

ALLEGATI

1. Preventivi
2. Lettere di adesione partner associati
3. Report Survey : “Emergency obstetrics and neonatal care needs assessment in Wolisso, Goro and Wonchi Woredas”
4. Report Survey: “Knowledge, attitude, and practices related to maternal health services in South West Shoa Zone”

1. Preventivi

PREVENTIVI ATTREZZATURE INFORMATICHE

Attrezzature informatiche (computer, stabilizzatore e stampanti, fotocopiatrice)**Fornitore:** Jupiter Trading

BENE	COSTO UNITARIO ETB	COSTO UI	N°	TOT
Toshiba C50 A299 Laptop	10.000,00	383,14	2	766,2835
Toshiba Tecra Laptop	19.130,43	730,45	4	2921,792
Infosec stabilizer	963,00	36,77	6	220,6186
Hp Laser Jet printer	5.086,00	194,20	1	194,1963
Canon Copier	24.782,00	946,24	1	946,239
Canon Toner	2.173,91	83,01	15	1245,08
HP Laser Jet printer M401D	5.734,78	218,97	1	218,9683
		0,00		0
		0,00		0
				6513,177

cambio uic (12/2013)

1 € '= 26,19 ETB



Jupiter Trading Distributor of Office Equipments Parts & supplies



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Awassa Tel: +251 06 20 7459 Fax: +251 06 20 7460
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Proforma Invoice

To DOCTORS WITH AFRICA CUAMM
TIN No 0001125795 VAT No
Address
Ref.
Remark

Voucher No BPRO-000215-01
Date 01/22/2014
Cart
Store
Distribution

SN	Description	Qty	Unit	Unit Amount	Total
1	Toshiba C50-A299 Lapt Computer	1	PCS	10,000.00	10,000.00
2	Toshiba Tecra R950-C095 Laptop Computer	1	PCS	19,130.43	19,130.43

- Toshiba Tecra Laptop R950-C095
- Processor: Type: Intel® core™ i5 processor M3230
- Clock speed: 2.6GHZ
- Enhanced Intel® speed step® Technology
- High speed 3rd level Cache 3MB
- System Memory:
- Standard 4GB
- Maximum expandability: 8GB
- Technology DDR3 RAM (1,333 MHZ)
- Hard Disk: Drive rotation 5,400 RPM Capacity: 500 GB
- Camera Built in Web cam Camera and mic
- Removable Drive Type: DVD Super Multi (Double Layer) drive
- DVD±RW (DVD Writer + Reader / CD Writer + Reader)
- Display size 15.6"
- Type Toshiba Intel® HD Graphics family
- Internal resolution: 1,366 X 768
- Graphics Adapter: manufacturer Intel®
- Type Intel® HD Graphics 4000
- Interfaces: 1x DC-in 1x external monitor 1x e-SATA
- 1x external microphone 1x RJ-45 1x Dokin Station
- 1x headphone (stereo) 1x HDMI-out 1x Expansion Bus Connector
- 1x 6-in-1 Bridge Media slot (supports SDTM Card, Memory Stick®,
- Memory Stick ProTM, Multimedia Card TM, xD-Picture Card TM, SDTM IO)
- 2x USB 3.0
- 1x USB 2.0
- Expansion: 2 x memory slots
- Wireless Communication: Compliancy: Bluetooth Wi-Fi®
- Network Support: 802.11b/g integrated
- Wireless Technology: Wireless LAN
- Security Device finger print scanner
- Wired communication integrated 10/100/1000 network card
- 10BASE-T/100 BASE-TX
- Sound System: Supported audio format: 24-bit stereo
- Speakers: built-in stereo speakers

ERP System Made By CNET Software Technologies Plc, Addis Ababa Ethiopia

(www.cnetsoft.com)

Canon



TOSHIBA

OPTIMA

EPSON

TullyGenicom



VAT Registration No. 012633



TIN Registration No. 0000018932



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Proforma Invoice (Continued)

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TIN No 0001125795 VAT No
Address
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Remark

Voucher No BPRO-000215-01
Date 01/22/2014
Cart
Store
Distribution

SN	Description	Qty	Unit	Unit Amount	Total
	Manufacturer: Realtek Battery: Technology: lithium-ion Ac adapter: input voltage: autosensing AC adapter (100/240V) for worldwide usage Out put voltage 19V, output current 3.42A Pre loaded Software: Windows 8 OEM Professional 64bit Office 2010 (full package), AutoCAD 2007, Peachtree 2010 Adobe Photoshop CS Adobe Acrobat Reader 10 MacAfee Enterprise 8.8 edition Antivirus Encarta 2010 Nero 8 Power Geez 2010 Bag included				
3	Infosec R1 1200VA Stabilizer Genuine	1	PCS	963.00	963.00
4	Hp M401A Laser Jet Printer Printing Technology: laser printing Printed speed: 33ppm First page out: 8sec Print resolution: black best Up to 1200 x 1200 dpi Monthly duty cycle: 50,000pages Processor speed: 800MHZ Memory, standard: 256MB paper tray (s) : 2 paper handling, input: 250-SHEET input tray, 50 sheet multi-purpose tray paper handling, output: Up to 150 sheets, Up to 10 envelopes. Up to 75 sheets transparencies Media sizes: Letter, legal, executive, 8.5 x 13 in Operating system : Windows 7, Windows Vista, Windows XP Home, Windows Xp Professional, Windows xp Professional x64, windows Server 2003, Windows 2000 USB Cable: Included Documentation : Installation CD and manual Power Requirement : 220V /50Hz	1	PCS	5,086.96	5,086.96
5	Canon iR 2420 Copier Copy Size: Cassette A5-A3 stack bypass A5R-A3, Envelopes Print Resolution: 600x600dpi	1	PCS	24,782.61	24,782.61





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Proforma Invoice (Continued)

To DOCTORS WITH AFRICA CUAMM
TIN No 0001125795 VAT No
Address
Ref.
Remark

Voucher No BPRO-000215-01
Date 01/22/2014
Cart
Store
Distribution

SN	Description	Qty	Unit	Unit Amount	Total
	Print standard direct USB print Maximum Original Size (Format) A3 Copy speed (A4): 20ppm (black A4) (A3): 10ppm (black A3) First copy time: 7.9 seconds Multiple Copies/Prints: 1 to 99 prints Zoom: 25 to 400 % (in 1 % increment) Multi bypass tray capacity: 80 sheets Paper Drawer: 250 sheets Media types: plain paper, Transparencies, Stickers, Glossy photo paper, Matte photo paper, paper Weight Support: 64-128 g/m2 Cartridges Count: 1, Colors count: 1-ink, LCD Screen, LCD: Yes LCD Type: Monochrome Features, Interfaces: USB 2.0 Memory: 64 MB Warm up time: 13 Seconds OS Support: Windows, MAC OS Power Consumption Operational: 1550W Width: 24.4 inch (622 mm) Height: 22.7 inch (580 mm) Depth: 25 inch (638 mm) Weight: 87.3 lbs (39.6 kg)				
6	CanonC-EXV14 Toner Genuine	1	Pkt	2,173.91	2,173.91
7	Hp M401D Laser Jet Printer HP LaserJet pro M401D Black and White Printer Printing Technology: laser printing Printed speed: 35ppm First page out: 8sec Print resolution: black best Up to 1200 x 1200 dpi Monthly duty cycle: 50,000pages Processor speed: 800MHZ Memory, standard: 256MB Duplex: Standard paper tray (s): 2 paper handling, input: 250-SHEET input tray, 50 sheet multi-purpose tray	1	PCS	5,734.78	5,734.78



ERP System Made By CNET Software Technologies Plc, Addis Ababa Ethiopia

(www.cnetsoft.com)

Canon



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EPSON
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TollyCencom
AUTHORIZED DISTRIBUTOR

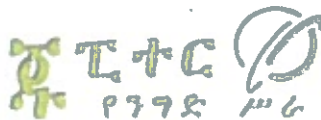
INFOSSEC
UPS SYSTEM
AUTHORIZED DEALER



VAT Registration No. 012633



TIN Registration No. 0000018932



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Proforma Invoice (Continued)

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TIN No 0001125795 VAT No
Address
Ref.
Remark

Voucher No BPRO-000215-01
Date 01/22/2014
Cart
Store
Distribution

SN	Description	Qty	Unit	Unit Amount	Total
	paper handling, output: Up to 150 sheets, Up to 10 envelopes, Up to 75 sheets tra				
	Media sizes: Letter, legal, executive, 8.5 x 13 in				
	Connectivity : 1 Hi-Speed USB 2.0; 1 Host USB; 1 Walk-up USB				
	Operating system : Windows 7 ,Windows Vista , Windows XP Home ,				
	Windows Xp Professional, Windows xp				
	Professional x64 ,windows Server 2003 , Windows 2000				
	USB Cable: Included				
	Documentation : Installation CD and manual				

Seventy Eight Thousand Fifty Two Birr And Fourty Four Cents Only

Sub Total	67,871.69
VAT (15%)	10,180.75
Grand Total	78,052.44

cambio : 1 € = 26,19 ETB
UIC 12/2013

Voucher Operators

1) Prepared By Hirutt On 1/22/2014



Toshiba Satellite Laptop C50-A299

Processor:

- Type: Intel® core™ i3 processor 3110M
- Clock speed: 2.4GHZ
- Enhanced Intel® speed step® Technology
- Front side bus 1333 MHZ
- High speed 3rd level Cache 3MB

System Memory

- Standard: 4GB
- Maximum expandability 8GB
- Technology DDR3 RAM (1.333 MHZ)

Hard Disk:

- Drive rotation 5,400 RPM Capacity: 500 GB
- Built in Web cam Camera and mic

Camera

Removable Drive:

- Type DVD Super Multi (Double Layer) drive
- DVD+/-RW (DVD Writer + Reader / CD Writer + Reader)

Display:

- Size: 15.6"
- Type Toshiba TruBrite® HD TFT
- Internal resolution 1366 X 768
- manufacturer Intel®

Graphics Adapter

- Type: Intel® HD Graphics 3000

Interfaces:

- 1x DC-in
- 1x external microphone
- 1x headphone (stereo)
- 1x USB 3.0
- 2x USB 2.0
- 2 x memory slots
- 1x external monitor
- 1x RJ-45
- 1x HDMI-out

Expansion:

Wireless Communication:

- Compliancy Wi-Fi®
- Network Support 802.11b/g integrated
- Wireless Technology: Wireless LAN

Wired communication

- Integrated 10/100/1000 network card
- 10BASE-T/100 BASE-TX
- Supported audio format 24-bit stereo
- Speakers built-in stereo speakers
- Manufacturer: Realtek
- Technology Lithium-ion

Sound System:

- input voltage: autosensing AC adapter (100/240V) for worldwide usage
- Out put voltage 19V, output current 3.42A

Battery:

Ac adapter:

- WINDOWS® 7 32bit
- Office 2007 (full package).
- AutoCAD 2007.
- Peachtree 2010
- Adobe Photoshop CS Adobe Acrobat Reader 10
- MacAfee Enterprise 8.8 edition Antivirus
- Encarta 2009
- Nero 8
- Power Gbez 2010
- Bag included

Pre loaded Software:





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jupiter@ethionet.et

- Price is subjected to change due to foreign currency fluctuation.

Terms and Conditions

- **Payment:** 100% after delivery.
- **Payment Mode:** cash or cheque to Jupiter Trading.
- **Price Validity:** 10 days
- **Delivery:** From Stock when quantity lasts.
- **Currency:** In Ethiopian Birr

After Sales Services

- One year warranty for manufacture defects.
- One year warranty for both the computer system unit and Monitor.
- Installing the machine (if you want our technician to install it)
- Basic and relevant trainings for your machine operators.
- Providing consumables, accessories and spares upon your request.

We trust you will find the above offers competitive for your requirements and we will look forward to receive your valued order.

Thank you again for your kind consideration.

Sincerely yours,



Canon



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TallyGenicom
AUTHORIZED DISTRIBUTION

SPINROSEC
UPS SYSTEM
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VAT Registration No. 012633



TIN Registration No. 0000018932

PREVENTIVO COSTRUZIONE CASA D'ATTESA E ARREDI



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A Bole Sub-city, Kebele 03, H.No 2409
Tin No.: 0000018110
Val Reg. No.: 010384

To: **Doctors with Africa CUAMM**
Addis Ababa Office

Performa Invoice No. 328 dated 22nd January 2014

Description	Unit	Unit Price	Total Price
- Construction cost of one mother waiting house to be built with local available materials in South West Shoa Zone Mad and wood walls Metal windows/doors Traditional ceiling Corrugated iron sheet roof and gutters Size - 520x700mt	Lump sum	19,975.00	19,975.00
- Standard VIP latrine 3Mx2.5M		3,825.00	3,825.00
- Traditional kitchen Size 3Mx3M		2,550.00	2,550.00
- Furniture (bedside cupboard, table, chair, soft furnishing		1,480.00	1,480.00
Overall Total Euro			27,830.00
VAT 15%			4,174.50
Overall Total Euro			32,004.50

26.3506
+ 15% VAT
= 30.3021

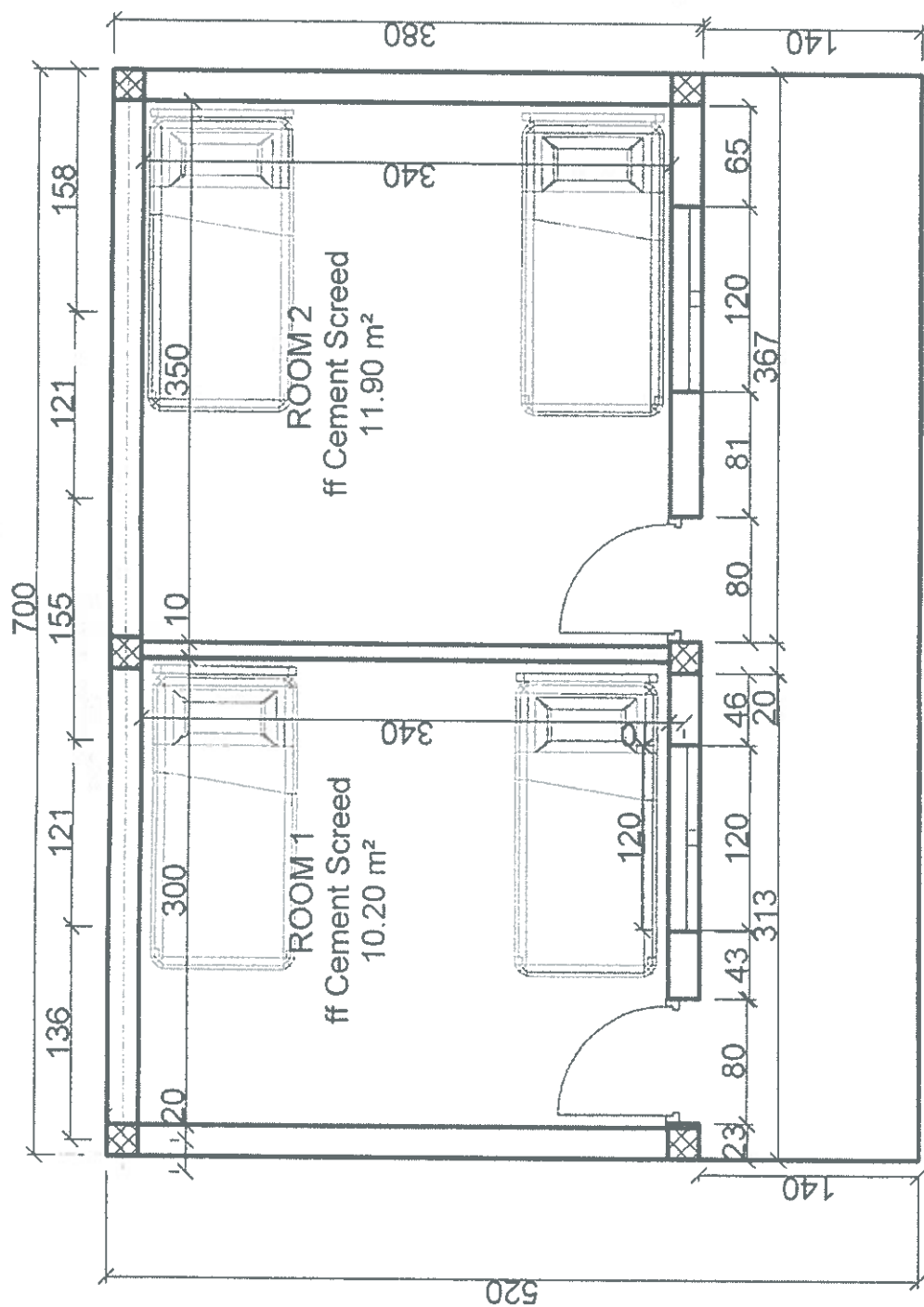
15%
+ VAT
= 1.702 €

Terms and Conditions

- **Payment:** 30% in advance and remaining based on work accomplishment
- **Delivery:** to be discussed according to the selected site
- **Offer validity:** 90 days



PRODUCED BY AN AUTODESK EDUCATIONAL PRODUCT



FLOOR PLAN MOTHER WAITING AREA

Scale 1:50

PRODUCED BY AN AUTODESK EDUCATIONAL PRODUCT

PREVENTIVO PANNELLI SOLARI

To: Doctors with Africa-CUAMM
Ethiopia

Date: 29/01/2014
Ref. No: SO.Q/008/14

Price Schedule for the Supply and Installation of 2.04kWp PV Generator

No.	Description	Total (€)
1	Supply of solar PV System Components This includes PV components and local installation accessories for one site	26,446.64
2	Transport Cost This includes the transport of material and technicians to the site.	1,552.68
3	Installation of the solar PV system This is installation of the solar PV system, providing training for the operators and staff members, handover, documentation and preventative maintenance service for one site.	7,000.71
Total Summary (€)		35,000.03

Selling Conditions

- (1) The prices offered are estimated prices and may vary based on the project implementation period.
- (2) Payment terms: 70% advance payment and 30% upon project completion and handover.
- (3) Validity of the offer: 1 month.
- (4) Delivery terms: For items that would be ordered, 12-13 weeks upon L/C approval.
- (5) The price offered is for a single site.

**MATERIALE SANITARIO DI CONSUMO PER OSPEDALE E
CENTRI DI SALUTE**

Materiale sanitario di consumo per ospedale e centri di salute

Se.N	Item	Unit Cost	Qt	Total Cost ET Birr	Total Cost + VAT 15% ET Birr	Total Cost Euro (exchange rate 26,19)	Supplier
1	Towel or cloth for newborn	87,6	0	0,00			Pharma Success
2	Blankets for cold weather	330,4	100	33.040,00	37.996,00	1.450,78	Pharma Success
3	Bed sheet (local)	470,4	100	47.040,00	54.096,00	2.065,52	Pharma Success
4	Gauze Bandage 5cmx5m mesh 28x24	24,5	140	3.430,00	3.944,50	150,61	Pharma Success
6	Cannula intravenous set 22 G	420,65	100	42.065,00	48.374,75	1.847,07	Pharma Success
7	Blood lancets, disposable sterile	56	200	11.200,00	12.880,00	491,79	Pharma Success
8	Surgical scalpel blade No.20	87,92	200	17.584,00	20.221,60	772,11	Pharma Success
9	Urine Bag poli venaly chlorid free product 1500ml	5,04	200	1.008,00	1.159,20	44,26	Labora
10	Absorbent cotton 100gm	7,9	200	1.580,00	1.817,00	69,38	Vital pharmaceuticals
11	Gauze Bandage 7.5cmx5m mesh 28x24	31,5	200	6.300,00	7.245,00	276,63	Vital pharmaceuticals
12	Catgut chromic gauge 2.0(4/0)75cm on 17-19 mm 1/2 circle cutting Needle	110	200	22.000,00	25.300,00	966,02	Vital pharmaceuticals
13	catgut chromic gauge 3.0 (3/0)75cm on 18 - 28 mm 1/2 circle round bodeid Needle	110	200	22.000,00	25.300,00	966,02	Vital pharmaceuticals
14	Disposable syring (sterile) 3 parts, 10ml with 21G Needle	134	200	26.800,00	30.820,00	1.176,79	Vital pharmaceuticals
15	Disposable syring (sterile) 3 parts, 3ml with 21G Needle	81	200	16.200,00	18.630,00	711,34	Vital pharmaceuticals
16	Disposable syring (sterile) 3 parts, 5ml with 21G Needle	79	200	15.800,00	18.170,00	693,78	Vital pharmaceuticals
16	Examination gloves Latex disposble Non-sterile medium size	74	150	11.100,00	12.765,00	487,40	Vital pharmaceuticals
18	Heavy duty Glove, Large size	55	150	8.250,00	9.487,50	362,26	Vital pharmaceuticals
19	Microscope slides, size 27x75mm, thicknes 1.2mm	27	200	5.400,00	6.210,00	237,11	Vital pharmaceuticals
20	Surgical Gloves sterile, altex No.7.5	229	100	22.900,00	26.335,00	1.005,54	Vital pharmaceuticals
21	Surgical Gloves sterile, altex No.7	229	100	22.900,00	26.335,00	1.005,54	Vital pharmaceuticals
22	Adhesive Plaster zink oxide 7.5cmx10m	19,1	200	3.820,00	4.393,00	167,74	Yusra
23	Gauze swab 10cmx10cm, 8 Plays (sterile)	64	100	6.400,00	7.360,00	281,02	Yusra
24	Catheter folley silconized latex sterile three wayes size 16 CH	13,2	100	1.320,00	1.518,00	57,96	Yusra
25	Catheter folley silconized latex sterile three wayes size 18 CH	13,2	100	1.320,00	1.518,00	57,96	Yusra
26	cover slide rectangular, size 22x22mm, thickness 1.13 mm	24,6	100	2.460,00	2.829,00	108,02	Yusra
27	Surgical scalpel blade No. 15	58,84	100	5.884,00	6.766,60	258,37	Yusra
28	Tongue depressor wooden (supplies)	34,16	100	3.416,00	3.928,40	150,00	Yusra
29	Uristics(dip stick for protine in urin)	175,00	150	26.250,00	30.187,50	1.152,63	Himed
30	Gauze surgical 90cmx100m mesh size 19x15	271,00	100	27.100,00	31.165,00	1.189,96	Himed
31	Cord ties	80,00	100	8.000,00	9.200,00	351,28	Himed
32	blood sugar tasting sticks	116,00	100	11.600,00	13.340,00	509,35	Nared
33	cannula interavenous set 18 G	345,00	100	34.500,00	39.675,00	1.514,89	Nared
34	Gauze bandage 12.5cmx5cmx10m	36,80	100	3.680,00	4.232,00	161,59	Medteach
35	Plastic sheeting	65,00	200	13.000,00	14.950,00	570,83	Etabs
				TOTALE/anno €		21.311,53	

ARREDI

EQUIPAGGIAMENTO BASE PER HCs

Equipaggiamento base per HC's							
Se.N	Item	Unit Cost	Qt	Total Cost ET Birr	Total Cost + VAT 15% ET Birr	Total Cost Euro (exchange rate 26,19)	Supplier
							Pharma Success
1	Flaxable Cannulae 4 mm	33,60	72	2.419,20	2.782,08	106,23	Pharma Success
2	Flaxable Cannulae 5 mm	33,60	72	2.419,20	2.782,08	106,23	Pharma Success
3	Flaxable Cannulae 6 mm	33,60	72	2.419,20	2.782,08	106,23	Pharma Success
4	Instrument tray	176,90	18	3.184,20	3.661,83	139,82	Pharma Success
5	BP apparatus	902,83	18	16.250,94	18.688,58	713,58	Pharma Success
6	Delivery set (pack)(s/s) stainless steel)	1.706,88	10	17.068,80	19.629,12	749,49	Pharma Success
7	Vacume aspirators syringes	470,40	18	8.467,20	9.737,28	371,79	Pharma Success
8	Vaginal spEculum (Hamilton Bailey)	340,00	18	6.120,00	7.038,00	268,73	Labora
9	Examination Table	1.550,00	10	15.500,00	17.825,00	680,60	Himed
10	Labour delivery table with stirrups	1.650,00	10	16.500,00	18.975,00	724,51	Himed
11	Dressing forceps	65	18	1.170,00	1.345,50	51,37	Himed
12	Vacum extractor with different size cups elec	5125	10	51.250,00	58.937,50	2.250,38	Yusra
13	Fetal sthetoscop wooden	115	18	2.070,00	2.380,50	90,89	Himed
14	Sponge bowls	95	18	1.710,00	1.966,50	75,09	Himed
15	IV Infusion stand local	360	18	6.480,00	7.452,00	284,54	Himed
16	Adult ventilator bag and mask	820	18	14.760,00	16.974,00	648,11	Himed
17	Plain thumbe forceps	45	18	810,00	931,50	35,57	Himed
18	Dressing forceps	65,00	18	1.170,00	1.345,50	51,37	Himed
19	Radiant warmer	12.500,00	10	125.000,00	143.750,00	5.488,74	Himed
20	Sponge forceps	110,00	18	1.980,00	2.277,00	86,94	Himed
21	Ventilation bag (for neonate)	750,00	18	13.500,00	15.525,00	592,78	Himed
22	Kidney basins Medium	65,00	18	1.170,00	1.345,50	51,37	Etabs
23	Kidney basins Small	50,00	18	900,00	1.035,00	39,52	Etabs
24	Arm Pit thermometer	22,00	18	396,00	455,40	17,39	Etabs
25	Baby weighing scale	585,00	18	10.530,00	12.109,50	462,37	Etabs
26	Vaginal speculum large(sims)	3.400,00	10	34.000,00	39.100,00	1.492,94	Etabs
27	Stethoscop (India)	120	18	2.160,00	2.484,00	94,85	Yusra
28	Stertcher (Imported)	1710	18	30.780,00	35.397,00	1.351,55	Yusra
29	Adult Weighg scale	1500	10	15.000,00	17.250,00	658,65	Yusra
30	Measuring Tape	4	18	72,00	82,80	3,16	Yusra
31	Mucus Extractor	25	18	450,00	517,50	19,76	Yusra
32	Infant face mask (size 0, 1, 2,)	120	18	2.160,00	2.484,00	94,85	Yusra
33	Needle Holder	66	18	1.188,00	1.366,20	52,16	Yusra
34	Stich scissor	83,9	18	1.510,20	1.736,73	66,31	Yusra
35	Dissecting forceps tootned	46,5	18	837,00	962,55	36,75	Yusra
				TOTALE per 18 HC's		18.064,61	

TOTALE per 18 HCs	18.064,61
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2. Lettere di adesione partner associati

Roma, 29 gennaio 2014
Prot. N. 593/14

Spett. CUAMM
Via S. Francesco, 126
35121 Padova
Attn. Dr. Dante Carraro

Oggetto: Disponibilità alla partecipazione al progetto *Mother and Child
Helt for all: rafforzamento dei servizi materno-neonatali-infantili nei
Distretti di Wolisso, Goro e Wonchi, Ethiopia.*

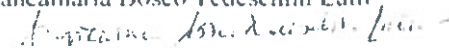
Con la presente il sottoscritto, Biancamaria Bosco Tedeschini Lalli, Presidente della
Fondazione Rita Levi-Montalcini Onlus

dichiara

- che intende collaborare come partner istituzionale associato con l'organizzazione Medici con l'Africa CUAMM di Padova nell'ambito della realizzazione del progetto *"Mother and Child Helt for all: rafforzamento dei servizi materno-neonatali-infantili nei Distretti di Wolisso, Goro e Wonchi, Ethiopia"* che sarà presentato al Ministero degli Affari Esteri, Direzione Generale per la Cooperazione allo Sviluppo, per approvazione e concessione del contributo.
- gli estremi di questa collaborazione saranno naturalmente negoziati successivamente.

Il Presidente

Biancamaria Bosco Tedeschini Lalli





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Università degli Studi di Siena

Dipartimento di Scienze Fisiche, della Terra e dell'Ambiente

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Prot 57/III/18

Siena 21 gennaio 2014

A chi di dovere

Oggetto: Disponibilità alla partecipazione al progetto *Mother and Child Health for all: rafforzamento dei servizi materno-neonatali-infantili nei Distretti di Wolisso, Goro e Wonchi, Ethiopia*.

A CHI DI COMPETENZA

Con la presente il sottoscritto, Prof. Mauro Coltorti, Direttore del Dipartimento di Scienze Fisiche, della Terra ed Ambientali dell'Università degli Studi di Siena,

dichiara

- che intende collaborare come partner scientifico con l'organizzazione Medici con l'Africa CUAMM di Padova nell'ambito della realizzazione del progetto *Mother and Child Health for all: rafforzamento dei servizi materno-neonatali-infantili nei Distretti di Wolisso, Goro e Wonchi, Ethiopia*, che sarà presentato al Ministero Affari Esteri, Direzione Generale per la Cooperazione allo Sviluppo, per approvazione e concessione del contributo.
- che nell'ambito del suddetto progetto il Laboratorio di Cartografia digitale e Sistemi Informativi Geografici (GIS) del nostro Dipartimento, coordinato dal Prof. Pier Lorenzo Fantozzi, contribuirà a realizzare le attività di analisi spaziale e cartografia numerica svolte mediante applicazioni GIS dei 3 Distretti con l'obiettivo di elaborare strumenti di valutazione e pianificazione dei servizi sanitari dei Distretti, con particolare riferimento ai servizi di assistenza al parto e alle emergenze ostetriche.

Siena, li. 21 gennaio 2014

Il Direttore del Dipartimento

Prof. Mauro Coltorti



3. Report Survey

“Emergency obstetrics and neonatal care needs assessment in Wolisso, Goro and Wonchi Woredas”



FREE ACCESS TO SAFE DELIVERY AND NEONATAL CARE

Emergency obstetrics and neonatal care needs assessment in Wolisso, Goro and Wonchi Woredas

August 2013

Final report

Acknowledgements

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Executive summary

Background information

Access to quality emergency obstetric (EmOC) services is thought to be the most effective way of reducing maternal mortality. Additionally, improving maternal health has direct effect on reduction in deaths among newborns and young children. With a maternal mortality ratio of 676, Ethiopia has one of the highest maternal mortality ratios worldwide. It is also among the 10 countries with the highest numbers of intrapartum-related neonatal deaths and intrapartum stillbirths. The national emergency obstetric and newborn (EmONC) needs assessment found the quality and availability of EmONC in Ethiopia to be well below recommended UN levels with none of the UN EmOC indicators being met. The 2011 Demographic and Health Survey shows that at the national level only 10% of deliveries are attended to by skilled providers, with only 1.5% of all deliveries being done by cesarean section.

This survey was conducted in order to provide baseline data for a project being implemented by the NGO doctors with Africa CAUMM that guarantees free access to safe delivery and neonatal care services in Goro, Wolisso and Wonchi Woredas of South West Shoa Zone, Oromiya region. The project runs from 2012 to 2016 and has three objectives; namely 1) to increase accessibility and utilisation of emergency obstetric and neonatal care, 2) to improve quality of maternal and newborn care and 3) to strengthen public-private partnership for maternal and newborn care.

The availability of EmONC measures the capacity of the health system to respond to direct obstetric and newborn complications, a critical pathway to reducing maternal and newborn mortality.

This assessment provides a baseline upon which future progress to strengthen the health system to provide basic and comprehensive EmOC and other maternal and neonatal services in Wolisso, Goro and Wonchi Woredas will be monitored and evaluated.

The **overall objective** of the assessment was to determine the existing capacity of health facilities, in Wolisso, Goro and Wonchi districts, to provide necessary life-saving care to pregnant women and their new-borns when complications occur.

Overview of study design

The assessment was a cross-sectional survey of selected health facilities providing childbirth services in Wolisso, Goro and Wonchi Woredas. A total of 8 facilities were assessed: 1 hospital and 7 health centres. Data collection tools were adapted from tools developed by AMDD.

Key findings

The Woredas had the minimum required number of comprehensive EmOC facilities but there was no basic EmOC facility. Consequently the Woredas had a gap for three basic EmOC centres. None of the health centres was performing assisted vaginal delivery or administering anticonvulsants for management of pre-eclampsia/eclampsia. The proportion of all birth in EmOC facility was 13.4% and the met need for EmOC was 17.1% against the recommended 100%. The population based caesarean section rate was 2.3% and the direct obstetric case fatality rate was 0.9%. Five maternal deaths were notified at the hospital and the proportion of maternal deaths due to indirect causes at the EmOC facility was 17%.

There was generally a high utilisation of maternity services at the hospital but an extremely low utilisation at the health centres. Each maternity staff at the hospital was attending to about 29 deliveries per month while each maternity staff at the health centre was attending to only 3 deliveries per month.

This study noted weaknesses in the referral system for maternal and newborn complications in the study area. The current referral system was found to be casual with no proper coordination between HCs and the hospital. Health centres were lacking pre-referral clinical management protocols and guidelines for obstetric and newborn complication. They also lacked protocols/guidelines to manage patient referred in from the health posts. Communication equipment for referral was missing at some health centres. All health centres were not documenting referrals.

The study also found a lack of some key equipment, supplies and drugs necessary for maternal and newborn care mainly at health centres. Knowledge gaps in maternal and newborn care, especially in the management of emergencies, were noted among nurses and midwives.

Conclusion

There is need to improve the availability, use and quality of maternal and neonatal health care in Goro, Wonchi and Wolisso but with a focus on health centres. The hospital has managed to maintain good standards despite the high demand for its services which is overstretching the available facilities and staff. There is need to upgrade three health centres to meet the recommended level of EmOC facilities per 500,000 population. This should be done alongside increasing the utilisation of institutional delivery services at the health centres by addressing demand side barriers to utilisation. A continuous medical education program for staffs to enable them to update their knowledge should be put in place. There is also need to work on strengthening the current referral system between the HCs and the hospital to ensure proper coordination and effectiveness.

