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U.S. President's Emergency Plan for AIDS Relief

Thinking Ahead: Voluntary Medical Male Circumcision Roll-Out With Devices

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Research questions



- What is the unit cost of VMMC in Zimbabwe?
 - forceps-guided surgery
 - mixed (integrating PrePex into an existing surgical MC program)
- What are the major cost drivers?
- What impact do the following have on unit cost?
 - % site capacity used
 - ratio of surgery vs. device-based circumcisions at mixed site
 - device cost



Key Assumptions



- Zimbabwe as test case
- Population is men ages 10-49
- High-throughput facilities only
- Services integrated into existing healthcare infrastructure; not at dedicated sites
- Staff are totally dedicated to VMMC
- For mixed site: unit cost of entire program, not allocated to surgery vs. device
- Did not include indirect costs or costs of complications or demand creation



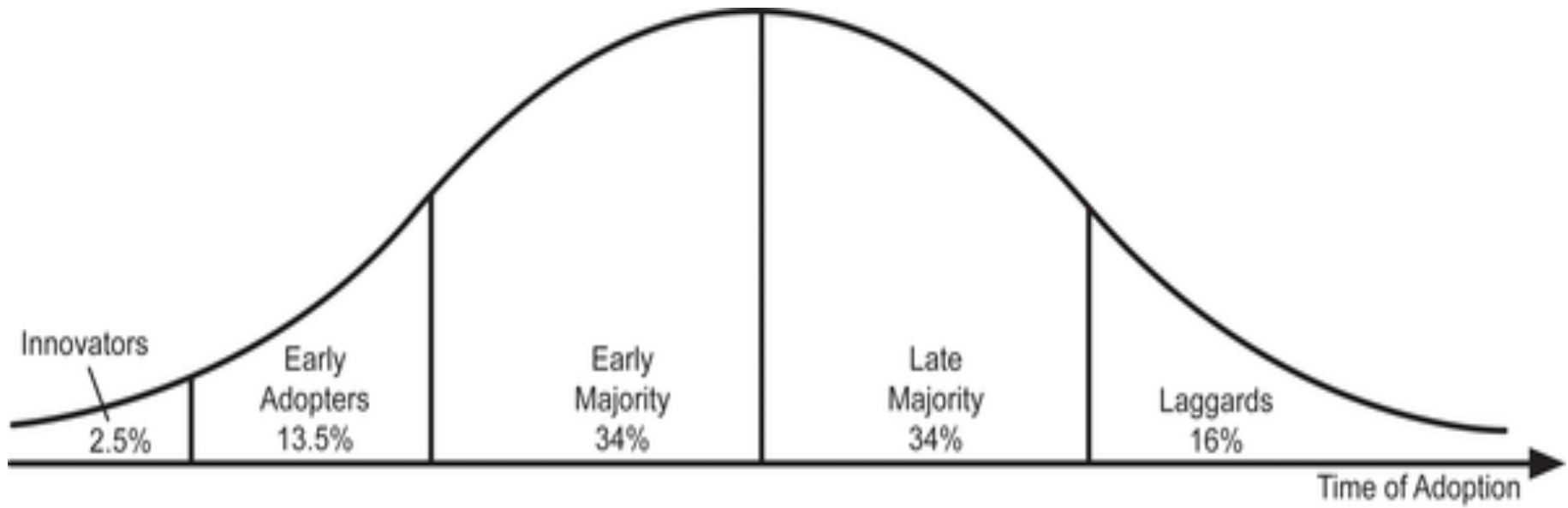
Caveats



- Not possible to obtain actual costs under scale-up situation; costs were obtained from pilot field study and assumptions; much missing information
- Many costs will be higher if circumcisions conducted in dedicated facility rather than integrated into a public facility
- Acceptability of device unknown
- Costs of demand creation unknown and may contribute significantly to costs
- Analysis did not look at effects of task shifting for the surgery



Figure 2. Diffusion of Innovation adoption status.



