



Estimating the Provider and Client Costs of Medical Male Circumcision in South Africa

SEPTEMBER 2015

This publication was prepared by Michel Tchuente and Steven Forsythe of the Health Policy Project, D. Loykisoona of the South African National Department of Health, and three consultants, Eurica Palmer, Dacia McPherson and Vibhuti Haté.



Suggested citation: Tchuente, M., S. Forsythe, D. Loykissoonlal, E. Palmer, E. McPherson, V. Haté. 2015. *Estimating the Provider and Client Costs of Medical Male Circumcision in South Africa*. Washington, DC: Futures Group, Health Policy Project.

ISBN: 978-1-59560-123-0

The Health Policy Project is a five-year cooperative agreement funded by the U.S. Agency for International Development under Agreement No. AID-OAA-A-10-00067, beginning September 30, 2010. The project's HIV activities are supported by the U.S. President's Emergency Plan for AIDS Relief (PEPFAR). It is implemented by Futures Group, in collaboration with Plan International USA, Avenir Health (formerly Futures Institute), Partners in Population and Development, Africa Regional Office (PPD ARO), Population Reference Bureau (PRB), RTI International, and the White Ribbon Alliance for Safe Motherhood (WRA).

Estimating the Provider and Client Costs of Medical Male Circumcision in South Africa

SEPTEMBER 2015

This publication was prepared by Michel Tchenche¹ and Steven Forsythe¹ of the Health Policy Project, Dayanund Loykissoonlal,² Eurica Palmer,³ Dacia McPherson,³ and Vibhuti Haté.³

¹ Avenir Health, ² South African Department of Health, ³ Consultant

The information provided in this document is not official U.S. Government information and does not necessarily represent the views or positions of the U.S. Agency for International Development.

CONTENTS

Acknowledgments	vi
Executive Summary	vii
Limited Cost Variations across Provinces	viii
Potential for Cost Savings.....	viii
Cost Barriers to Uptake of Voluntary Medical Male Circumcision.....	viii
Abbreviations	ix
Introduction	1
Study Objective	3
Methodology	4
Protocol Development	4
Selection and Training of Research Team	4
Site Selection and Geographical Location	4
Data Collection Tools	6
Testing of the Data Collection Tools	6
Institutional Review Board Approval	6
Data Collection Process	6
Data Sources	7
Facility Surveys	7
Client Surveys.....	9
Data Entry	10
Data Validation	10
Analysis and Interpretation	10
Results	11
Overall Unit Cost.....	11
Unit Cost by Mode of Service Delivery.....	11
Unit Cost by Cost Driver	12
Unit Cost by Province	12
Unit Cost in Urban, Peri-Urban, and Rural Sites	14
Unit Cost by Scale	14
Unit Cost by Type of Facility	15
Task Shifting.....	16
Cost of Demand Creation.....	17
Costs to Clients	19
Client Background Information	19
Expenses Incurred by Clients and Caregivers.....	20
Other Reported Expenses.....	21
Income Background of Respondents	22
Lost Income	22
Other Missed Opportunities and Reported Hardship	23
Study Limitations	24
Limited Sample.....	24

Changing Costs and Cost Limitations.....	24
Effects of Recall Bias.....	25
Unknown Influence of Economies of Scale.....	25
Limits on Capturing Demand Creation Data	25
Exclusion of Insurance Data	26
Conclusion: Moving Forward with Policy and Programming	27
Process and Policy Issues.....	28
Recommendations	29
References.....	30

LIST OF TABLES

Table 1. MMC Facility Survey Sites 4
Table 2. MMC Client Survey Sites..... 5

LIST OF FIGURES

Figure 1. Progress Towards Achieving Targets Set in 2011 2
Figure 2. Unit Costs by Service Delivery Mode 12
Figure 3. Unit Cost by Province 13
Figure 4. Unit Cost by Level of Urbanization 14
Figure 5. Unit Cost by Scale 15
Figure 6. Unit Cost at Hospitals vs. Healthcare Centers/Clinics 15
Figure 7. Potential Impact of Further Task Shifting on Clinical Labor Costs 16
Figure 8. Demand Creation by Major Cost Category 18
Figure 9. Age of MMC Clients 19
Figure 10. Age of Caregivers..... 19
Figure 11. Average Transport Expenses for Those Who Report Paying for Transport..... 20
Figure 12. Transport Costs Incurred by Location of the Facility..... 21
Figure 13. Income for Respondents Who are Employed 22
Figure 14. Days of Work Missed..... 23

ACKNOWLEDGMENTS

The Health Policy Project, in collaboration with the South African National Department of Health jointly conducted the medical male circumcision costing activity of the PEPFAR-supported sites in South Africa.

The Health Policy Project costing team would like to thank the following people for their valuable contribution:

First, at the National Department of Health, we appreciate the support provided by Dr. Yogan Pillay, Mr. Collen Bonnecwe, and Mr. Nqeketo Ayanda (seconded from the Sexual HIV Prevention Program to the medical male circumcision program at the National Department of Health).

Next, we are extremely appreciative of all the support provided by PEPFAR, including Ananthy Thambinayagam, Emmanuel Njeuhmeli, and Isaac Choge (USAID/South Africa) and Alfred Bere (Centers for Disease Control and Prevention/South Africa).

We would also like to thank all the provincial Department of Health and facility staff who facilitated the data collection exercise. Special thanks to the data collection team: Senior Researchers Dr. Lahla Ngubeni, Professor Welile Shasha, Benjamin Makhubele, and Researchers Fulufhelo Maphiri, Zakes Hlatshwayo, and Theron Dladla.

Thanks are also due to Katharine Kripke (Health Policy Project/Avenir Health) and Melissa Schnure (Health Policy Project/Futures Group) for their support and assistance in completing this study. The support of the following organizations was instrumental in gathering information on medical male circumcision demand creation cost and providing some clarifications during the entire data cleaning process: Maternal, Adolescent and Child Health, Southern African Clothing and Textile Workers' Union, Community Media Trust, Aurum Institute, Right to Care, Anova Health Institute, Jhpiego (an affiliate of Johns Hopkins), Johns Hopkins Health and Education South Africa, Centre for HIV/AIDS Prevention Studies, TB/HIV Care Association, Society for Family Health, and CareWorks. We would also like to thank Siraaj Adams at Metropolitan Health Risk Management for the discussions on the private sector medical male circumcision activities in South Africa. We also wish to thank Kim Ahanda (USAID, Office of HIV/AIDS) and Elizabeth Gold (Johns Hopkins University) for the valuable discussions on medical male circumcision demand generation.

We also wish to thank the essential cooperation and assistance provided by the Clinton Health Access Initiative, in particular Jorge Quevado, James Ndirangu and Jing-Yi Song, and Dion de Gruchy of Supply Chain Management Systems. We also would note the kind assistance in obtaining the costs of continuous quality improvement provided by Donna Jacobs, University Research Co., LLC.

EXECUTIVE SUMMARY

South Africa has the largest population of people living with HIV in the world. In order to prevent additional HIV infections, the South African Government has actively engaged in the scale-up of medical male circumcision. In 2010, after medical male circumcision had been shown to be an extremely cost-effective strategy for preventing HIV infections, South Africa initiated a medical male circumcision program as a part of the country's HIV prevention strategy. By 2012, the South African National Department of Health developed a national strategy designed to coordinate a comprehensive medical male circumcision program. This strategy, the *Strategic Plan for the Scale up of MMC in South Africa, 2012–2016*, set an ambitious target of performing 4.3 million circumcisions by 2016 (NDOH, 2015b). Yet, between 2010 and the end of 2014, South Africa had completed only 1.8 million circumcisions, leaving 2.5 million circumcisions still to be performed in 2015 and 2016.

The Health Policy Project team, at the request of and in collaboration with the National Department of Health, conducted a detailed study in 2015 of the costs of providing medical male circumcision in South Africa. The objectives of this study were to:

- Derive the unit cost of delivering medical male circumcision in South Africa at the facility level
- Assess costs from a client perspective
- Identify the level of spending currently incurred for demand creation

The study's findings, presented in this report, provide a detailed investigation, through a comprehensive bottom-up approach, of the costs to providers in offering medical male circumcision, as well as the cost to clients in receiving medical male circumcision. This was achieved by addressing the following set of key questions:

1. What is the unit cost of delivering medical male circumcision in South Africa?
2. How do the costs differ across service delivery models (fixed sites vs. fixed sites with outreach programs)?
3. What factors drive the actual cost of delivering medical male circumcision?
4. How do the costs vary depending on the geography and types of facilities that offer the services?
5. What cost savings are feasible?
6. What out-of-pocket costs are incurred by medical male circumcision clients?
7. What opportunity costs are incurred by clients of medical male circumcision?

Results from the study will assist the South African government to assess the actual unit costs of medical male circumcision delivery and scale-up and provide information about the financial barriers medical male circumcision clients might face. The study also assessed current spending on demand creation, so as to better assess the level of spending and the allocation of resources.

This analysis will also support the National Department of Health, development partners, and implementing partners to better project resources needed for medical male circumcision service delivery and to understand cost drivers and cost variances across provinces and different modes of medical male circumcision service delivery (e.g., circumcision provided at fixed sites vs. circumcision provided as part of outreach programs). The cost data from this report will also inform the second round of South Africa's investment case analysis.

Limited Cost Variations across Provinces

Comprehensive cost data was systematically collected from 33 government and PEPFAR-supported urban, rural, and peri-urban medical male circumcision facilities from eight of South Africa's nine provinces. It is important to note that the data collection team visited all nine provinces, but the North West province required extensive approvals that were not received in time to include it in the study. A unit cost of medical male circumcision, with information about how this cost varies by province, type of facility, scale, level of urbanization, and mode of service delivery is calculated in this report.

The study determined that the cost per circumcision performed in South Africa in 2014 was 1,431 South African rand (R). This cost was driven largely by direct labor costs (43%), medicines and consumables (24%), continuous quality improvement (13%), and indirect labor (11%). The unit cost was significantly higher when performed in public hospitals (R1,710) relative to health centers and clinics (R1,309). There were no statistically significant differences between circumcisions performed at fixed sites relative to fixed sites that also offer outreach services. There were also no significant differences in unit costs associated with circumcision performed in urban, peri-urban, or rural areas.

Potential for Cost Savings

It was noted that there were various potential opportunities for cost savings in the delivery of medical male circumcision services. First, the direct cost of labor could be reduced by 17 percent if South Africa encouraged further task shifting from doctors and clinical associates to professional nurses. This could result in a savings of as much as R163 million in 2015, a year in which the country has set a target of performing 1.6 million circumcisions. The second potential area for cost savings could be achieved by South Africa increasing the scale of its circumcision program. According to the calculations provided in this report, with each 1,000 circumcisions performed, the unit cost would be reduced by R84. Thus, by focusing on high volume sites, it is projected that the overall unit cost of scaling up medical male circumcision services could be further reduced.

Cost Barriers to Uptake of Voluntary Medical Male Circumcision

Information on the cost to clients also provides insights into some of the economic barriers faced by boys and men seeking medical male circumcision services. Overall, the cost of transporting clients (and when necessary, their caregivers) was estimated to be R100. This amount included travel for the surgery itself, for pre-surgery, and for post-surgery follow-up visits.

A review of medical male circumcision clients and their caregivers also indicated that medical male circumcision is associated with lost days of work, both at the time of receiving services and subsequent to the surgery. On average, respondents indicated that they lost more than two work days, with some reporting that they had lost more than five days of work.

Finally, an analysis of demand-creation costs indicated that R154 million was spent in 2014. Most of the demand-creation costs were attributable to the personnel and community mobilizers (36%) and small/mass media (35%). Further analysis is recommended to assess if both the level and allocation of spending is appropriate for South Africa's medical male circumcision program.

ABBREVIATIONS

AIDS	acquired immune deficiency syndrome
CHAI	Clinton Health Access Initiative
CQI	continuous quality improvement
DMPPT	Decision Makers' Program Planning Tool
HIV	human immunodeficiency virus
HPI	Health Policy Initiative
HPP	Health Policy Project
MMC	medical male circumcision
NDOH	National Department of Health
NGO	nongovernmental organization
ORPHEA	Optimizing the Response in Prevention: HIV Efficiency in Africa
PEPFAR	U.S. President's Emergency Plan for AIDS Relief
SMS	short message service
UNAIDS	Joint United Nations Programme on HIV/AIDS
URC	University Research Co., LLC
USAID	U.S. Agency for International Development
WHO	World Health Organization

INTRODUCTION

HIV, largely driven by sexual transmission and mother-to-child transmission, was first diagnosed in South Africa in 1983 (Ras et al., 1983). Key drivers of the epidemic include intergenerational sex, multiple concurrent partners, low condom use, low rates of male circumcision, and gender inequality (Weiss et al., 2009; Richardson et al., 2014; Exavery et al., 2015). South Africa has a generalized HIV epidemic and is home to the highest number of people living with HIV in the world (estimated to be approximately 6.4 million) (SANAC, 2014). A 2012 survey estimated national HIV prevalence among all ages at 12.2 percent (Shisana et al., 2014).

