

**PERFORMANCE ASSESSMENT
OF
EMERGENCY SURGICAL OFFICERS AT HEALTH
FACILITIES IN ETHIOPIA**

ETHIOPIA

2016



**Federal Democratic Republic of Ethiopia
Ministry of Health**



Disclaimer

This assessment was supported by ESOG-CDC Cooperative Agreement number U2G2396 funded by the U.S. Department of Health and Human Services (HHS), Centres for Disease Control and Prevention (CDC) Under the President's Emergency Plan for AIDS Relief (PEPFAR). Its contents are solely the responsibilities of the authors and do not necessarily reflect the official views of the Centres for Disease Control and Prevention or the Department of Health and Human Services

Table of Contents

Forward.....	iii
Acknowledgement	iii
Organizations and individuals involved in the assessment.....	iv
List of Tables and Figures.....	v
List of acronyms	vii
Executive summary.....	i
1. BACKGROUND AND RATIONALE	1
2. OBJECTIVES	7
3. MATERIALS AND METHODS	8
3.1. Study design and approach.....	8
3.2. Data sources	8
3.3. Study instruments and data collection	9
3.4. Data management.....	10
3.5. Ethical considerations	11
4. FINDINGS	12
4.1. Background of target facilities	12
4.2. Facility readiness/preparedness.....	13
4.3. Facility CEmONC services delivery status	19
4.3.1. The facility’s CEmONC signal functions/service implementation status ..	19
4.3.2. Service indicators	21
4.4. Facility Emergency Surgical Care services delivery status	28
4.5. Providers clinical skill assessment through patient card review	29
4.5.1. Patient chart review of cases admitted for obstetric management.....	29
4.5.2. Maternal death review	32
4.5.3. Chart review of cases admitted for emergency surgical management	33
4.6. Managerial Inquiry	36
4.7. ESO interview	37
4.8. Availability of patient records, registers and management protocols / guideline	39
5. CONCLUSIONS AND RECOMMENDATIONS	42
6. REFERENCES.....	46
ANNEX: List of Facilities assessed in the National ESO Performance Assessment	48

Acknowledgement

Ethiopian society of Obstetricians and Gynaecologists (ESOG) led and fully supported this assessment as part of its objective to support and promote quality reproductive health services in the country. It believes that the findings of this assessment will be highly useful to reflect on and improve the IESO programme of the country. The findings ultimately will help improve the quality of C-EmONC and Emergency Surgical Services provided in health facilities where ESOs are deployed.

ESOG would like to extend its especial thanks to the Federal Ministry of Health for providing the opportunity and unlimited support to conduct the assessment. Likewise; it is very grateful to CDC-Ethiopia for timely and extensive technical and financial support to undertake this important assessment. The investigators of the assessment listed below also deserve special thanks for shouldering the challenging task of the assessment process, from tool development to preparation of this report, with strong dedication investing their time and knowledge.

1. Dr Eyasu Mesfin Kassa, ESOG, Principal Investigator (PI)
2. Dr Abdulhamid Isehak, CDC-Ethiopia, Co-Principal Investigator (Co-PI)
3. Dr Dereje Negussie, ESOG, Co-Investigator
4. Dr Mahdi Bekri, ESOG, Co-Investigator
5. Kedir Seid Ali, F-MoH, Co-Investigator
6. Nurhan Towfik Mawi, F-MoH, Co-Investigator
7. Dr Haimanot Ambelu, WHO, Co-Investigator

ESOG deeply appreciates the support of Regional Health Bureaus', WHO and participant health facilities which contributed in so many ways in the assessment process. Most importantly, this assessment would not have been possible without the participation of the individual health care providers at the selected health facilities, data collectors and team supervisors who generously gave of their valuable time to make this report possible. ESOG sincerely recognizes the contributions of all individuals and organizations who supported the assessment in every possible way and is thankful to each one of them.

Organizations and individuals involved in the assessment

Ethiopian Society for Obstetricians and Gynaecologists (ESOG)

Dr Eyasu Mesfin Kassa, Principal Investigator (PI)

Dr Dereje Nigussie, Co-Investigator

Dr Mahdi Bekri, Co-Investigator

Federal Ministry of Health

Kedir Seid Ali, Co-Investigator

Nurhan Towfik Mawi, Co-Investigator

CDC-Ethiopia

Dr. Abdulhamid Isehak, Co-Principal Investigator (Co-PI)

Dr. Jelaludin Ahmed

Misgina Gebremedhin

Dr Alemayehu Mekonen

WHO

Dr. Haimanot Ambelu, Co-Investigator

Serkalem Girma

Individuals involved in Supervision

Proff. Yifru Birhan, Obstetrician & Gynaecologist

Dr Bitew Abebe, Obstetrician & Gynaecologist

Dr Abdulfeta Abdulkadir, Obstetrician & Gynaecologist

List of Tables and Figures

List of tables

Table -1: Regional distribution of facilities where ESOs were deployed by facility type.....	12
Table -2: Key human resource numbers in the Primary Hospitals and comparison with the national standard (N=63).	14
Table -3: Key human resource numbers in the General Hospitals and comparison with the national standard (N=29).	14
Table -4: Infrastructure and basic services that were available at the time of facility visit. ..	15
Table -5: Structure and equipment availability and status by facility type.....	16
Table -6: Essential drugs availability and status by type of facility.	17
Table -7: Equipment and supplies for newborn care	18
Table -8: The facility's CEMONC signal functions/services regular performance status in the 12 months prior to the assessment by type of facility.	20
Table -9: Regional distribution of the facility's CEMONC signal functions/ service regular performance status in the 12 months prior to the assessment.	20
Table -10: Change in volume of clinical services & procedures between one year just before and one year just after deployment of the ESOs.	22
Table -11: Change in volume of referral in and referral out for one year just before and one year just after deployment of the ESO	27
Table -12: Emergency surgical cases & procedures for one year just before and one year just after deployment of the ESO	28
Table -13: Quality/completeness of documentation for patient evaluation, follow-up and surgical procedures of cases admitted for Obstetric management.	30
Table -14: Documented Obstetric and Gynaecologic surgical complications by type of facility.	31
Table -15: Quality/completeness of documentation for patient evaluation, follow-up and surgical procedures of cases admitted for Emergency surgical care.	34
Table -16: Documented Emergency surgical complications by type of facility.	35
Table -17: Main challenges reported by the ESOs while working in the facilities.	37
Table -18: Availability of patient records, registers & management protocols in the assessed facilities	39

List of figures

Figure -1: Ethiopian health tier system (HSTP)	3
Figure -2: Percentage of increase in the number of clinical services & procedures in the one year just after ESOs' deployment compared to the year before.	24
Figure -3: Percentage of increase in the number of obstetric cases managed in the one year just after ESOs' deployment compared to the year before.	25
Figure -4: Percentage of change in volume of maternal and newborn outcomes in the one year after ESOs' deployment in comparison to a year prior to their deployment.	26
Figure -5: Percentage distribution of stated causes of maternal deaths in the one year after ESOs' deployment.	32
Figure -6: Percentage distribution of stated major contributors for maternal deaths.	33
Figure -7: Percentage distribution of stated reasons of ESOs' for intent to continue working in their current facilities in the year after the interview (N=86).	38
Figure -8: Percentage distribution of stated reasons of ESOs' for intent not to continue working in their current facilities in the year after the interview (N=86).	38
Figure -9: Summary of key strengths observed and discussed in each facility during the visit (N=96)	40
Figure -10: Summary of key problems observed and discussed in each facility during the visit (N=96)	41

List of acronyms

AMDD	Averting Maternal Death and Disability	HSTP	Health Sector Transformation Plan
AMTSL	Active Management of Third Stage of Labour	IEC	Institutional Ethical Committee
ANC	Ante-natal Care	IESO	Integrated Emergency Surgical Officer
APH	Ante Partum Haemorrhage	IMNCI	Integrated Management of Neonatal and Child Illness
BEmONC	Basic Emergency Obstetric and Newborn Care	IRB	Institutional Review Board
CEmONC	Comprehensive Emergency Obstetric and Newborn Care	IUFD	Intrauterine Fetal Death
CSA	Central Statistics Authority	MCH	Maternal and Child Health
C/S	Caesarian Section	MDG	Millennium Development Goal
D/C	Dilatation and Curettage	MDSR	Maternal Death Surveillance and Response
DHS	Demographic and Health Survey	MMR	Maternal Mortality Ratio
EmOC	Emergency Obstetric Care	MNCH	Maternal, Newborn and Child health
EmONC	Emergency Obstetric and Newborn Care	MNH	Maternal and Newborn Health
EC	Ethiopian Calendar	MsC	Master of Science
E/C	Evacuation & Curettage	MVA	Manual Vacuum Aspiration
EPHI	Ethiopian Public Health Institute	Mx	Management
ESOG	Ethiopian Society of Gynaecologists and Obstetricians	OR	Operation Room
ESO	Emergency Surgical Officer	PHC	Primary Health Care
FP	Family Planning	PNC	Post Natal Care
FMHACA	Food, Medicine and Health Care Administration & Control Authority	PPH	Post Partum Haemorrhage
F-MOE	Federal Ministry of Education	QI	Quality Improvement
F-MOH	Federal Ministry of Health	RHB	Regional Health Bureau
GC	Gregorian Calendar	SBA	Skilled Birth Attendance
GP	General Practitioner	SNNPR	Southern Nations, Nationalities and Peoples Region
Gyn-Obs	Gynaecology and obstetrics	SOP	Standard of Practice
HMIS	Health Management Information System	SPSS	Statistical Package for Social Sciences
HRH	Human Resources for Health	SRH	Sexual and Reproductive Health
HO	Health Officer	UN	United Nations
HSDP	Health Sector Development Plan	UNFPA	United Nations Population Fund
		UNICEF	United Nations Children's Fund
		WB	World Bank
		WHO	World Health Organization

Executive summary

Background and rationale:

Ethiopia was committed to the attainment of the Millennium Development Goals (MDGs) by 2015. These included the MDG 4 and 5 aiming to reduce child mortality by two thirds and maternal mortality by three quarters by 2015 from the 1990 levels. To achieve these targets, the government with its partners has been intensifying its efforts to strengthen health care services planning to construct many hospitals and train adequate skilled clinical staff that can provide comprehensive emergency obstetric & newborn care (CEmONC) services as well as emergency surgical services. One of the major initiatives designed by the F-MOH in 2009 was Integrated Emergency Surgical Officers (IESO) initiative which is a Master of Science (MsC) training program. The goal of the MSc training programme is to produce competent Emergency Surgical Officers (ESO) capable to handle common emergency obstetric-gynaecological and emergency general surgical procedures including trauma where a gynaecologist and a surgeon are inaccessible.

ESOs are deployed in several health facilities in different regions of the country since 2012 to provide CEmONC and emergency surgical services. As the deployment of ESOs at health facilities to provide these services is a new experience in the country, conducting the program assessment is reasonable and of paramount importance. In addition, it is to comply with the WHO and global recommendation of careful monitoring of task shifting approaches in health care service delivery like the IESO program.

Objective:

The general objective of the assessment is to provide an in-depth facility level performance assessment of CEmONC and emergency surgical services provided by emergency surgical officers and inform the different stakeholders for quality improvement of the service provided and the IESO program.

Materials and methods:

This is a facility based descriptive cross-sectional assessment. It was conducted by ESOG in collaboration with the Federal Ministry of Health, CDC-Ethiopia, Regional Health Offices, target facilities and other stakeholders. The inclusion criterion was all facilities where ESO's have been deployed for at least one year before the assessment. Data was collected in two rounds between July and December, 2015.

Data was collected using a data collection format prepared for the purpose by the F-MOH through interviews, discussions with facility staff, a review of patient's medical records & registers. To facilitate the data collection process and avoid the critical shortage of high level health care providers required for the data collection; the target regions were grouped in to four groups based on geographic proximity and data was collected in four rounds.

The data collector teams conducted the data collection with site visit staying at each facility for 3 - 5 days. All the collected data were coded. Both individual and facility level data were

then entered, cleaned and analyzed using SPSS Version 20.0 statistical software. Ethical clearance was obtained from Ethiopian Public Health Institute (EPHI) and Centres for Disease Control (CDC) before data collection.

Findings:

Data was collected from a total of 96 facilities from 8 regions of the country. About two third of the facilities, 66% (63/96), were primary hospitals. A total of 205 ESOs were deployed and practicing in the facilities with an average of about two ESOs per facility. In the majority of the facilities, 58.3% (56/96), ESOs were practicing in facilities where neither Obstetricians nor Surgeons were deployed (ESO-Only facilities).

Majority, 65.6% (63/96), of the facilities were providing regularly all the 9 signal functions in the 12 months period prior to the facility visit. Two of the facilities never started providing major surgical services although the ESOs were deployed for more than one year prior to the visit. Blood transfusion was the commonest essential service not provided regularly. It was not provided regularly in 32% (18/56) and 12.5% (5/40) of ESO-Only and ESO-Plus facilities respectively.

The volume of MNH and emergency surgical services showed remarkable increment in the year after the deployment of ESOs. The total number of deliveries increased by 40 % compared to the year before ESOs deployment. The increase in the number of deliveries in ESO-only facilities was about twice that of ESO-Plus facilities with 61% and 30% increases respectively. The number of instrument assisted and caesarean deliveries also increased by 39% and 59% respectively. Non-emergency surgical procedures increased by 162% in ESO-Only facilities raising a concern for patient safety and quality of care as ESOs scope of work doesn't include major elective surgical procedures.

The proportion of intra-facility maternal deaths per total deliveries in the facilities decreased by 38.2% in the year after ESOs deployment. The decrease in ESO-plus facilities (39.1%) was higher than that of ESO-Only facilities (29.7%). There was similarly a remarkable reduction in proportion of early neonatal deaths in ESO only facilities (34.2%) as compared to ESO plus facilities (6.9%).

Excessive blood loss and deep incision extension were the commonest documented complications in cases being managed by the ESOs in both groups of facilities with proportions of 35.6% (48/135) and 20.7% (28/135) respectively.

A total of 170 maternal deaths from the 63 facilities (32 ESO-Only & 31 ESO-Plus) were reviewed. Hypovolemic shock secondary to excessive bleeding was the commonest stated cause of maternal deaths being responsible for 58.5% (79/135) of the deaths. Patient delay to reach the facility was the major contributor for the maternal death in majority, 63.8% (83/130), of cases in both groups of facilities.

The pattern of change for volume of emergency surgical services provided in the facilities was mostly similar to that of MNH services. Shortage of equipments and supplies required

for surgery was the commonest challenge reported by 37.6% (53/141) of the ESOs. And, “absence or unsatisfactory duty payment and incentive” was the second commonest challenge reported by 35.5% (33/141). Majority of the ESOs, 68.7% (92/134), expressed their intent to continue working in their current facilities in the year after.

Conclusions and recommendations:

Generally the deployment of ESOs in all health facilities (Primary and General Hospitals) has resulted in remarkable increase in volume of MNH and emergency surgical services with improvement in maternal and perinatal outcomes. Key conclusions and recommendations include:-

- Shortage of equipment and supplies related to surgery, and absence or unsatisfactory duty payment and incentives were the main challenges reported by the ESOs.

Recommendations: The main challenges reported by the ESOs should be discussed and addressed by the stake holders and respective facilities so as to maintain the achievement gained so far.

- Pre-deployment assessment and filling of identified gaps was not done in many of the facilities. The deployment of ESOs in all facilities has led to significant increase in volume of MNH and emergency surgical services compared to the year prior to their deployment. The increase in ESO only facilities especially was more significant compared to ESO plus facilities which is commendable.

Recommendations:- Pre-deployment assessment of all facilities need to be done at all times to optimally utilize and maintain ESOs’ clinical skills.

- The reduction in proportion of intra-facility maternal deaths by more than a third was a good achievement. Excessive blood loss and deep incision extension were the commonest documented complications in cases being managed by the ESOs.

Recommendations:- To further reduce proportion of intra-facility maternal deaths and improve maternal and perinatal outcomes, factors leading to delay in reaching the facilities need to be assessed and addressed accordingly. As the most common complications are excessive blood loss, deep incision extension and wound infection, focused surgical skill building support/mentoring should be considered by the stake holders of the IESO programme.

1. BACKGROUND AND RATIONALE

Ethiopia, a Federal Democratic Republic with estimated population of 90 million in 2015, is the second most populous nation in Africa (1). The *2007 Population and Housing Census* result showed that the population grew at an average annual rate of 2.6 percent, 49.54% of the population were females and more than 84 percent lived in rural areas. The country is composed of 9 Regional states: namely Tigray, Afar, Amhara, Oromia, Somali, Benishangul-Gumuz, Southern Nations Nationalities and People Region (SNNPR), Gambella & Harari; and two city administrative states (Addis Ababa City administration and Dire Dawa city council) (1,2).

