

# Costs and revenue of health care in a rural Zimbabwean district

B VANDER PLAETSE,<sup>1</sup> G HLATIWAYO,<sup>1</sup> L VAN EYGEN,<sup>1</sup> B MEESSEN<sup>2</sup> AND B CRIEL<sup>2</sup>

<sup>1</sup>District Health Executive, Tsholotsho District, Matabeleland North Province, Zimbabwe and

<sup>2</sup>Department of Public Health, Institute of Tropical Medicine, Antwerp, Belgium

The District Health Executive of Tsholotsho district in south-west Zimbabwe conducted a health care cost study for financial year 1997–98. The study's main purpose was to generate data on the cost of health care of a relatively high standard, in a context of decentralization of health services and increasing importance of local cost-recovery arrangements. The methodology was based on a combination of step-down cost accounting and detailed observation of resource use at the point of service. The study is original in that it presents cost data for almost all of the health care services provided at district level. The total annualized cost of the district public health services in Tsholotsho amounted to US\$10 per capita, which is similar to the World Bank's *Better Health in Africa* study (1994) but higher than in comparable studies in other countries of the region. This can be explained by the higher standards of care and of living in Zimbabwe at the time of the study.

About 60% of the costs were for the district hospital, while the different first-line health care facilities (health centres and rural hospitals together) absorbed 40%. Some 54% of total costs for the district were for salaries, 20% for drugs, 11% for equipment and buildings (including depreciation) and 15% for other costs. The study also looked into the revenue available at district level: the main source of revenue (85%) was from the Ministry of Health. The potential for cost recovery was hardly exploited and revenue from user fees was negligible.

The study results further question the efficiency and relevance of maintaining rural hospitals at the current level of capacity, confirm the soundness of a two-tiered district health system based on a rational referral system, and make a clear case for the management of the different elements of the budget at the decentralized district level.

The study shows that it is possible to deliver district health care of a reasonable quality at a cost that is by no means exorbitant, albeit unfortunately not yet within reach of many sub-Saharan African countries today.

**Key words:** district health care, costing, revenue, Zimbabwe

## Introduction

Under the auspices of the District Health Services Management project (Medicus Mundi Belgium 1999), the District Health Executive (DHE) of the Tsholotsho district in Matabeleland North Province, Zimbabwe, decided to acquire detailed insight into the cost of public health care in its district. The purpose of the study was two-fold. The first and foremost motivation to carry out this cost and revenue analysis was managerial: Zimbabwean DHEs are increasingly confronted with the need to have a more precise view on cost data related to the core service outputs in a rapidly changing health policy environment characterized by decentralization. District managers must be able to account for the resources used in health facilities as well use them efficiently. To do this it was necessary to have cost data

related to service outputs, but this was a challenge as line items rather than activities or programmes determined the format of the government budget.

The second reason to conduct the study was more general: the District Health Services Management project wished to contribute to the body of knowledge on unit cost data of health care delivery in low- and middle-income countries. There is currently still a paucity of such data (Conteh and Walker 2004). The Tsholotsho environment was conducive to implementing such a study: the DHE was interested and the necessary human and financial resources to conduct it were available.

The general policy environment in the Zimbabwean health sector at the time of study (the end of the 1990s) created other urgent reasons for tackling the question of

health services cost. These were the declining budgetary provisions to the health sector, an economic structural adjustment programme and civil service reform, the decentralization of district health services to rural district councils, moves towards a purchaser-provider split and the increasing importance of local cost-recovery mechanisms. This was the context in which the Tsholotsho DHE decided to conduct a service cost and revenue analysis.

The health care delivery in Tsholotsho district (163 000 inhabitants) is considered to be of a reasonably high standard (Tsholotsho district won the national 'best district competition' in 1995). At the time of the study, public health care was delivered through the following structures: one district hospital (140 beds) located in the semi-urban Tsholotsho growthpoint, 11 rural health centres, one urban health centre located in Tsholotsho itself, and three rural hospitals. Health centres are staffed by a small team of about three to four people under the lead of a nurse-practitioner. Health centres offer a package of care composed of routine curative care, including follow-up of chronic patients, ante- and post-natal care, obstetrical care for normal deliveries, family planning services, care and follow-up of under-fives including immunization, promotion of sound water and sanitation technologies, and various health education programmes. Some of the health centres are owned by the local government (council clinics), the others by central government. Rural hospitals basically offer care that is similar to that delivered at health centre level, with the exception that inpatient facilities exist in rural hospitals.

