

**KNOWLEDGE AND SKILLS RETENTION AMONG HEALTH PROVIDERS  
TRAINED IN ADVANCED LIFE SUPPORT IN OBSTETRICS IN CAMEROON**

**By**

**NGORAN GRACE BONGBAN**

**REG NO: SN/PGMNH/08/13**

**A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENT  
OF THE DEGREE OF MASTER OF SCIENCE IN NURSING (MScN) OF MOI  
UNIVERSITY**

**2015**

**DECLARATION**

Declaration by Candidate

“This thesis is my original work and has not been presented to any other university/institution”

Students Name: Ngoran Grace Bongban

Sign----- Date: -----

Declaration by Supervisors:

“This thesis has been submitted to Moi University with our approval as University supervisors”

Prof. Peter Maina Gatongi (PhD)

Associate Professor Epidemiology

Moi University School of Public Health

Signed ----- date -----

Mrs. Isabella I. Mbai (MScN)

Moi University School of Nursing

Signed ----- date -----

**DEDICATION**

This thesis is dedicated to the glory of God and to my husband Dr. Ngah Edward Ndze and children Kongbunri Edward Ndze Junior, Ndze Samuel Berinyuy and Ndze Favour Nyuydini.

## **ACKNOWLEDGEMENT**

I owe the completion of this work to the Almighty God for giving me the strength to carry out the work.

My sincere gratitude goes to my able supervisors; Prof. Peter Maina Gatongi and Mrs. Isabella Mbai for their relentless efforts in guiding and timely correcting my work to the realization of this thesis.

I wish to really appreciate my husband Dr. Ngah Edward Ndze for encouraging and sponsoring me to do this course and for his intercessory prayers during my difficult moments.

My profound gratitude goes to Dr.and Dr/Mrs. Welty for sponsoring the project, their technical, and material support for this thesis and for connecting me with the supportive network.

I wish to sincerely thank Dr. Alan Tita, Yan Li, Dr. Jeff Sezychoski, Dr.Comfort Enah and Frida Tende for helping in data cleansing and analysis.

Many thanks go to Sister Dotty Meyer for her technical advice and support.

My sincere gratitude goes to the Director of CBCHS Prof. Tih Pius for completely involving the system in this survey and to the research assistants Mrs. Ndi Maria, Mr. Monjuh Anthony, Mrs. Kenchi Hope Banlon , Mrs. Pheungeh Beniolute, Mrs. Nga Priscila, Dr. Atta Constance Ndum, Mrs. Tih Emmaculate, Mrs. Tangwa Doris, Mrs. Yuniwoh Delphine, who stood the test of the day to ensure that data was collected without any bias.

I wish to sincerely appreciate Dr. Nancy Palmer who despite her busy schedule, created time to follow and oversee my data collection.

I wish to register profound gratitude to my two daughters Miss Yvonne Balack and Miss Racheal Nyuyfoni who took care of my children during my period out of home on study. I also wish to appreciate my children Kongbunri Edward Ndze Jr, Ndze Samual Berinuyuy and Ndze Favour Nyuydini for their relentless prayers, good wishes and good behavior during my absence from home.

## **ABSTRACT**

### **Introduction**

Advanced Life Support in Obstetrics (ALSO) is an educational programme meant for the preservation and passage of knowledge and skills necessary to deal with urgent and emergent conditions that arise during the course of labour and delivery of care by using mannequins, mnemonics and evidence-based approaches.

### **Objective**

The aim of this study was to determine knowledge and skills retention 6-30 months following the ALSO training in Cameroon, determine factors that affect retention and relationship between knowledge and skills retention with confidence in managing obstetric emergencies.

### **Method**

This was a before and after study where data collected immediately after ALSO training (available in Cameroon Baptist Convention Health Services(CBCHS) computerized archive under control of the personnel manager) was compared with data collected 11 to 30 months after the training by administering questionnaire and the same practical exam that was given immediately after training.