The health of mothers and children is central to global and national concerns, and improvements in maternal and child survival are two important Millennium Development Goals (MDGs). Pregnancy-related complications are the number one causes of death and disability among women of reproductive age worldwide. Although most pregnancies and births are uneventful, approximately 15% of all pregnant women develop a potentially life-threatening complication that calls for skilled care and some will require a major obstetrical intervention to survive (3-6). According to World Health Statistics 2016 released by the World Health Organization (WHO): every year some 303,500 women die of complications during pregnancy or childbirth globally, 99% of them being in developing countries, where 85% of the population lives (7). Provision of quality emergency obstetric care services to mothers with complicated pregnancies is a critical intervention to reduce this unacceptably high maternal mortality.

Ethiopia was committed to the attainment of the MDGs by 2015. These included the MDG 4 and 5 aiming to reduce child mortality by two thirds and maternal mortality by three quarters by 2015 from the 1990 levels. There was a need to accelerate the rate of decline of maternal mortality rate to a level of 5.9 percentage points in order to reach the MDG-5 target in 2015 (8-10). The 4th Health Sector Development Program (HSDP-IV) has also eyed at reducing maternal and infant mortality rate below 267 per 100,000 and below 31 per 1000 respectively (10,11). Accelerated efforts in Ethiopia enabled the maternal mortality ratio (MMR) to decline from 871 deaths per 100,000 live births in 2000 to 676 deaths per 100,000 live births in 2010 (Ethiopian DHS 2011). However, despite the encouraging results registered, maternal mortality remains high in the nation and the progress in decreasing maternal mortality rate was not to the level expected to achieve the MDG-5 target in 2015 (11-14). According to United Nations (UN) estimates, Ethiopia has so far reduced maternal mortality by 69% from the 1990s estimate with annual reduction rate of 5% or more. And the most recent estimate by WHO, UNICEF, UNFPA, World Bank Group and the United Nations Population Division, showed that the proportion of mothers dying per 100,000 live births has declined from 1400 in 1990 to 353 in 2015 (15).

Women die from a wide range of complications in pregnancy, childbirth or the postpartum period. Hemorrhage (27%), hypertensive disorders (14%), sepsis (11%), complicated abortion (8%) and other direct causes (10%) are the five leading global causes of maternal

death, with the leading underlying factors associated with the three known delays that can affect a woman's chances of surviving an obstetric emergency (16). Globally, about 80% of maternal deaths are due to these causes, yet many of these deaths are preventable. The first two—delays, delay in deciding to seek care when danger signs appear and delay in reaching a health facility, at least in part reflect underlying social factors (lack of resources, poor infrastructure, dearth of appropriate facilities, women's low status, family decision making about childbirth) that occur outside the facility and sometimes result in emergencies that are beyond medical help. The third delay, however, is related to health care providers, the facility, and the health system (5,6).

Giving birth at a health facility with a skilled birth attendant is crucial to reducing maternal deaths and ensuring the wellbeing of mothers and their babies (3-6). However, only 16.8% gave birth in health facilities with a skilled provider in 2009/10 in Ethiopia (17). The major challenges for maternal health care services are weak health system (critical lack of midwives, equipment and supplies), poor referral linkages, shortage of skilled attendance at birth, and especially lack of emergency obstetric and neonatal care. With the aim of reducing maternal mortality to 267 per 100,000 live births, a set of high impact interventions were being implemented, including antenatal care (ANC), skilled birth services and postnatal (PNC). The HSDP IV's target for skilled delivery was 62% and as of the nine months HMIS report of 2007 EFY, the coverage has reached 55% (18).

Besides ensuring skilled attendance at birth, improving the availability, accessibility, quality and use of services for the treatment of complications that arise during pregnancy and childbirth is the most recommended strategy to reducing maternal mortality. These services are collectively known as Emergency Obstetric and Newborn Care (EmONC). The availability of EmONC determines the ability of health care system to respond to obstetric and newborn complications and its contribution to reduce maternal and newborn mortality and morbidity. The UN has defined nine essential EmONC services termed as "Signal Functions", as described above, for the treatment and management of MNH complications. The designation of a C-EmONC facility depends upon round-the-clock availability of services and whether these life-saving signal functions have been performed recently (6). To qualify for a Comprehensive EmONC (CEmONC) facility, the health facilities must have performed the nine signal functions within the past three months (WHO, 2009; AMDD, 2009). Comprehensive EmONC services include:-

- (1) Administer parenteral antibiotics
- (2) Administer parenteral oxytocic drugs
- (3) Administer parenteral anticonvulsants for pre-eclampsia and eclampsia
- (4) Perform manual removal of placenta
- (5) Perform removal of retained products (e.g., manual vacuum aspiration)
- (6) Perform assisted vaginal delivery
- (7) Provide newborn care
- (8) Perform surgery (Caesarean section)

(9) Perform blood transfusion

Note: A Basic EmONC facility is one that is performing all of functions 1–7.

Emergency surgical conditions are similarly important causes of severe morbidity and mortality in the population including mothers that need to be addressed. Such conditions include acute abdomen and road traffic accidents. Road traffic injuries are the eighth leading cause of death globally, and the leading cause of death for young people aged 15–29 (19). Ethiopia is well known for its high trauma related morbidity and mortality. With increasing urbanization in the country, trauma mainly road traffic accidents result in devastating injuries and non-trauma surgical emergencies including acute surgical abdomen are wide spread and claim lives of children and young adults (20).

The challenge of maternal and perinatal mortality reduction and addressing emergency surgical conditions has received increasing attention from the government of Ethiopia. The Government with its development partners and civil society has been intensifying its efforts to strengthen health care services; creating more opportunities for Ethiopian mothers to opt for institutional delivery. As part of the response, the government has planned to construct many hospitals in the country in the coming years with a view to increasing access to health services and meeting the MDGs (8,9,11). And, to ensure the delivery of Primary Health Care (PHC) services throughout the country, the health-care delivery system is restructured into a three tier system; primary, secondary and tertiary level of care. A referral system links health posts upwards to the specialized hospitals. The health centres in the first tier will serve as Basic EmONC facilities whereas the hospitals will be Comprehensive EmONC facilities (10,18). See Figure -1 below.

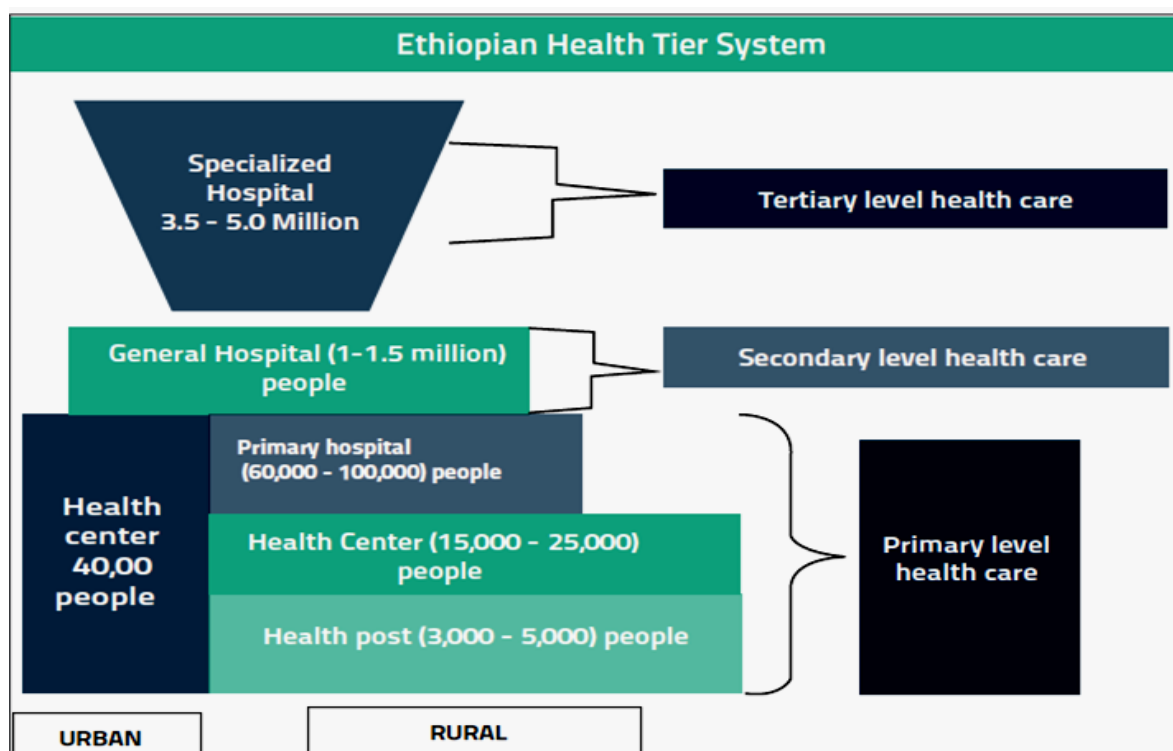


Figure -1: Ethiopian health tier system (HSTP)

An equally important barrier to efforts in reducing maternal and perinatal mortality is the lack of adequate trained and skilled clinical staff that can provide comprehensive emergency obstetric & newborn care (CEmONC) services as well as emergency surgical services. One of the major initiatives designed by the FMOH in 2009, Integrated Emergency Surgical Officers (IESO) initiative, was a Master of Science (MSc) training program to produce health professionals that can improve the provision of CEmONC and emergency surgical services at primary hospital level. The goal of the MSc training programme is to produce competent Emergency Surgical Officers (ESO) capable to handle common emergency obstetric-gynaecological and emergency general surgical procedures including trauma where a Gynaecologist and a surgeon are inaccessible to reduce the overwhelming maternal, prenatal and infant mortality rates and trauma related morbidities and mortalities (21).

The IESO initiative is a task shifting programme. Task shifting is defined as “the rational re-distribution of tasks among health workforce teams. Specific tasks are moved, where appropriate, from highly qualified health workers to health workers who have fewer qualifications in order to make more efficient use of the available HRH.” (WHO, 2008) (22). It is globally accepted approach to addressing the problem of insufficient workforce which could improve access to lifesaving interventions. A major concern of task shifting, however, is the quality and safety of interventions performed by health workers with “less training.” Improving access to EmOC and increasing intervention coverage rates may not directly lead to reductions in maternal and neonatal mortality and morbidity. The quality of the intervention provided is at least as important as coverage rates to improve maternal and newborn health. Although current studies do not show major differences in patient outcomes with task shifting, other important problems have been identified that could potentially undermine the positive effects of task shifting (23,24). Although 75% of surgical procedures, including caesarean delivery, in most low-resource countries are at low levels of complexity and do not require fully-trained doctors, clinical decision making is thought to be more complex and may not be satisfactorily addressed by task shifting (25,26).

The Integrated Emergency Surgery and Obstetrics (IESO) training in Ethiopia started in 2010 as a three years “*Masters of Science (MSc) in Integrated Emergency Surgery*” program for public Health Officers (HO) in 3 universities and 10 affiliated sites with intake of 43 students. Public Health Officers are professionals with a Bachelors degree in public health with a four years training. By 2013 the training programme has been expanded to 11 universities and 33 affiliated sites across the country. A total of 252 ESOs have so far graduated and been deployed at hospitals in different regions of the country to provide C-EmONC and emergency surgical services (27,28).

The training period includes 2 years of integrated emergency training and one year of internship (21). During the whole period of training, the students are coached on making proper decision before they subject the patient for surgery i.e. to let them know their limitation from the outset; to make a critical, analyzed sounding decision when they encounter difficulties among surgically treatable patients (preoperatively, intra-operatively and postoperatively), and to institute the life-saving supportive managements before referral

(haemostasis, resuscitation, bowel deflation, administration of medicaments). After two years of integrated emergency training and a one year internship, the graduate is expected to:

1. Diagnose common general surgical and obstetrical emergency problems.
2. Make a sound decision in clinical management
3. Perform emergency vaginal surgical procedures if indicated, e.g. vacuum extraction and craniotomy.
4. Perform emergency caesarean section, emergency hysterectomy, and laparotomy for tubal pregnancy.
5. Perform appendectomy, emergency small bowel resection & anastomosis, repair bowel perforation, colostomy, cystostomy and abscess drainage
6. Handle emergency trauma including fracture, dislocation, amputation, debridement, and septic arthritis.
7. Manage intra-operative and postoperative complications.
8. Be competent in cardio-respiratory resuscitation, primary care of head injuries, and thoracostomy.
9. Diagnose and manage common emergency medical problems.
10. Have basic knowledge in research methodology.
11. Have acquired appropriate communication skill with colleagues, patients and patient relatives.

Their scope of practice (SOP) as stated in the national Scope of Practice for Health Professionals, besides undertaking the tasks of the BSc qualified professional, includes performing the additional tasks stated above in the curriculum (29).

Quality EmONC involves a state of facility readiness that will enable the team to respond appropriately to obstetric emergencies in a way that fulfills the needs and rights of the clients. For the graduates to effectively and efficiently execute their duty and contribute to the desperately needed reduction in maternal and perinatal mortality & morbidity:-

1. The facilities to which they will be assigned need to be ready to provide quality Comprehensive EmONC. This includes staff available with requisite skills and a willingness to respond to clients 24 hours a day, 7 days a week, available and functional equipment and supplies, and adequate infrastructure.
2. The facility or staff should be able to provide prompt, appropriate care when emergencies arise, according to accepted clinical standards and protocols.
3. A standard and appropriate quality improvement (QI) process need to be put in place by the time the ESOs are deployed to their respective health facilities.

Many facilities to which these graduates are to be deployed are likely to be not ready to enable them provide quality EmONC services. According to a large emergency obstetric and

newborn care (EmONC) facility-based survey done in 2008 by the Federal Ministry of Health (F-MOH) and partners including all hospitals and health centres in the government and non-governmental sectors; only 51% of hospitals were qualified as comprehensive obstetric care facilities (30). Several signal functions were often missing: blood transfusion, parenteral anticonvulsants, assisted vaginal delivery with vacuum extraction or forceps, and neonatal resuscitation, and many facilities were missing essential equipments and skills. Thus, to fill the gap and maintain readiness for CEmONC and emergency surgical services the ministry conducted facility readiness assessment before the deployment of first and second batch graduate ESOs and filled the gap accordingly. In addition, it provided required medical equipments to facilities based on the gap the regions reported.

The Ethiopian society of Obstetricians and Gynaecologists (ESOG), a non-profit professional organization established in 1992 to promote quality reproductive health services in the country, has successfully concluded and is actively engaged in a number of projects and activities on SRH in the country to carry out its members professional responsibility & obligation, and contribute its share. It is also actively involved in advocacy, national policy making and guideline developments to address different RH issues. Maternal and newborn health is one of the major issues in which the society is actively involved at all levels. It fully supports the nation's effort in the reduction of maternal and perinatal mortality and morbidity mainly through avoiding the third delay in a woman's chances of surviving an obstetric emergency.

Rationale: The graduates of the IESO programme (ESO) are deployed in several health facilities in different regions of the country since 2012 to provide CEmONC and emergency surgical services. As the deployment of ESOs at health facilities to provide these services is a new experience in the country, conducting the program assessment is reasonable and of paramount importance. In addition, it is to comply with the WHO and global recommendation of careful monitoring of task shifting approaches in health care service delivery like the IESO program (22).

The performance assessment will help to measure success, identify gaps and inform the program for quality improvement. It will show the status of the ESO's performance and recommend appropriate interventions to improve the quality of service delivery. In addition, lessons and best practices learned from the programme will be disseminated nationally to help improve maternal and newborn health. It can also help provide feedback to the pre-service IESO training program.

2. OBJECTIVES

General objective of the assessment:

To provide an in-depth facility level performance assessment of CEmONC and emergency surgical services provided by emergency surgical officers and inform the different stakeholders for quality improvement of the service provided and the IESO program.

Specific Objectives:-

1. To describe the physical working environment of selected health facilities providing CEmONC and Emergency Surgical Services using a standard national tool.
2. To assess the current facility preparedness for provision of quality CEmONC and Emergency Surgical Services of the selected health facilities to inform the program.
3. To assess clinical skills of ESOs deployed in the target facilities and identify areas that need improvement at the site and program level.
4. To identify administrative and management gaps and challenges in the provision of CEmONC and Emergency Surgical Services by ESOs in the target facilities.
5. To measure selected indicators of CEmONC and Emergency Surgical services.
6. To compare outcomes of selected indicators of CEmONC and Emergency Surgical services one year before and one year after deployment of ESOs.

3. MATERIALS AND METHODS

3.1. Study design and approach

This is a facility based descriptive cross-sectional assessment. It was conducted by ESOG in collaboration with the Federal Ministry of Health, CDC-Ethiopia, Regional Health Offices, target facilities and other stakeholders. Performance assessment of ESOs in 96 selected target facilities was done to assess their performance status in the provision of CEmONC and emergency surgical services. Data was collected in four rounds between July and December, 2015.