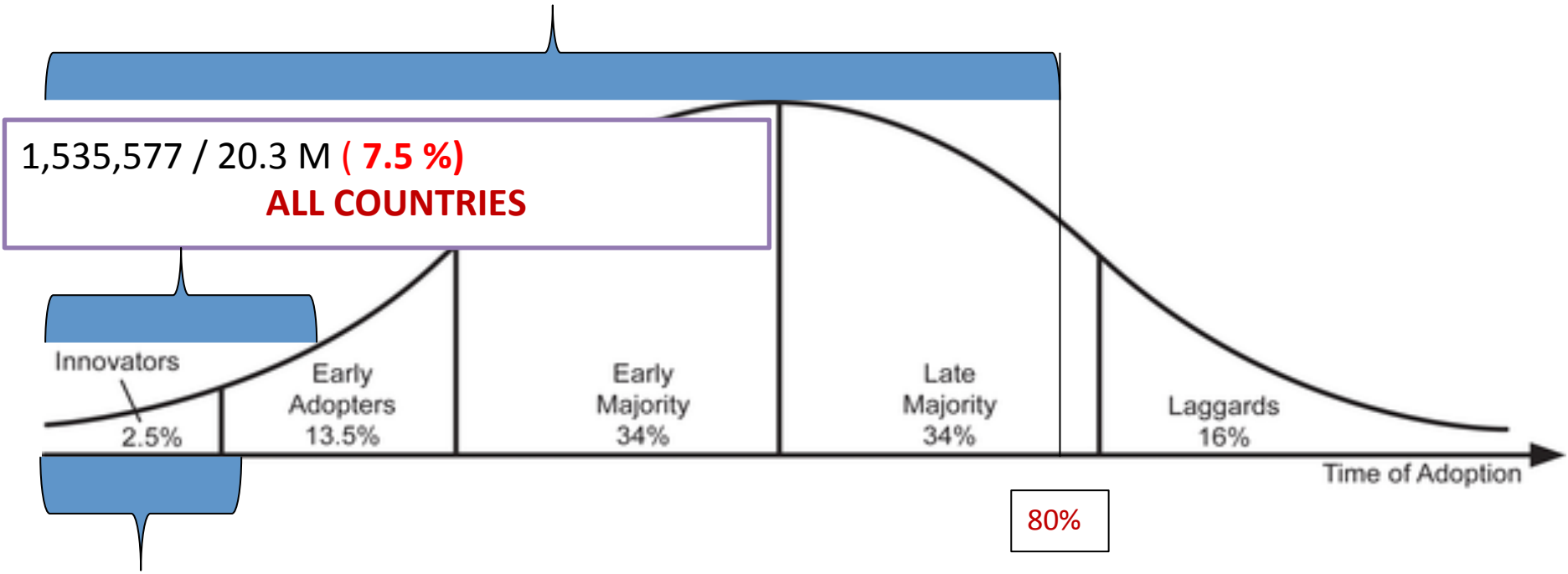
Dickson KE, Tran NT, Samuelson JL, Njeuhmeli E, et al. (2011) Voluntary Medical Male Circumcision: A Framework Analysis of Policy and Program Implementation in Eastern and Southern Africa. PLoS Med 8(11): e1001133. doi:10.1371/journal.pmed.1001133

<http://www.plosmedicine.org/article/info:doi/10.1371/journal.pmed.1001133>

PLOS MEDICINE



300,000 / 377,000 (**80%**)
Nyanza Province, Kenya



75,200 / 1.9 MC (**3.96%**)
Zimbabwe



Data sources



- Staffing patterns & costs; training, waste management costs; commodities and equipment lists: Zimbabwe PrePex operations research study team
- Consumables, durable equipment costs: SCMS
- Supply chain costs: Zimbabwe supply chain costing conducted by USAID Deliver project
- Device cost: PrePex manufacturer
- Assumptions: Zimbabwe study team, SCMS, USAID, PSI, JHPIEGO, FHI, BMGF, CDC



Site scenarios: surgery only



- Staff
 - 1 doctor
 - 6 nurses (surgery assistance, counseling)
 - 3 theatre assistants
 - 1 receptionist
- Capacity
 - Max 80/day
 - Average 40/day



Site scenarios: mixed site



- Staff
 - 1 doctor
 - 8 nurses (PrePex, surgery assistance, counseling)
 - 3 theatre assistants
 - 1 receptionist
- Capacity
 - Max 120/day
 - Average 70/day
- 73% surgery; 27% device (sensitivity analysis later)
 - 60% prefer surgery to device (assumption based on research environment in Zimbabwe)
 - 28% ineligible for device due to age < 18 (from DMPPT model)
 - 5% ineligible for device for medical reasons (based on Zimbabwe study)



