



Produced for the Rwandan Ministry of Health (MINISANTE)

2006 Rwanda Health Center and Hospital Cost Study Twubakane Decentralization and Health Project

15 May 2008

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This report is made possible by the support of the American people through the United States Agency for International Development (USAID). The contents are the responsibility of the authors and do not necessarily reflect the views of USAID or the United States Government.

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Acknowledgements

Twubakane, RTI International, and the School of Public Health would like to thank and acknowledge people and institutions for their support and contributions to the Rwanda Health Services Costing Study. The preparation of this report has involved the generous cooperation of several people and institutions from around the country that have lent their time and expertise to the study. The following people have supplied much input during preparation and review of the material contained in this report; in so doing, they have contributed to the important and exciting exercise of updating the costing and tariffs of Rwanda's health services, and furthered the goals of the Government of Rwanda to advance its health finance agenda:

- Karoline Kayonga - Permanent Secretary of the Rwanda Ministry of Health (MINISANTE)
- Dr. Claude Sekabaraga - Director of Policy and Planning of the Rwanda Ministry of Health (MINISANTE)
- Manzi Martin - Director of Infrastructure and Equipment for Health Facilities, MINISANTE Rwanda
- Gyuri Fritsche, MD, MSc, - MSH Rwanda
- Randolph Augustin - Health Officer of USAID Rwanda
- A.K. Nandakumar, PhD - Senior Health Economist, RTI International
- Laura Hoemeke - COP and Director of the Twubakane Program in Rwanda
- Dr. Etienne Gasana – Technical Coordinator for Health Facilities and Mutuelles Management, Twubakane Program in Rwanda
- Dr. Maurice Bucagu - Professor and Consultant of the Rwanda School of Public Health
- All the data collectors from the Rwanda School of Public Health

The following institutions have provided valuable assistance in the preparation of this report through technical and financial contributions, as well as data collection, compilation, and analysis:

- USAID/Rwanda
- MINISANTE - Ministry of Health of Rwanda
- Rwanda School of Public Health
- Management Sciences for Health (MSH) - Rwanda office
- The following 8 District Hospitals, (particularly their directors and HMIS officers) = Ruli, Rutongo, Ruhengeri, Gitwe, Mibilizi, Kibuye, Nyagatare, and Kibungo
- The following Health Centers, (particularly their directors and medical staff) = Biryogo, Busengo, Bwisige, Gashora, Gatagara, Gisagara, Gisakura, Giti, Gitega, Gisenyi, Kabaya, Kabusunzu, Karama, Kicukiro, Kigembe, Kigeme, Kinyinya, Kitabi, Mukungu, Murara, Musenyi, Mushaka, Muzanza, Mwogo, Nyange, Nyarusange, Remera Mbogo, Rilima, Rubengera, Rubungo, Rukira, Ruli, Rwankeli, Rwankuba, and Shingiro

To all of these people, institutions and any others who have made this study possible, the authors and Twubakane Project staff owes a tremendous debt of gratitude.

Abbreviations

| | |
|--------|---|
| C | cost |
| CBHI | community-based health insurance (<i>mutuelles</i>) |
| CPA | comprehensive package of services |
| FRW | Rwandan Franc |
| FTE | full time equivalent |
| GoR | Government of Rwanda |
| IP | inpatient |
| MMI | Military Medical Insurance |
| MPA | minimum package of services |
| MSH | Management Sciences for Health |
| OB/GYN | obstetrics/gynecology |
| OP | outpatient |
| PBF | performance-based financing |
| PMTCT | prevention of mother-to-child transmission |
| Q | quantity |
| RALGA | Rwandese Association of Local Government Authorities |
| RAMA | Rwandan Medical Insurance Scheme |
| RTI | Research Triangle Institute International |
| SPH | Rwanda School of Public Health |
| STI | sexually transmitted infections |
| USAID | United States Agency for International Development |
| VCT | voluntary counseling and testing |
| VNG | <i>Vereniging van Nederlandse Gemeenten</i> , International Cooperation Agency of the Netherlands |

Executive Summary

In early 2007, the USAID-funded Twubakane Decentralization and Health Program designed a costing analysis study in order to provide a robust accounting of the costs of health services at the health center and district hospital levels. To support the GoR in achieving its objectives for a better planned and managed health sector, Twubakane undertook a health services costing study in early 2007. Under the leadership of Twubakane partner RTI International and collaboration with the Rwandan School of Public Health, this study's primary objective was to conduct full and complete cost analyses of the existing minimum package of health services (MPA) provided at the health center level and the comprehensive package of health services (CPA) provided at the district hospital level. Data generated from these analyses serve to inform decision-making and improved management of health resources at the national, district, and facility levels.

The team designed its methodology and data collection to build upon and enhance previous studies conducted by the Rwandan Ministry of Health and to include additional data. The categories of data collected for the study are as follows: assets and equipment; personnel time allocation and specific activities; drugs and medical supplies; revenue and expenditure data; and allocation factors. The team then applied a step-down cost allocation methodology that was previously developed and applied in another country setting (Mongolia) and that allowed full capture of Rwandan health center and district hospital costs. Three cost centers were employed: indirect cost centers; support cost centers; and direct cost centers. The team calculated fully loaded unit costs, average costs and weighted costs for MPA and CPA services at the health centers and district hospitals, respectively.

Key findings from the cost study include:

- Compared with previous studies, unit costs are higher in the Twubakane study. This is less an indicator that costs have risen in 2006 than previously; rather, the Twubakane methodology included a greater number of resources and thus the results presented here represent a more full estimation of the costs of providing care at the health and hospital levels. More comprehensive cost information will be useful for the government when setting tariffs that cover a portion of the cost of care.
- At the health center level, the highest number of visits was reported for malaria consultations with the fewest reported for meningitis (note: meningitis care was only provided at seven of the 35 health centers included in the sample). The high number of malaria consultations indicates that malaria and malaria-related care constitute a significant burden on health centers in terms of care provided. However, from a cost standpoint, costs for malaria visits were found to be within the same range (around 2,000 FRW) as other services, given the small amount of variation among resources consumed when delivering each consultation.
- At the district hospital level, for the eight hospitals included in the sample, on average, utilization (measured in inpatient bed days) was highest for internal medicine, followed closely by OB/GYN visits, surgeries and with overall low pediatric visits. Subsequently, pediatric visits were on average the costliest, given low utilization and high fixed costs.
- At the health center level, family planning services are the most costly and the least utilized services. Efforts to improve utilization of family planning services would both reduce unit cost of these services and help to achieve national family planning goals.
- Out-of-pocket payments are higher for religious-affiliated (agree) health centers than public health centers, suggesting that households accessing these facilities face a higher financial burden in terms of overall costs of care than they might at public health facilities.

This also suggests that fewer households accessing the religious-affiliated are enrolled in *mutuelles* or other insurance schemes.

- Donors finance a higher portion (33.22%) of revenues at religious-affiliated health centers than public health centers (8.85%), which could have implications for short- and long-term sustainability of these facilities given the relative unpredictability of donor financing.

The results of the costing study can be used in the following ways:

Setting Tariffs

Setting tariffs for particular services can be very useful for developing a fee schedule that is standardized and consistent within the health services context. One of the primary considerations for setting tariffs depends on the specified payer of the service (i.e. an individual or health insurance program/mutuelle), their ability to pay, as well as inflationary factors, etc. The above described cost data represent “fully loaded” costs. In essence, if one expected the payer to cover 100% of the cost of a service, the unit cost of the service would be equivalent to the price. Rather, as outlined in the data regarding revenue sources earlier in this report, there are many different payers within the health sector in Rwanda. We suggest that the Rwanda Ministry of Health work on identifying reasonable objectives and targets for different payers to cover a portion of the cost of a service. Clearly, it would be very difficult for most citizens within Rwanda to pay the “full cost” of a service. Policymakers need to identify payer target proportions and develop incentives within the health system to achieve those targets.

Addressing Health Care Financing

Similarly, the data from the Twubakane cost study can be applied to further examine health care financing issues in Rwanda. First, the Ministry of Health should examine both expenditure and revenue data in order to develop financing targets (proportions shared by payer) as outlined above. Initially, a greater amount of subsidy may be necessary from government and donors. Overtime, as the *mutuelles* and performance-based financing mechanisms further develop, these institutions may be expected to cover a greater amount of health care costs. Furthermore, the Government of Rwanda should recognize the larger proportion of financing of health centers still coming from the general population, approximately 20% on average. Within the context of strengthening the *mutuelles*, further incentives and mechanisms should be put in place to reduce the direct burden of financing on individuals and families to a more shared, insurance-based financing approach.