Introduction

Background information

Almost all cases of maternal mortality are preventable. It is estimated that 74% of maternal deaths could be averted if women have access to interventions for preventing and treating pregnancy and birth complications, namely emergency obstetrics care (EmOC) [1]. Access to quality EmOC services is therefore thought to be the most effective way of reducing maternal mortality [2]. Additionally, improving maternal health has a huge bonus of direct reduction in deaths among newborns and young children [3].

With a maternal mortality ratio of 676 (95% CI: 541 to 810) per 100,000 live births,[4] Ethiopia has one of the highest maternal mortality ratios worldwide. The MMR has not significantly changed (confidence intervals overlap) since 2000 when it was 871 (95% CI 703 to 1,039) per 1000 live births. The high MMR puts Ethiopia among one of the 6 countries that contribute to more than 50% of all maternal deaths worldwide [5]. Most maternal deaths in Ethiopia (64%), as in other parts of Africa, are caused by direct obstetric complications namely: haemorrhage, sepsis, unsafe abortion, hypertensive disorders, and obstructed labour. Indirect causes account for 21% of all maternal deaths [6]. Ethiopia is also among the 10 countries with the highest numbers of intrapartum-related neonatal deaths and intrapartum stillbirths [7]. The country has a neonatal mortality rate 37 per 1000 live births, with little reduction since the year 2000 [4] and is one of the five countries that contribute to half of Africa's newborn deaths. The under 5 mortality rate, per 1000 live births, has almost halved since 2000 from 166 to 88 in 2011 [4].

The national emergency obstetric and newborn (EmONC) needs assessment found the quality and availability of EmONC in Ethiopia to be well below recommended UN levels [8]. In fact, none of the UN EmOC indicators was met. The survey showed that too few facilities were providing EmONC to meet the UN standards of 5 per 500 000 population. Only 7% of deliveries took place in institutions, and only 3% in facilities routinely provided all the EmOC signal functions. Only 6% of women with obstetric complications were treated in any health facility, half of whom were treated in fully functional EmONC facilities. A mere 0.6% of expected deliveries were by cesarean, and obstetric case fatality rate was 2%. The health system resources are scarce in Ethiopia, with total health expenditure per capita per year being around 16 US dollars [9]. The ratio of midwives per 5000 population is 0.08 [6], way below the WHO recommended ratio of 1/5000. The realization of government strategies aimed at reducing maternal and child mortality is often faced with gaps in implementation [10].

The 2011 Demographic and Health Survey shows that at the national level, only 33.9% of women receive any antenatal care from a skilled provider and only 10% of deliveries are attended to by skilled providers, with only 1.5% of all deliveries, being done by cesarean section [4].

Maternal and neonatal situation in Oromiya region

The coverage for delivery by skilled health personnel in Oromiya region is extremely low at 8.1% according to the latest DHS [4], although it has been estimated at 19% through routine data [9]. This

figure represent a significant increase from the 4.8% reported in the 2005 DHS survey.[11] Most women are assisted during delivery by relatives (52.3%) or traditional birth attendants (33.7%).

The main reasons why women don't deliver at health facilities include long distance/lack of transportation (18.2%), a feeling that it is not necessary (63.6%) and a perception that it is not customary (28.9%) [4]. Only 0.5% of deliveries in Oromiya are by Caesarean section [4].

The national EmONC needs assessment showed that the region had the following indicators: Availability of EmONC facilities per 500,000 population: 0.4, percent of births in EmONC facilities: 3%, met need for EmONC: about 3%, Caesarean section coverage: 0.4% and intrapartum and very early neonatal death rate: 5.2% [6].

A survey conducted by Doctors with Africa CUAMM in 2008 in South West Shoa Zone (SWSZ) of Oromiya region revealed a poor situation for most of the community health posts and health centres studied. Whereas the availability of drugs, supplies and equipment in outpatients was fair, obstetric care was poor in all its aspects: equipment availability and organization, service accessibility and quality. The number of monthly deliveries at health centres was less than 10 while the majority of the community health posts did not have the minimum requirements for carrying out obstetric care [12].

The survey concluded that inadequate and mal-distributed health infrastructure and human resources and poorly organized patients referral system seriously affected the access and utilization of the available health services in SWSZ especially by the most vulnerable groups [12].

Rationale for the assessment

This survey was conducted in order to provide baseline data for a project being implemented by the NGO doctors with Africa CAUMM that guarantees free access to safe delivery and neonatal care services at St. Luke's Catholic Hospital and selected peripheral health facilities in Goro, Wolisso and Wonchi Woredas (districts) of South West Shoa Zone. The project is part of a bigger 5 year project covering 4 districts in 4 countries and funded by Italian banks foundation. The project runs from 2012 to 2016.

The project has three objectives; namely 1) to increase accessibility and utilisation of emergency obstetric and neonatal care, 2) to improve quality of maternal and newborn care and 3) to strengthen public-private partnership for maternal and newborn care.

The project is meant to put in practice the existing evidence on safe motherhood focusing on emergency obstetric care. While concentrating primarily on hospitals for the provision of comprehensive emergency care, in selected cases it also tries to meet the challenges of effective implementation of EmOC services within the districts.

The availability of EmONC measures the capacity of the health system to respond to direct obstetric and newborn complications, a critical pathway to reducing maternal and newborn mortality. Although a national EmONC needs assessment involving a census of all facilities providing delivery care was done in 2008, the published report only has data disaggregated by region. Besides some changes might have taken place since that survey, hence the need to collect updated baseline data for this five year project.

The assessment provides a baseline upon which future progress to strengthen the health system to provide basic and comprehensive EmOC and other maternal and neonatal services in Wolisso, Goro and Wonchi Woredas will be monitored and evaluated.

Objectives

The **overall objective** of this assessment was to determine the existing capacity of health facilities, in Wolisso, Goro and Wonchi districts, to provide necessary life-saving care to pregnant women and their new-borns when complications occur.

The specific objectives of the assessment included:

- To measure the availability of infrastructure for EmONC;
- To establish a baseline for monitoring the availability, geographic distribution, level of utilization, and quality of EmONC (using the EmONC Indicators);
- To describe the policies regarding fees for obstetric services and facility level practices;
- To determine the availability of essential drugs, equipment, and supplies for EmONC;
- To determine the availability of health workers who perform the EmOC Signal Functions;
- To measure knowledge and competency levels of health workers regarding obstetric and new-born care
- To assess the functioning of the referral system
- To assess aspects of quality of delivery care by reviewing partographs

Materials and methods

Study area

This study was done in Wolisso, Goro and Wonchi Woredas (districts) of South West Shoa Zone (SWSZ), Oromiya region. The three Woredas have a combined population of about 372, 478 inhabitants. The Woredas are served by one hospital, 16 health centres, and, several community health posts. The hospital, which also serves as the main referral health facility for the entire zone, is private-non-profit and is located in Wolisso town; the capital of SWSZ. The hospital is supported financially by the ministry of health in the framework of private public partnership. All the HCs and health posts are owned by the government. One HC was under construction at the time of the survey and hence was not fully functional. In Ethiopia, delivery care services are usually provided at HCs and Hospitals.

Study design

This was a cross-sectional health facility assessment. Eight health centres and one hospital, which are supported by the project, were selected purposively for inclusion in the study. One HC, though supported by the project, was still under construction and was excluded from analysis.

Assessment of the providers' knowledge and competency in maternal and neonatal care was done for a maximum of 5 providers involved in maternal care at each facility. Typically, this included all maternity staff on duty on the day of survey. Service statistics for facilities over the previous consecutive twelve months (July 2011 to June 2012) were extracted from maternity registers. The items counted were vaginal and caesarean deliveries, direct and indirect obstetric complications and direct and indirect maternal deaths.

Partographs or deliveries which had taken place in the past one year (June 2011 to July 2012) were eligible for review. The sample size of partographs to be reviewed was calculated using the finite population sample size formula: $n = N / (1 + Ne^2)$ where n = required sample size, N = number of deliveries in the past one year and e = the acceptable error of precision, set at 0.05. The sample was then allocated to each facility in proportion to the total number of deliveries attended to at the facility. Partographs to be reviewed were systematically sampled at the hospital, but at the health centre, because of the low number of deliveries, all available partographs were reviewed.

Assessment tools

This assessment was done using the EmONC needs assessment modules developed by the Averting Maternal Death and Disability (AMDD) program of Columbia University (<http://www.amddprogram.org/d/>). The modules were locally adapted and pre-tested.

The following modules were used:

Module 1: Identification of Facility and Infrastructure through interviews, observation and taking GPS coordinates to: record general identifying information about the facility including GPS coordinates; gather general information about the facility's overall size and infrastructure in terms of management, availability of electricity and water, and services offered; identify the available and functioning means of transportation and communication at each facility; and to determine if, how, and when individuals pay for services at health facilities

Module 2: Human Resources to determine the staffing situation at the facility. This module collected information that was used to describe the available personnel, staff training, and services provided. Data will be collected through interviews.

Module 3: Essential Drugs, Equipment, and Supplies to evaluate the availability and functionality of the drugs, equipment, and supplies necessary for the delivery of EmONC services. Data were collected through interviews and observations.

Module 4: Facility Case Summary to collect the data necessary to calculate the EmONC Indicators and other important indicators and to assess the completeness and quality of data used to calculate the indicators. These data were extracted from registers, log books or reports.

Module 5: EmOC Signal Functions and Other Essential Services to gather information about how facilities actually function and whether they provide all, some, or none of the EmOC Signal Functions as well as other important maternal health services. Data for this module were collected through interviews, review of registers, and observation.

Module 6: Partograph Review to assess the quality of partograph completion in the facility and to know how many facilities are using the WHO partographs (modified, simplified, and composite). Data were extracted from partographs and individual patient notes.

Module 7: Provider Knowledge and Competency for Maternal and Newborn Care to evaluate aspects of providers' knowledge and competency. Data were collected through interviews.

Module 11: Referral system to collect information on referral for obstetric, newborn and other patients, management & policies on patients referred, and communication and transport capability of health facilities.

Data collection and organization of field work

Data collectors received a 2 days training. The training included an overview of the project and the survey objectives, background information on EmONC, standard interviewer techniques and a detailed understanding of how the modules are to be completed. Data collectors also had time review the tools in small groups and to conduct mock exercises in completing the tools.

The data collectors consisted of staff from the participating Woreda health departments and St. Luke's Hospital. Data collectors spent one day at each health centre and about 2 days at the hospital.

CUAMM's Public Health Advisor based in Addis Ababa and the Project Manager based in Wolisso were responsible for overall coordination of field work and data collection. Technical support for the implementation of the study was provided by the M&E Officer from CUAMM's head office in Italy.

Data management and analysis

Data were entered using EpidData 3.1. Each module had a separate data entry file. Data were then exported to STATA v.11 (StataCorp, College Station, Texas USA) for cleaning and analysis. Analysis was limited to descriptive statistics. Service statistics were used to calculate the following EmOC indicators by following standard UN guidelines [13]:

- Availability of EmOC: basic and comprehensive care facilities

- Proportion of all births in EmOC facilities
- Met need for EmOC
- Caesarean sections as a proportion of all births
- Direct obstetric case fatality rate
- Intrapartum and very early neonatal death rate
- Proportion of maternal deaths due to direct causes in EmOC facilities

Mapinfo software was used to map the availability and spatial distribution of health facilities.

Ethical issues

The study protocol was approved by the Oromia regional institutional review committee. This study does not raise serious ethical issues as most of the data were collected through reviewing routine data and asking questions regarding the availability of equipment, drugs and supplies. Staffs who were interviewed provided verbal informed consent.

Results

1. EmOC indicators

1.1. Indicator 1: Availability of EmOC Services

Availability of EmOC services was assessed based on the performance, by health facilities, of the nine EmOC signal functions. If a health facility provided the first seven signal functions in the last three months, it qualified as a basic EmOC facility and if it performed all the nine signal functions in the last three months, it qualified as a comprehensive EmOC facility. Facilities which were missing any of the first seven signal functions have been called 'partially functioning' as far as providing EmOC is concerned.

Based on the definition of signal function performance in the last three months, only the hospital was determined to be a fully functioning comprehensive EmOC facility (Table 1). One HC which was still under construction and not yet performing deliveries was excluded from the analysis. None of the HCs qualified as basic EmOC facilities.

Availability of EmOC services was also calculated based on the performance of the signal functions in the 12 month period prior to the survey. Based on this period, again no HC qualified a basic EmOC facility (Table 1.1).

The maximum number of signal functions performed by HCs was 4, and these were performed by 2 HCS. One HC had not performed any signal function in the past 3 months. Assisted vaginal delivery and administration of anticonvulsants were the most frequently missing signal functions with both of them lacking at all HCs surveyed (Table 1.2). Only the hospital performed blood transfusion and caesarean sections.

The minimum acceptable number of comprehensive EmOC facilities is determined by dividing the population by 500,000, and that number multiplied by 5 is the minimum acceptable number of basic and comprehensive facilities.

Using this information and the projected population of the Woredas (Wolisso, Wonchi and Goro); estimated to be 372, 478 based on census projection, there was 1 comprehensive EmOC facility and no basic EmOC facility per 500,000 population in the 3 Woredas based on signal function performance in the past 3 months. The required number of EmONC facilities for this population is 4, with 3 of them providing basic EmOC. There is therefore a gap of 3 basic EmOC facilities in these three Woredas.

Table 1.1: Availability of EmONC based on signal function performance in the preceding 3 and 12 months, by type of facility

Facility type	Three months prior to survey			Twelve months prior to survey			Total
	cEmONC facility	bEmOC facility	Partially functioning	cEmONC facility	bEmOC facility	Partially functioning	
Hospital	1	0	0	1	0	0	1
HC	0	0	7	0	0	7	7
Total	1	0	7	1	0	7	8

Table 1.2: Type of signal functions performed in the past 3 months

Signal function performed in past 3 months	Number of facilities		Total
	Hospital	HC	
Oxytocics administered parenterally	1	6	7
Manual removal of placenta	1	4	5
Neonatal resuscitation with bag and mask	1	4	5
Antibiotics administered parenterally	1	2	3
Removal of retained products	1	1	2
Assisted vaginal delivery performed	1	0	1
Anticonvulsants administered parenterally	1	0	1
Blood transfusion	1	--	1
Caesarean section	1	--	1
Total number of facilities	1	7	8

1.1.1. Choices regarding drugs and equipment in relation to the signal functions

Regarding the type of oxytocic administered in the past 3 months, the hospital and two health centres had administered both oxytocin and ergometrine while 4 HCs had administered only oxytocin.

Only the hospital had administered anticonvulsants in the past 3 months and magnesium sulphate had been used.

Removal of retained products had been done in the past 3 months only at one hospital and one HC. Staff at these facilities had used manual vacuum aspiration (MVA). Other methods of removal of retained products had not been used.

Only the hospital had performed instrumental vaginal delivery in the past 3 months. Staff at this facility had used vacuum extraction which is generally considered to be a safer technique.

1.1.2. Reasons for not performing signal functions

At health facilities where staff reported that the signal function was not performed in the last 3 months, they were asked why it was not performed. More than one reason for non-performance was allowed. Lack of an indication was the most common reason why most facilities had not performed signal functions, followed by lack of supplies/equipment and training issues (Table 1.3).

Administration of oxytocics and neonatal resuscitation had not been performed by one HC due to lack of an indication. Three and five HC had, respectively, not performed manual removal of a placenta and removal of retained products, for the same reason. Training issues were mentioned for not removing retained products (2/8 facilities), not performing assisted vaginal delivery (3/8 facilities) and not administering parenteral anticonvulsants (2/8 facilities). Lack of supplies/equipment was mentioned as a reason for not removing retained products (1 facility), not performing assisted vaginal delivery (4/8 facilities) and not administering parenteral anticonvulsants (4/8 facilities).

Table 1.3: Number of facilities that provided the signal functions in the last 3 and 12 months and reasons for not providing, by function

Signal function	No. of facilities that performed in the last:		No. of facilities that did not perform in last 3 mon.	Number of facilities that responded that the function was not performed in last 3 months due to:					
	12 mon.	3 mon.		Availability of HR	Training issues	Supplies/equip.	Management issues	Policy issues	No indication
Parenterally Oxytocics	8	7	1	0	0	0	0	0	1
Manual removal of placenta	7	5	3	0	0	0	0	0	3
Neonatal resuscitation	7	5	3	0	0	0	0	0	1
Parenteral antibiotics	4	3	5	0	0	0	0	0	5
Removal of retained products	2	2	6	0	2	1	0	0	5
Assisted vaginal delivery	2	1	7	1	3	4	1	1	4
Parenteral anticonvulsants	1	1	7	1	2	4	0	0	6
Blood transfusion*	1	1	0	-	-	-	-	-	-
Caesarean section*	1	1	0	-	-	-	-	-	-

*only for the hospital

1.2. Indicator 2: Geographic distribution of EmOC facilities

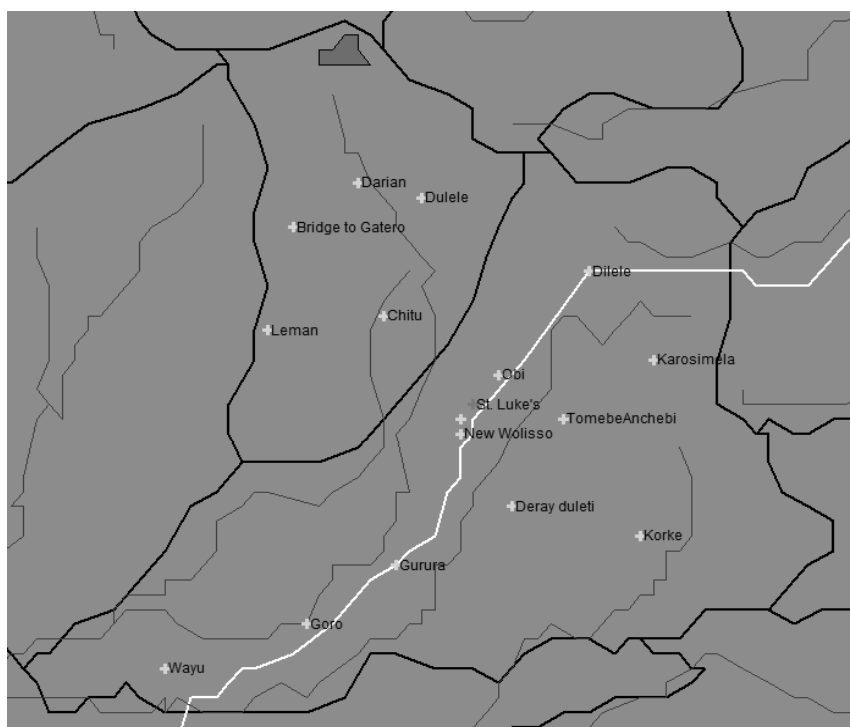


Fig: A map of the distribution of facilities in Goro, wonchi and Wolisso Woredas. (Rivers are in blue and the road is white. Goro and Wolisso Woredas are combined-old data).

1.3. Indicator 3: Proportion of all births in EmOC facilities

The population of Wolisso, Goro and Wonchi Woredas is 372,533. The expected number of births in these Woredas is 13,895. There were 3,272 deliveries in the study health facilities. Out of these, 2900 were conducted at the hospital. Routine data shows that among deliveries done at the hospital, only 64.4% come from these three Woredas. The estimated number of women who delivered at the hospital from these three Woredas is therefore 1868. The percentage of births attended in the EmOC facility can be estimated at 13.4% (1868/13895) as shown in **Table 1.4**. It is also worth noting that, among the facilities surveyed 89% of all the deliveries were conducted by the hospital. Over a 12 month period July 2011-June 2012), the busiest HC conducted 93 deliveries while the least busy conducted only one delivery.

Table 1.4: Percentage of births attended in EmONC facilities

Population of Goro, Wonchi and Wolisso	Expected number of births (CBR*pop) ¹	Number of births at EmOC facility	Number of births from the study Woredas at EmOC facility ²	Percent of expected births at EmOC facility
372533	13,895	2900	1868	13.4%

¹CBR = 37.3 per 1000 population. Source: Health and Health Related Indicators (Table 4.2 Vital Statistics 2000) based on CSA 2000 Statistical Abstract

²64.4% of births at the facility

1.4. Indicator 4: Met need for EmOC services

Of the 13,895 expected live births in Goro, Wonchi and Wolisso Woredas, 15% (2084) are expected to develop major direct obstetric complications. In this assessment the direct obstetrics complications considered were: antepartum and postpartum haemorrhage/ retained placenta, postpartum sepsis, severe pre-eclampsia and eclampsia, prolonged or obstructed labour, ruptured uterus, complications from abortion, and ectopic pregnancy. There were 553 cases of direct obstetric complications treated at the hospital (EmOC facility) and only 21 at the health centres (non-EmOC facilities). Data were not collected on which district women treated for complications at the EmOC facility came from, but about 64.4% of deliveries at the hospital are from the study Woredas, and hence it is reasonable to estimate that 356 of the complications treated at the hospital were from the study Woredas. All the complications treated at the health centres are more likely to be from the study Woredas. The met need for EmOC in these Woredas is therefore 17.1% (356/2084) and the percentage of women with direct obstetric complications treated in all the surveyed facilities is 18.1% [(356+21)/2084] and shown in **Table 1.5**.

Table 1.5: Percentage of women with expected major direct obstetric complications from study Woredas treated in all facilities and EmONC facilities

	Expected births ¹	Expected complications ²	All Facilities		EmOC Facility	
			No. of women with direct complications treated in facility	Met need	No. of women with direct complications treated in facility	Met need
Goro, Wonchi, Wolisso	13,895	2,084	377	18.1%	356	17.1%

¹Expected births are calculated as (population) * (crude birth rate)

²Expected complications are calculated as 15% of the number of expected births

Frequency of major obstetric complications

There were 574 major direct obstetric complications and only 18 indirect complications treated at all facilities (**Table 1.6**). The number of indirect complications might have been underestimated due to incompleteness of recording. Among direct complications, obstructed/prolonged labour (45.3%) was the most common followed by postpartum haemorrhage/retained placenta (17.4%) and severe preeclampsia (11%). These three accounted for 74% of major direct obstetric complications. Data on indirect obstetric complications were scarce and only 18 indirect complications were counted, almost all of them (17/18) being due to malaria.

Table 6 further shows that there were 6 maternal deaths; 5 due to direct complications and 1 due to an indirect complication. Raptured uterus was responsible for 4 out of the 5 direct complications while HIV/AIDS was responsible for the indirect death.

Table 1.6: Numeric and percent distribution of direct and indirect complications and maternal deaths

	Women with complications n	Women with complications %	Maternal deaths n	Maternal deaths %
Total DIRECT complications	574			100
APH	47	8.2	0	0
PPH/retained placenta	100	17.4	0	0
Obstructed/prolonged labour	260	45.3	0	0
Raptured uterus	35	6.1	4	75
Postpartum sepsis	22	3.8	1	25
Severe pre-eclampsia/eclampsia	63	11.0	0	0
Severe complications of abortion	23	4.0	0	0
Ectopic pregnancy	24	4.2	0	0
Total INDIRECT complications	18			100
Malaria	17	100	0	0
HIV/AIDS – related	1	0	1	100
Anaemia	0	0	0	0
Others	0	0	0	0

1.5. Indicator 5: Caesarean sections as a proportion of all births

The minimum recommended caesarean section (CS) rate for foetal and maternal indications is 5% while the maximum is 15%. Only the hospital was performing CSs. There were 489 CSs conducted from July 2011 through June 2012 (out of 3244 deliveries at the hospital). The institutional CS rate was 15.1%. Since the hospital is a referral facility for the entire zone, not all these deliveries were from Goro, Wonchi and Wolisso Woredas. Routine data shows that 64.4% deliveries at the hospital are from these three Woredas hence it can be estimated that 315 women who had CS delivery were from these Woredas. The number of expected deliveries in the three Woredas is 13,895 and therefore the population based CS rate is 2.3% as worked out in **Table 1.7** below.

Table 1.7: An estimation caesarean sections as a proportion of all births

Population of Goro, Wonchi and Wolisso Woredas	Expected number of births (CBR*pop) ¹	Number of CS deliveries at the hospital	Number of CS deliveries from Goro, Wonchi and Wolisso Woredas ²	Population based CS rate (%)
372478	13,895	489	315	2.3

¹ CBR = 37.3 per 1000 population. Source: Health and Health Related Indicators (Table 4.2 Vital Statistics 2000) based on CSA 2000 Statistical Abstract

² 64.4% of the CS deliveries at the hospital

1.6. Indicator 6: Direct obstetric case fatality rate

From July 2011 to June 2012, 5 maternal deaths due to direct obstetrics complications were recorded at the health facilities surveyed. All these deaths occurred at the hospital. Four of the deaths were due to ruptured uterus while 1 was due to postpartum sepsis. A total of 553 major direct obstetric cases were treated at the hospital.

Direct obstetric case fatality rate (DOCFR) is an indicator of quality of EmOC services at the facility. This indicator should not exceed 1%. The indicator is calculated as the proportion of women with direct obstetric complications in facilities who die before discharge. The DOCFR is therefore 0.9% (5/1041).

Cause specific case fatality rates

Using information in Table 6 above, the cause specific mortality rates at EmOC facility were 11.4% (4/35) for ruptured uterus and 4.5% (1/22) for postpartum sepsis.

1.7. Indicator 7: Intrapartum and very early neonatal death rates

Intrapartum and very early neonatal death rate measures the quality of intrapartum and newborn care. There is no internationally acceptable maximum benchmark for this indicator.

Since the objective of this indicator is to measure the quality of intrapartum and newborn care, newborns <2.5 kg are usually excluded from the numerator, as low birth weight infants have a high fatality rate in most circumstances. Neonates recorded as macerated stillbirths and those with missing weights were excluded from the calculation of this indicator.

This indicator was 1.03% at the EmOC facility, 0.54% at the health centres and 0.98% for all the facilities (**Table 1.8**). There is high probability that the number of very early neonatal deaths have been underestimated since women stay at the health facility, on average, for 6 hours after delivery. Not all deaths which might have occurred within the very early neonatal period, i.e. within the first 24 hours after delivery, can be ascertained.

Table 1.8: Still births and very early neonatal deaths

	Hospital (EmOC)	Health centre (non-EmOC)	Total
a. Number of deliveries	2900	372	3272
c. Fresh still births <2.5 kg	8	1	9
d. Fresh still births >2.5 kg	24	2	26
e. Still births, no weight or timing of death	3	2	5
f. Very early neonatal death >2.5 kg	6	0	6
g. Very early neonatal death <2.5 kg	5	0	5
h. Very early neonatal deaths, no birth weight	0	0	0
i. Stillbirths + very early neonatal deaths >2.5kg (d+f)	30	2	32
j. Fresh Still birth rate ^a	0.83%	0.54%	0.79%
k. Very early neonatal death rate ^b	0.21%	0.0%	0.18%
Intrapartum and very early neonatal death rate*	1.03%	0.54%	0.98%

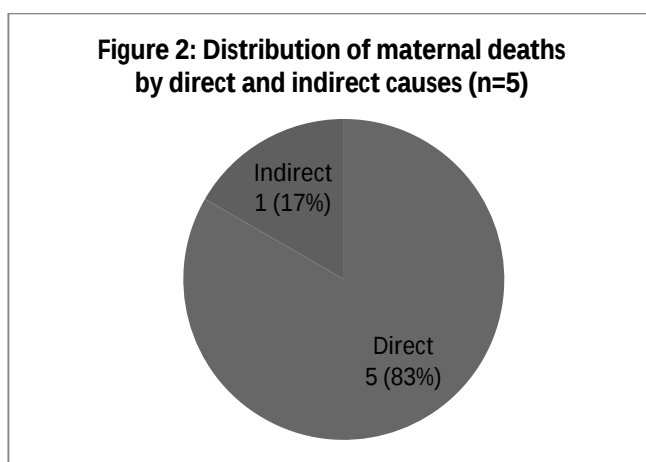
^a [(d)/a] *100

^b (f/a)*100

*[(i /a) x 100

1.8. Indicator 8: Proportion of maternal deaths due to indirect causes

Indirect causes of death result from previous existing disease or disease that developed during pregnancy and which was not due to direct obstetric causes, but which was aggravated by the physiologic effects of pregnancy. These diseases include malaria, HIV/AIDS, anaemia, hepatitis among others. The indicator does not have a recommended level but it highlights the larger social and medical context and has implications for intervention strategies, especially in addition to emergency obstetric care, that target the major indirect causes that kill many women of reproductive age. There were 6 maternal deaths, out of which 1 was due to indirect causes. The proportion of maternal deaths due to indirect causes was therefore 17% (Figure 2).



1.9. A summary of the EmOC indicators

Table 1.9: Indicators of emergency obstetric and neonatal care in Goro, Wolisso and Wonchi

Indicator	Acceptable level	Actual level
1a: Number of comprehensive EmOC facilities	1	1
1b: Number of basic EmOC facilities	3	0
3: Proportion of all births in EmOC facilities	To be set locally	13.4%
4: Met need for EmOC services	100%	17.1%
5: Caesarean sections as a proportion of all births	5-15%	2.3%
6: Direct obstetric case fatality rate in EmOC facility	≤1%	0.9%
7: Intrapartum and very early neonatal death rate in EmOC facility	None set	1.03%
8: Proportion of maternal deaths due to indirect causes in EmOC facility	Cannot be set	17%

1.10. Other maternal and neonatal health related services

Only 6 out of 8 facilities had used a partograph to manage labour; one facility had performed a breech delivery; seven had performed rapid HIV testing; and six had performed an episiotomy, in the past 3 months. Details on performance of other services and why the services had not been performed are summarised in **Table 1.10** below. Lack of an indication was the most frequently mentioned reason for not performing the functions.

Table 1.10: The number of facilities that performed essential services in the last three months and the reasons for not performing among those that did not perform

Service	No. of facilities that performed in the last 3 months (n=8)	Number of facilities that responded that the function was not performed in last 3 months due to:					
		Availability of HR	Training issues	Supplies/ equip.	Management issues	Policy issues	No indication
Partograph used to manage labour	6	0	0	0	0	0	2
Breech delivery performed	1	0	3	0	0	0	6
Rapid HIV testing in maternity/labour ward	7	0	0	0	0	0	1
ARV given to mothers in maternity/labour ward	4	0	0	2	0	0	4
ARV given to new-borns in maternity/labour ward	4	0	2	0	0	0	4
Episiotomy	6	0	0	0	0	0	2
Temporary family planning	7	0	0	0	0	1	0
Surgical method of permanent contraception	1	4	5	5	1	5	1

1.11. Training in family planning methods

Seven health centres had staff trained to insert and remove implant while four had a staff that is trained to insert and remove IUD. No health centre had a staff who could do tubal ligation, vasectomy or repair of fistula. Seven HCs were providing contraception to post abortion women.

2. Human Resources for EMONC

This chapter provides information on:

1. Overall staffing situation in health facilities surveyed;
2. Staff who provide EmONC signal functions and other essential services
3. Availability of 24 hour services in facilities by cadres and by types of health facilities

2.1. Overall staffing situation and attrition at the health facilities surveyed

The availability of adequate number of trained health providers is central to the provision of quality health care, especially to provision of EmONC services.

Table 2.1 shows the general staffing situation of health workers at the surveyed facilities. There was 1 obstetrician/gynaecologist, 1 paediatrician and 1 nurse anaesthetist working at the hospital. Additionally, the hospital had 1 general doctor, 3 general surgeons, 14 health officers 3 midwives and 113 nurses. There were 10 health officers, 12 midwives and 44 nurses working at the 7 health centres. Only 4 (57%) of health centres had at least two midwives and one health officer currently working.

Table 2.1 further shows that more nurses, midwives and health officers were being posted than any other cadres. For the nurses the hospital was the greatest beneficiary while for midwives the health centres were the greatest beneficiaries. The hospital had a net gain of 17 nurses and 3 health officers in the past 12 months but a net loss of nurse anaesthetists and a general doctor. There were no net losses at the health centres, but the gains were minimal.

Table 2.1: Total number of health workers currently working, who left and who were posted in the last 12 months, by type of facility and cadre of health worker

Health worker cadre	Hospitals (n=1)				Health Centres (n=7)			
	In the last 12 months:				In the last 12 months:			
	Currently working	staff left	staff posted	net gain (loss)	Currently working	staff left	staff posted	net gain (loss)
Obst./Gyne.	1	0	0	0	N.A	N.A	N.A	N.A
Paediatrician	1	0	0	0	N.A	N.A	N.A	N.A
General doctor	1	1	0	-1	N.A	N.A	N.A	N.A
General surgeon	3	0	0	0	N.A	N.A	N.A	N.A
Health officer	14	1	4	3	10	2	2	0
Midwife	3	0	1	1	12	5	6	1
Nurse, B.Sc.	2	1	0	-1	7	0	1	1
Nurse, diploma	111	36	54	18	37	4	5	1
Pharmacist/druggist	6	1	1	0	8	2	3	1
Nurse anaesthetist	1	3	1	-2	N.A	N.A	N.A	N.A
Laboratory technician	9	1	1	0	10	6	7	1

2.2. Human resource gaps in facilities surveyed

There were gaps in human resources both at the hospital and at the HCs. Based on the national staffing levels for a hospital with 200 beds, the hospital had a shortage of 2 obstetricians/gynaecologists, 2 paediatricians and 10 general medical practitioners. It also had a shortage of 4 midwives (**Table 2.2**). The minimum staffing level for nurses was however exceeded. Based on

staffing levels for health centres, the 7 health centres surveyed had a combined shortage of 5 nurses, 2 midwives and 11 HOs.

