

## Supplementary file 1

**Table S1.** Assumptions and Allocation Factors for Step-Down of Overhead Costs for Mt Meru RH

Department	Allocation factors in base analysis	Assumptions/Special considerations	Allocation factors in secondary analysis
General Administration	<i>Cost of personnel</i>		<i>Staff number</i>
Medical Stores	<i>Volume of supplies</i>		<i>Volume of supplies</i>
Medical Engineering	<i>Cost of the equipment</i>	<i>Only clinical departments were considered</i>	<i>Cost of the equipment</i>
General Transport	<i>Personnel cost</i>		<i>Number of Inpatient</i>
Kitchen	<i>Number of inpatients</i>		<i>Number of inpatients</i>
Laundry Services	<i>Number of nurses &amp; MA's</i>		<i>Costs of buildings</i>
Environmentals + security	<i>Cost of the buildings</i>		<i>Personnel Cost</i>
Housing + Mortuary	<i>Cost of personnel</i>	<i>Only clinical departments were considered</i>	<i>Number of nurses/MA</i>
Medical Records Services (including ICT)	<i>Cost of personnel</i>		<i>Cost of personnel</i>
Pharmacy	<i>Number of nurses &amp; MA's</i>	<i>Radiology and laboratory departments were excluded</i>	<i>Number of nurses &amp; MA's</i>
Utilities	<i>Cost of the buildings</i>		<i>Cost of the buildings</i>

**Table S2.** Assumptions and Allocation Factors for Step-Down of Overhead Costs for Meru DH

Department	Allocation factors in base analysis	Assumptions/Special considerations	Allocation factors in secondary analysis
General Administration	<i>Cost of personnel</i>		<i>Staff number</i>
Medical Stores	<i>Volume of supplies</i>		<i>Volume of supplies</i>
Registry (Staff records) and M&E Unit	<i>Number of staff members</i>		<i>Cost of the equipment</i>
General Transport/DIVO	<i>Personnel cost</i>		<i>Number of Inpatient</i>
Kitchen + Housing	<i>Number of staff members</i>	<i>Kitchen here serves staff and not patients</i>	<i>Number of inpatients</i>
Laundry Services	<i>Number of nurses &amp; MA's</i>	<i>Number of nurses correlate with patient load</i>	<i>Costs of buildings</i>

Social Welfare Department	<i>Number of nurses &amp; MA's</i>		<i>Personnel Cost</i>
BIMA Records	<i>Number of nurses &amp; MA's</i>		<i>Number of nurses/MA</i>
Medical Records Services	<i>Number of nurses &amp; MA's</i>		<i>Cost of personnel</i>
Dispensary/Pharmacy	<i>Number of nurses &amp; MA's</i>	<i>Physiology, radiology and laboratory departments were excluded</i>	<i>Number of nurses &amp; MA's</i>
Utilities	<i>Cost of the buildings</i>		<i>Cost of the buildings</i>

**Table S3.** Assumptions and Allocation Factors for Step-Down of Overhead Costs for Oltrumet DH

<b>Department</b>	<b>Allocation factors in base analysis</b>	<b>Assumptions/Special considerations</b>	<b>Allocation factors in secondary analysis</b>
General Administration	<i>Cost of personnel</i>		<i>Number of Staff</i>
Accounts	<i>Cost of personnel</i>		<i>Number of Staff</i>
Staff Housing	<i>Number of staff members</i>		<i>Personnel cost</i>
General Transport	<i>Personnel cost</i>		<i>Personnel cost</i>
Kitchen	<i>Number of staff members</i>	<i>Kitchen here serves staff and not patients</i>	<i>Personnel cost</i>
Laundry Services	<i>Number of nurses &amp; MA's</i>		<i>Cost of buildings</i>
Security	<i>Cost (size) of buildings</i>		<i>Cost (size) of buildings</i>
Mortuary	<i>Number of admissions</i>		<i>Number of admissions</i>
Medical Records Services	<i>Number of nurses &amp; MA's</i>		<i>Number of nurses &amp; MA's</i>
Dispensary/Pharmacy	<i>Number of nurses &amp; MA's</i>	<i>Physiotherapy, radiology and laboratory depts were excluded</i>	<i>Number of nurses &amp; MA's</i>
Utilities	<i>Cost of the buildings</i>		<i>Cost of the buildings</i>

**Table S4.** Types of Major Surgeries Performed at the Hospitals and Their Volumes

<b>Types of surgeries</b>	<b>Volumes (number of procedures performed in 12 months)</b>		
	Mt Meru RH	Meru DH	Oltrumet DH
Herniorrhaphy	163	14	8

