Quality of Maternal and Newborn Health Services in Tanzania:
A survey of the quality of maternal and newborn health in 12 regions of Tanzania

Report 1: Findings on Antenatal Care

Marya Plotkin
Gaudiosa Tibaijuka
Christina Lulu Makene
Sheena Currie
Maryjane Lacoste

Table of Contents

ABBREVIATIONS AND ACRONYMS

AMTSL	Active management of the third stage of labour
ANC	Antenatal care
BEmONC	Basic emergency obstetric and newborn care
EmOC	Emergency obstetric care
FANC	Focused antenatal care
FIGO	International Federation of Gynecology and Obstetrics
HMIS	Health management information system
ICM	International Confederation of Midwives
IM	Intramuscular
IP	Infection prevention
IPTp	Intermittent preventative treatment of malaria in pregnancy
IRB	Institutional Review Board
ITN	Insecticide-treated bed net
IU	International units
IV	Intravenous
JHSPH	Johns Hopkins Bloomberg School of Public Health
L&D	Labour and Delivery
MAISHA	Mothers and Infants, Safe, Healthy, Alive
MCHIP	Maternal and Child Health Integrated Program
MoHSW	Ministry of Health and Social Welfare
MTUHA	Swahili name for health management information system
PE/E	Pre-eclampsia/eclampsia
PMTCT	Prevention of mother-to-child transmission of HIV
PPFP	Postpartum family planning
PPH	Postpartum haemorrhage
SP	Sulphadoxine-pyrimethamine
TT	Tetanus toxoid
USAID	United States Agency for International Development
WHO	World Health Organization

ACKNOWLEDGEMENTS

ABOUT MAISHA AND MCHIP

MAISHA, meaning "life" in Swahili, promotes the philosophy that building solid foundations for quality services will empower providers at all levels of the health care system across the country to deliver targeted interventions that will make a real difference in keeping mothers and their newborn infants, safe, healthy and alive.

The USAID/Tanzania-funded MAISHA programme is assisting the MoHSW to strengthen the platforms of focused antenatal care (FANC) and basic emergency obstetric and neonatal care (BEmONC). These platforms will address the prevention and treatment of postpartum haemorrhage and other key contributors to maternal mortality, and essential newborn care including newborn resuscitation, prevention and treatment of sepsis, and immediate warming and drying. MAISHA is supporting the MoHSW in developing national and district resources (guidelines, training package, trainers, supervision tools) for FANC and BEmONC and in advocating and coordinating with district health management teams, donors and other key stakeholders to ensure that funding is allocated for implementing quality FANC and BEmONC, including training service providers at district level (using the resources developed at national and district levels) throughout the country. MAISHA is also strengthening the platform of prevention of mother-to-child transmission of HIV (PMTCT) to address gaps in integrating maternal and newborn health services for HIV-positive women and children

ABOUT MCHIP

The Maternal and Child Health Integrated Program (MCHIP) is the USAID Bureau for Global Health flagship maternal, neonatal and child health (MNCH) programme. MCHIP supports programming in maternal, newborn and child health, immunization, family planning, malaria and HIV/AIDS, and strongly encourages opportunities for integration. Cross-cutting technical areas include water, sanitation, hygiene, urban health and health systems strengthening.

EXECUTIVE SUMMARY

The MAISHA Quality of Maternal and Newborn Health Services study, conducted in July and August 2010, was an observational study conducted in 52 health facilities (regional hospitals, health centres and dispensaries) in 12 regions of Tanzania, as well as additional facilities in Zanzibar (Pemba and Unguja). The aim of the study, which combined observations of service delivery with inventories, record review and health worker knowledge assessments, was to gather information on the quality of maternal and newborn care currently being provided in these 12 regions. The results serve as a baseline for the MAISHA programme, as well as an important source of information on quality of maternal and newborn care for policymakers and stakeholders in Tanzania. This report presents key findings on antenatal care (ANC); a separate report on the labour, delivery and newborn care components will follow.

The provision of key services for antenatal care ranged from high coverage of weighing clients (84%), measuring blood pressure (79%), providing intermittent preventative treatment for malaria (IPT) (65%), to taking blood tests for anaemia (53%) and screening for syphilis (52%). These key services did not differ greatly among regional hospitals and health centres and dispensaries. The largest difference was in measuring blood pressure: whereas 93% of clients in regional hospitals had their blood pressure taken, 75% of the clients in health centres and dispensaries had the same. Overall, the lowest scored area was the urine test for protein, which 39% of clients received, followed by counselling for family planning, which 49% of clients received.

The mean score for clients accessing preventative treatment including IPT, iron/folate pills, tetanus toxoid and a voucher for an insecticide-treated bed net was 60%. This score did not differ greatly between the hospitals and the health centres/dispensaries. However, counselling on preventative treatments was quite low. For iron/folic acid, only 25% of clients received counselling on the importance, use and side effects of the supplement, while for IPTp (intermittent preventative treatment in pregnancy), only 20% of clients received similar counselling.

The overall mean percentage score for counselling on danger signs in pregnancy was 46%. Areas of weakness included discussion of persistent cough, severe headaches and swelling of hands and face.

A mean of 23% of ANC clients were screened for pre-eclampsia and eclampsia (checking blood pressure, checking face and hands for oedema and asking about severe headaches and/or blurred vision). This differed substantially between higher- and lower-level facilities, with 41% of hospital clients being screened and only 18% of clients in health centres/dispensaries being screened.

Overall, 66% of clients were referred for or received HIV testing and 59% received or were referred for counselling. The areas of weakness for counselling of the HIV-positive ANC client included discussion of feeding options for exposed babies (55% of the HIV-positive ANC clients) and the importance of bringing the infant back for testing (66% of HIV-positive ANC clients).

The findings on ANC from this study bring to the forefront areas of relative strength (provision of key services for ANC) as well as some significant weaknesses (counselling on danger signs, availability of tests such as testing urine for protein, HIV, syphilis and anaemia testing, and counselling for HIV-positive ANC clients). Given that the MoHSW is committed to increasing the number of women who have at least four ANC visits, improving quality of ANC in health centres and dispensaries should be a special focus, because they typically have the highest ANC caseloads.

1. INTRODUCTION/BACKGROUND

Improving quality of obstetric care in facilities is an essential strategy in reducing maternal and neonatal deaths (van den Broek and Graham 2009). To measure improvements in quality, objective baseline quality measurements must first take place. The study described in this report objectively measured key aspects of antenatal care (ANC), labour and delivery care, and neonatal care in selected health facilities in Tanzania.

The overall goal of the study was to provide sound information on maternal and newborn care at facility levels in selected regions, by documenting the appropriate use and quality of implementation of key maternal and neonatal health interventions in the provision of facility-based maternal and newborn care. The definition of "quality" as used in the study is that services are correctly performed per globally and nationally accepted evidence-based guidelines.

This study also serves as the baseline information source for the USAID/Tanzania-funded MAISHA *(Mothers and Infants, Safe, Healthy, Alive)* programme in Tanzania. MAISHA is a national programme to strengthen service delivery which, since 2008, has been working to improve the quality of maternal and neonatal health services through training of health care providers, provision of equipment and supplies, and implementation of quality improvement initiatives. MAISHA is being implemented in a phased approach in all 21 regions on mainland Tanzania as well as in Zanzibar (both Pemba and Unguja).