What are the key cost drivers?



	surgery only		mixed site surgery + PrePex		mixed site with 40% discount for PrePex	
	cost / circumcision	% of unit cost	cost / circumcision	% of unit cost	cost / circumcision	% of unit cost
staff	\$9.68	19%	\$6.62	12%	\$6.62	14%
training	\$0.19	0.4%	\$0.21	0.4%	\$0.21	0.5%
consumables	\$31.05	61%	\$29.92	55%	\$26.97	57%
device	\$0.00	0%	\$5.47	10%	\$3.28	7%
durable equipment	\$0.34	0.7%	\$0.51	0.9%	\$0.51	1.1%
supply chain management	\$9.75	19%	\$11.11	21%	\$9.50	20%
waste management	\$0.17	0.3%	\$0.17	0.3%	\$0.17	0.4%
Total unit cost/ circumcision	\$51.19		\$54.02		\$47.27	

Note: prices not comparable between 2 site scenarios because of different staffing patterns.



Consumables



Surgery \$31.05/circumcision

PrePex \$26.90/circumcision

- Surgery kit includes disposable instruments, while PrePex kits include reusable instruments; based on usage of the metal instruments 150x
- Price of PrePex consumables based on requirement for multiple kits per procedure (placement and removal). Price is best estimate given the items required, since kits are not currently priced in the market.
- Does not take into account bulk discounting of PrePex kits. Additional analysis included that incorporates 40% discount for consumables and device.



PrePrex consumables costs: placement kit



PREPEX

	Product	Pack Cost	Packs per	Cost per Procedure
Placement Kit as per CircMedTech	Exam Latex - Non Sterile - 100 pcs	\$ 6.40	0.040	\$ 0.26
	Antiseptic Solution - 2% Clorhexidine, 1000 ml	\$ 3.17	0.02	\$ 0.06
	Sterile Gauze Pads - 100 pcs	\$ 6.90	0.03	\$ 0.21
	Sizing Plate	\$ 0.05	1	\$ 0.05
	Skin Marker - set of 24	\$ 14.00	0.000833	\$ 0.01
	Anesthetic Dermal cream - 5% - 50 ml	\$ 0.95	0.1	\$ 0.10
	Nurse Utility Scissors	\$ 1.50	0.006667	\$ 0.01
	Pain Killer - Paracetamol tabs of 500mg - 1000 tabs	\$ 10.00	0.02	\$ 0.20
	Assembly of kit (No Sterility) and Profit	\$ 4.50	1	\$ 4.50



PrePrex consumables costs: removal kit, other supplies, and totals



PREPEX				
Removal Kit as per CircMedTech	Exam Latex - Non Sterile - 100 pcs	\$ 6.40	0.040	\$ 0.26
	Antiseptic Solution - 2% Clorhexidine, 1000 ml	\$ 3.17	0.02	\$ 0.06
	Sterile Gauze Pads - 100 pcs	\$ 6.90	0.04	\$ 0.28
	Mosquito Clamp Straight	\$ 1.50	0.006667	\$ 0.01
	Harvey Wire Scissors	\$ 60.00	0.006667	\$ 0.40
	Spatula	\$ 1.50	0.006667	\$ 0.01
	Scalpel Blade	\$ 1.00	1	\$ 1.00
	Povidone Iodine 10% solution - 200ml bottle	\$ 1.03	0.025	\$ 0.03
	Wound Dressing coated fabric tape with no pad	\$ 1.95	1	\$ 1.95
	Paper Tape - 36 meters	\$ 16.63	0.00625	\$ 0.10
	Packing of kit (w/ sterility) and Profit - separate instruments and consumables (2 kits)	\$ 7.00	1	\$ 7.00
Infection Prevention supplies	\$ 6.50	1	\$ 6.50	
Emergency Commodities	\$ 0.66	1	\$ 0.66	
Testing and STI Treatment commodities	\$ 3.25	1	\$ 3.25	
	TOTAL			\$ 26.90