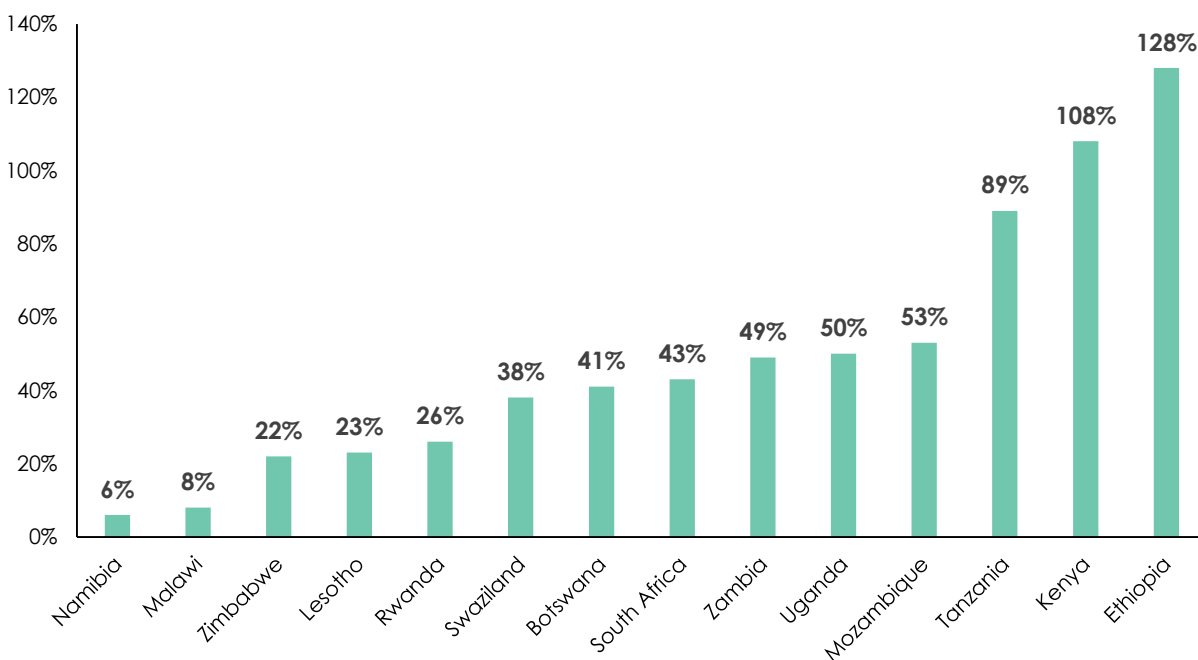
Medical male circumcision (MMC) has been shown to be one of the most cost-effective methods available for preventing new HIV infections. There is compelling evidence that MMC reduces men's risk of becoming infected with HIV through heterosexual intercourse by approximately 60 percent (Avert et al., 2005; Bailey et al., 2007). Based on this overwhelming evidence, the South African government introduced MMC as an HIV prevention intervention in 2010 (SANAC, 2012). Evidence from South Africa further shows that circumcision not only is effective in clinical trials, but also has a population level effect and can significantly reduce HIV incidence (WHO, 2012; Avert et al., 2013).

Currently, it is estimated that 46.4 percent of all males (over the age of 15) in South Africa have been circumcised, either through a traditional or medical procedure. However, only 18.6 percent of males have been circumcised medically (Shisana et al., 2014; Govender et al., 2013). To date there is no research demonstrating whether traditional circumcision also provides a protective effect against HIV. Thus, South Africa was identified by the United Nations Joint Programme on HIV/AIDS (UNAIDS) and the World Health Organization (WHO) in 2007 as one of the priority countries in eastern and southern Africa targeted for MMC scale-up (Govender et al., 2013; UNAIDS and WHO, 2011). The ultimate goal of the program is to contribute to the reduction of HIV incidence by scaling up MMC to reach 80 percent of HIV negative males between the ages of 15 – 49 by 2016 (UNAIDS, 2011; Dankie and Leboga, 2015).

Between 2010 and early 2015, the South African MMC program performed approximately 1.9 million medical male circumcisions (Dankie and Leboga, 2015). While the program's growth has been robust, this figure represents only 43 percent of the current target of 4.3 million MMCs completed by 2016. In order to stimulate scale-up, the South African government has set an ambitious goal of performing 1.6 million circumcisions in 2015 alone. This nearly doubles the cumulative number of circumcisions performed through 2014.

As Figure 1 below shows, progress towards the achievement of MMC targets has varied greatly from country to country. The achievement of 43 percent of its target places South Africa in the middle of the 14 priority countries that are scaling up circumcision. Countries such as Tanzania, Kenya, and Ethiopia have made tremendous progress, whereas countries such as Namibia, Malawi, and Zimbabwe have made minimal progress towards achieving their targets.

Figure 1. Progress Towards Achieving Targets Set in 2011



Source: Authors

The main MMC delivery models in South Africa can be classified as fixed sites (static) and fixed sites with outreach services. Outreach services are generally in schools and community health centers in localities where health facilities were not available or not staffed/equipped to provide routine MMC services. These outreach facilities receive personnel and material support to provide MMC services. The outreach services were also provided at “circumcision camps.” There have been three previous costing studies that have attempted to assess the unit cost of MMC in South Africa. These include studies performed by the Health Policy Initiative (HPI) and the Clinton Health Access Initiative (CHAI), and the Optimizing the Response in Prevention: HIV Efficiency in Africa (ORPHEA) study. The objective of these costing studies was to assess the resources required to scale-up MMC and to identify opportunities for potential cost savings. The HPI costing study was conducted in 2008, before South Africa had introduced circumcision as an HIV prevention strategy. This early study estimated that the mean cost per circumcision, based on a total of nine sites costed, was R525 (Mahomed et al., 2010). The ORPHEA study was based on 27 sites conducted in 2012 and estimated a unit cost of approximately R1,460 per circumcision (Bautista-Arrendondo et al, 2014). The CHAI study, concluded in 2015, estimated that the unit cost per circumcision performed was R1,561 (NDOH, 2015a).

In addition to costing studies, there have been various modeling efforts that have attempted to assess the costs and benefits of scaling up male circumcision. HPI estimated the impact of MMC using the Decision Makers’ Program Planning Tool (DMPPT 1.0) (HPI, 2009). In 2014, the Health Policy Project (HPP) conducted another modeling exercise, using DMPPT 2.0, to determine the costs and impacts of MMC scale-up when targeting different age groups and provinces (HPP, 2014).

In 2014, the South African government, through the South African National Department of Health (NDOH), indicated to PEPFAR a strong need to better understand the costs of MMC to both facilities and to clients. At the request of and in collaboration with the NDOH, HPP conducted a detailed study in 2015 of the costs of providing medical male circumcision in South Africa to explore:

1. What is the unit cost of delivering MMC in South Africa?
2. How do the costs differ across service delivery models (fixed sites vs. fixed sites with outreach programs)?
3. What factors drive the actual cost of delivering MMC?
4. How do the costs vary depending on the geography, and the types of facilities that offer the services?
5. What cost savings are feasible?
6. What costs are incurred out-of-pocket by clients of MMC?
7. What opportunity costs are incurred by clients of MMC?

The results of the study are being used to inform strategic planning for continued scale-up of MMC and to identify the resources required to sustain the MMC intervention. Study findings will also enable the South African Government to understand cost drivers and cost variances across the provinces and different modes of MMC service delivery. MMC clients do incur costs, such as transport and absenteeism from work. These costs and economic barriers are especially important to consider when developing MMC policy and outreach campaigns. This report provides results from the study, including a detailed investigation of the costs to providers in offering MMC and the cost to clients in receiving MMC.

STUDY OBJECTIVE

The objectives of this study were to:

- Derive the unit cost of delivering MMC in South Africa at the facility level
- Assess costs from a client perspective
- Identify the level of spending currently incurred for demand creation

The unit costs, including the variation of costs by geography and delivery strategy, will inform MMC planning and modelling activities in South Africa. This will enable health planners, policymakers, and program implementers to make informed decisions about targets and scale-up of services.

The assessment of costs to clients serves to better understand the economic barriers to MMC uptake. By understanding these barriers, decision makers will be better able to understand how to remove these barriers and increase the uptake of services.

Finally, with an understanding of the current spending on demand creation, it will become easier to comprehend the magnitude and allocation of resources required. This information can provide guidance to policymakers about gaps in spending and a clearer perspective about how resources might be spent to have a greater impact on MMC uptake.

METHODOLOGY

Protocol Development

The study protocol and data collection instruments were developed by the HPP research team, with support from the NDOH and key stakeholders.

Selection and Training of Research Team

Three senior researchers were contracted for stakeholder engagement and to review and manage the data collection process. An additional three researchers were contracted to conduct data collection with facility program managers and MMC clients. The team was trained and conducted interviews at selected pilot sites. The purpose of the training was to familiarize the research team with the data collection tool and outline the stakeholder engagement process at the provincial and national level.

Site Selection and Geographical Location

A list of 27 sites were initially selected and shared with the provincial authorities for their input (three sites in each of nine provinces). Meetings with provincial authorities highlighted a number of challenges with the initially selected sites. In a number of cases, selected sites were not operational or often managed at schools which would have required a separate, formal approval from the Department of Basic Education.

Through an extensive provincial consultative process, the initial list of sites was modified. Where possible, sites were replaced with alternative sites that were located in similar geographic areas in the province (e.g., urban sites were replaced by urban sites) and by mode of service delivery (e.g., outreach sites were replaced by other outreach sites). This extensive process of stakeholder engagement and site selection was necessary to obtain provincial buy-in and support for the study.

Facility data collection was ultimately conducted in a total of 33 sites across eight different provinces. The list of sites is indicated in Table 1.

Table 1. MMC Facility Survey Sites

Eastern Cape	Empilweni Community Health Centre
Free State	Lesedi Community Health Centre
Gauteng	Oliven Clinic
	Kgabo Clinic
	Phedisong Clinic
	Suurman Clinic
	Ramotse Clinic
	Jubilee District Hospital
	ODI District Hospital
	Laudium Community Health Centre
KwaZulu-Natal	Kwamashu Community Health Centre
	Stanger District Hospital
	Benedictine District Hospital

	Mpumelelo Clinic
	Port Shepstone Hospital
	Gamalakhe Community Health Centre
	Itshelejuba District Hospital
	Turton Community Health Centre
	Northdale District Hospital
	Kwadabeka Community Health Centre
	East Boom Community Health Centre
Limpopo	Mogoto Primary Health Care Clinic
	Evelyn Lekganyane Primary Health Care Clinic
	Mapela Clinic
Mpumalanga	Mapulaleng Regional Hospital
	Embhuleni Hospital
	Witbank Regional Hospital
	Kwaggafontein Clinic
	Topsy Foundation Community Health Centre
Northern Cape	Galeshewe Day Hospital
Western Cape	Malmesbury Community Health Centre
	Vredenburg Community Health Centre
	Mosselbay Provincial Hospital

Source: Authors

Client data collection was conducted at 25 sites across six provinces. While most client survey sites were the same as the facility sites, a few survey sites differed. Table 2 summarizes the sites visited for client surveys.

Table 2. MMC Client Survey Sites

	Jubilee District Hospital
	Kgabo Clinic
	Laudium Community Health Centre
Gauteng	ODI District Hospital
	Oliven Clinic
	Phedisong Clinic
	Suurman Clinic
KwaZulu-Natal	Kwadabeka Community Health Centre
	Itshelejuba District Hospital
	Stanger District Hospital
	Kwamashu Polyclinic

	Newtown
	Benedictine District Hospital
	Northdale District Hospital
	Mpumelelo Clinic
Limpopo	Mapela Clinic
	Mogoto Primary Health Care Clinic
	Evelyn Lekganyane Primary Health Care Clinic
Mpumalanga	Embhuleni Hospital
	Witbank Regional Hospital
	Mapulaneng Regional Hospital
North West	Lethabile Community Health Clinic
Free State	Lesedi Community Health Centre
Northern Cape	Galeshewe Day Hospital
Western Cape	Malmesbury

Source: Authors

Data Collection Tools

The data collection tools were comprised of two survey instruments: one for facilities and one for clients. The facility surveys were based on similar forms developed for costing male circumcision in Tanzania and Kenya. The client cost forms were developed exclusively for the purpose of this study.

Testing of the Data Collection Tools

Before data collection commenced, a series of activities were designed to evaluate the study instruments. The facility and client data collection tools were pre-tested at a facility in Gauteng. The research team reviewed the questions with the facility staff, clients, and care givers in order to assess their understanding of the questions. Responses from these interviews were documented and the data collection tools were subsequently revised and finalized by the team.

Institutional Review Board Approval

A final ethics clearance certificate was received on February 25, 2015 from the South African Human Research Ethics Committee (Medical), University of Witwatersrand, South Africa.

Data Collection Process

Cost data from facilities were collected from sites retrospectively, covering the most recent 12 month period of time (for most facilities, this was January to December, 2014). The team commenced with data collection in February 2015 and it was concluded in May 2015. To support the data collection process, two key documents were submitted to the provinces: 1) an introductory letter from the NDOH; and 2) the IRB approval letter from the University of Witwatersrand. Both of these documents laid out the study protocols and procedures. PEPFAR MMC implementing partners who support the South African Government in MMC service delivery were also consulted prior to visiting the facilities.