The district hospital has more human and technical resources and is in a position to offer more sophisticated care. Tsholotsho district hospital was upgraded in 1992 under the Family Health Project (funded by the World Bank), and most of its structures and major equipment date from that time. At the time of the study, two medical doctors, one clinical officer and various specialized nursing staff (e.g. anaesthetics and mental health) were working there. The hospital counts an internal medicine, a paediatric and a surgical ward, a theatre and a maternity ward. Next to its huge outpatient department that includes a septic theatre, the hospital hosts the classical support services like pharmacy, laboratory, X-ray department (static and mobile X-ray units as well as ultrasound), kitchen and laundry. The hospital further runs dental and physical rehabilitation services and operates a screened blood bank, voluntary HIV testing and counselling, and supportive treatment of AIDS patients. In addition, some level of home-based care for AIDS sufferers is offered. The hospital's package of care did not, at the time of the study, include prevention of mother-to-child HIV transmission (PMTCT), nor did it include anti-retroviral therapy. The district is recognized by the Ministry of Health and Child Welfare (MOH&CW) as sufficiently exemplary to function as a teaching district, both for hospital and primary health care services.

The Tsholotsho health services' utilization data, which can be considered as a proxy for the overall accessibility

**Table 1.** Fees charged at Tsholotsho district hospital, July 1997–December 1998

Type of service	Fee in Zim\$ (US\$)
Outpatient consultation	24 (1.4)
Antenatal care <sup>a</sup>	80 (4.6)
Medical examination <sup>b</sup>	101 (5.8)
General admission	60 (3.4)
Paediatric admission	30 (1.7)

<sup>a</sup>Covering the first and the repeat antenatal care visits, plus the delivery.

<sup>b</sup>For example, examination of food handlers or affidavits for police cases.

and acceptability of the local health care delivery system, were reasonably good. In the period 1997–98, the average utilization rate of curative care at rural health centre level was 0.8 new cases per inhabitant per year, with several health centres having utilization rates exceeding one new case per inhabitant per year. This is far beyond the 0.3–0.5 new cases per inhabitant per year usually noted in most other sub-Saharan African countries (Stryckman 1996). District hospital data for the same period indicate that the annual admission rate was about 40 admissions per 1000 inhabitants per year (some 6500 admissions in the year 1998), which is markedly above the median figure of 30 per 1000 noted in a survey of well-functioning African mission hospitals (Van Lerberghe et al. 1992).

At the time of the study, health care was free for people earning less than 150 Zimbabwe dollars (Zim\$) per month (US\$8.6). Fees were only charged at the level of the district hospital (see Table 1). Patients who by-passed the first level of care and who presented directly at the district hospital were not exempted (except for emergencies) whatever their income. Patients covered by medical aid societies paid the full rate prescribed by the National Association of Medical Aid Societies (NAMAS), while foreign patients were charged double the rates. The outpatient and inpatient fees were inclusive of all services including drugs, laboratory, imaging, etc. Dental fees, however, were charged separately at NAMAS rates.

The DHE had little influence on the implementation of the exemption policies. The responsibility to prove income rested with the patient. Elected councillors and the Department of Social Welfare located in Tsholotsho growthpoint could issue free treatment slips to patients unable to pay. In reality, almost no patients were paying fees.

## Methodology

We used a combination of step-down costing methodology and observations of resource use at the point of service. Step-down cost accounting is a method of analyzing the costs associated with specific health service outputs. It is based on scrutiny of the health

services production process to enable the best assignment of costs to the outputs to which they are related (Barnum and Kutzin 1993; Hanson and Gilson 1993). All expenditures are attributed to specific departments (cost centres) and then allocation criteria (such as time use) are employed to distribute all costs to final service categories. The costs considered in this study include the costs of the district management team, but do not include regional and/or national management costs.

The following four steps were taken. The *first* was to define units of service and their volume in the period of study. Six broad categories of units of service were considered: (1) first-line curative care at health centre level; (2) first-line preventive care at health centre level (antenatal care and immunization services); (3) second-line (ambulatory) curative care at district hospital level (referral consultations and medical examinations); (4) inpatient services at district hospital level; (5) outreach services from the hospital; and (6) paramedical services at hospital level (dental care, rehabilitation care, laboratory and imaging services). A first contact for curative care, for example, constitutes the whole process of entering the facility, registration, the consultation itself, prescribing and dispensing of drugs. The Zimbabwean Health Management Information System (HMIS) provided routine data on volume of services. The main forms used were the T5-forms for outpatient data and the HS3/5-form for inpatient data.

The *second* step consisted of establishing a list of personnel on the basis of the payroll, with the time they spent delivering the different units of service and the salaries paid. The number of salaried personnel in Tsholotsho district was equivalent to 220 full-time employees, at an aggregate average salary of Zim\$39 per hour (US\$2.3/hour).