### **Result**

There were 100 participants, 32(32%) met the criteria for knowledge/skill (KS) retention. The level of KS retention 41% during survey was significantly lower compared to 66% ( $p=0.0003$ ) recorded immediately after training. Five potential predictors: being an instructor, number of vacuum deliveries performed, location of practice, time since training, and participant's profession were significantly associated with KS retention. Participants who worked in urban area were 5.9 (95%CL 1.34-25.71) times more likely to retain their KS than those who worked in rural area. Instructors were 8.3 times more likely to retain their KS than non-instructors. Generally, the participants who retained KS were more confident in managing obstetric emergencies.

### **Conclusion**

Only 32% of ALSO providers trained in Cameroon under the CBCHS were able to retain their KS 11 to 30 months after training. Factors positively affecting KS retention were: being an instructor, number of vacuum deliveries performed, working in urban area, time since training, and participants' profession. Participants who retained their knowledge and skill tend to feel more comfortable in managing obstetric emergencies than those who did not retain their KS, except for maternal resuscitation.

**Recommendations:** This study recommends that refresher courses should be carried out at least on yearly basis. ALSO providers should be rotated between urban and rural areas. Similar studies be carried out on real life situation of human patients to assess the affective domain of care.

## TABLE OF CONTENT

DECLARATION .....	ii
DEDICATION.....	iii
ACKNOWLEDGEMENT.....	iv
ABSTRACT Introduction .....	v
TABLE OF CONTENT .....	vi
LIST OF TABLES .....	viii
ABBREVIATIONS .....	ix
DEFINITION OF TERMS.....	x
CHAPTER ONE: INTRODUCTION.....	1
Background.....	1
PROBLEM STATEMENT .....	3
JUSTIFICATION .....	4
RESEARCH QUESTIONS.....	4
OBJECTIVES OF THE STUDY.....	4
SCOPE OF STUDY.....	5
CHAPTER TWO: LITERATURE REIEW .....	6
CHAPTER THREE: METHODOLOGY.....	22
Study Area and Setting.....	22
Study population.....	25
Validity of Study.....	26
Reliability .....	27
Data Collection and Procedure .....	27
Pilot study.....	29
Data Management .....	30
Data Analysis.....	30
Limitations of the study.....	31
Ethical Considerations .....	31
Dissemination of Findings.....	32
CHAPTER FOUR: RESULTS.....	33
CHAPTER FIVE: DISCUSSION.....	42

Factors determining the level of skill and knowledge retention.....	43
CHAPTER SIX: CONCLUSIONS.....	50
RECOMMENDATIONS .....	50
REFERENCES .....	52
APPENDICES .....	58
APPENDIX 1: CONSENT TO PARTICIPATE IN ALSO TRAINING STUDY.....	58
APPENDIX 2: SURVEY QUESTIONNAIRE .....	61
APPENDIX 3: TRAINING MATERIAL FOR RESEARCH ASSISTANTS ON USE OF CHECKLIST FOR PRACTICAL (MEGA DELIVERY) EXAM .....	71
APPENDIX 4: CHECK LIST FOR PRACTICAL (MEGA DELIVERY) EXAM .....	74
APPENDIX 5: IREC APPROVAL LETTER .....	77
APPENDIX 6: CBCIRB APPROVAL LETTER.....	78
APPENDIX 7: SAMPLE INVITATION LETTER TO THE PARTICIPANTS BY THE DIRECTOR OF CBCHS.....	79

## LIST OF TABLES

Table 4.1 Comparison of scores between the before and after test .....	34
Table 4.2 Mega delivery score and retention by time interval .....	35
Table 4.3 Relationship between KS retention and location of practice instructors inclusive .....	35
Table 4.4 Relationship between KS retention and location of practice after adjusting for instructors .....	36
Table 4.5 Relationship between KS retention and being an instructor.....	36
Table 4.6 Knowledge and skill retention based on participants' profession.....	37
Table 4.7 Knowledge and skill retention based on comparison of participants' professions .....	37
Table 4.9 Association between KS retention and confidence in managing obstetric emergencies between participants who meet criteria for KS retention and those who did not using Fisher's exact test at significant level of 0.05. ....	38
Table 4.10 Relationship between KS retention or non-retention and confidence in managing obstetric emergencies.....	39
Table 4.11 the association between KS retention/non retention and confidence in managing the various obstetric emergencies .....	40
Table 4.12 Logistic model showing the relationship between KS retention or non-retention and confidence in managing vacuum delivery .....	41



