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Step-Down Costing Methodology for Health Facilities

Chad Child Survival Project

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I. What is Step-Down Costing?¹

Step-Down costing is a disaggregated method of analyzing the costs associated with specific health facility outputs. It is based on a scrutiny of the health facility production process to enable the best assignment of input costs to the outputs to which they are related. All expenditures on health facility inputs are first directly attributed to specific <<cost centers>> or departments. Three *primary cost centers* are employed in our Step-Down approach:

1. *Overhead outputs or services* defined as those outputs or services that are consumed exclusively by other service departments (i.e., not by patients);
2. *Intermediate outputs or services* defined as those outputs or services that are consumed both by other service departments and directly by patients; and,
3. *Final outputs or services* defined as those outputs or services that are consumed exclusively by patients.

Depending upon the type of health facility whose services are being costed, a subsidiary set of secondary cost centers or departments are then defined which are associated with the primary cost centers. A suggestive list of the type of secondary cost centers that could be defined for a health center and a hospital are provided below.

¹ Our explanation of the Step-Down costing methodology draws in part on Barnum and Kutzin, 1993, Public Hospitals in Developing Countries: Resource Use, Cost, Financing. Baltimore: Johns Hopkins University Press.

Primary Cost Center	Secondary Cost Centers	
	Health Center	Hospital
Overhead outputs	Administration Maintenance Stores Supervision	Administration Housekeeping Laundry Operation & Maintenance Purchasing Stores Supervision
Intermediate outputs	Cold Room Laboratory Pharmacy	Ambulance Anesthesiology Blood Bank Cold Room Food Services Laboratory Morgue Nursing Operating Theater Orthopedics & Physio- Therapy Pharmacy Radiology
Final outputs	Outpatient Preventive Growth Monitoring Family Planning Immunization Pre-Natal Care	Outpatient/Emergency Inpatient Cardiology Emergency Medicine General Medicine Neurology Obstetrics/Gynecology Pediatrics

It is recommended that you review the secondary cost center classification for the health centers you will be costing and make any changes deemed necessary. Note that the cost sheets defined in HC_COST1.XLS assume that the preceding cost center classification scheme is going to be used. If you make any changes to the preceding classification scheme, be sure to change HC_COST1.XLS accordingly.

II. Using a Step-Down Approach to Estimating Costs

Once the cost centers have been defined, input costs are allocated in a three-step process to these primary and secondary cost centers. The first step is to allocate all input costs to the primary cost centers (see Diagram 1 below). There are several options in this case. Option 1 is that the input is used exclusively to produce either an overhead output or service, an intermediate output or service or a final output or service. In this case 100% of the input use would be attributed to either the Overhead, Intermediate or Final cost center category. Option 2 is that the input is *shared* and thus used to jointly produce a combination of overhead, intermediate, and final outputs or services. In this case at least two categories would be attributed a percentage less than 100% but greater than 0% whose sum equaled 100%.

Different criteria are used to allocate the input costs between the primary cost centers depending upon the type of input. *Labor input costs* (wages, benefits) are allocated in proportion to the percentage of total working time a given employee spends on the production of overhead, intermediate or final services (see Example 1 below). *Non-labor input costs* are allocated either in proportion to the percentage of time the input is used to produce overhead, intermediate or final outputs, or in proportion to the utilization of the services produced, or in proportion to the total floor-space allocated to service production (see Example 2 below).

The second step is to allocate the primary cost center input costs to the secondary cost centers (see Diagram 1 and Example 3 below). The same allocation criteria as elaborated above should be used for this step. Diagram 1 depicts the allocation process for the annual labor costs of a Medical Assistant (MA). In this case the MA spends 20% of his total work time on Overhead-related service production. Of this 20% of his total time, he allocates 80% to Administrative tasks, and 20% to Supervision tasks. In addition, of the 5% of his total time that he allocates to Intermediate-related service production, he allocates 50% of it to Laboratory-related tasks, and the remaining 50% to Cold Room

related tasks. Finally, of the 75% of his total time that he uses for Final service production, he allocates 80% to Outpatient service production, and 20% to Preventive service production. The percentage of time allocated to Preventive service production is further decomposed as follows: 5% to Growth Monitoring service production; 5% to Family Planning service production; 5% to Immunization service production; and 5% to Pre-natal Care service production.