Examining Efficiencies and Economies of Scale and Scope

Lastly, the health center and hospital cost dataset could be used to further explore the concept of economies of scale and scope within Rwanda health service provision. Traditionally, cost functions have been a mechanism through which these types of analyses are explored. One could potentially begin to do this type of analysis by developing a model to examine the effect of independent variables such as type of ownership, location, frequency of visits and outputs, as well as personnel inputs, etc. on the average cost of a service in Rwanda.

Additionally, analyses pertaining to personnel and other resource areas would further assist the Rwanda Ministry of Health to appropriately allocate scarce health care services within the context of decentralization.

1. Introduction

The USAID-funded Twubakane Decentralization and Health Program is implemented by IntraHealth International, Inc. (prime), RTI International, Tulane University, and EngenderHealth. The Twubakane team works closely with the Government of Rwanda (GOR), civil society organizations, and other local associations and community-based organizations. Twubakane also includes as partners the Rwandese Association of Local Government Authorities (RALGA), VNG (Vereniging van Nederlandse Gemeenten, the International Cooperation Agency of the Netherlands), and Pro-Femmes Twese Hamwe. The overall goal of the Twubakane Decentralization and Health Program is to increase access to and the quality and utilization of family health services in health facilities and communities by strengthening the capacity of local governments and communities to ensure improved health service delivery at decentralized levels.

The program consists of six integrated components:

- 1) family planning and reproductive health
- 2) child survival, malaria and nutrition
- 3) decentralization policy, planning and management
- 4) district planning, budgeting and management
- 5) health facilities management
- 6) community access to, participation in and ownership of health services

Twubakane Program Participating Districts

- 1) Nyarugenge, Kigali
- 2) Kicukiro, Kigali
- 3) Gasabo, Kigali
- 4) Ngoma, Eastern Province
- 5) Kayonza, Eastern Province
- 6) Kirehe, Eastern Province
- 7) Rwamagana, Eastern Province
- 8) Kamonyi, Southern Province
- 9) Muhanga, Southern Province
- 10) Nyaruguru, Southern Province
- 11) Nyamagabe, Southern Province
- 12) Ruhango, Southern Province

To support the GoR in achieving its objectives for a better planned and managed health sector, Twubakane undertook a health services costing study in early 2007. Lead by RTI International and in partnership with the Rwandan School of Public Health, this study's primary objective was to conduct full and complete cost analyses of the existing minimum package of health services (MPA) provided at the health center level and the comprehensive package of health services (CPA) provided at the district hospital level. Data generated from these analyses serve to inform decision-making and improved management of health resources at the national, district, and facility levels.

At the national level, cost data can provide a benchmark for designing incentive programs within health centers and hospitals that will achieve greater economies of scale and improved efficiency in health service delivery. Furthermore, costing data can be used for reexamining tariffs for specific services, taking into consideration that tariffs may only cover a portion of the fully loaded cost of a service. As community-based health insurance (*mutuelles*) schemes continue to expand and be refined in Rwanda, cost data can be used to inform discussions about the levels at which these schemes can be expected to cover portions of the costs of the MPA and CPA.

At the district and facility levels, Cost data can also be used to guide efficient use of resources. At the district level, this information can be used for annual budget preparation, monitoring of facility efficiency, and to improve the application of performance-based financing. At the facility level, budgets can be developed based on the actual cost of services with consideration for capital resource investments. Cost data can be used to improve resource management at the district and facility level and to increase efficiency and examine how to better achieve economies of scale.

2.1. Types of Data Collected

The following components represent the type of data collected and analyzed within each workbook:

Assets – These data pertain to information regarding buildings, machinery and equipment, vehicles and furniture. Given the amount of time and effort necessary to capture detailed asset information, the SPH subcontracted with a consultant to conduct an analysis of facility assets for four health centers and two district hospitals. Cost data were amortized using local capital costing estimates. Subsequently, these data were applied to the larger sample of facilities using region, type, and size as a selector.

Personnel data – Personnel cost data pertain to both salary and allowances for both government-hired and contracted personnel. Furthermore, information pertaining to the total number of full-time equivalents (FTEs) was collected by staffing category. In order to allocate salary and allowance information among cost centers and by service, the RTI/Twubakane team collected additional data by way of both key informant interviews and direct observation as to how facility staff allocated their time. This effort was conducted at each facility in order to capture detailed staff-time allocations across all cost centers. However, given the difficulty in allocating exactly how time was used, some of the time allocation estimates may not be accurate and could lead to overestimation of certain costs of services.

Drug costs – Drug costs were collected from each facility and allocated among all direct service categories (prevention, consultations, chronic conditions, surgery, etc). Key informant interviews were used to allocate drug costs when more detailed information was unavailable.

Other annual expenses and revenues – Information pertaining to other annual recurrent expenses and revenues were captured from each facility. Recurrent expenses include information pertaining to categories such as transportation, electricity, water, food, training, stationary, etc. Given the on-going development of the facilities, it was necessary to update these data for the fiscal 2006-2007 period. In addition, annual revenues by source were captured to get a complete overview of the resource base for each facility. Taken together, these items represent the full 2006-2007 operating budget for each facility.

Utilization data and allocation factors – Utilization data are necessary to capture unit costs (total cost of service/measure of utilization of that service). The key utilization measures for the study are the number of outpatient visits by service category and the number of inpatient bed days for associated inpatient services. Allocation factors represent key data items necessary to conduct the step-down cost allocation. As applied in the aforementioned Mongolia study, allocation factors collected and derived for the analysis in Rwanda included: a) the proportion of outpatient visits; b) the proportion of inpatient bed days; c) the proportion of FTEs; d) derived proportion bed day equivalents; and e) the proportion of space as appropriate.

2.2. Cost Centers

For each facility, the data collected as described above were initially captured at three cost center levels including overhead/indirect, support, and direct service. More specifically, health and hospital indirect and support centers are outlined below:

Indirect cost centers – Indirect (overhead) cost centers contain the following facility activities: Administration, Finance, Maintenance and Engineering, Cleaning Services, Security, Laundry, and Sterilization.

Support cost centers – Support cost centers contain the following facility activities: Laboratory, Pharmacy, Ambulance, and Kitchen for both health centers and hospitals and Operating Theater and Radiology (for hospitals only).

Direct cost Centers – The direct service cost centers are different for health centers and hospitals given the different medical and health care activities:

Table 2.2.1 on the following page shows the direct service cost centers for both health centers and hospitals.

| Table 2.2.1. Direct Costs Centers: Health Centers & District Hospitals | |
|---|--------------------------------|
| Health Centers | District Hospitals |
| <i>Preventive Services</i> | |
| Tetanus toxoid vaccine Immunization | |
| Family planning | Family planning |
| HIV prevention of mother to child transmission (PMTCT) | HIV PMTCT |
| Antenatal care | |
| Voluntary counseling & testing | Voluntary counseling & testing |
| <i>Consultations for acute conditions</i> | |
| Helminthiases | Helminthiases |
| Gynecologic & obstetric disorders | OB/GYN Other |
| Acute upper respiratory tract infections | Tonsillitis |
| Measles | Otitis |
| Non stained blood diarrhea | STIs |
| Acute lower respiratory tract infections | Mental disorders |
| Stained blood diarrhea | Oral cavity & dental diseases |
| Sexually transmitted infections (STIs) | Skin diseases |
| Malaria | Dysentery |
| Meningitis | Malnutritional disorders |
| | Measles |
| | Asthma |
| | Broncho-pneumonia |
| | Malaria |
| | Meningitis |
| | Tetanus |
| | Internal medicine other |
| | Pediatrics |
| | Surgery |
| | Nutrition |
| <i>Consultations for chronic conditions</i> | |
| Hypertensive disease | Hypertensive disease |
| Diabetes | Heart failure |
| Tuberculosis | Lung tuberculosis |
| | Diabetes |
| <i>Minor surgery</i> | |
| Physical injuries | Circumcision |
| Minor surgery | Dental extraction |
| Normal assisted delivery | Herniorrhaphy |
| | Appendectomy |

| <i>Major surgery</i> | |
|----------------------|------------------|
| | Cesarean section |
| | Hysterectomy |
| | Amputation |
| | Laparotomy |
| | Osteosynthesis |

2.3. Step-Down Cost Analysis

In order to conduct the step-down cost analysis, indirect (overhead) costs are first allocated to both support and direct cost centers and then support center costs are allocated to direct cost centers for final totals and the derivation of unit costs.

