiry date or lost for other reasons. Similarly, if selected personnel are asked how much time is required per visit for malaria treatment, this will be net personnel time not including personnel costs related to breaks and periods where the health facility is operating below capacity leaving personnel idle. Data collected for the step-down costing methodology may be utilised for estimating these types of costs since this method will result in estimates of total medicine consumption and total personnel time available over the financial year.

For some cost categories, the two costing methods may suggest collection of the same type of information including for instance some of the capital goods utilised. This should however quickly be discovered during data collection so that duplication of work tasks is avoided. During the analysis phase, care must be taken not to double count resources. For instance, all medicines have been included in the step-down costing methodology and in the micro-costing methodology malaria specific drugs have been collected. However, one way of solving this is to remove the drugs from the step-down costing data set and replace these with micro-costing disease specific drug information and perhaps add an estimate of wastage for the medicine prescribed for this health problem.

## **4. An example of step-down costing and micro costing at health centres.**

The following pages present a worked example of how costs of selected services in a health centre may be estimated with specific focus on the costs per microscope test for malaria parasites and treatment for malaria as an outpatient department patient. This example shows the advantages of combining step-down costing and micro costing techniques. While this example does not utilise an actual data set of cost information, it nevertheless draws on experience mainly from data collection and methods applied for several studies in Uganda<sup>5</sup> (see for instance Mbonye et al 2008) where methods and tools presented in sections above and the appendix were utilised. Further, the example has been simplified in some aspects in order to make the presentation more tractable. For instance, fewer cost categories, cost centres and services provided have been

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<sup>5</sup> The very helpful cooperation during data collection by health centre personnel in Hoima, Kabale and Mukono districts, Uganda, is gratefully acknowledged.

included in the example than what would normally be available at a health centre and some of the information required may in reality be less accessible than portrayed below.

#### *4.1. Example: Step-down costing methodology component.*

For the present example, a health centre large enough to have a small laboratory with a microscope was visited. A first talk to the head of the health centre, referred to as the in-charge, revealed that she had kept records of the utilisation and associated costs over the financial year of stationery, utilities (fuel, lights and water), drugs and disposables, laboratory reagents and supplies as well as cleaning materials as reproduced in Table 6. However, no information on the total costs of salaries and capital costs for the financial year was available so this required additional data collection as follows. With the help of the in-charge, a list of personnel in post at the health centre as well as their rank and grade was developed. At a later stage, the government salary schedule including all allowances could be obtained from the Ministry of Health so that the information displayed in Table 7 could be developed based on which the total salary costs over the financial year were calculated and inserted in Table 6. With respect to the estimation of capital costs of buildings, equipment and furniture over the financial year, this also required some extra data collection. The building of the health centre consisted of an office utilised mainly by the in-charge, a dispensary with a store room for drugs and disposables, a laboratory with a microscope as the only equipment, an outpatient waiting area, an outpatient department, a delivery room and a maternity inpatient department. The plan of the health centre (available from Ministry of Health) indicated the size of the health centre in total and for individual rooms as indicated in Table 8. Subsequently, the engineering department at the Ministry of Health supplied figures from 2008 on construction costs per square metre for the types of departments which enabled the estimation of the total construction costs in 2008 for each room and department as seen in the third and the fourth column of Table 8. Constructing a health centre in 2008 of the specified size was therefore estimated to cost 160 million Shillings in total. Continuing with the equipment of the health centre, an inventory for each room and department was developed by registering all equipment and their model and make; for instance there was one microscope in the laboratory. Further, the Equipment Maintenance Department at the Ministry of Health had a list of current prices so that replacement costs of all equipment in 2007/08 by room and department could be calculated as displayed in Table 8 where for instance the costs of purchasing a microscope were 3 million Shillings. Similarly, an inventory of all furniture by room and department was developed. Prices of different pieces of furniture were found through a survey of shops in the capital city based on which replacement costs of all furniture by room and department could be calculated as is done in Table 8. Construction costs of the health centre and replacement costs of equipment and furniture as they appear in columns 4-6 in Table 8 are the costs of capital inputs if they were acquired today or rather for the study period 2007/08. As described in Section 3.2 above, capital inputs have a longer life span than one year so an annual equivalent cost must be calculated for the three different capital inputs. Using the formula given above in Section 3.2 and a discount rate of 5% as well as expected life spans of 30, 7 and 10 years for buildings, equipment and furniture respectively resulted in annual equivalents of the three types of capital goods as displayed in the last three columns in Table 8. These annual capital costs were transferred to Table 6.

**Table 6. Total costs by cost category at the health centre, financial year July 2007 to June 2008.**

	Shillings	%
<b>Recurrent costs</b>		
Salaries	23,400,000	45.9
Stationery	1,000,000	2.0
Utilities	1,500,000	2.9
Drugs and disposables	7,000,000	13.7
Laboratory reagents and supplies	2,500,000	4.9
Cleaning materials	500,000	1.0
<b>Capital costs</b>		
Buildings	10,447,260	20.5
Equipment	1,771,403	3.5
Furniture	2,849,101	5.6
<b>Total Recurrent and Capital costs</b>	<b>50,967,764</b>	<b>100.0</b>

**Table 7. Personnel in post and salaries at the health centre, financial year July 2007 to June 2008.**

Personnel in post	Number	Annual salary	Total salaries
Clinical officer (in-charge)	1	3,600,000	3,600,000
Midwife	1	3,300,000	3,300,000
Nurse	2	3,000,000	6,000,000
Nursing assistant	2	2,300,000	4,600,000
Laboratory attendant	1	2,700,000	2,700,000
Support staff	2	1,600,000	3,200,000
<b>Total</b>	<b>9</b>		<b>23,400,000</b>

**Table 8. Size of rooms and departments in the health centre and annual equivalent costs<sup>6</sup> of buildings, equipment and furniture (capital costs), financial year July 2007 to June 2008.**

Area in health centre	Size in m <sup>2</sup>	Construction costs per m <sup>2</sup>	Construction costs in total	Costs of equipment	Costs of furniture	----- Annual equivalent costs -----		
						Buildings	Equipment	Furniture
Office	10	600,000	6,000,000	450,000	2,000,000	390,309	77,769	259,009
Dispensary with store room	26	600,000	15,600,000	1,700,000	1,800,000	1,014,802	293,794	233,108
Laboratory	22	1,200,000	26,400,000	3,000,000	3,000,000	1,717,358	518,459	388,514
Waiting area (outpatients)	56	600,000	33,600,000	0	5,000,000	2,185,728	0	647,523
Outpatient department	50	1,000,000	50,000,000	2,600,000	3,700,000	3,252,572	449,332	479,167
Delivery room	20	850,000	17,000,000	1,500,000	2,500,000	1,105,874	259,230	323,761
Maternity inpatient department	20	600,000	12,000,000	1,000,000	4,000,000	780,617	172,820	518,018
<b>Total</b>	<b>204</b>		<b>160,600,000</b>	<b>10,250,000</b>	<b>22,000,000</b>	<b>10,447,260</b>	<b>1,771,403</b>	<b>2,849,101</b>

<sup>6</sup> Assuming a discount rate of 5% and expected life spans of 30 years for buildings, 7 years for equipment and 10 years for furniture.