There are known, effective interventions for screening, preventing and treating obstetric and newborn complications in health care facilities. Improving the quality of facility-based care to prevent and treat frequent maternal and newborn complications is important to reduce maternal and newborn deaths globally and assist countries to meet their targets for Millennium Development Goals (MDGs) 4 and 5. In Tanzania, approximately 50% of births take place in a health facility (Tanzania Demographic and Health Survey [TDHS] 2010), indicating that improving maternal and neonatal care in health facilities would potentially have a major impact on reduction of mortality.

The study specifically looked at lifesaving practices around the major causes of maternal death, including postpartum haemorrhage and hypertensive disorders in pregnancy. In Tanzania, postpartum haemorrhage is the most frequent cause of maternal deaths, accounting for 28% of maternal deaths, followed by unsafe abortion (19%), hypertensive disorders in pregnancy (pre-eclampsia/eclampsia [PE/E]) (17%), infections/sepsis (11%) and obstructed labour (11%) (WHO 2009). This is similar to the global causes of death in developing countries (Khan et al. 2006).

The study attempted to determine the frequency of use and quality of interventions that address frequent causes of maternal and newborn deaths in Tanzania. Causes of death include: For mothers, PE/E; postpartum haemorrhage (PPH); prolonged/obstructed labour; and sepsis; and for newborns, birth asphyxia. The obstetric and neonatal care interventions assessed include screening, management of PE/E, partograph use, use of active management of third stage of labour (AMTSL) to prevent PPH, management of PPH, infection prevention (IP), and essential newborn care including resuscitation.

The main approaches of this study were observations of health care providers during ANC consultations and when providing care in labour and deliveries, as well as health worker knowledge and skill assessments, including a demonstration of newborn resuscitation on a model, and inventories of the ANC, maternity and general facility pharmacy. The results of this assessment will be used as baseline data from which to measure progress of the MAISHA programme in Tanzania, and also to inform national programme and policy responses for assuring quality in ANC and maternity services.

This report presents study findings related to ANC. Subsequent reports will present findings on other study components, including labour and delivery, newborn care and health worker knowledge assessments.

2. STUDY DESIGN

The study used a combination of approaches, including observations of deliveries and ANC consultations, inventories of various areas of the health facility where drugs and supplies can be found, and knowledge and skills assessments of providers, including a simulated resuscitation of a newborn using a model.

The following tools were used at facility level:

- **Facility inventory**: Reporting of infrastructure conditions and verification of availability and storage conditions of medications, supplies and equipment. The inventory is conducted once per facility, but includes inventories of the general pharmacy, the ANC clinic and the maternity ward.

- **Record review**: This tool captured the number of ANC consultations, births (live and stillborn), and maternal and neonatal deaths at each facility for the last year, based on the health management information system (HMIS) tools (MTUHA books). Up to 24 individual patient charts from the past three months were also reviewed for partograph use/completeness of the filled-in partographs.

- **Clinical practice observation of ANC and labour and deliveries**: Structured clinical observation checklists were used for observation of ANC consults and vaginal deliveries in the facilities. The content of the checklists was developed based on international (approved by the World Health Organization [WHO]) protocols for: screening for PE/E in ANC; management of PE/E and PPH in labour and delivery (L&D); and other interventions in L&D—routine and correct use of the partograph; routine and correct use of AMTSL; infection prevention behaviours, provider-client interaction/communication; immediate essential newborn care; and newborn resuscitation. Minor revisions were made to ensure that the tools were tailored to Tanzania policies.

- **Health care worker interviews**: a series of questions to test the workers' knowledge of how to identify, manage and treat common maternal and newborn health complications. A simulated resuscitation with a newborn model was used to measure newborn resuscitation skills.

2.1 Sample and Sampling Strategies

Figure 1. Study sites
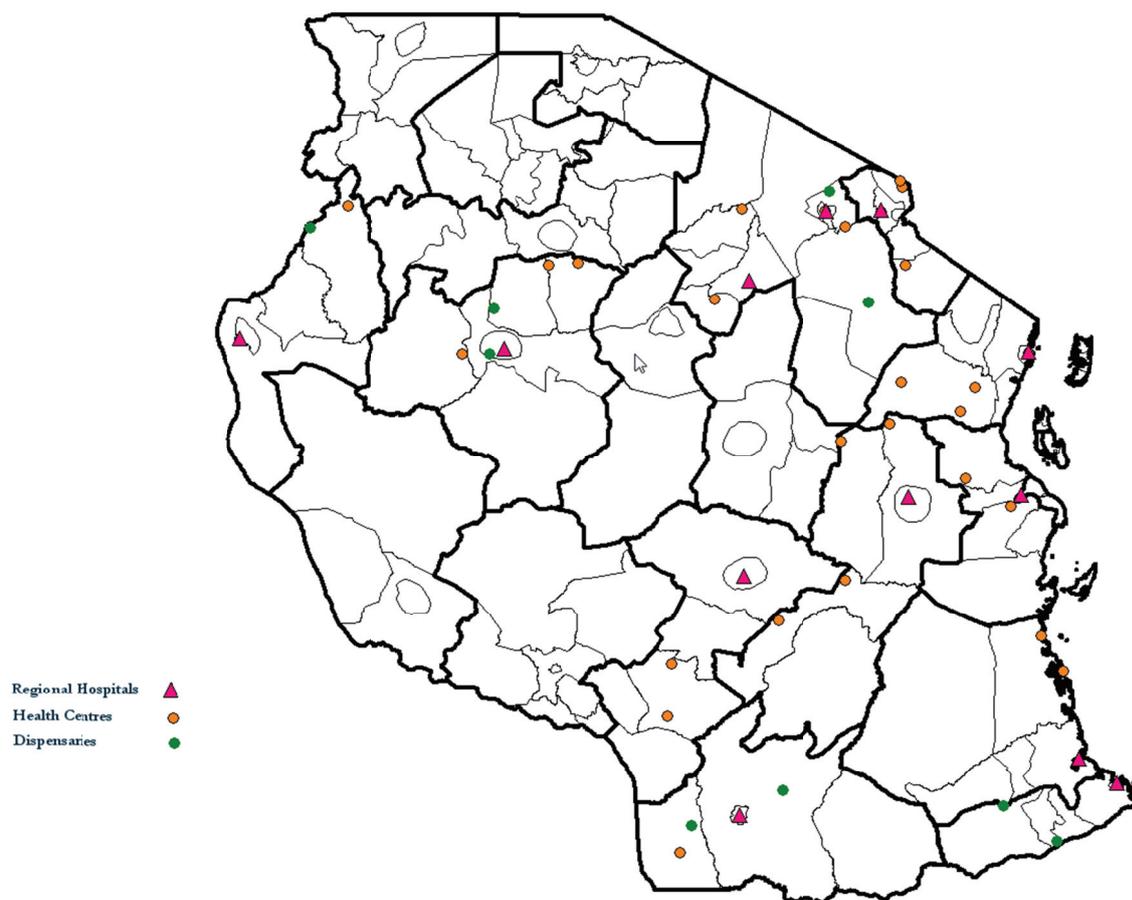
Because this is a baseline measurement for the MAISHA programme[1], the regions that hosted the first and second year of MAISHA (Year 1 and 2 regions) were selected. Within the selected regions, all regional hospitals were included in the sample. Based on 2009 delivery data from all MAISHA-supported facilities that were conducting deliveries in those regions, all facilities with at least one delivery per day were included in the study[2].