Table 2.2: Human resource standards, gaps, and number of facilities with minimum required selected human resources, by cadre and facility type

	HR standards (minimum no. of staffs required)		Number currently working		Gap (absolute numbers)	
	Hospital*	Health centres†	Hospital	Health centres	Hospital	Health centres
Obstetrician/Gyne.	3	N/A	1	-	-2	-
Paediatrician	3	N/A	1	-	-2	-
General Doctor	12	N/A	1	-	-10	-
Nurses (diploma/degree)	51	49	113	44	62	-5
Midwives	7	14	3	12	-4	-2
Health officers	N/A	21	14	10	-	-11

*minimum number required for a 200-bed hospital

†minimum number required for 7 health centres

2.3. Availability of 24 hour services in facilities by cadres and by types of health facilities

Availability of maternity services 24 hours a day and 7 days a week is necessary in order to ensure access to safe delivery and elimination of the 3rd delay. Therefore, there must be staff on site at all times to provide routine care and where indicated manage complications and refer to higher levels of care. This section describes the availability (on site or on call) of different cadres of providers over a 24-hour period. On site referred to the presence of the health worker on duty. On call meant the health workers were not on duty and had to be contacted.

Table 2.3 shows the 24 hour availability of health workers by cadre and work shifts. At the hospital, at least one member of all the considered cadres was on duty from Monday to Friday during the day. At least one member of the medical cadres was on call at night, and during weekends.

At the HCs, at least one member of the cadres considered was present on site from Monday to Friday during the day; except at one health centre which did not have a health officer. At least one midwife and one nurse were on site on a 24 hour basis at all the HCs.

2.4. Performance of signal functions and other selected essential services

Performance of EmONC signal functions by various staff cadres is as shown in **Table 2.4**. At HCs, no staff was administering anticonvulsants or conducting assisted vaginal delivery. It was only at one HC that a Hos performed dilatation or evacuation and curettage and at another HC that a midwife performed MVA. There are other essential services, besides the performance of signal functions that should be provided to mothers and their newborns to contribute towards making pregnancy and delivery safe for both the mother and the newborn. **Table 2.5** shows the number of health facilities that provide other essential services or procedures, by health worker cadre.

Table 2.3: Number of hospitals and health centers with health workers present on-site and on call during the week and during weekends, by health worker cadre

HOSPITALS (n=1)	Number of hospitals with cadre present	Mon-Fri daytime			Mon-Fri night			Sat-Sun day			Sat-Sun night		
		On-site		Total	On-site		Total	On-site		Total	On-site		Total
		n	n		n	n		n	n		n	n	
Health worker cadre													
Obstetrician/Gynecologist	1	1	0	1	0	1	1	1	0	1	0	1	1
Pediatrician	1	1	0	1	0	1	1	1	0	1	0	1	1
Medical doctor	1	1	0	1	0	1	1	1	0	1	0	1	1
General surgeon	1	1	0	1	0	1	1	1	0	1	0	1	1
Health officer	1	1	0	1	1	0	1	1	0	0	1	0	0
Midwife	1	1	0	1	1	0	1	1	0	1	1	0	1
Nurse, B.Sc.	1	1	0	1	0	0	0	0	0	0	0	0	0
Nurse, diploma	1	1	0	1	1	0	1	1	0	1	1	0	1
Pharmacist/druggist	1	1	0	1	0	0	0	1	0	1	0	0	0
Nurse anaesthetist	1	1	0	1	1	0	1	1	0	1	1	0	1
Laboratory technician	1	1	0	1	0	1	1	0	1	1	0	1	0
HEALTH CENTERS (n=7)													
Health worker cadre													
Health officer	7	6	0	6	1	4	5	2	4	6	1	4	5
Midwife	7	7	0	7	7	0	7	7	0	7	7	0	7
Nurse, B.Sc.	7	7	0	7	4	3	7	6	1	7	4	3	7
Nurse, diploma	7	7	0	7	7	0	7	7	0	7	7	0	7
Pharmacist/druggist	7	7	0	7	5	2	7	5	2	7	4	3	7
Laboratory technician	7	7	0	7	2	5	7	4	3	7	1	6	7

Table 2.4: Number of hospitals and health centers that provide EmONC signal functions, by health worker cadre

	Parenteral Drugs					Procedures					
	Facilities cadre present	Antibiotics	Oxytocics	Anti- convulsants	Manual removal of placenta	Removal of retained products		Assisted vaginal delivery	Neonatal resuscitation	Blood transfusion	Caesarean delivery
		n	n	n		n	MVA				
HOSPITALS (n=1)											
H. worker cadre											
Obste./Gynae.	1	1	1	1	1	1	1	1	1	1	1
Paediatrician	1	1	0	0	0	0	0	0	1	0	0
Medical doctor	1	1	1	1	1	1	1	1	1	1	1
General surgeon	1	0	1	1	1	1	1	1	0	0	1
Health officer	1	1	1	1	1	1	1	1	1	1	0
Midwife	1	1	1	1	1	1	1	1	1	1	0
Nurse, B.Sc.	1	1	0	0	0	1	1	1	1	1	0
Nurse, diploma	1	1	1	1	1	1	1	1	1	1	0

	Parenteral Drugs					Procedures					
	Facilities cadre present	Antibiotics	Oxytocics	Anti- convulsants	Manual removal of placenta	Removal of retained products		Assisted vaginal delivery	Neonatal resuscitation	Blood transfusion	Caesarean delivery
		n	n	n		n	MVA				
HEALTH CENTERS (n=7)											
H. worker cadre											
Health officer	6	2	4	0	4	0	1	0	5	n.a	n.a
Midwife	7	3	7	0	6	1	0	0	6	n.a	n.a
Nurse, B.Sc.	7	3	7	0	4	0	0	0	6	n.a	n.a
Nurse, diploma	7	3	7	0	4	0	0	0	5	n.a	n.a

Table 2.5: Number of hospitals and health centers that provide other essential services or procedures, by health worker cadre

HOSPITALS (n=1)	Normal delivery		Breech delivery		Partograph management		Immediate newborn care		Focused ANC		FP counseling		Temporary FP methods		Surgical FP methods		PMTCT		Uterotonic drugs by other routes		Newborn blood transfusion	
	n		n		n		n		n		n		n		n		n		n		n	
Health worker cadre																						
Obstetrician/Gynaecologist	1		1		0		1		1		0		0		1		0		1		1	
Paediatrician	0		0		0		1		0		0		0		0		0		0		1	
Medical doctor	1		1		0		1		1		0		0		1		0		1		1	
General surgeon	1		1		0		0		0		0		0		1		0		1		0	
Health officer	1		1		1		1		1		1		0		0		1		1		1	
Midwife	1		1		1		1		1		1		1		0		1		1		1	
Nurse, B.Sc.	1		1		1		1		1		1		1		0		1		1		1	
Nurse, diploma	1		1		1		1		1		1		1		0		1		1		1	
HEALTH CENTERS (n=7)																						
Health worker cadre																						
Health officer	5		2		3		5		4		4		3		0		4		1		n.a	
Midwife	7		3		6		7		7		7		7		0		7		1		n.a	
Nurse, B.Sc.	6		1		4		5		7		7		7		0		7		0		n.a	
Nurse, diploma	6		1		2		6		6		6		7		0		5		0		n.a	

3. Health Provider Knowledge

The Health Provider Knowledge assessment (module 7) was conducted by presenting clinical scenarios and questions to providers of maternity services in each health facility. Data collectors were instructed to direct the questions to a maximum of four staffs on duty who usually conduct deliveries. A maximum of four staffs could be interviewed at each facility. A total of one health officer, 15 midwives and four nurses were interviewed. A midwife/nurse at the hospital attended, on average, to 29 deliveries per month while midwife/nurse at the HC attended only to 3 deliveries per month. A senior midwife at the hospital had not attended to any delivery in the past month since she had been away (**Table 3.1**)

Table 3.1: Distribution of health providers interviewed and mean number of deliveries, by health cadre (n=20)

	Providers Interviewed at Hospital		Providers Interviewed at HCs		Total n (%)
		Mean number of deliveries attended in past month		Mean number of deliveries attended in past month	
	n		n		
Health worker cadre					
Health officers	0	--	1	3	1 (5)
Senior midwife	1	0	0	--	1 (5)
Midwife	1	30	13	4	14 (70)
Senior Nurse	1	25	1	1	2 (10)
Nurse	2	30	0	--	2 (10)
Total	5	29*	15	3	20 (100)

*Average for Midwife, Senior Nurse and Nurse

3.1. Antenatal care

Antenatal care services provide a forum for the education or reinforcement of education of both new and experienced mothers on all aspects of pregnancy and newborn care. Some conditions that may have adverse consequences for the mother or the newborn can be anticipated and addressed. Providers of antenatal care services seek to monitor the progress of pregnancy, manage pregnancy related conditions and impart health education messages. Respondents were asked to list the main components of focused antenatal care. The median score was 4 out of a potential maximum score of 6. Midwives (4.0) had a higher median score than nurses/HO (3.0). The most frequently mentioned components were preventing illness and promoting health (90%), detecting existing illnesses and managing complications (75%) and teaching danger signs while the least mentioned was promoting breastfeeding (5%).

Table 3.2: Providers with knowledge of focused antenatal care practices and which pregnant women are at risk, by health worker cadre

	Midwives (n=15)	Nurses/ Health officer (n=5)	Total (n=20)
Knowledge of focused antenatal care			
Median score (out of 6)	4.0	3.0	4.0
Percent providing specific response:	n%	n%	n%
Detect existing illnesses and manage complications	10 (67)	5 (100)	15 (75)
Prevent illness and promote health	14 (93)	4 (80)	18 (90)
Teach danger signs	11 (73)	4 (80)	15 (75)
Minimum of 4 consultations	9 (60)	3 (60)	12 (60)
Ensure woman has birth plan	7 (47)	1(20)	8 (40)
Promote breastfeeding	1 (7)	0 (0)	1 (5)

3.2. Intrapartum care

Quality of intrapartum care by a skilled birth attendant is one of the most important strategies for reducing maternal and newborn mortality. In several scenarios and questions the knowledge of respondents about intrapartum conditions were elicited.

The median score (out of 4) of knowledge of definitive diagnosis of labour was 3 (**Table 3.3**). All respondents (100%) mentioned dilatation of the cervix but only 30% mentioned rupture of membranes. Regarding what to monitor for when a woman is in labour, the median score was 5 (out of 10). Monitoring foetal heart beat (95%); maternal blood pressure (95%) and uterine contractions (80%) were the most frequently mentioned.

Events and clinical parameters of labour and delivery ought to be documented for monitoring and prompt intervention. Health workers often write in multiple clinical notes but the use of the partograph is accepted as the only clinical record necessary for most deliveries. In theory, using only partographs permits providers to pay more attention to clinical monitoring of their patients – and to more easily grasp the key clinical patterns in labour progression as they occur – than does writing several pages of notes during and after each delivery.

Most health care providers (85%) mentioned that labour observations are recorded on partographs but a few (15%) mentioned a piece of paper (**Table 3.3**). Midwives (93%) were more likely to mention recording of labour progress on a partograph than nurses/health officer (60%).

3.3. Active management of the third stage of labour

Postpartum haemorrhage can be prevented or managed by active management of the third stage of labour (AMTSL). Health providers were asked for the components steps of AMTSL. The median score of all the providers was 2 out of a maximum score of 4 (**Table 3.3**). Midwives had a high median score (2) compared to nurses/health officer (1).

The most frequently mentioned components of management of third stage of labour were immediate use of oxytocin (90%) and controlled cord traction (80%). The proportion of providers who mentioned use of oxytocin and controlled cord traction did not differ across the cadres.

Table 3.3: Providers who know when a woman is in labour, what to monitor, where to record information, and steps of active management of the third stage of labour (AMTSL), by health worker cadre

	Midwives (n=15)	Nurses/ health officer (n=5)	Total (n=20)
How do you know when a pregnant woman is in labour?			
Median score (out of 4)	3	3	3
Percent providing specific response:	n (%)	n (%)	n (%)
Dilation of the cervix	15 (100)	5 (100)	20 (100)
Regular uterine contractions	13 (87)	5 (100)	18 (90)
Discharge of blood and mucus	10 (67)	3 (60)	13 (65)
Breaking of the waters/ruptured membranes	3 (20)	3 (60)	6 (30)
What do you monitor when a woman is in labour?			
Median score (out of 10)	5	6	5
Percent providing specific response:	n (%)	n (%)	n (%)
Foetal heartbeat	14 (93)	5 (100)	19 (95)
Dilatation of the cervix	11 (73)	4 (80)	15 (75)
Maternal blood pressure	14 (93)	5 (100)	19 (95)
Uterine contractions	12 (80)	4 (80)	16 (80)
Maternal pulse	11 (73)	4 (80)	15 (75)
Maternal temperature	9 (60)	3 (60)	12 (60)
Descent of the head	4 (27)	3 (60)	7 (35)
Colour of amniotic fluid	2 (20)	1 (20)	4 (20)
Degree of moulding	3 (20)	0 (0)	3 (15)
Urine (protein, acetone, volume)	3 (20)	2 (40)	5 (25)
Where do you record this information?			
Percent providing specific response:	n (%)	n (%)	n (%)
Partograph	14 (93)	3 (60)	17 (85)
Clinical record	3 (20)	2 (40)	5 (25)
Piece of paper	1 (7)	2 (40)	3 (15)
What are the steps of AMTSL?			
Median score (out of 4)	2	1	2
Percent providing specific response:	n (%)	n (%)	n (%)
Immediate oxytocin (1 to 2 min)	12 (80)	4 (80)	16 (80)
Immediate ergometrine (1 to 2 min)	1 (7)	0 (0)	1 (5)
Controlled cord traction	13 (87)	5 (100)	18 (90)
Uterine massage	10 (67)	1 (20)	11 (55)

3.4. Haemorrhage

Health workers providing maternity services must be able to identify haemorrhage and manage it appropriately whenever it occurs. The overall median score of the signs to look for on a patient with postpartum bleeding was 3.5 out of a possible maximum score of 7 (**Table 3.4**). Most respondents (80%) would look for signs of shock and 65% would check for retained products of conception. Only 35% would check for the amount of blood lost; 20% among midwives and 80% among nurses/health officer and 25% would check for a full bladder.

Regarding what should be done to a woman with postpartum bleeding, the median score was 4 out of 7. All respondents (100%) mentioned beginning of intravenous (IV) fluids and a big majority (90%)

mentioned giving ergometrine or oxytocin. Taking blood for Hb and cross-matching was mentioned by the least proportion of respondents (15%). None of the nurses/health officer mentioned checking the woman for lacerations compared to 40% of midwives who mentioned so.

Regarding management of a woman with retained placenta, providers had a median score of 4; 4 for midwives and 5 for other staff, out of maximum potential score of 10. The most commonly mentioned actions to take were manual removal of placenta (90%), administration of IV fluids (70%) and giving oxytocin (60%). Only 45% of respondents mentioned controlled cord traction.

Table 3.4: Percentage of providers who know the signs of postpartum haemorrhage (PPH), how to treat PPH and retained placenta, by health worker cadre

	Midwives (n=15)	Nurses/ health officer (n=5)	Total (n=20)
What do you look for when a woman arrives with or develops heavy bleeding after birth?			
Median score (out of 7)	3	4	3.5
Percent providing specific response:	n (%)	n (%)	n (%)
Signs of shock	11 (73)	5 (100)	16 (80)
Signs of anaemia	5 (33)	3 (60)	8 (40)
Retained products or retained placenta	10 (67)	3 (60)	13 (65)
Amount of external blood	3 (20)	4 (80)	7 (35)
Damage to the genital tract	8 (53)	3 (60)	11 (55)
Whether uterus is contracted	8 (53)	1 (20)	9 (45)
Full bladder	4 (27)	1 (20)	5 (25)
What do you do when a woman arrives with or develops heavy bleeding after birth?			
Median score (out of 7)	4	4	4
Percent providing specific response:	n (%)	n (%)	n (%)
Begin IV fluids	15 (100)	5 (100)	20 (100)
Give ergometrine or oxytocin (IV or IM)	14 (93)	4 (80)	18 (90)
Manually remove retained products	9 (60)	4 (80)	13 (65)
Examine woman for lacerations	6 (40)	0 (0)	6 (30)
Massage the fundus	6 (40)	2 (40)	8 (40)
Take blood for Hb and cross-matching	1 (7)	2 (40)	3 (15)
Empty full bladder	4 (27)	2 (40)	6 (30)
What do you do when a woman has given birth and retained the placenta?			
Median score (out of 9)	4	5	4
Percent providing specific response:	n (%)	n (%)	n (%)
Manually remove placenta	14 (93)	4 (80)	18 (90)
Administer IV fluids	10 (67)	4 (80)	14 (70)
Give or repeat oxytocin	10 (67)	2 (40)	12 (60)
Refer	4 (27)	2 (40)	6 (30)
Monitor vital signs for shock and act	6 (40)	4 (80)	10 (50)
Apply controlled cord traction	6 (40)	3 (60)	9 (45)
Check that uterus is well contracted	5 (33)	1 (20)	6 (30)
Empty the bladder	5 (33)	0 (0)	5 (25)
Determine blood type and cross-match	1 (7)	2 (40)	3 (15)

3.5. Abortion care

Complications of abortion are major causes of maternal morbidity and mortality. Health workers must recognize complications of abortion – whether induced or spontaneous-and manage them when they occur. The median score for complications of unsafe abortion was 3 out of 4 (**Table 3.5**). Bleeding (80%) and sepsis (70%) were most often mentioned. The least mentioned was shock (50%).

Table 3.5: Recall of common complications of unsafe abortion by health providers

What are the complications of unsafe abortion?	Midwives (n=15)	Nurses/HO (n=5)	Total (n=20)
Median score (out of 4)	2.0	3.0	3.0
Percent providing specific response:	n (%)	n (%)	n (%)
Bleeding	11 (73)	5 (100)	16 (80)
Sepsis	10 (67)	4 (80)	14 (70)
Shock	7 (47)	3 (60)	10 (50)
Genital injuries	9 (60)	3 (60)	12 (60)

Regarding what to do for a woman with an unsafe or incomplete abortion, the median score was 3 out of 9 (**Table 3.6**). Nurses/HO had a higher median score than nurses. The commonly mentioned actions were starting IV fluids (85%), and starting antibiotics (75%). The least mentioned actions were assessing vital signs (20%), evacuation with curettage (15%) and counselling (15%).

Table 3.6: Knowledge of care after unsafe abortion by health providers

What do you do for a woman with an unsafe or incomplete abortion?	Midwives (n=15)	Nurses/ HO (n=5)	Total (n=20)
Median score (out of 9)	3.0	5.0	3.0
Percent providing specific response:	%	%	%
Start IV fluids	12 (80)	5 (100)	17 (85)
Start antibiotics	10 (67)	5 (100)	15 (75)
Refer	6 (40)	4 (80)	10 (50)
Assess vital signs	3 (20)	1 (20)	4 (20)
MVA	7 (47)	3 (60)	10 (50)
Vaginal exam	4 (27)	2 (40)	6 (30)
Assess vaginal bleeding	7 (47)	1 (20)	8 (40)
Evacuation with sharp curettage	1 (7)	2 (40)	3 (15)
Counsel	3 (20)	0	3 (15)

The median score on information given to women after unsafe or incomplete abortion was 2 out of 6 (**Table 3.7**). Family planning counselling (90%) and consequences of unsafe abortion (80%) were the most frequently mentioned. Only 5% mentioned return to fertility and none of the respondents mentioned social support.

Table 3.7: Recall of health education for patients treated for unsafe abortion by health providers

	Midwives (n=15)	Nurses/ HO (n=5)	Total (n=20)
What information do you give to women after unsafe or incomplete abortion?			
Median score (out of 6)	2.0	2.0	2.0
Percent providing specific response:	%	%	%
Family planning counselling and services	13 (87)	5 (100)	18 (90)
Consequences of unsafe abortion	12 (80)	4 (80)	16 (80)
Prevention of RTI/HIV	3 (20)	2 (40)	5 (25)
Referral for contraception	7 (47)	2 (40)	9 (45)
Return to fertility	1 (7)	0 (0)	1 (5)
Social support	0	0	0

3.6. Sexual and gender-based violence

Rape and other forms of sexual violence have adverse impact on the physical, mental and social wellbeing of women. The health providers are often the first to come into contact with victims of sexual and gender based violence; it befits providers to be skilled in managing victims of such violence.

Regarding what should be done to victims of sexual violence, the median score was 2 out of 8 (**Table 3.8**). The most frequently mentioned actions were providing emergency contraception (70%) and counselling for pre and post HIV testing (75%). All the other actions were mentioned by less than half of the providers.

Table 3.8: Knowledge of care for victims of rape by health providers

	Midwives (n=15)	Nurses/HO (n=5)	Total (n=20)
What do you do for the victim of sexual violence?			
Median score (out of 8)	2.0	2.0	2.0
Percent providing specific response:	%	%	%
Request urine and blood samples	0	1 (20)	1 (5)
Refer	1 (7)	2 (40)	3 (15)
Provide post-exposure prophylaxis for HIV	4 (27)	1 (20)	5 (25)
Provide emergency contraception	11 (73)	3 (60)	14 (70)
Help her complete the police report	3 (20)	0	3 (15)
Counsel her to report to police	3 (20)	0	3 (15)
Counsel for pregnancy prevention	4 (27)	0	4 (20)
Counsel for pre- and post-HIV testing	10 (67)	5 (100)	15 (75)

3.7. Immediate newborn care

The initial minutes to hours of a newborn's life are very crucial for its survival and health workers must provide quality care to prevent newborn morbidity and mortality. Health workers were asked to reflect on the last delivery they conducted and the care that they provided to the newborn.

The median score for components of immediate newborn care was 7; 7 for midwives and 8 for nurses/health officer, out of 10 (**Table 3.9**). Ensuring that the baby is dry (100%), providing prophylaxis to the eyes (90%), umbilical stump care (80%) and beginning breastfeeding within the first hour (77%) were the most commonly mentioned components. The least mentioned were clinical evaluation within the first hour (15%) and observation for colour (20%).

3.8. Newborn sepsis

Infections are a major cause of morbidity and mortality during the newborn period. It is therefore important that all health workers involved in newborn care be competent in identifying and managing newborn sepsis. The median score for signs and symptoms of neonatal sepsis was 2 out of 7 (**Table 3.9**). Hypothermia or hyperthermia (60%) and poor or no breastfeeding (50%) were the most mentioned options. The other options were mentioned by less than 50% of the respondents.

Regarding care for the infected newborns, respondents had a median score of 1 out of 3. The median score among midwives was less than 1. The most common mentioned action was beginning antibiotics (50%). The possible responses were mentioned each by only 10% of respondents.

3.9. Care of the low birth weight newborn

Low birth weight (<2.5 kg) is a risk factor for mortality and morbidity among newborns. Simple interventions such as early initiation of breastfeeding and kangaroo care may significantly improve survival. Only 6% of respondents mentioned all 5 options (**Table 3.9**). Majority (80%) of respondents mentioned ensuring that the baby is kept warm. Surprisingly, no respondent mentioned ensuring infection prevention.

Table 3.9: Percentage of providers who know steps of immediate newborn care, signs of newborn complications and the appropriate responses, by health worker cadre

	Midwives (n=15)	Nurses/ health officer (n=5)	Total (n=20)
The last time you delivered a baby, what immediate care did you give the newborn?			
Median score (out of 10)	7.0	8.0	7.0
Percent providing specific response:	n (%)	n (%)	n (%)
Clean the mouth, face and nose	9 (60)	4 (80)	13 (65)
Ensure the baby is breathing	8 (53)	4 (80)	12 (60)
Ensure the baby is dry	15 (100)	5 (100)	20 (100)
Observe for colour	3 (20)	1 (20)	4 (20)
Care for the umbilical cord	12 (80)	4 (80)	16 (80)
Provide prophylaxis for eyes	14 (93)	4 (80)	18 (90)
Weigh the baby	10 (67)	3 (60)	13 (65)
Thermal protection (skin to skin)	9 (60)	5 (100)	14 (70)
Begin breastfeeding within first hour	11 (73)	5 (100)	16 (80)
Evaluate/examine baby within first hour	1(7)	2 (40)	3 (15)
Signs & symptoms of newborn infection			
Median score (out of 7)	2.0	4.0	2.0
Percent providing specific response:	n (%)	n (%)	n (%)
Hypothermia or hyperthermia	8 (53)	4 (80)	12 (60)
Poor or no breastfeeding	6 (40)	4 (80)	10 (50)
Difficulty or fast breathing	3 (20)	5 (100)	8 (40)
Restlessness or irritability	5 (33)	3 (60)	8 (40)
Little muscle movement	2 (13)	1 (20)	3 (15)
Deep jaundice	2 (13)	1 (20)	3 (15)
Severe abdominal distension	0	0	0
Care for the infected newborn			
Median score (out of 3)	0.0	1.0	1.0
Percent providing specific response:	n (%)	n (%)	n (%)
Begin antibiotics	7 (47)	3 (60)	10 (50)
Continue to give breast milk	1 (7)	1 (20)	2 (10)
Keep airways open	0	2 (40)	2 (10)
Explain the situation to the mother	2 (13)	0	2 (10)
Care for the low birth weight newborn			
Median score (out of 5)	2.0	2.0	2.0
Percent providing specific response:	n (%)	n (%)	n (%)
Provide extra support to mother to establish breastfeeding	10 (67)	5 (100)	15 (75)
Ensure thermal protection (skin to skin)	12 (80)	4 (80)	16 (80)
Monitor ability to breastfeed	2 (13)	0	2 (10)
Ensure infection prevention	0	0	0
Monitor baby for first 24 hours	2 (13)	1 (20)	3 (15)

3.10. Training to perform selected services and interventions

Participants were asked if they had received training on selected services and interventions. The training could be in the form of pre-service college training or in-service training. Providers were further asked if they had performed the selected service in the 3-month period before the interview. Generally, for almost all services, there are differences between those trained and those who had performed the services in the last 3 months. Whereas 100% of the providers were trained manually to remove the placenta, only 45% had provided this service. Most staff (80%) had been trained to administer magnesium sulphate but only 25% had administered it; 90% had training to use vacuum extractor but only 29% had performed a delivery by vacuum extraction in 3 months. Focused antenatal care, beginning IV fluids, checking for anaemia suturing an episiotomy and counselling for family planning were the only services that providers were trained to perform and had recently performed.

Table 3.10: Percentage and number of providers who reported training in various services and percentage of those trained who provided the service in the past 3 months

	Total (n=20)			
	Trained		Provided	
	n	%	n	%
Provide focused antenatal care	16	80	15	75
Use of partograph				
Manually remove placenta	20	100	9	45
Begin IV fluids	20	100	15	75
Check for anaemia	20	100	18	90
Administer magnesium sulphate	16	80	4	25
Bimanual compression of uterus (external)	19	95	1	5
Bimanual compression of uterus (internal)	19	95	1	5
Suture an episiotomy	20	100	16	80
Suture vaginal lacerations	19	95	12	62
Suture cervical lacerations	14	70	0	0
Use vacuum extractor	18	90	5	29
Use forceps	13	65	0	0
Perform MVA				
Perform D&C	8	40	0	0
Administer antiretrovirals for PMTCT	19	95	11	58
Resuscitate an adult	14	70	4	29
Resuscitate a newborn with ambu bag & mask	20	100	13	65
Counsel women about family planning	19	95	16	85

3.11. Newborn resuscitation

The questions in this section were directed at only respondents who had performed neonatal resuscitation in the last 3 months or those who had been trained to perform neonatal resuscitation. In all 19 (95%) of the respondents met these criteria.

The respondents were asked for the care they would provide to a newborn without respiratory difficulties. The median score for this question was 2 out of 4 (**Table 3.11**). The most commonly mentioned action was initiating immediate breastfeeding (84%).

Table 3.11: Knowledge of care for a newborn without respiratory difficulties

If baby is breathing and no respiratory difficulty (intercostal retractions or grunting), what do you do?	Midwives (n=15)	Nurses (n=4)	Total (n=19)
Median score (out of 4)	2	2	2
Percent providing specific responses:	%	%	%
Keep baby warm	10 (67)	1 (25)	11 (58)
Immediate breastfeeding	13 (87)	3 (75)	16 (84)
Continue monitoring baby	10 (67)	2 (50)	12 (63)
Explain to the mother what is happening	1 (7)	2 (50)	2 (16)

Birth asphyxia is a leading cause of morbidity and mortality in the newborn period. Prompt recognition and appropriate intervention is needed to prevent mortality or long term morbidity. The median score for 3 critical interventions was 1 (out of 3). Continuing to ventilate (84%) was the most commonly mentioned action. Only 37% of providers mentioned oxygen administration; nurses were more likely to mention this than midwives (**Table 3.12**).

Table 3.12: Knowledge of care for a newborn with breathing difficulties

If baby does not begin to breathe, or if breathing is < 30 per minute, what do you do?	Midwives (n=15)	Nurses (n=4)	Total (n=19)
Median score (out of 3)	1	2	1
Percent providing specific responses:	%	%	%
Continue to ventilate	13 (87)	3 (75)	16 (84)
Administer O2	4 (27)	3 (75)	7 (37)
Assess need for special care	1 (7)	1 (25)	2 (11)

Regarding knowledge of the diagnosis of birth asphyxia, the median score was 2 out of 4 (**Table 3.13**). Depressed breathing (79%) and central cyanosis (74%) were the most commonly mentioned symptoms while floppiness was the least mentioned (21%).

Table 3.13: Knowledge of the diagnosis of birth asphyxia by health providers

How to diagnose birth asphyxia	Midwives (n=15)	Nurses (n=4)	Total (n=19)
Median score (out of 4)	2.0	2.0	2.0
Percent providing specific responses:	%	%	%
Depressed breathing	11 (73)	4 (100)	15 (79)
Floppiness	2 (13)	1 (25)	3 (16)
Heart rate < 100 BPM	3 (20)	1 (25)	4 (21)
Central cyanosis	10 (67)	4 (100)	14 (74)

The median score for preliminary steps of neonatal resuscitation was 3; 3 for midwives and 3.5 for nurses, out of 6 (**Table 3.14**). No respondent mentioned explaining what was happening to the mother. Most respondents mentioned placing the newborn face up (84%) and aspirating the mouth and then nose (90%).

Table 3.14: Recall of the steps of newborn resuscitation by health providers

	Midwives (n=15)	Nurses (n=4)	Total (n=19)
Preliminary steps of neonatal resuscitation			
Median score (out of 6)	3.0	3.5	3.0
Percent providing specific responses:	%	%	%
Place NB face up	13 (87)	3 (75)	16 (84)
Wrap baby, except for face & upper chest	7 (47)	1 (25)	8 (42)
Position baby's head so neck is extended	8 (53)	3 (75)	11 (58)
Aspirate mouth & then nose	13 (87)	4 (100)	17 (90)
Stimulate by rubbing feet	6 (40)	2 (50)	8 (42)
Explain process to mother	0	0	0

The median score for an action during ventilation using a bag and mask was 3 out of 5 (**Table 3.15**). Nurses scored 2.5 while midwives scored 3. A majority of respondents mentioned covering the baby's chin, mouth and nose with a mask. The rate of ventilation was mentioned by 42% of the providers.

Table 3.15: Recall of the steps to bag and mask resuscitation by health providers

	Midwives (n=15)	Nurses (n=4)	Total (n=19)
If resuscitating with bag & mask, what do you do?			
Median score (out of 5)	3.0	2.5	3.0
Percent providing specific responses:	n (%)	n (%)	n (%)
Cover baby's chin, mouth & nose with mask	14 (93)	3 (75)	17 (90)
Ensure seal	5 (33)	2 (50)	7 (37)
Ventilate 1 or 2 times	10 (67)	2 (50)	12 (63)
Ventilate 40 times per min	7 (47)	1 (25)	8 (42)
Pause to determine whether breathing is spontaneous	10 (67)	1 (25)	11 (58)

Regarding place of training in newborn resuscitation, most (90%) respondents had received pre-service training in this area (**Table 3.16**). In-service training on newborn resuscitation was scarce.

Table 3.16: Training of newborn resuscitation by health providers who received training or had performed newborn resuscitation in the last 3 months

	Midwives (n=15)	Nurses (n=4)	Total (n=19)
Where training in newborn resuscitation took place			
	n (%)	n (%)	n (%)
In-Service	0	2 (50)	2 (11)
Pre-service	15(100)	2 (50)	17 (90)

4. Partograph review

The aim of partograph review was to assess the use and quality of the partograph completion and labor management in the health facilities.

4.1. Availability of partographs for assessment

All health facilities using partographs were using the modified WHO partograph. Six health centers (HCs) and the hospital contributed partographs for review. Only one HC was not using partographs while another one was still under construction and had not started to conduct deliveries. In total, 354 partographs were reviewed, 309 (91%) from the hospital and 31 (9%) from HCs. Use of partographs was started earlier in labor at the hospital than at HCs. At the HCs more than half of the partographs (53%) were started at 7 cm dilatation but at the hospital, the corresponding figure was only 12%. Of the 354 partographs, 340 (96%) had the admission dilatation charted correctly on the partograph and could be used for further analysis (**Table 4.1**)

Table 4.1: Dilatation at the start of partograph use

	Women with partograph in hospital n (%)	Women with partograph in HC* n (%)	All facilities n (%)
Dilatation at start of partograph			
4 cm	137 (44)	12 (27)	149 (42)
5 cm	76 (25)	3 (7)	79 (22)
6 cm	59 (19)	6 (13)	65 (18)
7 cm	37 (12)	24 (53)	61 (17)
First dilatation charted on alert line	309 (100)	31 (69)	340 (96)
Total	309 (100)	45 (100)	354 (100)

*HC health center

4.2. Frequency of recordings during labor

Tables 4.2 and 4.3 shows how important standards are for recording observations during labor in order to manage labor well. Temperature, blood pressure, pulse and vaginal examination were analyzed by the number of hours women were in labor.

Number of hours in labor by type of facility: Overall, 67% of women stayed less than 6 hours in labor; 67% of women in hospitals and 83% of women in HCs, which suggests that women labor longer in hospitals than in HCs (Table 4.2).

Fetal heart rate: The fetal heart rate should be recorded every half hour. Almost all women with a partograph at the hospital (96%) had fetal heart rate monitored at least hourly. This figure was only 77% among women at HCs (Table 4.2)

Contractions: Contractions should be charted every half hour. Contractions were assessed at least hourly among 95% of the women; 96% at the hospital and 87% at HCs (Table 4.2).

