

Costing Study of selected Health Facilities in Fiji



Wayne Irava • Martina Pellny • Idrish Khan

Foreword

The provision of health services in Fiji is largely public funded and reflects Government's commitment to the widest accessibility of health services for the people of Fiji.

However the triple burden of disease, advancement in medical technology and rising costs of pharmaceutical products mean that the provision of health services is putting increased strain on government finances.

Costing exercises like that presented in this report is useful to help both the Ministry and the public better understand the costs involved in the provision of various health services.

As the report essentially looks at curative health services it creates an increased awareness of what resources are consumed across the different levels of the curative health service delivery provided by the Ministry. Furthermore, the report goes on to highlight some areas for improvement that when addressed can be avenues for increased cost savings.

The report has highlighted identified limitations to the study, it nevertheless will be a very helpful tool for the Ministry to consider especially on budgeting provision, fees structure and strategies to improve services.

Although the Government has made a commitment in the Pillar 10 of the People's Charter for Change to increase the Ministry's annual budgetary provision, the report challenges the Ministry to give the same attention to the issue of "what can I do best with the money that I have".

We thank our partners, the World Health Organization [WHO] and the Fiji National University's Centre for Health Information, Policy and Systems Research [CHIPSR] as well as our Ministry staff for undertaking this piece of work.



Dr E Tora
Permanent Secretary for Health

Costing study of selected Health Facilities in Fiji

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Disclaimer

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Authorship

This study is authored via a collaborative effort between CHIPSR (Centre for Health Information, Policy and Systems Research), WHO (World Health Organization) and the MoH (Fiji Ministry of Health). CHIPSR is a health research unit (and part of the Fiji National University) that is active in health system and services research, evaluation and policy analysis. The task of CHIPSR was to manage the costing analyses and the subsequent written report. WHO provided funding for the exercise, provided technical expertise during the study, and contributed to the report. The MoH provided a focal contact to facilitate the necessary access to stakeholders, health facilities, and data that was needed for the costing exercise. The MoH focal point also provided technical expertise. The authors team jointly undertook the field visits to the facilities to collect data and developed the design of this study.

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Last but not the least, we thank Professor Rachel Racelis for her review of the report and for providing valuable feedback which we have incorporated to strengthen the content of this report.

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Abbreviations

These are the list of abbreviations and acronyms used within this report. The first reference to the ‘entity’ uses the full name but all subsequent references thereafter to the ‘entity’ uses its acronym.

A&E	Accident and Emergency Department
AMW	Acute Medical Ward
ANC	Ante Natal Clinic
ANW	Ante Natal Ward
ASW	Acute Surgical Ward
CCU	Cardiac Control Unit
CHIPSR	Centre for Health Information Policy and Systems Research
CWM	Colonial War Memorial Hospital
GOPD	General Outpatients Department
HITH	Hospital in the Home
IT	Information Technology
LTK	Lautoka Divisional Hospital
MICU	Maternity Intensive Care Unit
MMU	Morrison Maternity Unit
MMW	Mens Medical Ward
MSW	Mens Surgical Ward
MoH	Ministry of Health, Fiji
NAU	Nausori Health Centre
NICU	Neonatal Intensive Care Unit
NSW	New Surgical Ward
PICs	Pacific Island Countries
PICU	Pediatric Intensive Care Unit
PNW	Post Natal Ward
SOPD	Special Outpatients Department
WHO	World Health Organization
WMW	Womens Medical Ward
WSW	Womens Surgical Ward

Definitions

Definitions of commonly used terms within this report are detailed below

Term	Definition used
Total cost	Health facilities' overall costs that included operational costs by different sources and those that occurred during a certain time period (e.g., personnel, equipment, materials, drugs, and buildings)
Overhead costs	Costs not easily associated with individual patients, procedures, activities, or services (i.e. cannot be specifically identified to a given output). They require allocation to final cost objects, and include such areas as human resources, administration, security, and building maintenance
Unit cost	Total cost divided by output unit during a certain time period for a specified ward, hospital or health service.
Utilization	The number of units of services used by patients in a health facility during a certain time period (per day, per month or per year)
Average length of stay	Total days of stay of all patients in the specified ward or hospital during a given time period, divided by the number of patient admissions during that same period
Inpatient unit costs	Total costs incurred by inpatients divided by total number of inpatient days for a certain time period for a specified ward, hospital or health service.
Outpatient unit costs	Total costs incurred by outpatients divided by total number of outpatient visits for a certain time period for a specified ward, hospital or health service.
Laboratory unit costs	Total costs incurred by laboratory services divided by total number of laboratory tests for a certain time period for a specified ward, hospital or health service.
X-ray unit costs	Total costs incurred by x-ray services divided by total number of x-ray examinations for a certain time period for a specified ward, hospital or health service.
Dental unit costs	Total costs incurred by dental services divided by total number of outpatient visits for a certain time period for a specified ward, hospital or health service.

Executive Summary

This study was a collaborative effort between the Ministry of Health Fiji, the World Health Organization, and the Fiji National University through the Centre for Health Information, Policy and Systems research. The objective of the study was to undertake a cost analysis of health services provided at public health facilities (2 divisional hospitals and 1 health centre) in the Fiji public health system in 2010. The 2009 & 2010 Fiji National Health Accounts Report estimates public funding of health expenditure at 61% of total health expenditure. As the largest purchaser and provider, the Fiji Ministry of Health has an interest to ensure that funds are spent efficiently at the different functional (health services) level. The findings of this report can be classified into three different categories and the discussion below is structured accordingly.

1. Total costs per departments

The first area of findings pertains to the total costs per department per health facility – which is a way of displaying costs that is not possible within the existing routine MoH accounting systems in Fiji so far. Comparing costs between departments that provide similar services allow one to benchmark facilities. We are however well aware that there are many limitations to such an approach since we only look at the costing side without being able to consider quality and effectiveness of services. It might however give some indication (especially for insiders of the Fiji hospital system) where improvements are possible and further studies necessary.

There were similarities and differences between the department's costs across the 3 facilities, however comparisons are better made between the 2 divisional hospitals since they have similar organizational structures and operations. Across the 2 hospitals, the most cost intensive departments were the Laboratory services, Operating Theatres, and Special Outpatients department (SOPD). This was expected since these departments had complex medical equipment, provided complex medical tests and procedures, and consumed most of the specialist doctors and consultants time. At the health centre level, General Outpatients Department (GOPD) consumed most of the costs of the facility. Again not surprising since health centers were established for the primary objective of providing outpatient primary care health services.

It is however interesting to note that there is a large variation, almost fourfold, in laboratory costs between CWM and Lautoka Hospital, although Lautoka Hospital for example has similar total costs for the operating theatre, thus indicating that in the area where laboratory monitoring of patients is crucial, the activities of the two hospitals seem similar.

Interesting findings can also be seen in Table 6 of this study, which converts total costs into unit costs per department of each facility: We would expect the costs at CWM and Lautoka Hospital to be quite similar since both are divisional referral hospitals. This expectation is confirmed in departments such as Ante Natal Clinic (ANC), General Outpatients Department (GOPD), Physiotherapy, Pediatric Intensive Care Unit (PICU), Lancaster Ward and Womens Medical Ward (WMW). However there were large variances in other departments with the biggest differences coming from the Cardiac Control Unit (CCU), Intensive Care Unit (ICU), Labour Ward and the Burns Unit.

2. Unit costs per defined health services (inpatient, outpatient, dental, laboratory and x-ray services)

The second area of findings is around the pre-defined unit costs for inpatient services, outpatient services, dental services, laboratory and x-ray services. Like department costs, the unit costs across the defined health services were similar between the health facilities selected for this study, with CWM having the highest unit costs across the 3 facilities. Inpatient services were cheaper at hospitals than compared to the health centre, and this was reversed (and expected) when it came to outpatient services. It also suggests that the recent health reforms to cease outpatient services at divisional hospitals and have this redirected to health centres may result in some cost savings (and this should be monitored accordingly), although again it needs to be emphasized that this only takes into account the costing side of things, and not the quality of services provided. Unit costs for laboratory services and X-ray services are higher in CWM than in Lautoka Hospital, and this goes in line with above observations on total costs by facility departments. It might be worth to more closely look into this for efficiency gains and cost savings.