MAISHA primarily targets lower-level health facilities (health centres and dispensaries) for quality improvement, but also works with the regional hospital to establish centres of excellence for training and high-quality referral care.

The study was powered on the number of deliveries to be observed. In order to achieve the power desired for analysis, it was determined that 214 deliveries in regional hospitals and 214 deliveries in health centres/dispensaries should be observed. The number of deliveries to be observed was then turned into a "quota" for each health facility, with lower-volume sites allocated fewer deliveries to be observed. This was done knowing that weights would be applied to the values to adjust for the differences in volume.

Regional hospitals in Tanzania provide tertiary-level care and serve as referral sites from district hospitals, while dispensaries provide primary health care. All three levels provide ANC, although regional hospitals sometimes provide ANC services only on a referral basis.

---

[1] Although this was a baseline, the timing of the study was such that in some regions, such as Mtwara and Lindi, the programme had been implemented for approximately a year, while in others, such as Tanga, the programme had not yet been introduced.
[2] In Mtwara and Lindi, no facilities had a delivery volume of one delivery per day, so two facilities in the sample had a lower delivery volume.

Regional hospitals and health centres/dispensaries were treated as two different strata; thus, if too few deliveries were observed in health centres, we did not "add" deliveries from a regional hospital. Most analyses are presented stratified by facility level, because the differences between the levels of health facility were significant. All aspects of essential maternal and newborn care should be available at each level of health facility.

Only data from the maternity observations were weighted. The findings on ANC presented in this report are not weighed, which means that the findings might be slightly biased towards the higher-volume facilities.

2.2 Data Collection

Data collectors were 20 health care providers who were endorsed by the MoHSW as national Life Saving Skills (LSS) trainers. Data collectors were given a two-day, technical update in BEmONC, followed by seven days of training in data collection, which included two days of practicum. The training covered research ethics and consent, familiarization with all of the tools, familiarization with the mobile phone technology (all data collection was conducted using mobile phones), simulations with scoring, an inter-rater reliability exercise and two days of practical applications at hospitals in the Dar es Salaam area.

Data collectors worked in teams of between two to four people, depending on the size of the health facility. Fieldwork was conducted from July to August 2010, and a total of 18 days was used for fieldwork.

2.3 Data Entry, Quality Control and Analysis

Survey data were recorded by data collectors on Smartphones using custom-created data entry programmes developed with a package called PocketPC Creations running on Windows mobile. Logic, skip and consistency checks were built into the programmes. Data collectors were trained to review records for missing or inconsistent answers before submission. Depending on whether phone coverage was available at the study site, the data from each handheld device were either uploaded directly to a central database at the end of each day or backed up to a secure digital card to be uploaded upon returning from the field. Data were uploaded from the phones into a database on a secure network. Once in the database, data were put into tables and made available for study team members via a Web site that was accessible only with a password. Analysis was conducted both by the study's Principal Investigator and team in the U.S., and by the study team in Tanzania using SPSS.

2.4 Ethical Considerations

The study protocol was submitted to and approved by the National Institute of Medical Research (NIMR) in Tanzania and the Institutional Review Board (IRB) of the Johns Hopkins Bloomberg School of Public Health (JHSPH). The JHSPH IRB ruled the protocol exempt from review under 45 CFR 46.101(b), Category (5). Informed consent was obtained from all participating health providers and patients, as well as from facility directors. If a woman was incapacitated, consent was to be obtained from next of kin or guardian. However, this situation did not occur in the course of the study.

3. HEALTH FACILITY OVERVIEW

The health facilities in the sample consisted of a total of 50 health facilities: 12 regional hospitals, 31 health centres and seven dispensaries (health centres and dispensaries were assigned a stratum together). However, two hospitals did not provide ANC services, as they are referral hospitals. Therefore, the sample for almost all ANC calculations is 48 health facilities. Table 1 shows basic infrastructure characteristics of the health facilities in the sample.

In facilities with fewer than 200 beds, the mean number of overnight beds per facility was 39, while for the 200–399 range, the mean number was 344, and for the 400+ category, the mean number of beds was 544.

Table 1. Facility infrastructure characteristics of the sample

FACILITY INFRASTRUCTURE CHARACTERISTICS	HOSPITALS n=12		HEALTH CENTRES/ DISPENSARIES n=38		ALL FACILITIES n=50	
	n	%	n	%	n	%
Number of overnight beds per facility (mean)						
<200	4	33.3	37	97	40	80
200–399	6	50	0	0	6	12
400+	2	16.6	1	3	4	8
Ability to conduct surgery with general anaesthesia	11	92	7	18	18	36
Electric power (grid or functioning generator with fuel)	12	100	27	71	39	78
Safe water source within 500 meters of facility	10	72	26	99	36	77
Patient room for ANC with auditory and visual privacy	4	33	23	82	27	54
Functional improved type toilet	11	92	26	68	37	74
Communication equipment	12	100	7	18	19	38
24 hour staff coverage (schedule observed or staff live onsite)	10	83.3	33	86.8	43	86
Emergency transport	12	100	28	73.6	40	80

4. FINDINGS

4.1 Case Volume and Self-Reported Infrastructure for ANC

The volume of ANC clients in health facilities visited was obtained from the record review. Table 2 shows average quarterly client volume from the health facilities in the sample. The overall median for hospital was 313 and for the health centres/dispensaries was 996. These figures are reflective of higher ANC attendance at lower-level health facilities, which was expected. At least four antenatal care visits are recommended for normal pregnancies.

Table 2. Client volume for ANC, year previous to study, from MTUHA records

	HOSPITALS	HEALTH CENTRES/ DISPENSARIES
Annual Average Client Volume (mean)	2,001	2,242
Annual Client Volume (median)	313	996

The following information on tests and services offered was taken from the ANC inventory in which the facility in-charge reported on services available (see Table 3). This table is offered as illustrative only, since the main source of information for services offered through ANC is from the actual observations of the client consultations.

Table 3. Self-reported availability of tests and services offered prior to and during ANC consultation

OFFERED PRIOR TO CONSULTATION	HOSPITALS n=10*		HEALTH CENTRES/ DISPENSARIES n=38		ALL FACILITIES n=48	
	n	%	n	%	n	%
Weighing clients	7	70	27	71	34	71
Taking blood pressure	6	60	27	71	33	69
Urine test for protein	2	20	4	11	6	13
Blood test for anaemia	5	50	9	24	14	29
OFFERED DURING CONSULTATION						
Urine test for protein	7	70	18	48	25	52
Blood test for anaemia	8	80	23	61	31	65
Blood test for syphilis	8	80	25	66	33	69
Sulphadoxine-pyrimethamine for IPT	8	80	28	74	36	75
Counselling for family planning	9	90	25	66	34	71
Voluntary counselling about HIV/AIDS	9	90	34	90	43	90
Voluntary testing for HIV/AIDS	9	90	34	90	43	90
Tetanus toxoid available on ANC days	9	90	34	90	43	90
Tetanus toxoid available today	9	90	33	87	42	88

* Two hospitals do not provide ANC services.

The self-reported availability of key components of ANC services was low. This finding was surprising, since one might expect this to be higher than that actually observed. For hospitals and health centres/dispensaries, weighing clients and taking blood pressure were reported to be available in approximately 70% of facilities. However, lower availability was reported for urine testing for protein: overall, 13% of facilities offered urine testing prior to consultation and 52% during consultation.