To maximize effectiveness and efficiency in resource utilization, the data collection process was linked to ongoing projects (mainly to the CDC-funded PMTCT expansion) and the six regional local chapter offices of ESOG. The regional chapter offices are ESOG's branch offices located in six bigger regions of the country with higher concentration of obstetricians and serve all regions of the country.

Data from each target facility was collected by a team of two data collectors (a Gynaecologist & Obstetrician or a Surgeon and a Public Health Specialist). To facilitate the data collection process and avoid the critical shortage of the high level health care providers required for the data collection; the target regions were grouped in to four groups based on geographic proximity and data was collected in four rounds. Selected four cities/towns (Addis Ababa city, Mekele, Bahir Dar & Hawaasa towns) were used as centres for the four geographic groups. The data collection in each of the four geographic groups were supervised by a team of 3 supervisors/ coordinators (1 each from F-MOH, RHBs and ESOG) to ensure the quality of data collection. In addition the assessment team (the investigators) oversaw the data collection process in all groups and regions.

To minimize cost and further avoid potential shortage of data collectors, the target facilities in each geographic group were sub-grouped in to teams of average of three facilities per data collection team based on geographic proximity to each other. A total of 31 data collector teams and 12 supervisors were involved in the assessment. The data collector teams conducted the data collection with site visit staying at each facility for 3 - 5 days. Majority of the team leaders, 74.2% (23/31), were Obstetricians & Gynaecologists while 25.8% (8/31) were Surgeons. The teams led by the Obstetricians collected data from 74% (71/96) of the facilities.

The assessment focused on the assessment of ESOs' and the facilities' performance in providing CEmONC and emergency surgical services. All members of the assessment team received training on data collection tools and ethical considerations as part of the orientation workshop and signed agreement to maintain confidentiality of interviewees and patient data.

3.2. Data sources

The sources for the data were health facilities in the country, their managers and health care providers. The target facilities were health facilities in the country where ESOs are deployed.

ESOs are already deployed in CEmONC facilities all over the country and the F-MOH has a list of all such facilities where ESOs are deployed including the duration of their deployment in each facility.

A purposive sampling strategy was used to select participant health facilities. The eligibility / inclusion criterion was all facilities in the country where ESO's have been deployed for at least one year before the assessment. This is to allow adequate number of facilities for the measurement and comparison of selected indicators. According to the F-MOH data and as identified jointly with the ministry, there were 96 such facilities in the country eligible for inclusion at the start of the assessment and all were included. These facilities are found in all regions of the country except Addis Ababa (the capital city), Afar & Dire Dawa Administrative regions. And, the regional distribution of the facilities is:- 31 from Oromya, 24 from Tigray, 17 from Amhara, 17 from SNNPR, 3 from Somali, 2 from Benshangul and 1 from each of Gambella and Harrari regions.

3.3. Study instruments and data collection

Data was collected using a standard structured national ESOs Performance assessment tool prepared by the F-MOH and modified for this assessment. As the data sources were all prepared in English and the interviewees (all being trained in English) understand English language, there was no need to translate the questionnaire in to local languages. The assessment involved key informant interview, observation and document review for collecting data. Checklists and score cards for core essential elements on obstetrics and surgical management were used to conduct providers' clinical skills assessment through review of medical records. This was used to assess providers' clinical skills and performances regarding patient evaluation, patient follow up, surgical procedures and management of surgical complications.

The data collection instrument and methods were designed to allow data collection on the key study variables. The variables include:-

Independent variables:-

- Facility preparedness at the time of assessment to provide integrated CEmONC and emergency surgical care. These variables are derived from the national standard list of requirements for CEmONC and emergency surgical care services.
- Facility Managerial issue variables related to integrated emergency Obstetrics and surgical care: physical work environment, employee (ESO) benefits status, timely supply of needed medical supplies and equipment's and ESO's adherence to regulatory, institutional & departmental norms.

Dependent variables:-

- The facility's CEmONC signal functions/service implementation status in the year after deployment of ESOs.

- Selected Service Indicators of CEmONC and emergency surgical care to compare the service delivery between before and after one year of the ESOs deployment.

The data collectors were oriented on the assessment, the data collection tool and the data collection procedures before deployment. The data collector teams conducted the site visit at each facility for 3 - 5 days. At each target facility the hospital head/manager, the ward head nurse and ESOs who have served for at least one year in the facility were interviewed after taking informed consent. At the end of each visit, the data collector teams conducted debriefing to the facility staff to review assessment finding and outline strength, challenges and action points for quality improvement.

Operational definitions:

- ***ESO-Only Facilities:-*** Facilities where ESOs are deployed but neither Obstetricians nor Surgeons were deployed.
- ***ESO-Plus Facilities:-*** Facilities where ESOs and Obstetrician & Gynaecologists or Surgeons or both are deployed.
- ***Satisfactory:-*** If the specific item/equipment/structure is found to be functional at the time of the assessment.
- ***Adequate supply:-*** If the specific item/supply is available in each room/unit where it is needed and fully functional at the time of the assessment.
- ***The quality /completeness of the patient charts meet the standard:*** When the documentation with all the core elements being implemented and >60% of reviewed charts showing complete documentation of the core elements.

3.4. Data management

All completed questionnaires were delivered to the assessment supervisors/coordinators at each centre and then taken to ESOG's central office. All the collected data were coded. Both individual and facility level data were then entered, cleaned and analyzed using SPSS Version 20.0 statistical software. Data was organized in to suitable formats. Descriptive and two step (bivariate & multivariate) cross tabulation/analysis was implemented to explore and determine the relationship between predictors and outcome variables.

The collected qualitative data was appropriately coded, categorized and developed in to themes for analysis. Triangulation of quantitative and qualitative findings was done to complement and validate the findings of the quantitative study. The data analysis was done to show:-

- Facility preparedness to provide integrated emergency obstetrics and surgical care in terms of manpower, services and logistics in comparison to the national health facility standard.

- If the facilities were providing services that can address the 9 CEMONC signal functions/services by looking the practice in the one year prior to the time of data collection.
- Comparison of load of CEmONC service delivery status using selected Service Indicators of CEmONC signal functions in terms of the number of selected procedures and cases managed one year before and one year after the deployment of the ESOs.
- Comparison of maternal and newborn outcomes (for facility births) by calculating maternal and perinatal mortality ratios one year before and one year after the deployment of the ESOs.
- Comparison of load of emergency surgical services using selected surgical procedures in terms of the number of selected emergency surgical procedures one year before and one year after the deployment of the ESOs.
- The quality of providers (ESOs) CEmONC & emergency surgical service provision by comparing core essential elements in patient evaluation, management and follow up to the national standard. Standard scoring Sheets will be used for Card Review of Obstetric Emergencies & Surgical Emergencies.

3.5. Ethical considerations

Ethical clearance was obtained from Ethiopian Public Health Institute (EPHI) and Centres for Disease Control (CDC) before data collection. Letter of support was taken from F-MOH and RHBs to every target facility. Participation in the assessment was completely voluntary and informed consent was acquired from every participant before participation. To obtain consent separate consent forms were used to interview Hospital Managers/Ward Head Nurses and ESOs. Participants in the assessment were given the necessary information about the assessment using the information on the consent form as to the objective of the assessment, their rights and risk/benefits to help them decide whether to participate or not. All members of the assessment team received training on ethical considerations as part of the orientation workshop and sign an agreement to maintain the confidentiality of the interviewees and patient data.

To maintain confidentiality only participant codes were entered on the assessment tool. Participants were not personally identified in any way. And, confidentiality/non-disclosure agreement was signed between ESOG and every data collection team member for the purpose of preventing the unauthorized disclosure of Confidential Information obtained during the assessment.

In addition, the assessment activities were open to inspection by the sponsor, the Centres for Disease Control (CDC), and regulatory authorities (national or foreign) as well as the IECs/IRBs to review compliance and regulatory requirements.”

4. FINDINGS

4.1. Background of target facilities

Data was collected from a total of 96 facilities from 8 regions of the country which fulfilled the inclusion criteria i.e. facilities where ESO's have been deployed for at least one year before the assessment. About two third of the facilities, 66% (63/96), were primary hospitals. General and Tertiary Hospitals accounted for 30% (29/96) and 4% (4/96) respectively. The total catchment population of the 96 facilities was 64,577,228 with an average catchment population of 672,689 per facility. Oromya region contributed the largest per region number of target facilities accounting for 32.3% (31/96). See table -1 below.

Only one of the facilities had no ESO practicing at the time of data collection as the deployed ESO has already left his post. As the ESO left his post after serving for more than one year, the facility was included in the assessment. In the majority of the facilities, 58.3% (56/96), ESOs were practicing in facilities where neither Obstetricians nor Surgeons were deployed (ESO-Only facilities). In the remaining facilities ESOs were practicing either with Obstetrician & Gynaecologists or Surgeons or both (ESO-Plus facilities). Both Obstetricians & Gynaecologists and surgeons were practicing in 18.8% (18/96) of the facilities while only surgeons and obstetricians were present in 17.7% (17/96) and 4.2% (4/96) of the facilities respectively. See Table -1 below.

Table -1: Regional distribution of facilities included in the assessment by facility type (N=96).

	Type & number of facilities								Percent (N=96)
	Primary			General			Tertiar y	Total	
	ESO- Only	ESO- Plus	Total	ESO- Only	ESO- Plus	Total			
1. Oromya	15	7	22	3	6	9	0	31	32.3
2. Tigray	19	0	19	3	2	5	0	24	25
3. Amhara	9	3	12	0	2	2	3	17	17.7
4. SNNPR	6	4	10	0	6	6	1	17	17.7
5. Benshangul	0	0	0	1	1	2	0	2	2.1
6. Somali	0	0	0	0	3	3	0	3	3.1
7. Gambella	0	0	0	0	1	1	0	1	1
8. Harrari	0	0	0	0	1	1	0	1	1
TOTAL	49	14	63	7	22	29	4	96	100
Percent (N=96)	51.0	14.6	65.6	7.3	22.9	30.2	4.2	100	

The total number of beds in the study facilities was 7,442. The number in each facility ranges from 7 to 522 with a mean bed number of 77 per facility. The minimum required number of beds according to the national standard (35 and 50 beds for primary and general hospitals respectively) was fulfilled in 69.8% (44/63) and 97.1% (27/29) of the primary and general hospitals (31,32). In most of the study facilities the beds dedicated for Obstetric and Gynaecologic care services were not separate i.e. the same group of beds are used for both services as needed depending on the case loads.

The beds dedicated for obstetric & Gynaecologic care and surgical care accounted for about 22.3% and 19.8% of the total hospital beds respectively. Most of the beds dedicated for obstetric care were in good shape in 56% (53/95) of the study facilities while needs major repair or replacement in 13.7% (13/95). Similarly; most of the beds dedicated for surgical care were in good shape in 53.3% (48/90) while need major repair or replacement in 13.3% (12/90) of the study facilities.

4.2. Facility readiness/preparedness

The study facilities' readiness/preparedness to provide CEmONC and emergency surgical care services was assessed using different parameters and variables. This was mainly to assess if the ESO's were practicing in a favourable environment considering the required key human resource, clinical services, facility setup, equipments, drugs and supplies.

Human resource:

The assessment tool was used to make inventory of key staff at each facility i.e. the number of ESOs, HOs, GPs, Midwives, anaesthetists, Obstetrician & Gynaecologists, and surgeons deployed in each facility as compared to the national standard. None of the 96 facilities were found to have met the nationally required minimum number of all of the ESOs, HOs, GPs, Midwives, and anaesthetist. A total of 205 Emergency Surgical Officers were deployed and practicing in the 96 assessed facilities with an average of about two ESOs per facility.

Although ESOs were supposed to be deployed only in the primary hospitals according to the national standard for human resource requirement, 1-6 ESOs were deployed in each of the assessed general and tertiary hospitals. This is because of the number of graduates which outpaced the facility development creating a condition for ESOs to be deployed where it was not intended (20,31-33). Similarly, four obstetrician & Gynaecologists and 12 surgeons were found to be deployed in 4 and 11 primary hospitals respectively where they were not supposed to be deployed.

The minimum required numbers of ESOs and midwives according to the national standard were fulfilled in all of the 63 assessed primary hospitals. However; the minimum required numbers of HOs, GPs and anaesthetists were fulfilled only in 54% (34/63), 58.7% (37/63) and 63.5% (40/63) of the primary hospitals. There were no GPs deployed in 36.5% (23/63) of

the facilities. For effective and sustainable CEmONC and emergency surgical care service delivery all the key professionals need to be available in all facilities all the time. Any shortage/absence of the key professionals at any one time will make the team incomplete and ultimately reflect on the performance of the ESO. See Table -2 below

Table -2: The availability and number of key health professionals in the Primary Hospitals and comparison with the national minimum requirement (N=63).

	The minimum number/facility (№ of facilities)	The maximum number/facility (№ of facilities)	Average number/facility	National minimum requirement	№ of facilities fulfilling the minimum	Percent fulfilling the minimum
Midwives	4(4)	18(2)	9.1	4	63	100.0
Health Officers	0(17)	12(12)	2.5	2	34	54.0
ESO	1(20)	5(2)	2.1	1	63	100.0
GP	0(23)	17(1)	4.8	3	37	58.7
OBGYN	0(59)	1(4)	0.1	0	---	---
Surgeon	0(51)	2 (1)	0.2	0	---	---
Anesthetist	1(23)	5(1)	2.2	2	40	63.5

Unlike in primary hospitals, none of the above health professionals' minimum requirements according to the national standard were fulfilled completely in the 29 general hospitals. The proportion of facilities which fulfil the minimum requirement of number for midwives, 72.4% (21/29), was much better than the other professional categories. Only 10.3% (4/29), 11.5% (4/29) and 10.3% (3/29) of the facilities have the minimum required number of Obstetrician & Gynaecologists, surgeons and anaesthetists respectively. These shortages of Obstetrician & Gynaecologists, and surgeons are one of the main reasons for the deployment of ESOs in the general hospitals. See Table -3 below

Table -3: The availability and number of key health professionals in the General Hospitals and comparison with the national minimum requirement (N=29).

	The minimum number/facility (№ of facilities)	The maximum number/facility (№ of facilities)	Average number/facility	Minimum requirement	№ of facilities fulfilling the minimum	Percent fulfilling the minimum
Midwives	7(1)	54(1)	22	13	21	72.4
Health Officers	0(6)	11(1)	2	0	---	---
ESO	0(1)	6(1)	2	0	---	---
GP	0(1)	48(1)	22	14	8	27.6
OBGYN	0(15)	2(3)	2	2	3	10.3
Surgeon	0(9)	3(1)	3	2	4	13.8
Anesthetist	1(3)	10(1)	9	8	3	10.3

Infrastructure and basic services:-

The availability and status of selected infrastructure and basic services at the time of data collection was assessed in all target facilities. Pharmacy, laboratory service and instrument sterilization services were available in all of the 96 facilities. Radiology and blood transfusion services, however, were not available in 33.3% (21/63) and 20.6% (13/63) of the primary hospitals respectively. Water supply was available in 96.8% (93/96) of all the facilities although it was satisfactorily available only in 56.3% (54/96) of the facilities. Majority of the facilities, 86.5% (83/96), had a separate MCH unit which is in line with the national standard. See Table -4 below

Table -4: Infrastructure and basic services that were available at the time of facility visit (N=96).

Service	Available by type of facility							
	Primary		General		Tertiary		Total	
	N ^o available	Percent (N=63)	N ^o available	Percent (N=29)	N ^o available	Percent (N=4)	N ^o available	Percent (N=96)
Pharmacy service	63	100.0	29	100.0	4	100.0	96	100.0
Radiology service	42	66.7	27	93.1	4	100.0	73	76.0
Laboratory service	63	100.0	29	100.0	4	100.0	96	100.0
Sterilization facility	63	100.0	29	100.0	4	100.0	96	100.0
Oxygen source	58	92.1	25	86.2	4	100.0	87	90.6
Backup power supply	56	88.9	29	100.0	4	100.0	89	92.7
Blood transfusion service	50	79.4	27	93.1	4	100.0	81	84.4
Water supply	61	96.8	28	96.6	4	100.0	93	96.9
Ambulance	56	88.9	26	89.7	3	75.0	85	88.5
Separate MCH unit	52	82.5	27	93.1	4	100.0	83	86.5

Equipment and supplies availability and status:

Having the required equipment and supplies is one of the key factors that affect the performance of the target facilities and hence the ESOs. Selected such parameters were assessed for availability and if they were functional at the time of the assessment.