Staff interviews were semi-structured and directed at program managers, finance managers, facility managers, and the medical officers conducting the surgical procedure. Data were also gathered from relevant sources such as outpatient registers, pharmacy registers, maintenance department, laboratory department, etc. In cases where data were not available from facilities, data collectors made robust efforts to obtain information from the district, provincial, or national levels within the South African Department of Health or from PEPFAR implementing partners, if items were purchased by the latter.

Data Sources

In order to collect high-quality data at each site, the human resources, financial data, and utilization data were gathered from existing official records from facilities, implementing partners, and interviews. National-level data on the cost of training, continuous quality improvement (CQI), and communication were obtained from implementing partners who support the training of service providers at the national and district levels.

Facility Surveys

Facility-based costing included interviews with key personnel at 33 sites across South Africa. At each facility, information was collected about direct and indirect staff. Direct staff members were largely clinical staff, such as general practitioners, clinical associates, nurses, counselors, and community mobilizers. Indirect staff members included individuals who were employed by a site to provide overall facility support, but who were generally not working exclusively on the MMC program. This might include, for example, security guards, maintenance staff, facility managers, office assistants, receptionists, drivers, etc. These indirect staff members were often times compensated by the facility itself and were not typically considered to be direct members of the MMC program.

Information on the employment status (permanent versus contracted staff) was collected for both direct and indirect staff members. Additional information collected included the number of personnel, their salaries, and the percentage of time allocated to MMC. Where external staff members were introduced to an NDOH site, information on salaries was collected from implementing partners who hired these employees. In some cases, implementing partners provided “roving teams” that traveled to sites on an intermittent basis (e.g., once or twice a week). In these cases, the proportion of time spent at a site was assigned a cost and allocated to each of the relevant sites.

In situations where indirect staff members were not employed predominantly by the MMC program, an allocation method was developed, using the proportion of MMC clients relative to the total client volume at the facility to appropriate indirect staff time to MMC costs. For instance, if MMC represented 5 percent of all clients at the facility, then 5 percent of the salaries of guards, maintenance staff, etc. were allocated to the MMC program.

Circumcision kits

The cost of circumcision kits purchased in South Africa has varied significantly over time. When kits were first introduced in 2010, the cost was US\$23 per kit. This cost has subsequently declined as bulk purchases have been made. Discussions with the Supply Chain Management System indicated that kits are currently being purchased at a cost of US\$13.05. The combined costs of technical assistance and supply chain management further increase the kit price to US\$15.11.

The goal is to reduce the unit cost further to US\$11 per kit. However, while there is a need to reduce the cost per kit, there is also increased demand from clinicians to include new components to the existing kit (e.g., dissecting scissors that will be used for the dorsal slit method). These additional items are expected to raise the price to approximately US\$22 per kit. At this price, it is expected that there will be increased pressure to reduce the price of kits.

Since data were collected on a retrospective basis for the purpose of this analysis, the pre-existing price of US\$15.11 was utilized (R164). It should be noted, however, that there is some uncertainty regarding the future price of circumcision kits; while the cost of the circumcision kits is projected to rise in the immediate future, there may be significant declines in the medium to long term, resulting from increased pressures to make kits more affordable.

Medications and other consumables

Information was also collected from facilities regarding medicines and other consumables. At each site, information was collected on the percentage of MMC clients that received specific types of medicines/consumables, the quantity that they received, the input costs of each item, and the total calculated cost assigned to the facility for all MMC clients.

In most cases, facilities provided detailed information about the quantity distributed to each MMC client. However, this analysis compared the quantities allocated to identify any potential misrepresentation of the quantities utilized.

Input costs for medicines/consumables were collected from an array of sources. Priority was given to sites that provided their own estimates of input costs. However, it should be noted that in many cases, facilities were unaware of the purchase price of consumables since these items were typically purchased either at the national level by NDOH or by an implementing partner at the local level and delivered directly to the facility. In such cases, efforts were made to gather information from NDOH or sources at nongovernmental organizations (NGOs).

Input costs for a number of the medications and other consumables were collected from a variety of sources, including the Supply Chain Management Systems, CHAI, and PEPFAR implementing partners. Most notably, data on the input costs of medications were also obtained from Northdale Hospital, the voluntary medical male circumcision Centre of Excellence in KwaZulu-Natal, which had extensive information on input costs for a number of the reviewed items.

Equipment and furniture

Next, information about equipment and furniture was obtained from each site. Facilities were asked to provide a list of all equipment and furniture utilized in the screening/review room, the counseling area, the operating theatre, and/or any relevant sterilization areas. In addition, facilities were asked to identify general equipment that was used as part of the MMC program. Each facility then provided information on the number of items utilized, the estimated percentage of time equipment/furniture was utilized by the MMC program (in most cases, this was 100%, but in some cases equipment and furniture was shared with other programs within the facility), the replacement cost of each item, and the expected useful life of each item. It is important to note that several furniture items, such as desks, filing cabinets, etc., were originally purchased by the government, the facility, or an implementing partner for use beyond the MMC program.

To obtain the input cost of these items, sites were asked to estimate the replacement cost of each item. In situations where facilities were unable to identify a replacement price, information on the same was obtained from the Supply Chain Management System, CHAI, and/or PEPFAR implementing partners. In select cases, where replacement costs were still not available, average costs were estimated based on the prices offered by South African private suppliers.

The useful life of equipment and furniture was mostly obtained from WHO-CHOICE, the Choosing Interventions that are Cost-Effective project (WHO, 2015). When useful life estimates were not available from WHO-CHOICE, data was collected from other circumcision costing studies performed in Lesotho and Tanzania.

Vehicles

Sites were also asked to identify all vehicles used by the facility as part of the MMC program. Facilities were asked to provide the number of vehicles, the replacement cost of the vehicles, and the proportion of time the vehicles were used by the MMC program. While in select cases vehicles were used specifically for the purpose of the MMC program, in most situations vehicles were used for general operational and programmatic purposes at the facilities, and were occasionally used for the MMC program. In the latter case, the proportion allocated to the MMC program was determined based on the number of MMC clients, relative to the total number of clients at the facility as a whole.

Several facilities were unable to provide a replacement cost for vehicles. In these instances, based on the information provided by sites regarding the vehicles make, model, and year of manufacture, the costs of a comparable used vehicle was obtained through a popular South African used vehicles website.

Overhead

Annual overhead costs were also collected from each of the selected sites. Overhead costs included a range of items, including costs associated with utilities (water, electricity, internet, telephone, waste management, cleaning services, etc.) and the rental or construction value of a facility. Overhead costs were apportioned to the MMC program based on the size of the space used for MMC programmatic activities, relative to the size of the entire facility. For instance, if circumcision services were offered within a 150 square meter space inside a facility that was 1,500 square meters in size, then 10 percent of the costs of utilities were allocated to the MMC program.

Overhead costs related to the rental or construction value of the facility were assigned to the MMC program either by determining the annual rental value of the entire facility or by identifying the original construction value of the facility. If facilities were able to provide a rental value, costs were allocated to the MMC program based on the proportion of the total facility space used for circumcisions. However, in situations where the rental value was not available, the construction value of the facility was translated into a rental value by depreciating the construction value over a 40 year time period. In situations where neither the rental value nor the construction value could be obtained, it was assumed that the value of the facility was equivalent in rental terms to that of a median, “typical” facility. In these cases, the rental value of the facility was determined to be R41 per square meter.

Continuous quality improvement

To obtain estimates of the cost of CQI, information was obtained from the University Research Co., LLC (URC) in South Africa, which manages CQI for PEPFAR partners in South Africa. Of the 33 sites costed by this study, 27 were receiving CQI support from URC. The cost of CQI at each site was largely driven by labor and travel costs, although they also included the costs associated with overhead, policy development, etc. The costs of the other six sites were estimated by URC based on the information available concerning adverse events, geographic location, and client volume at these facilities.

Client Surveys

While male circumcision services are provided at no cost throughout the public sector in South Africa, MMC clients nonetheless incur costs in seeking out and obtaining services. In order to assess the additional types of costs incurred by clients and their families (e.g., additional expenses incurred and/or income lost by the MMC client and/or their caregiver), the research team conducted semi-structured interviews with qualitative and quantitative capture components. Most clients were interviewed during their first or second follow-up visit after surgery. No clients were interviewed before their surgery visit. Researchers administered the informed consent form to prospective respondents, allowing them to accept or decline the interview. If the client was under 18 and was accompanied by a caregiver, the caregiver was interviewed instead of the client.

Additional indirect costs, not directly related to accessing services at the health facility, were also captured through client interviews. These included the costs for childcare, home care, or other tasks that had to be undertaken as a result of required modifications in the schedule of the client or caregiver resulting from the MMC procedure.

The client surveys were broken into three parts, namely direct medical expenses, direct non-medical expenses, and lost income/foregone employment opportunities. In the direct medical expenses section, the research team documented background demographic data of clients and their insurance and billing information. Direct non-medical expenses were covered in a second section of the surveys, which reviewed the arrangement of clinic visits per client, transportation costs for these visits, and other associated costs like food and wound care products. The third and final section of the survey covered lost income and opportunity and reviewed employment status, income, missed days of work, and lost income.

Data Entry

The HPP research team entered data from the facility surveys directly into the costing model, a modified version of the DMPPT 1.0 costing model (HPI, 2010). Qualitative and quantitative data from the client surveys were transcribed as discrete responses and notes per coded interview. These data were also entered and analyzed using Microsoft Excel®.

Data Validation

The team conducted extensive site visits to interview facility staff members provincial and district officials, and PEPFAR implementing partners supporting the facilities. Where records were incomplete or appeared to produce unclear results, the research team requested clarifications from facilities and/or the implementing partner.

Subsequently, following significant efforts to gather robust data, the research team held four data validation meetings. The first meeting was held on July 7, 2015 with PEPFAR implementing partners. A second validation meeting, held on July 20, 2015, was attended by the NDOH, CHAI, and URC. A third validation meeting, held with the MMC technical working group on July 23, 2015, provided an opportunity for extensive feedback from technical experts working on MMC. Finally, a fourth validation meeting with a senior management team from the NDOH was held on August 18, 2015. Feedback provided and issues raised during these meetings have been addressed in this final report.

Analysis and Interpretation

The final step in the analysis phase involved running statistics on the data within the costing model using Microsoft Excel®. Weighted and unweighted means of the unit cost were calculated for the various types of MMC services. Where data were compared for statistical purposes, a Student's t-test (often used to determine if two sets of data are significantly different from each other) was performed using Excel's statistical functions.

RESULTS

As outlined in the preceding section, the facility costing activity included the collection of extensive financial and human resource data required for estimating unit cost per MMC beneficiary. Unit costs were calculated using a bottom-up approach by mode of service delivery (fixed vs. fixed with outreach services), cost drivers (direct labor, consumables, CQI, indirect labor, overhead, training, equipment, and vehicles), geographic location (province), level of urbanization (urban, peri-urban, or rural), scale of MMC activities, and the type of facility where services were performed (hospital vs. healthcare center/clinic).

Overall Unit Cost

The overall unit cost at the 33 facilities was determined to be R1,431 per circumcision performed. At the average exchange rate for 2014 of R10.83 = US\$1, the overall unit cost is equivalent to US\$132 per circumcision performed.

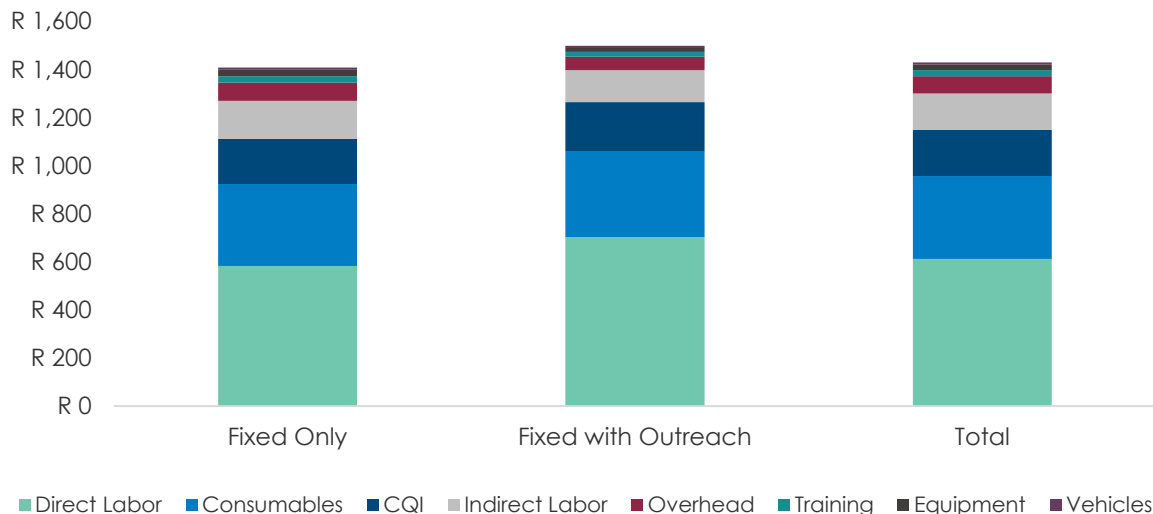
Unit Cost by Mode of Service Delivery

The analysis also compared unit costs by service delivery model. The most common modes of service delivery are fixed (static) sites, fixed sites with outreach services, and mobile services. Originally, this study attempted to include mobile services, but many of these sites were not operational or were not accessible without additional levels of approval. Due to concerns related to the feasibility and timeliness of gathering data from mobile sites, this analysis has focused on the comparison of unit costs for fixed sites vs. fixed sites that also had outreach services. There were a total of 25 sites that were fixed only and eight sites which were fixed with an outreach program.