Table 1: Total costs by facility departments

Department	Amount			Department	Amount		
	CWM Hosp.	LTK Hosp.	NAU HC		CWM Hosp.	LTK Hosp.	NAU HC
A&E	1,127,871.03	582,912.41	195,328.98	MMU	327,519.96		
AMW	995,010.12			MMW	741,815.41	503,781.78	
ANC Clinic	1,307,443.54	302,211.21	290,642.59	MSW		463,281.63	
ANW	515,150.18	322,847.50		NICU	794,810.28	546,938.46	
ASW	729,326.37			NSW	910,533.69		
Birthing Unit	133,731.79			Oncology Unit	170,319.54	93,950.70	
Burns	177,048.38	157,754.35		Ortho Wd		496,191.76	
CCU	452,774.78	481,594.61		GOPD			1,714,198.18
Child Wd 1	447,196.52	636,241.77		Oxfam	181,722.86		121,959.60
Child Wd 2	445,629.01			Paed (GOPD/A&E)	697,508.86		
Child Wd 3	422,946.88			Paying	693,393.74	373,829.86	
Dental Clinic	983,433.56	894,809.82	292,747.24	Physio	538,008.25	604,611.82	87,090.47
Diabetic Clinic	216,825.33			PICU	861,029.68	153,061.66	
EYE Unit	592,753.17	384,652.20		Plastic/ ENT	642,156.90		
GOPD	1,212,471.68	1,518,937.24	596,714.52	PNW	555,882.28	601,394.97	
Gynae Clinic	383,030.30			SOPD	1,800,542.53	676,124.06	155,780.84
HDU		197,637.47		TB Ward		299,525.40	
Housekeeper		39,640.52		Theatre/PARU	2,184,124.41	1,778,325.44	
HITH	167,142.39			WMW	578,725.93	564,568.88	
Hyperbaric	116,509.73			WSW		446,224.16	
Inpatients			488,598.40	X-Ray	1,516,948.52	635,028.00	
ICU	735,149.67	228,431.78		Lancaster Wd	566,360.88		
IT Services		57,158.04		Library unit		34,567.25	
Kidney	534,810.60			MCH Unit			266,681.19
Lab department	5,766,981.81	1,414,054.28		MICU	354,194.05		
				Total	32,221,340.44	16,147,278.50	2,528,054.78

3. Comparison of unit costs per defined health services (inpatient, outpatient, dental, laboratory and x-ray services)

The third area of findings is inter-temporal and compares the unit costs as presented under point 2 with the unit costs from the study of Wong and Govind in 1992. As expected, unit costs have increased over the period of 20 years. Some services however have shown only marginal increases in unit costs (e.g. inpatient and x-ray services) while in the case of laboratory services the increase in unit costs have been exponential. This large increase in laboratory services can be attributed to the increase in complexity of both laboratory machines and type of tests (and

subsequently lab chemicals and reagents), as well as increased utilization of lab services in hospitals. In health centres the large increment in costs shows how these facilities have grown and developed in terms of their capacity to now provide an increased variety of health care services.

Table 2: Units costs per defined health services across facilities

Inpatient Services			
	Costs (\$FJD)	Utilization (patient days)	Cost/day (\$FJD)
CWM	15,396,050.00	182519	84.35
LTK	8,334,751.18	90824	91.77
NAU	488,598.40	3601	135.68
Outpatient Services			
	Costs (\$FJD)	Utilization (visits)	Cost/visit (\$FJD)
CWM	15,435,503.44	261390	59.05
LTK	7,413,802.07	170165	43.57
NAU	1,714,198.18	98578	17.39
Dental outpatient services			
	Costs (\$FJD)	Utilization (visits)	Cost/visit (\$FJD)
CWM	983,433.56	16887	58.24
LTK	898,854.00	23339	38.51
NAU	292,747.24	13568	21.58
Laboratory Services			
	Costs (\$FJD)	Utilization (tests)	Cost/test (\$FJD)
CWM	5,766,981.81	260485	22.14
LTK	1,414,054.28	83317	16.97
NAU	-	-	-
Radiology Services			
	Costs (\$FJD)	Utilization (examinations)	Cost/exam (\$FJD)
CWM	1,516,948.52	77365	19.61
LTK	635,028.00	44384	14.31
NAU	63,271.44	4482	14.12

Table 3: Comparison of units costs in 2010 with unit costs in 1992

	CWM	LTK	NAU
Inpatient Services (cost/day)	84.35 (75.57)	91.77 (86.56)	135.68 (N/A)
Outpatient Services (cost/visit)	59.05 (17.31)	43.57 (8.13)	17.39 (2.06)
Dental outpatient services (cost/visit)	58.24 (N/A)	38.51 (17.34)	21.58 (1.70)
Laboratory Services (cost/test)	22.14 (4.21)	16.97 (2.25)	N/A (N/A)
Radiology Services (cost/examination)	19.61 (16.14)	14.31 (12.50)	14.12 (N/A)
Note: The figures in red are the values reported in the Wong and Govind study back in 1992. These figures have been adjusted for inflation to allow comparison with our 2010 findings.			

It is important to point out that the total and unit costs reported in this report are averages and therefore do not inform about specific diseases or case treatments. Neither do they inform us about the quality of services across the 3 facilities. Nevertheless if assuming, in a small country like Fiji, that the quality and scope of health services across the two divisional hospitals are comparable – then the unit costs (per department and per defined health service) give an interesting indication for hospital managers to assess the significant cost drivers within their facilities and identify potential avenues for costs savings.

In addition, the report also includes some observations the researchers came across while visiting the 3 facilities, and which also might hint to potentials of efficiency gains and cost savings, and need further studies.

We also recommend that a modern hospital accounting system be introduced to the Ministry that allows costs to be based on outputs rather than inputs and on a routine basis – so that hospital managers are in a better position to monitor the costs of their facilities.

And finally, since the Ministry of Health has launched the strengthening of primary health care with a reform that shifts primary care services from hospitals to health centres, this study can be used as a baseline to examine in 2-3 years from now if the reforms had any impact on costs and eventually, as can be derived from this study, produce some savings.

Chapter 1 Introduction

Motivation of study

The motivation for this study stemmed from several experiences encountered during our work with health financing issues in Fiji. Firstly, having being involved in the production of the Fiji National Health Accounts reports for 2007/2008 and 2009/2010, we saw a need for further advancement of accounting for health expenditure by obtaining more accurate and recent costing data on health services (especially for inpatient and outpatient services) provided by public health facilities.

Secondly the MoH recent reform of outpatient services¹ saw the need to establish a baseline of costs for the provision of services at hospitals and health centres. This would assist with monitoring the cost implications of the recent reforms to shift outpatient services from hospitals to health centres (if the study is replicated) as well as provide a costing estimation that can assist in the planning of future budget allocations for the different levels of care (hospitals, health centres, nursing stations).

A third motivation for this study was driven by questions that had stimulated our numerous discussions and debates. We wanted evidence to inform us on questions such as:

- How does the cost structure on facility level in 2010 compare to the cost structure on facility level in 1990 in Fiji (date of the last costing study)?
- Are there potentials for cost savings?
- How easy is it to convert data from the input oriented accounting system into output indicators (basic output indicators as used in this report) – and could this be done on a routine basis to help facility managers to better manage resources matched to outcomes?

¹ In 2011, the Ministry of Health undertook some structural reforms to the provision of out-patient services. A decision was made to cease out-patient services from the three main divisional hospitals (CWM, Lautoka and Labasa hospitals), while at the same time strengthen the out-patient services at Health Centres to cater for the increased demand. CWM hospital was chosen as a pilot case and undertook the reform by mid-year 2011. At the time this report was written Lautoka Hospital and Labasa hospital were yet to undergo the reform.

Unfortunately there are no straight forward and easy answers to such questions. To accurately address them all would imply a project of greater magnitude and scale that would require a lot more time, a lot more money, and a lot more effort. But many small steps eventually result in a giant leap, and so rather than making the giant leap we opted for a small step which involved undertaking a costing analysis of certain health services at chosen public health facilities. This costing analysis project on its own will not provide complete answers to our questions. It is only one piece of the puzzle but indeed a vital piece that will provide better information and insight into the costing of health services in Fiji.

Aim and Objectives

The aim of the study was to undertake a cost analysis of health services (inpatient, outpatient, laboratory, x-ray, and dental services) provided at public health facilities (2 divisional hospitals and 1 health centre) in 2010. This would enable us to (i) establish a baseline for inpatient, outpatient, ancillary and dental care costs at different levels of care provided, and (ii) to raise cost awareness to both health workers and the general population about the costs involved in the provision of health services.

To achieve this aim, the specific objectives of the study were as follows:

- To derive the total expenditure incurred at the studied health facilities for the year 2010
- To calculate the unit costs of inpatient, outpatient, laboratory, x-ray, and dental services at the studied health facilities in 2010
- To interview health staff at the studied facilities on their roles and processes in the provision of services including their knowledge on the utilization of services, as well as their views on potential savings or improvements in the service structure.

Outcomes

Our intention is that the outcomes of this project would better inform the MoH and their staff (as well as the population using the health services) about unit costs at health facility level. The health system in Fiji has always (both historically and at present) advocated the slogan “Free for

Health” with regards to public funded health services. In reality we know that there is no such thing as “free health”. There is always a cost and someone will always have to bear it.

By better understanding the costs of various health services, consumers of these services might have a better appreciation of the services rendered and how health workers are often limited to provide services because of resource constraints and financial budget limitations. For hospital managers and health centre managers (and the Ministry of Health), having knowledge about the basic unit costs as used in this study might help to better manage resources matched to outcomes: putting a number on how much on average one outpatient visit costs, how much it cost to keep a patient overnight, together with numbers on utilization of services – and trends of utilization over time, will give a good indication of how affordable services provided at different levels are and, depending on reform trends, how budgets need to be allocated to certain levels of care.

Chapter 2 Background

Health care systems all over the world are facing significant pressure to contain costs and improve the quality of health services, and since ultimately, there is a certain trade-off between both aims, policy makers ask for solutions. This is the case in the Pacific as well, especially because the external funding of the health sector by donors is significant and growing. One way of addressing this dilemma is to look into potential savings and inefficiencies of the system in order to make better use of available funding. To do this we need to first understand what it actually costs to provide health services.

Cost analysis is an essential tool relating the inputs of resources in monetary terms (eg. staffing costs, electricity bill, maintenance costs, laundry services etc) to the outputs of health services provided by health facilities (eg. number of outpatient and inpatients cared for), it involves thus to allocate direct and indirect costs to the respective services.