Descent: Descent was checked at least once in 97% of women at the hospital but only in 45% among women at HCs (Table 4.2).

State of membranes and liquor: This was recorded in only 76% of deliveries; 78% at the hospital and 55% at the HC (Table 4. 2)

Temperature: During labor, a woman's temperature should be recorded every 2 hours. A surprising 89% of women did not have their temperature recorded irrespective the length of time they were in labor (Table 4.3)

Blood pressure: Maternal blood pressure should be taken every 4 hours. Most women had blood pressure taken regularly. However, in 7% of women, blood pressure was not taken at all (Table 3)

Pulse: Maternal pulse should be recorded every 30 minutes. In 22% of records, maternal pulse was not recorded at all (Table 4.3).

Vaginal examination: Vaginal examinations should be carried out at least once every 4 hours during the first stage of labor. Data suggests that the performance of vaginal examinations was generally well timed (Table 4.3).

Table 4.2: Distribution of women with partographs according to hours between first exam and delivery and recording of key measurements, by type of facility

Component of management	Women with partograph in hospital n (%)	Women with partograph in HC* n (%)	All facilities n (%)
Hours between first exam and delivery			
0-2	106 (34)	13 (43)	119 (35)
3-5	101 (33)	12 (40)	113 (33)
6-8	49 (16)	4 (13)	53 (16)
9+	53 (17)	1 (3)	54 (16)
Foetal heart rate observed at least hourly	284 (92)	24 (77)	308 (91)
Contractions assessed at least hourly	296 (96)	27 (87)	323 (95)
Descent checked between admission and delivery	301 (97)	14 (45)	315 (92)
State of the membranes/colour of the liquor recorded	240 (78)	17 (55)	257 (76)
Total	309 (100)	31 (100)	340 (100)

*1 partograph in HC (health centre) had no information on the number of hours between first exam and delivery and was excluded

Table 4.3: Distribution of women with partographs and times that key measurements were taken and recorded, by hours between first exam and delivery

Component of management	Hours between first exam and delivery n (%)				Total
	0-2	3-5	6-8	9+	
Temperature					
0	109 (92)	98 (87)	51 (96)	44 (82)	302 (89)
1	9 (8)	8 (7)	2 (4)	8 (15)	27 (8)
2+	1 (1)	7 (6)	0 (0)	2 (4)	10 (3)
Blood pressure					
0	9 (8)	7 (6)	5 (9)	1 (2)	22 (7)
1	103 (87)	81 (72)	26 (49)	16 (30)	226 (67)
2	6 (5)	23 (20)	17 (32)	26 (48)	72 (21)
3+	1 (1)	2 (2)	5 (9)	11 (20)	19 (6)
Pulse					
0	36 (30)	18 (16)	15 (28)	6 (11)	75 (22)
1	26 (22)	26 (23)	10 (19)	8 (15)	70 (21)
2	9 (8)	5 (4)	6 (11)	8 (15)	28 (8)
3	17 (14)	8 (7)	4 (8)	0 (0)	29 (9)
4+	31 (26)	56 (50)	18 (34)	32 (59)	137 (40)
Vaginal examination					
1	10 (8)	8 (7)	2 (4)	1 (2)	21 (6)
2	107 (90)	81 (72)	19 (36)	6 (11)	213 (63)
3+	2 (2)	24 (21)	32 (60)	47 (87)	105 (31)
Total	119 (100)	113 (100)	53 (100)	54 (100)	339 (100)

4.3. Management and outcome of labor on the partograph

Of the 340 women whose progress could be assessed, 61% delivered on the left of the alert line, 21% between the alert line and the action line and 18% on or beyond the action line (**Table 4.4**). The proportion of partographs with delivery on the left of the alert line did not differ so much between partographs at the hospital (61%) and the HCs (65%). However, delivery took place on or beyond the action line in a higher proportion of partographs at the hospital (19%) than at the HCs (3%); the latter being only one case. It is worth noting that time at delivery was not indicated on 8% of records; 47% at HCs and 5% at the hospital (data not shown).

Table 4.4: Partograph assessment during labour, by type of facility

Component of management	Women with partograph in hospital n (%)	Women with partograph in HC* n (%)	All facilities n (%)
	(n=309)	(n=45)	(n=354)
First dilatation charted correctly on the alert line	309 (100)	31 (67)	340 (96)
Among those charted correctly on admission, those delivered	(n=306)	(n=31)	(n=337)
On the left of the alert line	186 (61)	20 (65)	206 (61)
Between the alert line and action line	61 (20)	10 (32)	71 (21)
On or beyond action line	59 (19)	1 (3)	60 (18)

*Health centre

In **Table 4.5**, results of the type of delivery and foetal outcome by the progress of labour on the partograph are presented. Of the 337 women, 259 (77%) delivered by spontaneous vertex delivery

(SVD), 20 (6%) by vacuum/forceps and 52 (15%) by caesarean section. Among those who delivered by SVD, 74% delivered on the left of the alert line; the corresponding figure among those who delivered by caesarean section was 8%. Among those who delivered by caesarean section, 60% delivered on or beyond the action line. Regarding the outcome of the baby, 6 (2%) of partographs did not have information. There were only 4 (1%) still births; distributed equally between those who delivered on the left of the alert line and those who delivered on/beyond the action line.

Table 4.5: Partograph assessment by progress of labour and type of delivery and foetal outcome

Component of management	When the woman delivered			Total
	On the left of the alert line	Between the alert line and action line	On or beyond action line	
Delivery type				
Spontaneous vertex	191 (74)	43 (17)	25 (10)	259 (100)
Vacuum extraction/forceps	8 (40)	9 (45)	3 (15)	20 (100)
Caesarean	4 (8)	17 (33)	31 (60)	52 (100)
Other	3 (50)	2 (33)	1 (17)	6 (100)
Outcome of the baby				
Live birth	200 (61)	70 (21)	57 (17)	327 (100)
Still birth	2 (50)	0 (0)	2 (50)	4 (100)
No information	4 (67)	1 (17)	1 (17)	6 (100)
Total	206 (61)	71 (21)	60 (18)	337 (100)

5. Equipment and supplies for EmONC

Availability of drugs, supplies and equipment is essential for the delivery of quality health services. Data were collected by inquiring from unit heads in the facility about the availability and functioning of key drugs, supplies and equipment on a checklist. Verification was done only if the respondent was not sure. Non-functional equipment was considered non-existent.

5.1. Drugs and supplies inventory management

It is important that the inventories of drugs and supplies are well managed to ensure that drugs and supplies are available without delay when needed. Some questions were asked to determine if health facilities were following appropriate protocols and if the drugs were properly stored.

All facilities surveyed had a pharmacy or a supply of medicine. One HC did not have a drug inventory registers. Although 6 health centres had a drug inventory register, it was only at 3 health centres that the inventory register was up-to-date. The government was the main source of medicine and all other supplies used at the health facilities (**Table 5.1**).

Table 5.1: Percentage of facilities with a supply of medicines with registers and sources of drugs and supplies, by type of facility

	Hospitals	Health Centers	Total	
	Freq (n=1)	Freq (n=7)	Freq (n=8)	%
Among all facilities				
Facility has pharmacy/supply of medicine	1	7	8	100%
Among facilities with a pharmacy/supply of medicine				
Drug inventory register exists	1	6	7	88%
Drug inventory register exists and is up-to-date	1	3	4	57%
Major source of medicine for facility				
Government	1	7	8	100%
Primary source for gloves, syringes and medical supplies				
Government supplier	1	7	8	100%
Primary source for infection prevention supplies				
Government supplier	1	7	8	100%

Questions were asked to ascertain the timing of drug ordering in the pharmacy, labour and delivery room, maternity ward and in the operating theatre. Most facilities (75%), including the hospital, ordered drugs in the pharmacy whenever drugs reached the re-order level. It was only at the hospital and at 2 health centres that drugs were ordered same time at regular intervals in labour and delivery rooms. At 50% of the facilities, there was no particular schedule for ordering drugs in the maternity ward.

Table 5.2: Percentage of facilities according to mechanisms for ordering drugs, by type of facility

	Hospitals Freq (n=1)	Health centre Freq (n=7)	Total Freq % (n=8)	
Among all facilities				
Drug supplies in the pharmacy are ordered				
Same time (each week, month or quarter)	0	2	2	25%
When stock reaches 're-order' level	1	5	6	75%
Drug supplies in labor and delivery rooms are ordered ¹				
Same time regular intervals	1	2	3	38%
When stock reaches 're-order' level	0	1	1	13%
When stock runs out	0	1	1	13%
On patient-by-patient basis	0	2	2	25%
Any time	0	1	1	13%
Drug supplies in maternity wards are ordered				
Any time no schedule	1	3	4	50%
When stock reaches 're-order' level	0	1	1	13%
When stock runs out	0	1	1	13%
On patient-by-patient basis	0	2	2	25%
At the hospital				
Drug supplies in the OT are ordered				
Same time regular intervals	1	--	1	100%

All health facilities surveyed provided pharmacy services on 24-hours a day and 7 days a week basis. The hospital and 6 health centres used the first-in first-out system to ensure that older stocks were dispensed before newer ones. All the facilities except one health centre had safeguards in place to prevent the dispensing of expired drugs. At all the facilities, drugs were protected from moisture, heat or infestation and drugs which needed refrigeration were in a refrigerator. All the facilities had at least one functioning refrigerator with one health centre having a solar refrigerator.

Table 5.3: Percentage of facilities reporting on pharmacy-related items, by type of facility

	Hospitals (n=1) Freq.	Health Centres (n=7) Freq.	Total (n=8) Freq. %	
Pharmacy is accessible 24/7	1	7	8	100%
"First-in-first-out" system in use	1	6	7	88%
Mechanism in place to ensure expired drugs are not distributed	1	6	7	88%
Drugs are protected from moisture, heat or infestation	1	7	8	100%
Required drugs are refrigerated	1	7	8	100%
Facility has at least 1 functioning electric / gas refrigerator	1	6	7	88%
Facility has at least 1 functioning solar refrigerator	0	1	1	13%

5.2. Delay in supplies to health facilities

Table 5.4 below shows that, the most common causes of delay in delivery of drugs and supplies in all health facilities were drug shortage at the central store (38%) and administrative difficulties (25%).

Table 5.4: Percentage of facilities reporting most common cause of delay of delivery of supplies, by type of facility

Most common cause of delay	Hospitals	Health Centers	All	
	Freq. (n=1)	Freq. (n=7)	Freq. (n=8)	%
Central store stock out	1	2	3	38%
Financial problems	0	1	1	13%
Administrative difficulties	0	2	2	25%
Inadequate transport	0	1	1	13%
Other ¹	0	1	1	13%

¹ 'Other' includes staff didn't know.

5.3. Availability and stock out of selected drugs essential to delivery of EmONC services

The drugs listed in tables 5.5 below are very important in the management of labour and should be available at all times in health facilities providing labour and delivery services.

Ketamine and atropine were always in stock at the hospital (**Table 5.5**). All health centres had never stocked ketamine. Atropine was in stock at 3 health centres but out of stock at 2. Two health centres had never stocked atropine.

Table 5.5: Availability and stock out of selected drugs, by type of facility

	Hospitals (n=1)	Health Centres (n=7)	Total (n=8)	
	Freq	Freq	Freq	%
Ergometrine				
Never had stock out in last 3 months	1	7	8	100
Oxytocin				
Never had stock out in last 3 months	1	6	7	88%
Never had oxytocin in stock	0	1	1	13%
Magnesium sulphate				
Always in stock in last 3 months	1	0	1	13%
Never had magnesium sulphate in stock	0	7	7	88%
Ketamine				
Always in stock in last 3 months	1	0	1	13%
Has never had ketamine in stock	0	7	7	88%
Atropine				
Always in stock in last 3 months	1	3	4	50%
Currently out of stock	0	2	2	25%
Has never had atropine in stock	0	2	2	25%
Out of stock in last 3 months	0	2	2	25%

Availability of selected antibiotics

Essential antibiotics that are commonly used in maternal and newborn care services are listed in **Table 5.6**. All health facilities had any form of antibiotic. However, many specific antibiotics were not available at the time of the survey. Ampicillin, amoxicillin, Trimethoprim/Sulphamethoxazole and Claxacilin were available at all health facilities. Cefotaxime injection and oral flucloxacillin, two antibiotics used for newborn sepsis were missing at all the facilities. Similarly, no facility had cefixime and cephalazoline. Clindamycin was in stock at only one health centre.

Table 5.6: Availability of selected antibiotics, by type of facility

	Hospitals (n=1)	Health Centres (n=7)	Total (n=8)	
	Freq	Freq	Freq.	%
Antibiotics (any)	1	7	8	100%
Tetracycline eye ointment /drops (for newborn)	1	6	7	88%
Gentamicin	1	6	7	88%
Ampicillin	1	7	8	100%
Amoxicillin	1	7	8	100%
Chloramphenicol	1	3	4	50%
Procaine benzylpenicillin	1	6	7	88%
Trimethoprim/Sulphamethoxazole	1	7	8	100%
Penicillin G (Benzyl)	1	5	6	75%
Erythromycin	1	6	7	88%
Cloxacillin Sodium	1	7	8	100%
Ceftriaxone*	1	5	6	75%
Metronidazole (injection)	1	0	1	13%
Clindamycin	0	1	1	13%
Cefotaxime injection (for newborn)	0	0	0	0%
Oral flucloxacillin (for newborn)*	0	0	0	0%
Cefixime	0	0	0	0%
Cephazoline Sodium	0	0	0	0%

Availability of anticonvulsants

Magnesium sulphate is the standard of care for Eclampsia and pre-eclampsia. However, the administration of other anticonvulsants and anxiolytics could be used in its absence. **Table 5.7** below presents data on the availability of anticonvulsants in health facilities.

There was at least one form of anticonvulsant in 75% of all facilities (the hospital and 5 health centres). Magnesium sulphate was available only at the hospital. Diazepam was the most common anticonvulsant available at health centres. Very few health facilities had phenytoin and phenobarbital injections.

Availability of antihypertensives

Antihypertensives are used in combination with anticonvulsants for the management of eclampsia and pre-eclampsia or used singly as part of care for hypertension in pregnancy. Selected antihypertensives, commonly used in the maternity are presented in **Table 5.7**.

Most health facilities (6/8) had any antihypertensive. Methyldopa was the most commonly available antihypertensive; being available at half of the facilities. Labetalol was unavailable at all facilities.

Table 5.7: Availability of selected anticonvulsants and antihypertensives, by type of facility

	Hospitals (n=1)	Health Centres (n=7)	Total (n=8)	
	Freq	Freq	Freq.	%
Anticonvulsants & Sedatives (any)	1	5	6	75%
Diazepam (injection)	1	3	4	50%
Phenobarbital (injection)	0	1	1	13%
Magnesium sulphate	1	0	1	13%
Phenytoin (Diphenylhydantoin)	1	1	2	25%
Antihypertensives (any)	1	5	6	75%
Methyldopa	1	3	4	50%
Hydralazine	1	0	1	13%
Nifedipine	0	1	1	13%
Labetalol	0	0	0	0%

Availability of uterotonics

Uterotonics are used to augment labour through their promotion of uterine contractions. Uterotonics are also used after delivery to prevent or manage postpartum haemorrhage. Uterotonics were available in some form at all the facilities (**Table 5.8**). Oxytocin (the preferred drug) was available at the hospital and in 6 out of 7 health centres. Ergometrine injection, Ergometrine tablets and misoprostol were missing at the hospital but were available in 5 out of 7 health centres.

Table 5.8: Availability of selected uterotonics, by type of facility

	Hospitals (n=1)	Health Centres (n=7)	Total (n=8)	
	Freq	Freq	Freq.	%
Oxytocics (any)	1	7	8	100%
Oxytocin	1	6	7	88%
Ergometrine Maleate (inj)	0	5	5	63%
Methylergometrine Maleate	1	5	6	75%
Ergometrine (tablets)	0	0	0	0%
Misoprostol*	0	5	5	63%
Prostaglandin E2 (Dinoprostone)	0	0	0	0%

Availability of emergency drugs

Table 5.9 focuses on the availability of common drugs used in the management common obstetrics emergencies which include hypovolemic shock, septic shock, drug toxicities and organ failure. All health facilities had at least one of the emergency drugs listed. The hospital should have all the drugs since it manages these complications. All the considered drugs except ephedrine, nitroglycerine and naloxone were available at the hospital. Adrenaline was available at all health centres. None of the health centres stocked digoxin, calcium gluconate, nitroglycerine and naloxone.

Table 5.9: Availability of selected emergency drugs, by type of facility

	Hospitals (n=1)	Health Centres (n=7)	Total (n=8)	
	Freq	Freq	Freq.	%
Drugs used in emergencies (any)	1	7	8	100%
Adrenaline (Epinephrine)	1	7	8	100%
Promethazine Hydrochloride	1	5	6	75%
Furosemide	1	5	6	75%
Ephedrine	0	4	4	50%
Aminophylline	1	5	6	75%
Diphenhydramine	1	3	4	50%
Hydrocortisone	1	4	5	63%
Atropine sulphate	1	4	5	63%
Digoxin	1	0	1	13%
Calcium Gluconate	1	0	1	13%
Nitroglycerine	0	0	0	0%
Naloxone Hydrochloride	0	0	0	0%

Anaesthetics

Availability of anaesthetics is important not only for obstetric surgery but also for repair of intrapartum genital tract trauma. All health facilities except one health centre had lignocaine/lidocaine 1 or 2% but only the hospital had ketamine and halothane (Table 5.10)

Analgesics

Analgesics were in stock in all facilities. Paracetamol was available at all facilities while acetylsalicylic acid was missing at only one HC. Pethidine was available only at the hospital but morphine was missing at all facilities (Table 5.10).

Table 5.10: Availability of selected anaesthetics and analgesics, by type of facility

	Hospitals (n=1)	Health Centres (n=7)	Total (n=8)	
	Freq	Freq	Freq	%
Anaesthetics (any)	1	6	7	88%
Lignocaine / Lidocaine 2% or 1%	1	6	7	88%
Ketamine Hydrochloride	1	0	1	13%
Halothane	1	0	1	13%
Analgesics (any)	1	7	8	100%
Paracetamol	1	7	8	100%
Acetylsalicylic acid	1	6	7	88%
Indomethacin	1	5	6	75%
Pethidine Hydrochloride	1	0	1	13%
Morphine Hydrochloride (inj)	0	0	0	0%

Tocolytics

Tocolytic agents help to stop or abate uterine contractions in preterm labour – major contributor to neonatal morbidity and mortality. The most common tocolytic was indomethacin, being available at the hospital and at 5 HCs. Salbutamol was unavailable at the hospital but was available at only 2 HCs (Table 5.11)

Table 5.11: Availability of selected tocolytic agents by type of facility

	Hospitals (n=1) Freq	Health Centers (n=7) Freq	Total (n=8)	
			Freq	%
Tocolytics (any)	1	6	7	88%
Indomethacin	1	5	6	75%
Salbutamol	0	2	2	25%
Ritodrine Hydrochloride	0	0	0	0%

Steroids

Steroids are essential in the in the management of shock and in the preparation of the mother for preterm. The hospital and 6/7 HCs had at least one form of steroid (Table 5.12).

Table 5.12 : Availability of selected steroid agents by type of facility

	Hospitals (n=1) Freq	Health Centres (n=7) Freq	Total (n=8)	
			Freq	%
Steroids (any)	1	6	7	88%
Prednisone	0	2	2	25%
Prednisolone	1	2	3	38%
Dexamethasone	1	2	3	38%
Betamethasone	0	0	0	0%

Intravenous fluids (IV)

In normal labour IV fluids may be used to maintain hydration or supply energy and in emergencies they may be used as volume expanders while waiting for blood transfusion or other interventions. IV fluids should be available in all health facilities where delivery is performed. **Table 5.13** shows that all health facilities had IV fluids of some sort. Dextran the only plasma expander in the list and glucose 10% was unavailable at all facilities.

Table 5.13 : Availability of selected intravenous fluids by type of facility

	Hospitals (n=1) Freq	Health Centres (n=7) Freq	Total (n=8)	
			Freq	%
IV Fluids (any)	1	7	8	100%
Ringer's Lactate	1	6	7	88%
Normal saline	1	6	7	88%
Dextrose	0	2	2	25%
Glucose 5%	1	5	6	75%
Glucose 10%	0	0	0	0%
Glucose 40% or 50%	1	6	7	88%
Dextran	0	0	0	0%

Antimalarials

Malaria is a major contributor to indirect maternal mortality and to preterm birth and newborn mortality. Health facilities should therefore be prepared for the management of malaria at all times. Artemisinin-based combination therapy (ACT) is the standard of care for treatment. The hospital had all the antimalarial agents (Table 5.14). Co-Artem and Chloroquine were missing at 1 HC while quinine was missing at 4 HCs. One HC did not have any antimalarial.

Table 5.14 : Availability of selected antimalarials by type of facility

	Hospitals (n=1)	Health Centres (n=7)	Total (n=8)	
	Freq	Freq	Freq	%
Antimalarial (any)	1	6	7	88%
Co-Artem	1	6	7	88%
Chloroquine	1	6	7	88%
Quinine Dihydrochloride	1	3	4	50%

Antiretrovirals

Health facilities need to stock antiretrovirals (ARVs) for HIV treatment when indicated and also to provide prevention-of-mother-to-child transmission (PMTCT) services. **Table 5.15** shows that ARVs for the mother were more likely to be available than ARVs for newborns. The hospital had all the items considered. Health centres were more likely to have ARVs for mother than for newborns. Rapid HIV testing kit was available at only 2/7 HCs.

Table 5.15: Availability of selected antiretrovirals by type of facility

	Hospitals (n=1)	Health Centres (n=7)	Total (n=8)	
	Freq	Freq	Freq	%
Antiretrovirals (any)	1	7	8	100%
Nevirapine – mother	1	5	6	75%
Nevirapine – newborn	1	4	5	63%
HIV Rapid testing kit	1	2	3	38%
Post-HIV exposure prophylactic treatment	1	4	5	63%
Combined ARV for mother	1	4	5	63%
Combined ARV for newborn	1	3	4	50%

Availability of contraceptive commodities

Contraceptive use can prevent unwanted pregnancy and unsafe abortion and hence can reduce maternal mortality caused by unsafe abortions. The hospital had no contraceptive commodities (Table 5.16). The hospital did not stock these commodities due to policy issues since it is Catholic owned facility. All HCs had at least three temporary contraceptives. Intrauterine contraceptive devices (IUDs) were available at only 3 HCs. Female condoms were universally lacking.

Table 5.16: Availability of commodities for temporary contraception by type of facility

	Hospital (n=1)	Health Centres (n=7)	Total (n=8)	
	Freq.		Freq	%
Contraceptives (any)	0	7	7	88%
At least 3 temporary methods	0	7	7	88%
3 month injectables	0	7	7	88%
Combined oral contraceptives	0	7	7	88%
Male Condoms	0	7	7	88%
Implants	0	7	7	88%
IUDs	0	3	3	38%
Female Condoms	0	0	0	0%

Other drugs

Table 5.17 focuses on drugs that are essential to the delivery of maternal and newborn health services but do not belong to a commonly used group of drugs. Vitamin K for the newborn was available at the hospital and at only 2 HCs. Nystatin for the newborn was unavailable at all the facilities while availability of anti D immune Globulin was scarce. The hospital was well stocked with these items compared to the HCs.

Table 5.17: Availability of selected essential drugs by type of facility

	Hospital (n=1)	Health Centres (n=7)	Total (n=8)	
	Freq.		Freq	%
Other drugs				
Oral rehydration solution	1	6	7	88%
Gentian violet paint	1	5	6	75%
Magnesium trisilicate	1	6	7	88%
Tetanus toxoid	1	7	8	100%
Ferrous sulphate or fumerate	1	7	8	100%
Folic acid	1	4	5	63%
Anti-tetanus serum	1	5	6	75%
Vitamin K (newborn)	1	2	3	38%
Nystatin (oral) (for newborn)	0	0	0	0%
Anti Rho (D) Immune Globulin	1	1	2	25%
Sodium citrate	1	6	7	88%
Heparin	1	0	1	13%

Infection Prevention in maternity

Care must be taken in a maternity to prevent the transmission of infections between patients and between patients and healthcare providers. Infection prevention supplies and equipment should be available in all maternity rooms. Data were gathered on the availability of a list of items in maternities (**Table 5.18**). The hospital had all the infection prevention items. But there were gaps in the availability of the items at HCs. Mayo stand was missing at all HCs and only one HC had non-sterile protective clothing. A regular trash bin and a covered trash bin were missing at 3/7 HCs. A disinfection solution was available at all HCs.

Table 5.18: Selected infection prevention materials in maternities by type of facility

	Hospitals (n=1)	Health Centres (n=7)	Total (n=8)	
	Freq.	Freq.	Freq.	%
Basic Items				
Soap	1	6	7	88%
Antiseptics	1	6	7	88%
Gloves	1	6	7	88%
Heavy duty gloves	1	5	6	75%
Non-sterile protective clothing	1	1	2	25%
Decontamination container	1	7	8	100%
Bleach or bleaching powder	1	7	8	100%
Prepared disinfection solution	1	7	8	100%
Regular trash bin	1	4	5	63%
Covered contaminated waste trash bin	1	4	5	63%
Puncture proof sharps container	1	7	8	100%
Mayo stand to establish sterile field	1	0	1	13%
Disinfectants and antiseptics				
Ethanol	1	5	6	75%
Chlorhexidine	1	1	2	25%
Povidone iodine	1	7	8	100%
Either chlorhexidine or povidone iodine	1	7	8	100%

5.4. Infrastructure in maternities

Availability of various infrastructures in the maternity ward was assessed. The hospital had all the item assessed but there were deficiencies in the HCs. Only 5/7 HCs had running water while 6/7 had sufficient lighting to perform task at night. Functioning fan or air conditioning was available in only 1 HC. A functioning toilet was available at 4 HCs and only 2 HCs had a means of providing privacy for the patients as shown in **Table 5.19**.

Table 5.19: Infrastructure and amenities in the maternity area, by type of facility

Infrastructure	Hospital (n=1)	Health Centres (n=7)	Total (n=8)	
			Freq.	%
Sufficient light source to perform tasks during day	1	7	8	100%
Sufficient light source to perform tasks at night	1	6	7	88%
Means of ventilation	1	7	8	100%
Running water	1	4	5	63%
Functioning toilet	1	4	5	63%
Heating / heating arrangements	1	1	2	25%
Functional fan / air conditioning	1	0	1	13%
Curtains / means of providing patient privacy	1	2	3	38%
Waiting area for visitors and family	1	5	6	75%

Guidelines and protocol in maternities

Clinical guidelines and protocols are standards of care that the Federal Ministry of Health sets for all health workers to comply with. Compliance with guidelines and protocols should ensure that all patients get quality care.

The hospital had all the guidelines/protocols considered except family planning guidelines (**Table 5.20**). HCs on the other sides were missing some of the guidelines/protocols. HIV related guidelines/protocols were the most commonly available while abortion related guidelines/protocols were the most frequently missing.

Table 5.20: Availability of guidelines / protocols in maternity wards, by type of facility

Guidelines or protocols	Hospitals (n=1) Freq	Health Centers (n=7) Freq	Total (n=8)	
			Freq	%
Management of obstetric and newborn complications	1	4	5	63%
Essential newborn care	1	4	5	63%
Focused antenatal care	1	5	6	75%
PMTCT (maternal and newborn dosing)	1	7	8	100%
Infection prevention for HIV	1	6	7	88%
Safe abortion	1	3	4	50%
Post-abortion care	1	2	3	38%
Family planning	0	6	6	75%

Equipment and supplies in maternities

Data were collected on the availability of basic equipment and supplies in the labour and maternity wards. The hospital and one HC had an ultrasound (Table 5.24). A clinical oral thermometer and a pulse oximeter were missing at all facilities. Uristix was missing at the hospital and at 5 HCs. Blank partographs were available at hospital at 6/7 HCs. One HC did not have a stethoscope. **Table 5.21** further shows the availability of supplies in the maternity. The hospital was well equipped but HCs were missing some of the items.

Table 5.21: Availability of equipment and supplies in maternity wards, by type of facility

	Hospital (n=1)	Health Centers (n=7)	Total (n=8)	
	Freq.	Freq.	Freq.	%
Diagnostics				
Ultrasound	1	1	2	25%
BP cuff	1	4	5	63%
Stethoscope	1	5	6	75%
Clinical oral thermometer	0	0	0	0%
Uristix (dip stick for protein in urine)	0	2	2	25%
Blood sugar testing sticks	1	0	1	13%
Partographs (modified form)	1	6	7	88%
Pulse oximeter	0	0	0	0%
Supplies				
Kidney basins	1	7	8	100%
Sponge bowls	1	6	7	88%
Scissors	1	5	6	75%
Needles and Syringes (10-20cc)	1	2	3	38%
Syringes (1ml, 2ml, 5ml, 10ml)	1	7	8	100%
Needles (23-25 gauge)	1	4	5	63%
Suture needles/suture materials	1	5	6	75%
Branulla or other catheter for IV line (16-18)	1	6	7	88%
IV Infusion stand(s)	1	6	7	88%
Urinary catheters	1	5	6	75%
IV cannulae	1	6	7	88%
Adult ventilator bag and mask	1	3	4	50%
Mouth gag	1	2	3	38%
Plain thumb forceps	0	1	1	13%
Dressing forceps	1	2	3	38%
Surgeon's hand brush with nylon bristles	0	0	0	0%
Watch/clock with second hand that can be easily seen	1	0	1	13%
Measuring tape	1	2	3	38%
Nasogastric tubes	1	1	2	25%

Delivery packs

Delivery packs are collections of tools that are sterilized and packed and ready for the next patient; one pack per patient. These packs ensure the delivery is done safely and aseptically. The accepted standard content of a delivery pack and all other packs in this study was locally defined. **Table 5.22** lists items that ought to be in a delivery pack. The hospital and 6/7 HCs had at least 1 complete pack of a delivery set.

Table 5.22: Availability of deliver packs by type of facility

	Hospital (n=1)	HCs (n=7)	Total (n=8)	
	Freq.	Freq.	Freq.	%
Delivery pack set				
Number of facilities with at least 1 complete delivery set	1	6	7	88%
Kocher's artery forceps 18 cm CVD	1	6	7	88%
Dressing forceps, 250 mm stainless steel (s/s)	1	5	6	75%
Dissecting forceps standard pattern 145 mm s/s	0	5	5	63%
Artery forceps straight, 140 mm s/s	0	2	2	25%
Cord-cutting scissors curved 135 mm s/s	1	5	6	75%
Cord ties	1	7	8	100%
Clampcut	1	5	6	75%
Episiotomy scissors, angular, 145 mm s/s	1	4	5	63%
Straight stitch scissors 135	0	4	4	50%
Gloves	1	6	7	88%
Long gloves	1	1	2	25%
Plastic sheeting	1	4	5	63%
Gauze swabs	1	6	7	88%
Cloth	1	1	2	25%
Number of complete delivery sets	Unknown	13	13	

s/s=stainless steel

Procedure packs for managing obstetric complications

Health facilities conducting deliveries must be well equipped to handle obstetric traumas that may occur during delivery. In addition there are other packs that are needed for assisted vaginal delivery, evacuation and removal of retained products of conception.

No facility had a complete obstetric trauma repair pack (**Table 5.22**). This shows that there is a great deal of improvisation using whatever is available during obstetric trauma repair. A vacuum extractor was available in the hospital and at only 3 HCs. The hospital had all types of obstetric forceps except the one for breech. Only 1 HC had any type of obstetric forceps. Overall, the hospital had a vacuum extractor and outlet and mid cavity forceps while no HC had this set of equipment. No facility had a complete set of items for a uterine evacuation pack. Complete manual aspiration packs were available in the hospital and in only 4 HCs.

Table 5.22: Availability of selected packs and items by type of facility

	Hospitals (n=1)	HCs (n=7)	Total (n=8)	
	Freq.	Freq.	Freq.	%
Episiotomy /Perineal /Vaginal / Cervical repair pack				
Sponge forceps	1	5	6	75%
Artery forceps large/small	1	2	3	38%
Needle holder	1	6	7	88%
Sutures	1	7	8	100%
Stitch scissors	0	1	1	13%
Dissecting forceps, toothed	1	3	4	50%
Vaginal speculum, large (Sims)	0	1	1	13%
Vaginal speculum (Hamilton Bailey)	0	2	2	25%
# facilities with all items above	0	0	0	0%
Vacuum extraction / forceps delivery			0	0%
Vacuum extractor with different size cups	1	3	4	50%
Obstetric forceps, outlet	1	1	2	25%
Obstetric forceps, mid-cavity	1	0	1	13%
Obstetric forceps, breech	0	0	0	0%
# facilities with vacuum extractor, outlet and mid-cavity forceps	1	0	1	13%
Uterine evacuation				
Vaginal speculum (Sims)	0	1	1	13%
Sponge (ring) forceps or uterine packing forceps	1	4	5	63%
Dissecting forceps, serrated jaws 250 mm s/s	0	4	4	50%
Forceps towel 48pprox.. 100 mm s/s	0	0	0	0%
Ovum forceps, 240 mm s/s	1	3	4	50%
Uterine forceps 3x4 teeth curved s/s	0	0	0	0%
Uterine forceps 241 mm s/s	0	2	2	25%
Uterine dilators, sizes 13-27	0	0	0	0%
Sharp uterine curettes, size 0 or 00	1	1	2	25%
Blunt uterine curettes, size 0 or 00	1	1	2	25%
Malleable metal uterine sound	0	1	1	13%
# facilities with all items above	0	0	0	0%
Manual vacuum aspiration				
Vacuum aspirators/syringes	1	4	5	63%
Silicone lubricant (for lubricating O-ring)	1	4	5	63%
Other oil (for lubricating O-ring)	1	4	5	63%
Flexible cannulae, 4 – 6 mm	1	4	5	63%
Flexible cannulae, 7-12 mm	1	4	5	63%
# facilities with syringes, one type of lubricant, and all cannulae	1	4	5	63%

s/s=stainless steel

Management of wounds is a common activity in maternity wards. Data were collected on the availability of the selected instruments that constitute a dressing set (**Table 5.23**). Additionally, table 5.23 shows the availability of gynaecological examination instruments.