Step 1 and Step 2 thus allocate the *direct* input costs to the primary and secondary cost centers. However, Overhead inputs are also used *indirectly* to produce Intermediate and Final outputs. In addition, Intermediate inputs are also used indirectly to produce Final outputs. Thus, a third re-allocative step is required which re-distributes Overhead and Intermediate input costs to Intermediate and Final output production.

The third step is to re-allocate the secondary Overhead and Intermediate input costs to the secondary Intermediate and Final cost centers (see Diagram 1 and Example 4). Again, the same allocation criteria as elaborated above should be used for this step. From Diagram 1, it can be seen that of the 16% of the MA's total time spent on "Overhead:Administration" related service production,² 30% of this time is allocated to administering the "Intermediate:Laboratory" service production, 10% is allocated to administering the "Intermediate:Cold Room" service production, 30% is allocated to administering "Final:Outpatient" service production, and 30% is allocated to administering "Final:Preventive" service production.³ Of the 4% of the MA's total time spent on

² 16% = 80% Administration share of the 20% of total time used to produce Overhead services. To see this note that $0.16 = 0.8 \times 0.2$.

³ The 30% of "Overhead:Administration" time allocated to "Final:Preventive" service production is decomposed further as follows: 2% allocated to "Final:Growth Monitoring"; 2% allocated to "Final:Family Planning"; 24% allocated to "Final:Immunization"; and, 2% allocated to "Final:Pre-Natal Care" service production.

“Overhead:Supervision” related service production,⁴ the MA allocates 25% of this time to supervising “Intermediate:Laboratory” service production, 25% to supervising “Intermediate:Cold Room” service production, 25% to supervising “Final:Outpatient” service production, and 25% to supervising “Final: Preventive” service production.

Of the 2.5% of the MA’s total time used for “Intermediate:Laboratory” service production, 85% is allocated to laboratory work performed for “Final:Outpatient” service production, and 15% is allocated to laboratory work performed for “Final:Preventive” service production. Of the 2.5% of the MA’s total time used for “Intermediate:Cold Room” related service production, 5% is allocated to storing vaccine and other heat-sensitive materials for “Final:Outpatient” related service production, and 95% is used to store vaccines for “Final:Preventive” service production.

The ultimate Step-Down allocation of input costs by Final cost center for the Medical Assistant example depicted in Diagram 1 is presented in Table 1. Note that the Intermediate cost calculation is based not only on the share of total costs allocated to Intermediate cost centers (in this case, Laboratory and Cold Room), but also on the share of Overhead costs that are attributed to these Intermediate Inputs (which in turn are used to indirectly support Final output production).

Remember, the preceding allocation process must be undertaken for every input used to produce health services at each facility studied. Given the small number of health care facilities that we will be considering, all those that are engaging in cost-recovery activities should be included in the costing exercise.

⁴ 4% = 20% Supervision share of the 20% of total time used to produce Overhead services.

Diagram 1: The Step-Down Cost Attribution Methodology -- Attributing a Medical Assistant's Labor Costs