Cost analysis tells us for example how much it costs in average to care for a patient in a hospital overnight, how much it costs on average to treat a patient on ambulatory level (outpatient visit),

how much a laboratory test costs, a visit with the dentist or a X-ray examination in a given country at a given time.

While there are numerous articles and reports existent in the literature on costing of health services worldwide, there is to our knowledge only a handful done (and reported) in health facilities in PICs. The small number of costing study reports done amongst PICs are largely inaccessible because often they are removed from the public literature and remain in the domain of the organizations that funded or undertook the study and thus making them difficult to obtain. For Fiji, only two reports about costing of health services, one in 1987 and the other in 1992, are mentioned in the literature. To our knowledge, these are the only health costing studies done so far in the country, thus the time is ripe for another health facility costing study².

Fiji's public health system is tax based, and thus budgets are allocated to each of the government sectors on an annual basis. To date, health sector budgets are mainly allocated as historical budgets. The budget system as such does therefore not require to link inputs to outputs – thus to link the (budget) money that goes into the sector to the provision of health care services. The reason is simple; it is because Fiji has (like any other country with a national health system) what we call an “internal market”: the purchaser of services (the government) is the provider of services (the government). In order to better understand the cost structure and produced quality, national health systems therefore often establish “internal” output indicators. In this costing study, we focus to derive a first few and simple output indicators:

- cost per inpatient day
- cost per outpatient visit
- cost per laboratory test
- cost per x-ray examination
- cost per dental examination

² One study was conducted by the World Bank (1987) and another study by the Agency for International Development/ USAID (1992). We were only able to obtain a report of the 1992 study.

More sophisticated disease based indicators, for example costs to care for a diabetes patient in Fiji, would require a more in-depth analysis – which was, given the time and budget for the study, not feasible. It is however possible in general.

It is also important to understand that - in line with the budget structure – the accounting structure of the health system in Fiji is likewise input based. The financial reporting system during the time of this study (the EPICOR system) is only able to display input cost categories such as human resource costs, capital costs, project costs, utility costs etc. (reference is made to table 2) but is not made for output based indicators. Furthermore, while the EPICOR system has the ability to report costs by department levels within various health facilities, it is used very little in this sense. The input costs categories are therefore mostly aggregated at facility level. EPICOR thus, historically, tells policy makers how much is spent on salaries or electricity by facility – but whether this amount is appropriate, and what and how much is actually “produced” with it, remains unknown. At the time of this study, EPICOR was in the process of being replaced by a new financial management system used by the Ministry of Finance and with no ability to record costs at department level/ facility level.

Chapter 3 Research Method

This section outlines and details the various components that comprise the selected methodological approach adopted for undertaking this costing exercise.

Selection of pilot facilities

The selection of health facilities for this study was done purposively and was based on logistical considerations (e.g. finances, time, and accessibility) rather than attempting to achieve a statistically representative sample. The selection also took into consideration that this was a pilot exercise to establish the groundwork for a larger in-depth (facility and disease) costing exercise. The selected health facilities include two divisional hospitals: Colonial War Memorial Hospital (CWM) and Lautoka hospital, and one health centre (Nausori health centre). All three facilities provided a wide range of health services, were available for access during the dates for field work (site visits and staff interviews), and had complete audited financial expenditure data for the year 2010. This made them ideal candidates for this costing study. Nausori and CWM are

located in the central division while Lautoka hospital is situated in the western division. For further information on the selected facilities see Table 1.

Table 1 Information about sampled facilities

	CWM Hospital	Lautoka Hospital	Nausori Health Centre
About the facility	<ul style="list-style-type: none"> - is the largest and main referral hospital in the country and located in the central division - has the most sophisticated medical technology and specialist medical expertise - functions as a training hospital for health students - biggest hospital in the country with the largest number of inpatient beds 	<ul style="list-style-type: none"> - second largest hospital and located in the western division - a referral hospital that also functions as a training facility for students 	<ul style="list-style-type: none"> - one of the more advanced and larger health centres in the country - located in the central division at a high density populated area - offers a wider range of health services than most health centres - one of the facilities that took on increased outpatients when this service ceased at CWM
Outpatient visits*	199,677 (257,032)	144,766 (170,165)	53,540 (112,146)
Outpatient visits (dental)	16,887	23,339	13,568
No. of beds**	442 (429)	269 (341)	17 (15)
Inpatient days*	182,519	90,824	3,601
No. of admissions*	26,850 (40,393)	13,901 (12,141)	1,660 (2174)
ALOS	6.86	6.53	2.17
Bed occupancy (%)	114	93	58
Deaths*	924	593	0
Discharges*	26,643	13,856	1,656

* Figures obtained from PATIS³

** Figures obtained from the MoH Annual report for 2010

Figures in brackets are data collected from interviews with facility staff

Reason for selecting a health centre

In January 2011, the MoH gave the directive that all out-patient services would cease operations at divisional hospitals over the next two years and that the public would be re-directed to outpatient services at health centres. CWM was chosen to pilot this transition of outpatient health services, and Nausori health centre was one of the centres that took on increased outpatients

³ PATIS is the patient information system used by the MoH in 2010. The information system reports a variety of health data including patient admissions, outpatient visits, patient days, patient discharges, patient deaths, etc. Not all health facilities in Fiji were using the PATIS at the time of this study and facilities using PATIS were mainly centered in the urban areas. Laboratory departments were not on PATIS at the time of this study.

when this service ceased at CWM. Including Nausori health centre into the study would further allow:

- i) To determine outpatient costs at two different levels of health service provision – at a divisional hospital level and at a health centre level.
- ii) To compare outpatient costs at the divisional hospital as opposed to a health centre and thus perhaps ascertain whether a cost savings is obtained from the restructuring of outpatient services.

Data sources and collection

A variety of data sources and different methods of collection was used because we were dependent on the availability of data, the way the data are stored and how the data was accessed and received. The sources of data included EPICOR (MoH financial management information system, PATIS (Patient information system), annual reports and other documents, interviews, and observations arising out of facility site visits⁴.

The EPICOR expenditure data by facility (inclusive of drugs, consumables and human resources) were extracted directly into Excel files. Data collected from PATIS included outpatient numbers, number of admissions, drug usage by wards, and patient days, and they were extracted in excel sheets for each facility. For drug costs we were able - in addition to the PATIS data – to obtain costing lists from the Fiji Pharmaceutical Services (FPS).

In addition, data from PATIS was triangulated with data collected from interviews (nurses and managers mostly referred to their manual book recordings for data) on indicators such as number of beds, admission data, outpatient data, drug distribution, number of x-ray exams, number of lab tests etc. As displayed in Table 1, for some of the data items we can see large variances which made it difficult for us to reliably establish denominator factors for the calculation of our indicators. We however decided to stick with the “official” PATIS data for consistency of database and because PATIS numbers are used in MoH official reports. However, we know that

⁴ Each facility was visited by the project team comprising of 1 representative each from WHO, FNU and MoH. The team visited all the departments/wards of the facility and talked with either the heads of departments (or in the case of the wards the sister in charge) or the senior management of that department.

PATIS sometimes is difficult to access for nurses and managers and acknowledge that PATIS figures may be under reported.

Interviews and consultations with key hospital staff of various departments was further done to collate data that was unavailable in any previous reports, in EPICOR or in PATIS, such as number of phones, number of power points, number of gas outlets, square footage area of department and number of staff (the latter items mostly to break down for example one of the big expenditure item in the accounting system, the electricity bill). Medical equipment lists was sought from the biomedical engineering unit via the MoH.

Interviews were also valuable in cross-checking estimates from other sources as well as verify that any assumptions made were realistic. Designed excel sheets were prepared for these interviews and in which data was directly entered during the interview. At each visited facility, the following were interviewed:

- Medical Superintendent
- Hospital Manager
- Head of Dental (2-3 staff)
- Head of X-Ray (2-3 staff)
- Head of Laboratory (2-3 staff)
- Head of Pharmacy (2-3 staff)
- Sisters in Charge of the various inpatient and outpatient wards and Theatre (also 2-3 staff nurses of each ward)
- Head of Stores/Supplies
- Head of Biomedical Engineering Unit
- Head of Services (Electricians, Plumbers, Carpenters)
- Head of Kitchen
- Head of Cleaning/Laundry

We collected written annual facility and department reports and various department documentation that included receipt books, invoice books, log books, duty rosters, etc. These secondary literatures were used to either provide missing data or verify and corroborate data collated earlier through other sources. These reports also provided insight into the functions and health services provided by the various departments of the facility.

Data collection was spread out over 3 months. We spent 2 weeks in CWM (28th March to 1st April), 4 days in Nausori Health Centre (19th to 22nd April) and 1 week in Lautoka Hospital (30th May to 3rd June). This timeline was largely driven by the availability of the facility (to receive us) and the availability of the investigators to visit the facilities.

Study design and analysis

This section briefly summarizes the design and analysis procedures undertaken in this project. A more detailed technical report of this section can be found in the appendix attached at the end of this report.