2.3.1. Allocation Rules

Certain rules are used to allocate indirect costs to support services and direct services. The specific allocation factors for *indirect cost elements* are as follows:

- Administration cost is allocated by the full time equivalent (*FTE*) of each service
- Finance cost is allocated by the *FTE* of each service
- Maintenance and Engineering costs are allocated by the *area/space* used by each service
- Cleaning Services cost is allocated by the *area/space* used by each service
- Security cost is allocated by the *area/space* used by each service
- Laundry cost is allocated by the *FTE* of each service
- Sterilization cost is allocated by the *area/space* used by each service

The specific allocation factors for support service cost elements are as follows:

- Operating Theater cost is allocated by *bed day equivalent* of each inpatient service
- Laboratory cost is allocated by the number of visits of each outpatient service or bed day equivalent of each inpatient service
- Pharmacy cost is allocated by the number of visits of each outpatient service or bed day equivalent of each inpatient service
- Radiology cost is allocated by *bed day equivalent* of each inpatient service
- Ambulance cost is allocated by the number of visits of each outpatient service or *bed day equivalent* of each inpatient service
- Kitchen cost is allocated by the number of visits of each outpatient service or *bed day equivalent* of each inpatient service

Allocation factors are also applied for several budget expenditure items but are not detailed here.

2.3.2. Derivation of Unit Costs

After completing the allocation process and loading direct costs (i.e. the “fully loaded cost”), the total costs were then divided by utilization measures in order to obtain the unit costs by facility. For outpatient costs, the utilization measure is outpatient visits. For inpatient services at the hospital, the measure of utilization is the bed day equivalent. . These utilization measures are consistent with the step-down cost allocation techniques used in the Mongolia model and as accepted in the scientific literature on health care costing analyses (Asian Development Bank, 2002).

The RTI/Twubakane team also derived weighted unit costs in order to have average unit costs for all facilities in the sample. The team used the following equation to derive weighted average unit costs:

$$\frac{\sum (\text{Facility-specific unit cost X facility-specific utilization measure})}{\sum (\text{Utilization measures for all facilities})}$$

2.3.3. Additional Analyses

In addition to the step-down cost analyses at the health center and hospital level, some preliminary analyses with regard to health center budgets, expenditures, and sources of revenue were conducted to provide a context for the analysis of unit costs. Furthermore, in addition to the unit cost analysis for the full sample, we also calculated and compared the unit costs of services at public and religious-affiliated (*agrée*) health centers and urban and rural health centers.

In the final part of this report, we address several important factors for the use of these data within the context of decision-making in Rwanda. These include areas previously raised by the Rwandan Ministry of Health including issues pertaining to tariff setting, and other health care financing issues and objectives. Further considerations and suggestions are noted for use of the data in *Section 9* of this report.

3. Results: Health Center Sources of Revenue

Figure 3.1 shows the average distribution of total revenue by source in 2006 among the 35 health centers. Donors and government source amount to approximately half of all revenues, while the third largest proportion comes from the general population by way of fees at the health center. Together, community-based health insurance (*mutuelles*), and performance-based financing (PBF) make up around 20% of health center revenues.

Figure 3.1. Sources of Revenue for All Health Centers, Rwanda 2006

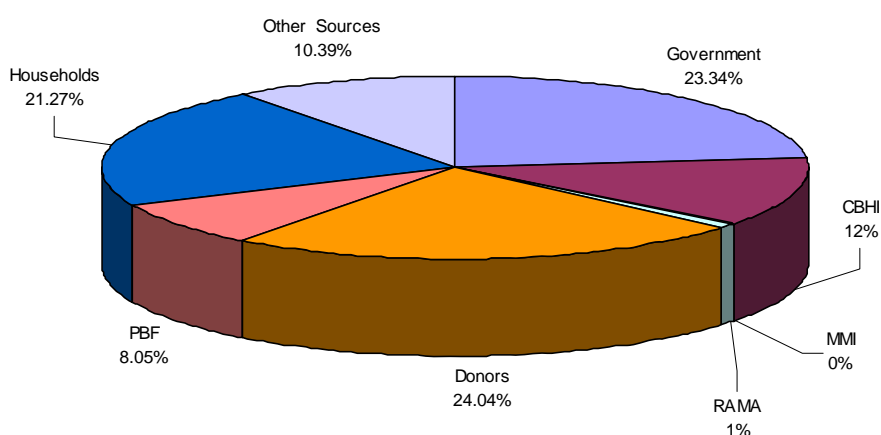


Figure 3.2 below shows the average distribution of total revenue by source in 2006 among the 19 public health centers. As expected, government contribution is the highest at 33.84%. Donors contribute 8.85% of the total revenue. Community-based health insurance (*mutuelles*) and performance-based financing (PBF) make up around 25% of health center revenues while households contribute 14.41% of the total revenue through out-of-pocket payments. (i.e. co-payments at point of service). Contributions from insurance programs – MMI (military health insurance) and RAMA (health insurance for government employees) are minimal sources of revenue for health centers, both public and religious-affiliated.

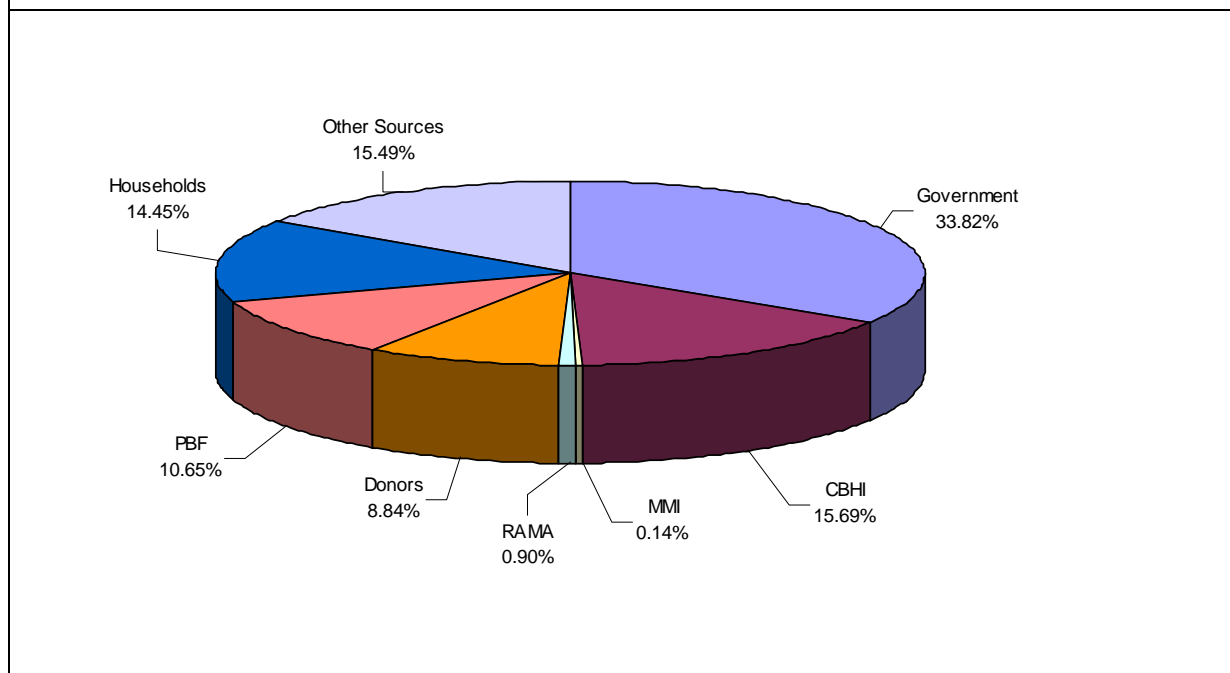
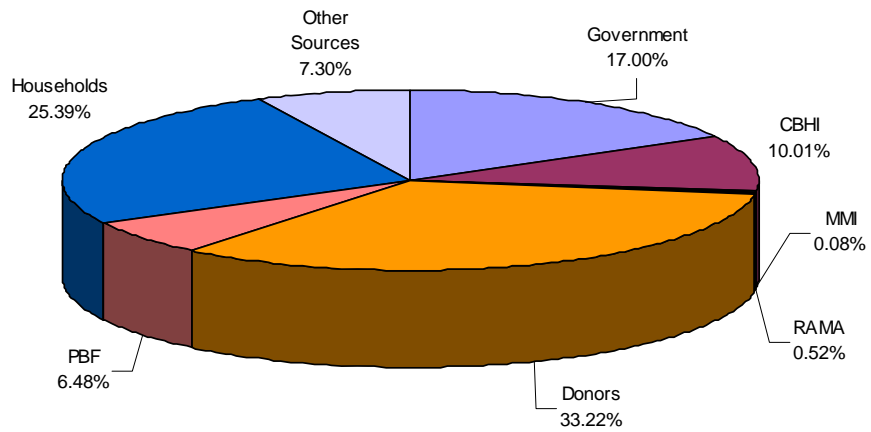
Figure 3.2. Sources of Revenue for Public Health Centers, Rwanda 2006

Figure 3.3 shows the average distribution of total revenue by source in 2006 among the 16 religious-affiliated health centers. Donors pay 33.22% of the total of revenue and the government pays 17% of the total revenue at religious-affiliated health centers. Community-based health insurance (*mutuelles*), and performance-based financing (PBF) account for less than 20% of religious-affiliated health center revenues while households contribute a significant amount through out-of-pocket payments(25.39%).