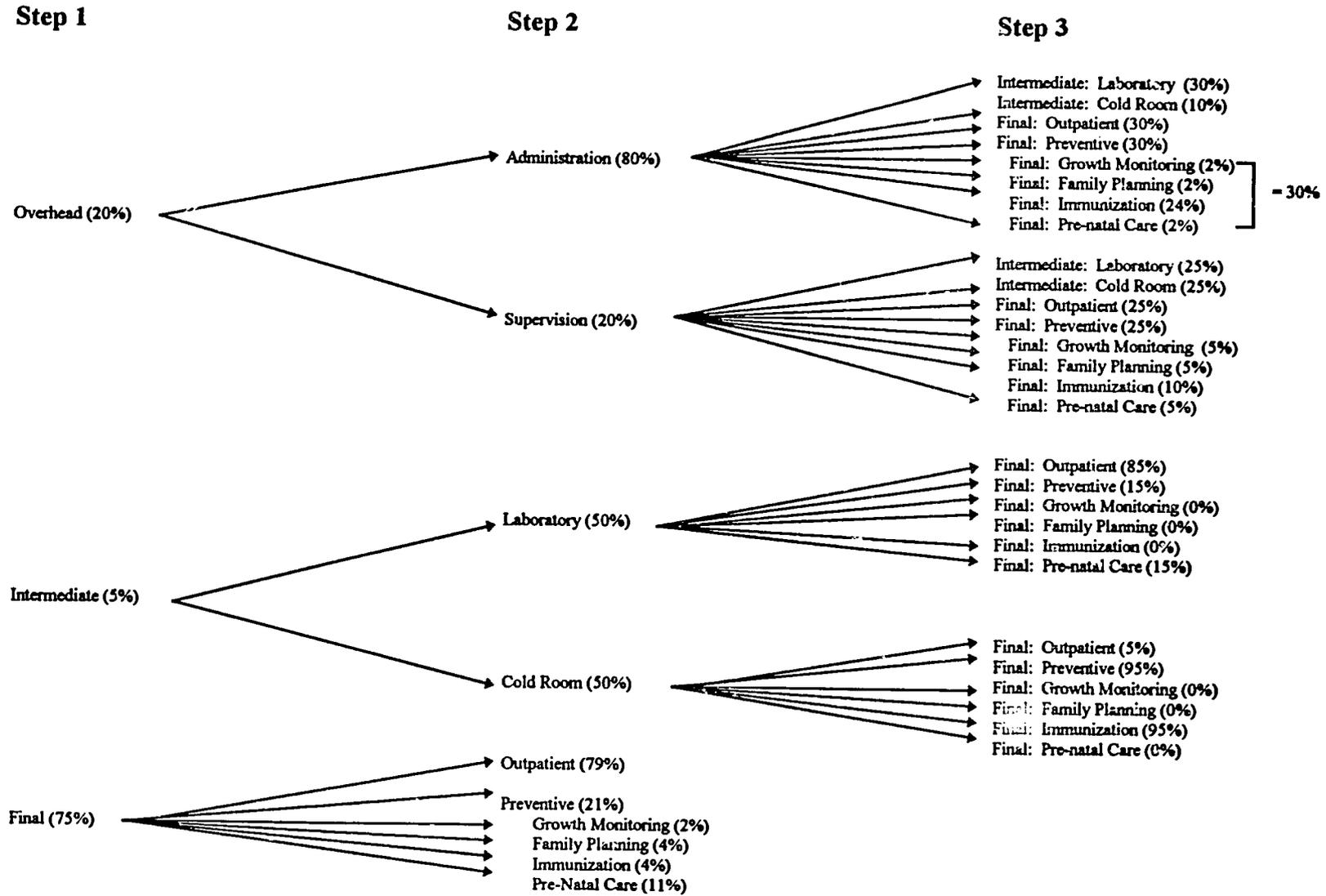


Table 1: Step-Down Cost Summary by Final Cost Center

Final Cost Center	Direct Costs	Indirect Costs		Total Costs
		Overhead Costs	Intermediate Costs	
Outpatient Services	$\$1000 \times 0.79 \times 0.75 =$ \$592.5	$\{[\$1000 \times 0.3 \times 0.8 \times 0.2 =$ $\$48] + [\$1000 \times 0.25 \times 0.2$ $\times 0.2 = \$10]\} =$ \$58	$\{0.85 \times [(\$1000 \times 0.05 \times$ $0.5 = \$25) + (\1000×0.3 $\times .08 \times 0.2 = \$48) +$ $(\$1000 \times 0.25 \times 0.2 \times 0.2 =$ $\$10)] = \$70.55\} + \{0.05 \times$ $[(\$1000 \times 0.5 \times 0.05 = \$25)$ $+ (\$1000 \times 0.10 \times 0.8 \times 0.2$ $= \$16) + (\$1000 \times 0.25 \times$ $0.2 \times 0.2 = \$10)] = \$2.55\}$ = \$73.10	\$600 + \$58 + \$73.10 = \$731.10
Preventive Services	$\$1000 \times 0.21 \times 0.75 =$ \$157.5	$\{[\$1000 \times 0.3 \times 0.8 \times 0.2 =$ $\$48] + [\$1000 \times 0.25 \times 0.2$ $\times 0.2 = \$10]\} =$ \$58	$\{0.15 \times [(\$1000 \times 0.05 \times$ $0.5 = \$25) + (\1000×0.3 $\times .08 \times 0.2 = \$48) +$ $(\$1000 \times 0.25 \times 0.2 \times 0.2 =$ $\$10)] = \$12.45\} + \{0.95 \times$ $[(\$1000 \times 0.5 \times 0.05 = \$25)$ $+ (\$1000 \times 0.10 \times 0.8 \times 0.2$ $= \$16) + (\$1000 \times 0.25 \times$ $0.2 \times 0.2 = \$10)] = \$48.45\}$ = \$60.90	\$150 + \$58 + \$60.90 = \$268.90
Total	\$750	\$116	\$134	\$1000

Notes: It is assumed in this illustrative case, that the annual salary of the Medical Assistant is \$1000.