CS	2,374	767	367
Myomectomy	13	10	5
Salpingectomy	102	23	-
Appendectomy	70	13	-
Laparotomy	177	-	-
Adenotonsillectomy	16	-	-
Tonsillectomy	21	-	-
Adenectomy	31	-	-
Surgical debridement	100	-	-
ORIF	29	-	-
Hysterectomy	88	-	-
Hydrocoelelectomy	-	5	-
Other major general surgeries	139	1	4
Other major Obs/Gynae surgeries	31	9	6
Other major orthopaedic surgeries	77	-	-
Other major ENT surgeries	26	-	-
<b>Total</b>	<b>3,457</b>	<b>842</b>	<b>390</b>

**Table S5.** Direct Costs of Overhead Departments at Mt Meru RH (in USD)

COST CENTRES	Direct Costs				Total
	Recurrent		Capital		
	Personnel	Other recurrent	Medical equipment	Other capital	
<b>General Administration</b>	228,159	20,295		4,385	259,839
<b>Medical Stores</b>	9,501	33,874		4,852	48,226
<b>Medical Engineering</b>	3,694	42,340		0	46,033

<b>General Transport</b>	17,448	0		34,162	51,610
<b>Kitchen</b>	15,085	16,867		2,466	34,419
<b>Laundry Services</b>	19,784	3,111		188	23,084
<b>Environmental Services + Security</b>	18,786	0		158	18,945
<b>Housing + Mortuary</b>	0	0		4,347	4,347
<b>Medical Records Services</b>	57,996	11,756		2,272	72,024
<b>Pharmacy</b>	69,710	819		165,298	235,827
<b>Utilities</b>	0	119,603		0	119,603
<b>Total</b>	440,163	248,664		218,128	906,955
	<b>49%</b>	<b>28%</b>	<b>0%</b>	<b>23%</b>	<b>100%</b>

**Table S6.** Direct Costs of Clinical Departments at Mt Meru RH (in USD)

<b>COST CENTRES</b>	<b>Direct Costs</b>				
	Recurrent		Capital		Total
	Personnel	Other recurrent	Medical equipment	Other capital	
<b>OPD/Casualty</b>	215,197	230,684		2,110	447,991
<b>Laboratory</b>	114,755	150,246	691	3,264	268,956
<b>Radiology</b>	62,566	11,793	6,047	1,596	82,002
<b>Obs/Gynae Theatre</b>	115,070	39,062	332	1,160	155,625
<b>Main Operating Theatre</b>	147,057	29,893	659	2,510	180,119
<b>Paediatric Ward</b>	218,173	5,559		11,514	235,245
<b>Maternity Wards + Gynae OPD</b>	232,996	47,938		16,235	297,169
<b>SOPD</b>	24,492	1,979		548	27,019
<b>Eye Department</b>	46,778	4,824		1,286	52,888
<b>Medical Ward + CTC + TB Unit</b>	290,842	12,683		17,564	321,089
<b>Surgical Ward</b>	261,420	60,302		10,776	332,498

<b>Dental Health</b>	49,499	6,997		543	57,039
<b>Physiotherapy + Mental Health + ICU</b>	147,529	6,650		4,478	158,657
<b>Total</b>	1,926,373	608,609	7,730	73,585	2,616,296
	<b>74%</b>	<b>23%</b>	<b>0.3%</b>	<b>3%</b>	<b>100%</b>

**Table S7.** Direct Costs of Overhead Departments at Meru DH (in USD)

COST CENTRES	Direct Costs				
	Recurrent		Capital		Total
	Personnel	Other recurrent	Medical equipment	Other capital	
<b>General Administration</b>	109,553	23,598		1,614	134,764
<b>Stores</b>	7,663	334		340	8,336
<b>Registry (Staff Records) and M&amp;E Unit</b>	15,131	121		314	15,565
<b>General Transport/DIVO Unit</b>	12,041	12,574		25,746	50,361
<b>Kitchen + Housing</b>	0	0		4,929	4,929
<b>Laundry Services</b>	5,731	2,159		1,902	9,792
<b>Social Welfare Office</b>	5,747	640		350	6,736
<b>BIMA Records</b>	5,148	438		677	6,262
<b>Medical Record Service</b>	9,357	2,571		836	12,765
<b>Dispensary/Pharmacy</b>	34,321	624		1,664	36,609
<b>Utilities</b>	0	7,875		0	7,875
<b>Total</b>	204,691	50,932		38,371	293,994
	<b>73%</b>	<b>18%</b>	<b>0%</b>	<b>9%</b>	<b>100%</b>