**ABBREVIATIONS**

AAFP: American Academy of Family Physician

ACNM: American College of Nurse-Midwives

ALSO: Advanced Life Support in Obstetrics

BLSO: Basic Life Support in Obstetrics

CBCHS: Cameroon Baptist Convention Health Services

CBLSO: Community Basic Life Support in Obstetrics

CBT: Competency Based Training

CDC: Centre for Disease Control

DHSC: Demographic Health Survey in Cameroon

EOC: Emergency Obstetric Care

KS: knowledge and skills

LSO: Life Support in Obstetrics

SBA: Skilled Birth Attendants

TBA: Traditional Birth Attendants

UNICEF: United Nations Children Emergency Fund

WHO: World Health Organization

**DEFINITION OF TERMS**

**ALSO PROVIDER:** This refer to those participants who have completed an ALSO provider course.

**INSTRUCTORS:** These are participants who have successfully completed an ALSO instructor course and have taught in the ALSO provider course.

**MEGA DELIVERY EXAMINATION:** This is a practical assessment utilizing multiple modules assessing the student's ability to recognize the need for: assisted vaginal delivery, demonstrate appropriate knowledge and manual skills to perform assisted vaginal delivery, shoulder dystocia and postpartum haemorrhage including non-pharmacologic and pharmacologic approaches.

**CRITICAL KNOWLEDGE AND SKILL RETENTION:** This is defined as maintenance or improvement of baseline knowledge and practical skills demonstrated from post mega delivery test (score 1) to final mega delivery assessment (score 2) of  $\geq 70\%$ .

**URBAN AREA:** This is a location characterized by high human population density and vast human-build features in comparison to the areas surrounding it.

**RURAL AREA:** this is a geographic area that is located outside cities and towns with very low population density

## CHAPTER ONE: INTRODUCTION

### Background

Life support in emergency obstetric courses is being advocated all over the world particularly in Sub-Saharan Africa where the maternal mortality ratio (MMR) constitutes 99 per cent of the world maternal mortality ratio (WHO, 2012). In-service training represents a significant financial investment for supporting continued competence of obstetric care workforce. Without follow-up to determine the effectiveness of such trainings, there could be huge financial losses without any benefit. “Post course evaluation immediately after short course training can help to demonstrate knowledge and skills retention” (Yang et al 2012). Many studies have shown that knowledge is adequately retained after such training but skills deteriorate rapidly.

“ALSO is an educational programme designed to assist health care professionals to effectively manage emergencies that occur during provision of obstetric care. It is an intensive 2-day course covering the recognition and management of the most common causes of maternal morbidity and mortality in the world with lectures and scenarios using easy to remember mnemonics and mannequins” (AAFP,2014). The course was introduced in Cameroon by the Cameroon Baptist Convention Health Services (CBCHS) in May 2012 as a complementary effort to the Ministry of Health’s effort in empowering health providers towards achieving the fourth and fifth Millennium Development Goal (MDG 4& 5). To date, there have been no studies assessing knowledge and skills retention following ALSO training in Cameroon. To be able to effectively plan trainings that will continuously make impact, it is necessary to evaluate knowledge and skills retention following such trainings.

Although Cameroon has “the 9<sup>th</sup> highest MMR of 690 maternal deaths per 100,000 live births” according to WHO report of 2012, much can still be done before the deadline of 2015 for MDG if health care workers are well equip with the necessary skills and knowledge to handle obstetric emergencies .

Many countries have evaluated the impact of ALSO (AAFP, 2012). Since the introduction of ALSO in Cameroon, no study has been carried out to evaluate its effect. The best way to evaluate the impact of such a programme will be to measure the effect on maternal and child mortality ratio. But since this programme is just two years old in Cameroon and only 156 providers have been trained so far at different time intervals within these two years, MMR evaluation will not give us a true effect of the programme. This study was undertaken to ascertain knowledge and skill retention by the providers and factors affecting retention after the training in order to ensure its effective implementation by tailoring future ALSO training to different levels of staff taking into consideration their facility, capacity level and equipment needs. This study results will be used to determine ways to maximize knowledge and skills retention by ALSO providers by effectively addressing the identified factors and tailoring trainings and refresher courses to meet the study recommendations.