Measuring and allocating different cost elements to the units of service was effected in the *third* step of the exercise. All expenditures are attributed to specific departments (cost centres), and then allocation criteria, such as time use, are employed to distribute all costs to final service categories. Staff time per unit of service was calculated with a distinction made between direct service time (time spent with the patients) and administrative time (time required to perform necessary administrative activities or to ensure continuity such as on-call periods). For instance, a nurse in a hospital ward spends most of her time directly on the patients (estimated at about 75%), checking vital signs, interacting with patients, washing them, dispensing drugs, dressing wounds, etc. The remainder (25%) is spent on administrative issues like stock management, ward meetings, etc. Other resources used in each unit of service were identified either by direct observation, from records or with step-down allocation methods. Furniture, special equipment and buildings were depreciated linearly and allocated to units of service. Furniture and special equipment are defined as items that last at least a year; beds, for instance, were supposed to

last 10 years. An expert evaluated the actual replacement costs of the buildings and their expected life span.

The end result of this third step was a cost per unit of service that could then be broken down to its distinct cost centres. The different cost centres in our study were salaries, medical and surgical vote line item, bedding and linen, laundry and other provisions, printing and stationery, depreciation of fixed assets, furniture and buildings, and other operating costs. The various allocation keys that were used resulted from a local consensus among the different staff members involved in the exercise. For instance, the costs of bedding, linen and provisions were allocated to the various hospital wards on the basis of the number of admissions in that ward; or the costs for post and telecommunication were allocated to the various facilities on the basis of the number of phone lines in each facility. The cost centre 'other operating costs' coincided with (parts of) vote line items that could not be directly linked to the units of service, and that were only known in aggregate form summarized for the whole district. These other operating costs (e.g. bus fares, subsistence allowances, disease control activities, post and telecommunication, ambulance cost, fuel, lights and water, etc.) were then allocated as overhead costs to the different units of service according to the fraction of variable costs (drugs, provision, bedding and linen, direct service time) incurred by each unit.

The revenue generated by the different units was defined in the *fourth* and final step of the data collection process. We used routine data from the accounts department, together with data made available by the Tsholotsho District Council, the Brethren in Christ Mission Administration, and the Provincial Office of the MOH&CW.

The data collection was conducted between March and May 1999, covering the financial period from July 1997 to December 1998. The Government of Zimbabwe used this 18-month period to allow the financial year from then on to coincide with the calendar year. The district staff set up the study and conducted the data collection, processing and initial analysis. Excel-based software was used to facilitate the data processing (Management Sciences for Health 1998). The currency used was the Zimbabwe dollar (Zim\$) valued at current prices. Where possible and for international comparison, we provide here amounts in US dollars (US\$), at the average exchange rate for the period July 1997–December 1998: Zim\$17.49 to 1 US\$ (Kumaranayake 2000). The disbursement of money from the central government was more or less constant throughout the year due to the monthly limit and target system of expenditure. Eight different district staff members were involved in the study under the lead of the district medical officer and the district health services administrator. In total about 150 person-days were invested in the data collection, data analysis and report writing. The cost of carrying out the entire costing and revenue analysis was estimated at about US\$11 000.

## Results

### Total costs

Table 2 presents the total costs of running the current health care services package in Tsholotsho district in the 18-month period July 1997–December 1998. About 20% of total costs was for the health centre network, another 20% for the three rural hospitals, and 60% was spent by the district hospital.

There were about 163 000 inhabitants in Tsholotsho district at the time of the study.<sup>1</sup> The annualized per capita cost to provide the current package of health care in the district was Zim\$175 (US\$10) over a 12-month period (i.e. two-thirds of the amount presented in Table 2, which covers an 18-month period). Since the rural hospitals function basically as health centres, we can consider that primary health care facilities together cost US\$4 per capita.

Salaries comprised 54% of the total cost, while drug expenditures constituted 20%. The full distribution of the costs per type of facility is presented in Table 3. Striking is the high proportion of salary costs for health centres (58%), and especially for rural hospitals (68%) compared with the district hospital (47%). Rural hospitals spent relatively less on drugs, medical and surgical supplies than health centres and district hospitals, where these proportions are identical.

The distribution of costs per activity – the two main categories being outpatient and inpatient care – is presented for each type of facility in Table 4. As could be expected, the bulk of costs at health centre level – more than 95% – is for outpatient curative and preventive care; whereas two-thirds of costs at hospital level are for inpatient care. Almost one-quarter of the costs of the district hospital is for ambulatory outpatient care. The breakdown of costs takes quite a different picture for rural hospitals, where half of costs are for outpatient care and half for inpatient care.

### Drug costs

Although it was not the primary purpose of the study, the data allowed the calculation of drug price differences between the government supplier – the General Medical Stores (GMS) – and the private sector. The total expenditure on drugs for the 18-month period was Zim\$8.4 million, of which 22% was spent on private sector orders. One unit of drugs or surgical items bought in the private sector cost on average 9.4 times more than the GMS price.