To analyze actual costs of health services (inpatient, outpatient, laboratory, x-ray and dental services) the study adopts a top-down cost accounting based design (Hume-Schwarz, 2007) where all expenditures are assigned to specific departments and allocated on the basis of some criteria to eventually calculate unit costs. There were two reasons for the choice of this methodology. Firstly, this was the same approach used by the USAID costing study done in Fiji back in 1992. Using the same costing design would allow us to make a comparison with the cost estimations of in the 1992 report. Secondly, our preliminary investigation of the EPICOR financial expenditure data showed us that the entered data could not be identified down to the department level within the facility⁵. This meant that aggregated costs from the EPICOR financial system had to be allocated across departments based on some rule of allocation. Thus, the “costs” produced are indicative.

In adopting the top-down cost accounting approach, we carried out the following steps on the cleaned and verified data. Firstly, we defined the final product which in our study was the unit costs of inpatient, outpatient, x-ray, laboratory, and dental health services. Secondly, we defined our cost centres. For this study, our cost centres comprised of the departments and units of the respective facilities. These units were divided into 3 categories: inpatient unit, outpatient unit or

⁵ Note that EPICOR does have the capability to do costing on department (cost centre) level however the lack of input of data to that level currently inhibits costing at department level. It should also be noted here that the MoH finance department is currently changing their financial system and that the EPICOR system will eventually be phased out. More importantly, the new financial management system does not have the ability to record costs at the department level.

other units. Those cost centres categorized under 'other units' were then apportioned across outpatient and inpatient (if they were relevant) units using some allocation rules. Thirdly, total input costs were obtained from EPICOR for each facility which had actual expenditures for the year 2010. The general ledger coding of the expenditures allowed identification and categorization of costs, albeit not down to the cost centre level. Fourthly, these input costs were then assigned to the various cost centres either directly if possible or else by allocation rules. All collated data were entered into a master excel sheet with each facility having a master sheet. Finally we computed total and unit cost for each final cost center and then reported the results.

Unit costs calculation

One of the objectives of the study is to ascertain the unit costs of providing health services. To ascertain these costs a combined "Top-down" method and "Step-down" allocation of overhead costs was the approach used for costing hospital services. Top-down costing starts at the top with total expenditures and then divides these by a utilization measure of total output (patient visits, days or admissions) to give an "average" cost per patient per visit, day or admissions. This approach was easier to carry out especially in situations where in-depth cost centre data was difficult to obtain and not available. This step down allocation of overhead costs to health care units (or cost centres) allows the computation of the full cost of providing each type of health service. Once full costs of providing health care services are determined the utilization data are then used to compute the unit costs.

Chapter 5 Results and findings

The purpose of this section is to simply present the results arrived at in our analysis of the collated data. The results are for the year 2010 and are presented in local currency units (FJD). The chapter also includes discussion and interpretation of these results. We split the results chapter into two sub-headings: first we compare the cost structures between the three different facilities in 2010, quasi benchmark them – and then we compare average costs in 2010 with those in 1990.

Comparing the cost structure between 3 different facilities in 2010

Table 2 Total facility cost by expenditure inputs

Category	CWM Hosp.		LTK Hosp.		Nausori HC	
	Amount	%	Amount	%	Amount	%
HR Costs	22,602,047.98	69.69	12,325,405.06	75.92	2,133,920.7	84.30
Laboratory	3,464,245.25	10.68	33,558.71	0.21		
Drug Costs/Pharmacy	2,053,027.25	7.14	1,410,965.50	8.69	188,570.67	7.45
X-Ray	74,141.16	0.23	4,080.13	0.03	6,417.29	0.25
Kitchen	686,268.96	2.12	584,042.32	3.60	10,303.95	0.41
Administration	512,286.35	1.58	24,488.17	0.15	23,782.67	0.94
Electricity Bills	1,083,583.22	3.34	602,240.50	3.71	37,716.18	1.49
Oxygen charges	560,398.56	1.73	424,589.93	2.62	3,353.14	0.13
Appliances & Dressings	905,167.24	2.79	337,997.74	2.08	62,166.63	2.46
Records						
Transport	227,680.24	0.70	135,710.39	0.84	35,986.57	1.38
Laundry	66,420.35	0.2	78,103.77	0.48	725.65	0.03
Phone Charges	183,663.35	0.57	111,218.74	0.69	3,286.64	0.13
Dental Unit					14,872.09	0.59
Stores			161,454.45	0.99		
Family Planning Supplies	11,822.72	0.04			10,723.49	0.43
MCHC					465.12	0.02
Health Promotion					88.89	0.004
TOTAL	32,430,752.63	100%	16,233,855.41	100%	2,531,379.63	100%

Table 2 presents the facility costs and their distribution as obtained from the MoH financial accounting system (EPICOR). For the year 2010, CWM costs amount to \$FJ32.4m, Lautoka Hospital to \$FJ16.2m and Nausori Health Centre to \$FJ2.5m. Across all three facilities human resource costs are the highest accounting for 70% of facility costs in CWM, 76% in Lautoka Hospital and 84% in Nausori Health Centre. Pharmaceutical costs come second to HR costs across the three facilities. Nausori Health Centre at the time of this report did not provide any laboratory services.

Table 3 Total costs by departments within facility

Department	Amount			Department	Amount		
	CWM Hosp.	LTK Hosp.	NAU HC		CWM Hosp.	LTK Hosp.	NAU HC
A&E	1,127,871.03	582,912.41	195,328.98	MMU	327,519.96		
AMW	995,010.12			MMW	741,815.41	503,781.78	
ANC Clinic	1,307,443.54	302,211.21	290,642.59	MSW		463,281.63	
ANW	515,150.18	322,847.50		NICU	794,810.28	546,938.46	
ASW	729,326.37			NSW	910,533.69		
Birthing Unit	133,731.79			Oncology Unit	170,319.54	93,950.70	
Burns	177,048.38	157,754.35		Ortho Wd		496,191.76	
CCU	452,774.78	481,594.61		Oxfam/Family planning	181,722.86		121,959.60
Child Wd 1	447,196.52	636,241.77		Paed (GOPD and A&E)	697,508.86		
Child Wd 2	445,629.01			Paying	693,393.74	373,829.86	
Child Wd 3	422,946.88			Physio	538,008.25	604,611.82	87,090.47
Dental Clinic	983,433.56	894,809.82	292,747.24	PICU	861,029.68	153,061.66	
Diabetic Clinic	216,825.33			Plastic/ ENT	642,156.90		
EYE Unit	592,753.17	384,652.20		PNW	555,882.28	601,394.97	
GOPD	1,212,471.68	1,518,937.24	596,714.52	SOPD	1,800,542.53	676,124.06	155,780.84
Gynae Clinic	383,030.30			TB Ward		299,525.40	
HDU		197,637.47		Theatre/PARU	2,184,124.41	1,778,325.44	
Housekeeper		39,640.52		WMW	578,725.93	564,568.88	
HITH	167,142.39			WSW		446,224.16	
Hyperbaric	116,509.73			X-Ray	1,516,948.52	635,028.00	
Inpatients			488,598.40	Lancaster Wd	566,360.88		
ICU	735,149.67	228,431.78		Library unit		34,567.25	
IT Services		57,158.04		MCH Unit			266,681.19
Kidney	534,810.60			MICU	354,194.05		
Lab department	5,766,981.81	1,414,054.28					
				Total	32,221,340.44	16,147,278.50	2,528,054.78

Table 3 shows the costs by facility departments. These are derived using the allocation rules described in the study design on the costs previously shown in Table 2. Notice that the total costs for all three facilities are different between Table 2 and Table 3. This is because not all the costs in Table 2 were incurred by the facility departments. For example while various supplies (including pharmaceutical drugs) were purchased for the facilities (under their respective budgets), some of these supplies were then given to smaller health centres and nursing stations in the vicinity as a result of request from these centres in times of shortage. Another example is that the laundry and laboratory services at both CWM and Lautoka are also provided to other nearby facilities.

At the department level we see that the laboratory department is the highest cost unit at CWM. At Lautoka Hospital it is the operating theatre department and at Nausori Health Centre it is the GOPD department (Refer Table 4).

Table 4 Five most costly units in the facility

CWM Hospital		Lautoka Hospital		Nausori Health Centre	
Lab department	5,766,981.81	Theatre	1,778,325.44	GOPD	596,714.52
Theatre	2,184,124.41	GOPD	1,518,937.24	Inpatients	488,598.40
SOPD	1,800,542.53	Lab department	1,414,054.28	Dental	292,747.24
X-Ray	1,516,948.52	Dental	894,809.82	ANC Clinic	290,642.59
ANC Clinic	1,307,443.54	SOPD	676,124.06	MCH unit	266,681.19

Table 5 shows the percentage allocation of costs by services at the three studied facilities. To obtain these costs the department costs in Table 3 were separated into the five health services. This was straight forward for departments that did not require a proportioning of their costs across the health services. For example the x-ray department costs were directly identified as costs for x-ray services. This was also the case for the laboratory, dental, inpatient and outpatient wards. There were other departments and costs (e.g. IT department, transport department, utilities, cleaning costs, etc.) that were not as straightforward and these had to be distributed by rules of allocation mentioned previously. For example cleaning costs were distributed across the departments by proportioning their salary according to the number of hours spent by cleaning staff in their department. After distributing all the costs across the health services we see that the percentage distributions are approximately equal in the hospitals. At health centres the costs are

driven more towards outpatient care. Unlike Nausori Health Centre, most health centres in Fiji do not have provision for inpatients and thus they are by definition mostly outpatient cost driven.