The hospital was well equipped with wound dressing instruments and gynaecological equipment whereas HCs were poorly equipped with most of them lacking the listed items.

Table 5.23: Availability of selected dressing and gynaecological equipment by type of facility

	Hospitals (n=1) Freq.	Health Centres (n=7) Freq.	Total (n=8)	
			Freq.	%
Dressing Instrument Set				
Gally pot s/s	1	2	3	38%
Dissecting forceps 1x2 teeth 140 mm	1	2	3	38%
Needle holder, 180 mm s/s	1	3	4	50%
Scissors, sharp point straight 120 mm s/s	1	2	3	38%
Scissors, flat s/s curved 180 mm	0	2	2	25%
Sponge forceps holding s/s	1	3	4	50%
Sponge forceps – holding 200 mm	1	2	3	38%
Artery forceps, mosquito 130 mm straight s/s	1	2	3	38%
Gynecological Equipment				
SIMS or other type vaginal speculum	1	2	3	38%
Cuscos or other type speculum, virgin size 75x17 mm	1	1	2	25%
Cuscos or other type speculum, adult size	1	3	4	50%
Uterine sound, graduated 305 mm s/s	1	2	3	38%
Tenaculum	1	3	4	50%
Scissors, straight, sharp 145 mm s/s	1	2	3	38%

s/s=stainless steel

Basic and emergency newborn packs in maternities

Maternity wards must be equipped to deal with basic routine care of the normal newborn and be able to handle the newborn emergencies. The availability of equipment needed for the care of all newborns and some that are used for the care of newborns with common newborn conditions is presented in **Table 5.24**.

The hospital had all the supplies and equipment for newborn care except a rectal thermometer, IV fluid set for neonates and an apnoea monitor. Baby weighing scale was available at all facilities. One HC did not have a foetal stethoscope. Generally, HCS were poorly equipped or not equipped at all with supplies and equipment for management of newborn with complications care.

Ventilatory bags were available in in the hospital and at 6/7 HCs. The hospital did not have infant face masks but these were available at 6/7 HCs. An infant laryngoscope was missing at all facilities and no HC had a suction apparatus. Details are shown in **Table 5.24**.

Table 5.24: Availability of newborn supplies and equipment in maternities, by type of facility

	Hospitals (n=1) Freq.	Health Centres (n=7) Freq.	Total (n=8) Freq. %	
Supplies and equipment needed for newborn				
Foetal stethoscope	1	6	7	88%
Rectal thermometer for newborn	0	1	1	13%
Low reading thermometer (32 or 35 degree C)	1	1	2	25%
IV fluid (neonatal giving) set/umbilical catheter	0	2	2	25%
Baby weighing scale	1	7	8	100%
Neonatal resuscitating table	1	2	3	38%
Incubator	1	0	1	13%
Radiant warmer	1	1	2	25%
Icterometer	1	0	1	13%
Fluorescent tubes for phototherapy to treat jaundice	1	0	1	13%
Apnoea monitor	0	0	0	0%
Paladay / small cup for breast milk expression	1	0	1	13%
Towels or cloth for newborn	1	1	2	25%
Neonatal Resuscitation Pack				
Mucus extractor	1	6	7	88%
Infant face masks (sizes 0, 1, 2)	0	6	6	75%
Ventilatory bag	1	6	7	88%
Suction catheter 10, 12 Ch	1	3	4	50%
Infant laryngoscope with spare bulb & batteries	0	0	0	0%
Endotracheal tubes 3.5, 3.0	1	0	1	13%
Disposable uncuffed tracheal tubes (sizes 2.0 to 3.5)	0	0	0	0%
Suction apparatus: Foot – or electrically-operated	1	0	1	13%
Mucus trap for suction	1	3	4	50%

Maternity beds, linens and furnishing

The maternity should be well furnished with beds, delivery tables and other equipment so that delivery can be done in a safe and conducive environment for both pregnant women and their attendants. The results on maternity beds, lines and furnishings are presented in **Table 5.25**. The hospital was well furnished; having all the assessed items. Only 3/7 HCs had an instrument trolley. Most HCs 6/7 had a delivery table with stirrups. None of the HCs had an oxygen cylinder.

Beds were available at only 3/7 HCs but only 1 HC had linens. The hospital had empty beds for the next patients but only 1 HC had an empty bed. The hospital did not have any bed in storage but 3 HCs had beds in store; one of them having more than 5 beds. The hospital provided food for patients and none of the HCs provided this service. At 5 HCs liquid spills or trash could be observed on floors; implying poor cleanliness.

Table 5.25: Availability of selected furnishings and amenities in maternities, by type of facility

	Hospital (n=1)	Health centres (n=7)	Total (n=8)	
	Freq.	Freq.	Freq.	%
Furnishings				
Instrument trolley	1	3	4	50%
Instrument tray	1	1	2	25%
Blankets for cold weather	1	1	2	25%
Filled O ₂ cylinder with carrier + key to open valve	1	0	1	13%
Wheelchair	1	4	5	63%
Stretcher with trolley	1	3	4	50%
Examination table	1	3	4	50%
Labour/delivery table with stirrups	1	6	7	88%
Labour/delivery table without stirrups	0	2	2	25%
Bed availability and storage				
Beds	1	3	4	50%
Linens	1	1	2	25%
Empty beds for next patients are available	1	1	2	25%
Empty beds are clean and ready	1	0	1	13%
Facility has any beds in storage	0	3	3	38%
Facility has 1 – 5 beds in storage	0	2	2	25%
Facility has > 5 beds in storage	0	1	1	13%
Miscellaneous Items				
Food is provided to patients by facility	1	0	1	13%
Liquid spills or trash observed on floors	0	5	5	63%

5.5. Operating theatre

Only the hospital had an operating theatre. Availability of items and equipment in the operating theatre is as shown in appendices A and B

5.6. Laboratory equipment and supplies

This section on laboratory equipment and supplies deals with the availability of essential equipment and supplies at the facilities surveyed. Laboratory procedures require a variety of equipment and supplies that must be kept in a good condition. All the health facilities had a laboratory but only the hospital and 5/7 HCs had laboratory guidelines (**Table 5.26**).

The hospital was well equipped with equipment and supplies for blood transfusion; lacking only 20% bovine albumin and Hepatitis C test. On the other side, HCs were poorly equipped; none had a refrigerator, only 3 had a microscope slide, none had a compound microscope, 3 had reagents for blood typing and cross matching, 6/7 had HIV test kits and 4/7 had syphilis test kit. None of the HCs had the capacity for collection of blood, storage and transfusion.

Table 5.26: Laboratories with equipment and supplies for blood transfusion, by type of facility

	Hospitals (n=1)	Health centres (n=7)	Total (n=8)	
	Freq.	Freq.	Freq.	%
Facility has a laboratory	1	7	8	100%
Facility has set of guidelines for laboratory	1	5	6	75%
Equipment & Supplies for Blood Transfusions				
Refrigerator	1	0	1	13%
Test tubes – small size	1	1	2	25%
Test tubes – medium size	1	1	2	25%
Slides (microscope)	1	3	4	50%
Compound microscope	1	0	1	13%
Microscope illuminator	1	2	3	38%
Blood lancets	1	4	5	63%
Cotton wool	1	5	6	75%
Rack	1	5	6	75%
8.5 g/l Sodium Chloride solution	1	2	3	38%
20% Bovine albumin	0	0	0	0%
Centrifuge (electric)	0	3	3	38%
Centrifuge (hand driven)	1	2	3	38%
37° Water bath (or incubator)	1	0	1	13%
Pipettes Volumetric – 1 ml	1	1	2	25%
- 2 ml	1	1	2	25%
- 3 ml	1	1	2	25%
- 5 ml	1	1	2	25%
- 10 ml	1	1	2	25%
- 20 ml	1	2	3	38%
Pipette holder of 10 pieces	1	0	1	13%
Blood typing and cross-matching reagents	1	3	4	50%
Blood collection bags	1	0	1	13%
Airway needle for collecting blood	1	0	1	13%
Hepatitis B Test	1	0	1	13%
Hepatitis C Test	0	0	0	0%
HIV Test	1	6	7	88%
Syphilis Test	1	4	5	63%
Scale for blood collection	1	0	1	13%
Anticoagulant bottles	1	1	2	25%
Artery forceps	1	0	1	13%

Laboratory Supplies

The hospital was well stocked with laboratory supplies. The hospital had a microscope, measuring cylinders of various sizes, different stains a refrigerator, pipettes, a counting chamber, petri dishes, Spectrophotometer, Micro-haematocrit centrifuge, beakers etc. Only the hospital had a CD4 machine, May Grünwald stain and a Spectrophotometer. Many basic equipment and supplies were lacking in some HCs. All HCs were lacking one or more of the items assessed as shown in **Table 5.27**. Only 5/7 HCs had a microscope and only 1 had beakers. A haemoglobinometer was available at 2/7 HCs and 4/7 HCs had a refrigerator. Ammonia was not available at all facilities.

Table 5.27: Facilities with laboratory supplies, by type of facility

	Hospitals (n=1)	Health Centres (n=7)	Total (n=8)	
	Freq.	Freq.	Freq.	%
Microscope	1	5	6	75%
Immersion oil	1	6	7	88%
Glass rods	1	4	5	63%
Sink or staining tank	1	5	6	75%
Measuring cylinder (25 ml) polypropylene	1	4	5	63%
Measuring cylinder (50 ml) polypropylene	1	4	5	63%
Measuring cylinder (100 ml) polypropylene	1	4	5	63%
Measuring cylinder (250 ml) polypropylene	1	3	4	50%
Measuring cylinder (500 ml) polypropylene	1	2	3	38%
Wash bottle containing buffered water	1	3	4	50%
Interval timer clock with alarm	1	6	7	88%
Rack for drying slides	1	3	4	50%
Giemsa stain	1	6	7	88%
Wright stain	1	4	5	63%
May Grünwald stain	1	0	1	13%
Funnel and filter paper	1	4	5	63%
Methanol	1	6	7	88%
Refrigerator	1	4	5	63%
Glass containers	1	3	4	50%
Counting chamber (Differential counter)	1	5	6	75%
Pipette (5 ml)	1	2	3	38%
Pipette (graduated, 1.0 ml)	1	1	2	25%
Dropping pipette	1	4	5	63%
Cover slips	1	5	6	75%
Petri dishes	1	2	3	38%
Bowls, stainless steel, assorted sizes	1	3	4	50%
Turk diluting solution	1	1	2	25%
Tally counter	1	1	2	25%
Haemoglobinometer	0	2	2	25%
Spectrophotometer	1	0	1	13%
Microhaematocrit centrifuge (manual or electric)	1	4	5	63%
Scale for reading results	1	2	3	38%
Heparinized capillary tubes (75 mm x 1.5 mm)	1	3	4	50%

Table 5.27: Facilities with laboratory supplies, by type of facility (continued)

	Hospitals (n=1)	Health Centres (n=7)	Total (n=8)	
	Freq.	Freq.	Freq.	%
Spirit lamp	1	2	3	38%
Ethanol	1	6	7	88%
Dip stick	1	6	7	88%
Pyrex test-tubes	1	6	7	88%
Test-tube holder	1	5	6	75%
Beaker: 100 ml	1	1	2	25%
Beaker: 250 ml	1	1	2	25%
Beaker: 1000 ml	1	1	2	25%
Ammonia	0	0	0	0%
Lugol's iodine solution	1	1	2	25%
CD4 machine	1	0	1	13%

Facilities performing selected laboratory tests

The survey sought to collect information on performance of selected laboratory tests. The hospital was performing all the tests listed but there were gaps in performance of the tests at the HCs. Two HCs were not performing a blood film, 1 was not performing blood typing, and 3 were not performing haemoglobin; VDRL and blood sugar testing (**Table 5.28**)

Table 5.28: Facilities performing selected laboratory tests, by type of facility

Laboratory tests performed	Hospitals (n=1)	Health Centres (n=7)	Total (n=8)	
	Freq.	Freq.	Freq.	%
Urine for protein	1	7	8	100%
Blood group and Rh	1	6	7	88%
Blood film	1	5	6	75%
Haemoglobin	1	4	5	63%
VDRL	1	4	5	63%
Blood sugar	1	4	5	63%

6. Health facility infrastructure

Whereas good infrastructure doesn't guarantee quality services, it is impossible to provide quality care with poor infrastructure. Information on the availability of functioning utilities and access to communications and transportation was sought.

6.1. Ratio of beds to 1000 institutional deliveries

Maternity beds, delivery tables, and the sum of maternity beds and delivery tables were compared with the total number of institutional deliveries that occurred in the 12 month period before the assessment. The number of maternity beds per 1000 deliveries was 7 at the hospital and 27 at the HCs. The WHO recommended ratio is 24 beds per 1000 deliveries. Additionally there was one delivery couch for 1000 deliveries at the hospital and 27 couches per 1000 deliveries at the HCs. This shows that HCs are underutilized while the hospital had been overstretched beyond its capacity (Table 6.1).

Table 6.1: Ratio of maternity beds and couches to 1000 deliveries, by facility type

	Facility Type		Total
	Hospital	Health centre	
Total number of facilities	1	7	8
Number of institutional deliveries in July 2011-June 2012	3244	372	3616
Number of all beds	200	21	221
Number of maternity beds	24	10	34
Number of delivery couches	3	10	13
Ratio of maternity beds to 1000 deliveries	7	27	9
Ratio of couches to 1000 deliveries	1	27	4
Ratio of maternity beds plus delivery couches to 1000 deliveries	8	54	13

According to the Essential elements of obstetric care at first referral level (WHO, 1991) there should be 24 beds per 1000 deliveries in the maternity ward (for both prenatal and postnatal patients). The labour and delivery room should have 6-8 beds. Overall, therefore, the standard would be approximately 30-32 beds for every 1000 deliveries at a facility that would be considered 'first referral level.' This is the equivalent to a district level hospital for about 100,000 population.

6.2. Electricity and water

Electricity is important at health facilities as it ensures that there is sufficient light to attend to patients during the night and for running equipment. All the health facilities had electricity. The primary source of electricity was the national grid for the hospital and 7 HCs. Only one HC had solar as the primary source electricity. At all the health facilities, electricity was functioning at the time of the data collection. Only the hospital and two HCs had a back-up generator. However the back generator was functional only at the hospital. Three HCs and the hospital had electricity every day in the month before the survey.

Water is important in the maternity area as it is useful for cleaning instruments and the working environment, hand washing to prevent sepsis and for personal hygiene. Water was available at the hospital and at 5/7 HCs. Water was piped at all the facilities with water with the hospital obtaining its water mainly from an onsite borehole.

7. Referral system

A good referral system is important in ensuring that patients with complications that cannot be managed at the lower levels promptly and efficiently access care at higher levels. Communications and transportation are two key elements of a referral system and when used effectively can save the lives of women and their babies during pregnancy, childbirth and the postpartum period.

Availability for emergencies

Availability of emergency services and to facility that provides obstetrics surgery and newborn unit are as shown in Table 7.1. The hospital and 6/7 HCs provided emergency obstetric and newborn care every day for 24 hours. Only the hospital was providing obstetric surgery and had a functional newborn care unit. The median distance between the HCs and the hospital was about 14 Km and the median travel time was 30 minutes.

Table 7.1. Availability for emergencies and time to facility that provides obstetrics surgery and new-born unit, by type of facility

	Hospitals	Health Centres	Total	
	Freq.	Freq.	Freq.	%
Among all facilities	(n=1)	(n=7)	(n=8)	
Facility provides emergency obstetric and new-born care 24 hours a day, 7 days a week	1	6	7	88%
Facility provides emergency care for patients other than obstetric or new-born cases 24 hours a day, 7 days a week	1	7	8	100%
Facility provides obstetric surgery	1	0	1	13%
<i>Among facilities that don't provide obstetric surgery</i>				
Distance in KM to the nearest facility that provides obstetrics surgery				
Median	--	14	--	--
Minimum-Maximum	--	2-21	--	--
Time in minutes by motor vehicle to the nearest facility that provides obstetrics surgery				
Median	--	30	--	--
Minimum-Maximum	--	5-60	--	--
Facility has a functional new-born care unit	1	0	1	13%

Communication and transport

Only 50% of the facilities (the hospital and 3/7 HCs) had any official means of communication available on site (Table 8.2). All health facilities had cell phones owned by staff members but there was no facility with its own cell phone. At 63% of health facilities, staff used their own airtime and cell phones to make work related calls but none of the facilities had a policy of reimbursing staff for work related calls.

None of the health facilities had a functional ambulance (Table 7.2). The hospital had other vehicles on site which could be used for emergency transport of patients but none of the HCs had other motorized means of transportation.

For transporting an emergency patient, only the hospital had its own means of transportation. All the HCs (plus also the hospital) used an ambulance from a dispatch centre for maternity cases. The

dispatch centre was being operated by the Ethiopian Red Cross and special arrangements were in place for the health facilities to call the centre in case they need transport for an obstetric emergency.

Table 7.2. Facilities with a functional mode of communication and transport, by facility type

	Hospital	Health Centres	Total	
	Freq. (n=1)	Freq. (n=7)	Freq. (n=8)	%
Communication				
Functioning land telephone in maternity	1	0	1	13%
Functioning land telephone elsewhere in facility	1	3	4	50%
Functioning cell telephone owned by the facility	0	0	0	0%
At least one means of communication on site*	1	3	4	50%
Functioning public telephone in the vicinity	1	0	1	13%
Facility has cell telephone owned by staff	1	7	8	100%
There is a cell phone signal at facility	1	7	8	100%
Staff use own airtime for work related calls	1	4	5	63%
There is policy to reimburse staff for work related calls using own airtime	0	0	0	0%
Transportation				
Facility has any form of ambulance	0	0	0	0%
Facility has other motorized transportation for emergency transport of patients	1	0	1	13%
Strategies for transporting emergency patients				
Facility has own transport means	1	0	1	13%
Facility uses a dispatch centre (maternity related cases)	1	7	8	100%
Facility assumes patients will arrange their own transport (other cases)	0	7	7	88%

*cell phones privately owned by individual staff members not considered

Management & policies on referred out patients

Expenses of the woman or the newborn needed to be cleared first before referral out of the hospital (Table 7.3). At 4/7 HCs, this was not required and at 3/7 HCs, there were never expenses to be cleared. At the hospital, women, newborns family members and other patients were required to pay for transportation or fuel for emergency transportation out of the facility. At all the HCs, women were not required to pay for emergency transportation out of the facility, but family members of newborns or sick children and other patients were required to pay.

Table 7.3. Management & policies on patients referred out of the facility , by type of facility

	Hospitals	Health Centres	Total	
	Freq.	Freq.	Freq.	%
	(n=1)	(n=7)	(n=8)	
Facility ever refer a woman or new-born to another facility for care	1	7	8	100%
Expenses of a woman at the facility need to be cleared before referral				
Yes	1	0	1	13%
No	0	4	4	50%
There are never expenses	0	3	3	
Expenses of a new-born at the facility need to be cleared before referral				
Yes	1	0	1	13%
No	0	4	4	50%
There are never expenses	0	3	3	
Persons required to pay for transportation or fuel for emergency transport out of the facility				
Women in labour	1	0	1	13%
Women recently delivered at home	1	0	1	13%
Women recently delivered in this facility	1	0	1	13%
Families of newborns delivered in this facility with complications (pre-discharge)	1	7	8	100%
Families of newborns delivered in this facility with complications (post-discharge)	1	7	8	100%
Families of newborns delivered in other facilities or at home with complications	1	7	8	100%
A sick child's family	1	7	8	100%
A sick adult, illness unrelated to pregnancy	1	7	8	100%

Communication for referral

During referral, the hospital always called ahead to the higher level before making the referral. On the other hand no HC called ahead, only 1/7 occasionally called ahead and the rest (6/7) never called ahead to the higher level before making a referral **(Table 7.4)**.

None of the HCs received feedback on the patients referred to a higher level.

Table 7.4: Communication between facilities during referral, by type of facility

	Hospital Freq. (n=1)	Health Centres Freq. (n=7)	Total Freq. % (n=8)	
Frequency of calling ahead to the higher level facility before referring				
Always	1	0	1	13%
Sometimes	0	1	1	13%
Never	0	6	6	75%
How often feedback is received on referred out patients				
Always	0	0	0	0%
Sometimes	1	0	1	13%
Never	0	7	7	88%

Accompanying patients during referral

It was only at the hospital where staff always accompanied referred out patients. At 5 HCs, staff never accompanied referred out patients for various reasons including transport problems (2/5) and lack of a policy on accompanying patients (2/5) as shown in **Table 7.5**.

Table 7.5: Accompanying referred patients by type of facility

	Hospital Freq. (n=1)	Health Centres Freq. (n=7)	Total Freq. % (n=8)	
How often a staff accompanies referred out patients				
Always	1	0	1	13%
Sometimes	0	2	2	25%
Never	0	5	5	63%
Staff that accompanies the patient				
Midwife	0	2	2	25%
Nurse	1	0	1	13%
Among facilities where staff does not accompany patient		(n=5)	(n=5)	
Reasons why staff does not accompany patient				
Not enough staff	--	2	2	40%
No re-imbursement to health worker to return to facility	--	1	1	20%
Transport problem	--	2	2	40%
No specific policy on accompanying patients	--	2	2	40%

Pre-referral guidelines

Availability of pre-referral guidelines for various maternal and newborn complications was assessed. The hospital had all the guidelines but none of the HCs except one had a single guideline as shown in Table 7.6. All the available pre-referral guidelines were developed by the facility.

Table 7.6. Availability of pre-referral guidelines, by type of facility

	Hospital	Health Centres	Total	
	Freq. (n=1)	Freq. (n=7)	Freq. (n=8)	%
Antepartum bleeding	1	0	1	13%
Postpartum bleeding	1	0	1	13%
Severe pre-eclampsia / eclampsia	1	0	1	13%
Prolonged / obstructed labour	1	0	1	13%
Ectopic pregnancy	1	0	1	13%
Shock / sepsis	1	0	1	13%
Abortion complications	1	0	1	13%
Foetal distress	1	0	1	13%
Jaundice	1	0	1	13%
Asphyxia	1	0	1	13%
Low birth weight	1	1	2	25%
Newborn infection / sepsis	1	0	1	13%
Malformations	1	0	1	13%

Documenting referrals from facilities

None of the facilities was required to report on the number of patients referred out (**Table 7.7**). Only 50% of the facilities had a stand-alone logbook for referrals or indicated in the maternity register if a patient is referred out. The hospital and only 4/7 HCs always prepared a referral form to accompany the referred patient. The maternal condition the required referral out most HCs (6/7) was obstructed labour. At the hospital although pre-eclampsia/eclampsia was mentioned as the most common indication for referring out, in reality the hospital referred out an insignificant number of women or newborns. On the other side, the median number of patients referred out from the HCs was 2 and 1 for obstetric and newborn complications, respectively.

Table 7.7. Documenting referrals out and number of referrals out, by type of facility

	Hospital	Health centres	Total	
	Freq. (n=1)	Freq. (n=7)	Freq. (n=8)	%
Facility required to report on patients referred out	0	0	0	0%
Facility has stand-alone logbook for referrals out	1	3	4	50%
Staff indicate in the maternity register if patient was referred out	1	3	4	50%
How often the referral form that accompanies the patient is filled				
Always	1	4	5	63%
Sometimes	0	1	1	13%
Never	0	2	2	25%
The referral form is standard	1	5	6	75%
Period of pregnancy that generates most referrals				
Antepartum	0	1	1	13%
Perinatal	1	5	6	75%
Postpartum	0	1	1	13%
Most common maternal condition that requires referral out				
Prolonged/obstructed labour	0	6	6	75%
Pre-eclampsia/eclampsia	1	0	1	13%
Number of obstetrics complications referred out in a month	0	2*		
Number of new-borns referred out in a month	0	1*		
Number of children referred out in a month	0	2*		
Number of adults referred out in a month	0	5*		

*median

Management and policies on referrals coming into this facility

All health facilities received women/new-borns referred in (Table 7.8). Patients referred to the hospital did not always come with referral forms. Almost all HCs received women/newborns referred by health extension workers. Referred in women and newborns were not required to pay before receiving care at the HCs but at the hospital this depended on the circumstances. No facility was required to report on the number of patients referred in and only the hospital had designated places in the logbook to indicate that the patient had been referred in.

None of the health facilities received an advance notification about a referral in.

Table 7.8. Management & policies on patients referred in the facility, by type of facility

	Hospital	Health centres	Total	
	Freq. (n=1)	Freq. (n=7)	Freq. (n=8)	%
Facility receives women/new-borns referred in	1	7	8	100%
Facility receives referral from private facilities	1	1	2	25%
Referred patients regularly come with referral forms	0	3	3	38%
Facility receives women/new-borns referred by health extension workers	0	6	6	75%
Women referred in obstetric complications required to pay before treatment				
Yes	0	0	0	0%
No	0	7	7	88%
Depends on circumstances	1	0	1	13%
For a new-born referred in, family required to pay before treatment				
Yes	0	0	0	0%
No	0	7	7	88%
Depends on circumstances	1	0	1	13%
Facility providing the following to family members who accompany maternity patients not referred in				
Food	0	0	0	0%
Lodging	0	0	0	0%
Fuel	0	0	0	0%
Facility required to provide reports on number of patients referred in	0	0	0	0%
Staff designate in logbooks whether a patient was referred in	1	0	1	13%
Facility receives advance notice about referrals in				
Never	1	7	8	100%

Data on referred in patients

On average, the hospital received respectively, 75 and 15 referrals for obstetric and newborn complications in a month (**Table 7.9**). On the other hand, each of the HCs had received a median of 3 and 1 referrals for obstetric and newborn complications, respectively, per month. Data were not readily available on the number of children and adults referred into the hospital per month. The median number of children referred into the HCs per month was 3.

Table 7.9. Data on referrals in by type of facility

	Hospital Freq (n=1)	Health Centres Freq (n=7)
Number of obstetrics complications referred in in a month	75	3*
Number of new-borns referred in in a month	15	1*
Number of children referred in in a month	xx	3*
Number of adults referred in in a month	xx	6*

*median, xx: no data

Guidelines for management of referred in patients

The hospital had all the guidelines for managing referred obstetric and newborn complications, except for malformations (Table 7.10). Guidelines for management of referred in patients were virtually universally missing at the HCs. All the available guidelines were from the Ministry of Health and from the facility.

Table 7.10. Facilities with management guidelines for referred in patients, by type of facility

	Hospital Freq (n=1)	Health Centres Freq (n=7)	Total Freq (n=8)	
			Freq	%
Antepartum bleeding	1	0	1	13%
Postpartum bleeding	1	0	1	13%
Severe pre-eclampsia / eclampsia	1	1	2	25%
Prolonged / obstructed labour	1	0	1	13%
Ectopic pregnancy	1	0	1	13%
Shock / sepsis	1	0	1	13%
Abortion complications	1	1	2	25%
Foetal distress	1	1	2	13%
Jaundice	1	0	1	13%
Asphyxia	1	0	1	13%
Low birth weight	1	0	1	13%
Newborn infection / sepsis	1	0	1	13%
Malformations	0	0	0	0%

Discussion

This facility based survey involving 8 health facilities in Wolisso, Goro and Wonchi Woredas, assessed the capacity of the health system to deliver lifesaving interventions for obstetric and newborn complications. The assessment provides a snap shot of the availability, use and quality of maternal and neonatal health care services in the Woredas.

Out of the 8 facilities assessed, only the hospital was providing comprehensive emergency obstetric care. None of the HCs had performed all the 7 basic EmONC indicators to meet the qualification for basic EmONC. The required number of EmONC facilities for this population is 4, with 3 of them providing basic EmONC. There was therefore a serious shortage of basic EmONC facilities in the Woredas. These findings are in line with what has been found in previous assessment in Ethiopia and in other countries whereby very few HCs meet the criteria for basic EmONC [14-17]. Assisted vaginal delivery (AVD) and administration of anticonvulsants for pre-eclampsia/eclampsia were missing at all health centres assessed. Most EmOC surveys find AVG to be the most frequently missing signal function [15, 18]. AVD using vacuum or forceps extraction offers an option of managing certain situations of complicated delivery without resorting to caesarean delivery and can be life and resource saving [18]. In Ethiopia, Magnesium Sulphate was only introduced on the list of essential drugs a few years ago following a national EmONC needs assessment which found that the drug was not available in health facilities [16]. Subsequently, guidelines were produced (some of which could be seen at HCs) and training of staffs was initiated. It however seems like there is still a challenge in supplying the drug to HCs and ensuring that staffs have sufficient skills and courage to administer it when the need arises.

The most common reason for not performing EmONC signal functions was lack of an indication. This is not surprising given the extremely low utilisation at HCs. Given that obstetric complications are relatively rare, HCs need to serve a sufficient number of women to be able to get an opportunity of performing some of the signal functions. There is therefore need to focus attention on the community; to stimulate the demand to maternal health services. Without performing EmONC signal functions, HCs are unlikely to contribute towards reducing maternal and neonatal mortality.

Met need for EmOC is an indicator that provides understanding of the proportion of women with complications that had access to EmOC facilities. The met need for EmOC was lower than the recommended level (17.1% vs 100%). However, the situation in the study area is much better than the situation the national level where the met need for EmOC is only 3% [16], which highlights the challenge of meeting the need for EmOC in Ethiopia. Increasing the number of EmOC facilities, ensuring that they are well distributed and increasing their utilisation is the way to achieve this indicator. When met need is low, the incidence of complications such as ruptured uterus, obstetric fistula and severe birth asphyxia might rise.

A recent study at Wolisso hospital has shown that in this context of low utilisation of maternal health services, women utilising delivery services at the hospital are those who belong to the higher socio-economic groups with the poorest groups being massively underrepresented [19]. This is partly because of the long distance and high transport costs to the hospital. On the other hand,

unpublished data show that the poor are more likely to use the HCs than the hospital. This underscores the need to support EmOC service delivery at the HCs in order to reach the poor.

The population based caesarean section rate is a reflection of access to the highest level of maternity care since caesarean section occurs only in a comprehensive EmOC facility, which in this case is the hospital. Although the caesarean section rate of 2.3% is below the UN minimum threshold of 5%, it is higher than the 1.5% at the national level [4]; which implies a general low access to this life saving service in Ethiopia.

The direct obstetric case fatality rate is an indicator of quality of maternal care but it is always vulnerable to the quality of data collected at health facilities. The value for this indicator (0.9%) was within the acceptable threshold, indicating good quality care at the hospital. A recent in-depth assessment of the quality of maternal and newborn care at the hospital found the hospital to be providing good quality care [20]. The study also noted an improvement in the quality of care provided at the hospital over time. This was despite the general upward trend in the utilisation of delivery services at hospital. Intra-partum and very early neonatal care, which reflects the quality of intra-partum care, was 1.03%. This figure is however an underestimate given that women are discharged from the maternity 6 hours after delivery and it is not feasible to capture data on discharged newborns that die within 24 hours.

There was a shortage of doctors, particularly general practitioners, and midwives at the hospital. The lack of general doctors probably explains the availability of health officers who usually are supposed to work in HCs. Shortage of midwives at the hospital implies that their tasks have been taken over by nurses, which partly explains the large number of nurses. The large number of nurses is also due to the overall large volume of patients served by the hospital. Only 57% of HCs had at least two midwives and one health officer. Given the low utilisation of maternity services at the HCs, there is currently no justification for posting more staffs to the HCs. A maternity nurse/midwife at the hospital attends to about 29 deliveries per month while a midwife at the HCs attends to only 3 deliveries per month.

Assessment of the knowledge of maternity staff in maternal and neonatal health care with a focus of maternal and newborn emergencies revealed a lot of knowledge gaps across the board. Similar findings have been documented in other studies [21]. The health workers tended to perform well on questions related to focused antenatal care, diagnosis of labour and routine immediate newborn care. They however performed poorly on questions related to abortion care, diagnosis of newborn complications and care of a sick/low birth weight newborn.

Even though most staff had received training in providing various services, the proportion of those who had actually provided the services was much lower. This could be related to the low service utilisation at the HCs and hence lack of opportunities to provide the service. There is need to create an opportunity for staffs working at HCs to practice the skills they learnt pre-service to avoid skill loss. Having in place a continuous medical education program for staffs could go a long way in helping them update their knowledge.

The use of partographs to monitor the progress of labour permits early diagnosis and prevention of obstructed labour and stillbirths [22, 23]. One HC was not using partographs at all. Even in the HCs with partographs, the partographs were not in routine use and their completion was poor. Many

women at HCs were therefore not monitored using a partograph. It is however worth noting that some women came to the health facility quite late for labour monitoring using a partograph to be done. HCs tended to start charting the partograph late; 53% of partographs at HCs were started at 7 cm dilatation compared to 12% at the hospital. The proportion of partographs with the correct frequency of recording key observations was lower at the HCs than at the hospital; with the hospital performing very well. Overall there is need to strengthen labour monitoring using a partographs with a special focus on the HCs.

The study found the hospital to be generally well equipped and stocked with essential drugs and supplies for maternal and newborn care. But there were gaps with regards to these items at the HCs. Lack of equipment, supplies and drugs for obstetrics and newborn care can compromise the quality of care rendered. The use of magnesium sulphate is now considered the gold standard of care for the management of eclampsia [24], yet this essential drug was missing at all HCs. There is a need to address the issue of equipment, supplies and drugs with an emphasis on the HCs. Addressing the stock out at the central store is part of the solution. Because of the high utilisation of delivery services at the hospital, the ratio of maternity beds per 1000 deliveries is well below the UN recommendation which implies that the capacity of the hospital is being overstretched. Increasing delivery service utilisation at the HCs will reduce the workload at the hospital and contribute to further improvement in the quality of care provided at the hospital.