Figure 2 shows the difference between fixed sites only (no outreach services) vs. those which have both fixed and outreach components. The difference between these two models of service delivery is not statistically significant ($p=0.322$), although the unit cost for sites with outreach services was slightly higher than sites without outreach services. There may be a number of reasons that explain why unit costs do not differ significantly. First, sites with outreach services may enjoy economies of scale, which counteracts the costs associated with transporting consumables, equipment, staff, etc. to communities. Facilities with outreach services had an average of 3,348 circumcisions per year, whereas facilities without outreach services had only 2,128 circumcisions per year.

Secondly, it should be noted that outreach services may represent variable percentage of all circumcisions performed. Thus, two facilities may be technically considered “outreach,” however, one site may have 99 percent of all circumcisions performed as part of an outreach effort (the other 1% of circumcisions performed at the fixed facilities), while the second site may have only 1 percent of all circumcisions implemented through outreach efforts (the other 99% circumcisions performed at fixed facilities). Finally, fixed sites might also incur additional costs associated with bringing clients to their facilities, whereas sites with outreach services might not require that transport is provided to clients.

Figure 2. Unit Costs by Service Delivery Mode



Source: Authors

Unit Cost by Cost Driver

Figure 2 also indicates the unit costs by service delivery model, broken down into cost components. As we can see, the largest component of unit costs is direct labor, representing 43 percent of all costs. This is followed by consumables (24%) which include the cost of the male circumcision kit, the most expensive component of the consumables costs. The next most expensive cost component is CQI (13%), followed closely by expenditures incurred due to indirect labor (11%). The remaining 9 percent of costs are represented by overhead, training, equipment, and vehicles.

Unit Cost by Province

Figure 3 provides a breakdown of unit costs by province. It is important to note that the number of MMC sites within a given province is indicated in brackets next to the province's name. As shown in the figure, the largest number of sites in this analysis are located in KwaZulu-Natal (11 sites), followed by Gauteng (8 sites). Despite initial attempts to ensure that all provinces were equally represented, complications related to obtaining permissions to conduct the costing study led to some provinces being under-represented in this analysis (e.g., Eastern Cape, Free State, and Northern Cape).

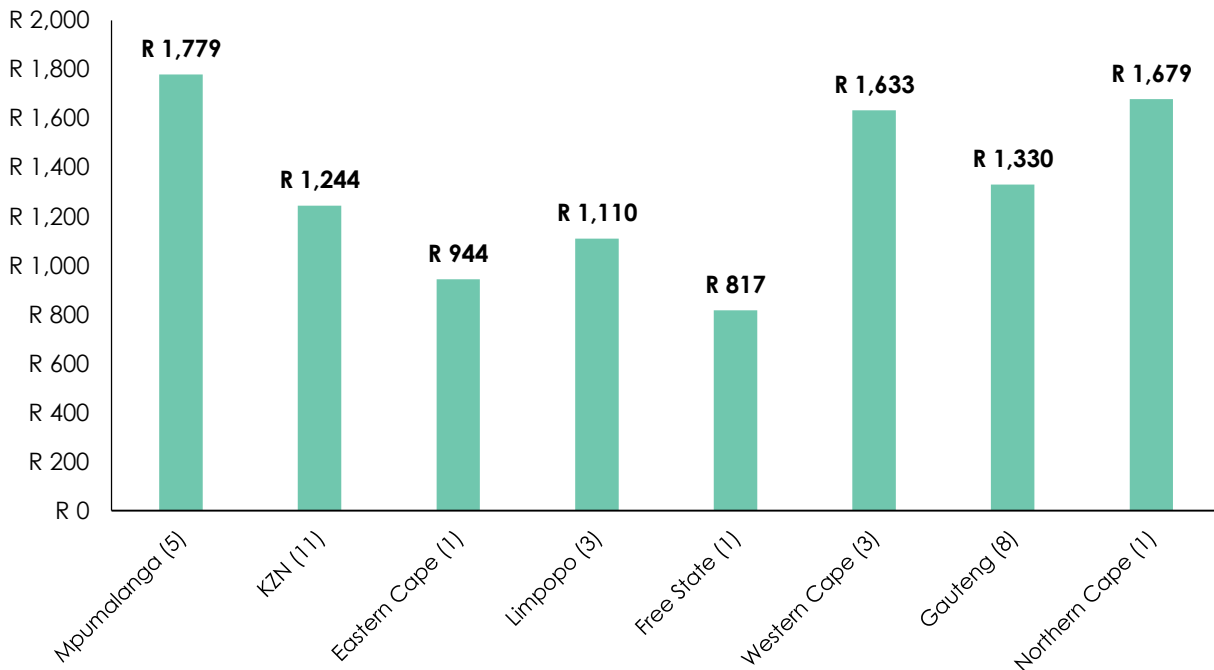
As indicated in Figure 3, Mpumalanga had the highest unit cost by province. All five sites within Mpumalanga had consistently high unit costs for labor and medicines/consumables; higher than the average calculated for all sites in the study. As discussed earlier, expenditure on labor is the largest cost driver among unit costs per circumcision. Not surprisingly, labor costs within sites in Mpumalanga explain the higher costs in this province to a much larger extent than the costs of medicines/consumables. While sites in this province do indeed demonstrate higher expenditures on medicines/consumables, the difference between unit costs for medicines/consumables in Mpumalanga's facilities differs by much smaller amounts from unit costs for medicines/consumables in facilities in other provinces (differences among Mpumalanga's sites from the average unit costs for medicines/consumables are between R10 – R100 from the average unit cost). However, unit costs for labor in Mpumalanga deviate from the average costs for labor in other sites by a significant degree (between R150 – R300 from the average unit cost for labor). It is interesting to note that three out of the five facilities in Mpumalanga (Embhuleni, Mapulaneng, and Topsy) have very high proportions of contracted labor in their clinical labor force compared to other sites that have equal (or higher) proportions of permanent labor compared to their

contracted labor. This might indicate that permanent clinical staff can be acquired at more competitive prices than clinical staff that is contracted. This is especially important in the case of essential clinical labor, such as general practitioners, clinical associates, and professional nurses, which are commonly high-cost resources. We find that a majority of facilities in the study with exceptionally high unit costs for labor reveal similar trends with higher proportions of contract versus permanent labor. A significant number of facilities with the highest per unit cost of labor uniformly demonstrated expenditures on contract labor that were equivalent to or even higher than expenditures on permanent labor. Additional analysis into the average unit costs for permanent labor versus contract labor might be called for.

The study found that that Kwaggafontein, which is also located in Mpumalanga is a significant outlier in terms of unit costs of labor. Unit costs of labor in Kwaggafontein differ on average by R685. However, Kwaggafontein should not be considered in the analysis of permanent versus contract labor since high unit costs for labor in Kwaggafontein are explained as a result of exceptionally low client volume and not the proportion of contracted labor (there is no contract labor in Kwaggafontein, all clinical staff is permanent labor). Total labor costs in Kwaggafontein are on the low-end of total labor costs among all facilities in the study, but as a result of small client volumes the unit costs calculated are artificially inflated as being high.

The least expensive province was Free State, although this province was represented by only one site. Both KwaZulu-Natal and Gauteng had large numbers of sites that were included in this study. In both of these provinces, the unit cost did not differ significantly from the overall unit cost.

Figure 3. Unit Cost by Province



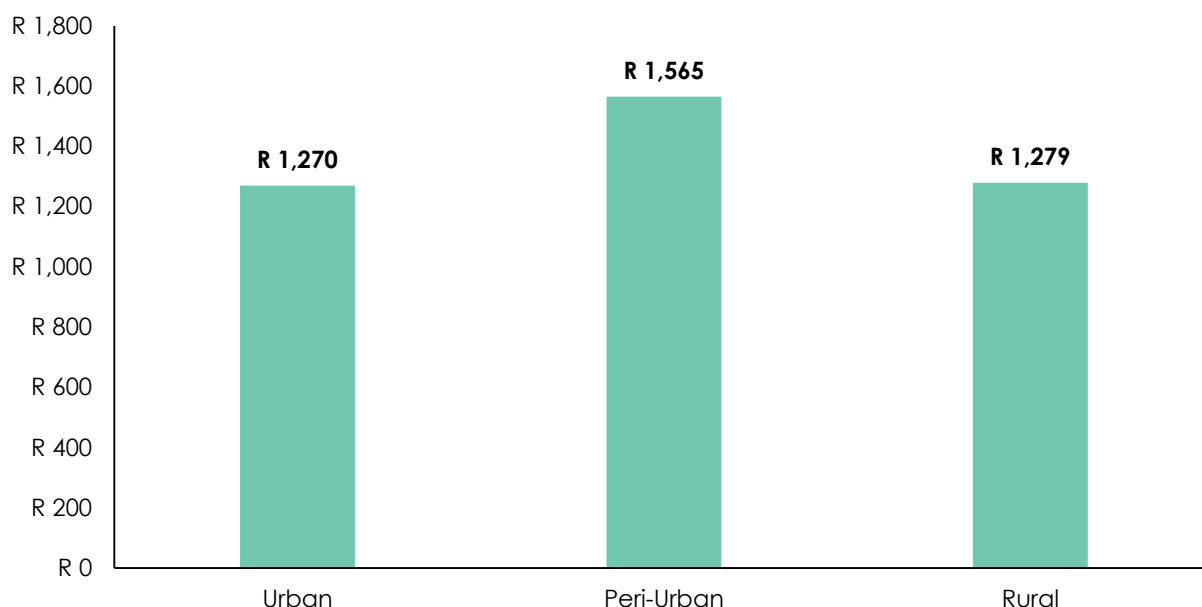
Source: Authors

Unit Cost in Urban, Peri-Urban, and Rural Sites

Each site was classified as being located in urban, peri-urban, or rural areas of the country. Figure 4 illustrates how unit costs differ depending on the level of urbanization in the communities where the facility operates. There were a total of 13 urban sites, 10 peri-urban sites, and 10 rural sites. Figure 4 indicates that the unit cost is unrelated to the level of urbanization of the site. In fact urban (R1,270) and rural sites (R1,279) appear to have almost identical unit costs. The higher unit cost in peri-urban sites (R1,739) appears to be driven by two sites with unusually high unit costs.

It is useful to note, however, that having a site located in an urban community does not necessarily mean that the facility operates exclusively in that urban area. Some urban sites, for example, provide outreach services that deliver services into peri-urban and rural areas. Therefore, it is possible that the results reflected in Figure 4 may not accurately show the differences in reaching boys in urban and rural areas.

Figure 4. Unit Cost by Level of Urbanization



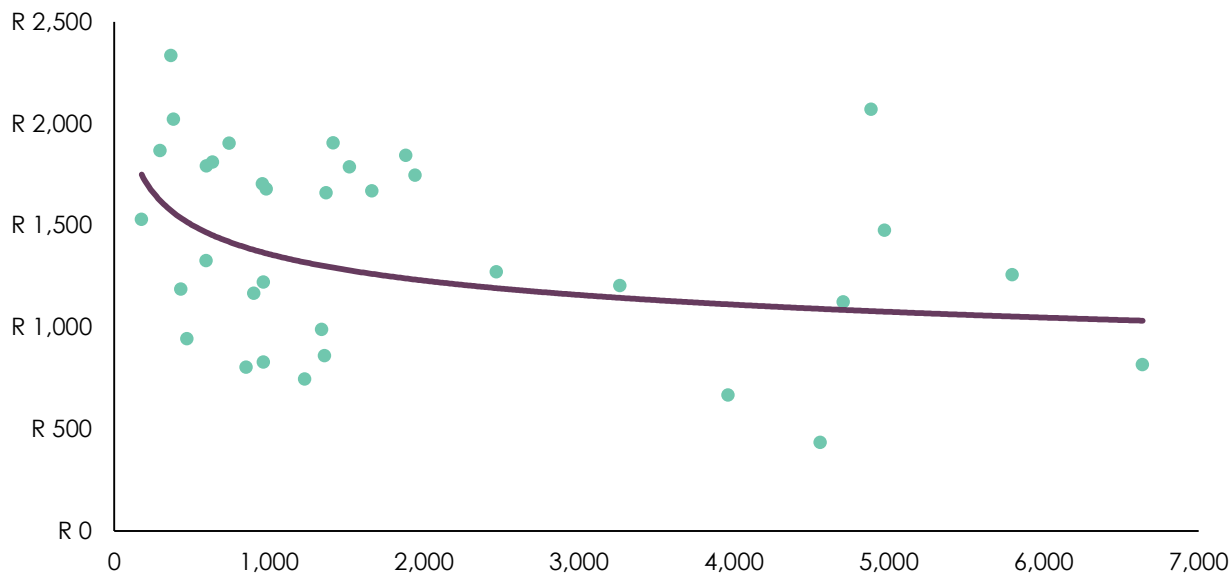
Source: Authors

Unit Cost by Scale

Figure 5 indicates the relationship between the number of circumcisions performed in the last 12 months and the average unit cost of each circumcison. As the figure illustrates, about 45 percent of all sites had fewer than 1,000 circumcisions per year. The average unit cost of these lower volume facilities was R1,473. On the other hand, about 21 percent of all sites reported more than 3,000 circumcisions per year. These higher volume sites had a unit cost of R1,231. The red line shown in Figure 5 shows that there is, as expected, an inverse relationship between volume and unit cost; sites which have higher numbers of MMC clients generally having a lower unit cost.