Example 1: Allocating Direct Staff Costs of a Medical Assistant at a Community Health Center

As per the example in Diagram 1, assume that the MA allocates his time between Overhead, Intermediate and Final service production in the following way:

Primary Cost Center	Share of Total Time
Overhead	20%
Intermediate	5%
Final	75%

Final service production time is further allocated among the following secondary cost centers: (1) Curative Outpatient care; (2) Growth Monitoring; (3) Family Planning; (4) Immunization; and (5) Pre-Natal Care. To estimate the percentage of time spent on each of these secondary final cost centers, first estimate the average time spent by the MA per consultation. For example,

Secondary Cost Center	Average Time per Consultation
Curative Outpatient	15 minutes
Growth Monitoring	5 minutes
Family Planning	7 minutes
Immunization	3 minutes
Pre-Natal Care	10 minutes

Next obtain annual utilization data for each of these secondary final cost centers. For example,

Secondary Cost Center	Annual Utilization
Curative Outpatient	5000
Growth Monitoring	400
Family Planning	500
Immunization	1200
Pre-Natal Care	1000

Using the average consultation time as "weights", calculate the total time allocated to all Final service production as follows:

$$(5000 \times 15) + (400 \times 5) + (500 \times 7) + (1200 \times 3) + (1000 \times 10) = 94,100$$

The proportion of *Final production time* allocated directly to each of the Final services is calculated as follows:

Curative Outpatient	$(5000 \times 15) / 94100 = 0.79$
Growth Monitoring	$(400 \times 5) / 94100 = 0.02$
Family Planning	$(500 \times 7) / 94100 = 0.04$
Immunization	$(1200 \times 3) / 94100 = 0.04$
Pre-Natal Care	$(1000 \times 10) / 94100 = 0.11$

The proportion of *total time* allocated directly to each of the Final services is calculated by multiplying the preceding proportions by the share of total time allocated to Final service production (in this case, 75%). For example,

Curative Outpatient	$0.79 \times 0.75 = 0.59$
Growth Monitoring	$0.02 \times 0.75 = 0.01$
Family Planning	$0.04 \times 0.75 = 0.03$
Immunization	$0.04 \times 0.75 = 0.03$
Pre-Natal Care	$0.11 \times 0.75 = 0.08$

Notes: This example is based in part upon Kara Hanson and Lucy Gilson, 1993, *Cost, Resource Use and Financing Methodology for Basic Health Services: A Practical Manual*. New York: UNICEF. Bamako Initiative Technical Report Series

Example 2: Allocating Direct Costs of a Health Center Building

Assume that the percentage of floor space used to supply the secondary final cost center services is the following:

Secondary Cost Center	% of Floor Space Used
Curative Outpatient	40%
Growth Monitoring] 60%
Family Planning	
Immunization	
Pre-Natal Care	

To distribute the floor space between the four preventive care cost centers, calculate the proportion of total utilization for these services:

Secondary Cost Center	Annual Utilization	Utilization Proportion
Growth Monitoring	400	$400 / 3100 = 0.13$
Family Planning	500	$500 / 3100 = 0.16$
Immunization	1200	$1200 / 3100 = 0.39$
Pre-Natal Care	1000	$1000 / 3100 = 0.32$
Total Preventive:	3100	$3100 / 3100 = 1.00$

The proportion of total floor space allocated to each secondary cost center service is thus:

Secondary Cost Center	Proportion of Floor Space
Curative Outpatient	40%
Growth Monitoring	$60\% * 0.13 = 8\%$
Family Planning	$60\% * 0.16 = 10\%$
Immunization	$60\% * 0.39 = 23\%$
Pre-Natal Care	$60\% * 0.32 = 19\%$
Total	100%

Since the HSFP&M Modules© use the same Step-Down approach as outlined above, the actual cost calculations will be carried out automatically. As should be clear from a review of Diagram 1 and Table 1, installation of the HSFP&M Modules will greatly simplify the implementation and updating of this type of cost-accounting exercise -- a capacity that is ultimately essential if the prefecture is to be in a position to accurately advise health facilities in break-even price setting.