**Table 9. Number of services by cost centre at the health centre and personnel time by type of service, financial year July 2007 to June 2008.**

	--- Overhead ---		----- Support -----		----- Final service -----		
	Admin	Cleaning	Dispensary services	Diagnostic services	Outpatient care	Deliveries	Immunisation services
Number of services in financial year	-	-	-	5,500	15,000	400	7,000
Average personnel time per service in minutes	-	-	-	20	15	180	10
Total personnel time by service in minutes in financial year	-	-	-	110,000	225,000	72,000	70,000

Having completed the information on costs by category of running the health centre over the financial year as displayed in Table 6, it was now possible to start the actual step-down allocation of costs as described in Section 3.2 above. Initially, discussions with the in-charge on the services offered at the health centre to the population and the activities performed to enable those services to happen suggested a range of cost centres. These included two overhead cost centres namely administration and cleaning of health centre, two support cost centres offering dispensary services and diagnostic services and three final service cost centres giving outpatient care, deliveries and immunisation services. For some of these cost centres, the level of services provided by these could immediately be established since each health facility in the country had to report to the District Office on a monthly basis the number of final services and diagnostic services. These numbers were as displayed in Table 9 where the number of dispensary services was not indicated since these services were not routinely registered. Likewise, the outputs of the administration and cleaning cost centres were less easy to measure.

The first step in the step-down costing methodology was to allocate the total costs over the financial year of running the health centre to the seven cost centres identified. Allocation of the costs of the categories in Table 6 to cost centres must ideally reflect actual resource utilisation. For instance, if the deliveries cost centre required a lot of personnel time, a large share of the salary costs should be allocated to this cost centre. The allocation criterion for distributing total salary costs among the seven cost centres was developed based on interviews with health centre personnel focusing on their most important work tasks and how much time they spent on these. Interviews with nurses suggested that diagnosing and treating an outpatient took on average 15 minutes per outpatient visit so that a total of 225,000 minutes of personnel time over the financial year was required to finalise all outpatient department visits as shown in Table 9. Similarly, interviews with other personnel gave information on laboratory services deliveries and immunisations. This type of information could be used for estimating time allocation among cost centres by individual staff at the health centres. Interviewing the in-charge suggested further that she utilised 35% of her time on general administration of the health centre and an additional 5% of her time for dealing with the dispensary and another 5% on the diagnostic services. For the

remaining of her time, the in-charge worked in the outpatient department performing outpatient department visits. A review of the outpatient department register where all treatments for each outpatient visit were recorded and where health centre staff signed after each treatment revealed that the in-charge performed about 25% of all outpatient visits over the financial year. Using the 15 minute estimate required per outpatient visit (Table 9), it could be calculated that the in-charge spent a total of 56,250 minutes over the financial year on outpatient visits. Assuming that on average, health centre personnel worked 47 weeks a year, 5 days a week and 8 hours a day, this gave a total of 112,800 minutes available for work during a financial year meaning that the in-charge spent 49.9% (56,250/112,800) of her time on outpatient visits. These percentages of time allocation of the in-charge have been inserted in Table 10 which left 5.1% of her time not allocated to a specific cost centre. Similar talks with the midwife revealed that she attended all the deliveries and 15% of all outpatient visits and using information from Table 9 it could be estimated that her time was allocated as displayed in Table 10. The time allocation of other health centre staff was easier since for instance the laboratory attendant and one nursing assistant spent all their time in the laboratory and dispensary respectively (Table 10). As indicated earlier, the method described did not distribute all the available work time among cost centres for all personnel. However, resources must not be left unallocated in the step-down costing process, but since the sizes of the unallocated time were small, a crude distribution method for these was applied. A proportional allocation of the unallocated time to the cost centres according to the time already allocated was used which gave the adjusted time allocation as indicated in the second part of Table 10. Having established the time allocation of individual staff members among cost centres, it was subsequently possible to distribute the annual salary of individuals working at the health centre to cost centres as done in the third part of Table 10. For instance, the total salary costs of the outpatient care cost centre were 3.8 million Shillings. These estimated salary costs by cost centre have been transferred to Table 11 from where the step 1 of the step-down costing methodology may now continue to the remaining cost categories of Table 6.

Stationery was allocated partly based on talks with staff and partly based on estimated actual consumption. The in-charge believed that a large proportion of stationery was utilised for the administrative duties (30%) while also the dispensary used a considerable share (10%) and the remaining stationery costs were allocated in proportion to services performed over the financial year. In other words, it was assumed that the consumption of stationery per outpatient visit was similar to the stationery consumption during immunisation vaccinations. With respect to the costs of utilities, this cost category was believed to depend at least to some extent by the size of the space occupied by individual cost centres. For instance, the dispensary occupied 12.7% of the total space of the health centre according to Table 8 and the dispensary was therefore also allocated this percentage of the total utilities costs. The costs of drugs and disposables were allocated in the first step to the dispensary cost centre. Similarly the costs of laboratory reagents and supplies as well as cleaning materials were allocated directly to the diagnostic services and cleaning cost centres respectively. All capital costs categories were allocated to the relevant cost centres. For instance, the annual equivalent of the total construction costs of the laboratory space in the health centre as well as the annual equivalent of the values of the microscope and the furniture were allocated to the laboratory services cost centre. Since the outpatient care and immunisation services cost centres both utilised the outpatient department (including waiting area) of the health centre as well as the equipment and furniture of to deliver their services, the capital costs of the

outpatient department were distributed between the outpatient care and immunisation cost centres. As an indicator of the relative utilisation of the outpatient department between outpatient care and immunisation cost centres, the total time by the two types of services over the financial year was used. According to Table 9, the total time needed to occupy the outpatient department to offer immunisation services was 70,000 minutes corresponding to 23.7% ( $70,000/(225,000+70,000)$ ) of the total time of the two services and the remaining 76.3% ( $225,000/(225,000+70,000)$ ) to the outpatient cost centre. At the end of step 1, the total costs of running the health centre through the financial year had been allocated as displayed in Table 11. The sum of all allocated costs was 50,967,764 Shillings which was equal to the estimated total costs of running the health centre as shown in Table 6. It could therefore be concluded that no cost had been left out during the step 1 allocation of costs.