Hammond, Saba, Simes and Cross (2000), in assessing retention of registered nurses’ knowledge 18 months after initial training in Advanced Life Support (ALS) demonstrated “that the participant’s theoretical knowledge remained at an equivalent level over the 18 months’ time frame but only 75 per cent of participants passed the practical skill assessment components with 25 per cent requiring a second attempt to pass”.

According to a systematic review of retention of adult advanced life support knowledge and skills in health care providers by Yang et al (2012), it was found that “there is lack of large well-designed studies to examine the retention of knowledge and skills in health care providers following life support trainings”. According to their findings, “the available evidence suggests that ALS knowledge and skills decay 6 months to 1 year after training and that skills fade faster than knowledge”. In their recommendation, they suggested that “additional studies are needed to help provide evidence based recommendations for assessment of current knowledge and skills and need for refresher training of ALS competency”.

## **PROBLEM STATEMENT**

The need for management of obstetrical emergencies is great globally and especially in developing countries, where maternal deaths account for 99 percent of the total global maternal mortality rate (WHO, 2012). In Cameroon, the maternal mortality ratio is 690 maternal deaths per 100,000 live births (WHO, 2012) and as such there is a greater need for knowledge and skill on managing obstetric emergencies.

For the programme like ALSO to be effective, providers responsible for the implementation should be able to maintain an adequate level of knowledge and skills on managing obstetric emergencies. Lack of knowledge and skills retention could compromise the competency level to manage obstetric emergencies after ALSO training. It is therefore critical to identify possible controllable factors that affect knowledge and skills retention after training. In this regard, this study sought to evaluate the knowledge and skills retention following ALSO training.

## **JUSTIFICATION**

Evaluating knowledge and skill retention after such training will generate evidence on the most effective programme for mounting refresher courses. Knowing the factors that affect knowledge and skill retention can pave ways for opportunities to control those factors. Good knowledge and skill retention can yield better management outcome and eventually facilitate future studies to determine the impact of programmes in reducing maternal and child mortality in Cameroon.

## **RESEARCH QUESTIONS**

1. Is there a difference in skill and knowledge 6 and 30 months after training as compared to that attained immediately after the ALSO training?
2. What factors determine the level of skill and knowledge retention 6 to 30 months after the training?
3. Are staffs with adequate knowledge and skill retention more confident in managing obstetric emergencies compare to those with inadequate retention of knowledge and skill?

## **OBJECTIVES OF THE STUDY**

### **Main objective**

To determine knowledge and skills retention among providers trained on ALSO 6 to 30 months after ALSO training and factors affecting the retention

### **Specific objectives**

1. To evaluate knowledge and skill retention among ALSO-trained providers 6 to 30 months after training

2. To determine the factors that influence knowledge and skill retention 6 to 30 months after training.
3. To determine the association between skill/knowledge retention and the confidence of managing obstetric emergencies.

### **SIGNIFICANCE OF THE STUDY**

Cameroon has “the 9<sup>th</sup> highest maternal mortality ratio in the world and a high infant mortality rate” (UNICEF 2013). Expanding training in obstetric and newborn emergency management to all levels of staff and facilities that provide maternity services has the potential to significantly reduce maternal and infant mortality and morbidity. Evaluating knowledge and skills retention after such training will enable us to know when to plan refresher courses. Good knowledge and skill retention can yield better management of obstetric emergencies by providers and eventually will facilitate future studies to determine the impact of the programme in reducing maternal and child mortality in Cameroon. Determining factors that affect knowledge and skills retention following such trainings can help the country health promoters to work on such factors when implementing health care programmes

### **SCOPE OF STUDY**

The baseline study was limited to the total population of 156 health workers who completed ALSO training mounted by CBCHS since the first course in 2012 and the facilities in their places of work that enabled them to practice.