It is, however, important to note that scale does not fully explain variation in unit cost. Some lower volume sites, for example, also have a low unit cost. On the other hand, some higher volume sites have a high unit cost.

Figure 5. Unit Cost by Scale

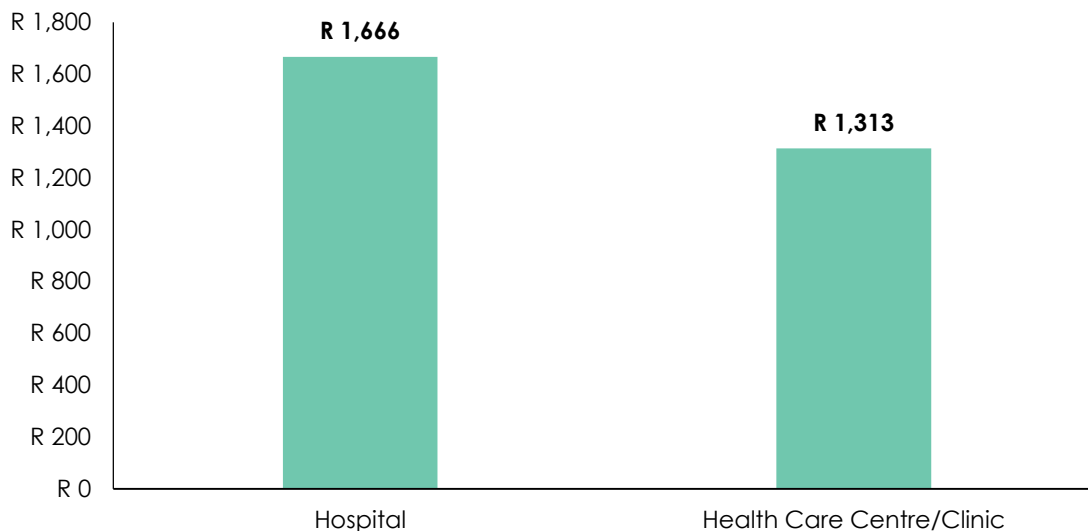


Source: Authors

Unit Cost by Type of Facility

Of the 33 sites where unit cost data were collected, 11 were hospitals and 22 were health centers/clinics. As Figure 6 indicates, the unit cost at hospitals (R1,666) is higher than at health centers/clinics (R1,313). The difference in this case is statistically significant ($p=.009$). Most of the differences are attributable to higher labor costs (both direct and indirect) at hospitals, relative to health centers and clinics.

Figure 6. Unit Cost at Hospitals vs. Healthcare Centers/Clinics



Source: Authors

Task Shifting

Task shifting, the planned delegation of tasks from higher-level health cadres (specialists or doctors) to non-physician clinicians (Ford et al., 2012), has been proposed as a way to expand surgical capacity, particularly in resource-limited settings (Chu et al., 2009). It has long been promoted by WHO as a potential solution to expanding MMC services (WHO and UNAIDS, 2008).

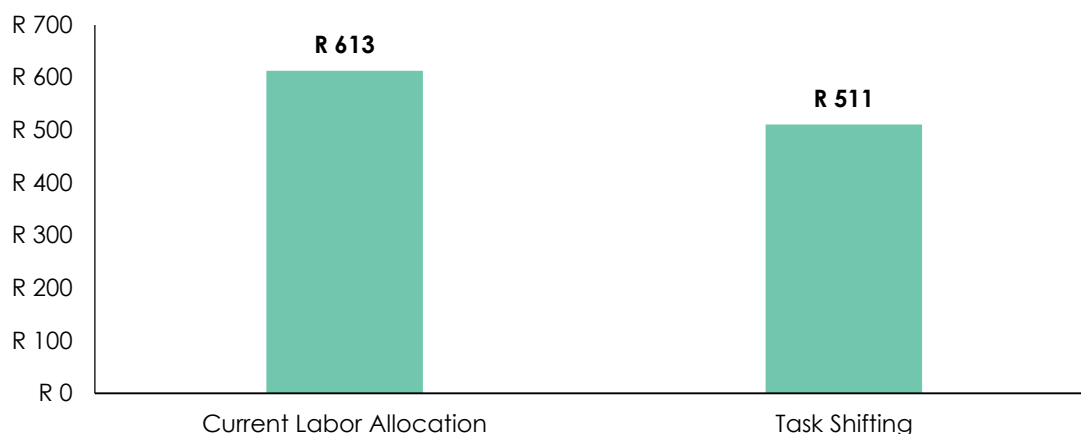
Task shifting in male circumcision is a process that results in the re-assignment of activities performed by more expensive doctors and clinical associates to nurses. With adequate training, nurses are able to provide comparably high-quality, affordable primary care and are able to deliver outcomes that are similar to doctors (Griffiths, 2009). Task shifting is beneficial for several reasons; including greater availability, lower costs (of nurses, relative to doctors and clinical associates), increased patient access to service delivery sites, and reduced service interruption. In order to assess the potential cost savings of task shifting, the research team performed an analysis in which the salaries of doctors and clinical associates were replaced by the salaries of professional nurses.

Figure 7 shows the direct labor costs with and without task shifting. The current direct labor unit costs for male circumcision are estimated to be R613. However, if doctors and clinical associates were replaced by professional nurses, this could be reduced to R511 per circumcision, a savings of R102, or 17 percent of direct labor costs. The government of South Africa established a target of performing 1.6 million circumcisions in 2015. Thus, if the average cost savings from task shifting was achieved, the total savings in 2015 alone would be R163.2 million.

It is important to bear in mind that this simple calculation might not reflect the entirety of the advantages of task shifting. Most notably, nurses are more widely available in health facilities than doctors and clinical associates. Since circumcision services are often not offered when the doctor is not available, shifting the task of performing circumcisions to nurses may not only result in lower costs, it may also permit a much larger number of circumcisions to be performed.

Furthermore, data from the Systematic Monitoring of the Voluntary Medical Male Circumcision Scale-up study indicates that doctors are much more likely to become burned out and leave the MMC program, whereas nurses report higher levels of job satisfaction and are therefore more likely to continue providing MMC services long after their training has ended (Bertrand et al., 2013). Thus, nurses also require significantly less retraining costs than doctors.

Figure 7. Potential Impact of Further Task Shifting on Clinical Labor Costs



Source: Authors

Cost of Demand Creation

Demand creation, which consists of mobilizing and motivating men to access MMC services (Bertrand et al., 2011), is crucial for the successful implementation of South Africa's MMC program. Demand creation increases awareness around the benefits of MMC services and provides information about the availability of services. Indeed, communication and social mobilization strategies work to increase knowledge about the benefits and limitations of MMC; raise awareness of the availability of services; and address socio-cultural and traditional norms and attitudes that may impede or facilitate the uptake of MMC (NDOH, 2012). MMC demand creation is crucial in ensuring clinics operate at or close to their full capacity which would result in a more efficient use of resources and declining average unit costs.

Information about South Africa's spending on MMC demand creation was obtained from PEPFAR's MMC demand creation and communication partners. In addition, all nine 2014 provincial business plans were reviewed to extract relevant MMC demand creation budgetary data. These plans produced limited data since most provincial plans did not contain specific line items for MMC demand creation. Finally, about a quarter of the facilities (8 out of 33) provided information on the resources utilized for MMC demand creation activities. Data from the facilities were then extrapolated to the approximately 900 sites where MMC services are available in South Africa.

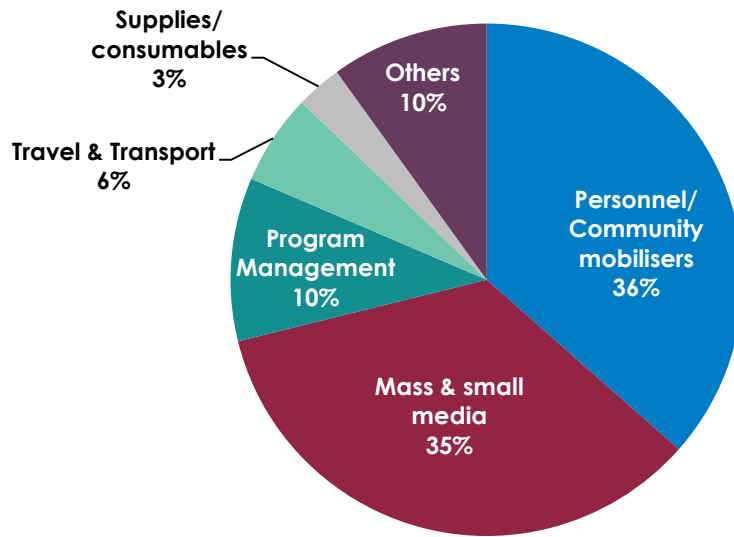
Actual spending on MMC demand creation, including community mobilization channels and mass and small media costs, were obtained directly from PEPFAR implementing partners supporting the national, regional, and local MMC communication and demand creation strategies. These partners include Anova Health Institute, Aurum Institute, CareWorks, Centre for HIV/AIDS Prevention Studies; Community Media Trust; Johns Hopkins Health and Education South Africa; Jhpiego (an affiliate of Johns Hopkins University); Right to Care; South African Clothing and Textile Workers Union, Worker Health Program; Society for Family Health; and TB/HIV Care Association.

It is important to note that no information on the cost of MMC demand creation was collected at the national level because the NDOH does not have a stand-alone, MMC-specific budget for demand creation.

About R421 million was spent by PEPFAR for MMC activities in fiscal year 2013 (PEPFAR, 2013), while an estimated R154 million (including PEPFAR and funding from other sources) was spent on MMC demand creation alone in 2014. Of this, R149 million was collected from implementing partners. These costs were disaggregated into major cost categories as shown in Figure 8. The remaining R5 million was derived both from the provincial business plans (approximately R1 million) and facilities' reported expenditures on MMC demand creation (extrapolated expenditures, approximately R4 million). The R5 million could not be disaggregated into cost categories and therefore is not included in Figure 8.

Major demand creation cost drivers include demand creation for personnel and community mobilizers salaries (36%); mass and small media (35%); demand creation program management (10%); travel and transport, including transport of MMC clients (6%); and supplies and consumables (3%). The "Other" category which includes furniture and equipment, systems development, applied research, demand creation training, and any other voluntary MMC communication channels (phone messaging, mobile signage, data collection, and reporting) represents the additional 10 percent of the total MMC demand creation cost.

Figure 8. Demand Creation by Major Cost Category



Source: Authors

It is important to note that the study collected demand creation cost data on actual spending and not on the current need for demand creation activities. The need for MMC demand creation could potentially be higher than the current level of spending. Also, this study did not consider options to strengthen demand creation in order to increase service delivery, linking service provision to demand creation activities (i.e., tracking people reached through social mobilization and mass media activities who accessed MMC service), or estimating the unit cost of demand creation per person circumcised. For these reasons, the demand creation cost was not included in the unit cost per person when assessing MMC services.

COSTS TO CLIENTS

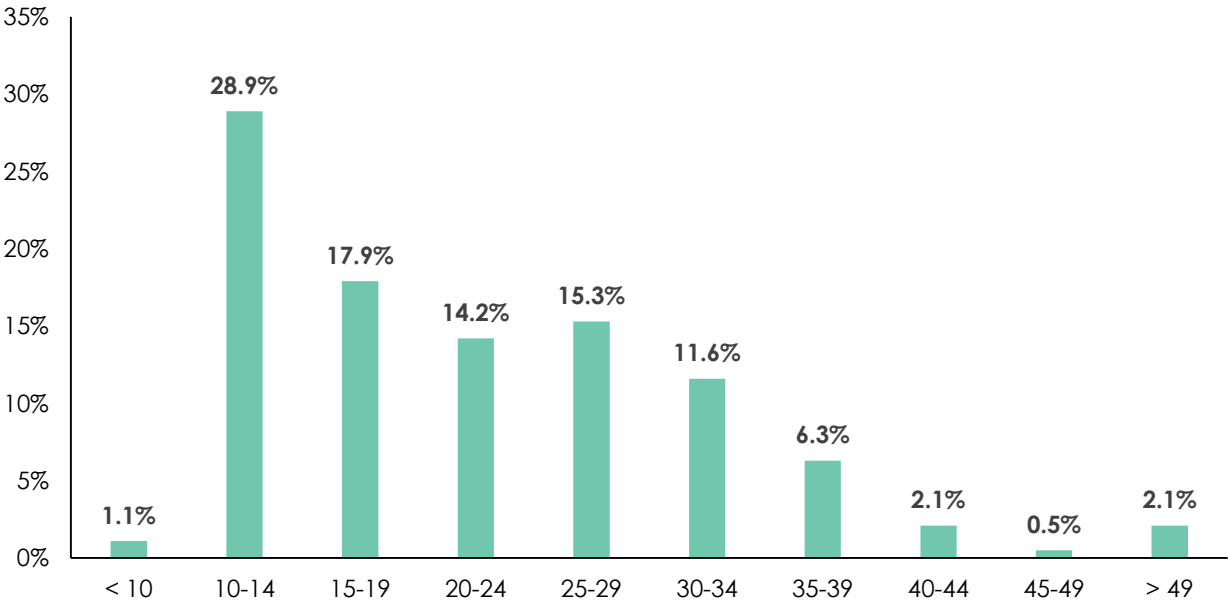
To estimate the costs, from the initial visit to final follow-up, incurred by MMC clients (and caregivers in cases where the client was a minor), the research team collected financial data. Non-medical expenses were also included such as transportation; lodging and meals; and additional childcare, home care, or other tasks paid for because the client or caregiver had to modify their work schedule as a result of the procedure. Opportunity costs of the client and/or his caregiver were assessed through days of missed work. This information was calculated using clients' monthly income bracket and disaggregated by clients' age, province, facility-type, facility location, and service-modality. Qualitative and quantitative data from client surveys were transcribed as discrete responses and coded.