The price of blood ordered at the national blood bank in Bulawayo was above Zim\$2 million (approximately US\$115 000), i.e. almost 25% of the total district expenditure for drugs and almost 5% of the cost of the entire district public health care delivery system. In the study period, 517 units of blood were ordered of which

**Table 2.** Total health costs for Tsholotsho district per type of facility, July 1997–December 1998

Type of facility	Total cost Zim\$ (US\$)	Proportion of total cost per type of facility (%)
Health centres (n = 12)	9 201 045 (526 075)	21.4
Rural hospitals (n = 3)	8 166 812 (466 942)	19.0
District hospital (n = 1)	25 607 524 (1 464 124)	59.6
Total district	42 975 382 (2 457 140)	100.0

**Table 3.** Percentage breakdown of costs by type of facility

	Health centres	Rural hospitals	District hospital	Total district
Salaries	58	68	47	54
Drugs, medical and surgical supplies	21	11	21	20
Equipment	7	6	11	9
Building	3	4	2	2
Other costs	11	11	19	15
Total	100	100	100	100

**Table 4.** Percentage breakdown of costs by type of activity and type of facility

	District hospital	Health centres	Rural hospitals
Outpatients (curative and preventive care)	23	96	50
Inpatients	63	4	50
Outreach activities	4	–	–
Other	10	–	–
Total	100	100	100

353 were used. This represents a cost of Zim\$3868 (US\$221) per unit ordered, and Zim\$5666 (US\$324) per unit effectively used.

### Costs per unit of service

The most important results in terms of cost per unit of service are presented in Tables 5–7. More details have been published elsewhere (Vander Plaetse and Criel 2001). The data presented in Table 5 relate to the cost of a curative care contact at a first-line health facility, i.e. a health centre in most cases, but also a rural hospital and the district hospital's outpatient department. A curative care contact is cheapest at health centre level (US\$2.8) and most expensive at district hospital level (US\$3.4).

Table 6 presents the cost data for preventive care, i.e. the cost of a first antenatal care (ANC) contact at the various levels of the district health system, and the average cost of an immunization and family planning contact. When we consider the average 'career' of a pregnant woman at

**Table 5.** Cost of curative care contacts at first-line health facilities, July 1997–December 1998

Unit of service	Cost in Zim\$	Cost in US\$
Curative care contact:		
at health centre level	49	2.8
at rural hospital level	56	3.2
at district hospital outpatient level	60	3.4
Average	53	3.0

**Table 6.** Cost of preventive care, July 1997–December 1998

Unit of service	Cost in Zim\$	Cost in US\$
First antenatal care (ANC) contact:		
at health centre level	33	1.9
at rural hospital level	32	1.9
at district hospital level	37	2.2
Average cost of a first ANC contact	34	2.0
Average cost of a repeat ANC contact	25	1.4
Average cost of a delivery at health centre level	416	23.5
Average cost of immunization contact	21	1.2
Average cost of family planning contact	32	1.8

health centre level in Tsholotsho district, she will attend ANC for a first time (costing US\$2) followed by an average of 2.9 repeat contacts (costing US\$4) as reported by the local Health Information System. Eventually she will deliver at the health centre (costing US\$23.5). The total cost would amount to US\$30.

Table 7 presents the costs of second-line care: the cost of seeing, on an ambulatory basis, a patient *referred* by a health centre nurse for a hospital consultation performed by a medical doctor. The cost of this referral consultation is significantly higher than the cost of a curative contact at the level of the hospital's outpatient department that is held by nurses (US\$4.9 versus US\$3.4). Table 7 also shows the cost of some other common inpatient services. In the study period most admissions took place at the district hospital, resulting in about 61 000 inpatient days. The three rural hospitals together accounted for about 15 000 inpatient days. Three out of the 11 rural health centres had a few inpatient beds (other than for delivery purposes): altogether they had some 300 admissions in the study period. The total number of inpatient days at health centre level was unrecorded.

The inpatient case mix strongly differed between the three different types of facilities. An admission at a rural health centre was not much more than a short observation period with possibly the provision of some intravenous fluids. The same held for the rural hospitals, with the difference that a staff member was present around the clock and lengths of stay were longer. The higher technical capacity available at the district hospital and the presence of more qualified personnel explain the higher cost of an

**Table 7.** Cost of second-line curative care, July 1997–December 1998

Unit of service	Cost in Zim\$	Cost in US\$
Referral consultation	85	4.9
Inpatient day:		
at rural health centre level	165	9.3
at rural hospital level	225	12.9
at district hospital level	257	14.7
Normal delivery at district hospital maternity	862	49.0
Average cost of a surgical procedure in the district hospital theatre*	1092	62.4

\*Minor and major cases together.

**Table 8.** Source and destination of funds for public health care in Tsholotsho district, July 1997–December 1998

	Source of funds (% total)	Destination of funds (% total)
MOH&CW	85	83
Rural District Council	5	6
Mission structures	5	11
Donors	5	n.a.
User fees	<1	n.a.

inpatient day at district hospital level: US\$14.7 compared with US\$9.3 at health centre level.