Step 2 entailed the allocation of the costs of the two overhead cost centres to individual support and final service cost centres. Table 12 replicates in the upper part the recurrent and capital costs allocated in the first step to individual support and final service cost centres and shows in the lower part the allocated administrative and cleaning costs (to be described in the following). The costs of performing administration services were estimated for the financial year to be 2.4 million Shilling (Table 11). These costs must be allocated to support and final service cost centres based on their administrative burden. As a proxy for this administrative burden, the costs of running individual cost centres over the financial year as estimated in step 1 were used assuming that the higher costs the more administrative issues. According to Table 11, the total step 1 costs of support and final service cost centres were 44.8 million Shillings. The share of the outpatient care cost centre was 32.5% ( $14,573,793/44,838,973$ ) so outpatient care was allocated 32.5% of the costs of the administration cost centre. The distribution of the costs of the administration cost centre to the remaining support and final service cost centres was done in a similar fashion and the resulting costs were as displayed in the bottom part of Table 12. The costs of running the cleaning cost centre were allocated to individual support and final service cost centres based on the relative size of the rooms occupied by individual cost centres. For instance, the size of the laboratory was 22 square metres (Table 8) while the total size of the rooms occupied by all support and final service cost centres was 194 square metres so that the laboratory occupied 11.3% of that space. Therefore, the laboratory services cost centres was allocated 11.3% of the cost of the cleaning cost centre. Shares for the remaining cost centres were calculated in the same way and this allocation criterion resulted in the distribution of the cleaning cost centre as seen in the bottom part of Table 12.<sup>7</sup> Again the sum of all allocated costs at the end of step 2 was 50,967,764 Shillings which was equal to the estimated total costs at the end of step 1 (Table 11).

Step 3 involved allocating the costs of running the two support centres to individual final cost centres. Table 13 replicates in the upper part the recurrent and capital costs allocated in the first step as well as the costs of overhead cost centres allocated in the second step. In addition, Table 13 contains in the lower part the allocated dispensary and laboratory costs to individual final

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<sup>7</sup> The allocation criteria for the administration and cleaning cost centres in the above example assume that there is no administrative duties for the cleaning cost centres and likewise that there is no cleaning in the office space for the administration cost centre. This is obviously a simplification to make the example shorter, but there are techniques available that allow for interactions among overhead cost centres and these typically involve adding an additional step to the step-down costing method (Drummond et al 2005, pp 78-83).

service cost centres (to be described in the following). The costs of running the dispensary services cost centre were distributed to the three final service cost centres using a relatively crude allocation rule as follows. It was assumed that the number of services performed in a cost centre was an acceptable reflection of their utilisation of dispensary services including drugs although each outpatient visit was weighted 1, a delivery weighted 3 and a vaccination weighted 0.5. This resulted in a distribution of the dispensary cost centre as seen at the bottom of Table 13. The costs of the laboratory services cost centre were allocated to individual final cost centres based on a review of the laboratory register which recorded all tests performed by type and who ordered the test (outpatient care or delivery). This suggested a distribution of the laboratory services cost centre as indicated in Table 13.<sup>8</sup> The sum of all allocated costs at the end of step 3 was equal to the estimated total costs at the end of step 2 (Table 12) indicating that no costs had been left out. Having finalised step 3, all costs of running the health centre (Table 6) had been allocated in a step-wise fashion to the three final service cost centres. It was now possible to estimate the costs per unit of service in each final cost centre using information on the number of services done during the financial year (Table 9). For instance, the estimated costs per outpatient department visit were 2,338 Shillings in this example. Likewise, using the allocated costs at the end of step 2 displayed in Table 12 enabled the calculation of the costs per laboratory test at 1,666 Shillings.

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<sup>8</sup> For both the dispensary services and the laboratory cost centres more refined and more time consuming allocation methods may be developed as will be seen in the section on micro-costing.



**Table 10. Allocation of time by each health centre staff among cost centres and subsequent calculation of total salary costs among cost centres at the health centre, financial year July 2007 to June 2008.**

	---- Overhead ----		----- Support -----		----- Final service -----				
	Admini- stration	Cleaning	Dispensary services	Diagnostic services	Outpatient care	Deliveries	Immuni- sation	Unallo- cated	Total
<b>[1] Time allocation by employee and cost centre (%)</b>									
<b>Staff member</b>									
Clinical officer	35.0		5.0	5.0	49.9			5.1	100.0
Midwife					29.9	63.8		6.3	100.0
Nurse					59.8		31.0	9.1	100.0
Nurse					59.8		31.0	9.1	100.0
Nursing assistant			100.0					0.0	100.0
Nursing assistant					59.8	19.1	18.6	2.4	100.0
Laboratory attendant				100.0				0.0	100.0
Support staff		100.0						0.0	100.0
Support staff		100.0						0.0	100.0
<b>[2] Adjusted time allocation by employee and cost centre (%)</b>									
<b>Staff member</b>									
Clinical officer	36.9		5.3	5.3	52.6			0.0	100.0
Midwife					31.9	68.1		0.0	100.0
Nurse					65.9		34.1	0.0	100.0
Nurse					65.9		34.1	0.0	100.0
Nursing assistant			100.0					0.0	100.0
Nursing assistant					61.3	19.6	19.1	0.0	100.0
Laboratory attendant				100.0				0.0	100.0
Support staff		100.0						0.0	100.0
Support staff		100.0						0.0	100.0

Continues next page

**Table 10 (continued). Allocation of time by each health centre staff among cost centres and subsequent calculation of total salary costs among cost centres at the health centre, financial year July 2007 to June 2008.**