Client Background Information

Of the 190 interviews conducted, the average age of all clients interviewed was 22 years (Figure 9). The average caregiver age was 42 years (Figure 10). Most of the respondents were clients themselves (87.4%, n=166), with only 12.6 percent (n=24) of respondents identified as caregivers.

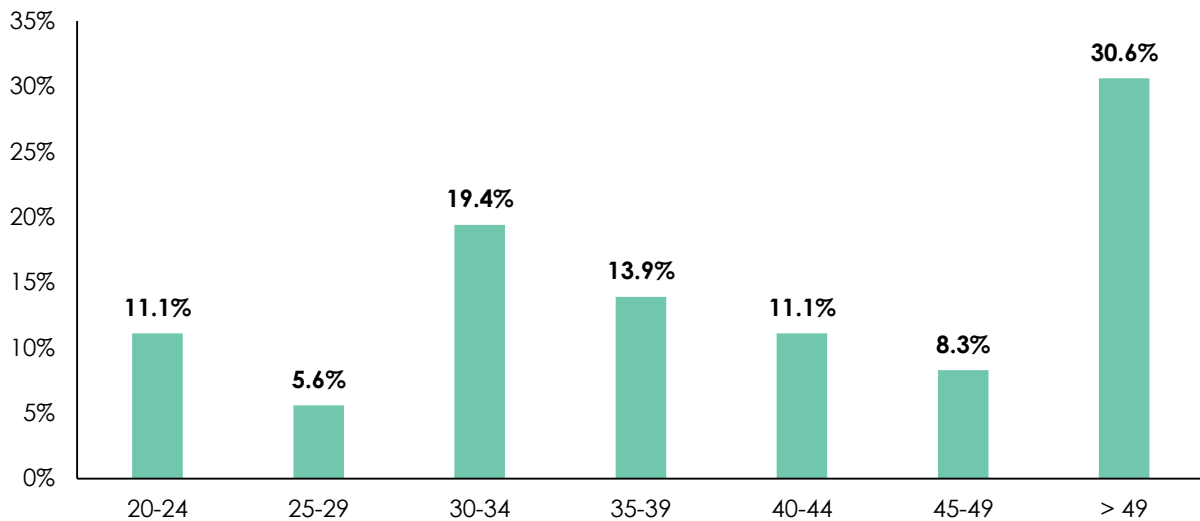
It is important to note here that most clients were interviewed during their first or second follow-up visit following their surgery. Some minors were unaccompanied while returning for follow-up services and were interviewed if there was consent. In these cases, the data collectors ensured they obtained the original circumcision consent form, plus the interview consent form.

Figure 9. Age of MMC Clients



Source: Authors

Figure 10. Age of Caregivers



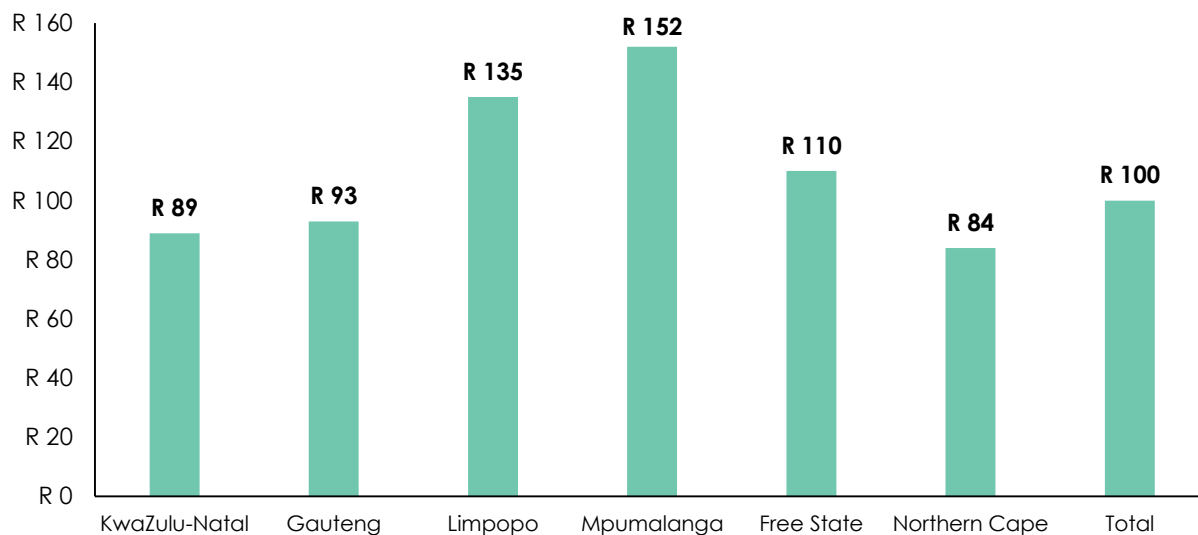
Source: Authors

Expenses Incurred by Clients and Caregivers

Clients and caregivers both incurred various costs related to accessing male circumcision services. These costs included transportation, meals, and materials for wound treatment. Only one client reported incurring additional expenses for childcare. As previously noted, there was no cost to clients for the circumcision itself in public sector facilities.

Of the clients and caregivers interviewed, 54.2 percent (103/190) reported that they incurred travel expenses. The average round-trip transportation expense to receive MMC services (from pre-surgery to the estimated, required future follow-up visits) for all respondents reporting transportation costs was R100 (Figure 11).

Figure 11. Average Transport Expenses for Those Who Report Paying for Transport

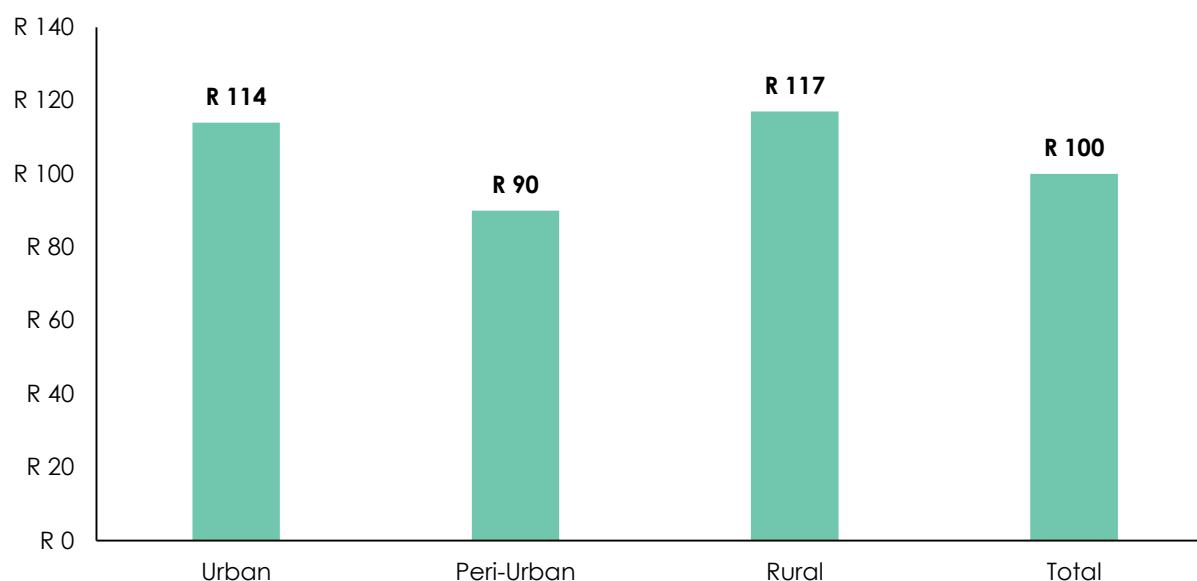


Source: Authors

Study results indicate that clients who sought care from sites with outreach services were less likely to report transport costs (41%) than clients who sought care from facilities that did not offer outreach services (71%). This finding is important as it indicates that outreach services eliminated transport costs for many of the clients.

Figure 12 also shows the transportation expenses incurred to reach facilities in urban, peri-urban, and rural areas. The results show that transportation costs do not vary greatly depending on the location of the facility. In fact transportation costs incurred at urban and rural facilities were nearly identical. Costs were slightly lower at peri-urban facilities; this may be in part because most clients who receive care at peri-urban facilities generally live closer to or have cheaper transport to these facilities than their counterparts in urban or rural areas, but further research is needed to support this assumption.

Figure 12. Transport Costs Incurred by Location of the Facility



Source: Authors

Other Reported Expenses

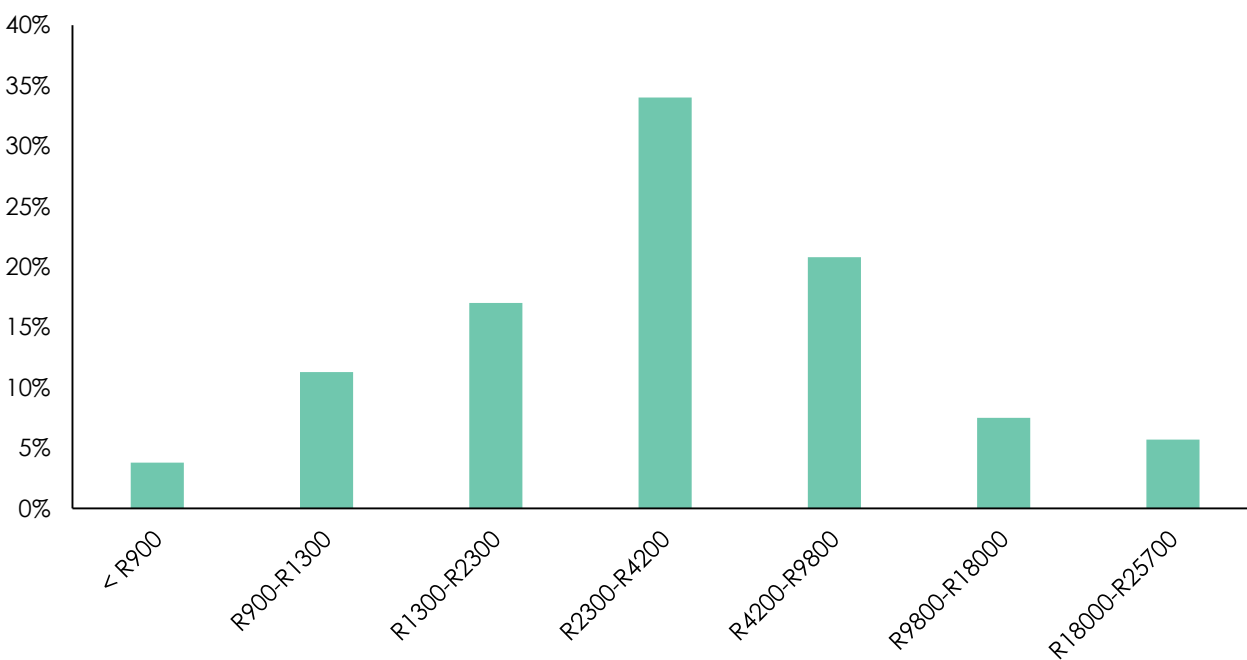
Aside from transportation costs, respondents reported a range of other expenses they incurred as a result of receiving MMC services. These included (in order from most to least reported), salt, food, underwear, clothes, medicine (aspirin reported once), wound care supplies, surgical spirit (a liquid used primarily for topical application that clients thought to be a wound care/cleaning solution), shoes, coconut oil/Vaseline, facecloth, detergent, bandages, airtime, fuel, and blankets. We note, however, that some of the expenses incurred for items like shoes reported above have no immediate connection to circumcision and no explanation was provided as to why clients had to purchase shoes as a result of receiving MMC services. Salt was most commonly reported with 17.4 percent (n=33) of respondents yielding an average price of R21. Salt was recommended for wound care by those performing circumcisions (applied topically in a saltwater solution to cure the wound). Food was second most reported, 14.2 percent (n=27) of respondents, with an average expense of R167.