4.2 Description of Clients in ANC Observations

ANC observations were conducted in 47 of 50 health facilities in the sample. (The facilities where observations were not conducted were three regional hospitals in which only referral ANC services were provided and two health centres in which a technical failure occurred in the phones.) The resulting sample of clients comprised 391 observations. The number of clients observed by region is detailed in Table 4, below.

Table 4. ANC clients observed, by type of facility

REGIONS	HOSPITALS	HEALTH CENTRES/ DISPENSARIES	ALL FACILITIES	
	n	n	n	%
Tanga	7	62	69	18
Arusha	0	13	13	3
Iringa	7	6	13	3
Kigoma	5	4	9	2
Kilimanjaro	0	16	16	4
Lindi	15	7	22	6
Manyara	12	31	43	11
Morogoro	0	38	38	10
Mtwara	4	11	15	4
Pwani	9	14	23	6
Ruvuma	15	20	35	9
Tabora	13	82	95	24
Total	87	304	391	100

It must be noted that, in efforts to reduce overcrowding, all of the regional hospitals in the sample are designated to receive only referred or complicated ANC cases in which women had additional or special needs. Thus, the tools, which were designed to capture routine ANC, sometimes did not fit well in the context of referral for ANC where clients may be seeing specialists, or where the client flow was substantially different from "normal" ANC.

The following cadres provided ANC services to the majority of ANC clients observed: nursing officers (16%), nurse midwives/enrolled nurses (58%) and clinical officers (1%). However, in 17% of observations, a maternal and child health aide or a medical attendant was providing ANC services. This is a cadre that is not authorized by the MoHSW to provide ANC services at facility level, though they may support staff in specific tasks such as weighing a patient (see Table 5).

Table 5. Cadre of ANC service provider providing ANC services

CADRE OF ANC SERVICE PROVIDER	OBSERVATIONS IN HOSPITALS n=88		OBSERVATIONS IN HEALTH CENTRES/ DISPENSARIES n=303		ALL OBSERVATIONS n=391	
	n	%	n	%	n	%
Nurse Officer	19	22	43	14	62	16
Nurse Midwife/Enrolled Nurse	55	63	171	56	226	58
Clinical Officer	2	2	0	--	2	1
Maternal and Child Health Aide	9	10	55	18	64	16
Medical Attendant	0	--	5	2	5	1
Medical/Nursing Student	0	--	2	1	2	1
Other*	3	3	27	9	30	7
Total	88	99	303	100	391	100

*Cadres falling in the "other" category were not specified in the tool.

Almost 70% of the observations were of clients returning for ANC. Regional hospitals saw a higher rate of referral within facility compared to health centres/dispensaries (39% versus 18%), most likely due to seeing pregnant women with complications or special needs (see Table 6).

Table 6. Type of ANC consultation observed

ANC CONSULTATIONS	OBSERVATIONS IN HOSPITALS n=88		OBSERVATIONS IN HEALTH CENTRES/ DISPENSARIES n=303		ALL OBSERVATIONS n=391	
	n	%	n	%	n	%
Type of ANC visit observed						
First visit	29	33	99	33	128	33
Follow-up visit	58	67	199	67	257	67
Gestational age at visit						
< =20 weeks	24	25	71	23	95	24
21-36 weeks	51	53	212	70	263	67
>= 37 weeks	21	22	12	7	33	8
Gravida						
Primigravida	24	27	80	26	101	26
Multigravida	64	73	223	74	286	74
Outcome of visit						
Client goes home	52	59	231	77	283	73

ANC CONSULTATIONS	OBSERVATIONS IN HOSPITALS n=88		OBSERVATIONS IN HEALTH CENTRES/ DISPENSARIES n=303		ALL OBSERVATIONS n=391	
	n	%	n	%	n	%
Referred within facility	34	39	54	18	88	23
Admitted to facility	1	1	6	2	7	2
Referred to another facility	0	0	7	2	7	2

The mean time of an ANC consultation varied considerably, with regional hospitals having much longer consultations. For regional hospitals, the mean duration of a first consultation was 57 minutes, while for health centres/dispensaries, the mean duration was 34 minutes. Similarly, for hospitals, the mean duration of a follow-up visit was 27 minutes, while the mean time for a follow-up visit in health centres/dispensaries was 10 minutes. The study did not reveal the cause, but this could be a reflection of the function of regional hospitals to receive referred ANC clients with more complex needs and/or the high caseload at lower-level health facilities (i.e., less time available per client).

4.3 Findings from ANC Inventory

An inventory of ANC clinic supplies and equipment was conducted, as well as a pharmacy inventory (see Table 7).

Table 7. Equipment and supplies available, by type of facility

EQUIPMENT AND SUPPLIES	HOSPITALS n=10		HEALTH CENTRES/ DISPENSARIES n=38		ALL FACILITIES n=48	
	n	%	n	%	n	%
Foetal stethoscope	10	100	36	95	46	96
Functional blood pressure machine	9	90	34	89	43	90
Functional stethoscope	6	60	33	86	39	81
Adult weighing scale	10	100	33	87	43	90
Vaginal speculum	8	80	21	55	29	76
Guidelines or protocols for antenatal care	7	70	27	71	34	71
Guidelines or protocols for management of PE/E	4	40	9	24	13	27
Guidelines or protocols for sexually transmitted infections	3	30	19	50	22	46
Visual aids for client education related to pregnancy/ANC	4	40	24	63	28	58
Disinfectant not yet mixed	10	100	30	79	40	83
Waste receptacle with lid and plastic liner	7	70	18	47	25	52

Many, but not all, ANC clinics (90%) had a functional blood pressure machine during the survey. The presence of the adult weighing scale varied more by type of facility: while all of the regional hospitals had a weighing scale, 87% of the dispensaries and health centres had a scale. Similarly, there was a notable difference between the availability of vaginal specula, with 80% of hospitals having a speculum compared to 55% of health centres/dispensaries. There was limited availability of guidelines on management of PE/E (27%) and sexually transmitted infections (46%).

4.4 Findings from ANC Consultation Observations
Key Services in ANC

Key services in ANC include: weighing clients; measuring blood pressure; testing urine for protein and glucose (sugar); testing blood for anaemia, syphilis and HIV; providing IPT and tetanus toxoid; and counselling for family planning, birth planning and danger signs. IPT should be given twice, after 20 weeks of gestation (once during the 2nd trimester and once during the 3rd trimester, at least 4 weeks apart), often referred to as IPT1 and IPT2. Counselling on postpartum FP (PPFP) is recommended at the 3rd and 4th ANC visits, whereas birth preparedness counselling should be carried out and updated as necessary at every ANC visit. Table 8 shows the number and proportion of ANC clients who were observed having the following key services for ANC.