Haematology machines were available in 69.8% (44/63) of the primary and 93.1% (/29) of the general hospitals but functional only in 44.4% and 58.6% respectively. Similarly; blood

chemistry machine was available in 79.1% (69/96) but satisfactorily only in 41.7% (40/96) of the facilities. It is satisfactorily available only in a third, 33.3% (21/63), of the primary hospitals. Blood collection & transfusion supplies were also available in 66.7% (64/96) but with adequate supply only in 42.1% (41/96) of all the facilities. The availability with adequate supply was better in the primary than general hospitals with 47.6% (30/63) and 27.6% (8/29) proportions respectively. See Table -5 below

Table -5: Structure and equipment availability, and status by facility type (N=96).

Item	Available by type of facility											
	Primary			General			Tertiary			Total		
	N ^o available	Percent (N=63)	Percent satisfactory	N ^o available	Percent (N=29)	Percent satisfactory	N ^o available	Percent (N=4)	Percent satisfactory	N ^o available	Percent (N=96)	Percent satisfactory
BP Cuff	62	98.4	66.7	28	96.6	75.9	4	100	100	94	97.9	70.8
Hematology machine	44	69.8	44.4	27	93.1	58.6	4	100	100	75	78.1	51.0
Clinical chemistry machine	42	66.7	33.3	23	79.3	51.7	4	100	100	69	71.9	41.7
Blood collection & transfusion supplies	42	66.7	47.6	19	65.5	27.6	3	75	75	64	66.7	42.7

Essential drugs:

Magnesium sulphate, which is the drug of choice in the management of preclampsia/eclampsia, was available in 84.4% (81/96) of the facilities. It, however, was available without any stock out for 12 months prior to the assessment only in 35% (34/96) of the hospitals. The situation in the primary hospitals is similar to the general picture. Although magnesium sulphate was available in 82.5% (52/63) of the primary hospitals, it was available without any stock out only in 35% (22/63). The availability of diazepam was much better than that of magnesium sulphate. Diazepam was available in 96.8% (61/63) and without stock out in 76.2% (48/63) of the primary hospitals. See Table -6 below

Table -6: Essential drugs availability and status by type of facility (N=96).

Item	Available by type of facility											
	Primary			General			Tertiary			Total		
	№ available	Percent (N=63)	Percent without stockout	№ available	Percent (N=29)	Percent without stockout	№ available	Percent (N=4)	Percent without stockout	№ available	Percent (N=96)	Percent without stockout (N=96)
Hydralazine	58	92.1	68.3	29	100.0	79.3	4	100	100.0	91	94.8	72.9
Magnesium sulfate	52	82.5	34.9	25	86.2	34.5	4	100	50.0	81	84.4	35.4
Diazepam injection	61	96.8	76.2	26	89.7	65.5	4	100	75.0	91	94.8	74.0
Misoprostol	58	92.1	61.9	26	89.7	51.7	4	100	100.0	88	91.7	59.4
Oxytocin	62	98.4	71.4	29	100.0	75.9	4	100	100.0	95	99.0	74.0
Normal Saline	60	95.2	52.4	27	93.1	69.0	3	75	50.0	90	93.8	57.3
Ringers lactate	62	98.4	63.5	28	96.6	72.4	4	100	75.0	94	97.9	66.7
Adrenalin	63	100.0	84.1	28	96.6	72.4	4	100	100.0	95	99.0	81.3
Iodine	62	98.4	81.0	29	100.0	72.4	4	100	100.0	95	99.0	79.2

Equipments and supplies for newborn care:

Although new born resuscitation corners were found in 95% (91/96) of the facilities, only one had all the essential components listed below in table -7 at the time of the data collection. Bag and mask ventilator was available in all while naloxone was available only in 5.2% (5/96) of all the facilities. See Table -7 below

Table -7: Availability of equipment and supplies for newborn care by type of facility (N=96).

Item	Available by type of facility											
	Primary			General			Tertiary			Total		
	No available	Percent (N=63)	Percent satisfactory	No available	Percent (N=29)	Percent satisfactory	No available	Percent (N=4)	Percent satisfactory	No available	Percent (N=96)	Percent satisfactory
1. New born resuscitation corner	59	93.7	74.6	28	96.6	69.0	4	100.0	100.0	91	94.8	74.0
2. Radiant heater	58	92.1	79.4	27	93.1	72.4	3	75.0	75.0	88	91.7	77.1
3. Bag & mask ventilator	63	100.0	92.1	29	100.0	89.7	4	100.0	100.0	96	100.0	91.7
4. Mucus extractor/suction catheter	61	96.8	85.7	27	93.1	72.4	4	100.0	100.0	92	95.8	82.3
5. Vitamin K ampules	61	96.8	82.5	27	93.1	75.9	4	100.0	100.0	92	95.8	81.3
6. Rectal thermometer	11	17.5	17.5	7	24.1	24.1	1	25.0	25.0	19	19.8	19.8
7. Baby weighting scale	62	98.4	85.7	28	96.6	82.8	4	100.0	100.0	94	97.9	85.4
8. Naloxone	2	3.2	3.2	3	10.3	3.4	0	0	0	5	5.2	3.1
9. Endotracheal tube	34	54.0	41.3	14	48.3	27.6	3	75.0	75.0	51	53.1	38.5
10. Pediatric laryngoscope	32	50.8	33.3	11	37.9	20.7	1	25.0	25.0	44	45.8	29.2
11. Umbilical catheter	3	4.8	4.8	3	10.3	3.4	1	25.0	25.0	7	7.3	5.2
12. Newborn coach	47	74.6	57.1	25	86.2	48.3	4	100.0	100.0	76	79.2	56.3
13. Pulse oximeter	40	63.5	39.7	15	51.7	31.0	2	50.0	50.0	57	59.4	37.5

4.3. Facility CEmONC services delivery status

4.3.1. The facility's CEmONC signal functions/service implementation status

Improving the availability, accessibility, quality and use of services for the treatment of complications that arise during pregnancy and childbirth is very instrumental in reducing maternal and newborn mortality. A health care systems ability/strength to respond to obstetric and newborn complications and deliver life-saving interventions for both mothers and their babies is determined by the availability of EmONC services. A Comprehensive EmONC (CEmONC) facility to which all the ESOs are deployed need to perform the nine signal functions round-the-clock. In this assessment, the data used to determine whether a signal function was performed were based on the immediate 12 month period prior to the data collection.

Majority, 65.6% (63/96), of the facilities were providing regularly all the 9 signal functions in the 12 months period prior to the facility visit. And parenteral antibiotics administration and manual removal of the placenta were the only two signal functions regularly performed by all the 96 facilities. Manual vacuum aspiration and new born resuscitation were provided in 100% of ESO only and ESO plus facilities respectively. Two of the facilities never started providing major surgical services although the ESOs were deployed for more than one year prior to the visit. This is because the ESOs were deployed in facilities which were not ready in terms of infrastructure, manpower, and equipments and supplies required to provide major surgical procedures. This could have been avoided with proper pre-deployment assessment for facility readiness and filling of the identified gaps before or immediately after their deployment. Although pre-deployment assessment was done for majority of the facilities, either it was not done or the identified gaps were not fulfilled in the two facilities.

In addition, 16% (9/56) and 7.5% (3/40) of the ESO-Only and ESO-Plus facilities respectively did not provide emergency surgical services regularly in the 12 months period related to lack of supplies. Blood transfusion was the commonest essential service not provided regularly. It was not provided regularly in 32% (18/56) and 12.5% (5/40) of ESO-Only and ESO-Plus facilities respectively due to interruption of transfusion related supplies. See Tables -8 & 9 below

Table -8: The facilities' CEMONC signal functions/services regular performance status in the 12 months prior to the assessment by type of facility (N=96).

Signal function	ESO only		ESO Plus		Total	
	No Regularly performed	Percent Regularly performed (N=56)	No Regularly performed	Percent Regularly performed (N=40)	No Regularly performed	Percent Regularly performed (N=96)
Parenteral Antibiotics	56	100.0	40	100.0	96	100.0
Parenteral Oxytocics	54	96.4	37	92.5	91	94.8
Parenteral Anticonvulsant	51	91.1	34	85.0	85	88.5
Assisted vaginal delivery (Vacuum..)	51	91.1	38	95.0	89	92.7
Manual Removal of Placenta	56	100.0	40	100.0	96	100.0
Manual vacuum Aspiration	56	100.0	39	97.5	95	99.0
New born Resuscitation	55	98.2	40	100.0	95	99.0
Blood transfusion	38	67.9	35	87.5	73	76.0
Surgery (e.g. caesarean section)	47	83.9	37	92.5	84	87.5

Table -9: Regional distribution of the facilities' CEMONC signal functions/ service regular performance status in the 12 months prior to the assessment.

Signal function	Oromya (N=31)	Tigray (N=24)	Amhara (N=17)	SNNPR (N=17)	Somali (N=3)	Ben			Total	
						shangul (N=2)	Gambella (N=1)	Harrari (N=1)	No	% (N=96)
Parenteral Antibiotics	31	24	17	17	3	2	1	1	96	100.0
Parenteral Oxytocics	30	24	16	14	3	2	1	1	91	94.8
Parenteral Anticonvulsant	26	24	16	13	3	1	1	1	85	88.5
Assisted vaginal delivery (Vacuum..)	29	22	16	15	3	2	1	1	89	92.7
Manual Removal of Placenta	31	24	17	17	3	2	1	1	96	100.0

Manual vacuum Aspiration	31	24	17	17	2	2	1	1	95	99.0
New born Resuscitation	31	24	17	16	3	2	1	1	95	99.0
Blood transfusion	25	16	14	12	3	1	1	1	73	76.0
Surgery (e.g. caesarean section)	28	18	17	15	2	2	1	1	84	87.5

4.3.2. Service indicators

In addition to the nine key C-EmONC indicators, other selected clinical service indicators were also used to assess the facilities' C-EmONC and emergency surgical care service delivery status. It was used to assess the ESO's performance in the facilities indirectly as both the quantity and quality of the services are expected to change following the deployment of ESOs. The "one year before and one year after ESO's deployment" approach was used to assess the change in volume and quality of selected clinical services. The service statistics (number of clinical services and procedures, cases managed and referrals) and maternal/newborn outcomes were used to calculate the changes in volume and quality of the selected services.

Accordingly a total of 9 facilities were excluded from this part of the analysis for lack of data in the one year before the ESOs' deployment. Five of the nine facilities were newly opened at the time of ESOs' deployment while four were old facilities with no data in the one year before the deployment. In addition, in selected facilities there was lack of data on certain parameters for the pre-deployment period and hence additionally excluded in the analysis. As a result the number of valid facilities included for comparison varies each of the clinical service/procedure analysed.

CEmONC services and procedures:

The comparison at the period 1 year prior and after deployment of emergency surgical officers generally showed significant increase in the volume of MNH services delivered which is a huge success by itself for the programme. The percentage increments for all services were much higher in ESO-Only facilities than ESO-Plus facilities. The much higher increment in volume of these services and procedures in ESO-Only facilities is mainly due to the deployment of ESOs in facilities where the services were either non-existent or very low in the year before their deployment as compared to the ESO-plus facilities. In some ESO-Only facilities limited CEmONC and emergency surgical services before the deployment of ESOs used to be provided by trained GPS and specialists deployed on short term basis.

The total number of clients seen for ANC and PNC generally has increased by 28% and 46% respectively compared to the year before ESOs deployment. Similarly, the total number of deliveries in the facilities increased by 40 %. The increase in the number of deliveries in

ESO-only facilities was about twice that of ESO-Plus facilities with 61% and 30% increases respectively. The number of instrument assisted and cesarean deliveries also increased by 39% and 59% respectively. These increases in ESO-only facilities were also much higher than in ESO-plus facilities with increase of 85% Versus 29% and 149% Versus 41% respectively. The overall C/S delivery rate in the one year period after the ESOs' deployment in the facilities was 14.6% (N=81). The C/S delivery rate in ESO only facilities was almost half the rate in ESO-Plus facilities with rates of 9.9% (N=47) and 17.6% (N=34) respectively. And, the overall instrumental delivery rate in the one year period after the ESOs' deployment in the facilities was 9.5% (N=74). The instrumental delivery rate in ESO only facilities similarly was almost half the rate in ESO-Plus facilities with rates of 6.1% (N=42) and 11.5% (N=32) respectively.

Laparotomy for ruptured uterus and gynaecologic emergencies showed the highest increment in ESO-Only facilities with more than two fold increments. Non-emergency surgical procedures also increased by more than 1.5 folds in ESO-Only facilities raising a concern for patient safety and quality of care as ESOs scope of work doesn't include major elective surgical procedures. See Table -10 below

Table -10: Change in volume of clinical services & procedures between one year just before and one year just after deployment of the ESOs.

Clinical service/ procedure	ESO only				ESO Plus				Total			
	Valid N	One year before	One year after	Change in %	Valid N	One year before	One year after	Change in %	Valid N	One year before	One year after	Chan ge in %
Total new ANC	51	43,757	56,069	28	36	40,721	52,126	28	87	84,478	108,195	28
Total postnatal	49	19,005	27,128	43	33	19,922	29,822	50	82	38,927	56,950	46
Total women seen for SRH problems	50	66,333	88,911	34	33	37,437	48,801	30	83	103,770	137,712	33
Total patients seen for surgical problems	28	5,551	14,352	159	18	14,516	17,634	22	46	20,067	31,986	59
Total deliveries	49	23,592	37,972	61	34	45,388	58,871	30	83	68,980	96,843	40
Vacuum/forceps deliveries	43	1,099	2,034	85	33	5,080	6,556	29	76	6,179	8,590	39
Destructive deliveries	39	41	126	207	23	137	213	56	62	178	339	90
Cesarean deliveries	49	1,515	3,775	149	37	7,587	10,686	41	86	9,102	14,461	59
Laparotomies (for ruptured uterus)	44	61	235	286	35	646	993	54	79	707	1,228	74

Laparotomies for gynaecologic emergency	43	48	159	232	33	459	685	49	76	507	844	67
Medical abortion	43	1,553	3,229	108	32	2,000	2,963	48	75	3,553	6,192	74
Surgical abortion (MVA, D/C, E/C)	46	2,128	4,037	90	34	4,688	7,156	53	80	6,816	11,193	64
Surgical contraceptive	44	206	576	180	33	512	738	44	77	718	1,314	83
Others (including non-emergency surgical procedures)	40	666	1,744	161.9	26	1,459	2,680	84	66	2,125	4,424	108

Similar pattern of increment in percentage volume was observed for gynaecologic services provided in the facilities. The number of clients who received surgical contraception generally increased by 83% with almost two fold (180%) and 44% increase in ESO-only and ESO-plus facilities respectively. This is mainly due to tubal ligation performed during caesarean deliveries. This increment especially in ESO-Only facilities is a big achievement and ignites a hope for the national FP programme as the national proportion of permanent contraceptives is very low. The number of clients who received medication abortion and surgical abortion services also increased by 74% and 64% respectively increasing access to the services. See Figure -2 below

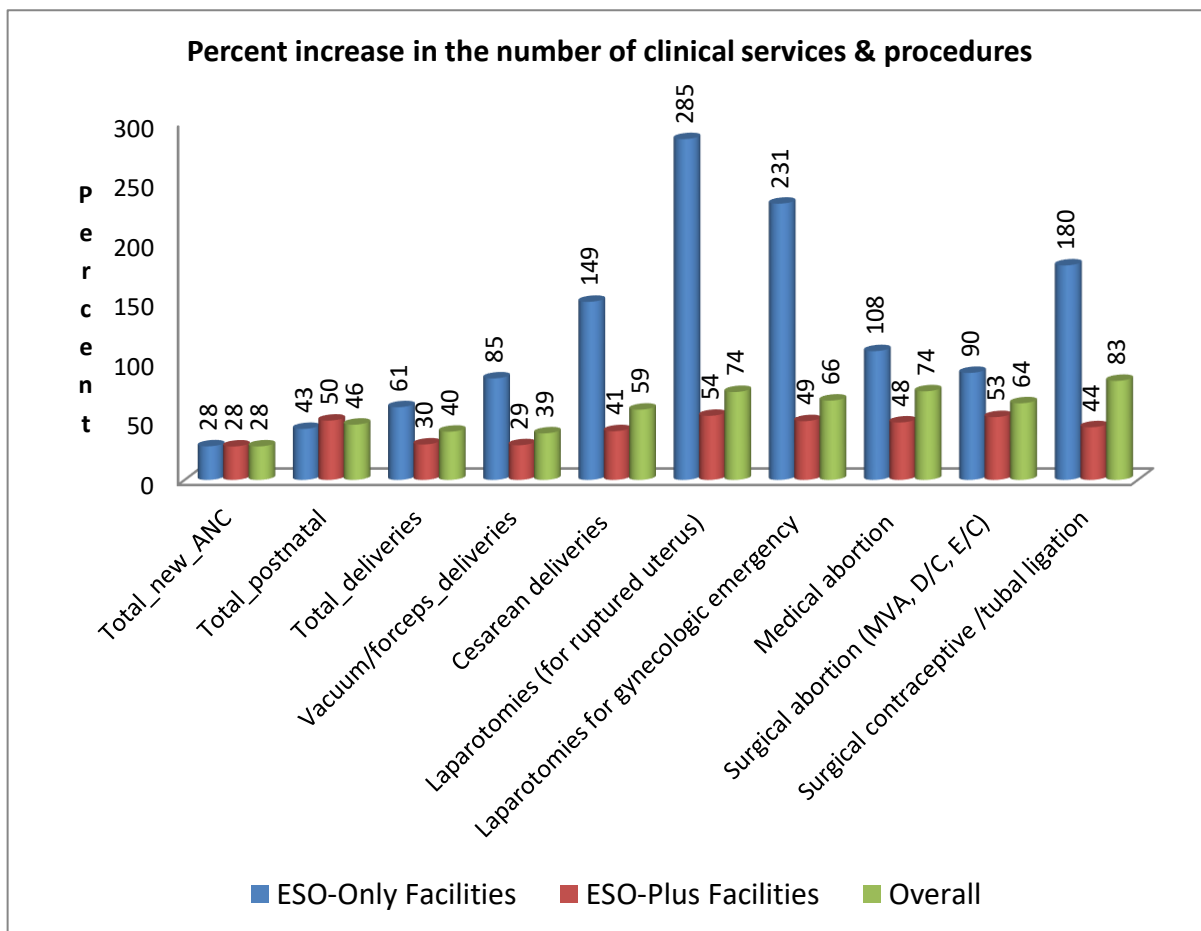


Figure -2: Percentage of increase in the number of clinical services & procedures in the one year just after ESOs’ deployment compared to the year before.