## CHAPTER TWO: LITERATURE REVIEW

### **Background of Advanced Life Support in Obstetrics (ALSO)**

ALSO is an educational programme meant for the preservation and passage of knowledge and skills necessary to deal with urgent and emergent conditions that arise during the course of labour and delivery of care by using mannequins, mnemonics and evidence-based approaches. It was developed by family physicians Doctor James Damos and Doctor John Beasley, through the University of Wisconsin, Department of Family Medicine” (AAFP, 2014). The initial ALSO course was presented in September, 1991 (Taylor, 1998).

According to Mark, Lee and Winslow (2007),” the course grew rapidly in the United States, reaching the point that it required more management than could be provided by the Wisconsin group and in 1993, the course was taken over by the AAFP”. “As ALSO expanded to developing countries, an international work group was formed in 2005 to make ALSO more relevant to the needs and resources of these countries” (Deutchman et al, 2007). The recognized needs are to address maternity care issues unique to developing countries through a modification of the course materials to include the Global ALSO supplemental manual and the basic life support in obstetrics (BLSO) programmes (AAFP, 2014).

### **Philosophy Behind ALSO**

According to Penny & Murray (2000), “ALSO is a structured, evidence-based, multidisciplinary educational programme that teaches the cognitive and procedural skills necessary to effectively manage obstetrical care emergencies”. The philosophy behind ALSO is that “women and their families will benefit from the standardized,



multidisciplinary approach to maternity care demonstrated during the course” (AAFP, 2014). All maternity practitioners know that there are many safe and acceptable ways of dealing with different emergency situations. “The procedures and approaches covered in the ALSO course are reasonable, consistent and evidence-based which enable everyone to not only identify those at risk of obstetrics emergencies but also to manage the emergencies when they arise” (AAFP, 2012).

### **Global ALSO**

“The Global ALSO programme is an addition to the U.S. ALSO programme and was created as a result of the ALSO programme expanding internationally. This is the modification mainly to target the epidemiological, medical, technological, pedagogical and cultural contexts where ALSO is taught. Included on the Global ALSO program are: instructions about introduction of ALSO courses to new regions using the ‘teach the teachers’ model, addition to each of the chapters in the main syllabus to give them an international context and to address issues relevant to developing countries that are not covered in the existing chapters” (Deutchman, Dresang and Winslow 2007). “New chapters addressing important clinical issues not covered in the main syllabus are also added with recommendations for how midwives, doctors and other skilled birth attendants can best interact with traditional birth attendants (TBAs) to develop clinical protocols and to create teamwork within the nation’s health care system and teacher training and resources for working with TBAs who may have limited literacy” (AAFP, 2014).

### **Basic Life Support in Obstetrics**

“This is a subset of ALSO content and addresses three of the five leading causes of maternal mortality in the world – haemorrhage (24%), eclampsia (12%), and obstructed

labour (8%) as well as Malpresentation, safety in maternity care and neonatal resuscitation” (AAFP, 2013). As a subset of ALSO, BLSO uses similar language, techniques and case studies thus creating a common learning experience and language for its participants. The hope is that this commonality of experience will create a common bond to foster communication and partnership between ALSO and BLSO providers (AAFP, 2009). “The BLSO course was designed for adult learners and requires their active participation. The format for the presentation of the BLSO curriculum will depend on the level of preparation of the learners. The curriculum could also be serialized to meet the needs of learners who are unable to take more than a few hours away from their work. BLSO creates a bridge to bring specific knowledge and skills to recognize and respond appropriately to the major causes of maternal and newborn death and disability to providers who do not provide obstetrical and newborn care as their primary responsibility” (AAFP, 2009).

### **Models for introducing the ALSO programme**

“A number of models have been used when introducing ALSO to a country for the first time. The most common and successful method has been “a week-long series of courses using a train-the-trainer model”. In this model, “a group of international ALSO instructors teach a 2-day ALSO provider course followed by a 1-day ALSO instructor course to a group of host-country’s clinicians. This is followed by the evaluation and assisting of the newly trained instructors as they teach a new group of host-country’s clinicians. Mannequins are donated. In just a week’s time, a core group of instructors is then empowered to promulgate ALSO throughout their institution, country and region” (AAFP 2014).