There are significant differences in the distribution of revenue sources of the 19 public health centers and the 16 religious-affiliated health centers. As expected, in the distribution in the public health centers, government pays a larger share of the total revenue than donors. On the other hand, at religious-affiliated health centers, donors pay a larger share of the total of revenue while the government pays a smaller share. It is important to note that, the proportion of revenues supported by user fees is higher in the religious-affiliated health centers than at the public health centers, suggesting that households face a higher financial burden when accessing religious-affiliated health centers than those that are public.

Figure 3.3. Sources of Revenue for Religious-Affiliated Health Centers, Rwanda 2006



4. Results: Analyses of Unit Costs for Outpatient Visits at Health Centers

Table 4.1 shows the average annual health center visits for prevention services at all 35 health centers. Visits for immunization services were largest while family planning services incurred the smallest number of visits. As indicated by the range measures (minimum and maximum), facilities greatly vary in the number of clients served. This is partially due to the size of the health center and their respective catchement areas.

Table 4.1. Average Annual Health Center Visits by Preventive Service Provided, 2006

| Preventive service | Average visits/year | Min | Max | N (health centers) |
|--------------------------------------|---------------------|-----|--------|--------------------|
| Tetanus toxoid vaccine | 1,040 | 203 | 11,776 | 34 |
| Immunization | 5,577 | 580 | 15,587 | 35 |
| Family planning | 554 | 7 | 3,241 | 31 |
| PMTCT | 1,504 | 69 | 3,231 | 24 |
| Antenatal care | 1,966 | 492 | 7,938 | 35 |
| Voluntary counseling & testing (VCT) | 2,728 | 189 | 5,330 | 24 |

Table 4.2 shows the average annual health center visits for consultation services at all 35 health centers. Visits for malaria services were largest and meningitis services were the least. Again, as indicated by the range measures (minimum and maximum), facilities greatly vary in the number of clients served.

Table 4.2. Average Annual Health Center Visits by Consultative Service Provided, 2006

| Consultative service | Average visits/year | Min | Max | N (health centers) |
|--|---------------------|-----|--------|--------------------|
| Helminthiasis | 1,738 | 335 | 4,248 | 35 |
| OB/GYN disorders | 338 | 23 | 1,258 | 35 |
| Acute upper respiratory tract infections | 2,751 | 435 | 12,843 | 35 |
| Measles | 24 | 1 | 122 | 26 |
| Acute lower respiratory tract infections | 2,073 | 394 | 12,105 | 35 |
| Stained blood diarrhea | 112 | 24 | 430 | 33 |
| STIs | 192 | 19 | 788 | 35 |
| Malaria | 3,086 | 275 | 13,390 | 35 |
| Meningitis | 1 | 1 | 2 | 7 |
| Non-stained blood diarrhea | 534 | 128 | 1,656 | 35 |

Table 4.3 below shows the average annual health center visits for chronic conditions and minor surgery services at all 35 health centers. Visits for minor surgery and physical injury services were greatest and diabetes and tuberculosis services were the least. It should be noted that minor surgery was provided only in six facilities.

Table 4.3. Average Annual Health Center Visits for Chronic Conditions & Minor Surgeries, 2006

| Condition/Surgery | Average visits/year | Min | Max | N (health centers) |
|--------------------------|---------------------|-----|-------|--------------------|
| Hypertensive disease | 54 | 1 | 527 | 21 |
| Diabetes | 19 | 1 | 124 | 16 |
| Tuberculosis | 26 | 1 | 135 | 23 |
| Physical injuries | 658 | 215 | 2,216 | 35 |
| Minor surgery | 2,516 | 22 | 7,283 | 6 |
| Normal assisted delivery | 403 | 102 | 1,149 | 29 |

Table 4.4 below shows the average unit cost per visit for prevention services at all 35 health centers. The average cost and weighted average cost are both represented as discussed in the methods section of this report. Unit costs for family planning services were the highest, while unit costs for immunization services were the lowest in this category. This result is driven by the number of visits for each service.

Table 4.4. Average Unit Cost (FRw) Per Visit for Preventive Services, 2006

| Preventive Service | Average Unit Cost | Weighted Average Unit Cost | Min | Max | σ | N (health centers) |
|------------------------|-------------------|----------------------------|-------|--------|----------|--------------------|
| Tetanus toxoid vaccine | 4,905 | 3,186 | 171 | 12,042 | 2,920 | 34 |
| Immunization | 1,396 | 1,124 | 45 | 8,502 | 1,502 | 35 |
| Family planning | 26,118 | 5,556 | 231 | 34,131 | 69,877 | 30 |
| PMTCT | 5,916 | 4,145 | 1,057 | 29,815 | 7,627 | 24 |
| Antenatal care | 2,502 | 1,895 | 110 | 9,739 | 2,010 | 35 |
| VCT | 3,337 | 2,407 | 775 | 2,1807 | 4,334 | 24 |

Table 4.5 shows the average unit cost per visit for consultation services at all 35 health centers. The average cost and weighted average cost are both represented as discussed in the methods section of this report. Unit costs for these services were found to be generally in the same range (around 2000 FRW). This is because that the small amount of variation among resources consumed when delivering each consultation.

Table 4.5. Average Unit Cost (FRw) Per Visit for Consultations, 2006

| Consultation | Average Unit Cost | Weighted Average Unit Cost | Min | Max | σ | N (health centers) |
|--|-------------------|----------------------------|-----|--------|----------|--------------------|
| Helminthiases | 2,052 | 1,720 | 674 | 10,548 | 1,745 | 35 |
| OB/GYN disorders | 2,796 | 2,706 | 543 | 12,778 | 2,151 | 35 |
| Acute upper respiratory tract infections | 1,859 | 1,926 | 534 | 10,284 | 1,663 | 35 |
| Measles | 2,440 | 1,192 | 506 | 7,665 | 2,436 | 9 |
| Acute lower respiratory tract infections | 2,072 | 2,075 | 543 | 10,284 | 2,009 | 35 |
| Stained blood diarrhea | 2,179 | 2,145 | 509 | 13,958 | 2,423 | 33 |
| STIs | 3,143 | 2,779 | 525 | 10,941 | 2,675 | 35 |
| Malaria | 2,231 | 2,227 | 552 | 11,335 | 1,920 | 35 |
| Meningitis | 2,813 | 2,929 | 153 | 6,711 | 2,459 | 7 |
| Non-stained blood diarrhea | . | . | . | . | . | . |

Table 4.6 shows the average unit cost per visit for chronic conditions and minor surgery services at all 35 health centers. As expected, these services are much more costly than preventive or general consultation services, particularly given the low frequency in which they occur at the health centers. Given the relative skewness in the actual average unit costs, the weighted average unit cost is lower in each of the service categories for chronic consultation and minor surgery services.

Table 4.6. Average Unit Cost (FRw) Per Visit for Chronic Conditions & Minor Surgeries, 2006

| Condition/Surgery | Average Unit Cost | Weighted Average Unit Cost | Min | Max | σ | N (health centers) |
|--------------------------|-------------------|----------------------------|-------|--------|----------|--------------------|
| Hypertensive disease | 17,533 | 9,200 | 522 | 81,621 | 18,136 | 21 |
| Diabetes | 19,235 | 16,136 | 506 | 66,561 | 22,476 | 16 |
| Tuberculosis | 19,707 | 15,635 | 506 | 69,854 | 17,779 | 23 |
| Physical injuries | 4,236 | 3,818 | 481 | 13,538 | 3,368 | 35 |
| Minor surgery | 16,024 | 2,513 | 686 | 72,661 | 28,105 | 6 |
| Normal assisted delivery | 7,845 | 7,815 | 1,629 | 16,618 | 3,913 | 29 |

To establish the validity of the data as well as for data interpretation, it is useful to compare results from Twubakane study with results from the former Rwanda School of Public Health studies (Kagubare et al., 2004 and 2005) and more recent findings from a Management Sciences for Health Study (MSH 2005). **Figure 4.1** shows a comparison of the weighted average unit costs of preventive service at Rwanda health centers among these studies. The unit costs are higher in all service categories under the Twubakane study than those under the SPH studies. This is due to the addition of several resource areas (assets, equipment, infrastructure, higher level of personnel cost detail, etc.) in the Twubakane study. When comparing the Twubakane cost study results with the recent MSH study, the unit cost results are much closer (for PMTCT and VCT services).