Example 3: Re-Allocating Indirect Overhead and Intermediate Cost Center Production Costs to Secondary Final Cost Centers -- The Case of a Medical Assistant Annual Labor Costs

It is assumed that a Medical Assistant's (MAs) annual wage plus benefit cost is \$1000.

Overhead Costs Allocated to Final Outpatient Care Service Production:

As indicated in Step 1 of Diagram 1, it is estimated that the MA allocates 20% of his time to Overhead service production activities. In Step 2 it is estimate that of this 20% of his total time he allocates 80% to Administration and 20% to Supervision. In Step 3, it is further estimated that he allocates 30% of the time devoted to "Overhead:Administration" to administering Outpatient care, and 25% of "Overhead:Supervision" to supervising Outpatient care. Thus the Overhead costs allocated to final Outpatient care production are calculated as follows:

Overhead:Administration:Final:Outpatient	$\$1000 \times (0.20 \times 0.80 \times 0.30) = \$ 48$
Overhead:Supervision:Final:Outpatient	$\$1000 \times (0.20 \times 0.20 \times 0.25) = \$ 58$

Intermediate Costs Allocated to Final Outpatient Care Service Production:

As indicated in Step 3 of Diagram 1, it is estimated that the MA allocates 30% of the "Overhead:Administration" time to administering Intermediate:Laboratory service production. A further 10% of "Overhead:Administration" time is allocated to administering "Intermediate:Cold Room" services. In addition, the MA allocates 25% of his "Overhead:Supervision" time to supervising the "Intermediate:Laboratory" service production, and a further 25% of his "Overhead:Supervision" time to supervising the "Intermediate:Cold Room" service production. Thus the Overhead costs allocated to Intermediate Laboratory and Cold Room service production are calculated as follows:

Overhead:Administration:Intermediate:Laboratory	$\$1000 \times (0.2 \times 0.8 \times 0.3) = \48
Overhead:Supervision:Intermediate:Laboratory	$\$1000 \times (0.2 \times 0.2 \times 0.25) = \10
Overhead:Administration:Intermediate:Cold Room	$\$1000 \times (0.2 \times 0.8 \times 0.1) = \16
Overhead:Supervision:Intermediate:Cold Room	$\$1000 \times (0.2 \times 0.2 \times 0.25) = \10

As indicated in Step 1 of Diagram 1, it is estimated that the MA allocates 5% of his time to Intermediate service production activities. In Step 2 it is estimated that 50% of the time allocated to Intermediate service production activities is used for the production of Laboratory services, and that the remaining 50% is used to produce Cold Room services. Finally, in Step 3 it is estimated that 85% of "Intermediate:Laboratory" service production time is allocated to "Final:Outpatient" service production, and that 5% of "Intermediate:Cold Room" service production time is allocated to "Final:Outpatient" service production. Thus, the Intermediate Costs allocated to Final Outpatient service production are calculated as follows:

Intermediate:Laboratory:Final:Outpatient	$\{\$48 + \$10 + [\$1000 \times (0.05 \times 0.5)]\} \times 0.85 = \70.55
Intermediate:Cold Room:Final:Outpatient	$\{\$16 + \$10 + [\$1000 \times (0.05 \times 0.5)]\} \times 0.05 = \$ 2.55$

Total Indirect Costs Allocated to Final Outpatient Care Production:

Overhead:Administration:Final:Outpatient	\$ 48
Overhead:Supervision:Final:Outpatient	\$ 58
Intermediate:Laboratory:Final:Outpatient	\$ 70.55
Intermediate:Cold Room:Final:Outpatient	\$ 2.55
Total Indirect Final:Outpatient	\$179.10

Notes: This example explains how the calculations in Table 1 for Indirect Overhead and Intermediate costs are derived.