The unit cost of a normal delivery at the district hospital was Zim\$862 (approximately US\$49). This represents the full admission cost for a normal delivery. A rough approximation of the cost of a Caesarean section would be the average cost of the surgical intervention (Zim\$1092 or US\$62.4 – see Table 7) plus the cost of seven inpatient days (Zim\$1799 or US\$103), which is the average length of stay in Tsholotsho district hospital. This amounts to a total cost of Zim\$2891 (approximately US\$165).

### Financing

Table 8 shows the sources and destination of the finance available in the Tsholotsho health service at the time of the study. Some 85% of the total funds came from the MOH&CW, including donor finance channelled through central budget support. MOH&CW funds flowed to all the different facilities regardless of their ownership. Mission structures account for about 5% of total funds at district level, but about 11% of the funds available flows back to them, suggesting a subsidy to the Tsholotsho Mission facilities.

In the study period, an amount of (only) Zim\$87 660 (approximately US\$5000) was raised through user fees. This is less than 1% of the total revenue. On the other hand, the amount of funds 'not collected' because of exemptions (including exemptions for TB patients for

whom care is free of charge) totalled Zim\$4 438 000 (approximately US\$254 000).

## Discussion

An annual per capita cost of US\$10 to provide the current package of curative, preventive and promotional health care in Tsholotsho district is lower than the (indicative) cost presented in the World Bank document *Better Health in Africa* (World Bank 1994). In the World Bank study, costs were extrapolated from data on well-functioning health centres and district hospitals. To the extent that the Tsholotsho health care facilities can be considered as 'well-functioning', some level of comparison is possible with the World Bank data. In the World Bank study, the annual total per capita cost for low-income African countries was estimated at US\$13.2, and at US\$16.4 for higher-income African countries. These figures, however, refer to a package that includes water and sanitation, as well as a significant level of national and regional management support. In that respect, it may be more appropriate to handle the *Better Health in Africa* figures that correspond to the district-based health care component only, which is also the main focus in the Tsholotsho study: these are US\$7.74 and US\$10.75 for low- and higher-income African countries, respectively. These figures are roughly equivalent to the those established in our study.

The Tsholotsho costs, however, are significantly higher than those established in the international comparative analysis of costs in sub-Saharan Africa and Asia carried out by the Bamako Initiative Management Unit (BIMU) of UNICEF (Stryckman 1996). Zimbabwe was one of the 13 developing countries surveyed in the analysis (data for the period 1993–94). In the BIMU study, the per capita cost of operating a health centre was estimated at US\$1.5 (US\$4 in our study) and the per capita cost of the district hospital was US\$3.85 (US\$6 in our study). The reasons for these differences are unclear. A possible contributory element is the fact that the BIMU study did not include the depreciation costs of equipment, furniture and buildings, whereas the Tsholotsho study did. A comparison of the cost structure reveals that the proportion of personnel costs is similar in both studies: 58% of total costs at health centre level in the Tsholotsho study and 59% in the BIMU study; 47% of total costs at district hospital level in Tsholotsho and 55% in the BIMU study. The cost of drugs and supplies at health centre level was 32% of total costs in the BIMU study and only 21% in our study. For the district hospital, the relative proportion of the cost for drugs and supplies was 31% in the BIMU study, but only 21% in our study.

Another BIMU study conducted in 1994 in three Zimbabwean hospitals (Binga, Gutu and Shurugwi districts) estimated the recurrent cost per capita – not including depreciation costs – for running all facilities in the district at between US\$4.4 in Gutu district (with a mission hospital) and US\$8.1 in Binga district (Bijlmakers

and Chihanga 1996). The latter cost comes close to the Tsholotsho findings and the distribution of total costs per type of facility in Binga district is also similar to that observed in Tsholotsho.

An average cost per inpatient day in the Tsholotsho district hospital of US\$14.7 is significantly higher than the cost per inpatient-day found in the study of six Malawi district hospitals (Mills et al. 1993) and that found in 16 Tanzanian hospitals of the Evangelical Lutheran Church (Flessa 1998). In the Malawi study, the highest cost per hospital inpatient day was about US\$5 and the costs for other units of service (e.g. outpatients) were also consistently lower than in Tsholotsho. In the Tanzania study, the average cost per equivalent inpatient day was also lower (US\$6.4), but the cost per outpatient attendance at hospital level (US\$4.1) was similar to the one found in Tsholotsho. However, costs were similar to those found in a study carried out in two other Zimbabwean district hospitals (Hansen et al. 2000). Plausible explanations for the higher costs in Zimbabwe compared with other countries in the region are the relatively high standard of the Zimbabwean public health care delivery system, and also the (at that time) higher standard of living and thus higher salaries in Zimbabwe compared with many other African countries.

The Malawi study quoted above further indicated that the six hospitals investigated accounted for 61–73% of the total district health costs. In Tsholotsho this proportion was similar, at 59.6%.