Figure 4.1: Comparison of Weighted Average Unit Costs (FRW) Per Visit

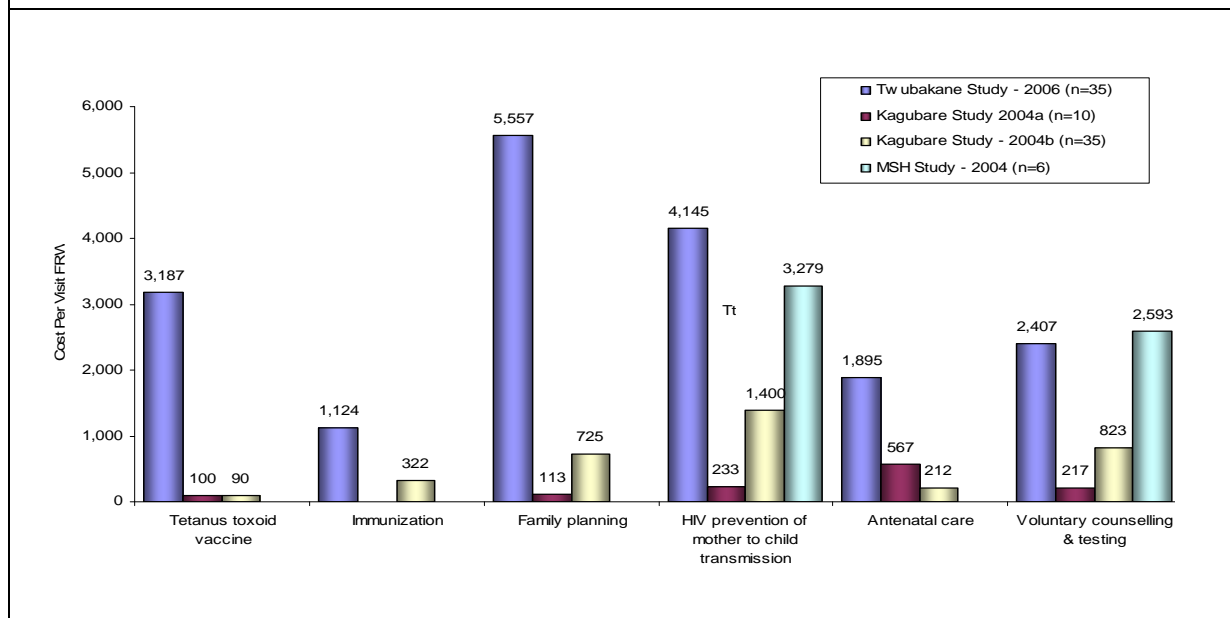
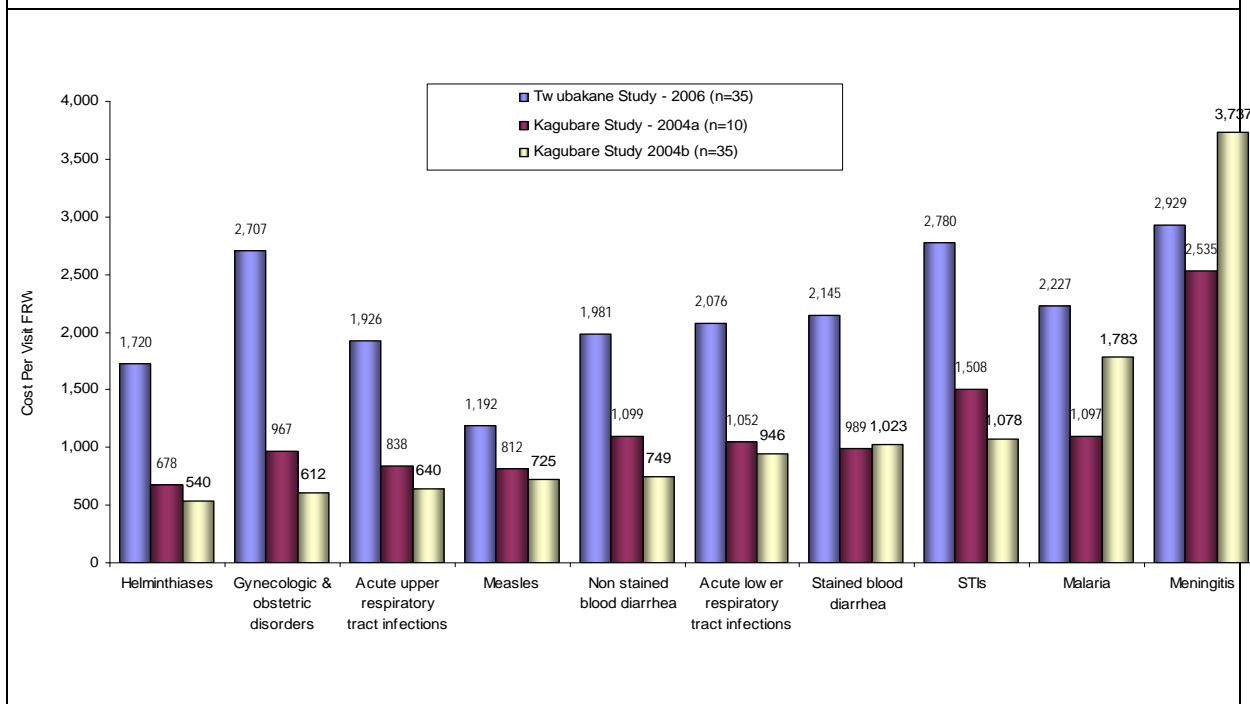


Figure 4.2 shows a comparison between the Twubakane study and results of the two SPH studies (the MSH study did not include these costs). As anticipated, results for most service categories indicate a higher unit cost (roughly 100% increase) for the Twubakane study. For Meningitis consultation, it should be noted that the unit cost is lower in the Twubakane study. We believe this is reflective of the low amount of utilization of this service at the health center level, resulting in relatively unstable cost estimates for this type of service.

Figure 4.2: Comparison of Weighted Average Costs (FRW) Per Consultation Service



5. Cost Study Data Breakouts by Type of Ownership and Location

In this section we compare the weighted average unit costs for the different services provided by health centers – public and religious-affiliated – in urban and rural settings. We note that costs presented in the following tables are relatively high compared to other services given overall low utilization and relatively high fixed costs.

Table 5.1 shows weighted average unit costs per visit for different preventive services for public and religious owned facilities and for urban and rural locations. The following observations can be made based on the data presented in the table:

- (1) On average, weighted average unit costs of preventive services at religious health centers are higher than those at public health centers.
- (2) On average, weighted average unit costs of preventive services at urban health centers are significantly higher than those at rural health centers.
- (3) Among the six preventive services, unit costs for family planning services were the most costly, while unit costs for immunization services were the least costly in this category.

Service categories with a higher level of visits by comparison have a lower average unit cost, as fixed costs per unit decrease the greater number of units produced.

Table 5.1. Comparison of Weighted Average Unit Costs of Preventive Services per Visit – 2006 (FRW), Public, Religious, Urban, and Rural

| Type of Service (Preventive) | Weighted Average Unit Cost, 2006 | | | |
|---------------------------------|----------------------------------|-----------|--------|-------|
| | Public | Religious | Urban | Rural |
| Tetanus toxoid vaccine | 2,082 | 5,931 | 14,006 | 2,613 |
| Immunization | 901 | 1,323 | 3,334 | 964 |
| Family planning | 4,432 | 9,264 | 14,721 | 6,591 |
| PMTCT | 2,592 | 5,547 | 3,546 | 2,957 |
| Antenatal care | 2,071 | 1,779 | 7,884 | 1,613 |
| VCT | 1,726 | 2,913 | 2,628 | 1,741 |

Table 5.2 shows weighted average unit costs per visit for different consultation services for public and religious owned facilities and for urban and rural locations. From the comparison in the table, the following observations can be made:

- (1) On average, weighted average unit costs of consultation services at religious health centers are higher than those at public health centers.
- (2) On average, weighted average unit costs of consultation services at urban health centers are much higher than those at rural health centers.
- (3) The cost differences among the ten consultation services are not as large as the cost difference among the six preventive services. Within the narrow range, unit costs for OB/GYN disorders and treatment of STIs and meningitis were relatively more costly.