CEmONC cases managed:

The number of emergency obstetric and newborn cases managed in the facilities showed an increasing trend in the year after ESOs deployment. The number of PPH and pre-eclampsia cases managed showed the most significant increment in the year after by 86% and 79% respectively. These rises are significantly higher in ESO-only facilities than ESO-Plus facilities with increases of 260% versus 44% for PPH and 201% versus 58% for pre-eclampsia respectively. The much higher rise in the number of cases managed in ESO-Only facilities is mainly due to increased client load and better case detection rates associated with deployment of the ESOs. See Figure -3 below

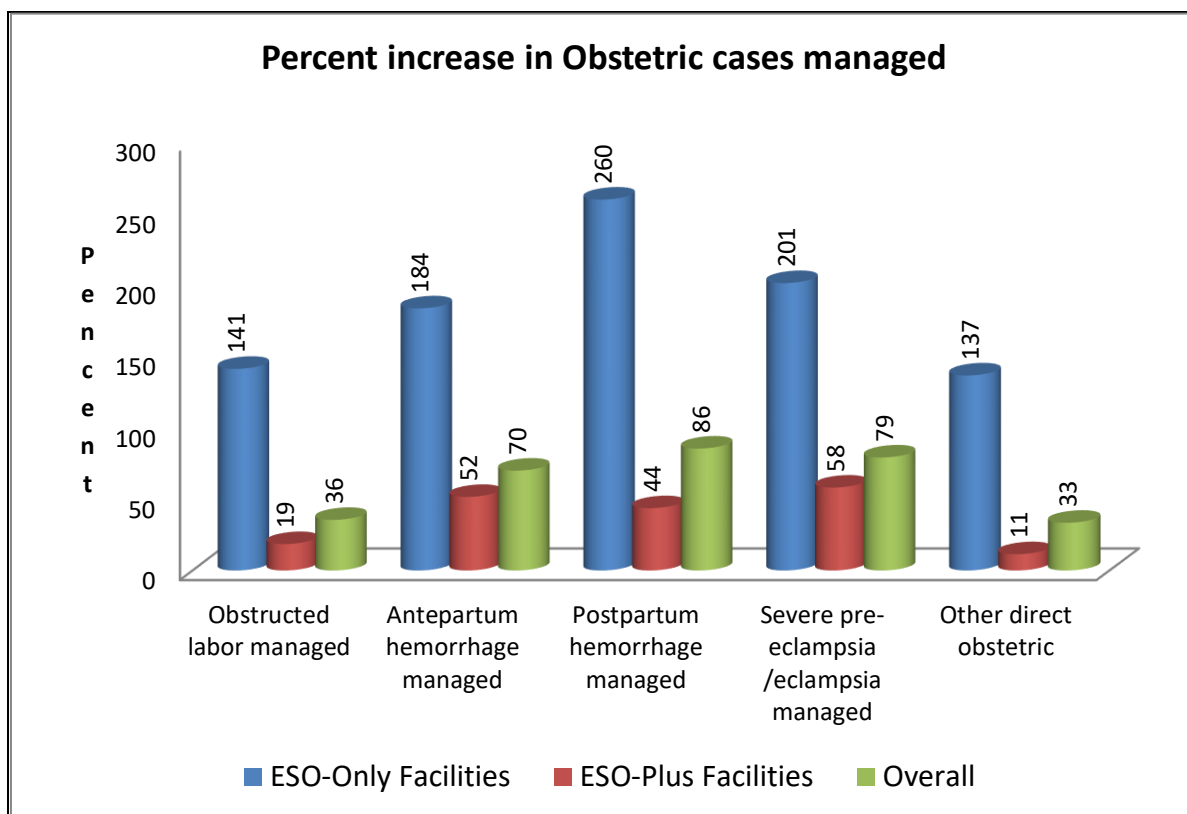


Figure -3: Percentage of increase in the number of obstetric cases managed in the one year just after ESOs' deployment compared to the year before.

Maternal and newborn outcomes:

Maternal and newborn outcomes in the target facilities were used as an indirect indicator of the quality of care provided by the ESOs and their facilities. The total number of maternal deaths in the facilities decreased by 13% (N=67) in the year after ESOs deployment while the proportion of intra-facility maternal death per all deliveries in the facilities showed a much higher reduction of 38.2%. The decrease in ESO-plus facilities (39.1%) was higher than that of ESO-Only facilities (29.7%). This significant reduction in the proportion of intra facility maternal deaths is mainly the result of ESOs deployment which led to more timely medical and surgical interventions for emergency conditions.

There was a remarkable reduction in proportion of early neonatal deaths in ESO only facilities (34.2%) as compared to ESO plus facilities (6.9%). The overall reductions in proportion of intra facility stillbirths and early neonatal deaths, 23.2% (N=80) and 17% (N=66) respectively, are much less than that of the reduction in maternal deaths. The higher reduction in ESO only facilities is mainly due to the newly initiated CEmONC services like caesarean section delivery after their deployment which led to better and timely interventions, and hence improved perinatal outcome. See Figure –4 below

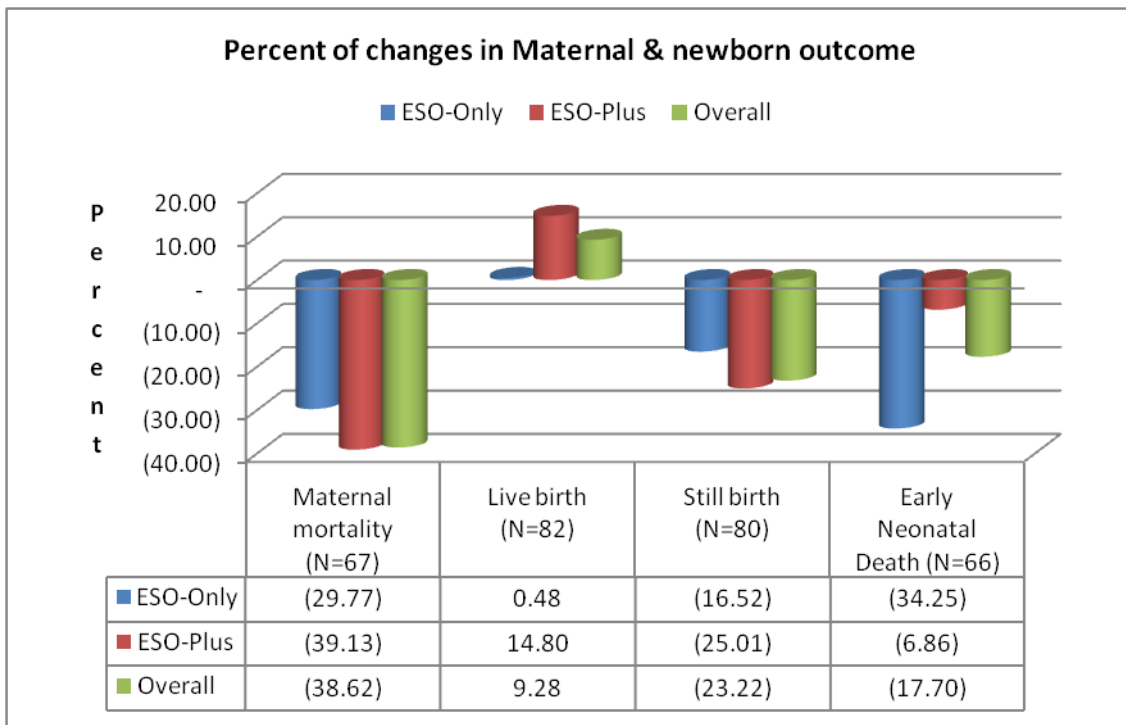


Figure -4: Percentage of change in volume of maternal and newborn outcomes in the one year after ESOs’ deployment in comparison to a year prior to their deployment.

Referrals:

Getting a proper documentation of referrals was much more difficult than the other conditions. Referral-in for obstetric emergency conditions significantly increased by 65% (N=17) while referral-outs for the same condition decreased by 26.5% (N=44). These changes are even more significant in ESO-Only facilities with referral in for obstetric emergency conditions increment by 96.8% (N=9) and decrement in referral-outs for the same condition by 31.6% (N=32). The more significant change observed in ESO-Only facilities can be related to the increase in obstetric emergency case load and increased number of cases managed in the facilities as a result of the ESOs’ deployment.

Unlike in the obstetric emergency conditions the number of both referral-ins and referral-outs for newborn emergency conditions showed increments by 102% and 27% respectively. The rise in referral out could be related to the high rate of referral-ins and poor facility set ups for care of newborns with problems. Similar pattern was seen in referrals for non-obstetric emergency surgical conditions. See Table –11 Below

Table -11: Change in volume of referral in and referral out for one year just before and one year just after deployment of the ESO

Clinical service/ procedure	ESO only			ESO Plus			Total			Change in %		
	Valid N	One year before	One year after	Change in %	Valid N	One year before	One year after	Change in %	Valid N		One year before	One year after
Referral outs obstetric indications	32	1599	1094	-31.6	12	174	209	20.1	44	1773	1303	-26.5
Referral outs non-obstetric surgical indications	21	809	908	12.2	14	715	842	17.8	35	1524	1750	14.8
Referral outs newborn indications	11	68	89	30.9	8	157	197	25.5	19	225	286	27.1
Referral ins obstetric indications	9	314	618	96.8	8	1686	2684	59.2	17	2000	3302	65.1
Referral ins non-obstetric surgical indications	7	110	395	259.1	5	201	253	25.9	12	311	648	108.4
Referral ins newborn indications	4	81	131	61.7	4	20	73	265.0	8	101	204	102.0

4.4. Facility Emergency Surgical Care services delivery status

The pattern of change for volume of emergency surgical services provided in the facilities was mostly similar to that of MNH services. All the assessed emergency surgical services/indicators have shown significant increment in volume over the year after deployment of the ESOs. All the increases were much more significant in ESO-only facilities with increment in volume by at least three folds. The much higher increment in volume of these services and procedures in ESO-Only facilities is similarly due to the deployment of ESOs in facilities where the services were either non-existent or very low in the year before their deployment as compared to the ESO-plus facilities.

The number of cases who had appendectomy and chest tube insertion increased by more than 8 folds (62 Vs 657 for and 9 Vs 83 for appendectomy and chest tube insertion respectively) in ESO-only facilities while the rise was only 12.7% and 8.4% respectively for ESO-plus facilities. See Table -12 Below

Table -12: Emergency surgical cases & procedures for one year just before and one year just after deployment of the ESO

Clinical service/ procedure	ESO only				ESO Plus				Total			
	Valid N	One year before	One year after	Change in %	Valid N	One year before	One year after	Change in %	Valid N	One year before	One year after	Chan ge in %
Chest tube insertion	43	9	83	822	29	381	413	8	72	390	496	27
POP application	46	121	774	540	31	2082	2399	15	77	2203	3173	44
Abscess drainage	48	366	2026	454	31	2374	2752	16	79	2740	4778	74
Appendectomy and appendiceal abscess	48	62	657	960	32	1823	2054	13	80	1885	2711	44
Small bowel resection and anastomosis	44	56	293	423	31	620	1149	85	75	676	1442	113
Colostomy	41	1	67	6600	32	721	744	3	73	722	811	12
Amputation	44	9	77	756	32	234	280	20	76	243	357	47
Other emergency surgical procedure (e.g skin traction, suprapubic cystostomy)	46	581	2269	291	29	2163	3092	43	75	2744	5361	95
Others (including non-emergency surgical procedures)	34	1473	4853	229	28	4205	5519	31	62	5678	10372	83

4.5. Providers clinical skill assessment through patient card review

In addition to comparison of the volume and outcome of MNH services during the one year before and after ESOs deployment, the ESOs' skill was also assessed reviewing medical charts of patients managed. Each ESO site should have a properly documented medical record of patients admitted for obstetric and emergency surgical care. The chart review was meant to assess the quality/completeness of the ESOs' overall documentation and indirectly assess their skill in clinical decision making and surgical procedures. This was done by reviewing systematically selected random charts of patients to assess:-

- The quality/completeness of their patient evaluation and follow-up evaluating their documentation of history and physical examination, diagnosis/overall assessment, and management plan including investigations.
- The appropriateness of indications, operative interventions and operative documentation of caesarean sections and emergency surgical procedures.
- The documentation of surgical complications (intra and post operative) that occur during cesarean sections and emergency surgical procedures and the appropriateness of their management.
- The major contributors of all maternal deaths that occur in the year after the deployment of ESOs.

4.5.1. Patient chart review of cases admitted for obstetric management

According to the assessment made using a standard tool, the quality/completeness of documentation for patient evaluation, follow-up and surgical procedures of majority of the facilities didn't meet the standard i.e a documentation with all the core elements being implemented and >60% of reviewed charts showing complete documentation of the core elements. Only 51.6% (48/93), 30% (28/92) and 28.6% (26/91) of the facilities met the standard for documentation of patient evaluation, follow-up and surgical procedures. As can be seen the quality/completeness of documentations was better for patient evaluation but progressively declines for follow-up and surgical procedures. While patient evaluation and follow-up scores were better in ESO only facilities, scores in surgical procedures were better in ESO plus facilities. This could be an indication of gaps in surgical skill/procedures of ESOs. See Table -13 below.

Table -13: Quality/completeness of documentation for patient evaluation, follow-up and surgical procedures of cases admitted for Obstetric management.

	ESO-Only Facilities		ESO-Plus Facilities		Total	
	Count	Column N %	Count	Column N %	Count	Column N %
Patient evaluation Scoring						
• Needs urgent remediation	1	1.9	6	15.0	7	7.5
• Need improvement	22	41.5	16	40.0	38	40.9
• Meets National standard	17	32.1	10	25.0	27	29.0
• Surpasses expectations	13	24.5	8	20.0	21	22.6
Total	53	100.0	40	100.0	93	100.0
Patient follow-up Scoring						
• Needs urgent remediation	7	13.2	9	23.1	16	17.4
• Need improvement	28	52.8	20	51.3	48	52.2
• Meets National standard	8	15.1	7	17.9	15	16.3
• Surpasses expectations	10	18.9	3	7.7	13	14.1
Total	53	100.0	39	100.0	92	100.0
Surgical procedures Scoring						
• Needs urgent remediation	18	35.3	12	30.0	30	33.0
• Need improvement	20	39.2	15	37.5	35	38.5
• Meets National standard	8	15.7	8	20.0	16	17.6
• Surpasses expectations	5	9.8	5	12.5	10	11.0
Total	51	100.0	40	100.0	91	100.0

All obstetric and gynaecologic patients with surgical complications (intra and post operative) should have appropriate management according to the standard properly documenting the following core elements: clear description of surgical complications, specific actions taken for its management, and final outcomes. Although the plan was to include 10 charts with documented complications while being managed by the ESOs from each facility, such charts were found only in 44.8% (43/96) of the assessed facilities. Majority of these, 60.5% (26/43), were ESO-only facilities. Up to 10 systematically selected/identified charts of obstetric and gynaecologic patients with surgical complications while being managed by the ESOs in each of the target facilities were analysed. The average number of charts included was three per

facility in both ESO-Only and ESO-Plus facilities. A total of 135 complications were analysed with 59.3% (80/135) being from ESO-only facilities. Each patient chart had about 1.1 complications in both groups.