A common pattern in developing countries is the very substantial outpatient functions of hospitals. A study by Mills (1990) of the economics of hospitals in seven developing countries indicated that outpatient care absorbs approximately 20% of hospital current expenditure (it is often also an important source of revenue, which renders rationalization policies more difficult). This was the case in Tsholotsho where 23% of the total costs of the district hospital were for the outpatient department. Mills (1990) indicated that in the different African countries investigated the share of hospital expenditure consumed for salaries and wages was 40–50%. This again is in line with our own findings.

An intrinsic limitation of this costing methodology is that there is always a certain level of approximation and even arbitrariness in the definition of the various allocation keys. There is no reason to believe that this was different in our study. We also acknowledge the possibility of bias in the direct observations of resource use at the point of service.

Data on volumes of service were not always readily available for the service centres or units as we defined them. It was also impossible to trace back the revenues to the units of service: payments were made in one main receipt book as cover charges for a variety of services delivered at the hospital and for drugs, laboratory services, X-rays and hotel costs. There was the further complication of bulk

payments for group accounts, largely from medical aid societies and other account holders, which were impossible to break down to the services provided. We decided to use the aggregated revenues for interpretation only in areas where this was possible. Financial data for the Pumula Mission Rural Hospital (one of the three rural hospitals in the district) were incomplete and information for 11 months had to be extrapolated to 18 months. Our data do not permit computation of costs separately for acute and chronic curative care, making it unfortunately not possible to assess the impact of HIV/AIDS on service costs.

We did not include the costs of support from provincial and central levels, such as visits by medical consultants, insecticide spraying, and some health education activities that were paid for by the higher levels. In principle these costs should be imputed to the district. The cost data found in this study thus constitute a slight underestimation of the real total costs. Finally, we acknowledge that the usefulness of the results from this study, in the absence of standard service indicators of the quality of services provided, will necessarily remain limited.

#### **Poor efficiency of Zimbabwean 'rural hospitals' and relevance of a rational two-tiered district referral system**

Our study results strongly question the relevance of maintaining the rural hospitals at the current level of capacity. They are situated at a level in-between health centres and district hospital. Except for the more extended inpatient services the rural hospitals offered, there were no major differences with the health centre network in terms of the level of staff qualifications, the equipment available and the content of the care offered. For ambulatory curative care, the relatively overstuffed rural hospitals are more costly than health centres for an output of service that, in our experience, is roughly similar to that of health centres. It would be rational in Tsholotsho to downgrade the staffing level and the inpatient facilities of rural hospitals to that prevailing in neighbouring rural health centres.

Another result of the costing study is the evidence it provides in support of a rational referral system. Compared with the experience of many developing countries, Zimbabwe has made great strides in the development of a health care system based on the primary health care model. However, there still remains much to be done in order to enhance rational referral patterns (Criel et al. 1996; Sanders et al. 1998). In Tsholotsho district, the costs of first-line curative care, preventive care and normal deliveries at health centre level are lower than the costs at the district hospital's outpatient department. The quality of the curative and preventive care that is offered at health centre level is comparable, in our experience, to the ambulatory care supplied by the hospital's outpatient department nurses. This is, however, less clear-cut for deliveries, where a gradient in quality may be expected at hospital level.

#### **Buying drugs from the private sector**

At the time of the study, the drug market in Zimbabwe had only been recently liberalized. Many entrepreneurs of variable skills and ethics were appearing and disappearing from the market. Moreover, the civil service was only beginning to discover the tools to strengthen their hand in business negotiations. The costing results must thus be viewed in this perspective and may only be partially extrapolated to the future; but they indicate that there was not much room to increase private sector involvement in the supply of drugs. Though often criticized for its unreliable services, the GMS provided drugs at much more competitive prices. If the GMS were to succeed in stabilizing its supply, this would definitely constitute a major benefit for the Zimbabwean health system.

#### **The cost of blood**

Blood transfusion services are one of the most expensive elements of health systems (Foster and Buvé 1995). In the case of Tsholotsho, the high cost of the blood bank at the district hospital was one of the most striking findings of the entire exercise: the cost of blood services equalled the total costs of three average health centres. But the Zimbabwean blood transfusion services were also considered to be of good quality and among the best performing in sub-Saharan Africa (personal communication from Dr D Verkuyl, Gynaecology and Obstetrics consultant at the United Bulawayo Hospitals).

A study from Tanzania reports that the cost of a suitable blood unit under a centralized supply system is US\$25–40 (Jacobs and Mercer 1999). In Uganda, the National Blood Transfusion Programme provides 40 000 units annually of safe blood components to hospitals throughout the country at a cost of approximately US\$28 per transfused unit (Van de Perre et al. 1997). Both these figures are far lower than that found in Tsholotsho.