Table 8. Key services provided for ANC clients, from ANC observations

KEY SERVICE	HOSPITALS n=88		HEALTH CENTRES/ DISPENSARIES n=303		ALL FACILITIES n=391	
	n	%	n	%	n	%
Weight taken	75	85	255	84	330	84
Blood pressure taken	82	93	228	75	308	79
Urine test for protein	38	43	116	38	154	39
Blood test for anaemia	46	52	140	46	206	53
Counselling for family planning	53	60	140	46	193	49
Offered tetanus toxoid	61	69	199	66	260	66
Following for first visit clients only *n=29 hospital and n=99 for health centre*	n=29	%	n=99	%	n=128	%
SP for IPT	12	41	43	43	56	44
Blood test for syphilis n=29 hospital and n=99 for health centre	25	86	53	54	78	61
Counselling and testing for HIV n=29 hospital and n=99 for health centre	21	72	58	59	80	63
Mean percentage score of ANC key services	67%		57%		60%	

The provision of key ANC services did not vary substantially between the different levels of facility. The largest difference was in the taking of blood pressure: whereas 93% of clients in regional hospitals had their blood pressure taken, 75% of the clients in health centres and dispensaries had the same. Overall, the lowest scored area was the urine test for protein, which 39% of clients received, followed by counselling for family planning, which 49% of clients received. Similarly, while 86% of first-visit clients in hospitals were tested for syphilis, 54% of clients in health centres and dispensaries received the same service.

It must be noted that due to the method used to collect data, the denominator for all of the proportions presented above is all ANC clients rather than those ANC clients who needed the service (i.e., clients who may have received a voucher for an insecticide-treated bed net [ITN] in a previous visit were still in the denominator for those who did/did not receive an ITN voucher during this observation). This means that the actual proportion of clients who received the key service that they were supposed to get in ANC might be slightly higher than the above figures.

Pre-Eclampsia Screening

Screening for pre-eclampsia is one of the key components of ANC services that can translate into saving women's lives. Three components of screening for pre-eclampsia are included in an index and presented below (Table 9) as a mean score.

Table 9. Screening for pre-eclampsia

COMPONENTS OF SCREENING	REGIONAL HOSPITALS n=87*		HEALTH CENTRES/ DISPENSARIES n=301*		ALL FACILITIES n=388*	
	n	%	n	%	n	%
Ask about headache or blurred vision	29	33	65	22	94	24
Ask about swollen hands or face	22	25	64	21	86	22
Take the client's blood pressure	82	93	228	75	308	79
Composite indicator for screening for pre-eclampsia**	41%		18%		23%	

*Total clients observed slightly lower due to non-response.

**Composite indicator: must perform one of the screenings for danger signs and correctly take blood pressure.

Only seven out of the nine hospitals (78%) and exactly half of the 36 health centres/ dispensaries reported that urine is checked for protein as part of routine ANC.

Preventative Treatments in ANC

Intermittent preventative treatment of malaria (IPTp), iron/folate pills, tetanus toxoid and access to an ITN are important components of ANC services in Tanzania. During the ANC visit, a client is supposed to receive 90 tablets of iron or iron/folate, sulphadoxine-pyrimethamine for IPTp if the client is over 20 weeks (1st or 2nd dose), tetanus toxoid injections and an ITN voucher once during the ANC services.

The scores for the preventative treatments given to ANC clients did not differ greatly between the hospitals and the health centres/dispensaries. The mean score was 60%, lowered slightly by the ITN voucher.

The data in Table 10 below are for all ANC clients, and thus present an imprecise measure of the service for some services for which some clients are not eligible. For example, a client who is below 20 weeks' gestation would not be eligible for anti-malarial prophylaxis, and a client who had previously received an ITN voucher would not be eligible to receive another one.

Table 10. Preventative treatments given during ANC consult*

PREVENTATIVE TREATMENT PRESCRIBED OR GIVEN TO CLIENT	REGIONAL HOSPITALS n=88		HEALTH CENTRES/ DISPENSARIES n=303		ALL FACILITIES n=391	
	n	%	n	%	n	%
Preventative Treatment						
Iron pills or folic acid or both	63	72	197	65	260	66
Tetanus toxoid injection	61	69	199	66	260	66
SP for IPT given*	12	41	43	43	55	43

PREVENTATIVE TREATMENT PRESCRIBED OR GIVEN TO CLIENT	REGIONAL HOSPITALS n=88		HEALTH CENTRES/ DISPENSARIES n=303		ALL FACILITIES n=391	
	n	%	n	%	n	%
Insecticide-treated net (ITN) voucher given	16	55	52	53	192	49
Mean percentage score for preventative treatment	67%		61%		60.2%	
Percentage of clients who got ALL FOUR interventions	41%		33%		35%	

* Italics indicate for first-visit clients only, n=128.

The values for provision of IPTp were 41% and 43% for regional hospitals and health centres/dispensaries respectively (this includes either IPT1 or IPT2).

In addition to giving preventative treatments, providers must counsel clients on how and why to take these treatments. Table 11 below presents findings concerning counselling on the preventative treatments that occurred in the ANC consultations.

Table 11. Counselling on preventative treatments during ANC consultation

ELEMENTS OF COUNSELLING	REGIONAL HOSPITALS n=88		HEALTH CENTRES/ DISPENSARIES n=303		ALL FACILITIES n=391	
	n	%	n	%	n	%
Counselling on iron/folic pills						
Explain the purpose of the treatment	50	57	165	54	215	55
Explain how to take	60	68	179	59	239	61
Explain possible side effects	29	33	68	22	97	25
Counselling on iron/folic acid (received all three of above)	53%		22%		25%	
Counselling on tetanus toxoid injection						
Explain the purpose of the treatment	44	50	111	36.6	155	40
Counselling on ITN voucher						
Explain the importance of the treatment	56	64	154	51	210	54

Only 25% of clients received counselling on the three elements of iron/folic pills: this was dramatically higher in hospitals compared to health centres/dispensaries.

Table 12 below shows proportion of first-visit clients who received IPT and counselling on IPT. Overall, 44% of first-visit clients were given SP. In terms of counselling, 41% of clients were given an explanation of the purpose of the treatment, and 48% were told how to take the IPT1. Eleven percent (11%) were informed of possible side effects.

Table 12. IPT and IPT counselling for first-visit clients

| COUNSELLING FOR FIRST-VISIT CLIENT	REGIONAL HOSPITALS n=29		HEALTH CENTRES/ DISPENSARIES n=99		ALL FACILITIES n=128	
	n	%	n	%	n	%
Provision of IPT						
SP for IPT given*	12	41	43	43	56	44
Counselling on IPTp						
Explain the purpose of the treatment	12	41	41	41	53	41
Explain how to take	10	38	51	51	61	48
Explain possible side effects	3	10	11	11	14	11

*Provision of IPT may include those who were ineligible since they were under 16 weeks of gestation.

Counselling on Danger Signs and Birth Preparedness

Counselling on danger signs during pregnancy is an important part of ANC services, because it provides clients with the relevant information on when to seek care urgently, and can help prevent maternal, foetal and newborn death. All ANC clients should be informed at each visit on key danger signs for which they should consult the nearest health facility, including vaginal bleeding, swollen face and hands, severe headaches, convulsions and decrease in foetal movement; in addition, clients are told to return for persistent cough. In addition, ensuring birth preparedness, including deciding where to deliver, delivering with a skilled birth attendant, having the necessary supplies at home, and having some money available in case of emergencies, is an important component of ANC services.

Figure 2 below shows the proportion of clients counselled on danger signs in regional hospitals and health centres/dispensaries.