Excessive blood loss and deep incision extension were the commonest documented complications in cases being managed by the ESOs in both groups of facilities with proportions of 35.6% (48/135) and 20.7% (28/135) respectively. Surgical wound infection was the third most common complication in ESO-Only facilities occurring three times higher than in ESO-Plus facilities with proportions of 16.3% (13/80) and 5.5% (3/55) respectively. This finding could reflect the difference in quality of infection prevention practices in the two groups. See Table -14 Below

Table -14: Documented Obstetric and Gynaecologic surgical complications by type of facility.

Type of complication	ESO-Only		ESO-Plus		Total	
	Count	%	Count	%	Count	%
Spinal anesthesia related hypotension	6	7.5	2	3.6	8	5.9
Anesthesia related complication	4	5.0	3	5.5	7	5.2
Bladder injury	1	1.3	5	9.1	6	4.4
Intestine injury	0	0.0	1	1.8	1	0.7
Deep incision extension	16	20.0	12	21.8	28	20.7
Fetal injury	1	1.3	1	1.8	2	1.5
Excessive haemorrhage	28	35.0	20	36.4	48	35.6
Others	11	13.8	8	14.5	19	14.1
Wound infection/dehiscence	13	16.3	3	5.5	16	11.9
Total	80	100.0	55	100.0	135	100.0

Majority of the complications, 80.7% (80/109), were assessed as avoidable in both groups of facilities. However; the management of the complications was assessed as appropriate in the majority of cases, 86.3% (107/124), in both groups of facilities.

4.5.2. Maternal death review

Review of each maternal death in the facilities can potentially provide information on the quality of care provided. The plan was to assess all maternal deaths that occur in all target facilities in the year after the deployment of ESOs. And, the purpose was to identify major contributors for the maternal deaths and see if the maternal death was preventable or not as decided by the data collection team based on the chart review guide. However, only 65.6% (63/96) of the target facilities which had documentation and medical records for maternal deaths were included. The facilities which had no documentation/medical records on maternal deaths were mainly those facilities in which the earlier batches of ESOs were deployed before the HMIS and medical recording was strengthened.

A total of 170 maternal deaths from the 63 facilities (32 ESO-Only & 31 ESO-Plus) were reviewed. About two third of the maternal deaths included were from ESO-Plus facilities due to the twice higher number of maternal deaths reviewed per facility (3.5/facility in ESO-Plus Versus 1.8/facility in ESO-Only facilities). The mean number of maternal deaths reviewed was 2.7/facility. Nearly half, 47.6% (30/63), of the facilities had one maternal death reviewed. The maximum number of maternal deaths reviewed per facility was 10 in 3.2% (2/63) of facilities.

Hypovolemic shock secondary to excessive bleeding was the commonest stated cause of maternal deaths being responsible for 58.5% (79/135) of the deaths. And; eclampsia/pre-eclampsia was the second commonest cause accounting for 23% (31/135) of the deaths. See Figure –5 below

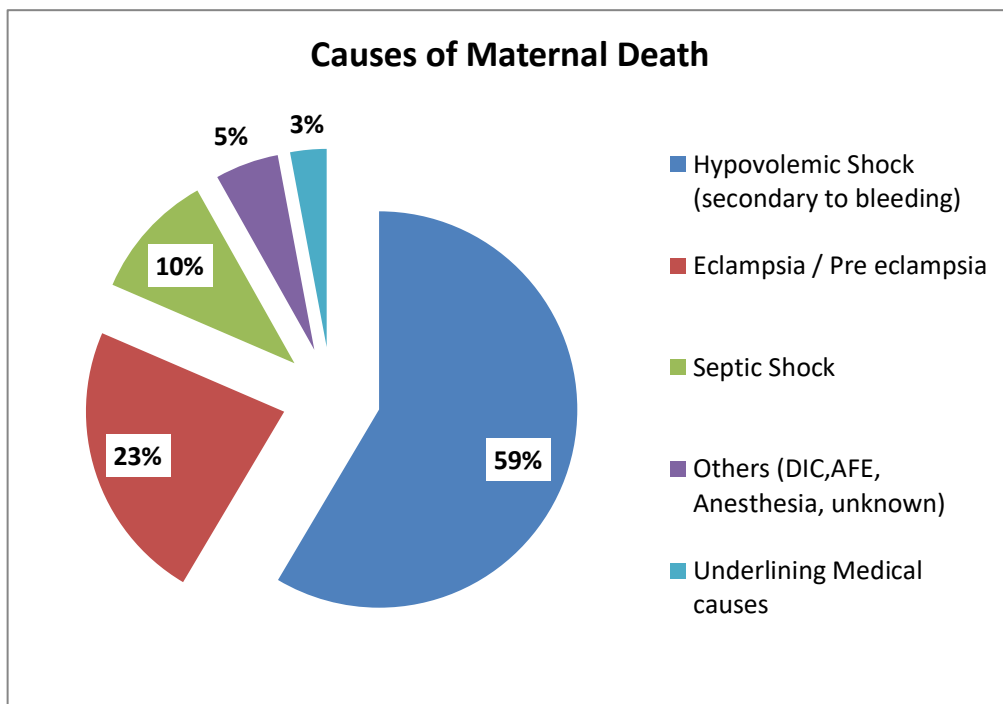


Figure -5: Percentage distribution of stated causes of maternal deaths in the one year after ESOs' deployment.

Appropriate intervention before the maternal death was done in 55.8% (29/52) and 63.8% (67/105) of the mothers in ESO-Only and ESO-Plus facilities respectively. Patient delay to reach the facility was the major contributor for the maternal death in majority, 63.8% (83/130), of cases in both groups of facilities. And, delayed management in the assessed facility was the second important factor contributing for 16.3% (7/43) and 11.5% (10/87) of maternal deaths in ESO-Only and ESO-Plus facilities respectively. See Figure –6 Below

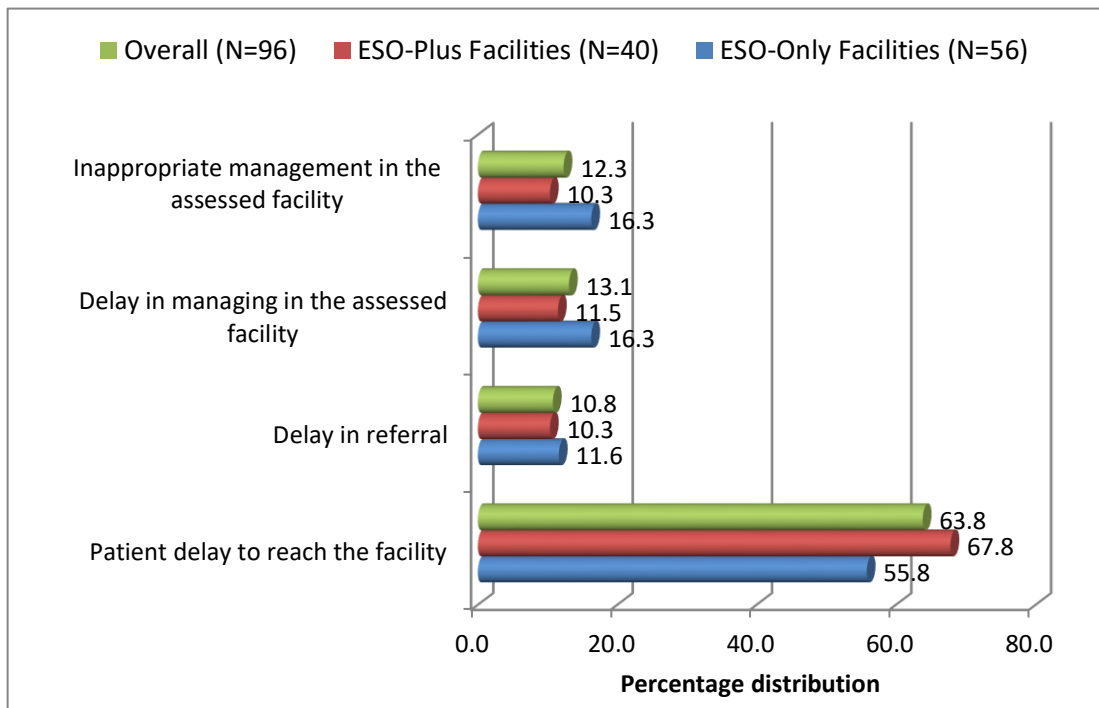


Figure -6: Percentage distribution of stated major contributors for maternal deaths.

4.5.3. Chart review of cases admitted for emergency surgical management

The quality/completeness of documentation for patient evaluation, follow-up and surgical procedures of cases admitted for emergency surgical care was similar to that of cases admitted for CEmONC services stated above. Only 40% (32/80), 33% (26/79) and 26.3% (20/76) of the facilities met the standard for documentation of patient evaluation, follow-up and surgical procedures. Similarly, the quality/completeness of documentations was better for patient evaluation but progressively declines for follow-up and surgical procedures. And, while patient evaluation and follow-up scores were better in ESO only facilities, scores in surgical procedures were better in ESO plus facilities. This could again be an indication of gaps in surgical skill/procedures of ESOs. See Table -15 below.

Table -15: Quality/completeness of documentation for patient evaluation, follow-up and surgical procedures of cases admitted for Emergency surgical care.

	ESO-Only Facilities		ESO-Plus Facilities		Total	
	Count	Column N %	Count	Column N %	Count	Column N %
Patient evaluation Scoring						
• Needs urgent remediation	4	8.2	6	19.4	10	12.5
• Need improvement	23	46.9	15	48.4	38	47.5
• Meets National standard	9	18.4	6	19.4	15	18.8
• Surpasses expectations	13	26.5	4	12.9	17	21.3
Total	49	100.0	31	100.0	80	100.0
Patient follow-up Scoring						
• Needs urgent remediation	10	20.4	10	33.3	20	25.3
• Need improvement	20	40.8	13	43.3	33	41.3
• Meets National standard	11	22.4	4	13.3	15	18.8
• Surpasses expectations	8	16.3	3	10.0	11	13.8
Total	49	100.0	30	100.0	79	98.8
Surgical procedures Scoring				0.0		
• Needs urgent remediation	18	39.1	11	36.7	29	38.2
• Need improvement	18	39.1	9	30.0	27	35.5
• Meets National standard	4	8.7	5	16.7	9	11.8
• Surpasses expectations	6	13.0	5	16.7	11	14.5
Total	46	100.0	30	100.0	76	100.0

As in obstetric and gynaecologic patients with surgical complications (intra and post operative) stated above, all emergency surgical patients with surgical complications should have appropriate management and proper documentation. Charts with documented surgical complications during emergency surgical care were found only in 25% (24/96) of the assessed facilities. Majority of these, 58.3% (14/24), were ESO-only facilities. Up to 5 systematically selected identified charts of emergency surgical patients with surgical complications while being managed by the ESOs in each of the target facilities were analysed. The overall average number of charts included was 2.4 per facility with rates of 2.6 and 2.1 charts per facility in ESO-Only and ESO-Plus facilities respectively. A total of 62

complications were analysed with 62.5% (40/62) being from ESO-only facilities. Each chart had about 1.1 complications in both groups.

Surgical wound infection/dehiscence/failure was the commonest documented complication in both ESO-only and ESO-Plus group of facilities accounting for 42.5% (17/40) and 31.8% (7/22) of complications respectively. This could be partly related to the quality of infection prevention practices in both groups more importantly in ESO-only facilities. Excessive haemorrhage was similarly the second commonest complication in both groups but occurring more than twice more frequently in ESO-Plus than ESO-only facilities with proportions of 27.3% (6/22) and 12.5% (3/24) respectively. Death occurred in 3/40 ESO-only facilities while no death was reported in ESO-Plus facilities. This could be due to handling of more complicated cases in ESO-Only facilities and better management of complications in ESO-plus facilities. See Table -16 Below.

Table -16: Documented Emergency surgical complications by type of facility.

Type of complication	ESO-Only		ESO-Plus		Total	
	Count	%	Count	%	Count	%
Spinal anesthesia related hypotension	2	5.0	3	13.6	5	8.1
Intestine injury	2	5.0	1	4.5	3	4.8
Excessive haemorrhage	5	12.5	6	27.3	11	17.7
Ureteric injury	2	5.0	1	4.5	3	4.8
Others	2	5.0	2	9.1	4	6.5
Wound infection/dehiscence	17	42.5	7	31.8	24	38.7
Anesthesia related complications	3	7.5	2	9.1	5	8.1
Death	3	7.5	0	0.0	3	4.8
Anastomotic leak & enterocutaneous fistula	4	10.0	0	0.0	4	6.5
Total	40	100.0	22	100.0	62	100.0

The assessment of complications followed similar pattern to that of obstetric & Gynaecologic complications. Majority of the complications, 85% (45/53), were assessed as avoidable in both groups of facilities comparably. And; the management of the complications was assessed as appropriate in the majority of cases, 86.3% (107/124), in both groups of facilities.

4.6. Managerial Inquiry

The facilities' CEO/Medical directors were interviewed to assess their opinion on facility managerial issues and professionalism related to integrated emergency Obstetrics and surgical care. The issues in the interview include: physical work environment, employee (ESO) benefits status, timely supply of needed medical supplies and equipment's and ESO's adherence to regulatory, institutional & departmental norms.

Majority, 62% (60/96), of the facility managers do not think that appropriate infrastructure, resources and equipment to perform the job are in place. Nearly all, 95% (57/60), however have plans to fulfil resources which are in urgent need.

The managers in 45% (43/96) of the facilities stated that ESOs experienced delayed payment (of salaries, duty allowances) in the last 12 months before the assessment. Majority, 58% (56/96), stated that the facilities provide some form of employee benefits (not considering salaries and duty allowances) to the ESOs. Although there was no document about the scope of work of the ESOs and/or standard for hospitals in 59.4% (57/96) of the facilities, 58.3% (56/96) of the managers claim to be aware of the job description of the ESOs.

The managers had "observations or reports of breach of boundaries in the scope of work (level of ESO training)" and "major complaints/accusations from patients or clients related to the practice of the ESOs" in 14.6% (14/96) and 20.8% (20/96) of the facilities respectively. Generally more than 90% (86/96) of the managers assess the ESO's adherence to regulatory, institutional and departmental norms as satisfactory (70%) and exemplary (20%).

4.7. ESO interview

A total of 141 Emergency Surgical officers from 86 target facilities who have served in the facility for at least one year before the assessment were interviewed. This was to assess their experience and challenges while practicing in the facilities. The number of ESOs interviewed per facility was one in 52.3% (45/86) the facilities while four ESOs were interviewed per facility in 3% (2/86). Majority of the ESOs, 87.2% (123/141), were male. About 20% (28/141) of the ESOs have worked as an ESO in other health facilities before their current deployment site. The mean duration of service in the current facilities was 22 months.

A total of 14 main challenges to working in the facilities were reported by the ESOs. Shortage of equipments and supplies required for surgery was the commonest challenge reported by 37.6% (53/141) of the ESOs. And, “absence or unsatisfactory duty payment and incentive” was the second commonest challenge reported by 35.5% (33/141). See Table -17 Below.

Table -17: Main challenges reported by the ESOs while working in the facilities.

SN	Main challenges described	Frequency	Percent (N=141)
1.	Shortage of Equipment’s and supplies related to Surgery	53	37.6
2.	Absence or unsatisfactory Duty payment and incentive	50	35.5
3.	Substandard Facility set up and space problems	33	23.4
4.	Lack of blood for transfusion	28	19.9
5.	Shortage and in some cases absence of OR staffs (anesthetists, scrub nurses...)	25	17.7
6.	Luck of management and staff support	21	14.9
7.	Undefined or absence of carrier development	18	12.8
8.	There is no on the job training	12	8.5
9.	Lack of clear work description for ESO in the facility	8	5.7
10.	Shortage of drugs	6	4.3
11.	Limited or no exposure to surgical patients	4	2.8
12.	Luck of intra operative consultation support	4	2.8
13.	Limited or no acceptance by the community	4	2.8
14.	Very low case load	2	1.4
TOTAL		268	

Majority of the ESOs, 68.7% (92/134), expressed their intent to continue working in their current facilities in the year after. While 37% (29/78) and 23% (17/46) of ESOs from ESO-

Only and ESO-Plus facilities expressed their intent not to continue in their current facilities in the year after. The reasons for their intent were expressed by 129/141 of the ESOs. “Conducive working environment and community” was the commonest stated reason for intent to continue working in the facility followed by “will to serve the community” accounting for 52.3% (45/86) and 23.3% (20/86) of the stated reasons respectively. See Figures - 7 & 8 below.