Table 5.2. Comparison of Weighted Average Unit Costs of Consultation Services per Visit – 2006 (FRW), Public, Religious, Urban, and Rural

| Type of Service (Consultative) | Weighted Average Unit Cost, 2006 | | | |
|---|----------------------------------|-----------|-------|-------|
| | Public | Religious | Urban | Rural |
| Helminthiasis | 1,810 | 1,557 | 2,115 | 1,630 |
| OB/GYN disorders | 2,878 | 2,557 | 3,700 | 2,333 |
| Acute Upper Respiratory Tract Infection | 1,772 | 1,993 | 2,608 | 1,468 |
| Measles | 1,118 | 2,583 | 1,390 | 802 |
| Non Stained Blood Diarrhea | 1,729 | 2,317 | 2,451 | 1,875 |
| Acute Lower Respiratory Tract Infection | 1,990 | 2,118 | 2,723 | 1,509 |
| Stained Blood Diarrhea | 1,734 | 2,549 | 2,874 | 1,820 |
| STI | 2,229 | 2,988 | 2,534 | 2,878 |
| Malaria | 2,170 | 2,274 | 2,800 | 2,023 |
| Meningitis | 2,424 | 3,333 | 557 | 3,607 |

Table 5.3 shows weighted average unit costs per visit for different chronic consultation and minor surgery services for public and religious owned facilities and for urban and rural locations. From the comparison in the table, the following observations can be made:

- (1) On average, weighted average unit costs of chronic consultation and minor surgery services at religious health centers are similar to those at public health centers.
- (2) On average, weighted average unit costs of chronic consultation and minor surgery services at urban health centers are similar to those at rural health centers.
- (3) Among the six chronic consultation and minor surgery services, unit costs for treatment of diabetes and tuberculosis cases are the most costly.
- (4) The low cost of Meningitis services in urban area is reflective of data from only two health centers. This unit cost should be interpreted with caution given the very low sample of two and may not reflect actual cost the service.

Table 5.3. Comparison of Weighted Average Unit Costs of Chronic Conditions and Minor Surgery per Visit – 2006 (FRW), Public, Religious, Urban, and Rural

| Type of Service (Condition/Surgery) | Weighted Average Unit Cost, 2006 | | | |
|--|----------------------------------|-----------|--------|--------|
| | Public | Religious | Urban | Rural |
| Hypertensive Disease | 17,092 | 14,492 | 8,473 | 10,820 |
| Diabetes | 20,390 | 26,732 | 17,416 | 13,034 |
| Tuberculosis | 16,266 | 26,013 | 15,689 | 15,537 |
| Physical Injuries | 4,525 | 3,361 | 5,932 | 2,956 |
| Minor Surgery | 12,972 | 2,493 | 2,538 | 2,411 |
| Normal Delivery | 7,095 | 8,609 | 11,934 | 7,049 |

6. Results: District Hospital Inpatient Visits and Unit Cost Analyses

Table 6.1 shows results of the total number of bed days for inpatient services at the 8 Rwandan District Hospitals. The four main inpatient service categories are Internal Medicine, Pediatrics, OB/GYN, and Surgery.

Table 6.1. Rwandan District Hospitals – Total Inpatient Bed Days By Service Type - 2006

| Hospital | Internal Medicine Other | Pediatrics | OB/GYN Other | Surgery |
|-----------|----------------------------|------------|--------------|---------|
| Ruli | 10,616 | 6,668 | 9,636 | 6,683 |
| Rutongo | 5,113 | 2,354 | 6,391 | 5,380 |
| Ruhengeri | 17,924 | 12,130 | 34,079 | 45,053 |
| Gitwe | 14,496 | 4,491 | 11,518 | 8,380 |
| Mibilizi | 16,818 | 1,228 | 22,149 | 12,640 |
| Kibuye | 30,769 | 5,041 | 10,747 | 9,548 |
| Nyagatare | 13,304 | 5,332 | 5,228 | 5,106 |
| Kibungo | 10,355 | 6,324 | 14,955 | 10,920 |

Table 6.2 shows the actual average unit cost per bed day for each of the inpatient service types for the eight hospitals.

Table 6.2. Rwandan District Hospitals – Inpatient Actual Unit Cost Per Bed Day (FRW) by Service Type - 2006

| Hospital | Internal Medicine Other | Pediatrics | OB/GYN Other | Surgery |
|-----------|----------------------------|------------|--------------|---------|
| Ruli | 15,357 | 12,509 | 11,538 | 13,077 |
| Rutongo | 16,169 | 15,724 | 9,482 | 10,833 |
| Ruhengeri | 11,050 | 7,711 | 5,069 | 4,264 |
| Gitwe | 5,746 | 8,006 | 6,004 | 5,267 |
| Mibilizi | 3,924 | 14,793 | 2,633 | 3,473 |
| Kibuye | 3,723 | 7,356 | 5,033 | 5,878 |
| Nyagatare | 10,260 | 9,590 | 11,642 | 12,133 |
| Kibungo | 12,977 | 10,437 | 7,920 | 7,955 |

Table 6.3 shows the calculation of the weighted average unit cost per bed day for the eight hospitals by inpatient service category. These data are shown in both FRW and \$US. The associated exchange rate at the time of the study was (540 FRW = 1\$US). The cost per bed day for internal medicine and pediatrics were more costly compared to OB/GYN and surgery services.

Table 6.3. Calculation of Weighted Inpatient Unit Costs (FRW) By Service Type Total (Unit Cost x Bed Days)/Total Bed Days By Service Category

| Hospital | Internal Medicine Other | Pediatrics | OB/GYN Other | Surgery |
|-------------------------------|----------------------------|-------------|--------------|-------------|
| Unit Costs x Visits | | | | |
| Ruli | 163,029,046 | 83,410,377 | 111,176,741 | 87,395,150 |
| Rutongo | 82,670,095 | 37,013,677 | 60,598,293 | 58,279,481 |
| Ruhengeri | 198,057,293 | 93,528,992 | 172,756,254 | 192,123,989 |
| Gitwe | 83,294,419 | 35,954,480 | 69,157,141 | 44,134,503 |
| Mibilizi | 65,992,676 | 18,165,211 | 58,319,890 | 43,897,328 |
| Kibuye | 114,541,597 | 37,081,149 | 54,091,455 | 56,126,894 |
| Nyagatare | 136,504,883 | 51,135,378 | 60,863,963 | 61,952,152 |
| Kibungo | 134,371,869 | 66,003,521 | 118,438,872 | 86,870,701 |
| Total | 978,461,877 | 422,292,784 | 705,402,610 | 630,780,198 |
| Total Visits | 119,395 | 43,568 | 114,703 | 103,710 |
| Weighted Cost FRW | | | | |
| Per Bed Day | 8,195 | 9,693 | 6,150 | 6,082 |
| Weighted \$US Cost Per | | | | |
| Bed Day | \$15.18 | \$17.95 | \$11.39 | \$11.26 |

7. Results: District Hospital Outpatient Visits and Unit Cost Analyses

Tables 7.1 and *7.2* show the district hospital outpatient visits by service type. It should be noted that for services that are similarly provided at the health center level, there are significantly fewer number of visits at the hospital level. Given that the low number of outpatient visits, and that the costs of outpatient services provided at the hospital level are generally higher than those at the health center, it is recommended that the Ministry of Health take into consideration how and where services are provided in order to achieve improved economies of scale among facilities.

Table 7.1. District Hospital Outpatient Visits By Service Type – 2006

| Outpatient Service | Ruli | Rutongo | Ruhengeri | Gitwe | Mibilizi | Kibuye | Nyagatare | Kibungo |
|-------------------------------|------|---------|-----------|-------|----------|--------|-----------|---------|
| Family planning | . | . | . | 48 | . | 60 | . | . |
| PMTCT | . | . | . | . | . | 46 | . | . |
| VCT | . | . | . | 187 | 46 | 180 | . | 6,535 |
| Helminthiasis | 34 | 61 | 1,344 | 322 | 238 | 322 | 762 | 432 |
| Tonsillitis | 12 | 0 | 437 | 58 | 37 | 50 | 143 | 219 |
| Otitis | 25 | 21 | 255 | 31 | 38 | 31 | 103 | 120 |
| STIs | 33 | 19 | 723 | 31 | 15 | 31 | 144 | 49 |
| Mental disorders | . | 7 | 225 | 20 | 35 | 22 | 80 | 544 |
| Oral cavity & dental diseases | 6 | 73 | 3,379 | 236 | 496 | 230 | 654 | 1,436 |
| Skin diseases | 97 | 88 | 80 | 101 | 211 | 90 | 411 | 146 |
| Dysentery | . | 1 | 76 | 55 | 20 | 40 | 66 | 28 |
| Malnutritional disorders | 3 | 5 | 191 | 95 | 29 | 90 | 8 | 53 |
| Measles | . | . | 1 | . | . | . | . | . |
| Asthma | 27 | 13 | 69 | 32 | 32 | 30 | 108 | 76 |
| Broncho-pneumonia | 87 | 57 | 330 | 111 | 174 | 105 | 967 | 330 |
| Malaria | 146 | 30 | 4,014 | 2,796 | 304 | 2,800 | 4,039 | 4,250 |
| Meningitis | . | . | 9 | 11 | . | 12 | 2 | 1 |
| Tetanus | . | . | 3 | . | . | . | . | . |