The enormous cost of blood in Tsholotsho remained unknown to managers as a result of the failure to link the budget to the actual use of funds. For possibly good reasons, blood was distributed at the provincial level, using the district medical and surgical vote. Though overspending of this particular vote was a recurrent phenomenon in most Zimbabwean districts, the attribution of the cost of blood remained unidentified until this exercise. The separation of budget holding, purchasing and actual use of purchased goods blurred managerial oversight.

Once the high cost of the transfusion service was discovered, measures to rationalize the use of blood were implemented through a thorough review of guidelines. The quality of management of the blood bank at the Tsholotsho hospital was analyzed and found to be good. Alternative options like blood donation on the spot by relatives and/or auto-transfusion could also be explored. From 2000, a separate budget line for blood transfusion services was instituted at the district level.

### User fees as a cost-recovery mechanism

The revenue collected in the study period through user fees represented, at that time, a recovery rate of less than 0.5% of the total recurrent expenditure in the entire health district. The limited cost recovery was also highlighted in the BIMU study in three Zimbabwean districts (Bijlmakers and Chihanga 1996). The main reason for the low level of user fee revenue in Tsholotsho district, in our experience, lies in the huge number of exemptions, especially for rural peasants. We suspect that in the case of Tsholotsho, there was a substantial level of leakage in the process of identifying people in need of free health care, which undermined the intended scope for local revenue generation aimed at within the fee-paying policy framework prevailing at the time.

The fee-paying policy in Zimbabwe was actually broadened somewhat from January 2001 on. Rural District Councils (RDCs), who have the autonomy to decide on fee policies independently from government clinics, started to charge fees in their own network of rural clinics. The Tsholotsho council decided to charge a 'health levy' of Zim\$50 per episode of illness for an adult and Zim\$25 per episode of illness for a child. The policy of free health care at the point of use was maintained, however, at the level of government clinics in order not to compromise access to primary care, but there was an increase in fees at district hospital level. Besides an increase in cost-recovery at hospital level, this measure aimed to discourage direct hospital utilization and to strengthen the gate-keeping function of first-line health care facilities. A flat fee was charged at the hospital outpatient department (Zim\$120 for an adult and Zim\$60 for a child), except for the under-fives, patients over 65 years, invalid patients, those with a letter from Social Welfare, and other economically vulnerable patients treated free of charge at all levels of care.

### Conclusion

This study provides us with more insight into the costs of providing district health care of a relatively high standard compared with the care offered in many other African settings. It provides Zimbabwean DHE's with evidence that may steer the re-organization of some of their services, more specifically the downgrading of inefficient rural hospitals. It also provides evidence in favour of a reform of the budget system. The data on the cost of blood illustrate the need not to separate budget holding, purchasing and actual use of resources and goods. In the context of health services reforms and decentralization, this exercise makes a case for the different elements of the budget to be managed at district level. The study further confirms the soundness of the district health system model, specifically its referral component. From a system perspective it is clear that there are appropriate levels at which distinct types of services should be delivered. This study confirms that care rendered at the primary health care level is cheaper than that in hospital. The potential for cost recovery was not fully exploited at the time of the

study. However, more local revenue generation would imply concomitant careful thinking on appropriate criteria for the identification of fee-paying exemptions.

Finally, this study indicates that the cost of providing the classical health district package of curative, preventive and promotional care, delivered through a two-tiered system of health services, is by no means exorbitant, albeit unfortunately not yet within the reach of what many sub-Saharan African countries can afford today. These findings nevertheless illustrate that it is *possible* to organize district health care of a reasonable standard at a relatively low cost.

### Endnote

<sup>1</sup>An important part of the population living in the Nyamandlovu area (in total some 20 000–25 000 people), where one of the three rural hospitals was located, used the different Bulawayo-based provincial hospitals for referral care more often than the Tsholotsho district hospital. The public transport lines were such that travelling to Bulawayo was a more convenient option. This implies that the figure of 163 000 for the district population is an overestimate of the population that really used Tsholotsho hospital for referral care and that the annual per capita costs are underestimated.

### References

- Barnum H, Kutzin J. 1993. *Public hospitals in developing countries: resource use, cost, financing*. Baltimore, MD: The Johns Hopkins University Press.
- Bijlmakers L, Chihanga S. 1996. District health systems in Zimbabwe: cost, resource adequacy, efficiency and the core service package. A comparison of three districts. *Bamako Initiative Technical Report Series*, no. 36. New York: UNICEF.
- Conteh L, Walker D. 2004. Cost and unit cost calculations using step-down accounting. *Health Policy and Planning* **19**: 127–35.
- Criel B, Macq J, Bossyns P, Hongoro C. 1996. A coverage plan for health centres in Murewa district in Zimbabwe: an example of action research. *Tropical Medicine and International Health* **1**: 699–709.
- Flessa S. 1998. The costs of hospital services: a case study of Evangelical Lutheran Church hospitals in Tanzania. *Health Policy and Planning* **13**: 397–407.
- Foster S, Buvé A. 1995. Benefits of HIV screening of blood transfusions in Zambia. *The Lancet* **346**: 225–7.
- Hansen K, Chapman G, Chitsike I, Kasilo O, Mwaluko G. 2000. The costs of HIV/AIDS care at government hospitals in Zimbabwe. *Health Policy and Planning* **15**: 432–40.
- Hanson K, Gilson L. 1993. Cost, resource use and financing methodology for basic health services – a practical manual. *Bamako Initiative Technical Report Series*, no. 16. New York: UNICEF.
- Jacobs B, Mercer A. 1999. Feasibility of hospital-based blood banking: a Tanzanian case study. *Health Policy and Planning* **14**: 354–62.
- Kumaranayake L. 2000. The real and the nominal? Making inflationary adjustments to cost and other economic data. *Health Policy and Planning* **15**: 230–4.
- Management Sciences for Health. 1998. *Cost and revenue analysis tool (CORE), A user's guide*. Boston, MA: Management Sciences for Health.