Income Background of Respondents

Slightly more than half of respondents (52.6%, n=102/190) reported their monthly income bracket (Figure 13). Of these, about 50 percent also said they were employed ($N_{\text{employed}}=53$, $N_{\text{unemployed}}=49$). Broken down by respondent type (caregivers or clients) revealed that the majority of caregivers who reported income (84%, n=16) also reported being unemployed. Most clients (60%, n=50) reported being employed. Examining this information by facility type, peri-urban facility respondents reported the highest income brackets. Also, a majority of respondents in peri-urban (60%, n=27) and urban settings (61%, n=19) reported being employed.

However, when analyzed independent of reported income bracket, the majority of clients (64%) and caregivers (87%) said they were unemployed. Several individuals who reported being unemployed reported an income, which could come from state or family support. Further analysis of income and employment statistics were omitted to maintain focus on client costs and lost income, but these figures could be reviewed in the future to better understand client and caregiver demographics.

Figure 13. Income for Respondents Who are Employed



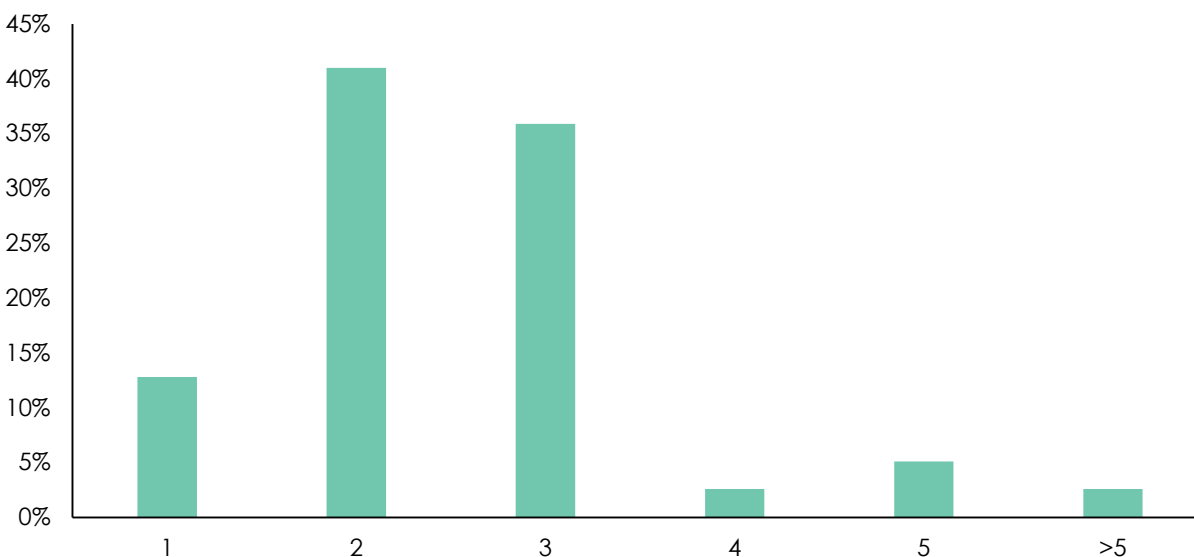
Source: Authors

Lost Income

Respondents were asked to report the number of days of work they missed due to MMC and if they lost any income as a result. Overall, there were only 10 reports of respondents losing income due to missed days of work. The average missed income amounted to R280, excluding two outliers. These two outliers (R6,000 and R3,000) were difficult to explain. The first reported that he had lost his job, although it was unclear how this job loss occurred. The second reported a three-week absence from work, although he also indicated there was no adverse event associated with his surgery. This respondent indicated that he lacked the energy to carry on with his job due to his surgery.

There were 40 respondents reporting missed days of work due to MMC. For those that did miss days of work, the average number of work days missed was 2.4 (Figure 14).

Figure 14. Days of Work Missed



Source: Authors

Other Missed Opportunities and Reported Hardship

Some respondents indicated they experienced hardships in the qualitative section of the client survey. Commonly reported answers included statements such as, “the facilities should provide food for the clients just as they do for those that donate blood,” and, “days not spent at school or work were a burden.”

Respondents also describe their experience of the program and offered inputs for improvement. The burden of missing days of school or work reappeared more prominently in this section. Several clients commented that MMC programs need better and more communications in order to create awareness among potential and existing clients. Additionally, using more volunteers to communicate information on the MMC program was mentioned as a possible option for information sharing and promotion. Clients also recommended utilizing technology, like a toll free number, short messaging services (SMS) or WhatsApp (a mobile platform messaging application which allows free exchange of SMS) to improve communication efforts. Lastly, public places, especially schools and churches, were mentioned as good places for outreach.

Several clients mentioned the need for special outreach among students, with school visits and focused treatment. Some respondents mentioned that there is a need to deal with the stigma arising from misconceived perceptions of fear and pain resulting from MMC procedures. The need for engaging the employer to allow men to take leave for MMC was also reported here. In addition, clients complained about transportation fees and several respondents recommended roving or mobile facilities, in addition to public institutions, as possible ways to reduce the burden of transport on clients.

A few clients mentioned that the ongoing pain after the procedure prevented them from carrying out their daily tasks, which represented a significant burden. Only one client mentioned the emotional stress of having a partner who was not supportive of the client having the procedure performed.

STUDY LIMITATIONS

There were a number of limitations to this study, which should be noted.

Limited Sample

First, the sample size for the facility survey (33 sites from eight of the nine provinces) makes it difficult to extrapolate costs to the national program. The Eastern Cape, Free State, and Northern Cape each had only one site included. Using only one site to provide an average for a province is a limitation and should not be used to draw broad conclusions about MMC costs these provinces. Additionally, despite efforts to collect data from all nine of South Africa's provinces, data from North West province could not be used because of delays in obtaining approvals and the subsequent incompleteness of the data. A larger sample size may have provided better opportunities to compare unit costs across provinces.

Furthermore, the exclusion of mobile sites is a limitation to this study in terms of estimating costs by service delivery models. If mobile sites could have been included, this would have provided greater clarity regarding the relative costs of the three main models of MMC service delivery.

Next, the lack of data from the private sector represents a significant gap in knowledge on the overall cost of scaling-up services in South Africa. There is an increasing interest in utilizing the private sector to expand healthcare coverage, either within the private sector or at public sector facilities. While it would be possible to estimate private sector costs by assuming that private sector doctors would be paid a salary which is comparable to the salaries paid to public sector doctors, it is not clear if this would be appropriate. An attempt was made to collect data from 10 private sector sites, but this effort was unsuccessful. As a result, NDOH and PEFPAR have both prioritized an additional data collection effort which will address this limitation.

Changing Costs and Cost Limitations

It is not possible to assess the impact of missing data on the overall unit cost of MMC in South Africa. This study focused only on the cost of surgical circumcision. Non-surgical circumcisions using the PrePex™ device were not included in this study.¹ It is expected that PrePex™ will be introduced at various sites in South Africa in the next two years, which is likely to have an effect on the cost of performing circumcisions. Since circumcisions using the PrePex™ device do not require surgery, experts conjecture that this method of circumcision will require less intensive inputs of clinical labor, medicines, consumables, and equipment and will consequently cost significantly less than surgical male circumcisions. A pilot test of PrePex™ devices is currently being evaluated in South Africa and costs are being estimated.

In addition, this study did not identify how unit costs might change in the future as South Africa further scales-up its program. On the one hand, unit costs might decline as a critical mass of clients is reached. Conversely, unit costs might increase as it becomes increasingly difficult to identify the diminishing number of clients who are ready and willing to adopt male circumcision.

Additionally, it should be noted that the cost of circumcision kits are projected to change significantly over both the short and long term. Over the short term, it is projected that circumcision kit costs are likely to increase with the inclusion of additional items. On the other hand, as the program is scaled-up, there is

¹ PrePex is an adult disposable medical device developed in 2009 to facilitate non-surgical MMC. This elastic ring controlled radial compression device causes necrosis of the foreskin in seven days or less and clients who undergo voluntary MMC using the PrePex device neither use any anesthesia nor suturing (Duffy et al, 2013).

likely to be pressure on suppliers to reduce the costs of kits. Thus while this is not a limitation of this study, it is important to note as it may affect the cost of future circumcisions.

Effects of Recall Bias

Study researchers did not do a time-motion analysis of how staff spent their time on the MMC program. Instead, respondents were asked to provide a general allocation of time during each day. Since the allocation of time was based on recall and not on actual observations, it is possible that there may have been an overestimation or underestimation of time spent on male circumcision.

Likewise, while every effort was made to obtain all information about resources used at facilities, the interview process did require that respondents were able to accurately recall and identify direct and indirect resources. As for client surveys, clients were at various stages of follow-up at the time they were surveyed. Given this, the time from when they incurred the expenses they reported varied, possibly influencing reporting accuracy. Further, as clients were interviewed in the clinic setting, most likely not far from one another at the interview, it is possible that one client's answers might have potentially influenced the next clients' answers who followed in the interview order at the same facility.

Unknown Influence of Economies of Scale

The data on the number of circumcisions was collected for the latest 12 month period of time where data were available. This was preferred over asking about the number of circumcisions in the last month, which would likely have been affected by the "low" and "high" seasons when circumcisions are generally performed. While using a 12 month period of time is expected to incorporate both low and high seasons, it is important to note that seasonality is likely to have an impact on the cost per circumcision performed in any one month. In other words, given economies of scale, the unit cost of circumcision is likely to be lower during the "high season" and higher during the "low season".

In addition, the study did not collect data on the length of time that a facility had been performing circumcisions. Therefore it is not possible to determine if or by how much this information would affect the unit cost. However, the age of a facility might affect the unit cost in a number of ways. For example, older and more established sites might have a lower unit cost because they are delivering services routinely and may have already incurred many of the start-up costs. Alternatively, newer sites might be less expensive because of its proximity (reducing travel cost which this study finds to be a burden for assessing services) and consequently, the opportunity to reach a large number of clients who may not have previously been offered circumcision services.

Limits on Capturing Demand Creation Data

As for assessing spending on demand creation, it is important to note that this study assessed current spending and did not determine the ideal levels of demand creation spending. There appears to be general consensus that additional demand creation is required. What is less clear is how to most cost-effectively reach boys and men in order to increase demand. While an MMC toolkit does exist, there is no standard package for gathering demand creation data (RTI International and PSI, 2012). Also, this study neither considered ways to strengthen demand creation to increase service delivery, link service provision to demand creation activities, nor estimated the unit cost of demand creation per person circumcised. For these reasons, the demand creation cost was not included in the unit cost per person assessing the MMC service. But, it is important to note that demand creation is vital for uptake of MMC services. A future study focusing entirely on MMC demand creation is both needed and viable.

The level of detail of the demand creation figures relied mostly on information provided by implementing partners. Despite multiple efforts to ensure the data captured here was only for MMC demand creation activities, we have no way to verify whether the information provided by implementing partners was

solely for their MMC demand creation activities. It is therefore possible that some implementing partners might have reported some of their service delivery costs under demand creation.

Exclusion of Insurance Data

There were also limitations in the client survey portion of this study. Only three clients (or their caregivers) reported being covered by any (public or private) health insurance, thus, any cost clients incurred while on insurance programs were not statistically viable. Also, the research team did not collect annual insurance costs and/or bills received from insurance or interview clients at private facilities. This precluded the capturing of any healthcare facility billing of clients before, during, and after the procedure. Since the client out-of-pocket analysis could not determine if insurance coverage was a facilitator in any way for accessing MMC services, no insurance was contacted about their financing schemes regarding MMC services.

CONCLUSION: MOVING FORWARD WITH POLICY AND PROGRAMMING

Medical male circumcision, launched in South Africa in 2010 and implemented across all nine provinces, is one of the key biomedical interventions in combined HIV prevention (Dankie and Leboga, 2015). In South Africa, there is strong political leadership around and substantial government funding for MMC activities. Circumcision services are provided in an integrated approach and combine HIV testing and counseling, counseling on sexual risk-reduction, sexually transmitted infection and tuberculosis screening, and pre-operative and post-operative care.

The unit cost of MMC in South Africa is estimated to be R1,431. This estimate is significantly higher than the first unit cost study conducted in South Africa, based on data from 2008, which estimated the cost at R525. However, the MMC unit cost estimated by this study is comparable to more recent estimates by the ORPHEA study (R1,460) and the CHAI analysis (R1,561).

The study found that the largest component of the MMC unit cost was direct labor, which accounted for 43 percent of all costs. This was followed by consumables (24%), CQI (13%), and indirect labor costs (11%). The fact that direct labor accounts for such a large proportion of the overall cost indicates that any attempt to reduce unit costs would need to focus on direct labor.

One area of costs savings could come from task shifting. Task shifting was projected to reduce direct labor costs by R102 (17%). By lowering service delivery costs, this could allow for existing funds to be stretched further. Using South Africa's target of performing 1.6 million circumcisions in 2015, task shifting could save R163 million in that year alone. However, as already indicated, the benefits of task shifting are likely to exceed the costs saved. Task shifting is also likely to increase the number of circumcisions that are performed and reduce retraining costs.

Another way to reduce the cost of MMC is to focus on high volume sites, which generally incur lower unit costs. One option may be to close inefficient, low volume sites or have these sites retool as outreach sites, and move resources from these sites to higher volume sites.