Figure 2. Counselling on danger signs
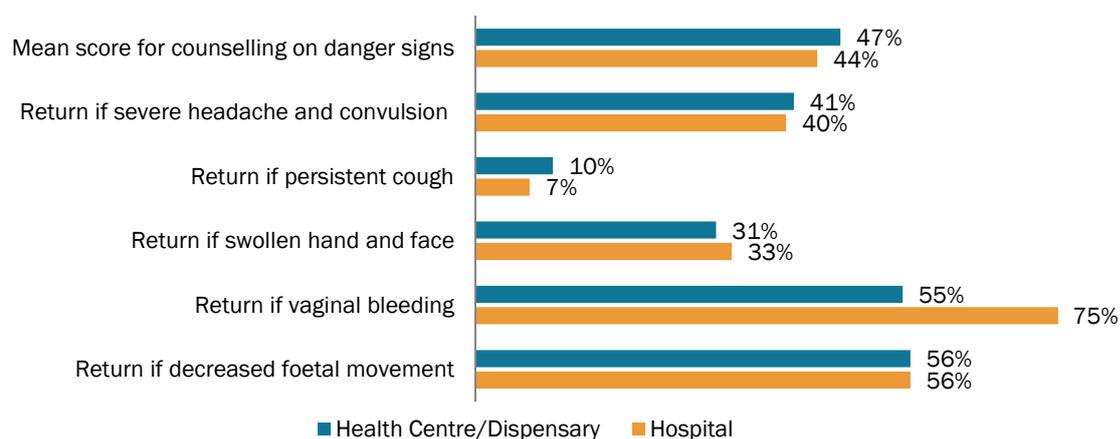
The overall mean percentage score for counselling on danger signs in pregnancy was 46%. In general, especially in health centres/dispensaries, approximately half of ANC clients were counselled on key danger signs (vaginal bleeding 55%; severe headache and/or convulsions 40%). Areas of weakness included discussion of persistent cough and swollen hands and face.

The overall mean score for birth preparedness counselling was 68% (66% for health centres/ dispensaries and 77% for regional hospitals) (see Table 13).

Table 13. Counselling on birth preparedness during ANC visit

BIRTH PREPAREDNESS	REGIONAL HOSPITALS n=88		HEALTH CENTRES/ DISPENSARIES n=303		ALL FACILITIES n=391	
	n	%	n	%	n	%
Ask client where she will deliver	65	74	205	68	270	69
Advise client to prepare for delivery (e.g., set aside money, arrange for emergency transport)	75	85	216	72	291	75
Advise client to use skilled health worker during delivery	62	70	189	63	251	65
Discuss with client what items to have on hand at home for emergencies (e.g., sterile blade)	67	76	191	64	258	66
Mean percentage score birth preparation counselling	77%		67%		69%	
Counselling on postpartum family planning	53	61	14	47	183	47

Overall, approximately half (47%) of the clients observed were counselled about PPFP, with considerably more in regional hospitals versus health centres/dispensaries (60% versus 46%). This information is presented in Figure 3, below.

Figure 3. Birth preparedness counselling
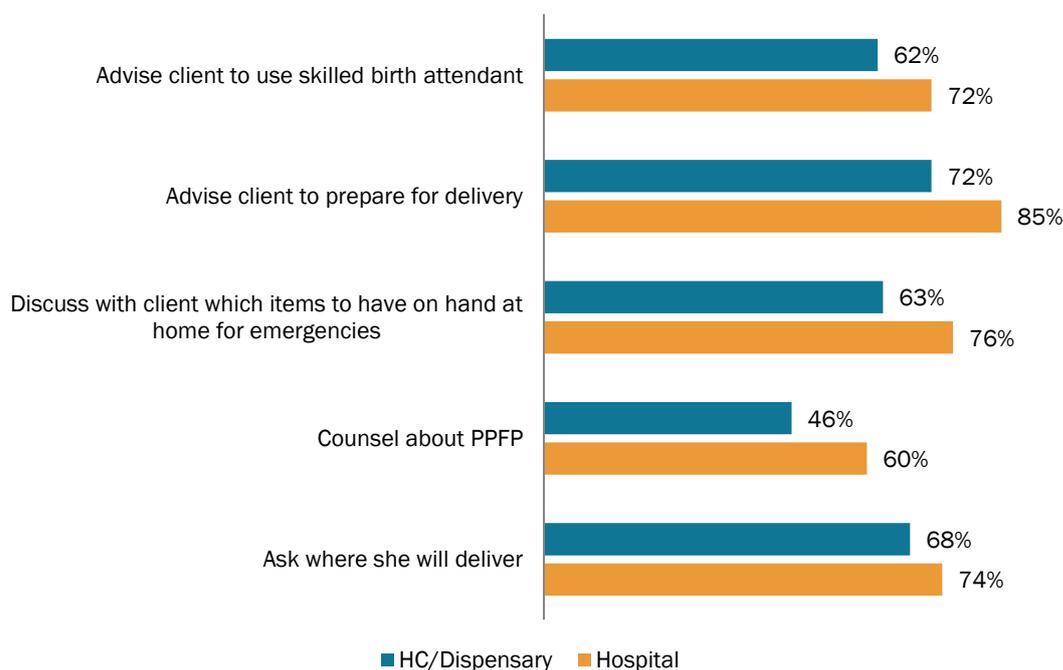
First ANC Visits

Ideally, the first visit should occur around, or preferably before, week 16 of pregnancy. However, regardless of the gestational age at first enrolment, all pregnant women coming to the clinic for ANC will be enrolled and assessed according to the norms for the first and subsequent visits. The first ANC visit is an important one, with a number of activities to be provided to the client including history taking, examination, counselling and preventative/ corrective treatments. One hundred and twenty eight first-visit ANC clients had their consultations observed.

Table 14 below shows the services provided during the consultation for 128 first-visit clients observed during the study. The mean score for the first ANC visit is calculated by adding the percentage score for the categories observed and dividing by number of observed categories.

Table 14. Content of first ANC visit

HEALTH WORKER ASKED ABOUT OR CLIENT MENTIONED	REGIONAL HOSPITALS n=29		HEALTH CENTRES/ DISPENSARIES n=99		ALL FACILITIES n=128	
	n	%	n	%	n	%
Client's age	29	100	94	95	123	96
Medications client is taking	7	24	31	31	38	30
Client's last menstrual period	28	97	93	94	121	94
Health worker asked about number of prior pregnancies	24	83	71	72	95	74

A total of 74% of first-visit ANC clients were asked about the three elements of biographical data in Table 14 above. History taking about prior pregnancies was lower at health centres/dispensaries and questioning of women about whether they were taking any medications was low at all facilities (average 30%).

History of Previous Pregnancies

History taking of any complications of previous pregnancies and deliveries is important because it can identify clients who may need special care based on their previous or existing history. Discussion about previous pregnancy complications was often neglected among first-visit multigravida clients, with an overall mean of 34% of first-visit multigravida clients being asked about previous pregnancy or birth complications (see Table 15).

Table 15. Previous pregnancy discussion for multigravida, first-visit ANC clients

HEALTH WORKER ASKED ABOUT OR CLIENT MENTIONED	REGIONAL HOSPITALS n=20		HEALTH CENTRES/ DISPENSARIES n=61		ALL FACILITIES n=81	
	n	%	n	%	n	%
Prior stillbirth	15	75	31	51	46	57
Heavy bleeding, during or after delivery	12	60	22	36	34	42
Previous caesarean section	16	80	23	38	39	48
Previous abortions	15	75	41	67	56	69
Previous multiple pregnancies	4	20	8	13	12	15
Previous prolonged labour	4	20	6	10	10	12
Previous pregnancy-induced hypertension	6	30	8	13	14	17
Previous pregnancy-related convulsions	2	10	6	10	8	10
Overall average of discussion of previous pregnancy complications	46%		30%		34%	

PMTCT in ANC

In Tanzania, the overall adult HIV prevalence in women is 6.1%, and prevalence in ANC is 8.2% (TDHIS 2009). Prevention of mother-to-child transmission of HIV (PMTCT) is an extremely important component of ANC services, including counselling the pregnant woman, testing for HIV, and advising, prescribing medications or referring the HIV-positive client for more comprehensive care and treatment.