Table 7.2. District Hospital Outpatient Visits By Service Type – 2006

| OP Service | Ruli | Rutongo | Ruhengeri | Gitwe | Mibilizi | Kibuye | Nyagatare | Kibungo |
|----------------------|------|---------|-----------|-------|----------|--------|-----------|---------|
| Internal Medicine | | | | | | | | |
| Other | . | . | . | . | . | . | . | . |
| Pediatrics | . | . | . | . | . | . | . | . |
| OB/GYN Other | . | . | . | . | . | . | . | . |
| Surgery | . | . | . | . | . | . | . | . |
| Nutrition | . | . | . | . | . | . | . | . |
| Hypertensive disease | 114 | 29 | 196 | 30 | 152 | 30 | 60 | 40 |
| Heart failure | 29 | 3 | 219 | 12 | 22 | 15 | 91 | 29 |
| Lung tuberculosis | 12 | 8 | 151 | 33 | 9 | 35 | 32 | 61 |
| Diabetes | 48 | 4 | 57 | 20 | 77 | 23 | 137 | 52 |
| Plombage | . | . | . | . | . | . | . | . |
| Circumcision | . | 20 | . | 70 | . | 70 | . | . |

| | | | | | | | | |
|-------------------|-----|-----|-----|-----|-----|-----|-----|-----|
| Dental extraction | . | 62 | . | 102 | . | 102 | . | . |
| Herniorrhaphy | 41 | 13 | 147 | 2 | 78 | 2 | 32 | 88 |
| Appendicectomy | 2 | . | 27 | . | 14 | . | 7 | 15 |
| Cesarean section | 319 | 249 | 701 | 252 | 698 | 253 | 382 | 959 |
| Hysterectomy | 21 | 3 | 72 | . | . | . | 5 | 16 |
| Amputation | 2 | 7 | 67 | . | 1 | . | . | 19 |
| Laparotomy | 24 | 14 | 429 | 31 | 87 | 30 | 27 | 44 |
| Osteosynthesis | . | 11 | 237 | . | . | . | . | 142 |

Tables 7.3 and 7.4 show the actual unit cost per outpatient visit by service type for each of the eight district hospitals. If the service is not provided, the associated block in the table is left empty. As reflected in the data, the unit costs vary significantly due to several factors including a high level of fixed costs, low levels of utilization and possibly inherent diseconomies of scale.

Table 7.3. District Hospital Actual Unit Costs Per Visit (FRW) By Service Type – 2006

| OP Service | Ruli | Rutongo | Ruhengeri | Gitwe | Mibilizi | Kibuye | Nyagatare* | Kibungo |
|-------------------------------|---------|---------|-----------|---------|----------|---------|------------|---------|
| Family planning | . | . | . | 122,486 | . | 78,428 | . | . |
| PMTCT | . | . | . | . | . | 152,698 | . | . |
| VCT | . | . | 1,316 | 32,843 | 35,262 | 61,392 | . | 3,164 |
| Helminthiasis | 93,033 | 34,869 | 3,935 | 5,535 | 5,285 | 5,663 | 4,577 | 6,535 |
| Tonsillitis | 75,726 | | 3,517 | 5,605 | 5,810 | 6,067 | 4,577 | 5,253 |
| Otitis | 62,869 | 30,149 | 3,651 | 6,215 | 4,897 | 6,446 | 4,577 | 5,490 |
| STIs | 63,270 | 31,813 | 3,294 | 7,157 | 10,343 | 7,528 | 4,577 | 7,890 |
| Mental disorders | | 34,208 | 3,567 | 6,698 | 4,561 | 6,702 | 4,577 | 4,670 |
| Oral cavity & dental diseases | 235,822 | 32,672 | 3,284 | 5,823 | 3,797 | 6,054 | 4,577 | 5,025 |
| Skin diseases | 63,062 | 30,004 | 11,893 | 6,747 | 4,294 | 7,464 | 4,577 | 7,747 |
| Dysentery | | 68,159 | 4,460 | 4,704 | 5,363 | 5,077 | 4,577 | 7,219 |
| Malnutritional disorders | 60,472 | 28,093 | 3,020 | 3,910 | 2,973 | 3,800 | 4,577 | 4,674 |
| Measles | | | 2,947 | | | | | |
| Asthma | 62,671 | 32,266 | 5,673 | 6,253 | 5,422 | 6,673 | 4,577 | 6,139 |
| Broncho-pneumonia | 74,404 | 37,652 | 8,050 | 10,052 | 7,148 | 11,262 | 4,577 | 7,880 |
| Malaria | 101,695 | 110,858 | 4,700 | 4,878 | 13,257 | 4,907 | 4,577 | 5,596 |

* For Nyagatare, the proportion allocated to OP was very small and we were limited in allocation factors, thus there was little or no difference among these costs.

Table 7.4. District Hospital Actual Unit Costs (FRW) By Service Type – 2006

| OP Service | Ruli | Rutongo | Ruhengeri | Gitwe | Mibilizi | Kibuye | Nyagatare* | Kibungo |
|----------------------|--------|---------|-----------|--------|----------|--------|------------|---------|
| Meningitis | | | 3,334 | 3,979 | | 3,864 | 4,577 | 6,807 |
| Tetanus | | | 2,947 | | | | | |
| Internal | | | | | | | | |
| Medicine Other | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pediatrics | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OB/GYN Other | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Surgery | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Nutrition | | | | | | | | |
| Hypertensive disease | 56,942 | 28,385 | 3,481 | 5,274 | 3,067 | 5,364 | 4,577 | 6,230 |
| Heart failure | 61,249 | 45,969 | 3,671 | 9,249 | 6,024 | 8,691 | 4,577 | 8,119 |
| Lung tuberculosis | 60,472 | 29,586 | 3,316 | 4,540 | 5,565 | 4,475 | 4,577 | 5,105 |
| Diabetes | 60,781 | 48,406 | 7,133 | 8,727 | 4,161 | 8,601 | 4,577 | 7,539 |
| Plombage | | | | | | | | |
| Circumcision | | 40,066 | | 42,018 | | 30,310 | | |
| Dental extraction | | 26,220 | | 928 | | 12,202 | | |
| Herniorrhaphy | 52,240 | 41,598 | 53,952 | 53,409 | 10,681 | 43,401 | 28,562 | 24,657 |
| Appendicectomy | 56,725 | | 54,024 | | 10,752 | | 28,562 | 24,776 |
| Cesarean section | 52,928 | 41,021 | 54,521 | 43,097 | 10,789 | 31,546 | 28,562 | 24,697 |
| Hysterectomy | 51,346 | 41,103 | 53,694 | | 10,796 | | 28,562 | 24,598 |
| Amputation | 50,953 | 40,066 | 53,573 | | 10,357 | | | 24,238 |
| Laparotomy | 52,809 | 41,266 | 53,682 | 42,638 | 10,602 | 31,047 | 28,562 | 24,945 |
| Osteosynthesis | | 40,066 | 53,573 | | | | | 24,238 |

* For Nyagatare, the proportion allocated to OP was very small and we were limited in allocation factors, thus there was little or no difference among these costs.

Table 7.5 shows the average weighted unit cost per visit for all outpatient services at the eight district hospitals. Costs are shown in both FRW and \$US. Among prevention service, family planning and HIV/PMTCT services were incurred very high costs, while the other prevention service costs appear much more stable. The high unit costs of family planning and HIV/PMTCT are due to the low numbers of visits and the relatively high fixed costs in the hospital for these services. For unit cost estimations, we recommend that the numbers reported in Section 4 can be used. As expected, more complicated conditions appear more costly than general consultations.