Table 5 Percentage allocation of costs by service

Health Service	CWM	LTK	NAU
Inpatient	34.6	36.0	19.0
Outpatient	33.9	39.1	66.9
Dental	3.0	4.7	11.6
X-Ray	4.6	3.4	2.5
Laboratory	17.4	7.5	-
Theatre	6.6	9.4	-
Total	100%	100%	100%

Table 6 shows the unit costs of the departments within the facilities. These unit costs were arrived at by dividing the total department’s costs in Table 3 by the utilization data. For outpatient departments the number of outpatient visits was used and for inpatient departments the number of inpatient days was used. In Table 6 laboratory and x-ray costs were distributed to inpatient and outpatient departments based on the number of laboratory tests and the number of x-ray examinations recorded.

Some interesting findings can be seen in Table 6. For example outpatient services at the Nausori health centre, GOPD, are a fraction of the GOPD costs at CWM or Lautoka hospital. This suggests that strengthening primary care via encouraging more people to visit outpatient centres that are closer to them can bear cost savings for the Ministry. In general, services at the Nausori facility are cheaper than the same services at CWM and Lautoka, with the exception of the Accident and Emergency department. As pointed out earlier, whether the quality of care is the same or different at Nausori or CWM and Lautoka is of course an important factor to consider, but falls outside the scope of this study.

Table 6 Unit costs of departments within facility

Department	CWM Hospital		LTK Hospital		Nausori HC	
	Inpatient	Outpatient	Inpatient	Outpatient	Inpatient	Outpatient
Oxfam		30.66				
Birthing Unit		77.64				
Gynecology Clinic		91.53				
Ante Natal Clinic		65.41		71.79		25.44
Paed (GOPD and A&E)		60.82				
A&E		42.47		27.11		168.82
GOPD		56.13		50.04		8.76
SOPD		100.27		33.04		31.25
Hosp in the home		91.74				
Diabetic Clinic		36.97				
Kidney		204.13				
Oncology Unit		365.07		136.85		
Dental		58.40		38.51		21.58
Hyperbaric		3,530.60				
Physio		27.14		34.21		23.86
Eye Unit		27.90		28.06		
NICU	119.94		106.10	283.07		
PICU	279.16		282.21			
Lancaster Ward/WSW	70.64		72.40	105.09		
PNW	30.34		46.86	46.47		
MMW	153.96		83.08	221.29		
MSW			83.76	135.42		
NSW	85.80					
Paying	126.45		149.02			
ASW	43.05					
Plastic/ ENT	37.58					
AMW	92.86					
CCU	55.90		275.73	373.60		
ICU	577.80		178.93			
Labour Ward	103.52	73.33		170.82		
MICU	21.00	68.80				
ANW	52.57	22.08	69.24			
MMU	97.69	53.75				
WMW	108.34	176.70	96.78			
Child Wd 1	46.12	68.62	100.17			
Child Wd 2	58.23	108.20				

Child Wd 3	78.52	146.22				
Burns	147.58	297.01	447.45			
TB Ward			32.26	661.55		
Ortho & Trauma Wd			92.59			
HDU Ward			121.56			
MCH Unit & Family Planning						131.67

We would expect the costs at CWM and Lautoka Hospital to be quite similar since both are divisional referral hospitals. This expectation is confirmed in departments such as Ante Natal Clinic (ANC), General Outpatients Department (GOPD), Physiotherapy, Pediatric Intensive Care Unit (PICU), Lancaster Ward and Womens Medical Ward (WMW). However there were large variances in other departments with the biggest differences coming from the Cardiac Control Unit (CCU), Intensive Care Unit (ICU), Labour Ward and the Burns Unit. The cause of the variances in all cases is driven by the difference in numerator (i.e. the costs of the departments). For example in the ICU the total department cost for CWM is 735,149.67 while at Lautoka it is only 228,431.78. A further investigation into what is the significant driver of the varying department costs is certainly recommended. One other driver might be human resource costs. Notice that HR costs at CWM are almost twice than that of Lautoka hospital (refer Table 1).

In Table 7 we have identified from Table 6 the inpatient departments with the highest unit costs (Nausori has only one inpatient ward). At CWM the highest unit cost per patient day is at ICU and at the Burns Unit for Lautoka hospital. Inpatient wards such as ICU, Burns Unit, Paying Ward, and PICU feature on the top five list of higher costing departments across both CWM and Lautoka hospitals.

Table 7 Top five departments in terms of inpatient costs per unit

CWM Hospital		Lautoka Hospital		Nausori Health Centre	
ICU	577.8	Burns Unit	447.45	Inpatient	135.68
PICU	279.16	PICU	282.21		
MMW	153.96	CCU	275.73		
Burns Unit	147.58	ICU	178.93		
Paying Wd	126.45	Paying Wd	149.02		

The paying wards are expected to be high in costs since they are considered the best of inpatient services at both hospitals, albeit at a cost to patients via room fees per night. The intensive care units (ICU, PICU, and CCU) are high in costs because while they handle fewer patients, these patients incur a much higher number of patient days, as well as are mostly attended to by consultants and medical specialists.

In Table 8 we have identified from Table 6 the outpatient departments with the highest unit costs. It is unusual to note that in both CWM and Lautoka hospital, the highest outpatient costs are incurred in departments that are largely inpatient wards⁶ (TB Ward, Burns, WMW, CCU, NICU, and MMW). These inpatient wards surprisingly had outpatient costs that surpassed the departments that were largely outpatient focused e.g. GOPD, A&E, Dental and SOPD.

The labour ward at Lautoka Hospital functioned more like an intermediary (holding bay) where mothers from maternity wards would come to the labour ward for their deliveries and then would be transferred back to the wards they came from.

Table 8 Top five departments in terms of outpatient costs per unit

CWM Hospital		Lautoka Hospital		Nausori Health Centre	
Hyperbaric	3,530.60	TB Ward	661.55	A&E	168.82
Oncology Unit	365.07	CCU	373.60	MCH Unit & Family Planning	131.67
Burns	297.01	NICU	283.07	SOPD	31.25
Kidney	204.13	MMW	221.29	Ante Natal Clinic	25.44
WMW	176.7	Labour	170.82	Physio	23.86

Specialized services such as the hyperbaric decompression unit and the kidney dialysis unit also showed high outpatient costs per unit. The hyperbaric unit only attends to a few patients a year but the operational costs and maintenance of the unit is very high. The kidney dialysis unit also has high maintenance and equipment costs and thus cost per patient treatment estimates this at \$204.13. This cost however excludes the cost of drugs which are often brought by patients when coming for treatment.

⁶ While these wards are largely inpatient focused, they also attend to a number of outpatients. These outpatients were previously patients that were admitted to these wards and come back to the wards for follow up checks with the doctors. They do not go to the outpatient departments and are often attended to when the doctors have completed their ward rounds.

Cost Structure development between 1990 and 2010

To calculate the unit costs for our five services of interest (i.e. inpatient, outpatient, x-ray, dental, and laboratory) we categorized the departments according to these services. We then summed the total costs of all the departments in the respective categories and together with their utilization statistics, calculated the unit costs for these services. It is however noted that for example the cost per inpatient day is highly dependent on the occupancy rate, since the denominator is the number of patient in-days (refer to earlier discussion and Table 1). Increases in the occupancy rate would bring down the average daily inpatient cost, whereas decreases in occupancy would increase the average daily cost etc., thus the denominator is crucial. The calculated health services unit cost arising from our calculations are shown in Table 9. In Table 9 the figures in brackets are results of the Wong and Govind study of 1990. These values have been converted to real values to remove the effects of inflation between 1990 and 2010.

Our results show that in terms of our studied health service costs, inpatient unit costs are the highest, and this is seen across all the three studied facilities. This is followed by outpatient unit costs and then ancillary services unit costs. A comparison of this study (2010) with the findings of the Wong and Govind study of 1990 study show that costs have increased across all services. In some services the increase has been marginal (e.g. radiology services, inpatient costs) while in some services the increases are quite significant (e.g. laboratory services).

Inpatient unit costs have increased marginally since 1990. In CWM the marginal increase is because total costs (numerator) have increased proportionally with patient days (denominator). This is in contrast to Lautoka hospital that showed a decrease both in terms of inpatient costs as well as patient days, but with similar proportions. The results also show that inpatient costs at hospitals are lower than that at health centres when we compare the unit costs of CWM (\$FJ84) and Lautoka (\$FJ92) hospital with Nausori HC (\$FJ136).