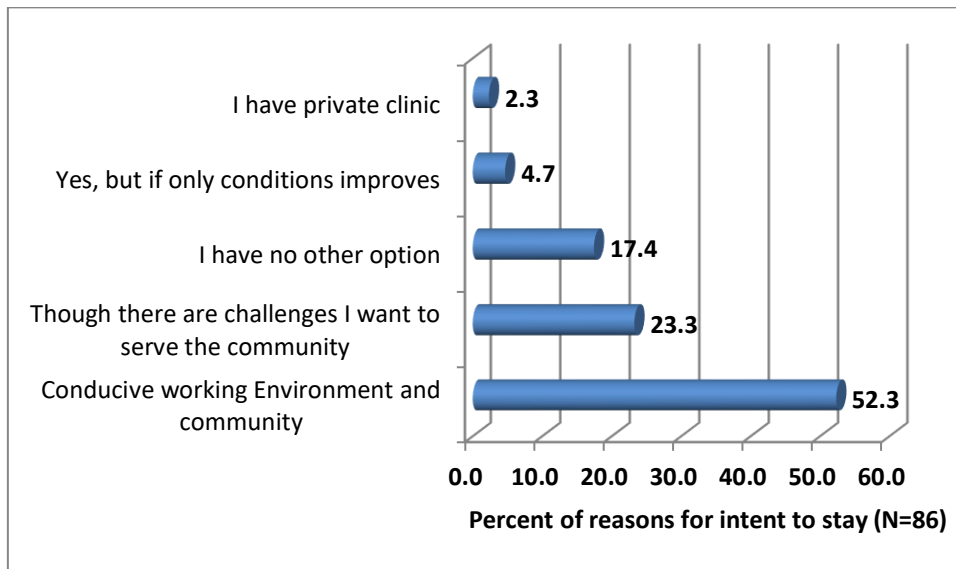


Figure -7: Percentage distribution of stated reasons of ESOs’ for intent **to continue** working in their current facilities in the year after the interview (N=86).

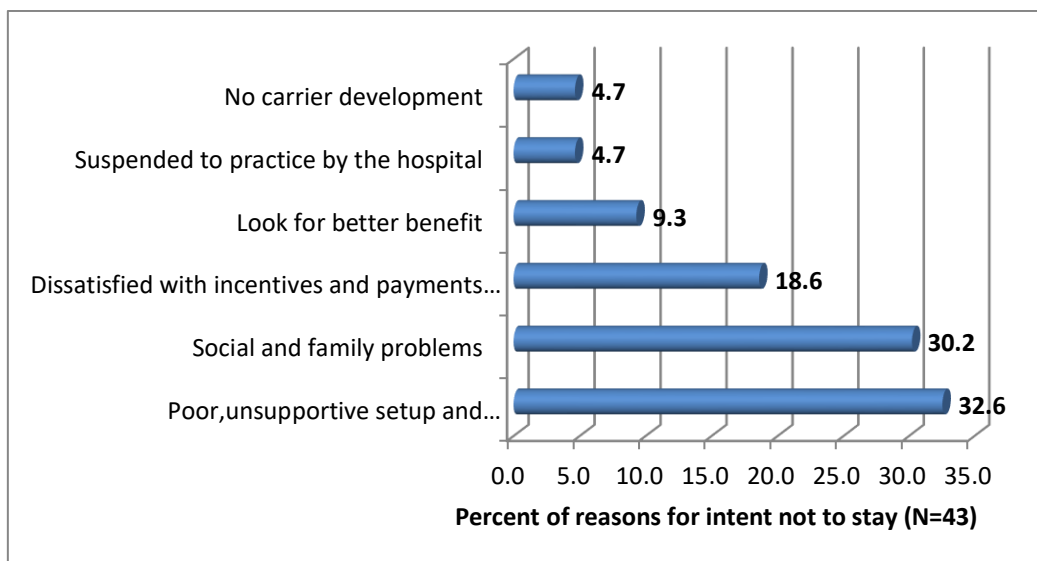


Figure -8: Percentage distribution of stated reasons of ESOs’ for intent **not to continue** working in their current facilities in the year after the interview (N=86).

4.8. Availability of patient records, registers and management protocols / guideline

Availability of patient records, registers and management protocols/guidelines required in MNH and emergency surgical care provision was assessed by reviewing patient charts, visiting the respective units and interviewing ward head nurses. Patient records have all forms for history and physical examination, progress notes, order sheets and discharge note in 61.4% (54/88) of the facilities. Most, 93.2% (82/88), had copies of partograph for labour follow-up. Antenatal care and delivery registers were available in all.

Written protocols and procedures for admissions and discharges were available only in 30.4% (17/51) and 40% (16/38) of the facilities. Protocols for management of emergency obstetric and surgical conditions were not available in 51% (49/89) of the facilities. See Table -18 below

Table -18: Availability of patient records, registers & management protocols in the assessed facilities

Item	Available by type of facility							
	Primary		General		Tertiary		Total	
	No available	Percent (N=63)	No available	Percent (N=29)	No available	Percent (N=4)	No available	Percent (N=96)
1. Patient records with all forms for patient evaluation, Mx & follow-up	37	58.7	14	48.3	3	75.0	54	56.3
2. Copies of partograph	55	87.3	23	79.3	4	100.0	82	85.4
3. Delivery register or log book	59	93.7	28	96.6	4	100.0	91	94.8
4. Antenatal care register or log book	58	92.1	28	96.6	4	100.0	90	93.8
5. Family planning register or log book	56	88.9	28	96.6	4	100.0	88	91.7
6. Safe abortion/post abortion register	52	82.5	26	89.7	4	100.0	82	85.4
7. OR log book	55	87.3	24	82.8	4	100.0	83	86.5
8. Protocols for the management of emergency obstetric & surgical conditions	31	49.2	15	51.7	3	75.0	49	51.0
9. Written protocols and procedures for admission, follow up & discharges	21	33.3	11	37.9	1	25.0	33	34.4

4.9. Key strengths and challenges

At the end of data collection summary of up to three Key strengths and problems observed by the data collecting team and discussed in each facility during the visit were documented. A total of 6 key strengths and 13 key problems were reported. Good staff motivation and commitment was the commonest key strength being reported in 71.9% (69/96) of the facilities. Good and clean working set-up observed in 12.4% (16/96) of the assessed facilities was the second important key strength reported by the data collecting team. See Figure -9 Below

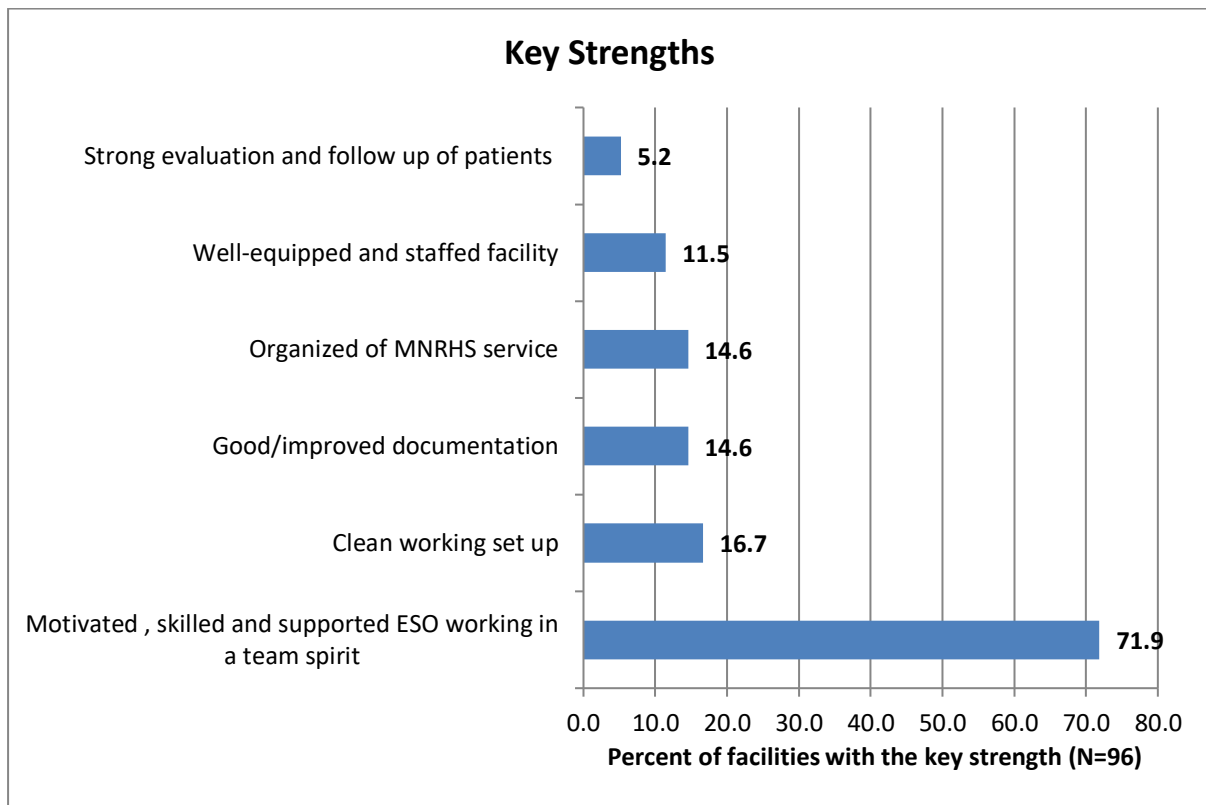


Figure -9: Summary of key strengths observed and discussed in each facility during the visit (N=96)

Poor documentation of charts and log- books was the most important key problem identified being observed in more than half, 54.2% (52/96), of the facilities. And, almost equally important key problem identified in 53.1% (51/96) of the facilities was shortage and malfunctioning of medical equipment's and supplies. See Figure -10 Below

Summary of key problems observed and discussed

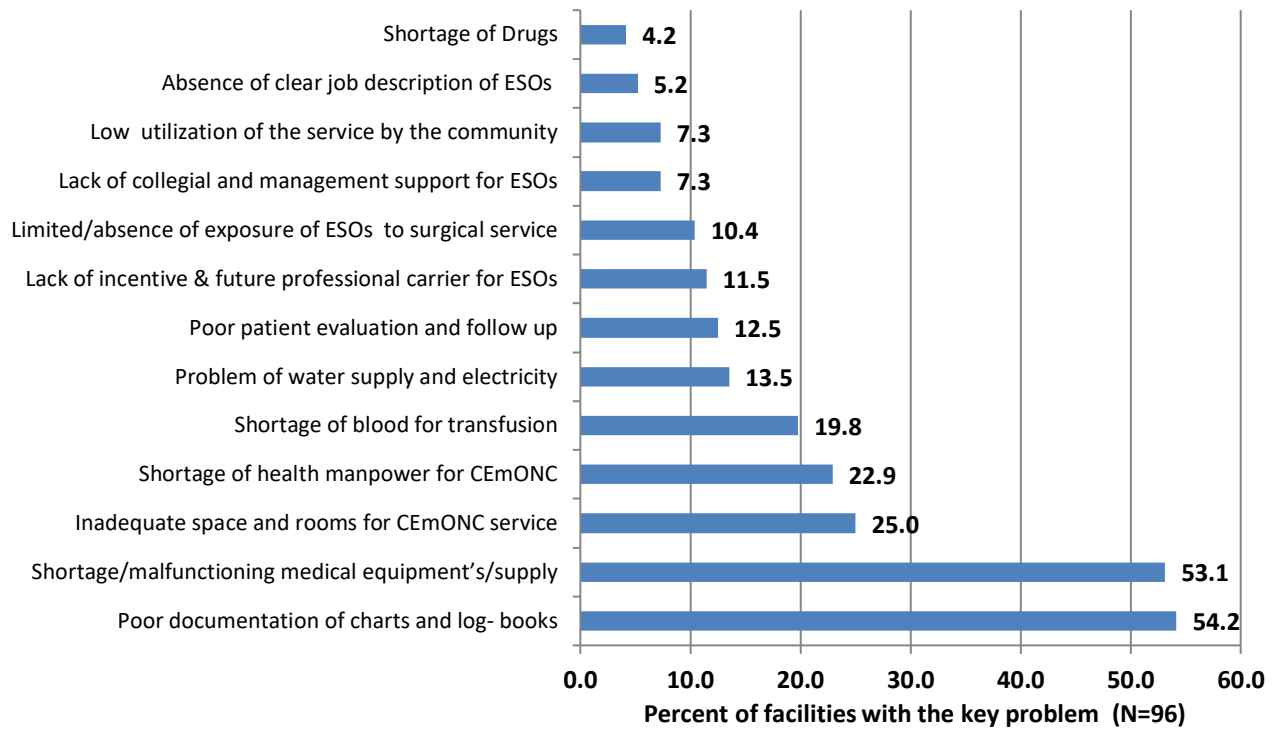


Figure -10: Summary of key problems observed and discussed in each facility during the visit (N=96)

5. CONCLUSIONS AND RECOMMENDATIONS

Generally the deployment of ESOs in all health facilities (Primary, General and Tertiary Hospitals) has resulted in remarkable increase in volume of MNH and emergency surgical services with improvement in maternal and perinatal outcomes. Access to CEmONC and emergency surgical services, as a result of their deployment, has proportionally increased contributing to the nation's relentless effort in averting maternal and prenatal mortality, and trauma related morbidity and mortality. There were, however, multiple challenges and limitations observed during the assessment. And, the F-MOH in collaboration with all stakeholders of the IESO programme at all levels need to timely respond to these challenges and limitations in organized manner to sustain and further improve the gains of the programme. The detailed conclusions and recommendations are discussed below.

5.1. ESO deployment status

- The main objective of the IESO programme is to produce and deploy competent ESOs in facilities where neither Surgeons nor Obstetricians & Gynaecologists are available, specifically Primary Hospitals. Hence, the deployment of majority (two thirds) of the ESOs in the primary hospitals is in line with the objective of the program.
- ESOs in majority of the cases (68%) were deployed in facilities where neither Surgeons nor Obstetricians & Gynaecologists were available (ESO-Only facilities) with a situation to practice independently. The retention on service of ESOs practicing independently in all ESO-Only facilities despite many challenges is a success by itself and commendable.
- The deployment pattern of ESOs is not similar across the country. Although the average number of ESOs per facility was two, excess numbers of ESOs (up to 6) were deployed in some facilities.
- Shortage of equipment and supplies related to surgery, and absence or unsatisfactory duty payment and incentive were the main challenges reported by the ESOs. In addition, the following factors were identified to contribute to their dissatisfaction,
 - Inadequate infrastructure (water and power supply) as well as medical equipment and supplies
 - Limited/absence of exposure of ESOs to surgical service
 - Absence or unsatisfactory duty payment and incentive
 - Absence of clear job description at facility level, and
 - Lack of career development structure
- The fact that majority (68.7%) of the ESOs have the intention to continue working in their current facilities despite the challenges is encouraging.

Recommendations:

- For the sake of efficiently using the ESOs, it is recommended to shift excess ESOs to new primary hospitals after ensuring the readiness of the facilities. In addition, a proper planning at the national level should be in place to optimize the number of graduates with the pace of facility development to avoid deployment of ESOs where not intended.
- The main challenges reported by the ESOs should be discussed and addressed by the stake holders and respective facilities so as to maintain the achievement gained so far.
- Measures such as financial and/or non-financial incentives, performance-based incentives or other methods as means to retain and enhance their performance need to be considered in facilities where not provided. In addition, national career progression mechanisms for the ESOs need to be designed and implemented.

5.2. Facility readiness/preparedness

- The minimum required numbers of ESOs and midwives according to the national standard were fulfilled in all of the primary hospitals and 75% of general hospitals which is very commendable. The inadequate number of anaesthetists in about a third of facilities, however, is a key challenge that can ultimately reflect on the performance of the ESO.
- It is encouraging that majority of the facilities have fulfilled the required infrastructure and basic services. Lab diagnostic machines, however, though available in most were not functional in majority of facilities. This is an indication that there is a need to improve availability of the required machines and biomedical maintenance services. Blood transfusion service was also not available satisfactorily in about half of the primary hospitals.
- The high stock out of some essential drugs and supplies especially that of magnesium sulfate across all types of facilities has likely affected the quality of care provided and needs due attention at all levels.
- Although having newborn resuscitation corners in large majority of the facilities was a commendable achievement, most of the corners were not fully equipped with all the required equipments and supplies according to the standard.

Recommendations:

- For effective and sustainable delivery of quality CEmONC and emergency surgical services, the required number and skill mix of health professionals which work with the ESOs, especially anesthetists, need to be fulfilled.
- Blood transfusion service is one important service that need to be available all the time in all facilities. And to ensure its availability of all time and

satisfactory transfusion services, due attention need to be given at all levels to identify the challenges and urgently take corrective measures.