An alternative to the above model is “for a host country to send a core of clinicians to a country where ALSO is already established to take a provider and instructor course” (AAFP, 2014)

According to Shereen & Susan (2000), the “competency based approach to training (CBT) places great emphasis on acquiring skills through hands on practice and repetition”. They observed that “it is based upon higher order behaviorist theory, with its stimulus-response approach to learning, and uses behavioral objectives, programmed texts, modelling, and self-assessment tasks aiming at mastery of specific knowledge and skills”. It is probably the most influential emergency obstetric care training programme for developing country use to be developed so far.

### **Nature of the ALSO Provider Course**

The ALSO programme starts with a large evidence-based manual distributed to the participants at least a month to the course which should be read thoroughly before the course begins. Learning on the ALSO course occurs through syllabus reading and didactic lectures, the use of hands on work stations and mannequins and memorization of easy to remember mnemonics. Assessment methods include a written test and a “mega delivery” testing exercise, as well as long term follow-up on comfort with the procedures and self-reported changes in practice (AAFP, 2014). The actual course is supposed to last for 2 days. Mnemonics are used to prompt appropriate responses in emergency situations. The usual ratio of participants to instructors is 5:1. ALSO is a multidisciplinary course aimed at benefiting everyone who provides maternity care (Penney & Murray, 2000).

## **Objectives and Content of the ALSO Provider Course**

Participants who successfully complete the course will be able to:

- 1) Manage emergencies during pregnancy, labour, delivery and in postpartum
- 2) Improve outcomes for women and their babies in an evidence-based manner
- 3) Recognize the value of multidisciplinary working in maternity care
- 4) Pass the written and practical examination at the end of the course (AAFP, 2012).

The material covered by the ALSO provider course is updated regularly as new evidence-based practice information become available and topics currently include:

- a) Safety in maternity care
- b) First trimester bleeding
- c) Medical complications of pregnancy
- d) Pre-eclampsia/eclampsia
- e) Third trimester bleeding
- f) Preterm labour and premature rupture of membranes
- g) Labour dystocia
- h) Malpresentation/ multiple fetuses
- i) Vacuum delivery
- j) Shoulder dystocia
- k) Postpartum haemorrhage
- l) Maternal resuscitation
- m) Neonatal resuscitation
- n) Cesarean delivery
- o) Manual vacuum aspiration (AAFP, 2014)

### **ALSO in Cameroon**

The CBCHS conducted the first ALSO training in Cameroon in May 2012, using the train-the-trainer model. The training was carried out by Certified ALSO Faculty from the Institute of Family Medicine in Kenya and the United States with the help of some donor organizations. From 2012 to date, eight ALSO provider trainings have been carried out for a total of 156 maternity care providers, including 22 who became certified instructors. Since the initial introduction of ALSO in Cameroon, only one (the advanced course) out of the three levels (advanced, basic, and community) of life support in obstetrics has been used so far. Beginning with the initial ALSO training in 2012, the CBCHS have offered slightly longer provider and instructor courses than those used in the USA (3 days, as opposed to 2 days for provider courses, and 2 days, as opposed to 1 day for instructor courses), because it was assumed that Cameroonian participants would require longer training than in the USA where the course was first initiated.

### **Assessing the Effectiveness of Emergency Obstetrics Care Trainings**

According to Crofts et al (2007),” practical multiprofessional, obstetric emergency training increased midwives’ and doctors’ knowledge of obstetric emergency care management. They also observed that, neither the location of training, in a simulation center or in local hospitals, nor the inclusion of teamwork training made any significant difference to acquisition of knowledge in obstetric emergencies”.

In a study in Somalia assessing the impact of emergency obstetric care training, Ameh et al (2012) observed that “the training impacted positively on the availability and quality of emergency obstetrics care and resulted in up-skilling of midwives”

Sloan et al. (1998), in evaluating the use of life saving skills training using the American College of Nurse-Midwives (ACNM) modules, along with the introduction of new equipment in Ghana, found that “the detection of life-threatening obstetric conditions improved at the primary and the secondary health facility levels, and that management of such conditions improved only at secondary level”. Because indications of negative effects of the training intervention were included in the evaluation, it was also revealed that, “in some cases, increase in confidence accompanied by poor level of understanding had resulted in mismanagement”.