**Table S8.** Direct Costs of Clinical Departments at Meru DH (in USD)

COST CENTRES	Direct Costs		
	Recurrent	Capital	Total

	Personnel	Other recurrent	Medical equipment	Other capital	
<b>OPD (GOPD, POPD, BIMA and DM OPD)</b>	170,574	178,775		5,544	354,893
<b>Laboratory</b>	71,000	6,860	8,750	905	87,515
<b>Radiology</b>	21,518	2,615	3,792	1,428	29,354
<b>Main Operating Theatre</b>	53,676	15,004	8,160	2,583	79,423
<b>Minor Operating Theatre</b>	54,919	14,067	641	1,184	70,811
<b>Paediatric Ward</b>	77,562	2,002		1,298	80,861
<b>Maternity Ward</b>	138,830	18,699		6,117	163,646
<b>Female Ward</b>	57,217	3,085		3,782	64,083
<b>Male Ward</b>	54,757	2,150		4,026	60,933
<b>RCH (Including CECAP Unit)</b>	64,259	1,049		6,530	71,838
<b>Physiotherapy + Nutrition + Health Office</b>	35,776	612		1,377	37,766
<b>CTC +TB/Leprosy Unit</b>	76,511	3,737		4,605	84,853
<b>Eye + Dental Units</b>	55,879	991		4,318	61,189
<b>Total</b>	932,479	249,646	21,343	43,697	1,247,165
	<b>75%</b>	<b>20%</b>	<b>2%</b>	<b>4%</b>	<b>100%</b>

**Table S9.** Direct Costs of Overhead Departments at Oltrumet DH (in USD)

COST CENTRES	Direct Costs				
	Recurrent		Capital		Total
	Personnel	Other recurrent	Medical equipment	Other capital	
<b>General Administration</b>	50,924	3,946		1,644	56,514
<b>Accounts</b>	3,877	33		345	4,255
<b>Staff Housing</b>	0.14	0		2,206	2,206
<b>General Transport</b>	1,174	7,756		28,123	37,053

<b>Kitchen</b>	0	0		294	294
<b>Laundry Service</b>	1,073	0		147	1,220
<b>Security</b>	3,218	0		0	3,218
<b>Mortuary</b>	3,910	0		294	4,204
<b>Medical Record Service</b>	9,482	4,205		309	13,996
<b>Dispensary/Pharmacy</b>	11,987	0		817	12,804
<b>Utilities</b>	0	3,464		0	3,464
<b>Total</b>	85,646	19,404		34,180	139,230
	<b>68%</b>	<b>15%</b>	<b>0%</b>	<b>17%</b>	<b>100</b>

**Table S10.** Direct Costs of Clinical Departments at Oltrumet DH (in USD)

<b>COST CENTRES</b>	<b>Direct Costs</b>				
	Recurrent		Capital		Total
	Personnel	Other recurrent	Medical equipment	Other capital	
<b>OPD (GOPD, POPD, BIMA and DM OPD)</b>	83,311	83,442		897	167,650
<b>Laboratory</b>	18,535	142	1,858	613	21,147
<b>Radiology</b>	3,763	80	388	242	4,473
<b>Main Operating Theatre</b>	21,710	235	1,250	806	24,001
<b>Minor Operating Theatre</b>	27,752	6,029	3,671	3,841	41,293
<b>Paediatric Ward</b>	8,653	1,507		57	10,217
<b>Maternity Ward</b>	61,196	8,839		4,333	74,368
<b>Female Ward</b>	21,645	13,652		4,025	39,322
<b>Male Ward</b>	15,321	2,884		2,241	20,447
<b>RCH (Including CECAP Unit)</b>	6,635	0		477	7,112
<b>Physiotherapy + Nutrition + Health Office</b>	16,039	28		872	16,939
<b>CTC +TB/Leprosy Unit</b>	5,192	0		238	5,430

<b>Eye + Dental Units</b>	8,694	87		1,892	10,673
<b>Total</b>	298,446	116,926	7,167	20,533	443,072
	<b>75%</b>	<b>20%</b>	<b>2%</b>	<b>4%</b>	<b>100%</b>