HIV testing should occur on the ANC client's first visit. According to the observations, 66% of first-visit ANC clients were referred for or received HIV testing and 59% received or were referred for counselling (see Table 16).

Table 16. Counselling and HIV testing for first-visit ANC clients

SERVICE BY HEALTH CARE PROVIDER	REGIONAL HOSPITALS n=88		HEALTH CENTRES/ DISPENSARIES n=303		ALL FACILITIES n=391	
	n	%	n	%	n	%
Perform, inquire about or refer for HIV test	63	72%	197	65%	260	66%
Provide or refer for counselling related to HIV test	59	67%	171	56%	230	59%

Of the 260 ANC clients who tested for HIV in the study, 21 tested positive (8%), a figure representative of national data in the Tanzania Demographic and Health Survey. Table 17 shows the services that the HIV-positive ANC clients received.

Table 17. Services received by HIV-positive ANC clients

SERVICE BY HEALTH CARE PROVIDER	REGIONAL HOSPITALS n=7		HEALTH CENTRES/ DISPENSARIES n=22		ALL FACILITIES n=29	
	n	%	n	%	n	%
Explain the purpose of antiretroviral prophylaxis	6	85	15	68	21	72
Explain when to collect nevirapine	6	85	15	68	21	72
Explain how to take nevirapine at the onset of labour	6	85	13	59	19	65
Explain how to take AZT at 28 weeks	5	71	13	59	18	62
Explain feeding options for exposed babies	5	71	11	50	16	55
Explain about importance of bringing exposed infant back for testing	6	85	13	59	19	66
Refer to a care and treatment centre	5	71	13	59	18	62

The areas of weakness for counselling of the HIV-positive ANC client included discussion of feeding options for exposed babies, with only 55% of the clients receiving counselling on this topic. Combined with 66% receiving counselling on the importance of bringing the infant back for testing, this may indicate an area of concern for the well-being of HIV-exposed children. Less than two-thirds of the women were referred for care and treatment.

5. LIMITATIONS

This study is not nationally representative, but provides a good indication of the quality of ANC services in the 12 regions visited. The main limitation of the findings presented is in the denominators for those key ANC services that are not supposed to be provided to every client at every visit, for example, IPT or HIV testing. The observer did not examine the client's ANC card since the observer was not to interfere with the consultation. Therefore, some of the observations might have indicated that a service was not provided when, in fact, the service was not needed since it had already been provided or the client was not eligible for this service (for example, a client who had already had two doses of SP would not need a third). This means that there is a possible underestimation of the proportion of women who received the necessary ANC services in our findings.

We have attempted to minimize this bias by presenting findings from first-visit clients for key services that they are supposed to receive.

Another limitation occurs in the HIV counselling and testing findings. The observation records whether a client was "referred for or provided with" an HIV test, making it difficult to know whether she actually had the test.

Finally, due to an oversight, the ANC inventory checklist did not include RPR (rapid plasma reagin) test kits for syphilis or SP, which makes it difficult to know whether a client did not receive the service because of provider performance or because of a stockout of the equipment and supplies.

6. DISCUSSION

Pregnancy is a very important event for the woman and her family from both sociocultural and medical perspectives. Therefore, pregnant women should receive high-quality, focused care from competent health care providers to ensure healthy outcomes for women and newborns. ANC is a key entry point to a broad range of health promotion and preventative health services for a pregnant woman, including nutritional support and prevention and treatment of anaemia; prevention, detection and treatment of malaria, tuberculosis and STIs/HIV/AIDS (particularly syphilis and HIV transmission from mother to child); care and treatment for HIV-infected mothers; and tetanus toxoid immunization. ANC is also an opportunity to promote the benefits of skilled attendance at birth and to encourage women to seek postpartum care for themselves and their newborns, including improving uptake of PPFP. The MoHSW has invested significantly in improving the quality of ANC in Tanzania. The following discussion will review **key findings**, their implications for service provision and recommendations.

The findings on ANC from this study bring to the forefront areas of relative strength. Provision of key services for ANC, such as monitoring weight gain, was occurring for a high proportion (84%) of clients. This has long been a component of traditional approaches to ANC and it is likely that facilities and staff were fully equipped to undertake this service.

The mean score for clients accessing preventative treatment including IPT, iron/folate pills, tetanus toxoid and a voucher for an ITN was 60%. This finding did not differ greatly between the hospitals and the health centres/dispensaries. The values for provision of IPTp were 43% and 41% for regional hospitals and health centres/dispensaries respectively (this includes either IPT1 or IPT2). These figures are consistent with findings from other sources: recent data from Jhpiego's sentinel sites from January to March 2011 showed that 53% of first-visit ANC clients received IPT.

Syphilis detection and treatment are important in reducing stillbirths (Lawn et al. 2011) and the fact that just over 50% of women received these services during ANC is a concern.

6.1 Screening for PE/E

Recent estimates show that the leading causes of maternal death globally are haemorrhage and hypertension, and these two conditions are among the top three causes of deaths in sub-Saharan Africa (WHO 2010). Fortunately, simple, low-cost interventions are available to prevent most cases of eclampsia and to manage them when they occur. Timely diagnosis and effective initial management can reduce morbidity and the risk of maternal, foetal and newborns deaths associated with severe PE/E, and ANC is the main entry point for the detection of PE/E. This is therefore a vital component of ANC.

A mean of 23% of ANC clients were screened for pre-eclampsia and eclampsia (checking blood pressure, asking about severe headaches or blurred vision, and checking for oedema). This differed substantially in higher- and lower-level facilities: whereas in hospitals 41% of clients received the screening, in health centres and dispensaries only 18% had the screening.

In observations of ANC consultations, blood pressure (BP) measurements were taken for 79% of ANC clients (93% in hospitals and 75% in health centre/dispensaries). Ten percent (10%) of facilities did not have a functioning BP machine in the inventory findings. The fact that 25% of women in health centres/dispensaries did not have their BP checked is a major gap in ANC—identification of hypertension is vital in the diagnosis of PE/E and other complications. Another major gap is the absence of routine urine testing for protein in so many facilities.

A further but equally important component of identifying women who may be developing PE/E is to ensure that women, families and communities understand **danger signs** and those women have a **birth preparedness and complication readiness plan** that will support them to access care in a timely manner. Overall, 46% of the ANC clients received counselling on key danger signs related to PE/E. Fifty-five percent of women in health centres/dispensaries and 75% of women in hospitals were told to return in case of vaginal bleeding and 40% to return in case of severe headache or convulsions. With less than half of the women observed receiving adequate counselling on danger signs, this is another major gap that can be addressed with some simple steps such as ensuring that information, education and communication materials with consistent messaging are available at all facilities.

Recommendations:

- Improve information and counselling for women, families and communities about the risks, signs and symptoms of PE/E and how to respond if they arise.

- Ensure that health facility staff have all necessary supplies and resources, especially functional BP measuring equipment, to identify women who may be developing PE/E.