	---- Overhead ----		----- Support -----		----- Final service -----			Unallo- cated	<b>Total</b>
	Admini- stration	Cleaning	Dispensary services	Diagnostic services	Outpatient care	Deliveries	Immuni- sation		
<b>[3] Salary allocation by employee and cost centre (Shillings)</b>									
<b>Staff member</b>									
Clinical officer	1,328,175		189,739	189,739	1,892,347			0	<b>3,600,000</b>
Midwife					1,053,191	2,246,809		0	<b>3,300,000</b>
Nurse					1,975,610		1,024,390	0	<b>3,000,000</b>
Nurse					1,975,610		1,024,390	0	<b>3,000,000</b>
Nursing assistant			2,300,000					0	<b>2,300,000</b>
Nursing assistant					1,410,082	451,226	438,692	0	<b>2,300,000</b>
Laboratory attendant				2,700,000				0	<b>2,700,000</b>
Support staff		1,600,000						0	<b>1,600,000</b>
Support staff		1,600,000						0	<b>1,600,000</b>
<b>Total</b>	<b>1,328,175</b>	<b>3,200,000</b>	<b>2,489,739</b>	<b>2,889,739</b>	<b>8,306,839</b>	<b>2,698,035</b>	<b>2,487,473</b>	<b>0</b>	<b>23,400,000</b>

**Table 11. Allocation of health centre level costs to individual overhead, support and final service cost centres at the health centre (Step 1), financial year July 2007 to June 2008.**

<i>Allocated to cost centre:</i>									
Cost category	---- Overhead ----		----- Support -----		----- Final service -----			<b>Total</b>	Allocation criterion
	Admini- stration	Cleaning	Dispensary services	Diagnostic services	Outpatient care	Deliveries	Immuni- sation		
<b>Recurrent costs</b>									
Salaries	1,328,175	3,200,000	2,489,739	2,889,739	8,306,839	2,698,035	2,487,473	<b>23,400,000</b>	Estimated staff time
Stationery	300,000		100,000	118,280	322,581	8,602	150,538	<b>1,000,000</b>	Estimated use
Utilities	73,529		191,176	161,765	594,467	294,118	184,945	<b>1,500,000</b>	Relative size of space
Drugs and surg. suppl.			7,000,000					<b>7,000,000</b>	To relevant cost centre
Laboratory reag. suppl.				2,500,000				<b>2,500,000</b>	To relevant cost centre
Cleaning materials		500,000						<b>500,000</b>	To relevant cost centre
<b>Capital costs</b>									
Buildings	390,309		1,014,802	1,717,358	4,147,856	1,886,492	1,290,444	<b>10,447,260</b>	Actual use
Equipment	77,769		293,794	518,459	342,710	432,050	106,621	<b>1,771,403</b>	Actual use
Furniture	259,009		233,108	388,514	859,340	841,780	267,350	<b>2,849,101</b>	Actual use
<b>Total costs allocated at the end of step 1</b>									
	<b>2,428,791</b>	<b>3,700,000</b>	<b>11,322,620</b>	<b>8,294,115</b>	<b>14,573,793</b>	<b>6,161,075</b>	<b>4,487,371</b>	<b>50,967,764</b>	

**Table 12. Allocation of the costs of overhead cost centres to individual support and final service cost centres at the health centre (Step 2), financial year July 2007 to June 2008.**

Cost category	----- Support -----		----- Final service -----			<b>Total</b>	Allocation criterion
	Dispensary services	Diagnostic services	Outpatient care	Deliveries	Immuni-sation		
<b>Recurrent costs (step 1)</b>							
Salaries	2,489,739	2,889,739	8,306,839	2,698,035	2,487,473	<b>18,871,825</b>	Estimated staff time
Stationery	100,000	118,280	322,581	8,602	150,538	<b>700,000</b>	Estimated use
Utilities	191,176	161,765	594,467	294,118	184,945	<b>1,426,471</b>	Relative size of space
Drugs and surg. suppl.	7,000,000					<b>7,000,000</b>	To relevant cost centre
Laboratory reagent suppl.		2,500,000				<b>2,500,000</b>	To relevant cost centre
Cleaning materials							Allocated in step 1
<b>Capital costs (step 1)</b>							
Buildings	1,014,802	1,717,358	4,147,856	1,886,492	1,290,444	<b>10,056,952</b>	Actual use
Equipment	293,794	518,459	342,710	432,050	106,621	<b>1,693,634</b>	Actual use
Furniture	233,108	388,514	859,340	841,780	267,350	<b>2,590,091</b>	Actual use
<b>Overhead cost centres (step 2)</b>							
Administration	613,312	449,267	789,418	333,727	243,067	<b>2,428,791</b>	In proportion to costs allocated in step 1
Cleaning	495,876	419,588	1,541,936	762,887	479,713	<b>3,700,000</b>	Relative size of space
<b>Total costs allocated at the end of step 2</b>							
	<b>12,431,808</b>	<b>9,162,969</b>	<b>16,905,147</b>	<b>7,257,689</b>	<b>5,210,151</b>	<b>50,967,764</b>	

**Table 13. Allocation of the costs of support cost centres to individual final service cost centres at the health centre (Step 3), financial year July 2007 to June 2008.**

Cost category	----- Final service -----			<b>Total</b>	Allocation criterion
	Outpatient care	Deliveries	Immuni- sation		
<b>Recurrent costs (step 1)</b>					
Salaries	8,306,839	2,698,035	2,487,473	<b>18,871,825</b>	Estimated staff time
Stationery	322,581	8,602	150,538	<b>700,000</b>	Estimated use
Utilities	594,467	294,118	184,945	<b>1,426,471</b>	Relative size of space
Drugs and disposables					Allocated in step 2
Laboratory reagents and supplies					Allocated in step 2
Cleaning materials					Allocated in step 1
<b>Capital costs (step 1)</b>					
Buildings	4,147,856	1,886,492	1,290,444	<b>10,056,952</b>	Actual use
Equipment	342,710	432,050	106,621	<b>1,693,634</b>	Actual use
Furniture	859,340	841,780	267,350	<b>2,590,091</b>	Actual use
<b>Overhead cost centres (step 2)</b>					
Administration	789,418	333,727	243,067	<b>2,428,791</b>	In proportion to costs allocated in step 1
Cleaning	1,541,936	762,887	479,713	<b>3,700,000</b>	Relative size of space
<b>Support cost centres (step 3)</b>					
Dispensary services	9,465,844	757,268	2,208,697	<b>12,431,808</b>	Estimated use
Diagnostic services	8,704,821	458,148		<b>9,162,969</b>	Review of laboratory register
<b>Total costs allocated at the end of step 3</b>	<b>35,075,811</b>	<b>8,473,105</b>	<b>7,418,848</b>	<b>50,967,764</b>	
Costs per service	2,338	21,183	1,060		

#### *4.2. Example: Micro-costing methodology component.*

The costs per final service shown at the bottom at Table 13 are average unit costs in the sense that these do not distinguish among different diagnoses. Treatment of different diseases will often differ in the drugs prescribed and the personnel time required and therefore also the costs. Similarly, the costs per laboratory test found with the help of the estimated total costs in Table 12 are an average of all different tests performed using the microscope. Different tests will in particular vary with respect to the reagents and supplies required as well as the time of the laboratory attendant so that the costs will differ also. The following will extend the methods described in section 4.1 to enable the estimation of the costs of a malaria parasite test using a microscope and the costs of the treatment of malaria in the outpatient department using more detailed cost data collection.