**Table S11.** Final Costs of the Clinical Departments of Mt Meru RH after Step-Down of Overhead Costs (in USD)

COST CENTRES	Final Costs				
	Recurrent		Capital		Total
	Personnel	Other recurrent	Medical equipment	Other capital	
<b>OPD/Casualty</b>	257,406	246,224		11,518	515,147
<b>Laboratory</b>	136,569	170,806	691	6,393	314,460
<b>Radiology</b>	75,047	38,292	6,047	2,682	122,069
<b>OG Theatre</b>	141,716	52,766	332	9,003	203,817
<b>Main Operating Theatre</b>	179,777	46,542	659	11,525	238,503
<b>Paediatric Ward</b>	267,202	31,552		25,834	324,589
<b>Maternity Wards + Gynae OPD</b>	310,679	104,233		52,722	467,634
<b>SOPD</b>	28,650	3,421		1,124	33,195
<b>Eye Department</b>	54,820	7,714		2,441	64,975
<b>Medical Ward + CTC + TB Unit</b>	357,289	53,427		36,923	447,639
<b>Surgical Ward</b>	321,067	90,511		28,972	440,550
<b>Dental Health</b>	57,939	10,082		1,742	69,763
<b>Physiotherapy + Mental Health + ICU</b>	178,375	20,371		12,315	211,060
<b>Total</b>	2,366,536	875,941	7,730	203,194	3,453,401
	<b>69%</b>	<b>25%</b>	<b>0.2%</b>	<b>6%</b>	<b>100%</b>

**Table S12.** Final Costs of the Clinical Departments at Meru DH after Step-Down of Overhead Costs (in USD)

COST CENTRES	Final Costs
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	Recurrent		Capital		Total
	Personnel	Other recurrent	Medical equipment	Other capital	
<b>OPD</b>	200,712	416,706,946		9,433	396,415
<b>Laboratory</b>	82,811	9,890.09	8,750	2,335	103,786
<b>Radiology</b>	25,019	3,575.62	3,792	1,943	34,330
<b>Main Operating Theatre</b>	79,584	20,585.48	8,160	4,793	113,123
<b>Minor Operating Theatre</b>	67,922	17,413.61	641	3,157	89,133
<b>Paediatric Ward</b>	93,825	6,482.15		4,073	104,381
<b>Maternity Ward</b>	166,942	26,587.98		10,994	204,525
<b>Female Ward</b>	72,899	7,380.52		6,410	86,689
<b>Male Ward</b>	69,920	6,499.33		6,721	83,140
<b>RCH (Including CECAP)</b>	79,970	5,856.12		9,594	95,421
<b>Physiotherapy</b>	42,679	3,150.22		2,831	48,661
<b>CTC + TB/Leprosy Unit</b>	89,984	9,117.17		8,357	107,458
<b>Eye + Dental Units</b>	64,902	4,263.15		6,532	75,697
<b>Total:</b>	1,137,170	307,071.64	47,746,473	77,174	1,542,758
	<b>74%</b>	<b>20%</b>	<b>1%</b>	<b>5%</b>	<b>100%</b>

**Table S13.** Final Costs of the Clinical Departments at Oltrumet DH after Step-Down of Overhead Costs (in USD)

COST CENTRES	Final Costs				
	Recurrent		Capital		Total
	Personnel	Other recurrent	Medical equipment	Other capital	
<b>Out-Patient Department</b>	100,746	87,756		4,832	193,334
<b>Laboratory Department</b>	22,190	1,212	1,858	1,536	26,796
<b>Radiology</b>	11,093,932	431	388	523	6,301
<b>RCH</b>	27,205	1,887	1,250	2,248	32,590

<b>Main Operating Theatre</b>	36,024	8,742	3,671	5,655	54,092
<b>Minor Operating Theatre</b>	11,595	2,350		753	14,698
<b>Maternity Ward</b>	79,590	14,199		8,926	102,715
<b>Female Ward (+Paediatric) ward</b>	32,168	16,665		6,462	55,295
<b>Male Ward</b>	23,892	5,242		4,139	33,274
<b>Physiotherapy</b>	7,944	693		1,067	9,704
<b>CTC + TB Unit</b>	18,679	1,514		2,215	22,409
<b>Mental Health</b>	6,653	635		817	8,105
<b>Dental Unit</b>	12,446	1,055		2,744	16,245
<b>Total</b>	384,092	142,381	7,167	41,917	575,557
	<b>67%</b>	<b>25%</b>	<b>1%</b>	<b>7%</b>	<b>100%</b>