- Check urine for protein at the first ANC visit, at every ANC visit after 20 weeks' gestation, and at any other visits if the woman's diastolic BP has been 90 mmHg or higher.

6.2 Maternal Anaemia

In Tanzania, 53% of pregnant women are anaemic (TDHS 2010) and anaemia is a major, indirect cause of maternal death (up to 20%) (*Lancet* series 2008) and contributes to maternal morbidity. Therefore the prevention, detection and management of anaemia should be a cornerstone of ANC. Universal supplementation of pregnant women with daily iron/folic acid tablets is one of the key, evidence-based interventions. With one-third of women in health centres/dispensaries and more than one-quarter of women receiving ANC in hospitals in the study not receiving supplementation, this is a concern.

Recommendations:

- Ensure adequate supply of iron/folate at facilities.

- Improve detection and management of anaemia (especially severe anaemia) through availability of equipment to measure hemoglobin.

6.3 Human Resource Issues

According to multiple sources, including the findings of this study, nurses and midwives are the attendants who provide most ANC. The finding that some ANC services are being provided by "unskilled" maternal and child health aides or medical attendants is indicative of the human resources crisis. The shortage of staff contributes to reduced attendance at ANC, with only 43% of women receiving the recommended four or more ANC visits (TDHS 2010).

Recommendations:

- Promote task shifting/sharing, especially to the community level for tasks such as counselling on birth preparedness/complication readiness and distribution of iron/folate.

- Increase available number of qualified health personnel for ANC and other maternal health services.

- Improve supportive supervision.

6.4 Counselling on Preventative Aspects of ANC

Counselling on preventative treatments was low. For iron/folic acid supplementation, 25% of clients received counselling on the importance, use of and side effects of the supplement, while for IPTp, only 20% of clients received similar counselling. Increasing patients' understanding of why certain drugs or supplements are recommended is vital to women's compliance in taking preventative treatments and continuing to attend for routine ANC.

Recommendation:

- Continue to strengthen interpersonal skills at in-service and pre-service training levels.

6.5 Birth Preparedness/Counselling on Danger Signs

The areas that were weakest had to do with counselling about danger signs. Overall, less than half of the ANC clients (46%) received counselling on key danger signs. Fifty-five percent of women in health centres/dispensaries and 75% of women in hospitals were told to return in case of vaginal bleeding and 40% to return in case of severe headache or convulsions.

Because effective communication builds trust and fosters confidence, providers should talk with women and their husbands/companions in a manner that encourages communication about birth preparedness, complication readiness, and HIV prevention, care and treatment. To promote and encourage health-seeking behaviour and to address some of the delays linked to maternal death, birth preparedness and complication readiness are essential components of the ANC package.

Recommendations:

- Continue to strengthen interpersonal skills at in-service and pre-service training levels; improve available job aids and information, education and communication materials on birth preparedness and complication readiness.

- Support community mobilization for improved birth preparedness and complication readiness.

6.6 Postpartum Family Planning (PPFP)

Spacing the intervals between pregnancies can prevent 20–35% of all maternal deaths (Singh et al. 2004). However, family planning services in Tanzania continue to face challenges in meeting clients' expectations and needs, with high levels of unmet need especially in the postpartum period. With an average of only 52% of women receiving counselling on PPFP during ANC, this is a missed opportunity.

Recommendations:

- Strengthen integration of PPFP in ANC and all maternal, neonatal and child health programs and related training activities.

- Ensure that staff are updated on the benefits of "Healthy Timing and Spacing of Pregnancy".

- Ensure that family planning-related job aids are available at all ANC clinics.

6.7 HIV-Positive Clients

Without treatment, approximately one-third of children born to women living with HIV will become infected with the virus in the womb, at birth or through breastfeeding. This risk can be greatly reduced by treating an expectant mother with antiretroviral therapy. Globally, improvements are being made in preventing and treating HIV, and new HIV infections are declining (UN 2011).

In the study, 66% of clients overall were referred for or received HIV testing and 59% received or were referred for counselling. The areas of weakness with regard to counselling of the HIV-positive ANC client included discussion of feeding options for exposed babies (55% of the HIV-positive ANC clients) and the importance of bringing the infant back for testing (66% of the HIV-positive ANC clients). This gap is highlighted in the Countdown Report (*Lancet* 2008), which notes "Opportunities are being missed—for example, preventing mother-to-child transmission of HIV during antenatal care". Efforts to address this gap must be sustained.

Recommendations:

- Strengthen quality and integration of PMTCT services into ANC in general and include prevention, identification and management of TB.

- Strengthen PMTCT linkages through the continuum of care, especially at community level, to encourage women and their babies to stay within the health system.

- Support the MoHSW efforts to ensure universal access to antiretrovirals.

- Ensure that HIV/PMTCT management guidelines are widely disseminated and implemented.

7. CONCLUSION

Health care during pregnancy is vitally important in detecting and managing conditions that may complicate pregnancy and childbirth. ANC has much to contribute to meeting Millennium Development Goals 4, 5 and 6 in Tanzania. The coverage of ANC in Tanzania is generally good—the key is to improve the quality of care and thereby contribute to efforts to increase ANC attendance of at least four visits from 64% to 90% (MoHSW 2008).

WHO (2007) details the six essential "building blocks" of a health system—to achieve the best health outcomes, the health workforce must have access to supplies and resources. This study has identified gaps in facility-based ANC service provision that can be addressed. Quality of care is improved by ensuring that there are sufficient numbers of competent health care providers who have skills and knowledge, and are working within an enabling environment with adequate resources. Quality of care is also supported by informed and valued community members who have access to the information needed to save lives.

REFERENCES

Countdown to 2015: A report card on maternal, newborn, and child survival. 2008. *The Lancet* 371(9620): 1217–1219.

Khan K, Wodjyla D, Say L, Gülmezoglu M, Van Look P. 2006. WHO analysis of causes of maternal death: A systematic review. *The Lancet* 367 (April 1):1066–1074.

Lawn JE et al. 2011. Stillbirths: Where? When? Why? How to make the data count? *The Lancet* 377(9775): 1448–1463.

Maternal and child undernutrition (series). 2008. *The Lancet* 371(9612).

Ministry of Health and Social Welfare (MoHSW). 2008. *The National Road Map Strategic Plan to Accelerate Reduction of Maternal, Newborn and Child Deaths in Tanzania 2008–2015.*

Singh S et al. 2004. *Adding it Up: The Benefits of Investing in Sexual and Reproductive Health Care.* The Alan Guttmacher Institute and UNFPA: Washington, D.C. and New York.

Tanzania Demographic and Health Survey 2010. National Bureau of Statistics, Dar es Salaam, Tanzania, and ICF Macro: Calverton, Maryland, USA.

United Nations (UN). 2011. *The Millennium Development Goals Report.* UN, New York.

van den Broek NR and Graham WJ. 2009. Quality of care for maternal and newborn health: The neglected agenda. *BJOG* 116(Suppl 1): 18–21.

World Health Organization (WHO) 2010. *Trends in Maternal Mortality: 1990–2008. Estimated developed by WHO, UNICEF, UNFPA and the World Bank.* WHO: Geneva.

World Health Organization (WHO). 2009. *The World Health Report.* WHO: Geneva.

World Health Organization (WHO). 2007. *Strengthening Health Systems to Improve Health Outcomes: WHO's Framework for Action.* WHO: Geneva.