This study has highlighted weaknesses in the referral system for maternal and newborn complications in the study area. The current referral system is quite casual with no proper coordination between HCs and the hospital and between health posts, run by health extension workers, and the HCs. Patients referred from HCs are expected to arrange their own means of transportation and are not accompanied by staff. The low number of referred clients from HCs to the hospital points to the overall underutilization of services at HCs. There was a lack of clinical management protocols for obstetric and newborn care at HCs. Such protocols and guidelines are needed to improve the management of patients before referral and to help strengthen the referral system. Data on the number of clients referred were often missing at HCs due to lack of documentation. Besides, health workers were not required to report on such data. Monitoring and evaluating the function of the referral system relies on availability of data on this element and hence such data need to be collected. Local health authorities should also request for such data so as to monitor the functioning of the referral system. There was little communication between HCs and the hospital regarding referrals; HCs were not calling the hospital in advance and the hospital was not providing feedback to the HCs on the outcome of the referred patients. Some HCs were also lacking official means of communication and staffs were using their own phones and money to make calls for referral.

Conclusion and recommendations

Improvement in the availability, use and quality of maternal and neonatal health care in Goro, Wonchi and Wolisso Woredas calls for interventions at the health centre level. There is no EmOC in this region outside the hospital. The hospital has managed to maintain good standards despite the high demand for its services which is overstretching the available facilities and staff. In line with the findings of this study, the following recommendations can be made:

1. Increase the availability of EmONC through upgrading health centres to provide basic EmOC. This will partly involve training staff to perform basic EmOC signal functions and providing equipment, supplies and drugs necessary for basic EmOC. At least three HCs need to be upgraded to provide basic EmOC and contribute towards meeting the need for EmOC in the Woredas. The location of these facilities should be carefully thought to ensure that they are strategically located for the convenience of a majority and to ensure equity.
2. Increase utilisation of institutional delivery services with a focus on the HCs which are currently severely underutilised. For a facility to qualify as an EmOC provider, it must be used by a sufficient number of women besides having the staffs, equipment, supplies and drugs necessary for EmOC. Training of staffs and improvements in infrastructure, supplies, equipment and drugs is therefore not enough when talking about upgrading HCs to meet EmOC status. There is still need to stimulate demand for maternity services in the population by addressing barriers to access. This can be achieved through implementing proven interventions such as use of non-monetary incentives and community mobilisation. Increasing utilisation of delivery services at HCs will go a long way in helping to reduce the workload of staffs and the congestion at the hospital and will contribute towards further improvement in the quality of services at the hospital.
3. Continuous medical education for staffs to enable them to update their knowledge. This is particularly important for staffs working at HCs who attend to very few deliveries and hence face the risk of losing their previously acquired skills. The HC staffs need to be given an opportunity to practice obstetric life saving skills. Availing opportunities for HCs staffs to work at the hospital for a short period can be one way of achieving this. Further to this, there is need to establish a staff mentorship program whereby nurses and midwives at HCs regularly receive professional counsel and support from their senior counterparts at the hospital.
4. There is need for supervision and if necessary training of staffs at HCs on labour management using a partograph.

5. There is need to ensure availability of basic equipment, supplies and drugs necessary for emergency obstetric and newborn care according to the national guidelines.
6. There is need to strengthen the current referral system between the HCs and the hospital. This will involve a review of the current management and policies related to referral, ensuring that the HCs have access to an official means of communication, ensuring that HCs have access to a means of transporting patients to the hospital, providing both operational and clinical guidelines related to referrals and strengthening data collecting to monitor the functioning of the system.

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List of abbreviations

AMTSL	Active management of third stage of labour
ANC	Antenatal care
ARV	Anti-retroviral
CBR	Crude birth rate
CS	Cesarean section
D&C	Dilatation and Curettage
DHS	Demographic and Health Survey
DOCFR	Direct obstetric case fatality rate
EmOC	Emergency obstetrics care
EmONC	Emergency obstetrics and newborn care
GPS	Global positioning system
HC	Health center
HO	Health officer
IUD	Intra uterine device
IV	Intra-venous
PMTCT	Prevention of mother to child transmission
s/s	Stainless steel
MVA	Manual vacuum aspiration
SWSZ	South West Shoa Zone
UN	United Nations
WHO	World Health Organization

Appendix A: Availability of selected equipment and supplies in the operating theatre at the hospital

	1 = Available 0 = not available
Basic Items	
Operating table	1
Light- adjustable, shadow less	1
Surgical drapes	1
Syringes 5ml	1
Syringes 10ml	1
Syringes 20ml	1
Needles 21, 22, 23	1
Obstetric laparotomy / caesarean delivery pack	
Stainless steel instrument tray with cover	1
Towel clips	1
Sponge forceps, 22.5 cm	1
Straight artery forceps, 16 cm	1
Uterine haemostasis forceps, 20 cm	1
Needle holder	1
Surgical knife handle/No 3	1
Surgical knife handle/No 4	1
Surgical knife blades	1
Triangular point suture needles/7.3 cm/size 6	1
Round-bodied needles/No 12/size 6	1
Abdominal retractor/size 3	1
Abdominal retractors/double-ended (Richardson)	1
Curved operating scissors/blunt pointed (Mayo) 17cm	1
Straight operating scissors/blunt pointed (Mayo) 17cm	1
Scissors, straight, 23 cm	1
Suction nozzle	1
Suction tube, 22.5 cm, 23 French gauge	1
Intestinal clamps, curved (Dry), 22.5 cm	0
Intestinal clamps, straight, 22.5 cm	1
Dressing (non-toothed tissue) forceps/15 cm	1
Dressing (non-toothed tissue) forceps/25 cm	1
Sutures (different sizes and types)	1

Appendix B: Availability of anaesthesia equipment and supplies in the hospital's operating theatre

	1 = Available 0 = not available
Anaesthesia Equipment	
Anaesthetic face masks	1
Oropharyngeal airways	1
Laryngoscopes (with spare bulbs and batteries)	1
Endotracheal tubes with cuffs (8 mm)	1
Endotracheal tubes with cuffs (10 mm)	1
Intubating forceps (Magill)	1
Endotracheal tube connectors: 15 mm plastic (connect directly to breathing valve; three for each tube size)	0
Spinal needles (18-gauge to 25-gauge)	1
Suction apparatus: Foot-operated	0
Suction apparatus: Electric	1
Anaesthesia apparatus (draw-over system)	1
Oxygen cylinders with manometer and flow-meter (low flow) tubes and connectors	0
Craniotomy Equipment	
Decapitation hook Jardine's s/s	0
Craniotomy forceps Brawn's s/s	0
Perforator	0

s/s= stainless steel

4. Report Survey

“Knowledge, attitude, and practices related to maternal health services in South West Shoa Zone”

Knowledge, attitude, and practices related to maternal health services in South West Shoa Zone

A study report

October 2013



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List of abbreviations

ANC	Antenatal care
CI	Confidence interval
CUAMM	Collegio Univasitario Aspiranti Medici Missionari
HIV/AIDS	Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome
MCH	Maternal and child health
JHPIEGO	Johns Hopkins Program for International Education in Gynecology and Obstetrics
MDG	Millennium Development Goals
MMR	Maternal mortality ratio
NGO	Non-Governmental Organization
OR	Odds ratio
SPSS	Statistical Package for Social Sciences
SWSZ	South West Shoa Zone
TT	Tetanus toxoid
UNICEF	United Nations Children's Fund
WHO	World Health Organization

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Summary

Background: Ethiopia has one of the highest MMR worldwide: 676 per 100,000 live births. Monitoring maternal mortality is expensive and technically demanding. Coverage indicators are therefore used as good proxies to monitor mortality reduction. Skilled attendance at delivery is arguably the single most important factor in preventing maternal deaths. However in Ethiopia, most women still deliver at home due to various barriers of accessing care at health facilities.

Doctors with Africa CUAMM, a non-governmental organisation, is implementing a 3 year project to support public health activities in 3 woredas (districts) of South West Shoa Zone, Oromiya region. The project's aim is to improve the health of the population in the three districts with special attention to maternal and child health (MCH). One of the specific objectives of the project is to improve access to maternal, neonatal and perinatal services. This study was implemented to collect baseline data that will be used for planning, monitoring, and evaluation of the project.

The objectives of this study were: 1) to assess the coverage of maternal health services: antenatal; delivery; and postnatal care services; 2) to assess the knowledge of and attitude towards maternal health among women; 3) to assess birth preparedness among women; 3) to explore determinants of utilization of at least 4 antenatal care (ANC) visits; and delivery by skilled providers.

Methodology: The study was conducted in Wolisso, Wonchi and Goro districts in February 2013. The study subjects were 500 women aged 15-49 years who had delivered in the past 2 years prior to the survey. Data were collected through a cross sectional study design using a two-stage sampling that involved selection of primary sampling units (villages) by probability proportionate to size, and random selection of secondary sampling unit (households) using "spin the pen" method. Data were collected by trained data collectors drawn from the Public Health Department of St. Luke Hospital and the health departments of the three districts. Characteristics of participants, knowledge, attitude, practices related to maternal health were summarized using descriptive statistics. Principal component analyses were used to construct wealth and an attitude score indices. Crude and adjusted odds ratios for determinants of at least 4 ANC visits, and delivery by a skilled provider were computed using logistic regression.

Results: Most women (78.8%) attended at least one ANC visit but only 45.5% completed the minimum required four visits. Among women who attend ANC, 91.3% had blood pressure checked, 82.5% had a blood sample taken, 75.5% had a urine sample taken, and 74.1% had all the three components done. Coverage of two doses of tetanus toxoid during pregnancy was 70%. Only 28.6% of women were attended to by a skilled provider at delivery; 3.7% delivered by caesarean section; and 21.8% received postnatal care in 2 days. Most infants (69.3%) were breastfed within one hour after birth. Less than half of the women knew about the minimum required number of ANC visits; 23.3% mentioned at least 3 danger signs of pregnancy; and 13.4% were well prepared for the birth of the baby. About a third of the women perceived that the quality of maternal health services at the nearest health centre/hospital was average or poor.

Utilisation of 4 ANC visits was associated with wealth index, age, and having the correct knowledge about the required number of ANC visits. On the other hand, the determinants of skilled birth attendance were: place of residence, wealth quintile, parity, marital status, time to the nearest health centre/hospital, experience of pregnancy related problems, attendance of at least 4 ANC

visits, having correct knowledge on the required number of ANC visits, perceived quality of care at nearest health centre/hospital, final decision maker on where to deliver, and delivery preparedness.

Conclusions: There is need to create more awareness about antenatal care and emphasize the minimum required number of ANC visits. All pregnant women should be encouraged to have a birth and complication readiness plan. Service delivery at health facilities, especially at health centres should be improved. Apart from increasing coverage, improving service delivery at health centres will contribute towards reduced inequity. There is need to target and support non-married women who may be disadvantaged by the established cultural norms. Community mobilisation targeting not only women but also their husbands, families and the entire community for their involvement in maternal health should be strengthened. Gainfully engaging traditional birth attendants to refer women to deliver in health facilities has the potential to increase institutional delivery.

Introduction

The fifth millennium development goal (MDG) aims to improve maternal health, with a target of reducing maternal mortality ratio (MMR) by 75% between 1990 and 2015. Globally, an estimated 287,000 maternal deaths occurred in 2010; a decline of 47% from the 1990 estimate [1]. Sub-Saharan Africa accounted for 56% of the global burden of maternal deaths. This region had the highest MMR at 500 maternal deaths per 100 000 live births [1].

Ethiopia has one of the highest MMR worldwide: 676 per 100,000 live births [2]. The high MMR positions the country among the 6 countries that contribute to more than 50% of all maternal deaths worldwide [3]. Ethiopia is also among the 10 countries with the highest numbers of intrapartum-related neonatal deaths and intrapartum stillbirths [4]. The country has a neonatal mortality rate 37 per 1000 live births, with little reduction since the year 2000 [2], and is one of the five countries that contribute to half of Africa's newborn deaths.

Monitoring maternal mortality is expensive and technically demanding. Coverage indicators are therefore used as good proxies to monitor mortality reduction. Increases in coverage signify that policies and delivery strategies are successfully reaching target populations [5]. The high maternal mortality in Ethiopia is reflective of the low coverage of good quality key maternal health services. At the national level, 42.6% of women attend at least one antenatal care (ANC) visit but only 19.1% complete the recommended four visits. Gaps in the quality of ANC services received exist: among women who attend antenatal care, only 20% are informed about signs of pregnancy complications; 71.6% get a blood pressure check; 41.3% have a urine sample taken; and 54% have a blood sample taken. The contraceptive prevalence rate is 28.6% and only 10% of deliveries are attended to by skilled providers, with 1.5% of all deliveries being done by cesarean section. A very small percentage of delivering women (6.7%) receive postnatal care within 2 days of child birth [2]. About a half of newborns (52%) are breastfed within one hour and 52% of children aged less than 6 months are exclusively breastfed [2].

In Ethiopia, health system resources are scarce: total health expenditure per capita per year is around 16 US dollars [6]. The ratio of midwives per 5000 population is 0.08 [7]; way below the WHO recommended ratio of 1/5000. Even though the Ethiopian Government has in the past launched various Health Sector Development Programmes to address the health challenges faced by the country, such programmes have suffered from implementation problems [8].

Skilled attendance at delivery is arguably the single most important factor in preventing maternal deaths [9]. However in Ethiopia, most women still deliver at home due to various barriers of accessing care at health facilities. Studies in the country have found that being in a rural area, having no education, being in lower wealth group, being older, having a higher parity, staying far away from the health facility, not attending ANC, and not having knowledge about pregnancy related services are some of the factors associated with low utilisation of skilled delivery by a health professional [10-16]. However, some factors such as decision making regarding place of delivery and birth preparedness have rarely been assessed. Few studies have looked at determinants of ANC utilisation; an important strategy of improving maternal health.

This survey was conducted in order to provide baseline data for a three year public health project funded by the Italian International Cooperation in Wolisso, Goro and Wonchi districts, and implemented by the NGO Doctors with Africa CAUMM. One of the objectives of this project is to improve access to maternal, neonatal and perinatal health services. A household survey done in 2008 in 5 Kebeles (villages) of 5 Woredas (districts) of South-West Shoa Zone found that 64.8% of women attended two antenatal visits, 16.2% delivered in health facilities and 18.8% made a postnatal visit at a health facility [17]. Little is however known about the determinant of utilization of maternal health services in South West Shoa Zone. This assessment provides a baseline upon which progress towards delivering maternal health services in the 3 districts will be monitored and evaluated.

Study objectives

1. To assess the coverage of maternal health services: antenatal, delivery and postnatal care services
2. To assess the knowledge of and attitude towards maternal health among women
3. To assess birth preparedness among women
4. To explore determinants of utilisation of at least 4 antenatal care visits, and delivery by skilled providers

Methodology

Study area

This study was conducted in Wolisso, Goro and Wonchi Woredas (districts) of South West Shoa Zone (SWSZ), Oromiya region. The three Woredas have a combined population of about 372,478 inhabitants. The Woredas are served by one hospital, 16 health centres, and several community health posts. The hospital also serves as the main referral health facility for the entire zone. In Ethiopia, delivery care services are usually provided at HCs and Hospitals.

Study design and population

This is a cross sectional study of women of reproductive age (15-49 years) who had delivered in a period of two years prior to the survey.

Sample size and sampling

The sample size was estimated using the formula: $n = 1.96^2 pq / d^2$; where p is the institutional delivery coverage in the three Woredas, estimated to be 20%; q is (1-p); and d is an alpha value of 0.05 for a 95% confidence interval. The sample size was further adjusted for a design effect 1.8 and a non-response rate of 10%. This yielded a minimum required sample size of 490 women.

Multistage sampling was used to select study subjects. The first stage involved selection of Kebeles (villages) by probability proportionate to size, and the second stage involved selection of women to interview. The calculated sample size was allocated in proportion to the population in each Woreda. Within each Woreda, Kebeles to be visited were selected by probability proportionate to size. With this sampling method, Kebeles with higher populations are more likely to be selected. Because of resource constraints, to achieve the sample size, it was decided that only 25 Kebeles would be selected and 20 women will be drawn from each selected Kebele. Within each Kebele, “spin the pen method” was used to decide which households to visit. This involved identification of the centre of the Kebele, and spinning the pen to identify the random walking direction. Once this had been done, one team began walking from the centre and visited consecutive households in the direction of the pen and another team went to the end of the Kebele and visited consecutive houses towards the centre. This ensured that women who stayed both in the middle and at the end of the Kebele were included. Each team interviewed 10 eligible women per Kebele. No household had more than one eligible woman to warrant further sampling at this stage.

Survey team and implementation

Data were collected by four survey teams, each composed of two data collectors. The survey teams visited two Kebeles in a day, i.e. two teams per Kebele. One supervisor was in charge of two teams. The data collectors were drawn from the Public Health Department of St. Luke Hospital and from the Woreda health departments. The data collectors had been trained both theoretically and practically on data collection.

Data collection tools

Data were collected through interviewer administered questionnaires. The questionnaires were developed from the UNICEF’s Multiple Cluster Indicator Survey questionnaires and from JHPIEGO’s tools for monitoring birth preparedness and complication readiness [18]. Two questionnaires were used: a household questionnaire which collected data on household characteristics, asset ownership

and access to water and sanitation facilities; and a women's questionnaire which collected data on characteristics of women, various aspects of maternal health, and breast feeding. The questionnaires were completed in English but interviewers used Oromo language translated versions to interview.

Data management and analysis

Data processing started in the field with the supervisors checking and editing each questionnaire. Further verification and editing was performed by the supervisors at the project office located at St. Luke hospital in Wolisso. Two trained data entry clerks double entered the data using EpiData version 3.1. Data were then validated and exported to Stata 12 for cleaning, recoding and analysis.

Descriptive statistics

The probability proportionate to size method described above resulted into oversampling in urban areas. To account for this, the data were weighted. The weights were the inverse of the probability of selection in each area (urban/rural). Stata commands that account for survey design and weighting were used for analysis. Data on characteristics of households and women, utilisation of antenatal; delivery; and postnatal services, birth preparedness, initiation of breastfeeding, and attitude towards maternal health were summarised using descriptive statistics. Additionally, factor analysis was performed using SPSS to derive wealth quintiles and attitude score tertiles. The wealth quintiles were based on factor analysis of household assets, housing material, and access to water and sanitation services. Attitude score tertiles were based on factor analysis of 8 Likert scale statements that were designed to assess attitude on 3 aspects of maternal health: birth preparedness, male involvement, and barriers to institutional delivery. The presented percentages are weighted but the frequencies are un-weighted.

Inferential statistics

Analyses of determinants of access to antenatal and delivery by skilled health personnel were done.

Outcomes

Two outcome variables were considered: at least 4 ANC visits by a health professional or a health extension worker, and delivery care by a skilled birth attendant (doctor, nurse, midwife, or health officer).

Independent variables for these analyses were:

Woreda (Wolisso, Goro, Wonchi); residence (urban, rural); wealth index (poorest, second, middle, third, richest); number of household members (2-3, 4-5, >5), age of the woman (15-24, 25-29, 30-34, 35-49), parity (1, 2-3, 4-5, >5), woman's education (none, primary, secondary), partner's education (none, primary, secondary), marital status (married, single), ethnicity (Oromo, others), and religion (Orthodox Christian, Protestant, Muslim). Other variables included: distance to the nearest health centre/hospital (<30 min, 30-60, >60), knowledge of the required number of ANC visits, knowledge of at least 3 danger signs of pregnancy, maternal health attitude score tertile (poor, middle, high) ownership of a radio/television. In looking at determinants of delivery by skilled health provider, the following additional variables were considered: attendance of at least 4 ANC visits, experience of a pregnancy related health problem, final decider on delivery place (women alone, woman and the partner, partner alone/other family member), and well prepared for the birth of the baby. The later

was determined by whether the woman had made any 2 of the following arrangements in anticipation of the birth of the baby [18]: identified transport, saved money, identified blood donor, decided where the baby will be born, and identified skilled provider.

Logistic regression models were used to obtain crude and adjusted odds ratios with 95% confidence intervals (CIs) for the associations between independent and outcome variables. Variables with $p < 0.1$ in crude analysis were included in adjusted analysis. The significance of each variable in the model was assessed using an F test; which is a χ^2 test adjusted for the survey design [19]. All $p < 0.05$ values were considered statistically significant.

Ethical considerations

The study protocol was approved by the Oromiya Regional Institutional Review Board. Health authorities in the participating Woredas and the South West Shoa Zonal Health Office also provided permission to conduct this study. At the household level, the purpose of the study was explained to the participants and verbal informed consent was obtained. Confidentiality of the collected data was ensured.

Results

Characteristics of households

Data were collected from 500 women. Slightly more than half of them were from households utilising improved water sources (Table 1). One third of women were from households with no toilet facility, and a big majority were having houses with an earth/dung floor. A radio, a mobile phone, and mosquito net were available in 54.0%, 53.2% and 37.3% of households, respectively. Electricity was available in just below a third of the households whilst a bicycle was available in only a few households.

Table 1: Percent distribution of women with a delivery in the past two years according to housing characteristics and asset ownership, by Woreda

Characteristics	Wolisso	Goro	Wonchi	Total
Source of drinking water				
Improved sources	49.3	62.9	59.4	53.5
Unimproved sources	52.3	37.1	40.6	46.5
Type of toilet				
Flush toilet	2.4	0	0	1.3
Pit latrine	5.5	75.0	81.8	65.4
No facility/bush	43.1	25.0	18.9	33.3
Floor material				
Earth/dung	94.3	100.0	91.0	94.2
Wood planks	0	0	8.3	2.4
Cement	5.7	0	0.8	3.4
Asset ownership				
Has electricity	38.6	13.2	17.6	28.6
Has a radio	51.7	62.3	54.0	54.0
Has a television	12.8	3.5	7.5	9.8
Has a bed with a mattress	27.0	14.8	15.5	21.7
Has a table	48.8	23.0	56.7	47.0
Has a watch	25.3	24.5	39.4	29.2
Has a mobile telephone	58.1	46.3	47.5	53.2
Has a bicycle	3.2	2.3	1.7	2.6
Has an animal drawn cart	1.0	0	3.8	1.7
Has a mosquito net	37.2	68.5	20.4	37.3
Total %	100.0	100.0	100.0	100.0
Number of women	280	80	140	500

Wealth index

Factor analysis was conducted using all the variables in table 1 above to construct a wealth index. Women were then classified into wealth quintiles based on factor scores. Results in **Table 2** show that women dwelling in urban areas were more likely to belong to higher wealth groups compared to women in rural areas: 78.6% of urban dwellers belonged to the highest wealth quintile compared to only 10.3% of rural dwellers, and 46.3% of rural dwellers belonged to the lowest two wealth quintiles compared only 0.1% of urban dwellers.

Table 2: Percent distribution of women by wealth quintiles, according to residence and Woreda

Residence/ Woreda	Wealth quintiles					Total	Number of women
	Lowest	Second	Middle	Fourth	Highest		
Residence							
Urban	0.0	0.1	5.5	15.5	78.6	100.0	100
Rural	23.0	23.3	22.3	21.0	10.3	100.0	400
Woreda							
Wolisso	22.8	14.7	16.7	19.8	26.0	100.0	280
Goro	12.4	34.4	28.7	16.1	8.4	100.0	80
Wonchi	18.0	23.0	21.5	23.0	14.4	100.0	140
Total	19.8	20.2	19.9	20.2	19.9	100.0	500

Characteristics of women

Most of the women were staying in rural areas. The mean household size was 5.5 with no major differences across the Woredas. Almost 50% of the women had a household size of more than 5 members. The women had a mean age of 27.7 years and 19.8% of them had a parity of more than 5. Slightly more than a half had no education but a majority (77%) had a partner with at least primary level education. Most of the women were married (96.4%); of Oromo tribe (86.6%); and were Orthodox Christians (51.8%). However, in Goro, a majority (77.6%) were Muslims. About a third of the women stayed less than 30 minutes away from the nearest health facility with delivery care services but for 42.4%, the nearest facility that provides delivery care was at least 60 minutes away. The youngest child for slightly more than a half of the women was aged less than 1 year. The characteristics of women are summarised in **Table 3**.

Table 3: Percent distribution of women with a delivery in the past two years according to socio-demographic characteristics, by Woreda

Characteristics	Wolisso	Goro	Wonchi	Total
Residence				
Urban	14.8	17.5	9.9	13.8
Rural	85.2	82.5	90.2	86.2
Household size				
Mean (SE)	5.4 (0.19)	5.7(0.31)	5.7 (0.15)	5.5 (0.12)
2-3	18.6	16.3	13.7	16.8
4-5	35.6	34.0	34.2	35.0
>5	45.8	49.7	52.2	48.3
Age in years				
Mean (SE)	27.4 (0.36)	26.6 (0.39)	28.9 (0.42)	27.7 (0.29)
15-24	32.5	19.9	17.6	26.3
25-29	32.2	53.3	38.2	37.2
30-34	17.3	17.8	21.7	18.6
>34	18.0	9.1	22.5	17.9
Parity				
1	21.4	18.0	17.6	19.8
2-3	31.5	28.6	25.4	29.3
4-5	28.8	33.3	34.5	31.1
>5	18.3	20.1	22.5	19.8
Woman's education				
None	44.7	75.2	54.6	52.3
Primary	41.2	22.1	37.8	37.2
Secondary/higher	14.2	2.6	7.6	10.5
Partner's education				
None/no partner	24.1	28.4	17.8	23.0
Primary	51.2	65.8	63.0	56.8
Secondary/higher	24.7	5.9	19.3	20.2
Marital status				
Married	92.3	98.3	97.8	96.4
Not married	4.8	1.7	2.2	3.6
Ethnicity				
Oromo	82.5	77.6	99.5	86.6
Others	17.5	22.4	0.5	13.4
Religion				
Orthodox Christian	62.8	19.6	48.2	51.8
Protestant	16.2	2.8	51.9	24.3
Muslim	21.0	77.6	0	23.8
Time to nearest facility				
< 30 minutes	36.3	39.5	26.2	33.9
30-59 minutes	20.9	28.9	26.5	23.7
≥ 60 minutes	42.8	31.6	47.3	42.4
Age of youngest child				
<12 months	57.0	56.8	50.8	55.2
≥ 12 months	43.0	43.3	49.2	44.8
Total %	100.0	100.0	100.0	100.0
Number of women	280	80	140	500

Antenatal care

Slightly less than a half of women had correct knowledge on the required minimum number of antenatal care (ANC) visits during pregnancy (Table 4). The proportion of women with correct knowledge on the number of ANC visits was highest in Wolisso and lowest in Goro. Overall, 78.8% of women attended at least 1 ANC visit during the previous pregnancy but only 45.5% attended the recommended 4 visits. Among women who attended any ANC visit, 93% received care from a health professional (a nurse, a doctor, a midwife or a health officer) and the rest received care from a health extension worker. Among women who attended ANC, 91.3% had blood pressure checked, 82.5% had a blood sample taken, 75.5% had a urine sample taken and 74.1% had all the three components done. The proportion of women who had all the three components done was highest in Wolisso and lowest in Wonchi. Table 4 further shows that 70% of women received two doses of tetanus toxoid vaccine during their last pregnancy.

Table 4: Percent distribution of women by antenatal care knowledge; number of visits; person providing care; components of care, and tetanus toxoid immunization during pregnancy, by Woreda

	Wolisso	Goro	Wonchi	Total
Has correct knowledge on number of ANC visits	51.5	39.5	48.8	48.8
Antenatal care coverage				
At least 1 visit	75.6	90.4	78.5	78.8
At least 2 visits	72.9	85.9	74.7	75.5
At least 3 visits	67.1	72.1	67.2	67.9
4 or more visits	46.0	48.0	43.2	45.5
Number of women	280	80	140	500
Person providing antenatal care				
Health professional	94.0	90.9	92.3	93.0
Health extension worker	6.0	9.1	7.7	7.0
Components if antenatal care				
Blood pressure measured	96.9	83.8	85.6	91.3
Blood sample taken	91.8	78.8	67.5	82.5
Urine sample taken	88.2	70.1	55.0	75.5
All the three done	87.7	65.7	54.1	74.1
Number of women	217	73	111	401
Tetanus toxoid immunization				
Received at least 1 TT injection	74.0	86.8	74.3	76.0
Received two doses of TT injection	67.3	79.5	70.0	70.0
Number of women	280	80	140	500

Reasons for not attending any antenatal care

Women who had not attended any antenatal care (n=99), were asked why they had not done so (Figure 1). The most frequently mentioned reasons were: it was not necessary, the facility was too far or there was no means of transportation, it was not customary, and the pregnancy had no problem.

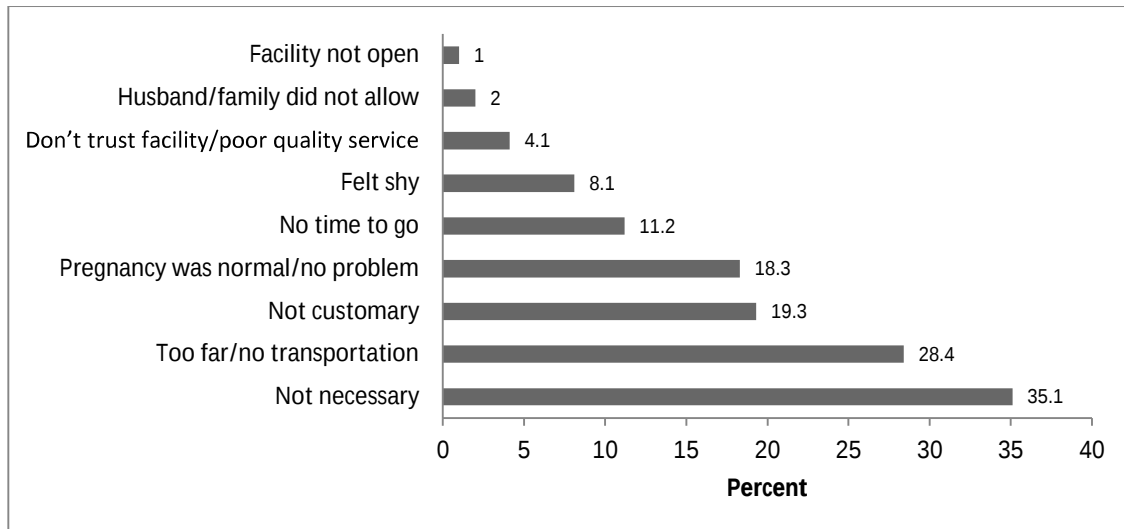


Figure 1: Percent distribution of women by reasons for not attending antenatal clinic

Complications during pregnancy

Women were also asked if they experienced any pregnancy related complication during the previous pregnancy, and the type of complications they had experienced. A total of 96 women had experienced any one of the complications in Figure 2 below. The most frequently experienced complications were: anaemia/pallor/fatigue, sharp abdominal pain, and hypertension/headache/fits.

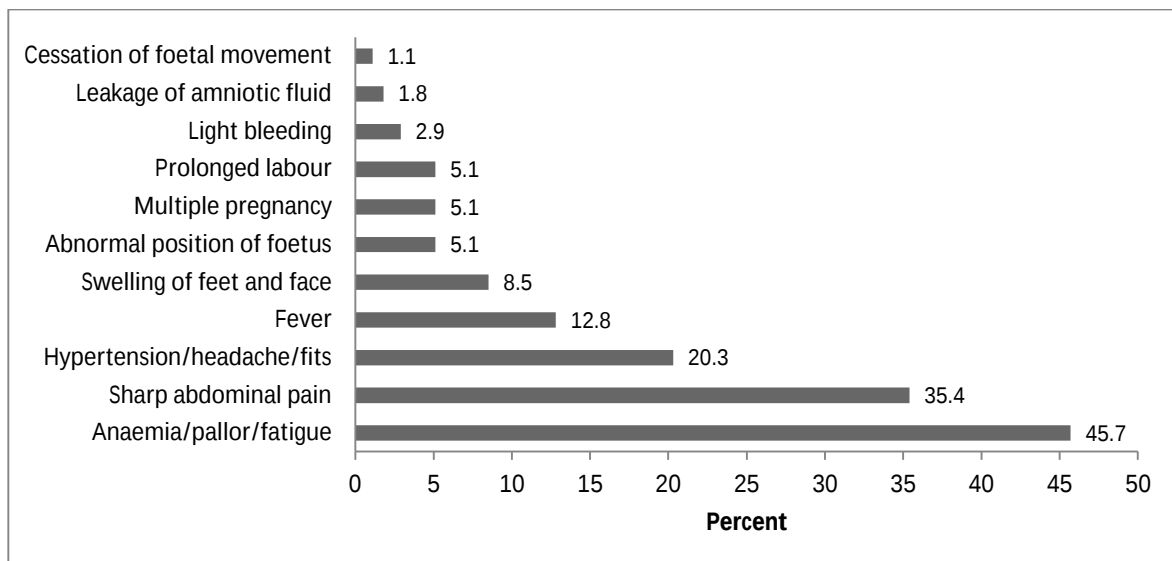


Figure 2: Percent distribution of women by pregnancy related problem experienced

Delivery care

Only 28.6% of women were assisted by a health professional during their last delivery, and 28.5% delivered in a health facility (Table 5). The proportion of women who were assisted by a health professional was lowest in Wonchi and highest in Wolisso. Most women were assisted by a traditional birth attendant (TBA) and a significant proportion was assisted by a relative/friend. Coverage of delivery by caesarean section was 3.7%; and was highest in Wolisso and lowest in Goro; though, this is based on small numbers.