Shereen and Murray (2000) observed that “competency-based training, problem-solving approaches and management of change all represent important advances in the techniques of training”. They found that “in the evaluation area, things have moved from the days when a written test of knowledge and perhaps a final day student evaluation were all that one could expect to find as tools for judging the value of such courses or training intervention”. They suggested that “methods allowing for the detection of iatrogenic effects and the missing elements of the training are a valuable and important addition”.

Sullivan and McIntosh (1996) observed that “emergency obstetrics care (EOC) training in under-resource settings is not a straightforward matter. Shortcomings such as poor pre-service training, lack of good equipment and lack of obstetric protocols in the work place can substantially hinder the positive learning process that EOC in-service training courses are designed to offer”. Where pre-service training has not encouraged the development of analytical ability or teamwork, nor provided sufficient clinical training, projects have discovered that there is often a need to bring the health workers up to an

acceptable skills and knowledge level before new skills may be taught (Sullivan & McIntosh 1996).

According to Theron (1999) “the Perinatal Education Programme in Eastern Cape Province, South Africa was developed in recognition of the reality that providing courses in academic centers or during visits to individual towns was only reaching a small proportion of midwives”.

According to Penny and Murray (2000), “there are four main sources of information that can be used to assess the effectiveness of emergency obstetric care trainings. These include:

- 1) “Learner assessments of their own learning”:

To have satisfactorily met the trainees’ needs, as defined by the trainee is often considered an important measure of success in educational enterprises. Simple satisfaction ratings conducted at the end of the course of training are of limited value by themselves, given that they are dependent upon the initial levels of expectation and can be bound by courtesy conventions.

Evaluation by Taylor of the impact of the ALSO course on the performance of the former students used a Likert scale measure of ‘comfort’ with the procedures surveyed at 6 months and at a 1 year follow-up, and correlated with changes in reported practice patterns (Taylor, 1998).

“Critical incident analysis is another method in which the usefulness of training for real life practice can be charted. Trainees can be asked to relate critical incidents that have

occurred for which the course did not provide them with adequate training, thereby providing information on which additions to the training might be made” (Rich & Parker, 1995)

2) “Service user/ community assessment”:

Increased service acceptability to users and to the community as a result of the training may also be used as a measure of effectiveness of training interventions. Exit interviews or community surveys are the usual means of gathering this type of information. According to O’Rourke (1995), Gilson & Goldman (1998), “a pre-intervention study had shown considerable fear of admission to hospital among the public in general and poor attitudes of health professionals to client”.

3) “Trainers Assessment of Skills Acquisition/Competency Measures”:

“The cognitive domains of learning are often tested in written examinations or in practical tests towards the end of courses” (Taylor, 1998). Sullivan and McIntosh (1996) observed that “competency based training programmes typically have skills acquisition as their measure of success and used observed competency checklists which are applied by the trainers”.

Competence includes not only appropriate skills and supporting knowledge, but also appropriate values, referred to as “attitudes” within nursing and midwifery. “Although skills and competencies are often used interchangeably, competence signifies not only the performance of a task, but also the underlying knowledge and attitudes” (Duffield, 1991). “Competency is person-oriented, referring to the person’s underlying characteristics and qualities that lead to an effective performance in a job” (McMullen et al, 2000). Duffield



(1991) observed that lack of competence is a lack of knowledge, skills or judgment, which may be accompanied by a negative attitude. According to World Health Organization (WHO) (2001),” there is a view that a competency-based approach might run the risk of returning to task orientation rather than a more holistic approach”.

- 4) “ Proxy measures for health outcomes, derived from routine service delivery status”:

“Despite the very real difficulties in evaluating the various interventions that are put in place when a training programme is implemented, an imperative to demonstrate impact on health outcomes is often felt. While the main goal of all EOC trainings would be a reduction in maternal and perinatal mortality and morbidity rates, these are not practical indicators for measuring the impact of trainings projects” (Campbell, 1999). According to Bhuyian (1997), “some routine service delivery data can be used to develop proxy measures of the health impact of their training interventions”. The strengthening of Emergency Obstetrics Care Project in Bangladesh, for example, which involved training in emergency obstetrics care provision for medical officers, nurses, family welfare visitors and medical technologists, chose case fatality rates and caesarean section rates, as measure of impact.