Table 9 Unit cost of health services

Inpatient Services			
	Costs (\$FJD)	Utilization (patient days)	Cost/day (\$FJD)
CWM	15,396,050.00 (9,721,828)	182519 (128,644)	84.35 (75.57)
LTK	8,334,751.18 (8,421,408)	90824 (97,287)	91.77 (86.56)
NAU	488,598.40	3601	135.68/ day
Outpatient Services			
	Costs (\$FJD)	Utilization (visits)	Cost/visit (\$FJD)
CWM	15,435,503.44 (4,034,454)	261390 (233,007)	59.05 (17.31)
LTK	7,413,802.07 (1,883,836)	170165 (231,740)	43.57 (8.13)
NAU (VAL)	1,714,198.18 (206,029)	98578 (100,000)	17.39 (2.06)
Dental outpatient services			
	Costs (\$FJD)	Utilization (visits)	Cost/visit(\$FJD)
CWM	983,433.56 (804,755)	16887 (N/A)	58.24 (N/A)
LTK	898,854.00 (529,598)	23339 (30,546)	38.51 (17.34)
NAU (VAL)	292,747.24 (18,423)	13568 (10,842)	21.58 (1.70)
Laboratory Services			
	Costs (\$FJD)	Utilization (tests)	Cost/test (\$FJD)
CWM	5,766,981.81 (1,489,168)	260485 (353,872)	22.14 (4.21)
LTK	1,414,054.28 (589,202)	83317 (261,923)	16.97 (2.25)
NAU	-	-	-
Radiology Services			
	Costs (\$FJD)	Utilization (examinations)	Cost/examination (\$FJD)
CWM	1,516,948.52 (904,129)	77365 (56,005)	19.61 (16.14)
LTK	635,028.00 (504,026)	44384 (40,328)	14.31 (12.50)
NAU	63,271.44	4482	14.12

Notes:

1. We included 85% of theatre costs to inpatient costs for our 2010 figures. The 85% was an estimation provided by theatre staff.
2. The figures in the table which are in brackets are the results of the Wong and Govind study of 1990. These have been inflated to 2010 using the CPI inflation rate of 1.64
3. The VAL in brackets represents Valelevu HC which was a facility costed in the Wong and Govind study and is used to compare with Nausori HC in the 2010 study. The Wong and Govind study did not cost Nausori HC.

Our results also show that in hospitals the costs of inpatient services with respect to outpatient services are not very different. For example at CWM, inpatient and outpatient costs are both 39% of total hospital costs. At Lautoka hospital, inpatient costs are 44% and outpatient costs are 40% of total hospital costs. These findings are in contrast to the 1990 study where hospitals were largely dominated by inpatient costs (57% in CWM and 71% in Lautoka). The change is a result of our findings that the inpatient wards also saw large numbers of outpatients as reported by staff in the various inpatient wards. In CWM hospital 12 inpatient wards said they also catered for

outpatients in 2010. In Lautoka hospital there were 7. This meant that costs incurred at inpatient wards were distributed between inpatients and outpatients and thus reducing inpatient unit costs.

In the case of outpatient costs, all facilities showed unit costs that were much higher than the unit costs found by the Wong and Govind in their 1990 study. Unlike the marginal changes in inpatient unit costs, the changes in outpatient unit costs are quite significant. CWM showed a 241% change increase, Lautoka showed 435% and Nausori with respect to Valelevu showed a 744% increase. These large increases are largely driven by the numerator (total costs) rather than the denominator (outpatient visits). Outpatient costs (including dental outpatient costs) were much higher in the hospitals (CWM and Lautoka) than in the health centre (Nausori Health Centre). This may probably support the notion that outpatient care is most cost effective when decentralized to health centres rather than centralized at hospitals – on the condition that the same quality of health care is provided. Thus strengthening of primary health care may prove to be very cost-effective for the Ministry.

Looking at ancillary unit costs, while x-ray unit costs have only slightly increased over the period from 1990 to 2010, lab costs have exponentially increased. At CWM, the costs of laboratory services have more than tripled since 1990 and this was largely driven by the costs of chemicals and reagents (we should also note that more complex tests and equipment have been introduced since the 1990s). Correspondingly, the numbers of lab tests undertaken have doubled. It should be noted that the CWM laboratory services also caters for surrounding health centres that do not provide laboratory services. X-ray unit costs have shown marginal increases from 1990 to 2010 with CWM showing 21% increase and Lautoka 14%. The results also show that x-ray costs are similar across three studied facilities and there is no difference between x-ray unit costs at hospitals and at health centres. This is because across all facilities general x-ray and ultrasound examinations were the prevalent test carried out (93% in CWM, 97% in Lautoka, 100% in Nausori). More complex examinations (like CT scans and OPG which are only available at hospitals) were only a fraction of the total number of tests carried out in 2010.

Chapter 6 Limitations and Side-observations

This chapter is in two sections. The first outlines some of the limitations of this study, and the second discusses some of the side-observations arising from the study. Both sections provide useful avenues for future studies and research.

Limitations of the Study

The results presented above were not without limitations. We list these limitations here so that readers may be accurately informed and made aware of the limitations of our study. This is important when quoting or interpreting our results.

1. In calculating unit costs we have not included the historical cost of the buildings and depreciation of capital assets. These costs were difficult to estimate since they are not included in the MoH EPICOR system. Certainly the inclusion of these costs would have raised the unit cost currently reported here. However we have included any costs associated with new capital investments (renovations and machines) made in the year 2010 which amounted to less than 5% of total costs. Our findings are comparable with the Wong and Govind study of 1990 because they also did not account for the historical cost of the buildings and depreciation of capital assets.
2. There were many shortcomings of the Ministry financial system (EPICOR) that introduced several limitations on the outcomes. Firstly, the nature of the accounting system (line budget items) meant that it was difficult to directly attach costs down to departments (here our cost centres) when cost centres were not entered in the system. Some of the transaction we could allocate by their descriptions and nominal codes, however many others were not possible. We had to make some assumptions and distribution rules to allocate costs to cost centres. For example utility costs are transacted to the facility level however we had to allocate these down to department levels. In the case of telephone bills these were distributed by the number of phones in each unit, with greater weighting given to phones that could make direct national and international calls. Secondly, the existence of what was termed “special budgets” further complicated

allocation of costs. Often these budgets had little detailed reporting and operated outside the normal financial EPICOR system thus making allocation to cost centres difficult. In 2010, there were special budgets for a variety of items including security services, cleaning services, medical equipment procurements, staff uniforms, maintenance, air conditions, etc. Special budgets usually decrease transparency and are often used to offload (or hide) extra costs from a certain sector. Thirdly, at facility level fixed asset registers, materials management records, failed to exist altogether or were available in inaccurate or incomplete forms. Shortcomings of the manual accounting systems were a major obstacle to allocating expenditures across departments.

Side-observations arising from the study

Apart from the main objectives of our study which was to estimate the unit costs of health services in the studied facilities, we encountered several other interesting side-outcomes that are worth mentioning. We highlight them here in the hope that they may be picked up by others as areas of further research and evaluation since they influence the delivery of health services and paying some attention to them can help improve the delivery of our health services.

1. In the collation of data we requested annual reports from facilities as well as units within facilities. We noticed that the annual reports varied largely across facilities and across departments. Some information we could find in some reports but missing in others. There were no clear guidelines or set out requirements of what indicators were mandatory for a department to report. Some reports were very lengthy while others were less than 10 pages in total. Some heads of departments also mentioned that they found difficulty compiling their reports because of a lack of guidelines on how they should structure their reports. We suggest that a standard template be developed that should provide at least a skeletal structure on how departments and facilities should write up their annual reports. These reports should also include some financial information so as to raise the awareness amongst staff that there is a cost associated with what we call “free health services”. Furthermore all reports should be made available in soft copy for safe-keeping of institutional knowledge. In most departments we visited the head of the unit had neither copies nor any knowledge of previous year’s annual reports.

2. In the collation of patient data we also found large discrepancies between numbers reported in PATIS and numbers manually kept in record books by departments and wards. While we did understand that a time lag would exist between the manual books and PATIS numbers, some of the differences were too large to be explained by this time lag. There were several reasons suggested by various staff on why such a situation exists. Some had no computers; some had computers but did not have network ports that allowed access to PATIS, some others had some other software or hardware malfunction. In some situations nurses said shortage of time was a problem when it came to entering data in PATIS. The information technology and information systems staff also cited network problems and server downtime as a problem. Another possible problem was staff recruited to enter data into PATIS were given very little status and recognition as important workers within the health system. These persons were merely seen as data entry clerks that did not have clear career pathways within the system. They were also poorly remunerated as well as understaffed.

3. In a few departments we found medical equipment that was not working and thus impacted the delivery of health services. Some of these equipment we found were donated and sourcing either consumables or spare parts was cited as a problem of why they were not been used. We suggest that there should be strict guidelines and policies on receiving donated equipment. While no one in management mentioned such a document we later located such a document in the library of one of the facilities. There was no year or authorship quoted on the document and we have requested MoH to advise on the authenticity of the document before it is made available to management and the Biomedical Engineering Units. We feel it is important that follow up costs of donations and effective use of donations should be monitored, and evaluated.

4. During interviews with ward sisters we noticed that it was fairly common to have patient movement between wards. In fact the mobility was quite frequent. We were informed that this movement was part of what was called a 'flexi-bed policy'. Every Nursing Sister in every ward knew about the flexi-bed policy but no one had actually seen a written document outlining the policy. Even management was unable to source a flexi-bed policy

document. We stress that any policy acted on by staff should be written clearly to outline the workings of the policy and staff should have access to these documents. It was verbally communicated that the policy states that no patient shall be denied a bed if their condition required hospitalization. This meant for example that if the burns unit had all their beds occupied and a burnt victim arrived at the facility they could be moved to another ward that had available bed space. Wards with a large number of beds were thus heavily occupied and consumed large amounts of resources. Staff in these wards also complained of being overworked because they were looking after patients from various other wards. An evaluation of the flexi-bed policy should be done and the policy clearly outlined in a written document.