Table 7.5. District Hospital Average Weighted Outpatient Unit Cost Per Visit By Service Type – 2006

| OP Service | Weighted Unit Cost (FRW) | Weighted Unit Cost (\$US) |
|------------------|--------------------------|---------------------------|
| Family planning | 98,009 | 181.50 |
| PMTCT | 152,698 | 282.77 |
| VCT | 3,567 | 6.61 |
| Helminthiasis | 6,188 | 11.46 |
| Tonsillitis | 5,329 | 9.87 |
| Otitis | 7,764 | 14.38 |
| STIs | 6,440 | 11.93 |
| Mental disorders | 4,705 | 8.71 |

| | | |
|-------------------------------|--------|-------|
| Oral cavity & dental diseases | 4,571 | 8.46 |
| Skin diseases | 12,239 | 22.66 |
| Dysentery | 5,176 | 9.59 |
| Malnutritional disorders | 4,183 | 7.75 |
| Measles | 2,947 | 5.46 |
| Asthma | 10,433 | 19.32 |
| Broncho-pneumonia | 10,108 | 18.72 |
| Malaria | 6,024 | 11.16 |
| Meningitis | 3,889 | 7.20 |
| Tetanos | 2,947 | 5.46 |
| Hypertensive disease | 14,295 | 26.47 |
| Heart failure | 8,914 | 16.51 |
| Lung tuberculosis | 6,679 | 12.37 |
| Diabetes | 12,511 | 23.17 |
| Circumcision | 36,652 | 67.87 |
| Dental extraction | 11,146 | 20.64 |
| Herniorraphy | 36,536 | 67.66 |
| Appendicectomy | 35,295 | 65.36 |
| Cesarian section | 33,120 | 61.33 |
| Hysterectomy | 45,246 | 83.79 |
| Amputation | 46,277 | 85.70 |
| Laparotomy | 43,614 | 80.77 |
| Osteosynthesis | 42,511 | 78.72 |

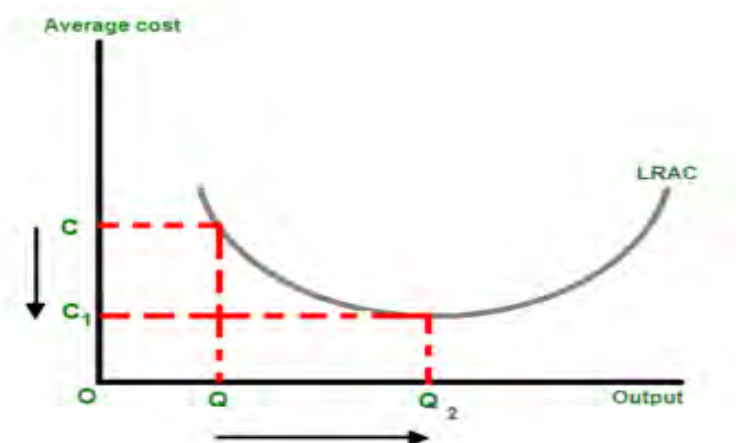
8. General Interpretations and Limitations

The Twubakane cost study provides a unique opportunity to have a full and complete costing of approximately 10% of all health centers and eight district hospitals throughout the country of Rwanda. As outlined at the beginning of this report, the above described data can be very important for interpretation and application within the health sector and specifically within the process of decentralization. The costing methodology can be useful to examine health center and hospital budgets and for examining future resource use at the district and facility level.

From the health center analyses, the data generally reflect the trend that more frequently used services are less costly compared with less frequently used services. For example, the average weighted unit cost per visit for an immunization visit (1,124 FRW) within the 35 health centers is approximately 5 times less than the average weighted unit cost per visit for a family planning visit (5,556 FRW). This cost difference is largely reflective of the fact that the number of visits for immunization services is approximately 10 times greater than the number of visits for family planning.

We see in general that as the number of visits increase for a particular service, the unit cost tends to be relatively less. This would indicate possible existing economies of scale as represented in **Figure 8.1** below. As greater output is produced in this case, more visits, the average cost of that service decreases. The challenge for Rwanda policymakers is to further explore the data for economies of scale and scope. Ideally, health centers would be operating at C_1 Q_1 or the lowest level of unit cost and the greatest amount of output. This is important to identify for both health centers and hospitals.

Figure 8.1: Economies of Scale



When comparing the results of the average unit cost per outpatient visit within hospitals and health centers, we recognize the relatively high cost of providing outpatient services at the hospital, specifically given the low frequency of visits. Further consideration should be given to examining where resources are most appropriately allocated (either at the health center or hospital level for these services). For example the cost of an STI visit at the health center is 2,779 FRW compared to the cost of the same service at the hospital costing 6,440 FRW. Unless there are distinct clinical advantages to providing the service at the hospital level, resources for this service should be directly more to the health center or community level.

Although we made significant attempts at improving the data capture of resources used in delivering both the MPA and CPA packages in Rwanda, limitations in applying the methodology do exist. With regard to the costing of personnel services, even though we used both key informant and direct observation approaches, we found it very difficult to capture and allocate exact time for staff offering specific services. The culture of the health center and hospital seems to be one where resources can shift depending on demand. Furthermore, we identified significant periods of downtime at some facilities. This further suggests the possibility for economies of scale within health centers and hospitals. Lastly, the analysis of infrastructure was conducted for only a subset of facilities. Some difficulties were incurred while attempting to extrapolate to the broader set of facilities. For example, space for VCT services was estimated for the infrastructure analysis. For facilities that did not offer VCT services, it was necessary to eliminate or reallocate that specific space depending on the circumstances of that facility. These nuances were not always captured for the specifically for each facility.

9. Potential Uses of Costing Study Results

The Rwanda Ministry of Health and international partners have indicated an interest in using the cost data results for application in specific decision-making areas within the context of decentralization. These include the following areas: 1) Setting tariffs, 2) Addressing health care financing objectives, 3) Further examination of economies of scale and scope. These issues are briefly addressed below.

9.1 Setting Tariffs

Setting tariffs for particular services can be very useful for developing a fee schedule that is standardized and consistent within the health services context. One of the primary considerations for setting tariffs depends on the specified payer of the service (i.e. an individual or health insurance program/mutuelle), their ability to pay, as well as inflationary factors, etc. The above described cost data represent “fully loaded” costs. In essence, if one expected the payer to cover 100% of the cost of a service, the unit cost of the service would be equivalent to the price. Rather, as outlined in the data regarding revenue sources earlier in this report, there are many different payers within the health sector in Rwanda. We suggest that the Rwanda Ministry of Health work on identifying reasonable objectives and targets for different payers to cover a portion of the cost of a service. Clearly, it would be very difficult for most citizens within Rwanda to pay the “full cost” of a service. Policymakers need to identify payer target proportions and develop incentives within the health system to achieve those targets.

9.2 Addressing Health Care Financing

Similarly, the data from the Twubakane cost study can be applied to further examine health care financing issues in Rwanda. First, the Ministry of Health should examine both expenditure and revenue data in order to develop financing targets (proportions shared by payer) as outlined above. Initially, a greater amount of subsidy may be necessary from government and donors. Overtime, as the mutuelles and performance-based financing mechanisms further develop, these institutions may be expected to cover a greater amount of health care costs. Furthermore, the Government of Rwanda should recognize the larger proportion of financing of health centers still coming from the general population, approximately 20% on average. Within the context of strengthening the mutuelles, further incentives and mechanisms should be put in place to reduce the direct burden of financing on individuals and families to a more shared, insurance-based financing approach.

9.3 Examining Efficiencies and Economies of Scale and Scope

Lastly, the health center and hospital cost dataset could be used to further explore the concept of economies of scale and scope within Rwanda health service provision. Traditionally, cost functions have been a mechanism through which these types of analyses are explored. One could potentially begin to do this type of analysis by developing a model to examine the effect of independent variables such as type of ownership, location, frequency of visits and outputs, as well as personnel inputs, etc. on the average cost of a service in Rwanda. These types of analyses help to further identify the point of $C_1 Q_1$ (in the above described figure) to obtain the most efficient level of health care provision.

Additionally, analyses pertaining to personnel and other resource areas would further assist the Rwanda Ministry of Health to appropriately allocate scarce health care services within the context of decentralization.

References

McMennanim, T. and G. Fritsche (2007). Cost and Revenue Analysis in Six Rwandan Health Centers: 2005 costs and revenues. Management Sciences for Health. Rwanda HIV Performance-Based Financing Project. USAID Contract GHS-1-00-03-00030-00, Task Order GHS-I-02-03-00030-00.

Nandakumar, A.K., Ts. Tsolmongerel, and B. Bulganchimeg (2005). "Hospital Costing Study in Mongolia." Ulaanbaatar: Asian Development Bank and Mongolian Ministry of Health.

Kagubare, J., M. Bacagu, T. Kigabo, and P. Basinga (October 2005). "*Etude des couts des services de sante au Rwanda.*" Rwanda Ministry of Health and Rwanda School of Public Health.

Kagubare M. J, M. Bucagu M, and P. Basinga (June 2005). "*Evaluation de la performance des mutuelles de santé au Rwanda.*" Rwanda Ministry of Health and Rwanda School of Public Health.