III. How to Use the HC_COST1.XLS Cost Input File to Conduct a Step-Down Cost Study

In order to facilitate the collection and classification of cost data, use the EXCEL file called HC_COST1.XLS (referred to hereafter as “the file”) which has been sent with this explanatory text. The file is an EXCEL Workbook which can only be used in EXCEL Version 5.0. The file contains the following 34 sheets:

No.	Sheet Name	Purpose
1	Building	To establish what current buildings would cost to build
2	Equipment (1)	To identify equipment costs at health center number 1
3	Equipment (2)	To identify equipment costs at health center number 2
4	Equipment (3)	To identify equipment costs at health center number 3
5	Equipment (4)	To identify equipment costs at health center number 4
6	Equipment (5)	To identify equipment costs at health center number 5
7 - 11	Furniture (1) - Furniture (5)	To identify furniture costs at health centers number 1 to 5
12 - 16	Labor (1) - Labor (5)	To identify labor costs at health centers number 1 to 5
17 - 21	Supplies (1) - Supplies (5)	To identify supplies costs at health centers number 1 to 5
22 - 26	Training (1) - Training (5)	To identify training costs at health centers number 1 to 5
27 - 31	Transport (1) - Transport (5)	To identify transport costs at health centers number 1 to 5
32	Utilities	To identify utility costs at all health centers
33	Other	To identify any other costs not attributable to cost categories identified above.
34	Step-Down Proportions	To establish cost allocation proportions for final stage of Step-Down Costing

Specific observations or instructions for each of these 34 sheets will be provided in order below.

Sheet 1: Building

Col [2]: eg., Rural Health Center

Col [3]: Estimate the total investment cost of building a comparable health facility in the same location in current (1994) FCFA. Be sure to factor in difference in construction costs that might result from the distance of the construction site from the contractor or materials supplier.

Col [4]: Have the architect/builder estimate annual maintenance costs for each of these facilities -- assuming the necessary financing is available.

Col [5] - Col [7]: Refer to definition of Overhead, Intermediate and Final service production provided above. Should sum to 100%.

Col [8] - Col [11]: Should sum to 100%.

Col [12] - [14]: Should sum to 100%.

Col [15] - [19]: Should sum to 100%. **Remember: If any changes are made to the Secondary Cost Center classification scheme proposed above, these changes should be reflected in these sheets.**

Sheet 2 - Sheet 6: Equipment (1) to Equipment (5)

Col [1]: Be specific in equipment description, including manufacturer information, model type etc. so that cost information can be confirmed or obtained if not available locally.

Col [4]: Total cost is the product of columns [2] x [3]. This should be expressed in 1994 FCFA.

Col [6] - Col [20]: These estimates should be made in conjunction with the health center staff that use the equipment. The distinction between "Equipment" and "Supplies" is that the former has a useful life of more than one year, whereas the latter (e.g., a sheet of paper) has a useful life of less than a year.

Col [6] - [8]: Must either sum to 0% (if the equipment is not used at all), or sum to 100%. For example, if the equipment is used exclusively in the Laboratory then Col [6] = 0%; Col [7] = 100%; and Col [8] = 0% (whose sum = 100%). This is the case even if the equipment is only used at 25% of capacity.

Col [9] - Col [12]: Must either sum to 0% (if the equipment is not used at all), or sum to 100%.

Col [13] - Col [20]: Must either sum to 0% (if the equipment is not used at all), or sum to 100%.

Sheet [22] - Sheet [26]: Training (1) to Training (5)

Record actual training received by health center staff in 1993, 1994, and scheduled for 1995. Cost data should be estimated by the training center for each type of training activity. Remember, costs are to be expressed on a per participant basis.

Sheet [27] - Sheet [31]: Transport (1) to Transport (5)

Vehicles include both motorized and non-motorized varieties (eg., bike). This is for vehicles “owned” exclusively by a given health facility.

Sheet [32]: Utilities

Col [5]: Eg. for kerosene refrigerators.

Sheet [33]: Other

Use this sheet to include the cost of any other input that cannot be included in the classification scheme represented by sheets [1] through [32]. **Be sure to allocate the cost between the different primary and secondary cost centers as is done on the other sheets.**

Sheet [34]: Step-Down Proportions

Provide estimates of the proportion of Overhead costs that are indirectly attributable to Intermediate and Final Cost Centers, and the proportion of Intermediate costs that are indirectly attributable to Final Cost Centers.

Note: The same proportions will be used for all inputs, so this can only be a “guestimate”.