5. We found that Laboratory services had great difficulty in providing us data on the number of variety of tests they provided, the revenues raised from various tests, the number of tests carried out by wards, the number of patients they conducted tests on in the year, and the resources consumed by various units within Laboratory services (e.g. Serology, Cytology, Hematology, etc.). A contributory factor to this problem is that Lab services are not recorded on any information system software. At the time of our study we were informed that the Ministry was working on a special software program for Labs. We were not told of specific dates when the new software would be implemented but we felt that this would have to happen soon to monitor utilization of services (overuse and duplication), appropriateness, quality and safety and costs. The lack of monitoring within the Lab departments has given rise to continuous stock outs of lab reagents and consumables.
6. Various departments mentioned stock outs of drugs and other consumables. Staff in the operation theatres (MOT/ MIT/ PARU) said stock outs created many problems but fortunately so far none of the stock outs resulted in the cancellation of operations. Ward reports however show that stock outs in supplies caused long waiting times for patients, especially the childrens wards and labour wards mentioned this (for example in 2010, no disposable gloves for one week in labour ward). Stock outs are certainly avoidable with

better management even though Fiji's location and the necessity to ship most of it in on time is recognized.

7. A lot of what is done in SOPD - especially in the medical and diabetic department (not so much in the surgical dept) is probably preventive care. The two clinics per day stabilize and manage a lot of chronic patients and elderly patients - and along with long term prescriptions, one would expect that doctors and nurses teach patients how to manage and self-manage their disease/ secondary prevention.
8. The Accident and Emergency (A&E) department's patient utilisation across all studied facilities were alarmingly high. They get over 12000 patients a year. Many of these patients are not emergency cases - but come to A&E because GOPD is overcrowded or closed after hours. There are clearly organizational issues here - as well as making sure that some patients don't get special access to care by bypassing the normal channels.
9. At the time of writing this report, GOPD services at CWM had closed and patients were advised to use the outpatient services provided at their nearest health centres. Lautoka hospital however was still providing outpatient services and mentioned that overcrowding was a daily problem and more serious on Mondays. Tuesday and Wednesdays. Although there is discussion that Lautoka would follow in the steps of CWM, the facility needs to deal with the overcrowding of GOPD patients at present. There is probably some sort of awareness and behavioural change campaign necessary, but it would probably also be good to look into different appointment systems (including telephone systems). A good start would be a survey to see where patients especially on Mondays and Tuesday come from, how they got to Lautoka hospital (bus/ how much was the bus fare, can they easily afford the bus fare), what kind of services they are asking for (is it to receive drugs they don't get in their health centres etc) - and also if they own a mobile phone. GOPD saw over 37000 patients in 2010 alone, with peaks in Sept/ Oct and Dec. and with lows in Jan and May.

10. Since the increase of user fees for dental treatment (first quarter of 2011), the staff observe that they see less patients overall, but that the cases they see are much more severe since people wait too long to come to the dental health services. This is a good example of how user fees should NOT impact the general public. The evidence base for user fees internationally shows now that user fees are detrimental to access in care, increase costs for care since people delay visits, and thus should be abolished. However if applied they should encourage preventive behavior within the population (e.g. bonus points for patients that have regular dental check-ups etc).

11. The system of revenue collection of user-fees needs to be better managed and coordinated. The existing system of collecting user fees seems very administration-intensive. There were instances where revenue clerks had to be called at night to receipt fees before the patient could be admitted into wards. Revenue clerks also had the difficult task of visiting wards and reminding patients to pay their fees adding increased stress and discomfort to sick patients. Patients also complained that reimbursements from the accounts sections can often take weeks. It also seems that the existing collection system has difficulty in generating information on revenues by wards, and revenues by what services have actually been provided. During our field visit to the dental clinic in CWM, we also realized that the cost recovery per year (collection of user fees) is actually equal to the salary of the staff that is responsible for the collection of the user fees. Since all user fee revenue goes to the MoF consolidated revenue account, MoH budget (with the salary of the collection clerk) is indirectly subsidizing the MoF budget with this, with no real positive impact on the dental health of the population. Here we recommend that an evaluation study on the costs of collecting fees (salaries), their revenue, and unintended effects on access of care be carried out.

12. There seem to be a bit of a mix up between public services and private services. Some health staffs exploit public facilities and its equipment, drugs etc for servicing private patients that pay directly to the health staff. There should be clear rules in place of what is allowed and also clear fee schedule/margins of what private consultants are allowed to charge. Doctors and nurses mutating in and out of public and private practice as they like

have been seen in many countries where a private market emerges. However, in many countries, when a certain threshold of private providers is reached, governments have implemented a clear separation between public and private services meaning that a staff can either work in the public or private share - but not in both. Evidence has shown that in the long run a mix is prone to corruption and decreases equal access to health for the population.

13. We noticed that services such as security and cleaning were being outsourced in the hospitals. Outsourced services need to be evaluated in terms of costs and quality. For example, many staff said the current outsourcing of cleaning services arrangement was less favorable compared to the in-house services that existed before. It would be good to have independent evaluators assess whether this is true. Out sourcing seems to have impacted other services as well. For example, since redundant staff had to be kept, they are now used by kitchen services as lending hands to give out meals to patients - is this effective?

14. We found a lot of inpatient wards were providing outpatient care. We wondered if this was normal or should there be a reorganization of service provision.

Chapter 7 Conclusion

The aim of this research was to undertake a cost analysis of health services (inpatient, outpatient, ancillary, and dental services) provided at public health facilities (2 divisional hospitals and 1 health centre) in Fiji in 2010. Using the activity based costing methodology from the accounting discipline we have managed to estimate new unit costs for health services since the last published figures of the early 1990s. These new unit costs can help to establish a baseline for the distribution of funds across the health services (inpatient, outpatient, ancillary and dental care) at different levels of care provided.

While the Fiji health system has always advocated “free health for all”, the reality is that there is a cost to the provision of health services and this cost is paid for by the very people who use these services through taxation revenue. In estimating unit costs, the report has also raised awareness about the need for health workers and the general population to be informed about the costs related to the provision of public health services. For example our report has found that for CWM hospital, the average inpatient cost per day is \$FJ84. We also know now that one visit of a patient to the physio-department in Lautoka Hospital costs \$FJ34, and that one visit to the dentist in Nausori Health Centre costs the tax payer on average \$FJ22. It might be an idea to at least internally display average unit costs so that health staff is more aware of the costs – and more alert to possible savings.

Compared to over 20 years ago, the study shows increased unit costs across all the five studied services of health care. Also the total facility level cost in 2010 was much greater than the total facility level cost in 1990. This is somewhat expected after a period of 2 decades. However the cost increases require a good monitoring system to ensure that any increases are appropriate and justified, certainly after all avenues for any potential cost savings have been considered.

The side observations arising out of this report have been very useful in highlighting various areas within the Fiji Health System that will require detailed analysis and possibly some reform. These areas present fruitful avenues and potential for cost savings and it would be in the Ministry’s interest to explore some of these. Likewise, the benchmarking of unit costs per

department per facility might give some good indication to health facility managers where potentials for improvements can be found.

The 2010 World Health Report estimates between 20% to 40% of all health spending is wasted, and thus inefficiently used. Certainly assessing and addressing some of these can help the Ministry of Health to reorganize health resources more wisely, to reduce inefficiencies and improve the delivery of healthcare to the population of Fiji. This study was meant to contribute to this goal.

We would however also mention a note of caution: any inefficiencies, especially on the level of hospitals should be well balanced by an investment into better and more modern hospital accounting systems: before starting to cut budgets, hospitals in Fiji need to be put into a position to better be able to monitor their expenditures: and this first and foremost means an investment - that in the long run will translate into improved cost-effectiveness.

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Appendix

Table 1: Schedule of User Fees at Public Health Facilities

Services at public health facilities	Cost/day (FJ\$) Residents (1983 amendment)	Cost/day (FJ\$) Residents (2010)
Private suite (per day)	25.00	115.00
Private ward single bed (per day)	10.00	46.00
Semi-private wards 2 beds (per day)	6.00	34.50
General paying ward (per day)	4.00	23.00
Outpatient clinic (divisional hospitals)	0.50	0.58
Outpatient clinic (other facilities)	0.20	0.23
Special clinics	2.00	2.30
Consultants clinics	<8.00	0.58
Minor operation	<30.00	<230.00
Intermediate operation	<60.00	<690.00
Major operation	<150.00	<2875.00
Use of delivery rooms by private practitioner	50.00	230.00
Dental examination	1.00	5.75
Dental tooth extraction	2.00	5.75
Dental X-ray	2.00	5.75-9.20
Conservative dentistry (e.g. amalgam)	3.00-8.00	3.45-230.00
Oral surgery	5.00-30.00	23.00-103.50
Prosthetics-F/F Dentures	1.00-60.00	3.00-200.00
Periodontics	1.00-24.00	3.45-230.00
Orthodontics	20.00-100.00	115.00-460.00
X-rays (immigration, employment, etc.)	10.00	23.00 (adult)
X-rays others	8.00-40.00	23.00-460.00
Laboratory tests	1.00-10.00	8.05-115.00
Cath Lab Charges		
• Insured patients		3450.00
• Uninsured patients earnings > 15k		1725.00
• Patients earning < 15k		575.00