The estimation of the costs of a malaria parasite test using a microscope started from the information available in Table 12 showing the total costs in the financial year of running the laboratory services cost centre by cost category including administration and cleaning. Malaria tests and all other tests were likely to differ in particularly in the time required per test by the laboratory attendant (salary costs category) and also in the utilisation of supplies (laboratory reagents and supplies). These two cost categories were also the largest cost component in the laboratory according to Table 12. So it was worthwhile spending more time collecting detailed data on these. A review of the laboratory register revealed that three different tests were performed in the laboratory of which the malaria parasite test was the most common (Table 14). Further, interviewing the laboratory attendant suggested that he needed 25 minutes net time to perform a malaria parasite test. This time estimate excluded drying time and other waiting time where the laboratory attendant could take care of other work tasks. Consequently, it could be estimated that the laboratory attendant spent 79.5% of his time doing malaria parasite testing and this percentage could be used as an allocation criterion for distribution of salary costs among types of tests (see later). The cost category of “laboratory reagents and supplies” could be divided among the three tests using the government delivery system where the laboratory attendant placed an order for reagents and supplies every month using a specific laboratory order form. A review of these order forms incorporated many items used exclusively for malaria testing such as Field’s stain. However, for other items like gloves the distribution among tests had to be estimated. For instance, it was assumed that tests utilised an equal number of slides per test which could be used to allocate the costs of slides among the three tests. The result of this laboratory order form review was as displayed in Table 15. Similarly, the costs by other cost categories in the laboratory had to be distributed between malaria parasite tests and all other tests which were done as displayed in Table 16. Allocation of the salaries and the laboratory reagent and supplies cost categories were described above. For the remaining cost categories, the distribution of costs between malaria parasite tests and other tests was not based on additional detailed data collection but rather utilised information already collected. For instance, the capital costs of the microscope were allocated to malaria parasite tests and all other tests based on the relative time the microscope was used for these two tests in total. Even though the performance of a specific type of test entailed other activities than just looking into the microscope, the allocation criterion developed above on the laboratory attendant time distribution among tests was used as a proxy for the microscope as well (and also for other capital costs). For stationery

**Table 14. Number of tests performed in the laboratory and laboratory attendant time by type of test at the health centre, financial year July 2007 to June 2008.**

Name of test	Number performed	Net time per test in minutes	Total time in minutes	Time allocation in %
Malaria parasite	3,500	25	87,500	79.5
Urine examination	1,500	10	15,000	13.6
Stool examination	500	15	7,500	6.8
<b>Total</b>	<b>5,500</b>	<b>20</b>	<b>110,000</b>	<b>100.0</b>

**Table 15. Distribution of the costs of laboratory reagents and supplies between malaria tests and all other tests at the health centre, financial year July 2007 to June 2008.**

Reagents, supplies	Shillings	%
Field's stain A	750,000	0.30
Field's stain B	495,000	0.20
Immersion oil	125,000	0.05
Methanol alcohol	100,000	0.04
Microscope slides	75,000	0.03
Syringes and needles	50,000	0.02
Test tubes	50,000	0.02
Lancets	62,000	0.02
Gloves	37,000	0.01
Cotton wool	25,000	0.01
Supplies for other tests	731,000	0.29
<b>Total</b>	<b>2,500,000</b>	<b>1.00</b>

costs, it was assumed that the utilisation of this input was the same per test irrespective of type since for each test it was mainly a matter of writing the test result in the register and on a form for the patient. Consequently, the allocation criterion of stationery was the proportion of each type of test where for instance the share of malaria parasite tests out of the total number of tests was 63.6% as could be calculated based on the figures in Table 14. This allocation criterion was also used for allocating administration and cleaning. Applying the methods described above resulted in an estimated cost per malaria parasite test of 1,975 Shillings which was higher than the average costs per laboratory test of 1,666 Shillings (Table 16).

**Table 16. Distribution of the costs of the laboratory cost centre between malaria tests and other tests using micro-costing for selected cost categories at the health centre, financial year July 2007 to June 2008.**

Cost category	Malaria parasite tests	Other tests	<b>Total</b>	Allocation criterion
<b>Recurrent costs (step 1)</b>				
Salaries	2,298,656	591,083	<b>2,889,739</b>	Proportion of lab. attendant time
Stationery	75,269	43,011	<b>118,280</b>	Proportion of tests
Utilities	128,676	33,088	<b>161,765</b>	Proportion of lab. attendant time
Laboratory reag. suppl.	1,769,000	731,000	<b>2,500,000</b>	Actual use from order forms
<b>Capital costs (step 1)</b>				
Buildings	1,366,080	351,278	<b>1,717,358</b>	Proportion of lab. attendant time
Equipment	412,411	106,049	<b>518,459</b>	Proportion of lab. attendant time
Furniture	309,045	79,469	<b>388,514</b>	Proportion of lab. attendant time
<b>Overhead cost centres (step 2)</b>				
Administration	285,897	163,370	<b>449,267</b>	Proportion of tests
Cleaning	267,010	152,577	<b>419,588</b>	Proportion of tests
<b>Total costs end step 2</b>	<b>6,912,045</b>	<b>2,250,924</b>	<b>9,162,969</b>	
Costs per test	1,975	1,125	1,666	

Treatment of fevers and malaria was done in the outpatient department of the health centre so a good starting point for estimating the costs per malaria treatment was Table 13 where the first column suggested that the total costs in the financial year of running the outpatient care services cost centre were 35.1 million Shilling. The breakdown of this total figure by cost category showed that salaries, dispensary services and laboratory services were the most significant cost components of which the total costs of the laboratory services cost centre have already been distributed among malaria parasite tests and all other tests (Table 16). All cost categories seen in Table 13 for the outpatient department must be allocated among outpatient visits for malaria and all other diagnoses. A reasonable allocation criterion for dividing total salaries in the outpatient department among outpatient visits for malaria and for all other diagnoses would be to estimate how much time over the financial year the employees utilised on malaria care and treatment of all



other diagnoses respectively. A review of the outpatient register revealed that 3,749 of patient visiting the outpatient department were treated for malaria (Table 17). Further, the nurses working in the outpatient department were observed over two whole days when they were seeing patients. The time taken to diagnose and treat individual outpatients was recorded for each outpatient visit and it turned out that an outpatient visit resulting in malaria treatment lasted on average 18 minutes while outpatient visits for the treatment of all other diagnoses lasted on