- Availing the critical equipments and supplies required for newborn resuscitation at all facilities need to be seriously considered to improve the quality of newborn resuscitation.

5.3. Facility CEmONC & Emergency Surgical services status

- Pre-deployment assessment and filling of identified gaps was not done in majority of the facilities. This has led to deployment of ESOs in two facilities which were not ready for surgical services.
- The deployment of ESOs in all facilities has led to significant increase in volume of MNH and emergency surgical services compared to the year prior to their deployment. The increase in ESO only facilities especially was more significant compared to ESO plus facilities which is commendable. As a result, the population which is served by the facilities especially primary hospitals has proportionally increased benefitting from their deployment.
- There was similarly more significant increase in non-emergency surgical services after ESO deployment in ESO only facilities as compared to ESO plus facilities which could be due to ESOs' engagement in major surgeries for cold cases which is not in line with their scope.

Recommendations:-

- Pre-deployment assessment of all facilities needs to be done at all times before deployment of ESOs to optimally utilize and maintain their clinical skills.
- As the volume of services provided by the ESOs increases over time, quality could be compromised and mechanisms to continuously monitor and improve the quality need to be in place. Such mechanisms can also help provide appropriate and timely feedbacks to the professionals, the facility and all other stake holders.
- Being a new initiative to the country and a task shifting approach, practicing within the scope and boundaries of the ESO profession is of paramount importance to ensure patient safety and provide quality care. Hence facility managers and providers need to be well informed about the scope of practice of ESOs.

5.4. Quality of performance

- ESOs' quality of performance indirectly measured by percentage change in maternal and perinatal outcomes in all types of facilities showed improvement in the year following their deployment. The reduction in proportion of intra-facility maternal

deaths by more than a third was a tremendous achievement. Had patient delay to reach the facility not been the major contributor for the deaths in about two third of cases, this achievement would have been even much better. Similarly the ESOs are managing remarkable number of newborn problems with relatively good outcomes as reflected by increased referral-ins for newborn problems as well as a notable reduction in early neonatal death as compared to the ESO's pre-deployment. There was, however, an increase in referral-out for new born problems for better care to higher level facilities.

- Maternal deaths due to inappropriate management, delayed management and delayed referral were relatively higher in ESO-only facilities though this finding can be confounded by factors such as facility type etc.
- Excessive blood loss and deep incision extension were the commonest documented complications in emergency Obstetrical & Gynaecologic surgical cases being managed by the ESOs. And, surgical wound infection was the third most common complication in ESO-Only facilities occurring three times higher than in ESO-Plus facilities and the commonest documented complication following emergency surgical procedures. All the three complications are potentially avoidable with better surgical skill and infection prevention practices. However, the appropriate management provided for the majority of the complications was appropriate good practice.
- The quality of documentation of patient evaluation, follow-up and surgical procedures didn't meet standards in majority of facilities more so in ESO-Only facilities. This needs remarkable improvement.

Recommendations:-

- To further reduce proportion of intra-facility maternal deaths and improve maternal and perinatal outcomes, factors leading to delay in reaching the facilities need to be assessed and addressed accordingly. Further measures should be taken to identify and solve modifiable factors at facility level through the MDSR system.
- As travelling referred from facility to facility would be difficult for sick newborns and predispose them to more complications, strengthening the newborn care setup in the facilities would curtail these referrals and improve newborn outcomes.
- As the most common complications are excessive blood loss, deep incision extension and wound infection, focused surgical skill building support/mentoring should be considered by the stake holders of the IESO programme. In addition the facilities' IP practices need to be assessed and appropriate facility specific measures need to be taken to ensure practices according to the national IP guidelines.
- To improve the quality of documentation more emphasis need to be given during the pre-service training and facility level mentoring/supportive supervisions.

6. REFERENCES

1. Population Projection of Ethiopia for All Regions at Woreda Level from 2014 – 2017: Federal Demographic Republic of Ethiopia Central Statistical Agency, August 2013.
2. News release of CSA, 30th Januray 2015.
Accessed at <http://www.csa.gov.et/images/banners/csa2>.
3. World Health Organization, UNICEF, UNFPA, The World Bank, United Nations Population Division. Trends in Maternal Mortality: 1990 to 2013. Geneva: WHO; 2014. http://www.who.int/reproductivehealth/publications/monitoring/maternal_mortality-2013/en/.
4. Say L, Chou D, Gemmill A, Tunçalp Ö, Moller AB, Daniels J, et al. Global causes of maternal death: a WHO systematic analysis. *Lancet Glob Health* 2014 Jun;2 (6):e323–33.
5. The Partnership for Maternal, Newborn and Child Health. A Global Review of the Key Interventions Related to Reproductive, Maternal, Newborn and Child Health (RMNCH). Geneva, Switzerland: PMNCH; 2011. http://www.who.int/pmnch/topics/part_publications/essential_interventions_18_01_2012.pdf.
6. World Health Organization, UNFPA, UNICEF, Mailman School of Public Health. Averting Maternal Death and Disability (AMDD). Monitoring emergency obstetric care. A handbook. Geneva: WHO; 2009. <http://www.who.int/reproductivehealth/publications/monitoring/9789241547734/en/>.
7. World health statistics 2016: Monitoring health for the SDGs, sustainable development goals. © World Health Organization 2016.
8. Road map for accelerating the reduction of maternal and newborn morbidity and mortality in Ethiopia, 2011 – 2015: F-MOH, August 2011.
9. Health Sector Development Programme III: F-MOH, Ethiopia, 2004/05.
10. Health Sector Development Programme IV: 2010/11 – 2014/15; F-MOH, 2010.
11. Annual Performance Report EFY 2005 (2012/13), Health Sector Development Programme IV: Ethiopia F-MOH, VERSION 1, 2013.
12. Ethiopia Demographic and Health Survey 2000. Central Statistical Authority [Ethiopia] and ORC Macro. 2001. Addis Ababa, Ethiopia, and Calverton, Maryland: Central Statistical Authority and ORC Macro.
13. Ethiopia Demographic and Health Survey 2005: Central Statistical Agency, Addis Ababa, Ethiopia; ORC Macro Calverton, Maryland, USA. September 2006
14. Ethiopia Demographic and Health Survey 2011: Central Statistical Agency, Addis Ababa, Ethiopia; ICF International, Calverton, Maryland, USA. March 2012.
15. Trends in maternal mortality: 1990 to 2015: Estimates by WHO, UNICEF, UNFPA, World Bank Group and the United Nations Population Division. WHO 2015.
16. *Lancet Glob Health* 2014; 2: e323–33, May 6, 2014 [http://dx.doi.org/10.1016/S2214-109X\(14\)70227-X](http://dx.doi.org/10.1016/S2214-109X(14)70227-X)
17. Health and Health Related Indicators 2003 E.C (2010/11G.C.): F-MOH, Policy Planning Directorate, MOH, April, 2012

18. Health Sector Transformation Plan (HSTP): 2015/16 - 2019/20; F-MOH, Ethiopia. August 2015.
19. Global status report on road safety: time for action. Geneva, World Health Organization, 2009.
(http://www.who.int/violence_injury_prevention/road_safety_status/2009/en/index.html, accessed 7 February 2013.).
20. –Ethiopia <http://www.moh.gov.et/ieso>; accessed May, 2016
21. Curriculum for Master of Science course in Integrated Emergency Surgery (obstetrics, gynecology and general surgery): The Federal Ministry of Education and the Federal Ministry of Health, February 2012.
22. WHO; Task shifting: rational redistribution of tasks among health workforce teams : global recommendations and guidelines. 2008
23. Wilson A, Lissauer D, Thangaratinam S, Khan KS, MacArthur C, Coomarasamy A. A comparison of clinical officers with medical doctors on outcomes of caesarean section in the developing world: meta-analysis of controlled studies. *BMJ* 2011; 342:d2600.
24. C. Schneeberger, M. Mathai; Emergency obstetric care: Making the impossible possible through task shifting. *International Journal of Gynecology and Obstetrics* 131 (2015) S6–S9
25. De Brouwere V, Dieng T, Diadhiou M, Witter S, Denerville E. Task shifting for emergency obstetric surgery in district hospitals in Senegal. *Reprod Health Matters* 2009; 17(33):32–44.
26. Kouanda S, Coulibaly A, Ouedraogo A, Millogo T, Meda BI, Dumont A. Audit of cesarean delivery in Burkina Faso. *Int J Gynecol Obstet* 2014;125(3):214–8.
27. MOH –Ethiopia <http://www.moh.gov.et/ieso>; ©2012, accessed May, 2016).
28. H-6 NEWS H4+ Ethiopia: Task-Shifting Procedures To Non-Physician Clinicians To Save Women’s Lives (#H4plus): December 21, 2015. <https://h6partners.wordpress.com/2015/12/21/h4-ethiopia-task-shifting-procedures-to-non-physician-clinicians-to-save-womens-lives/> accessed May, 2016.
29. Scope of Practice For Health Professionals in Ethiopia: Food Medicine and Health Care Administration and Control Authority, Addis Ababa, Ethiopia, August 2013
30. National Baseline Assessment for Emergency Obstetric & Newborn Care: F-MOH, ETHIOPIA, 2008.
31. ETHIOPIAN STANDARD: Primary Hospital - Requirements; Ethiopian Standard Agency, First edition ES3617:2012.
32. ETHIOPIAN STANDARD: General Hospital - Requirements; Ethiopian Standard Agency, First edition ES3614:2012.
33. ETHIOPIAN STANDARD: Comprehensive Specialized Hospital - Requirements; Ethiopian Standard Agency, First edition ES3618:2012.

ANNEX

List of facilities assessed in the National ESO Performance Assessment

№	Facility Name	Region	Type of facility
1	Ataye hospital	Amhara	Primary (ESO-Only)
2	Boru Meda	Amhara	Primary (ESO-Only)
3	Debark hospital	Amhara	Primary (ESO-Only)
4	Debre Birhan Referral hospital	Amhara	Tertiary (ESO-Plus)
5	Debre Markos Referral hospital	Amhara	Tertiary (ESO-Plus)
6	Debre Tabor hospital	Amhara	General (ESO-Plus)
7	Dessie Referral Hospital	Amhara	Tertiary (ESO-Plus)
8	Enat hospital	Amhara	Primary (ESO-Plus)
9	Finoteselam Hospital	Amhara	Primary (ESO-Plus)
10	Hidar 11 Hospital	Amhara	Primary (ESO-Only)
11	Mehalmeda hospital	Amhara	Primary (ESO-Only)
12	Mekaneselam Hospital	Amhara	Primary (ESO-Only)
13	Mekele Patriots Memorial Hospital	Amhara	Primary (ESO-Plus)
14	Metema hospital	Amhara	Primary (ESO-Only)
15	Shegaw Motta District hospital	Amhara	Primary (ESO-Only)
16	Tefera Hailu Memorial Hospital	Amhara	Primary (ESO-Plus)
17	Woldiya General Hospital	Amhara	General (ESO-Plus)
18	Asosa Hospital	Benshangul	General (ESO-Plus)
19	Pawe Hospital	Benshangul	General (ESO-Only)
20	Gambella Hospital	Gambella	General (ESO-Plus)
21	Jugal Hospital	Harrari	General (ESO-Plus)
22	Adola hospital	Oromya	Primary (ESO-Only)
23	Arsi Robe Hospital	Oromya	Primary (ESO-Only)
24	Bale Robe Hospital	Oromya	General (ESO-Plus)
25	Batu Hospital	Oromya	Primary (ESO-Only)
26	Bedele Hospital	Oromya	Primary (ESO-Plus)
27	Begi Hospital	Oromya	Primary (ESO-Only)

№	Facility Name	Region	Type of facility
28	Bisdimo Hospital	Oromya	General (ESO-Only)
29	Bishoftu Hospital	Oromya	Primary (ESO-Plus)
30	Chiro hospital	Oromya	General (ESO-Plus)
31	Deder hospital	Oromya	Primary (ESO-Only)
32	Dodola Hospital	Oromya	General (ESO-Only)
33	Dollo Mana Hospoital	Oromya	Primary (ESO-Only)
34	Fiche Hospital	Oromya	Primary (ESO-Plus)
35	Garamuleta Primary Hospital	Oromya	Primary (ESO-Plus)
36	Gedo hospital	Oromya	Primary (ESO-Only)
37	Gendeberet Hospital	Oromya	Primary (ESO-Only)
38	Gida Ayana	Oromya	Primary (ESO-Only)
39	Gimbi Hospital	Oromya	General (ESO-Plus)
40	Ginner Hospital	Oromya	General (ESO-Plus)
41	Goba Hospital	Oromya	General (ESO-Plus)
42	Haromaya	Oromya	Primary (ESO-Only)
43	Kuyu hospital	Oromya	Primary (ESO-Only)
44	Limmu Genet Hospital	Oromya	Primary (ESO-Only)
45	Melka Oda hospital	Oromya	Primary (ESO-Plus)
46	Metu Hospital	Oromya	General (ESO-Plus)
47	Moyale district hospital	Oromya	Primary (ESO-Only)
48	Shambo Hospital	Oromya	Primary (ESO-Plus)
49	Shenen Gibe Hospital	Oromya	Primary (ESO-Only)
50	Tulubolo hospital	Oromya	Primary (ESO-Only)
51	Yabello hospital	Oromya	Primary (ESO-Plus)
52	Abomsa Hospital	SNNPR	General (ESO-Only)
53	Adare Hospital	SNNPR	Primary (ESO-Plus)
54	Arbaminch General Hospital	SNNPR	General (ESO-Plus)
55	Bona District Hospital	SNNPR	Primary (ESO-Plus)
56	Bonga hospital	SNNPR	General (ESO-Plus)
57	Butajira Hospital	SNNPR	General (ESO-Plus)
58	Chencha Primary Hospital	SNNPR	Primary (ESO-Only)

№	Facility Name	Region	Type of facility
59	Dubo St Mary primary Hospital	SNNPR	Primary (ESO-Plus)
60	Durame Hospital	SNNPR	General (ESO-Plus)
61	Gidole Primary Hospital	SNNPR	Primary (ESO-Only)
62	Jinka general Hospital	SNNPR	General (ESO-Plus)
63	Karat District Hospital	SNNPR	Primary (ESO-Only)
64	Kelle Primary Hospital	SNNPR	Primary (ESO-Only)
65	Kulito Hospital	SNNPR	Primary (ESO-Plus)
66	Leku primary Hospital	SNNPR	Primary (ESO-Only)
67	Sawla Hospital	SNNPR	Primary (ESO-Only)
68	Tercha General Hospital	SNNPR	General (ESO-Plus)
69	Worabe Hospital	SNNPR	Tertiary (ESO-Plus)
70	Degahabur Hospital	Somali	General (ESO-Plus)
71	Filtu hospital	Somali	General (ESO-Plus)
72	Gode Hospital	Somali	General (ESO-Plus)
73	Abiy Adi General Hospital	Tigray	General (ESO-Only)
74	Adi Daero Primary Hospital	Tigray	Primary (ESO-Only)
75	Adigrat General hospital	Tigray	General (ESO-Plus)
76	Adigudom Primary hospital	Tigray	Primary (ESO-Only)
77	Adishihu primary hospital	Tigray	Primary (ESO-Only)
78	Birshwa primary Hospital	Tigray	Primary (ESO-Only)
79	Dewhan primary hospital	Tigray	Primary (ESO-Only)
80	Edagarbi primary hospital	Tigray	Primary (ESO-Only)
81	Enticho primary hospital	Tigray	Primary (ESO-Only)
82	Fatsi Primary Hospital	Tigray	Primary (ESO-Only)
83	Fire Sematat primary Hospital (Hawzen)	Tigray	Primary (ESO-Only)
84	Hagereselam Primary hospital	Tigray	Primary (ESO-Only)
85	ketema-Nigus	Tigray	Primary (ESO-Only)
86	Maiari sheraro	Tigray	General (ESO-Plus)
87	Mehoni primary hospital	Tigray	Primary (ESO-Only)
88	Meorie -General Hospital	Tigray	General ESO-Only
89	Muhi Primary hospital	Tigray	Primary (ESO-Only)

№	Facility Name	Region	Type of facility
90	Mytsebri primary hospital	Tigray	Primary (ESO-Only)
91	Samre Primary hospital	Tigray	Primary (ESO-Only)
92	Selekleka Primary Hospital	Tigray	Primary (ESO-Only)
93	Semema Hospital	Tigray	Primary (ESO-Only)
94	Wekoit Primary hospital	Tigray	Primary (ESO-Only)
95	Wukro General Hospital	Tigray	General (ESO-Only)
96	Yechilla Primary Hospital	Tigray	Primary (ESO-Only)