Table 5: Percent distribution of women by person assisting during delivery, place of delivery and delivery by caesarean section, by Woreda

	Wolisso	Goro	Wonchi	Total
Person assisting during delivery				
Health professional	32.7	30.5	19.7	28.6
Health extension worker	1.2	0	1.5	1.1
Traditional birth attendant	49.9	46.2	67.6	54.4
Relative/ friend	15.5	22.4	10.5	15.1
No one	0.8	0.9	0.8	0.8
Place of delivery				
Home	67.3	69.5	80.8	71.5
Health facility	32.7	30.5	19.2	28.5
Delivered by caesarean section	4.2	1.4	4.0	3.7
Number of women	280	80	140	500

Reasons for not delivering in a health facility

Women who did not deliver in a health facility (n=336) were asked for the reasons behind this. The most common reasons provided in descending order included: labour was urgent, too far/no transportation, not necessary, and not customary (Figure 3).

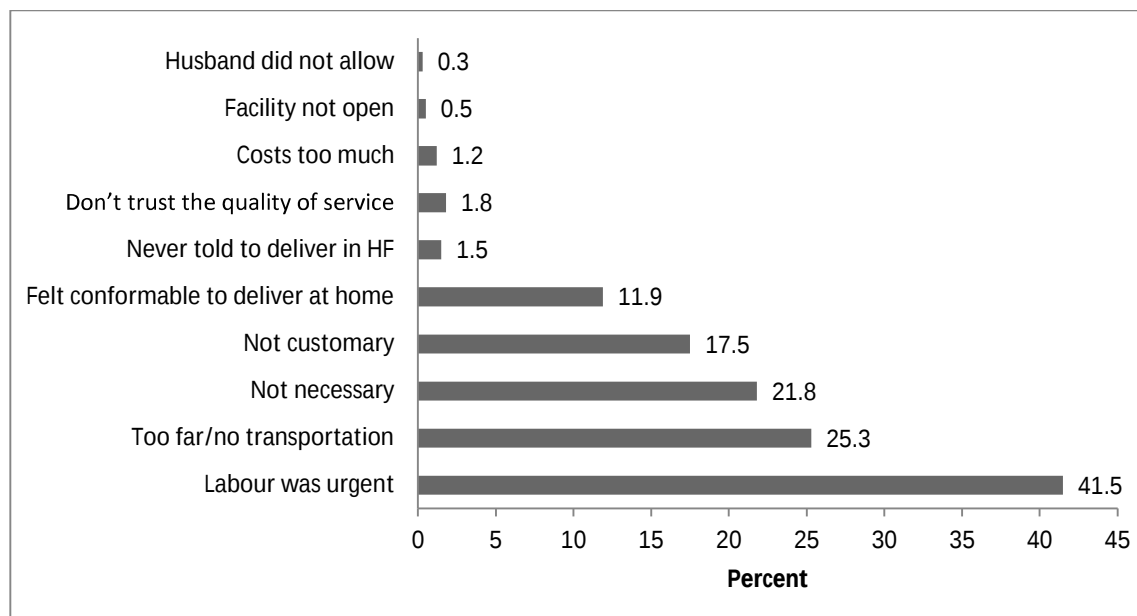


Figure 3: Percent distribution of women by reasons for not delivering in a health facility

Birth preparedness

Slightly more than half of the women had made any special arrangements in anticipation for the birth of the baby (Table 6). The special arrangements considered include identifying transport, saving money, identifying a blood donor, deciding where the child will be born, and identifying a skilled provider. Saving money was the most common special arrangement made followed by deciding where the child will be born. Women who had made at least two special arrangements were regarded as being well prepared for birth. Overall, 13.4% of women had made at least two arrangements. The proportion of those who were well prepared was highest in Goro and lowest in Wolisso.

Women were also asked about the person who made the final decision on where the baby should be born. The final decision maker on place of delivery was the woman herself for 41.1% of respondents, and both woman and husband for 41.5% of respondents. Only 5% of respondents mentioned that another family member made the decision.

Table 6: Percent distribution of women by birth preparedness and the person who made the final decision on place of delivery, by Woreda

	Wolisso	Goro	Wonchi	Total
Made any special arrangements for birth				
Yes	55.2	62.3	48.6	54.4
No	44.8	37.8	51.4	45.6
Special arrangements made				
Identify transport	5.0	7.3	5.2	5.4
Save money	52.6	60.0	47.1	52.2
Identify blood donor	0.6	0.0	0.0	0.4
Decide where the child will be born	11.5	13.9	9.0	11.1
Identify skilled provider	3.8	7.3	7.1	5.3
Well prepared for birth (≥ 2 arrangements)	11.5	19.4	13.8	13.4
Final decider of where to deliver				
The woman	41.7	45.5	37.6	41.1
The husband	5.9	22.8	19.3	12.4
Both woman and husband	46.5	26.3	40.2	41.5
Other family member	5.9	5.5	3.0	5.0
Number of women	280	80	140	500

Postnatal care

Only 21.8% of women had received any postnatal care from a health extension worker or a health professional within the first two days of delivery (Table 7). Among women of had received postnatal care, 93.1% had received postnatal care from a health professional and the rest from a health extension worker.

Table 7: Percent distribution of women by postnatal care attendance, timing and staff providing postnatal care, by Woreda

	Wolisso	Goro	Wonchi	Total
Received any postnatal care				
No	69.3	74.0	73.0	71.1
Yes	30.6	26.0	27.0	28.9
Postnatal care in first 2 days				
No	74.0	81.6	84.3	78.2
Yes	26.0	18.4	15.7	21.8
Number of women	280	80	140	500
Provider of postnatal care				
Health professional	95.5	100	81.0	93.1
Health extension worker	4.5	0	1.9	6.9
Number of women	83	17	26	126

Initiation of breastfeeding

Almost all the women had ever breastfed their youngest child (Table 8). However, only 69.3% had initiated breastfeeding within the first one hour after delivery.

Table 8: Percent distribution of women by having ever breastfed the last born child and timing of breastfeeding, by Woreda

	Wolisso	Goro	Wonchi	Total
Ever breastfed youngest child				
Yes	99.4	100	98.5	99.2
No	0.6	0	1.5	0.8
Breastfed within one hour				
No/don't know	30.0	33.6	30.5	30.7
Yes	70.0	66.4	69.5	69.3
Breastfed within one day				
No/don't know	5.2	0	6.5	4.8
Yes	94.8	100	93.5	95.2
Number of women	280	80	140	500

Coverage of health interventions along the continuum of care

Figure 4 summarises the coverage of maternal and new-born interventions along the continuum of care in Wolisso, Goro and Wonchi woredas. The figure shows coverage gaps of key interventions as well as missed opportunities with regards to components of antenatal care.

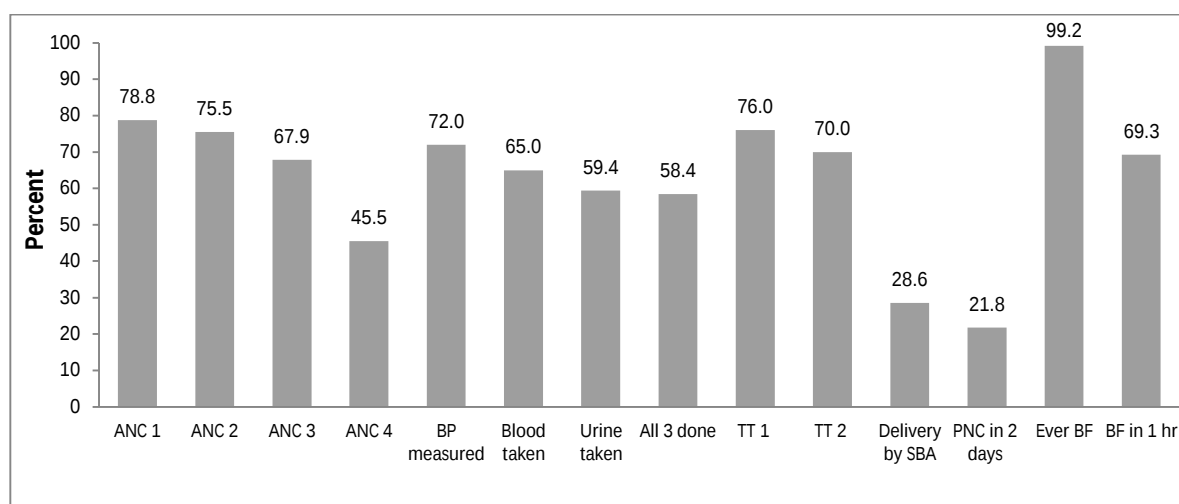


Figure 4: Coverage of maternal and new-born interventions along the continuum of care in Wolisso, Goro and Wonchi Woredas

(ANC=Antenatal care, BP=blood pressure, TT=tetanus toxoid, SBA= skilled birth attendant, PNC=postnatal care and BF=breast fed)

Perceived quality of care at nearest health facility

Women were asked about their perception on the quality of maternal health services at their nearest health facility that provides delivery services (typically a health centre or a hospital). Only 15.4% felt that the quality was excellent. A bigger proportion felt it was good but almost one third felt that it was average or poor (Table 9).

Table 9: Percent distribution of women by perceived quality of maternal health services at nearest health facility

Perceived quality of maternal health services	Wolisso	Goro	Wonchi	Total
Excellent	14.0	20.2	15.5	15.4
Good	49.1	42.7	46.4	47.4
Average	20.2	22.6	28.9	23.0
Poor	13.7	14.2	8.4	12.3
Don't know	3.0	0	0.7	1.9
Number of women	280	80	140	500

Knowledge of danger signs during pregnancy

Participants were asked to mention danger signs during pregnancy that may prompt a woman to immediately seek medical attention. Overall, 23.3% of the respondents mentioned at least 3 danger signs (Table 10).

Table 10: Percentage distribution of women by knowledge about danger signs during pregnancy, by Woreda

Danger sign mentioned	Wolisso	Goro	Wonchi	Total
Sharp abdominal pain	32.6	42.1	38.6	35.8
Cessation of foetal movement	25.5	33.4	22.7	25.9
Abnormal position of foetus	26.8	29.1	21.6	25.6
Heavy bleeding	17.3	12.6	12.9	15.3
Anaemia/pallor/fatigue	14.7	20.0	12.9	15.0
Fever	10.2	26.5	10.2	12.7
Light bleeding	7.2	12.8	10.5	9.0
Hypertension/headache/fits	9.1	8.6	6.6	8.4
Leakage of amniotic fluid	8.0	5.5	1.0	5.6
Swelling of feet and face	2.2	3.1	6.5	3.6
Multiple pregnancy	2.1	3.6	0.8	2.0
Foul smelling discharge	2.0	2.3	0.4	1.6
At least 3 danger signs mentioned	22.7	30.3	20.5	23.3
Number of women	280	80	140	500

Attitude towards maternal health care

Women were presented with 8 different statements on maternal health and asked to what extent they agreed/disagreed with the statements on a 4-point Likert scale (Table 11). The statements covered 4 areas: birth preparedness, male involvement in maternal health and barriers to delivery. Most women either strongly agreed or agreed that a woman should plan ahead of time where to give birth, and how to get there. Most women either disagreed or strongly disagreed with statements that implied that men should not be involved in maternal health. Most participants did not perceive that the main reasons why women do not deliver in health facilities were because it was too expensive; difficult to get there; or poor treatment of women by staff.

Table 11: Percent distribution of women by their perceptions on different aspects of maternal health

Statement	Strongly agree	Agree	Disagree	Strongly disagree	Don't know
Birth preparedness					
A woman should plan ahead of time where she will give birth.	45.3	46.9	6.9	0.2	0.7
A woman should plan ahead of time how she will get to the place of delivery.	39.6	51.8	8.0	0.2	0.4
Men involvement					
It is not necessary for a husband/ partner to accompany his wife to antenatal care visits.	2.4	13.6	50.7	32.7	0.7
It is not necessary for a husband/ partner to accompany his wife when she is giving birth	0.2	5.3	46.4	47.9	0.2
Giving birth is mostly a woman's matter.	2.9	16.1	39.9	41.3	0
Husbands/partners have little to contribute					
Barriers to institutional delivery					
When women do not go to a health facility to give birth, it is mainly because it is too expensive.	1.4	10.3	58.7	28.5	1.1
When women do not go to a health facility to give birth, it is mainly because it is too difficult to get there	4.8	26.0	46.3	22.7	0.2
When women do not go to a health facility to give birth, it is mainly because the staff there do not treat them respectfully	2.4	13.0	54.2	28.4	1.9

Attitude scores

Perceptions towards different aspects of maternal health (Table 11) were analysed using factor analysis to obtain attitude score tertiles. The first tertile was designated as “poor attitude” while the third tertile was designated as “good attitude”. **Table 12** shows the attitude score tertiles stratified by women’s background characteristics. Overall, there were little differences in the distribution of the attitude score tiles by Woreda, age, wealth index and woman’s education (each with $p>0.05$). On the contrary, women in urban areas tended to have better attitude than those in rural areas ($p<0.001$)

Table 12: Percent distribution of women according to maternal health attitude score tertiles by selected background characteristics

Background characteristics	Attitude score tertile			Total %	Number of women
	1 (Poor)	2 (Medium)	3 (Good)		
Woreda					
Wolisso	32.3	36.0	31.7	100	280
Goro	33.3	33.3	33.5	100	80
Wonchi	38.0	26.0	36.0	100	140
Residence					
Urban	18.9	32.8	48.7	100	100
Rural	36.5	32.8	30.8	100	400
Wealth tertile					
Lowest	40.1	33.0	26.9	100	155
Middle	33.9	29.0	37.1	100	157
Highest	28.2	36.1	35.7	100	188
Age in years					
15-24	29.2	37.1	33.7	100	135
25-29	35.0	30.1	34.9	100	185
30-34	32.6	36.2	31.2	100	93
≥ 35	40.9	28.0	31.1	100	87
Woman’s education					
None	38.9	29.5	31.6	100	250
Primary	30.4	34.7	34.9	100	188
Secondary	23.0	41.6	35.4	100	62
Total	34.1	32.7	33.2	100	500

Determinants of antenatal care use

Crude analysis of determinants of antenatal care use

Coverage of at least 4 ANC visits did not vary by woman's Woreda; marital status; ethnicity; religion; and having a television/radio at home (**Table 13**).

In crude analysis, place of residence, household size, wealth quintile, woman's age, parity, woman's education status and the woman's partner's education status were statistically significantly associated with attendance of four ANC visits (**Table 13**). Additionally, having correct knowledge of the minimum required number of ANC visits, knowing at least three danger signs of pregnancy, time to the nearest health centre/hospital, perceived quality of care at nearest health centre/hospital, and attitude score tertile were statistically significantly associated with attendance of 4 ANC visits. Women in urban areas were more likely to attend 4 ANC visits compared to those in rural areas (OR 3.69, 95% CI 2.21-6.17). The number of household members was negatively associated with ANC attendance: the odds of attending 4 ANC visits were about twice higher in women with 2-3 household members compared to those with more the four members. Wealth index was positively associated with ANC attendance: the odds of attending ANC were almost six times higher among women in the highest wealth quintile compared to those in the lowest wealth quintile. Age and parity were negatively associated with attending ANC with the odds of attending 4 ANC visits being 61% lower among women aged >34 years compared to those aged 15-24 years, and 63% lower among women with a parity of >5 compared to the primiparous. Education of the woman and that of the partner/husband were associated with increased odds of attending 4 ANC visits. The odds of attending ANC visits were almost 3 times higher among women with secondary or higher education compared to those without education. Women who knew the minimum required number of ANC visits and those who mentioned at least 3 danger signs of pregnancy were more likely to attend 4 ANC visits. The time it takes to arrive at the nearest health centre/hospital was negatively associated with attending ANC: the odds of attending 4 ANC visits were 63% lower among women who took more than 60 minutes to arrive at the health facility compared to those who took less than 30 minutes. Women who perceived that the quality of maternal health services at the nearest health centre/hospital was excellent were more likely to attend 4 ANC visits compared to those who perceived that the quality was poor. Maternal health attitude score was positively associated with attending ANC.

Table 13: Coverage of at least four antenatal care (ANC) visits and crude associations between women's characteristics and attendance of four antenatal visits in Wolisso, Goro and Wonchi

Characteristics	Attended ≥ 4 ANC visits (N=500)		Crude OR (95% CI)	F test P value
	n	%		
Woreda				0.829
Wolisso	134	46.0	1	
Goro	40	48.0	1.08 (0.58-2.01)	
Wonchi	63	43.2	0.89 (0.47-1.68)	
Residence				<0.001
Rural	165	41.3	1	
Urban	72	72.2	3.69 (2.21-6.17)	
Household size				0.017
>5	95	39.5	1	
4-5	88	48.2	1.43 (0.91-2.24)	
2-3	54	57.2	2.04 (1.29-3.25)	
Wealth index quintile				<0.001
Lowest	25	27.2	1	
Second	45	47.8	2.44 (1.45-4.11)	
Middle	33	35.3	1.46 (0.75-2.85)	
Fourth	50	49.2	2.59 (1.50-4.47)	
Highest	84	68.2	5.74 (2.90-11.35)	
Age in years				0.001
15-24	77	55.7	1	
25-29	95	49.6	0.78 (0.50-1.21)	
30-34	35	35.0	0.43 (0.27-0.69)	
35-49	30	33.1	0.39 (0.24-0.64)	
Parity				0.012
1	63	57.2	1	
2-3	74	48.0	0.69 (0.42-1.13)	
4-5	68	43.8	0.58 (0.36-0.96)	
>5	32	32.9	0.37 (0.20-0.67)	
Woman's education status				0.001
None	98	38.1	1	
Primary	98	50.4	1.65 (1.07-2.56)	
Secondary/higher	41	65.0	3.01 (1.70-5.33)	
Partner's education status				0.013
None/no partner	39	35.6	1	
Primary	130	45.2	1.49 (0.86-2.59)	
Secondary/higher	68	57.8	2.48 (1.33-4.62)	
Marital status				0.512
Married	230	45.8	1	
Single	7	37.9	0.72 (0.26-1.99)	
Ethnicity				0.056
Oromo	193	43.6	1	
Others	44	58.0	1.79 (0.98-3.26)	
Religion				0.559
Orthodox Christian	117	43.2	1	
Protestant	61	49.2	1.27 (0.80-2.03)	
Muslim	59	46.8	1.16 (0.71-1.87)	
Knowledge of number of ANC visits				<0.001
No	81	30.7	1	
Yes	156	61.0	3.53 (2.43-5.13)	
Knowledge of at least 3 pregnancy danger signs				0.032
No	166	42.8	1	
Yes	71	54.6	1.61 (1.04-2.49)	
Time to nearest facility				0.003
<30 minutes	118	59.4	1	
30-59 minutes	50	44.4	0.55 (0.29-1.03)	
≥ 60 minutes	69	35.1	0.37 (0.20-0.69)	

→ Continued on the next page

Table 13 continued: Coverage of at least four antenatal care (ANC) visits and crude associations between women's characteristics and attendance of four antenatal visits in Wolisso, Goro and Wonchi

Characteristics	Attended $\geq$ 4 ANC visits (N=500)		Crude OR (95% CI)	F test P value
	n	%		
Perceived quality of care at nearest HC/Hospital				0.035
Average/poor/don't know	82	39.2	1	
Good	109	46.4	1.34 (0.81-2.21)	
Excellent	46	59.6	2.28 (1.21-4.31)	
Maternal health attitude score tertile				<0.001
Poor	54	30.3	1	
Medium	74	46.6	2.01 (1.33- 3.03)	
Good	99	60.0	3.45 (1.98-6.02)	
Has a radio or television				0.073
No	89	40.4	1	
Yes	148	49.6	1.45 (0.96-2.19)	

Adjusted analysis of determinants of antenatal care use

After adjusting for confounding factors, wealth index quintile, age, and knowing the required number of ANC visits were the only factors that were statistically significantly associated with attending 4 ANC visit (**Table 14**). The odds of attending 4 ANC visits were about four times higher among women in the richest wealth index quintile compared to those in the poorest quintile (OR 4.06, 95% CI 1.79-9.18). The odds of attending ANC generally reduced with increasing age: women aged >34 years had a 60% reduction in the odds of attending 4 ANC visits when compared to those aged 15-24 years (OR 0.40, 95% CI 0.19-0.84). Knowing the required number of ANC visits during a pregnancy was associated with an almost 3 fold increase in the odds of attending 4 ANC visits (OR 2.90, 95% CI 1.82-4.63). There was some evidence that having better attitude towards maternal health increased the likelihood of attending 4 ANC visits: women with a good maternal health attitude score were more than two times more likely to attend 4 ANC visits compared to those with a poor attitude score (OR 2.32, 95% CI 1.31-4.12). However, the association between attitude score and ANC 4 attendance was not statistically significant (P=0.064).

In adjusted analyses, place of residence, household size, woman's education status, partner's education status, ethnicity, time to nearest health centre/hospital, knowledge of at least 3 danger signs of pregnancy, perceived quality of care at nearest health centre/hospital, and having a television/radio were not statistically significantly associated with attending 4 ANC visits (**Table 14**).

Table 14: Adjusted associations between women's characteristics and attendance of at least four antenatal care visits in Wolisso, Goro, Wonchi

Characteristics	Adjusted OR (95% CI)	Wald test P value
Residence		0.427
Rural	1	
Urban	1.29 (0.67-2.49)	
Household size		0.774
>5	1	
4-5	1.33 (0.57-3.12)	
2-3	1.40 (0.46-4.26)	
Wealth index quintile		0.006
Lowest	1	
Second	2.42 (1.34-4.40)	
Middle	1.11 (0.53-2.33)	
Fourth	2.05 (0.96-4.36)	
Highest	4.06 (1.79-9.18)	
Age in years		0.035
15-24	1	
25-29	0.74 (0.38-1.47)	
30-34	0.35 (0.16-0.77)	
35-49	0.40 (0.19-0.84)	
Parity		0.834
1	1	
2-3	1.06 (0.43-2.61)	
4-5	1.52 (0.43-5.29)	
>5	1.33 (0.27-6.49)	
Woman's education status		0.474
None	1	
Primary	1.04 (0.56-1.91)	
Secondary/higher	0.78 (0.42-1.45)	
Partner's education status		0.809
None/no partner	1	
Primary	0.94 (0.46-1.94)	
Secondary/higher	0.79 (0.32-1.93)	
Ethnicity		0.356
Oromo	1	
Others	1.25 (0.76-2.02)	
Time to nearest facility		0.375
<30 minutes	1	
30-59 minutes	0.63 (0.30-1.30)	
≥ 60 minutes	0.66 (0.33-1.32)	
Has correct knowledge on number of ANC visits	2.90 (1.82-4.63)	<0.001
Knows at least 3 pregnancy danger signs	0.91 (0.58-1.41)	0.649
Perceived quality of care at nearest HF		0.222
Average/poor/don't know	1	
Good	1.44 (0.92-2.27)	
Excellent	1.80 (0.86-3.75)	
Maternal health attitude score tertile		0.064
Poor	1	
Medium	1.62 (0.95-2.77)	
Good	2.32 (1.31-4.12)	
Has a radio or television	0.88 (0.58-1.33)	0.530

Determinants of delivery by a skilled health provider

Crude analysis of determinants of delivery by a skilled health provider

In crude analyses, place of residence, wealth index quintile, having a radio/television, number of household members, age, parity, woman's education status, partner's education status, time to the nearest health centre/hospital, and having a radio/television were statistically significantly associated with delivery by a skilled health provider (**Table 15**). Additionally, knowledge of the required number of ANC visits, knowledge of pregnancy danger signs, perceived quality of care at nearest health centre/hospital, attitude towards maternal health, attendance of at least 4 ANC visits, the final decider on where to deliver, and being prepared for delivery were statically significantly associated with delivery by a skilled provider.

Women living in urban areas had an almost 33 fold increase in the odds of delivery by a skilled health provider compared those living in rural areas. The probability of delivering with the assistance of a skilled provider increased with increasing wealth status: women in the richest wealth quintile had a 27 fold increase in the odds of delivery by a skilled provider compared to those in the poorest wealth group. Women in households with fewer members were more likely to be assisted by a skilled provider at delivery. The odds of delivery by a skilled provider reduced with increasing age, and parity: there was 50% reduction in the odds of delivery by a skilled provider among women aged more than 34 years compared to those aged 15-24 years, and an 80% reduction in the odds of delivery by a skilled provider among women with a parity of more than 5 compared with those with a parity of 1. Being educated or having an educated partner increased the likelihood that a woman would be attended to by a skilled provider at delivery. There was an almost 9 fold increase in the odds of delivery by a skilled provider among women with secondary/higher education compared to the uneducated, and a 10 fold increase in the odds of delivery by a skilled provider among women whose partner had secondary/higher education compared to those with uneducated partners. Distance to the nearest health facility that provides delivery service was negatively associated with delivery by a skilled provider: the odds of delivery by a skilled provider were 86% lower in women who could reach the health facility in more than 1 hour compared to those who could reach the facility in less than 30 minutes. Having a radio/television was associated with an almost 2 fold increase in the odds of delivery a skilled provider. Women with correct knowledge of the required number of ANC visits and those who could mention at least 3 danger signs of pregnancy were more likely to deliver assisted by a skilled provider. Women who perceived that the quality of maternal health services at the nearest health centre/hospital was excellent had an almost 4 fold increase in the odds of delivery by a skilled provider compared to those who felt that the quality was poor. An increase in the attitude score was associated with a corresponding increase in the odds of delivery by a skilled provider: women with a good attitude score had a more than 2 fold increase in the odds of delivery by a skilled provider compared to those with a poor attitude score.

Women who attended 4 ANC visits had an almost 4 fold increase in the likelihood of delivery by a skilled provider compared to those who did not attend 4 ANC visits. Women who decided on where to deliver by themselves were less likely to use skilled birth attendants compared to those whose decision on delivery place was made by both the women and the partner or by the partner/other family member. Women who were well prepared for the delivery of the baby had a more than 5 fold increase in the odds of delivery by a skilled provider compared to those who were poorly

prepared. Delivery by skilled health provider did not statistically significantly vary by Woreda, marital status, ethnicity, religion, and experience of pregnancy related problems (**Table 15**).

Table 15: Coverage of delivery by skilled provider and crude associations between woman's characteristics and delivery by skilled provider in Wolisso, Goro and Wonchi

Characteristic	Delivered by skilled provider (N=500)		Crude OR (95% CI)	F test P value
	n	%		
Woreda				0.554
Wolisso	105	32.7	1	
Goro	28	30.5	0.91 (0.26-3.13)	
Wonchi	32	19.7	0.51 (0.14-1.81)	
Residence				<0.001
Rural	76	19.0	1	
Urban	89	88.5	32.80 (12.40-86.74)	
Wealth quintile				<0.001
Lowest	8	8.7	1	
Second	12	12.8	1.54 (0.68-3.53)	
Middle	13	12.9	1.55 (0.67-3.61)	
Fourth	38	36.4	6.00 (2.63 -13.69)	
Highest	94	72.3	27.46 (8.48-88.89)	
Number of household members				<0.001
>5	53	19.9	1	
4-5	59	28.6	1.60 (1.04-2.48)	
2-3	53	53.6	4.63 (2.77-7.75)	
Age in years				0.026
15-24	58	38.1	1	
25-29	56	25.9	0.57 (0.37-0.87)	
30-34	28	25.8	0.56 (0.37-0.86)	
>34	23	23.3	0.50 (0.26-0.96)	
Parity				<0.001
1	64	54.7	1	
2-3	51	29.0	0.34 (0.20-0.58)	
4-5	30	17.0	0.17 (0.10-0.28)	
>5	20	19.8	0.20 (0.09-0.45)	
Woman's education status				0.0001
None	49	17.7	1	
Primary	71	33.3	2.33 (1.47-3.70)	
Secondary/higher	45	66.5	9.27 (3.01-28.47)	
Partner's education status				<0.001
None/no partner	13	11.5	1	
Primary	80	25.2	2.49 (1.51-4.46)	
Secondary/higher	72	57.5	10.37 (5.16-20.85)	
Marital status				0.079
Married	162	29.2	1	
Not married	3	13.8	0.39 (0.13-1.13)	
Ethnicity				0.186
Oromo	126	25.9	1	
Others	39	45.9	2.42 (0.62-9.49)	
Religion				0.818
Orthodox Christian	82	27.0	1	
Protestant	44	32.5	1.30 (0.58-2.91)	
Muslim	39	28.1	1.05 (0.40-2.76)	
Time to nearest health centre/hospital				<0.001
<30 minutes	115	39.7	1	
30-59 minutes	23	19.9	0.22 (0.10-0.45)	
≥ 60 minutes	27	13.6	0.14 (0.05-0.37)	
Has a radio/television				0.005
No	46	19.3	1	
Yes	119	36.1	2.37 (1.33-4.21)	

→ Continued on the next page

Table 15 continued: Coverage of delivery by skilled provider and crude associations between woman's characteristics and delivery by skilled provider in Wolisso, Goro and Wonchi

Characteristic	Delivered by skilled provider (N=500)		Crude OR (95% CI)	F test P value
	N	%		
Correct knowledge of number of ANC visits				<0.001
No	50	18.8	1	
Yes	115	38.8	2.74 (1.85-4.05)	
Number of pregnancy danger signs mentioned				0.016
0-2	106	24.9	1	
≥ 3	59	40.9	2.08 (1.16- 3.75)	
Perceived quality of care at nearest facility				0.002
Average/poor/don't know	50	21.7	1	
Good	72	27.4	1.36 (0.81-2.31)	
Excellent	43	51.0	3.77 (1.89-7.49)	
Maternal health attitude score tertile				0.017
Poor	39	21.2	1	
Medium	49	25.4	1.26 (0.79-2.02)	
Good	77	39.4	2.41 (1.36-4.25)	
Attended at least 4 ANC visits				<0.001
No	50	16.3	1	
Yes	115	43.3	3.91 (2.57-5.94)	
Experienced any pregnancy related problem				0.100
No	127	26.8	1	
Yes	38	36.1	1.54 (0.92-2.60)	
Final decider on delivery place				<0.001
Woman alone	39	16.1	1	
Partner/other family member alone	25	27.4	1.97 (1.02-3.79)	
Woman and partner together	101	41.5	3.71 (2.45-5.63)	
Well prepared for the birth of the baby				<0.001
No	114	23.3	1	
Yes	51	62.9	5.59 (2.42-12.85)	

Adjusted analyses of determinants of delivery by a skilled provider

After adjusting for confounding factors, place of residence; wealth index; parity; marital status; time to the nearest health centre/hospital; experience of pregnancy related problems; attendance of at least 4 ANC visits; having correct knowledge on the required number of ANC visits; perceived quality of care at nearest health centre/hospital; final decision maker on where to deliver; and being well prepared for delivery were factors that maintained statistically significant association with delivery by a skilled provider (**Table 16**).

Women in urban areas were more likely to deliver assisted by a skilled provider compared with those in rural areas (OR 6.68, 95% CI 2.47-17.94). There was a dose response relationship between wealth index quintile and delivery by a skilled provider: women in the wealthiest wealth group had a 13 fold increase in the odds of delivery by a skilled provider compared to those in the poorest wealth group (OR 13.33, 95% CI 2.28-77.82). Higher parity was associated with lower odds of delivery by a skilled provider. Women with a parity of more than 5 had a 94% reduction in the odds of delivery by a skilled provider compared to the primiparous women. Unmarried women had an 82% reduced odds of delivery by a skilled provider compared with married women (OR 0.18, 95% CI 0.05-0.69). Time to nearest health centre/hospital was negatively associated with delivery by a skilled provider. Women who spent more than 1 hour to arrive at the nearest health centre/hospital were less likely to deliver with the assistance of a skilled provider compared with those who spent less than 30 minutes (OR 0.29, 95% CI 0.12-0.72). Experience of a pregnancy related problem (OR 3.50, 95% CI 1.70-7.24); having correct knowledge of the required ANC visits (OR 3.36, 95% CI 1.97-5.70); and attending at least 4 ANC visits (1.56, 95% CI 1.04-2.33) were associated with increased likelihood of delivery by a skilled provider. Women who decided by themselves on where to deliver were less likely to deliver with the assistance of a skilled provider. Women whose final decision on where to deliver was made together with the husband had a more than 5 fold increase in the odds of delivery by a skilled provider compared with those who made this decision unilaterally. Finally, women who were well prepared for the birth of the baby had close to 7 fold increase in the odds of delivery by a skilled provider compared with those not well prepared (OR 6.78, 95% CI 2.39-19.23).

The number of household members, and woman's age; education; partner's education; knowledge of more than 3 danger signs of pregnancy, maternal health attitude score tertile, and having a radio/television were not statistically significantly associated with delivery by a skilled provider (**Table 16**).