**Table 17. Number of outpatient visits by diagnosis and employee time by type of outpatient visit at the health centre, financial year July 2007 to June 2008.**

Diagnosis	Number of OPD visits	Employee time per OPD visit in minutes	Total time in minutes	Time allocation, %
Malaria	3,749	18	67,482	30.0
Other diagnoses	11,251	14	157,518	70.0
<b>Total</b>	<b>15,000</b>	<b>15</b>	<b>225,000</b>	<b>100.0</b>

average 14 minutes (Table 17). Multiplying these average durations with the number of outpatient visits over the financial year resulted in an estimate of total personnel time for malaria and all other diagnoses in the outpatient department so that an estimated 30% of nurses' time was used for malaria outpatient visits (Table 17). Consequently, 30% of the total salary costs in the outpatient department were allocated to malaria care (see later).

Another cost category with a high level of costs in the outpatient department was the dispensary consisting mainly of drugs and disposables costs. It was therefore worthwhile spending more time and more detailed methods on dividing this cost category between malaria visits and non-malaria visits. Information on drug utilisation during individual outpatient visits was available from the outpatient department register which specified diagnosis and drugs prescribed for each patient visiting the outpatient department over the financial year. This information was utilised to get an idea of the drug costs per outpatient visit for patients diagnosed with malaria and all other health problems. The individual outpatient visits entered into the outpatient register served as a sampling frame based on which systematic sampling could be applied. Every 70th outpatient visit was selected from the register resulting in 63 outpatient visits with malaria and 151 patients with other diagnoses. Information extracted from the outpatient register has been displayed in Table 18a for malaria and for all other diagnoses in Table 18b. However, the information shown in the two last columns on costs per tablet and costs per prescription was not found at the health centre. Instead the costs per tablet or injection were later captured from the Central Medical Stores in the capital city (last column but one) which could be multiplied by the number of tablets prescribed to arrive at the total drug costs per visit (last column). The average drug costs for malaria were 503 Shillings while the drug costs per visit were 259 Shillings for all other diagnoses (Tables 18a and 18b).



**Table 18a. Drugs prescribed and the associated costs in a sample of patients diagnosed with malaria in the outpatient department at the health centre, financial year July 2007 to June 2008.**

Patient number	Age in years	Diagnosis	Name of drug	Method	Strength	Number prescribed	Price per unit	Drug costs
1	14	Malaria	ACT	Tablet	100/20 mg	18	26	468
			Paracetamol	Tablet	500 mg	21	5	105
2	50	Malaria	ACT	Tablet	100/20 mg	20	26	520
3	9	Malaria	ACT	Tablet	100/20 mg	16	26	416
4	26	Malaria	ACT	Tablet	100/20 mg	18	26	468
			Paracetamol	Tablet	500 mg	21	5	105
5	26	Malaria	ACT	Tablet	100/20 mg	20	26	520
6	52	Malaria	ACT	Tablet	100/20 mg	20	26	520
7	23	Malaria	ACT	Tablet	100/20 mg	16	26	416
8	4	Malaria	ACT	Tablet	100/20 mg	18	26	468
9	54	Malaria	ACT	Tablet	100/20 mg	20	26	520
10	40	Malaria	ACT	Tablet	100/20 mg	16	26	416
11	34	Malaria	ACT	Tablet	100/20 mg	18	26	468
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.								
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.								
62	13	Malaria	ACT	Tablet	100/20 mg	18	26	468
			Paracetamol	Tablet	500 mg	21	5	105
63	37	Malaria	ACT	Tablet	100/20 mg	20	26	520
<b>Average drug costs per visit</b>								<b>503.0</b>
<b>Standard deviation, drug costs</b>								<b>65.7</b>

**Table 18b. Drugs prescribed and the associated costs in a sample of patients diagnosed with other health problems than malaria in the outpatient department at the health centre, financial year July 2007 to June 2008.**

Patient number	Age in years	Diagnosis	Name of drug	Method	Strength	Number prescribed	Price per unit	Drug costs
1	11	Allergy	Chlorpheniramine	Tablet	4 mg	30	21	630
2	8	Fungal infection	Chlorpheniramine	Tablet	4 mg	25	21	525
3	21	Urethral discharge	Kanamycin Sulphate	Injection	1 g	3	54	162
			Doxycycline	Tablet	100 mg	16	32	512
4	50	Diarrhoea	Metronidazole	Tablet	200 mg	10	19	190
5	55	Worm infection	Albendazole	Tablet	200 mg	2	29	58
6	11	Conjunctivitis	Tetracycline	Ointment	1%	1	183	183
7	37	Abdominal pains	Paracetamol	Tablet	500 mg	21	3	63
8	11	Wound on foot	Amoxicillin	Tablet	250 mg	20	18	360
9	19	Tonsillitis	Penicillin Procaine	Injection	300 ml	3	43	129
10	55	Coughing	Cotrimoxazole	Tablet	400/80 mg	36	7	252
11	7	Impetigo	Amoxicillin	Tablet	250 mg	30	18	540
12	54	Gastroenteritis	Cotrimoxazole	Tablet	400/80 mg	30	7	210
.								
.								
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.								
149	54	Abdominal pains	Paracetamol	Tablet	500 mg	21	3	63
150	21	Wound on foot	Amoxicillin	Tablet	250 mg	16	18	288
151	47	Tonsillitis	Penicillin Procaine	Injection	300 ml	3	43	129
<b>Average drug costs per visit</b>								<b>258.6</b>
<b>Standard deviation, drug costs</b>								<b>173.9</b>