The issue of demand creation is one which requires further and significant analysis. This study found that approximately R154 million is currently being spent on MMC demand creation. Most of these resources are spent by PEPFAR implementing partners, although provinces and some facilities are also spending on demand creation. A large proportion of these resources were being spent on personnel and community mobilizers' salaries (36%) and mass and small media (35%). While there is overall consensus that current levels of spending on demand creation are inadequate, there is currently no agreement about what level of demand creation would be required in order to produce 1.6 million circumcisions in 2015. There is also currently no data which guides the government and implementing partners towards improved allocation of demand creation resources.

As previously noted, data on the costs of providing MMC services via the private sector were not part of this study. However, the private sector costs of MMC are extremely important to the NDOH and to development partners. Policymakers might wish to utilize the public sector direct labor costs to project the price at which the private sector might be reimbursed for circumcisions performed. However, for a number of reasons, this may not be ideal. First, private sector salaries (and corresponding cadre assigned to perform circumcisions) may not match those of the public sector. Second, private sector providers may require a profit motive to perform circumcisions. Third, private sector doctors that perform circumcisions in their private practices may have overhead costs which are significantly different from those incurred in

the public sector. Fourth, it is not clear if the same materials and supplies purchased by existing partners could be purchased at the same price by the private sector.

Overall, the study shows client costs could be mediated in several areas to improve MMC uptake. Although circumcision itself is free to clients, they and their caregivers both incur various costs related to accessing male circumcision services. These costs include transportation, meals, and materials for wound treatment.

About 54 percent of clients and their caregivers incur significant transport costs in seeking out MMC services. The average client and caregiver spent R100 in travel and transport from pre-surgery to the estimated future follow-up visits that would be required. This transport cost is likely to represent a significant burden for many MMC clients and suggests that methods of reimbursing clients for transport may significantly increase MMC uptake.

Outreach services appear to successfully reduce the proportion of clients who do not have to pay anything for transport (71% of clients at facilities offering outreach services paid nothing, whereas only 41% of clients at facilities that do not offer outreach services paid nothing). At the same time, facilities offering outreach services reported seeing 58 percent more clients than facilities which do not offer outreach services.

While 21 percent of clients reported missing days of work, only 4.2 percent reported losing income due to work days missed, with an average lost productivity income of R280 per day. The average number of work days missed was slightly more than two days, but in some cases clients reported missing more than five days. On a large scale, 4 percent of clients incurring lost income due to MMC could be quite significant. For example, for every one million MMC clients, 40,000 clients could experience lost income with an average lost productivity of over R22 million, or more than US\$1.7 million at current exchange rates. Demand generation strategies for MMC might consider advocating with employers to encourage clients to receive paid time. For unemployed clients, this preferential treatment could be difficult as it is unclear who would bear the cost of compensation at a flat rate for lost income when they seek out MMC services. Counseling procedures might also further incorporate advice on what to expect post-procedure in terms of clients' ability to work. This could help clients prepare to miss days of work and to coordinate getting a doctor's note on or before their surgery visit.

Clients also reported a range of other expenses incurred as a result of receiving MMC services. The two most notable ones were salt (17.4%) and food (14.2%). The average price of salt was R21 while the average expense for food was R167. However, only 9 percent of the clients actually incurred any costs for extra meals with an average extra food expense of R33. While these costs may not be a barrier to accessing male circumcision they may be a burden to clients who elect to be circumcised and incur these post-procedure costs unexpectedly. Knowledge of these common additional expenses could inform post-surgery, follow-up procedures, in either simply telling clients what they can expect to pay for after the procedure or in deciding which common items could be subsidized/provided at the point-of-care or through outreach services.

Process and Policy Issues

There were also a number of issues identified by NDOH, development partners, and local stakeholders during the data collection process.

- South Africa's MMC program is currently driven by NGOs funded by PEPFAR. The NDOH and local stakeholders acknowledge that scale-up would not have been achievable without the assistance of NGOs, given the severe shortages of staff to implement such an ambitious program (NDOH, 2015a; Dankie and Leboga, 2015). However, the voluntary MMC program is not fully

under the stewardship of government and for all intents and purposes is a vertical program which is not integrated into the primary healthcare system.

- Currently the cooperation between the provincial departments and the NGOs (implementing partners) is good. However, the provinces may have inadvertently handed over management and control of their program to the implementing partners. For the long-term sustainability of the MMC program, it is essential that South Africa's provincial Departments of Health take on a stronger leadership role in the program. It is not clear, however, how the provincial Departments of Health plan to achieve this.
- Stakeholders at the provincial level also noted that the cost of the MMC kits varies from province to province, depending on the procurement practices utilized. A standardized procurement system would most likely reduce costs through high-volume discounts and limit questionable procurement practice.
- In all the provinces visited, sites reported having significant levels of “down time.” As a result, the MMC program staffs were not gainfully employed for extended periods of time. It was recognized that this problem results in tremendous inefficiencies. Most of those who were interviewed noted that better demand creation was needed. Further investment in this area will be essential as South Africa scales up its MMC program.

RECOMMENDATIONS

In order for the country to reach its target for MMC, the study team recommends the development of a more efficient service delivery model for MMC that addresses the following:

1. **Coordinate, harmonize, and integrate the MMC program.** Personnel in every site that conducts MMCs must be trained on-site on voluntary MMC. This will ensure buy-in and enable task shifting to be taken up and internalized. There has to be seamless mobility by staff across the continuum of the public healthcare service platform. Clinical associates and nurses already conduct a number of the circumcisions in the districts.
2. **Improve communication at all levels.** Inadequate and irregular consultation makes for a disjointed program. Especially, the facility manager must assume responsibility for the program, relay voluntary MMC information from NDOH and other high level management meetings and direct all MMC activities in his/her unit to build a more strategically focused program.
3. **Streamline procurement.** Procurement of kits, drugs, and related consumables must be streamlined. This will avoid duplication and wastage of limited resources.
4. **Better utilize circumcision camps.** Outreach sites which also serve as ‘camps’ have the potential to yield better returns for the MMC program. Provinces should also be supported to develop and implement robust approaches for attracting clients to camps.

REFERENCES

- Auvert B., D. Taljaard, E. Lagarde, J. Sobngwi-Tambekou, R. Sitta, et al. 2005. "Randomized, Controlled Intervention Trial of Male Circumcision for Reduction of HIV Infection Risk: The ANRS 1265 Trial." *PLoS Medicine* 2(11): e298.
- Auvert B., D. Taljaard, D. Rech, P. Lissouba P., B. Singh, et al. 2013. "Association of the ANRS-12126 Male Circumcision Project with HIV Levels among Men in a South African Township: Evaluation of Effectiveness using Cross-sectional Surveys." *PLoS Medicine* 10(9): e1001509.
- Bailey, RC., S. Moses, C.B. Parker, K. Agot, I. Maclean, et al. 2007. "Male Circumcision for HIV Prevention in Young Men in Kisumu, Kenya: A Randomised Controlled Trial. *The Lancet* 369:643-656.
- Bautista-Arredondo, S., S.G. Sosa-Rubí, M. Opuni, A. Kwan, C. Chaumont, et al. 2014. "Assessing Cost and Technical Efficiency of HIV Prevention Interventions in sub-Saharan Africa: The ORPHEA Study Design and Methods. *BMC Health Services Research* 14:599.
- Bertrand, J.T., E. Njeuhmeli, S. Forsythe, S. Mattison, H. Mahler, et al. 2011. "Voluntary Medical Male Circumcision: A Qualitative Study Exploring the Challenges of Costing Demand Creation in Eastern and Southern Africa." *PLoS ONE* 6(11): e27562.
- Bertrand, J.T., D. Rech, D. Aduda, S. Frade, M. Loolpapit, et al. 2013. *Systematic Monitoring of the Voluntary Medical Male Circumcision Scale-up in Eastern and Southern Africa (SYMMACS): Final Report of Results from Kenya, South Africa, Tanzania, and Zimbabwe*. Baltimore: USAID | Project Search: Research to Prevention.
- Chu, K., P. Rosseel, P. Gielis, and N. Ford. 2009. "Surgical Task Shifting in sub-Saharan Africa." *PLoS Medicine* 6(5): e1000078.
- Dankie, B. and K.A. Leboga. 2015. "Voluntary Medical Male Circumcision in SA: Accelerated HIV Prevention." PowerPoint presentation presented at 7th South Africa AIDS Conference, Durban.
- Duffy, K., M. Galukande, N. Wooding, M. Dea, and A. Coutinho. 2013. "Reach and Cost-Effectiveness of the PrePex Device for Safe Male Circumcision in Uganda." *PLoS ONE* 8(5): e63134.
- Exavery, A., A.M. Kanté, K. Tani, A. Hingora, and J. Phillips. 2015. "Sociodemographic Drivers of Multiple Sexual Partnerships among Women in Three Rural Districts of Tanzania." *HIV/AIDS* 7:105-113.
- Ford, N., K. Chu, and E.J. Mills. 2012. "Safety of Task-shifting for Male Medical Circumcision: A Systematic Review and Meta-analysis." *AIDS* 26(5): 559-566.
- Govender, K., G. George, C. Muckeuki, and M. Strauss. 2013. "Voluntary Medical Male Circumcision in South Africa: Challenges and Opportunities. *South African Health Review* 2013/14.
- Griffiths, P. 2009. "RN+RN=Better Care? What Do We Know About the Association Between the Number of Nurses and Patient Outcomes?" *International Journal of Nursing Studies* 46(10): 1289-1290.
- Health Policy Initiative (HPI). 2009. *Male Circumcision Decision-Makers' Program Planning Tool (DMPPT)*. Washington, DC: Futures Group, HPI. Available at: <https://www.malecircumcision.org/resource-bundle/male-circumcision-decision-makers%E2%80%99-program-planning-tool-dmppt>.

- HPI. 2010. *Costing Workbook: NGO Health Center*. Washington, DC: Futures Group, HPI. Available at: <https://www.malecircumcision.org/resource/costing-workbook-ngo-health-center>.
- Health Policy Project (HPP). 2014. *Estimating the Effects of Targeting Voluntary Medical Male Circumcision Programs to Different Age Groups: The Decision Makers Program Planning Toolkit (DMPPT 2.0)*. Washington, DC: Futures Group, Health Policy Project.
- Mahomed, O., S. Asmall, Z. Pretorius, S. Forsythe, and E. Njeuhmeli. 2010. *Costing Male Circumcision and the Impact of Scaling up the Male Circumcision Program in South Africa*. Washington, DC: Futures Group, Health Policy Initiative.
- National Department of Health (NDOH). 2012. *Strategic Plan for the Scale up of Medical Male Circumcision (MMC) in South Africa, 2012-2016*. Pretoria: Government of South Africa.
- NDOH. 2015a. *South Africa Costed Operational Plan 2015-2019*. Pretoria: Government of South Africa.
- NDOH. 2015b. *Strategic Plan for the Scale up of Medical Male Circumcision in South Africa, 2012-2016*. Pretoria: Government of South Africa.
- PEPFAR. 2013. “PEPFAR Dashboards.” Available at: <http://data.pepfar.net/country/expenditure?country=South%20Africa&year=2013>.
- Ras, GJ., I.W. Simson, R. Anderson, O.W. Prozesky, and T. Hamersma. 1983. “Acquired Immunodeficiency Syndrome: A Report of Two South African Cases.” *South African Medical Journal* 4(4): 140–2.
- RTI International and Population Services International (PSI). 2012. *Voluntary Medical Male Circumcision: Demand Creation Toolkit*. Washington, DC: RTI International and PSI.
- Richardson, ET., S.E. Collins, T. Kung, J. Jones, K.H. Tram, et al. 2014. “Gender Inequality and HIV Transmission: A Global Analysis.” *Journal of the International AIDS Society* 17(1):19035.
- South African National AIDS Council (SANAC). 2011. *National Strategic Plan on HIV, STIs, and TB (2012 – 2016)*. Pretoria: SANAC.
- SANAC. 2012. *Progress Report on the National Strategic Plan for HIV, TB, AND STIs (2012 – 2016)*. Pretoria: SANAC.
- Shisana, O., T. Rehle, L.C. Simbayi, K. Zuma, S. Jooste, et al. 2014. *South African National HIV Prevalence, Incidence, and Behaviour Survey, 2012*. Cape Town: HSRC Press.
- United Nations Joint Programme on HIV/AIDS (UNAIDS) and World Health Organization (WHO). 2011. *Joint Strategic Action Framework to Accelerate the Scale-Up of Voluntary Medical Male Circumcision for HIV Prevention in Eastern and Southern Africa*. Geneva: UNAIDS.
- Weiss, H.A., C.A. Hankins, and K. Dickson. 2009. “Male Circumcision and Risk of HIV Infection in Females: A Systematic Review and Meta-analysis.” *The Lancet Infectious Diseases* 9: 669–677.
- WHO and UNAIDS. 2008. *Operational Guidance for Scaling up Male Circumcision Services for HIV Prevention*. Geneva: WHO and UNAIDS.
- WHO. 2012. “Voluntary Medical Male Circumcision in South Africa: Program Update, Identified Gaps, and Quick Wins.” Available at: http://www.who.int/hiv/topics/malecircumcision/fact_sheet/en/.

WHO. 2015. *Voluntary Medical Male Circumcision for HIV Prevention in 14 Priority Countries in East and Southern Africa*. Geneva: WHO.