- Medicus Mundi Belgium. 1999. District Health Services Management (DHSM) Project, Tsholotsho District, Matabeleland North Province. Report of a seminar held in Esigodini, 8 May 1998. Brussels: Medicus Mundi Belgium.
- Mills A. 1990. The economics of hospitals in developing countries. Part II: costs and sources of income. *Health Policy and Planning* 5: 203–18.
- Mills AJ, Kapalamula J, Chisimbi S. 1993. The cost of the district hospital: a case study in Malawi. *Bulletin of the World Health Organization* 71: 329–39.
- Sanders D, Kravitz J, Lewin S, McKee M. 1998. Zimbabwe's hospital referral system: does it work? *Health Policy and Planning* 13: 359–70.
- Stryckman B. 1996. Comparative analysis of cost, resource use and financing of district health services in sub-saharan Africa and Asia. *Bamako Initiative Technical Report Series*, no. 37. New York: UNICEF.
- Van de Perre P, Diakhate L, Watson-Williams J. 1997. Prevention of blood-borne transmission of HIV. *AIDS* 11 (Suppl B): S89–98.
- Van Lerberghe W, Van Balen H, Kegels G. 1992. Typologie et performances des hôpitaux de premier recours en Afrique sub-saharienne. *Annales de la Société belge de médecine tropicale* 72 (Suppl 2): 1–51.
- Vander Plaetse B, Criel B. 2001. Cost and revenue study, District Health Services Management (DHSM) Project. Brussels: Medicus Mundi Belgium.
- World Bank. 1994. *Better health in Africa*. Washington, DC: The World Bank, Africa Technical Department, Human Resources and Poverty Division.
- Gordon Hlatiwayo is a Health Services Administrator. He trained at the University of Zimbabwe, Harare. He was district health services administrator for Tsholotsho District, Zimbabwe for the period 1995–99. He was administrator of Mpilo Central Hospital in Bulawayo, Zimbabwe, from 1999 to 2000. He is presently working as health services administrator in St. Lukes Mission Hospital, Lupane District, Zimbabwe. He collaborated in the design, data collection and analysis of the Costing and Revenue Exercise (CORE).
- Luk Van Eygen is a Medical Doctor. He worked for the non-governmental organization Medicus Mundi Belgium (MMB) in Tsholotsho District, Zimbabwe as a general and acting district medical officer in the period 1999–2003. He collaborated in the data collection for the Costing and Revenue Exercise (CORE). He is now working as a general practitioner in Belgium.
- Bruno Meessen is a health economist and is based at the Department of Public Health, Institute of Tropical Medicine, Antwerp, Belgium. He has extensive overseas experience in Africa and South East Asia with the non-governmental organization Médecins Sans Frontières Belgium. He is currently conducting research in the domain of institutional economics and health care financing.
- Bart Criel is a Medical Doctor. He has a DTM&H, an MSc in Community Health in Developing Countries (London School of Hygiene & Tropical Medicine), and a Ph.D. from the Free University of Brussels. He is currently a lecturer at the Department of Public Health, Institute of Tropical Medicine, Antwerp, Belgium. He has extensive experience in the field of health systems research in various sub-Saharan Africa countries. He was responsible for the scientific follow-up of the District Health Services Management (DHSM) project in Tsholotsho District, Zimbabwe in the period 1992–2002.

## Biographies

Bart Vander Plaetse is a Medical Doctor. He has a DTM&H and an MPH (Institute of Tropical Medicine, Antwerp). He worked for the non-governmental organization Medicus Mundi Belgium (MMB) in Tsholotsho District, Zimbabwe as a general and district medical officer in the period 1995–99. He was the principal researcher in the Costing and Revenue Exercise (CORE). He is now working in Nigeria as an advisor to the Ministry of Health.

*Correspondence:* Bart Criel, Department of Public Health, Institute of Tropical Medicine, 155 Nationalestraat, B-2000 Antwerp, Belgium. E-mail: bcriel@itg.be