Detailed information was collected for developing allocation criteria for the largest cost categories so it was now possible to proceed to some of the minor cost categories. Table 19 presents the results of allocating the total costs of the outpatient cost centre as displayed in Table 13 between malaria visits and all other visits in the outpatient department. The total costs of salaries in the outpatient department were allocated with 30% to malaria visits and 70% to other outpatient visits based on the nurses' time allocation as described earlier. This allocation formula was also applied to other cost categories including utilities and the capital costs of buildings, equipment and furniture (Table 19). Stationery costs were allocated according to the number of visits resulting in a share of 25% of costs allocated to malaria and the rest to all other visits since the number of malaria outpatient visits constituted one quarter of all outpatient visits (Table 17). This allocation method effectively assumed that the utilisation of stationery per visit was the same for malaria and other diagnoses. For the administration and cleaning cost centres, the proportion of visits was also used as an allocation criterion so that a 25% share of costs allocated for malaria visits and the remaining costs to all other visits (Table 19). The costs allocated from the dispensary cost centre to the outpatient care cost centre were 9.5 million Shillings (Table 13), but this amount could be broken down into slightly more detailed categories. A review of the pharmacy order forms to Central Medical Stores in the capital revealed that of the 7,000,000 Shillings spent on drugs and disposables (Table 12), 10% were used for disposables, 15% were for vaccines, 2% were for maternity drugs while the remaining 73% were used for the outpatient services. Using this information suggested that the total drug costs were 5,110,000 Shillings and the total disposables costs were 376,344 Shillings in the outpatient care cost centre for the financial year (Table 19). The remaining costs of the dispensary services could be termed overhead costs since these consisted of non-specific costs like laboratory attendant salary costs and building costs. Multiplying the estimated drug costs per malaria visit (Table 18a) by the number of malaria visits resulted in a total of 1,885,747 Shillings while similarly using the drug costs per non-malaria visit (Table 18b) gave a total of 2,909,723 Shillings. Adding these two total drug costs figures did however not sum to 5,110,000 Shillings which could possibly be explained by some of the drugs expiring before being put to use during the financial year. The estimated drug costs for malaria and non-malaria were therefore increased proportionally so that they summed to 5,110,000 Shillings thus including estimated drug wastage in the costs per visit (Table 19). With respect to disposables, it was assumed that the costs per visit were similar for malaria and all other diagnoses so that the relative number of visits (proportion of visits) was used as the allocation criterion. The overhead costs of the dispensary services were allocated to the two types of visits in proportion to their drugs and disposables costs which meant that malaria visits were given a share of 38.3%. Finally, the costs of the diagnostic services cost centre had already been split between malaria and of tests (Table 16). As a result of the described cost allocation process, it was estimated that the total costs over the financial year for malaria outpatient visits were 15.5 million Shillings which translated into costs per visit of 4,129 Shillings for diagnosing and treating a malaria case in the outpatient department. This latter cost figure was an average in the sense that it was calculated among malaria visits where some had a malaria parasite test done and some were diagnosed presumptively. More specific costs per visits could however be calculated based on the data collected. Leaving out the diagnostic services cost component (6,912,045 Shillings) resulted in an estimate of malaria treatment without a formal test of 2,285 Shillings per visit (Table 19). Further, adding the costs per test from Table 16 to this estimate resulted in estimated costs per malaria visit including a malaria microscopy test of a total of 4,260 Shillings (Table 19).

**Table 19. Distribution of the costs of the outpatient care cost centre between malaria and all other diagnoses using micro-costing for selected cost categories at the health centre, financial year July 2007 to June 2008.**

Cost category	Malaria visits	Other visits	<b>Total</b>	Allocation criterion
<b>Recurrent costs (step 1)</b>				
Salaries	2,491,387	5,815,452	<b>8,306,839</b>	Proportion of nurses' time
Stationery	80,624	241,957	<b>322,581</b>	Proportion of visits
Utilities	178,292	416,174	<b>594,467</b>	Proportion of nurses' time
<b>Capital costs (step 1)</b>				
Buildings	1,244,025	2,903,831	<b>4,147,856</b>	Proportion of nurses' time
Equipment	102,786	239,925	<b>342,710</b>	Proportion of nurses' time
Furniture	257,733	601,607	<b>859,340</b>	Proportion of nurses' time
<b>Overhead cost centres (step 2)</b>				
Administration	197,302	592,116	<b>789,418</b>	Proportion of visits
Cleaning	385,381	1,156,555	<b>1,541,936</b>	Proportion of visits
<b>Support cost centres (step 3)</b>				
Drugs	2,009,431	3,100,569	<b>5,110,000</b>	Actual use from OPD register
Disposables	94,061	282,283	<b>376,344</b>	Proportion of visits
Dispensary overhead	1,525,760	2,453,739	<b>3,979,500</b>	Proportion of costs drugs/disp.
Diagnostic services	6,912,045	1,792,776	<b>8,704,821</b>	Actual use (see Table 16)
<b>Total costs end step 3</b>	<b>15,478,828</b>	<b>19,596,983</b>	<b>35,075,811</b>	
Costs per visit (all)	4,129	1,742	2,338	
Costs per visit (no test)	2,285			
Costs per visit (with test)	4,260			

## References.

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

Conteh L and Walker D (2004) Cost and unit cost calculations using step-down accounting. *Health Policy and Planning* **19**;127-135.

Drummond MF, Sculpher MJ, Torrance GW, O'Brien B and Stoddart GL (2005) *Methods for the economic evaluation of health care programmes, third ed.* Oxford University Press, Oxford.

Jegers M, Edbrooke DL, Hibbert CL, Chalfin DB and Buchardi H (2002) Definitions and methods of cost assessment: an intensivist's guide. *Intensive Care Medicine* **28**;680-685.

Hansen KS and Yeung S (2009) ACT Consortium Guidance on Collecting Household Costs. Available at [www.actconsortium.org/healthconomicsguidance](http://www.actconsortium.org/healthconomicsguidance).

Kumaranayake L, Pepperall J, Goodman H, Mills A and Walker D (2000) *Costing guidelines for HIV prevention strategies*. UNAIDS, Geneva.

Luce BR, Manning WG, Siegel JE and Lipscomp J (1996) Estimating costs in cost-effectiveness analysis. In: *Cost-effectiveness in health and medicine* (eds MR Gold, JE Siegel, LB Russell and MC Weinstein) Oxford University Press, New York, pp 176-213.

Mangham L (2009) ACT Consortium Guidance on Economic Evaluation. Available at [www.actconsortium.org/healthconomicsguidance](http://www.actconsortium.org/healthconomicsguidance).

Mbonye AK, Hansen KS, Bygbjerg IC, Magnussen P (2008) Intermittent preventive treatment of malaria in pregnancy: The incremental cost-effectiveness of a new delivery system in Uganda. *Transactions of the Royal Society of Tropical Medicine and Hygiene* **102**;685-693.

Phillips M, Mills A and Dye C (1993) *Guidelines for cost-effectiveness analysis of vector control*. World Health Organization, Geneva.

Shepard DS, Hodgkin D and Anthony YE (1998) *Analysis of hospital costs: a manual for managers*. World Health Organization, Geneva.

World Health Organization (2002) *Guidelines for estimating costs of introducing new vaccines into the national immunization system*. World Health Organization, Geneva.