**Table S14.** Activity Profile per Type of Surgery at Mt Meru RH

<b>INDEX SURGERIES</b>	<b>Pre-op consults</b>	<b>Pre-op stay (surgical)</b>	<b>Pre-op stay (Obs/Gynae)</b>	<b>Lab tests</b>	<b>Imaging tests</b>	<b>OT time (main OT)</b>	<b>OT time (Obs/Gynae)</b>	<b>Post-op stay (surgical)</b>	<b>Post-op stay (Obs/Gynae)</b>	<b>Follow-up</b>
<b>Herniorrhaphy</b>	1	1	0	1	0	0.88	0	1	0	2
<b>Laparotomy</b>	0	0	0	1	1	2.25	0	4	0	2.5
<b>Appendectomy</b>	0	0.1	0	1	0	0.75	0	1	0	2
<b>Adenotonsillectomy</b>	2	1	0	1	0	0.63	0	0.2	0	1
<b>Tonsillectomy</b>	2	1	0	1	0	0.33	0	0.2	0	1
<b>Adenectomy</b>	2	1	0	1	0	0.33	0	0.2	0	1
<b>Surgical debridement</b>	0	0.33	0	1	1	2.00	0	24.5	0	4
<b>ORIF</b>	4	1	0	1	1	1.50	0	2	0	4
<b>CS</b>	0.5	0	0.5	1	1	0	0.75	0	1.5	2
<b>Hysterectomy</b>	4	0	2	1	1	0	1.25	0	2.5	2

<b>Myomectomy</b>	2	0	2	1	1	0	2.50	0	2.5	2
<b>Salpingectomy</b>	0	0	0	1	1	0	0.54	0	2.5	2

**Table S15.** Activity Profile per Type of Surgery at Meru DH

<b>INDEX SURGERIES</b>	<b>Pre-op consults</b>	<b>Pre-op stay (surgical)</b>	<b>Pre-op stay (Obs/Gynae)</b>	<b>Lab tests</b>	<b>Imaging tests</b>	<b>OT time (main OT)</b>	<b>OT time (Obs/Gynae)</b>	<b>Post-op stay (surgical)</b>	<b>Post-op stay (Obs/Gynae)</b>	<b>Follow-up</b>
<b>CS</b>	0.5	0	0.25	1	1	0.68	0	0	2.17	2.33
<b>Salpingectomy</b>	0	0	0	1	1	0.78	0	2.4	0	1.8
<b>Appendectomy</b>	0.1	0.1	0	1	1	0.75	0	1	0	2
<b>Herniorrhaphy</b>	1	1	0	1	0	1.19	0	2.75	0	2
<b>Myomectomy</b>	3.5	1	0	1	1	1.29	0	2.83	0	1.67
<b>Hydrocoelectomy</b>	1	1	0	1	0	0.33	0	2	0	2
<b>Other major surgeries</b>	0	0.33	0	1	1	2	0	2.5	0	4

**Table S16.** Activity Profile per Type of Surgery at Oltrumet DH

<b>INDEX SURGERIES</b>	<b>Pre-op consults</b>	<b>Pre-op stay (surgical)</b>	<b>Pre-op stay (Obs/Gynae)</b>	<b>Lab tests</b>	<b>Imaging tests</b>	<b>OT time (main OT)</b>	<b>OT time (Obs/Gynae)</b>	<b>Post-op stay (surgical)</b>	<b>Post-op stay (Obs/Gynae)</b>	<b>Follow-up</b>
<b>CS</b>	0.5	0	0.25	1	1	0.63	0	0	2.5	2
<b>Herniorrhaphy</b>	2	1	0	1	0	0.50	0	2	2	2
<b>Myomectomy</b>	4	1	0	1	1	1.88	0	1	2.5	2

Other surgeries	2	1	0	1	0	0.63	0	0.2	0	0
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**Abbreviations Used in Tables S1-S16:** BIMA = National Health Insurance Fund; CECAP = Cervical Cancer Prevention; CS = Caesarean Section; CTC = Care and Treatment Centre; DH = District Hospital; DIVO = District Immunisation and Vaccination Office; DM = Diabetes Mellitus; ENT = Ear, Nose and Throat; GOPD = General Out-Patient Department; ICU = Intensive Care Unit; Intra-op = Intra-operative; Lab = Laboratory; M&E = Monitoring and Evaluation; MA = Medical Attendants; Mt = Mount; Obs/Gynae = Obstetrics and Gynaecology; OPD = Out-Patient Department; OT = Operating Theatre; POPD = Paediatric Out-Patient Department; Post-op = Post-operative; Pre-op = Pre-operative; RCH = Reproductive and Child Health; RH = Referral Hospital; SOPD = Surgical Out-Patient Department; TB = Tuberculosis; USD = United States Dollars.