FG surgery consumables costs



SURGERY			
Product	Pack Cost	Packs per Procedure	Cost per Procedure
MC Disposable instrument Kit	\$ 14.01	1.0000	\$ 14.01
Surgical Gloves - pair	\$ 0.34	4	\$ 1.36
Diathermy Cautery Tips - single	\$ 2.77	1	\$ 2.77
Lidocaine HCL 1% - 20ml vial	\$ 0.47	1	\$ 0.47
Bupivacaine HCL 0.5% - 20 ml	\$ 2.68	0.2	\$ 0.54
Paracetamol 500mg - 1000 tabs	\$ 10.00	0.02	\$ 0.20
Povidone Iodine 10% solution - 200ml bottle	\$ 1.03	0.3	\$ 0.31
Compression Bandage - self adherent -162 meters	\$ 22.32	0.0046	\$ 0.10
Sterile Gauze Pads - 100 pcs	\$ 6.90	0.1	\$ 0.69
Suture Braided absorbable - 12 pcs	\$ 3.60	0.01	\$ 0.04
Infection Prevention supplies	\$ 6.66	1	\$ 6.66
Emergency Commodities	\$ 0.66	1	\$ 0.66
Testing and STI Treatment commodities	\$ 3.25	1	\$ 3.25
TOTAL			\$ 31.05



Supply chain management



Surgery \$9.75/circumcision

PrePex \$14.73/circumcision

- 20% of consumables/device costs for logistics
- 11.4% of consumables/device costs for procurement
- Costs obtained from Zimbabwe supply chain costing conducted by USAID Deliver project
- Procurement costs will be higher if some commodities require air freight rather than ocean freight



How does the ratio of device to surgery based circumcisions affect the cost?



The unit cost increases as the percent of device-based circumcisions increases

% surgical circumcisions	% device-based circumcisions	unit cost
100%	0%	\$48
95%	5%	\$49
90%	10%	\$50
80%	20%	\$52
70%	30%	\$55
60%	40%	\$57
50%	50%	\$59
40%	60%	\$61
30%	70%	\$63
20%	80%	\$65
10%	90%	\$67
5%	95%	\$68



Site Utilization Sensitivity Analysis

	# circ/yr	unit cost
10% of max	2,640	\$90
20% of max	5,280	\$68
average	15,400	\$54
80% of max	21,120	\$52
max	26,400	\$51

- Unit cost decreases with increased site utilization
- At 10% utilization the unit cost is almost double the unit cost at “average” site utilization

Device Cost Sensitivity Analysis



device price sensitivity analysis with 73% surgery; 27% device

device cost	unit cost	% of unit cost
\$0.50	\$48.68	0.3%
\$1	\$48.82	0.6%
\$2	\$49.09	1.1%
\$5	\$49.91	3%
\$10	\$51.28	5%
\$15	\$52.65	8%
\$20	\$54.02	10%
\$25	\$55.38	12%
\$30	\$56.75	14%

device price sensitivity analysis with 95% device-based circumcisions

device cost	unit cost	% of unit cost
\$0.50	\$49.57	0.3%
\$1	\$50.05	0.5%
\$2	\$51.00	1.1%
\$5	\$53.85	3%
\$10	\$58.60	5%
\$15	\$63.35	6%
\$20	\$68.10	8%
\$25	\$72.85	9%
\$30	\$77.60	11%



Kenya PrePex vs. forceps-guided MC costing study

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- Analyses based on 48,265 MCs in Kenya 2009-2011
 - Used USAID/UNAIDS DMPPT
 - Sensitivity: AE rate, follow-up rate, % phimosis, personnel mix
 - Did not use kits for consumables
 - Did not include costs for supply chain mgmt
 - Indirect costs included; demand creation not included
- Unit costs of one MC surgery:
 - **\$46.36-\$51.34**
PrePex
(not including device cost)
 - **\$54.52-\$55.29**
forceps-guided

Conclusions



- There is **no significant cost difference** per procedure between surgery-only programs and those that used both surgery and Prepex device
- Even at a 40% discounted price of device and consumables, the cost difference is not significant
- Key cost drivers are **supply chain management commodities** including **device costs**, and **staffing**
- **Acceptability of devices** as estimated by % of procedures performed using devices is a significant driver of cost
- **Demand** for male circumcision is very important -- as underutilization of sites leads to significant unit costs



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