# Appendix:

## **Data collection tools for cost information**



## Data capture sheet\_1: Recurrent and capital expenditure

Name of health facility: \_\_\_\_\_

Specify period: \_\_\_\_\_

Category	Expenditure	Currency
<b>Recurrent expenditure</b>		
Salaries		
Medicines		
Disposables		
Stationery		
Maintenance of buildings and compound		
Post and Telecommunications		
Utilities (electricity, water, sanitation)		
Transport		
Domestic expenses		
Laundry		
Training		
Other:		
<b>Capital expenditure</b>		
Buildings		
Vehicles		
Equipment		
Furniture		
<b>Total expenditure</b>		





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## Data capture sheet\_4: Capital goods available

Size of rooms or departments and availability of equipment and furniture

Name of health facility: \_\_\_\_\_

Specify period: \_\_\_\_\_

Name of room or department: \_\_\_\_\_

Size of room or department in square metres: \_\_\_\_\_ Square metre price: \_\_\_\_\_

List all equipment in the room/department:

Name	Model and make	Expected lifespan	Number available	Price	Source of price data

List all furniture in the room/department:

Name	Model and make	Expected lifespan	Number available	Price	Source of price data

Only equipment in working order must be listed.

If a piece of equipment has been out of order for the whole financial year, it should not be listed.

If a piece of equipment has been working for some of the financial year, it should be listed above.

## Data capture sheet\_5: Capital goods available

Vehicles available

Name of health facility: \_\_\_\_\_

Specify period: \_\_\_\_\_

List all vehicles available:

<b>Name</b>	<b>Model and make</b>	<b>Expected lifespan</b>	<b>Number available</b>	<b>Price</b>	<b>Source of price data</b>

Only vehicles in working order must be listed.

If a vehicle has been out of order for the whole financial year, it should not be listed above.

If a vehicle has been working for some of the financial year, it should be listed above.

## Data capture sheet\_6: Types of activities and services performed

Name of health facility: \_\_\_\_\_

Specify period: \_\_\_\_\_

Type of activity	Tick if available
<b><i>Overhead activities</i></b>	
Administration	
Accounting	
Compiling health information	
Cleaning of health centre	
Laundry	
Other:	
<b><i>Support activities</i></b>	
Dispensary services	
Diagnostic services	
Other:	
<b><i>Final service activities</i></b>	
Outpatient care (malaria)	
Outpatient care (other diagnoses)	
Antenatal visits	
Postnatal care visits	
Vaccination	
Family planning services	
Maternity services	
Other:	

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## Data capture sheet\_7: Number of diagnostic tests performed

Name of health facility: \_\_\_\_\_

Specify period: \_\_\_\_\_

Type of service:	Malaria microscopy						
	Enter number of services below						
January _____ (indicate year)							
February _____							
March _____							
April _____							
May _____							
June _____							
July _____							
August _____							
September _____							
October _____							
November _____							
December _____							



## Data capture sheet\_8: Number of final services performed

Name of health facility: \_\_\_\_\_

Specify period: \_\_\_\_\_

Type of service:	Outpatient care (malaria)	Outpatient care (other diagnoses)	Antenatal visits	Postnatal care visits	Vaccination	Family planning services	Maternity services
	Enter number of services below						
January ____ (indicate year)							
February ____							
March ____							
April ____							
May ____							
June ____							
July ____							
August ____							
September ____							
October ____							
November ____							
December ____							

## Data capture sheet\_9: Time allocation of health centre employees

Name of health facility: \_\_\_\_\_

Specify period: \_\_\_\_\_

Estimate in % time allocated during a normal week

Personnel category	Midwife	Nurse	Other:		
<b>Activity</b>					
Administration					
Accounting					
Compiling health information					
Cleaning of health centre					
Laundry					
Dispensary services					
Diagnostic services					
Final service activities					
Other:					
<b>Total</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

## Data capture sheet\_10: Time allocation of personnel for final services

Name of health facility: \_\_\_\_\_

Specify period: \_\_\_\_\_

Indicate how many minutes are normally used per single service:

	Midwife	Nurse	Other:		
Outpatient care visit (malaria)					
Outpatient care visit (other diagnoses)					
Antenatal visit					
Postnatal care visit					
Vaccination					
Family planning services					
Maternity (per day per patient)					
Other:					

Some of the final services listed below may be performed with more than one personnel at a time attending to a patient:

	List the personnel who normally work together for the services listed
Outpatient care visit (malaria)	
Outpatient care visit (other diagnoses)	
Antenatal visit	
Postnatal care visit	
Vaccination	
Family planning services	
Maternity (per day per patient)	
Other:	







## Data capture sheet\_14: Malaria microscopy testing

Micro-costing

Name of health facility: \_\_\_\_\_

Specify period: \_\_\_\_\_

Size of area utilised for malaria microscopy testing in square metres: \_\_\_\_\_

List all equipment available for malaria microscopy testing:

Name	Model and make	Number available	Price	Source of price data
Microscope				

List all furniture available for malaria microscopy testing:

Name	Model and make	Number available	Price	Source of price data

List name and number of all tests performed using the microscope during the financial year:

Name of test	Number performed

## Data capture sheet\_15: Malaria microscopy testing

Micro-costing

Name of health facility: \_\_\_\_\_

Specify period: \_\_\_\_\_

List all personnel available for malaria microscopy testing:

Personnel category	Personnel time per individual test

List name and amount of consumables utilised per individual test as well as the amount of consumables utilised in total over the financial year

Description	Amount required per test	Amount in total utilised during financial year	Price per unit	Source of price data
Field stain A				
Field stain B				
Oil immersion				
Test kit				
Needle				
Cotton wool				

List name of items that can be used for more than one test and how many times it may be utilised as well the number of items consumed in total over the financial year

Description	How many times may this be re-used?	Number of items consumed in total during financial year	Price per item	Source of price data
Microscope slide				
Gloves				
Tube				



## Data capture sheet\_16: Malaria treatment

Micro-costing

Name of health facility: \_\_\_\_\_

Specify period: \_\_\_\_\_

Size of area utilised for malaria treatment (outpatient area) in square metres: \_\_\_\_\_

List all equipment specifically for malaria treatment (if any):

Name	Model and make	Number available	Price	Source of price data

List all furniture specifically for malaria treatment (if any):

Name	Model and make	Number available	Price	Source of price data

Indicate number of outpatient department visits by diagnosis during the financial year:

Diagnosis	Number of OPD visits
Malaria	
Other diagnoses	

List all personnel available for malaria treatment:

Personnel category	Personnel time per malaria OPD visit