Table 2: Data Collection and rules of allocation

Data collected	Data source	How data will be obtained
Schedule of user-fees charged at health facilities	MoH finance Unit	Straightforward from set fee schedule
Revenue generated from health facility	MoH finance Unit	Some estimation is required. Currently revenue is not exactly locked to a facility or a service. May need a manual examination of invoices/receipts. The difficult situation here is that not all persons are charged the set fees. The stats on how many persons on average per year get charged over the total patients seen may be unavailable.
Drugs price list	FPS	Straightforward from drugs cost price list
Patient Statistics	PATIS, Health facility interviews, Annual reports	An examination of records for procedures and costing of these inpatient/outpatient services will require some manual calculations.
Hospital statistics	MoH Planning Unit, Health facility, MoH Annual reports	Include inpatient numbers, out-patient numbers, inpatient days, beds, equipment etc.
Health facility expenditure details	MoH finance unit, facility	Utility costs, personnel costs, overhead costs etc. Availability of these costs will depend on the line budget EPICOR accounting system. However these costs will further be allocated to the various services/units. Suggested distribution of utility costs is by equipment numbers, area space in square meters, patient numbers, or staff numbers. Electricity can be allocated on the basis of the number of lights and sockets in use, water on the basis of the number of usable taps in use, and telephone on the basis of the number of calls (or phones) by department. Ideally the prerequisites of a hospital accounting system are for an accurate costing study is <ul style="list-style-type: none"> - Chart of accounts - Departments identified as cost centres - Accounting system that collects financial data by cost centres (departments) with the data displayed by expense and revenue items identified from a chart of accounts - Up to date management information system that collects non-financial (service and utilization statistics) by cost centres
Personnel salary structure/grades	MoH finance unit	Average salary cost will be calculated. For example: Let's say 2 nurses are required for a medical procedure. The MoH salary scale for Nurses is 10-20 thousand per annum. 30 thousand will be taken as the salary cost for the 2 nurses per annum. From this, the amount paid per hour for the nurse will be calculated. The cost of the time required for the nurses during the medical

		<p>procedure will then be calculated.</p> <p>Allocation rule for Human Resource Costs</p> <p>If calculating personnel cost using total number of staff working for the cost centre, follow the steps below.</p> <ul style="list-style-type: none"> • Identify all staff working for cost centre (full-time or part-time), including all staff involved in outreach activities and supervision. Decide whether or not to only include national staff and do not include the costs of international staff/consultants working in the cost centre but paid from elsewhere. • Group all staff according to their category or grade level at the MoH (e.g. Manager, medical doctor, medical assistant, nurse, etc.). • Identify and attribute the gross monthly salary for each category of staff based on the salary scales available from the MoH. Note that when travel allowances are paid to staff, these should be included in the transportation cost category and not listed under personnel. • Identify all other allowances and benefits and estimate the average monthly value of these for each category of staff listed. • Identify the average time spent in the cost centre for each category of staff.
Building information		<p>The number and size of the rooms used by the each department will be estimated, and then using the current construction cost per metre (from infrastructure unit at MoH), the cost for each department is estimated by multiplying the size of department and the cost per meter. Finally the monthly cost is calculated by dividing the departmental cost by the length of life of the hospital of 50 years (600 months).</p>
Procedures for - inpatient - outpatient - laboratory - x-ray - dental	Health facility (staff interviews), procedural manuals	<p>Note that for the various procedures a client-flow analysis must be done. This means to either observe several clients from registration (starting point) through to discharge. However this will require lots of time, thus the alternative is to interview health workers in these facilities on what the typical procedures are for these services and their workload involvement. This is done in order to calculate the average time for a particular service or clinical procedure. Interviews will be conducted with staff at the facility to understand the inpatient procedures followed. This includes the resources and costs associated with the procedure.</p> <p>The PATIS system will also be checked to see what information it can provide to enable costing of medical procedures.</p>

Table 3: Steps adopted to guide the research

Steps		
1	Define the purpose, objectives and assumptions	Estimate the cost of health services (inpatient, outpatient, lab, x-ray and dental) provided at 2 divisional hospitals (CWMH and Lautoka Hospital) and 1 health centre (Nausori HC).
2	Define the final products	<p>Unit cost of health services (inpatient, outpatient, lab, x-ray and dental)</p> <p>If final product was at ward level but we have only department level data then do the following</p> <ul style="list-style-type: none"> - Exclude intermediate products (e.g. drugs, x-ray, labs) from department total - Apportion total cost of department across wards based on activity levels of each ward - Activity levels are derived through observation of activity across a short time period - Total cost different for each ward based on activity level - Unit cost will be calculated using the same denominator and numerator for each ward - Intermediate department output is identified separately. Example, total cost of lab tests are calculated then apportioned to Wards (or disease groups) - Final product at ward level will equal the cost associated with the level of activity plus the cost associated with the consumption of intermediate products - at ward level one would also have to track staff movements across wards in one department
3	Define the cost centres (CC)	<p>Ideally the CC should be the following departments (actually the services for which the unit costs are being calculated for): outpatient, inpatient, lab, x-ray and dental.</p> <p>However this will prove a challenge because the MoH Accounting System does not use the above as CC.</p> <p>Have CC that correspond to the existing organizational structure of the hospital</p> <p>Three broad categories of CC are patient care (inpatient, outpatient), intermediate (x-ray, lab, pharmacy), and overheads (accounts, security, utilities, etc)</p>
4	Classify cost components of each input	<ul style="list-style-type: none"> - Brief interview with key informants would justify the validity of weighting the meals consumed by surgical wards - maintenance services are commonly apportioned to cost centres based upon cost centre square footage - Personnel costs often use a mix approach of administrative data and verification via interviews and/or direct observation. Note however that a profile distribution of staff is needed. For example with doctors there is the staff level (consultant, registrar, intern) and the specialty (medicine, surgery, pediatrics) - Individual salaries can be approximated by using the midpoint of the salary range of the employee's classification level (in the situation where

		<p>actual salaries for employees are not accessible)</p> <ul style="list-style-type: none"> - The simplest way would be to assume that the hospital's share of maintenance costs is proportional to its area (square feet or meters). And even more accurate is to also weigh the older buildings more than the newer ones <p>Capital costs</p> <ul style="list-style-type: none"> - Typically building lasts 30 years, equipment 10yrs, beds and furniture 10yrs and vehicles 5yrs
5	Identify the full cost for each input	<ul style="list-style-type: none"> - For laundry costs either use laundry (kg) done per centre (manual recordings), or inpatient days, or floor space (assuming no. of beds correlates with size of unit, or direct observation of consumption of resource (time consuming and costly). - Maintenance services are apportioned to cost centres based upon cost centre square footage, some by the capital consumption of cost centre -
6	Assign inputs to CC	
7	Allocate all costs to final CC	
8	Compute unit costs for each final CC	
9	Report results (unit costs of CC)	

Table 4: Unit of activity for identified cost centres

For this costing study the Cost Centres (CC) and the main Unit of Activity (UoA) for that centre is given in Table 2.

Cost Centres (CC)	Unit of Activity (UoA)	Measures
All inpatient wards	<ul style="list-style-type: none"> - Total inpatient days - Admissions - Total bed days 	Unit cost per day of hospitalization
All outpatient clinics (SOPD, A&E, GOPD, Dental)	Patient visits	Unit cost per patient visit
Laboratory	Number of tests	Unit cost per patient test
Radiology	Number of x-rays	Unit cost per patient examination

Rules of allocation of inputs to CC	
1.	Labour/Salaries <ul style="list-style-type: none"> a. Approximate using midpoint of salary scale b. Proportion of time spent in a CC determined and applied accordingly e.g. use daily rosters
2.	MoH Admin spending <ul style="list-style-type: none"> a. E.g. on stationery, maintenance, etc. Was allocated on distribution of staff numbers to different cost centers
3.	Medical Supplies/Drugs <ul style="list-style-type: none"> a. Distribution by facilities (FPS) b. Allocated to CC by PATIS department records of ordered and administered drugs c. Alternatively take a sample of the annual data and then calculate the % distribution for the year
4.	Ancillary services (X-Ray & Lab) <ul style="list-style-type: none"> a. Actual use estimated by department records or requested patient tests b. Review of records kept by ancillary department on PATIS for the year
5.	Fuel <ul style="list-style-type: none"> a. Records of fuel spending estimated using mileage and number of transport requests by departments b. Or direct cost estimate from EPICOR regarding transport and fuel
6.	Maintenance <ul style="list-style-type: none"> a. Allocate central maintenance costs to health facility, then to cost centre by maintenance worksheets of duties carried out b. Alternatively use floor area in square meters as the way to distribute maintenance costs
7.	Food <ul style="list-style-type: none"> a. Estimated by days of care
8.	Laundry <ul style="list-style-type: none"> a. Estimated by either days or care or area of ward
9.	Cleaning <ul style="list-style-type: none"> a. Floor area and the hours spent by cleaning services in a CC
10.	Utilities (Water, Power, Telecommunications) <ul style="list-style-type: none"> a. Water – by number of taps b. Power – by number of used power points with higher weighting to high usage CC's like x-ray and laboratory c. Telecommunications – by number of used telephones with higher weighting to outside direct lines
11.	Administration <ul style="list-style-type: none"> a. By direct cost, or personnel numbers, or personnel cost
12.	Capital items (note that this was not done in this study but put here for interested follow up researchers) <ul style="list-style-type: none"> a. Equals replacement cost/annulisation factor b. First calculate real interest rate then use this to get annulisation factor c. Real interest rate = $[(1+\text{nominal interest rate})/(1+\text{annual inflation})] - 1$

Contributing Organizations