Table 16: Adjusted associations between women's characteristics and delivery by skilled provider in Wolisso, Goro and Wonchi

Characteristic	Adjusted OR (95% CI)	F test P value
Residence		0.001
Rural	1	
Urban	6.68 (2.47-17.94)	
Wealth index quintile		0.003
Lowest	1	
Second	0.77 (0.32-1.84)	
Middle	0.78 (0.20-3.06)	
Fourth	4.20 (1.44-12.23)	
Highest	13.33 (2.28-77.82)	
Number of household members		0.886
>5	1	
4-5	1.04 (0.24-4.47)	
2-3	1.37 (0.32-5.97)	
Age in years		0.186
15-24	1	
25-29	1.09 (0.42-2.86)	
30-34	2.11 (0.90-4.93)	
35-39	2.63 (0.74-9.31)	
Parity		0.006
1	1	
2-3	0.21 (0.05-0.87)	
4-5	0.07 (0.04-0.28)	
>5	0.06 (0.01-0.61)	
Woman's education status		0.251
None	1	
Primary	0.55 (0.26-1.18)	
Secondary/higher	0.77 (0.18-3.35)	
Partner's education status		0.566
None/no partner	1	
Primary	0.71 (0.36-1.39)	
Secondary/higher	0.62 (0.21-1.77)	
Marital status		0.015
Married	1	
Single	0.18 (0.05-0.69)	
Time to nearest health centre/hospital		0.022
<30 minutes	1	
30-59 minutes	0.49 (0.21-1.12)	
≥ 60 minutes	0.29 (0.12-0.72)	
Experienced any pregnancy related problem	3.50 (1.70-7.24)	0.002
Has correct knowledge of number of ANC visits	3.36 (1.97-5.70)	<0.001
Attended at least 4 ANC visits	1.56 (1.04-2.33)	0.031
Knows at least 3 pregnancy danger signs	0.76 (0.31-1.85)	0.531
Perceived quality of care at nearest health centre/hospital		<0.001
Average/poor/don't know	1	
Good	1.83 (0.94-3.57)	
Excellent	8.75 (3.55-21.58)	
Maternal health attitude score tertile		0.093
Poor	1	
Medium	0.45 (0.20-1.00)	
Good	0.54 (0.24-1.24)	
Final decider on delivery place		<0.001
Woman alone	1	
Partner/other family member alone	4.19 (1.70-10.35)	
Woman and partner together	5.54 (2.35-13.06)	
Well prepared for the birth of the baby	6.78 (2.39-19.23)	0.001
Has a radio/television	0.90 (0.41-1.99)	0.789

Discussion

This study assessed the knowledge, attitude and practices related to maternal health, and explored the determinants of utilisation of antenatal care service, and delivery by skilled providers. The study found that 78.8% of women attended at least 1 ANC visit but only 45.5% completed the minimum required 4 ANC visits. Among women who attend ANC, 91.3% had blood pressure checked, 82.5% had a blood sample taken, 75.5% had a urine sample taken, and 74.1% had all the three components done. Most women (70%) received two doses of tetanus toxoid during pregnancy. Only 28.6% of women were attended to by a skilled provider at delivery; 3.7% delivered by caesarean section; and 21.8% received postnatal care in 2 days. About 69% of infants were breastfed within one hour after birth. Less than half of the women knew about the minimum required number of ANC visits; 23.3% mentioned at least 3 danger signs of pregnancy; and 13.4% were well prepared for the birth of the baby. About a third of the women perceived that the quality of maternal health services at the nearest health centre/hospital was average or poor.

After accounting for all other factors, utilisation of 4 ANC visits was associated with wealth index, age and having the correct knowledge about the required number of ANC visits. In adjusted analysis, place of residence; wealth quintile; parity; marital status; time to the nearest health centre/hospital; experience of pregnancy related problems; attendance of at least 4 ANC visits; knowledge of the required number of ANC visits; perceived quality of care at nearest health centre/hospital; final decision maker on where to deliver; and being well prepared for delivery were statistically significantly associated with delivery by skilled provider.

The coverage indicators estimated in this survey are generally higher than the estimates from routine data. For instance, institutional delivery in the three districts is estimated at 20% through routine data. The discrepancies could be due to inaccuracies in estimating the denominator used to calculate coverage based on routine data. Another source of discrepancy could be that some women in the study districts deliver in health facilities located outside the district and are hence not captured through the districts' routine data.

This study shows that poverty and higher age are negatively associated with attending 4 ANC visits. These results agree with those of a systematic review of 28 studies on determinants of ANC use [20]. The present study however did not find a significant association between 4 ANC visits and many other socio-demographic factors such as maternal education, husband's education, parity, marital status, and distance as has been reported in the review [20] and in one study in Ethiopia [12]. These studies however did not specifically look at attending 4 ANC visits but rather at any ANC visit. Knowledge about the required number of ANC visits increased the use of delivery services, but on the contrary, knowledge of at least 3 pregnancy danger signs did not have significant effect on delivery service use. This could be because the question on ANC is more specific compared to the question on danger signs which has numerous possible answers.

In keeping with the results from a study conducted at St. Luke hospital, this study found that access to delivery by skilled providers was in favour of women living in urban areas, and the wealthier [21]. Higher household wealth and urban residence are known to increase delivery service use [22]. In line with other studies [18, 22], this study found a reduced likelihood of utilising delivery service with increasing parity, and time to the nearest health facility. Unmarried women were less likely to be

assisted by a skilled health provider at delivery. This may be related to cultural taboos in the study area whereby pregnancy outside marriage is not culturally acceptable and hence unmarried pregnant women may prefer to deliver at home to maintain privacy. The present study did not find an association between use of delivery service and woman's age, woman's education and partner's education as has been reported in other studies [22].

Studies have shown that women are more likely to use delivery services if they experience pregnancy related problems [11, 12, 22]. The findings in this study concur with this. Women with complications in pregnancy may self-refer to health facilities. Alternatively, they may be referred by traditional birth attendants or other persons assisting them during delivery once a complication that cannot be managed at home has been detected. Unfortunately such referrals do not always happen on time and mothers/neonates have lost lives due to various delays [23].

In the present study, a decision made by husband/family member or by the woman and her husband increased the likelihood that a woman will be assisted by a skilled provider at delivery. Similar findings have been reported in a study conducted in the same region [11] and highlights the importance of family support in utilising health services.

Having a birth plan increases the likelihood of delivering in a health facility [24]. Theoretically, this is mediated through reduction in delays in obtaining care [23]. This study looked at whether women made special arrangements for the delivery of the baby and the results support the concept of birth preparedness and complication readiness during pregnancy; highlighting the importance of this intervention in increasing delivery service use. Unfortunately, in line with the present study, other studies in Ethiopia have found that few women are well prepared for birth and pregnancy complications [25, 26]. It is therefore not surprising that among women who delivered at home, a majority said they did so because labour was urgent-implying lack of preparedness. Poor knowledge and practices related to birth preparedness has also been reported in Ethiopian [26].

Perceived quality of care is a major barrier to utilisation of maternal health services and can result into the famous first delay: delaying the decision to seek care [23]. The findings in the present study are in line with this well documented barrier.

This is the first study in Goro, Wolisso and Wonchi districts to have looked at determinants of use of maternal health services: ANC and skilled birth attendance. The study has established coverage levels for maternal health services along the continuum of care and identified the main determinants of access to two important maternal health services. The results will hopefully be useful to local health authorities and Doctors with Africa CUAMM in planning for maternal health services in the study districts.

In line with the findings of this study, the following recommendations can be made:

1. There is need to create more awareness about antenatal care and emphasize the minimum required number of ANC visits. This should be accompanied to encouraging women to seek ANC early in pregnancy in order to be able to complete the required 4 visits. This is because knowing the number of ANC visits increased the likelihood that a woman would attend at least 4 ANC visits, and would deliver with the help of a skilled provider.

2. All pregnant women should be encouraged to have a birth and complication readiness plan. This should be done routinely during ANC visits and also through community mobilisation with the involvement of health extension workers.
3. There is need to improve service delivery at health facilities, especially health centres, in the study area. Poor perception on the quality of care provided at health facilities is one of the barriers to delivery service use identified in this study. At the moment, the study districts have numerous health centres whose utilisation is very poor as has been found out in a separate health facility survey conducted by Doctors with Africa CAUMM. There is a high potential to improve coverage of institutional delivery in the study area if health centres are strengthened to respond to the maternal health needs in the population. Apart from increasing coverage, improving service delivery at health centres will also contribute towards reduced wealth, and urban/rural inequity identified in this study.
4. Non-married women were less likely to deliver assisted by skilled providers. There is need to target and support this minority group of women who may be disadvantaged by the established cultural norms.
5. The results of this study suggest that family involvement in deciding where a woman will deliver is important in delivery service use. This highlights the need not only to mobilise women but also their husbands, families and the entire community. Pregnant women need the encouragement and support of family members in order to access the services of skilled birth attendants. If family members are involved, they are more likely to contribute towards transportation costs and to physically escort the woman to a health facility when labour starts.
6. Given that most women deliver at home assisted by TBAs, there is need to develop a framework for collaboration between the formal health system and TBAs. Such collaboration should focus on encouraging TBAs to refer pregnant women to deliver in health facilities. For this to succeed, the TBAs will need to be compensated in some way for the lost income.

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Appendix: Questionnaires

Household questionnaire	
HOUSEHOLD INFORMATION PANEL	
HH	
HH1. Kebele number: _____	HH2. Household number: _____
HH3. Interviewer number: _____	HH4. Day / Month / Year of interview: _____ / _____ / _____
HH5. Kebele: Urban 1 Rural 2	HH6. Name of Woreda: Wolisso 1 Goro 2 Wonchi 3

WE ARE FROM THE WOREDA HEALTH DEPARTMENT. WE ARE WORKING ON A PROJECT CONCERNED WITH MATERNAL AND CHILD HEALTH. I WOULD LIKE TO TALK TO YOU ABOUT THIS SUBJECT. THE INTERVIEW WILL TAKE ABOUT **5 MINUTES**. ALL THE INFORMATION WE OBTAIN WILL REMAIN STRICTLY CONFIDENTIAL AND YOUR ANSWERS WILL NEVER BE SHARED WITH ANYONE OTHER THAN OUR PROJECT TEAM.

MAY I START NOW?

- ☐ Yes, permission is given ⇒ Go to HH12 to record the time and then begin the interview.
- ☐ No, permission is not given ⇒ END.

After all questionnaires for the household have been completed, fill in the following information:	
HH7. Name of head of household: _____	HH8. Respondent to household questionnaire: HH8a. Name: _____ HH8b. Line Number: _____
HH9. Total number of household members: _____	HH10. Record the time. Hour _____ Minutes _____

HOUSEHOLD LISTING FORM

FIRST, PLEASE TELL ME THE NAME OF EACH PERSON WHO USUALLY LIVES HERE, STARTING WITH THE HEAD OF THE HOUSEHOLD.

List the head of the household in line 01. List all household members (HL2), their relationship to the household head (HL3), and their sex (HL4)

Then ask: ARE THERE ANY OTHERS WHO LIVE HERE, EVEN IF THEY ARE NOT AT HOME NOW?

If yes, complete listing for questions HL2-HL4. Then, ask questions starting with HL5 for each person at a time.

Use an additional questionnaire if all rows in the household listing form have been used.

HL1. Line number	HL2. Name	HL3. WHAT IS THE RELATION-SHIP OF (name) TO THE HEAD OF HOUSE- HOLD?	HL4. Is (name) MALE OR FEMALE? 1 Male 2 Female		HL5. HOW OLD IS (name)? Record in completed years. If age is 95 or above, record '95'	For women age 15-49 HL6. HAS (NAME) EVER DELIVERED IN THE PAST 2 YEARS EVEN IF THE CHILD DIED AFTER DELIVERY? 1 YES 2 NO
Line	Name	Relation*	M	F	Age	Y N
01		0 1	1	2		1 2
02			1	2		1 2
03			1	2		1 2
04			1	2		1 2
05			1	2		1 2
06			1	2		1 2
07			1	2		1 2
08			1	2		1 2
09			1	2		1 2
10			1	2		1 2
11			1	2		1 2
12			1	2		1 2
13			1	2		1 2
14			1	2		1 2
15			1	2		1 2
16			1	2		1 2
17			1	2		1 2

Tick here if additional questionnaire used

☐

Probe for additional household members. Probe especially for any infants or small children not listed, and others who may not be members of the family (such as servants, friends) but who usually live in the household.

Insert names of additional members in the household list and complete form accordingly.

* Codes for HL3: Relationship to head of household:

01 Head	05 Grandchild	08 Brother / Sister	12 Other relative
02 Wife / Husband	06 Parent	09 Brother-In-Law / Sister-In-Law	13 Adopted / Foster / Stepchild
03 Son / Daughter	07 Parent-In-Law	10 Uncle / Aunt	14 Not related
04 Son-In-Law / Daughter-In-Law		11 Niece / Nephew	98 Don't know

WATER AND SANITATION		WS
WS1. WHAT IS THE <u>MAIN</u> SOURCE OF DRINKING WATER FOR MEMBERS OF YOUR HOUSEHOLD?	Piped water Piped into dwelling..... 11 Piped into compound, yard or plot..... 12 Piped to neighbour 13 Public tap / standpipe 14 Tube Well, Borehole 21 Dug well Protected well 31 Unprotected well 32 Water from spring Protected spring 41 Unprotected spring 42 Rainwater collection 51 Tanker-truck 61 Surface water (river, stream, dam, lake, pond, canal, irrigation channel) 81 Bottled water 91 Other (<i>specify</i>) 96	
WS2. DO YOU DO ANYTHING TO THE WATER TO MAKE IT SAFER TO DRINK?	Yes 1 No 2 DK 8	2⇒WS4 8⇒WS4
WS3. WHAT DO YOU USUALLY DO TO MAKE THE WATER SAFER TO DRINK? <i>Probe:</i> ANYTHING ELSE? <i>Record all items mentioned.</i>	Boil A Add bleach / chlorine B Strain it through a cloth C Use water filter (ceramic, sand, composite, etc.) D Solar disinfection E Let it stand and settle F Other (<i>specify</i>) X DK Z	
WS4. WHAT KIND OF TOILET FACILITY DO MEMBERS OF YOUR HOUSEHOLD USUALLY USE? <i>If “flush” or “pour flush”, probe:</i> WHERE DOES IT FLUSH TO? <i>If necessary, ask permission to observe the facility.</i>	Flush / Pour flush Flush to piped sewer system 11 Flush to septic tank 12 Flush to pit (latrine) 13 Flush to somewhere else 14 Pit latrine Ventilated Improved Pit latrine (VIP) 21 Pit latrine with slab 22 Pit latrine with wood planks 23 Pit latrine without slab / Open pit 24 Composting toilet 31 No facility, Bush, Field 95 Other (<i>specify</i>) 96	

HOUSEHOLD CHARACTERISTICS		HC
HC1. <u>Main</u> material of the dwelling floor. Record observation.	Natural floor Earth / Sand11 Dung12 Rudimentary floor Wood planks21 Palm / Bamboo22 Finished floor Parquet or polished wood31 Ceramic tiles32 Cement33 Other (specify) 96	
HC2. <u>Main</u> material of the roof (from outside). Record observation.	Natural roofing No Roof11 Thatch / Grass / Leaves12 Rudimentary Roofing Wood planks23 Plastic paper25 Finished roofing Iron sheet31 Wood32 Ceramic tiles33 Cement(concrete)36 Asbestos sheet37 Other (specify) 96	

HC3. DOES YOUR HOUSEHOLD HAVE:	Yes	No	
[A] ELECTRICITY (GRID/SOLAR/GENERATOR)?	Electricity 1	2	
[B] A RADIO?	Radio 1	2	
[C] A TELEVISION?	Television 1	2	
[D] A BED WITH A SPONGE MATTRESS?	A bed with a mattress 1	2	
[E] A TABLE?	A table 1	2	
HC4. DOES ANY MEMBER OF YOUR HOUSEHOLD OWN:	Yes	No	
[A] A WATCH?	Watch 1	2	
[B] A MOBILE TELEPHONE?	Mobile telephone 1	2	
[C] A BICYCLE?	Bicycle 1	2	
[E] AN ANIMAL-DRAWN CART (GARI)?	Animal drawn-cart 1	2	
MOSQUITO NETS		TN	
TN1. DOES YOUR HOUSEHOLD HAVE ANY MOSQUITO NETS THAT CAN BE USED WHILE SLEEPING?	Yes 1	No 2	2⇒HH13
TN2. HOW MANY MOSQUITO NETS DOES YOUR HOUSEHOLD HAVE?	Number of nets.....	___	

HH13. Record time.....Hour_____ Minutes _____.

HH14. DOES ANY ELIGIBLE WOMAN AGE 15-49 WHO DELIVERED IN THE PAST TWO YEARS RESIDE IN THE HOUSEHOLD?

CHECK HOUSEHOLD LISTING FORM, COLUMN HL6 FOR ANY ELIGIBLE WOMAN.

IF THERE ARE TWO WOMEN, SELECT ONE OF THEM RANDOMLY BY TOSSING A COIN. IF THERE ARE MORE THAN TWO ELIGIBLE WOMEN, SELECT ONE OF THEM RANDOMLY USING A RANDOM NUMBER TABLE PROVIDED.

☐ YES ⇒ GO TO QUESTIONNAIRE FOR WOMEN

INTERVIEWER'S OBSERVATIONS

WOMEN'S QUESTIONNAIRE**WOMAN'S INFORMATION PANEL**

This questionnaire is to be administered to one female member of the household who delivered in the past 2 years.

WM1. Kebele number:

WM2. Household number:

WM3. Woman's name:

Name _____

WM4. Woman's line number:

WM5. Interviewer number:

WM6. Day / Month / Year of interview:

___ / ___ / _____

Read the following to the woman:

WE ARE FROM THE **WOREDA HEALTH DEPARTMENT**. WE ARE WORKING ON A PROJECT CONCERNED WITH THE HEALTH OF MOTHERS. I WOULD LIKE TO TALK TO YOU ABOUT THIS SUBJECT. THE INTERVIEW WILL TAKE ABOUT **25** MINUTES. ALL THE INFORMATION WE OBTAIN WILL REMAIN STRICTLY CONFIDENTIAL AND YOUR ANSWERS WILL NEVER BE SHARED WITH ANYONE OTHER THAN OUR PROJECT TEAM.

MAY I START NOW?

☐ Yes, permission is given ⇒ Go to WM8 to record the time and then begin the interview.

☐ No, permission is not given ⇒ END.

WM8. RECORD THE TIME.

Hour and minutes ___ : ___

NUMBER OF PREVIOUS BIRTHS		WB
CM1. HOW MANY CHILDREN HAVE YOU EVER GIVEN BIRTH TO WHO ARE CURRENTLY ALIVE? I MEAN SONS OR DAUGHTERS TO WHOM YOU HAVE GIVEN BIRTH TO WHO ARE ALIVE AND LIVE WITH YOU OR LIVE ELSEWHERE? <i>If none, record '00'.</i>	Boys _ _ Girls _ _	
CM2. HOW MANY CHILDREN HAVE YOU EVER GIVEN BIRTH TO (BOYS OR GIRLS) WHO WERE BORN ALIVE BUT LATER DIED? <i>If "No" probe by asking:</i> I MEAN, TO CHILDREN WHO EVER BREATHED OR CRIED OR SHOWED OTHER SIGNS OF LIFE — EVEN IF HE OR SHE LIVED ONLY A FEW MINUTES OR HOURS? <i>If none, record '00'.</i>	Boys _ _ Girls _ _	
CM3. SUM ANSWERS TO CM1 AND CM2.	Sum _ _	
CM4. OF THESE (<i>total number in CM3</i>) BIRTHS YOU HAVE HAD, WHEN DID YOU DELIVER THE LAST ONE (EVEN IF HE OR SHE HAS DIED)? Month and year must be recorded.	Date of last birth Day _ _ DK day 98 Month _ _ Year _ _ _ _	

CM5. Check CM4: Last birth occurred within the last 2 years, that is, since (day of interview) February in 2003 ☐ No live birth in last 2 years. ⇒ END this questionnaire. ☐ One or more live births in last 2 years. ⇒ Ask for the name of the last child Name of child _____ If child has died, take special care when referring to this child by name in the following modules. Continue with the next module.
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WOMAN'S BACKGROUND		WB
WB1. IN WHAT MONTH AND YEAR WERE YOU BORN?	Date of birth Month.....__ __ DK month.....98 Year__ __ __ __ DK year.....9998	
WB2. HOW OLD ARE YOU? <i>Probe: HOW OLD WERE YOU AT YOUR LAST BIRTHDAY?</i> <i>Compare and correct WB1 and/or WB2 if inconsistent</i>	Age (in completed years)__ __	
WB3. HAVE YOU EVER ATTENDED SCHOOL OR PRESCHOOL?	Yes1 No2	2⇒WB6
WB4. WHAT IS THE HIGHEST LEVEL OF SCHOOL YOU ATTENDED?	Preschool1 Primary2 Secondary (grades 9-12)3 Higher4 Non-standard curriculum5	1⇒WB6 4⇒WB6 5⇒WB6
WB5. WHAT IS THE HIGHEST GRADE YOU COMPLETED AT THAT LEVEL? <i>If less than 1 grade, enter "00"</i>	Grade__ __	
WB6. DID YOUR HUSBAND/PARTNER EVER ATTEND SCHOOL OR PRESCHOOL?	Yes1 No2	2⇒WB9
WB7. WHAT IS THE HIGHEST LEVEL OF SCHOOL YOUR HUSBAND/PARTNER ATTENDED?	Preschool1 Primary2 Secondary (grades 9-12)3 Higher4 Non-standard curriculum5	0⇒WB9 4⇒WB9 5⇒WB9
WB8. WHAT IS THE HIGHEST GRADE HE COMPLETED AT THAT LEVEL? <i>If less than 1 grade, enter "00"</i>	Grade__ __	
WB9. WHAT IS YOUR RELIGION	Orthodox Christian1 Catholic2 Protestant3 Muslim4 Other (specify).....5	
WB10. WHAT IS YOUR MARITAL STATUS	Married/living together1 Single Never married.....2 Divorced/separated3 Widowed.....4	
WB11. WHAT IS YOUR ETHNICITY	Oromo1 Gurage2 Amhara.....3 Other (specify).....4	

MATERNAL AND NEWBORN HEALTH		MN												
<i>This module is to be administered to a women with a live birth in the 2 years preceding date of interview [i.e. since February 2003].</i> <i>Check CM5 on page WM.3 and record name of last-born child here _____.</i> <i>Use this child's name in the following questions, where indicated.</i>														
MN1. DID YOU SEE ANYONE FOR ANTENATAL CARE DURING YOUR PREGNANCY WITH (name)?	Yes1 No2	2⇒MN8												
MN2. WHOM DID YOU SEE? <i>Probe:</i> ANYONE ELSE? <i>Probe for the type of person seen and circle all answers given.</i>	Health professional(Doctor/Health officer/nurse/Midwife) A Other person Health extension worker B Traditional birth attendant..... C Other (specify) X													
MN3. HOW MANY TIMES DID YOU RECEIVE ANTENATAL CARE DURING THIS PREGNANCY?	Number of times DK.....98													
MN4. AS PART OF YOUR ANTENATAL CARE DURING THIS PREGNANCY, WERE ANY OF THE FOLLOWING DONE AT LEAST ONCE: [A] WAS YOUR BLOOD PRESSURE MEASURED? [B] DID YOU GIVE A URINE SAMPLE? [C] DID YOU GIVE A BLOOD SAMPLE?	<table border="0"> <thead> <tr> <th></th> <th>Yes</th> <th>No</th> </tr> </thead> <tbody> <tr> <td>Blood pressure</td> <td>1</td> <td>2</td> </tr> <tr> <td>Urine sample</td> <td>1</td> <td>2</td> </tr> <tr> <td>Blood sample.....</td> <td>1</td> <td>2</td> </tr> </tbody> </table>		Yes	No	Blood pressure	1	2	Urine sample	1	2	Blood sample.....	1	2	
	Yes	No												
Blood pressure	1	2												
Urine sample	1	2												
Blood sample.....	1	2												
MN5. DO YOU HAVE A CARD OR OTHER DOCUMENT WITH YOUR OWN IMMUNIZATIONS LISTED? MAY I SEE IT PLEASE? <i>If a card is presented, use it to assist with answers to the following questions.</i>	Yes (card seen)1 Yes (card not seen)2 No3 DK.....8													
MN6. WHEN YOU WERE PREGNANT WITH (name), DID YOU RECEIVE ANY INJECTION IN THE ARM OR SHOULDER TO PREVENT THE BABY FROM GETTING TETANUS, THAT IS CONVULSIONS AFTER BIRTH?	Yes1 No2 DK.....8	2⇒MN9 8⇒MN9												
MN7. HOW MANY TIMES DID YOU RECEIVE THIS TETANUS INJECTION DURING YOUR PREGNANCY WITH (name)? <i>If 7 or more times, record '7'.</i>	Number of times DK.....8	⇒MN9												
MN8. WHY DIDN'T YOU SEE ANYONE FOR ANTENATAL CARE DURING YOUR PREGNANCY WITH (NAME)? PROBE: ANY OTHER REASON RECORD ALL MENTIONED	Costs too much1 Facility not open2 Too far/ no transportation3 Don't trust facility/poor quality service4 No female provider at facility5 Husband/family did not allow6 Feels shy7 No time to go8 Long waiting time9 Not necessary10 Not customary11 Pregnancy was normal/No problems12 Other (specify) 96													

MN9. DURING YOUR PREGNANCY WITH (NAME), DID YOU EXPERIENCE ANY HEALTH PROBLEMS/ COMPLICATIONS	Yes 1 No 2 Don't know 3	2⇒MN11 3⇒MN11
MN10. WHICH PROBLEMS DID YOU EXPERIENCE <i>Probe:</i> ANY OTHER SYMPTOMS? Keep asking for more signs or symptoms until the respondent cannot recall any additional symptoms. CIRCLE ALL SYMPTOMS MENTIONED, BUT DO NOT PROMPT WITH ANY SUGGESTIONS	Hypertension / headache / swelling / fits ... A Anaemia /pallor /fatigue / breathlessness ..B Abnormal position of foetus C Cessation of foetal movement D Foul smelling dischargeE Light bleeding / spottingF Haemorrhage / heavy bleeding G Multiple pregnancy / large abdomen H Prolonged labour / "sun set two times" I Leakage of amniotic fluid J Sharp abdominal pain K Swelling of feet and face L Fever M Other (specify) N	
MN11. DURING PREGNANCY, HOW MANY TIMES IS A WOMAN REQUIRED VISIT THE ANTENATAL CLINIC	 Don't know 99	
MN12. WHO ASSISTED WITH THE DELIVERY OF (name)? <i>Probe:</i> ANYONE ELSE? <i>Probe for the type of person assisting and circle all answers given.</i> <i>If respondent says no one assisted, probe to determine whether any adults were present at the delivery.</i>	Health professional (Doctor/Health officer/Nurse/Midwife)..... A Other person Health extension worker B Traditional birth attendant C Relative / Friend D Other (specify) X No one..... Y	
NM13. WOULD YOU HAVE PREFERRED THAT SOMEBODY ELSE ASSIST WITH THE BIRTH OF (name) INSTEAD OF(CHECK MN12)	Yes 1 No 2 Don't know..... 3	2⇒MN15 3⇒MN15
NM14. WHOM WOULD YOU HAVE PREFERRED TO ASSIST YOU WITH THE BIRTH OF (name)? INSTEAD OF(CHECK MN12)	Health professional (Doctor/Health officer/Nurse/Midwife)..... A Other person Health extension worker B Traditional birth attendant C Relative / Friend D Other (specify) X No one..... Y	
MN15. WHERE DID YOU GIVE BIRTH TO (name)? <i>Probe to identify the type of source.</i> <i>If unable to determine whether public or private, write the name of the place.</i> (Name of place)	Home Your home 11 Other home..... 12 Public sector Govt. hospital 21 Govt. clinic / health centre 22 Govt. health post 23 Other public (specify) 26 Private Medical Sector Private hospital (St. Lukas Wolisso)..... 31 Private hospital (other) 32 Private clinic 33 Other private (specify) 35 Other (specify) 96	21⇒MN17 22⇒MN17 23⇒MN17 26⇒MN17 31⇒MN17 32⇒MN17 33⇒MN17 35⇒MN17 96⇒MN17

MN16. WHY DIDN'T YOU DELIVER IN A HEALTH FACILITY? PROBE: ANY OTHER REASON RECORD ALL MENTIONED	Cost too much1 Facility not open2 Too far/ no transportation3 Don't trust facility/poor quality service4 No female provider at facility5 Husband/family did not allow6 Felt more comfortable to deliver at home....7 Labour was urgent8 Not necessary9 Not customary10 Other (specify).....96	
MN17. WAS (name) DELIVERED BY CAESAREAN SECTION? THAT IS, DID THEY CUT YOUR BELLY OPEN TO TAKE THE BABY OUT?	Yes1 No2	
MN18. PRIOR TO THE BIRTH OF (name) DID YOU OR YOUR FAMILY MEMBER MAKE ANY SPECIAL ARRANGEMENTS FOR THE BIRTH OF THIS CHILD	Yes1 No2 Don't know3	2⇒MN20 3⇒MN20
MN19. WHICH ARRANGEMENTS DID YOU OR YOUR FAMILY MAKE FOR THE BIRTH OF (name)	Identify transport.....1 Save money.....2 Identify blood donor3 Decide where the child will be born4 Identify skilled provider5 Other.....6	
MN20. WHO MADE A FINAL DECISION ON WHERE YOU SHOULD GIVE BIRTH?	Myself1 My husband2 Both myself and my husband3 Other family member4 Other person (specify)5	
MN21. AFTER YOU GAVE BIRTH TO (NAME), DID ANYONE CHECK ON YOUR HEALTH?	Yes1 No2	2⇒MN24
MN22. WHO CHECKED ON YOUR HEALTH AT THAT TIME? PROBE: ANYONE ELSE?	Health professional (Doctor/Health officer/Nurse/Midwife).....A Other person Traditional birth attendant.....B Health extension workerC Relative / FriendD Other (specify)X	
MN23. HOW LONG AFTER DELIVERY OF (NAME) DID THE FIRST CHECK TAKE PLACE? IF IMMEDIATELY, RECORD "00" UNDER HOURS IF LESS THAN ONE DAY, RECORD HOURS. IF LESS THAN ONE WEEK, RECORD DAYS.	HOURS 1 ____ DAYS 2 ____ WEEKS 3 ____ DON'T KNOWZ	
MN24. DID YOU EVER BREASTFEED (name)?	Yes1 No2	2⇒MN26
MN25. HOW LONG AFTER BIRTH DID YOU FIRST PUT (name) TO THE BREAST? If less than 1 hour, record '00' hours. If less than 24 hours, record hours. Otherwise, record days.	Hours1 ____ Days2 ____ Don't know / remember998	

MN26. DO YOU KNOW ANY NEAREST HEALTH FACILITY (HOSPITAL OR HEALTH CENTRE) WHERE A WOMAN CAN GO TO BE ASSISTED TO DELIVER?	Yes1 No2	2⇒IS
MN27. WHAT IS THE NAME OF THIS FACILITY	_____	
MN28: IN YOUR COMMUNITY, HOW WOULD A WOMAN GO TO THIS FACILITY TO DELIVER	Walking1 Public transport2 Hired car/taxi3 Other (specify)4 Don't know5	
MN29. HOW LONG DOES IT TAKE TO GO TO THIS FACILITY BY _____ (THE MEANS MENTIONED IN MN28)	Minutes _____ Hours _____	
MN30. IN YOUR OPINION, HOW ARE THE SERVICES FOR WOMEN AT THIS FACILITY. WOULD YOU SAY THEY ARE EXCELLENT, GOOD, AVERAGE OR POOR	Excellent1 Good2 Average3 Poor4 Don't know5	
ILLNESS SYMPTOMS		IS
IS. SOMETIMES A WOMAN WHO IS PREGNANT MAY DEVELOP SEVERE COMPLICATIONS THAT REQUIRE HER TO SEEK HELP URGENTLY AT A HEALTH FACILITY. WHAT TYPES OF SYMPTOMS DURING PREGNANCY WOULD CAUSE A WOMAN TO SEEK MEDICAL HELP AT A HEALTH FACILITY RIGHT AWAY? <i>Probe:</i> ANY OTHER SYMPTOMS? Keep asking for more signs or symptoms until the respondent cannot recall any additional symptoms. Circle all symptoms mentioned, but do NOT prompt with any suggestions	Hypertension / headache / swelling / fits ... A Anaemia /pallor /fatigue / breathlessness . B Abnormal position of foetus C Cessation of foetal movement D Foul smelling discharge E Light bleeding / spotting F Haemorrhage / heavy bleeding G Multiple pregnancy / large abdomen H Prolonged labour / "sun set two times" I Leakage of amniotic fluid J Sharp abdominal pain K Swelling of feet and face L Fever M Other (<i>specify</i>) X Other (<i>specify</i>) Y	

ATTITUDE AND PERCEPTIONS**ATT**

NOW I AM GOING TO READ OUT A LIST OF COMMON PERCEPTIONS ABOUT PREGNANCY, CHILDBIRTH, AND THE PERIOD IMMEDIATELY AFTER CHILDBIRTH. I WOULD LIKE TO KNOW WHETHER YOU STRONGLY AGREE, AGREE, DISAGREE, OR STRONGLY DISAGREE WITH THESE STATEMENTS. THERE IS NO RIGHT OR WRONG ANSWER TO ANY OF THESE.

WE ARE ONLY INTERESTED IN HEARING YOUR OPINION.

QN #	QUESTION	CODES				
		STRONGLY AGREE	AGREE	DISAGREE	STRONGLY DISAGREE	DON'T KNOW
ATT1	A WOMAN SHOULD PLAN AHEAD OF TIME WHERE SHE WILL GIVE BIRTH TO HER BABY.	1	2	3	4	9
ATT2	A WOMAN SHOULD PLAN AHEAD OF TIME HOW SHE WILL GET TO THE PLACE WHERE SHE WILL GIVE BIRTH.	1	2	3	4	9
ATT3	IT IS NOT NECESSARY FOR A HUSBAND/ PARTNER TO ACCOMPANY HIS WIFE TO ANTENATAL CARE VISITS.	1	2	3	4	9
ATT4	WHEN WOMEN DO NOT GO TO A HEALTH FACILITY TO GIVE BIRTH, IT IS MAINLY BECAUSE IT IS TOO EXPENSIVE.	1	2	3	4	9
ATT5	WHEN WOMEN DO NOT GO TO A HEALTH FACILITY TO GIVE BIRTH, IT IS MAINLY BECAUSE IT IS TOO DIFFICULT TO GET THERE	1	2	3	4	9
ATT6	WHEN WOMEN DO NOT GO TO A HEALTH FACILITY TO GIVE BIRTH, IT IS MAINLY BECAUSE THE STAFF THERE DO NOT TREAT WOMEN RESPECTFULLY	1	2	3	4	9
ATT7	IT IS NOT NECESSARY FOR A HUSBAND/ PARTNER TO ACCOMPANY HIS WIFE WHEN SHE IS GIVING BIRTH	1	2	3	4	9
ATT8	GIVING BIRTH IS MOSTLY A WOMAN'S MATTER. HUSBANDS/PARTNERS HAVE LITTLE TO CONTRIBUTE	1	2	3	4	9

WM9. Record the time.	Hour and minutes__ : __	
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INTERVIEWER'S OBSERVATIONS