“Where detailed perinatal and maternal deaths audits have been introduced as part of the package of interventions, midwives and doctors can participate in an ongoing process of self-evaluation that can identify improvements in care and any weaknesses, in provider skills and service provision, was done for example, in the Nepal Safe Motherhood Project” (Theron, 1997).

According to a study in Rwanda by Homaifar et al. (2013), assessing knowledge and practical skills retention among medical students following a short training course, it was demonstrated that “the 2 day emergency obstetric courses increased knowledge among medical students and the knowledge gained from these courses were retained for up to 9 months but practical skills deteriorated”.

In a study to determine knowledge retention on cardiopulmonary resuscitation by residents of Anesthesiology following an educational electronic package by Mireskander et al. (2012), “knowledge retention was noted to be enhanced only for six months”.

In a study to assess retention of neonatal resuscitation skills and knowledge by Janusz, Cheryl & Meryll (1998), it was observed “that the overall participants had significantly lower scores at follow-up than at baseline thus indicating deterioration in both neonatal skills and knowledge.”

In assessing the long term knowledge retention following simulation training for uncommon but critical obstetrical events, it was observed that residents and attending physician scored significantly higher overall following the second simulation training than they did immediately after the first simulation training (Vadnais et al, 2012).

According to Bennett (1998), assessing factors that influence skill decay and retention; it was observed that there is an increase in the amount of skill decay as the length of the non- practice interval increases.

According to Reseir (2011) in assessing post-initial training providers’ skill retention on helping babies breathe, it was observed that beyond four months after

helping babies breathe training, providers skills are deteriorating below the accepted standards.

In assessing knowledge and skills retention of mobile phone data collection protocol in Liberia, it was observed that 63.6 percent of participants displayed evidence of statistically significant knowledge and skills retention (Munro et al 2014)

In a study by Jurjus et al (2014), assessing the anatomical knowledge retention in third-year medical students prior to obstetrics and gynecology and surgery rotation, there was a significant drop in retention overall ( $p = 0.009$ ) from 86.9% to 51.5% from cohort as first year students in the anatomy course.

According to Gobezyehu et al (2014), educational attainment was among the few variables found to significantly predict test performance, when assessing the knowledge and skills retention among frontline health workers in rural Ethiopia. The result also demonstrated an overall strong retention of knowledge and skills among health extension workers as compared to guide team members and demonstrated that across regions, health workers scored lowest on steps that involved non-action.

In a study by Crofts et al (2013) to determine the retention of factual knowledge after practical training for Intrapartum emergencies, training was found to be associated with sustained retention of factual knowledge of obstetric emergency care for at least one year even though the decay in knowledge was small compared with the original gain in knowledge.

Following assessment of long-term knowledge retention of single day simulation training for uncommon but critical obstetrical events, attending physicians were found to remained more comfortable managing these scenarios up to one year later, however, knowledge retention diminished with time (Vadnais et al, 2012).

In a study to evaluate home-based lifesaving skills in Matlab, Bangladesh, it was determined that, knowledge testing of community health research workers showed strong retention with an increase in mean scores between immediate post-training and one year post training (from 78.7% to 92.7%) (Dynes et al 2011).

While studying the effectiveness of an Obstetrics- Based Advanced Cardiac Life Support Education Program, it was observed that nurses reported statistically significant increases ( $p < 0.001$ ) in 13 elements of satisfaction and self-confidence following completion of the course (Roth et al, 2015).

According to a study by Walker, Fetherston & McMurray (2013) assessing perceived changes in knowledge and confidence of doctors and midwives to manage obstetric emergencies following completion of an Advanced Life Support in Obstetrics course in Australia, it was demonstrated that there was a significant improvement in confidence and perceived knowledge of the recommended management of all the 17 emergency situations immediately post course ( $p < 0.001$ ) but, however, there was a significant decrease in knowledge and confidence for many emergency situations from immediately post course to six weeks post course ( $p < 0.05$ ) was observed in both groups.

In assessing ALSO international development, Deutman, Dresang and Winslow (2007) observed that “when the ALSO program is introduced to a new country or region, methods that have resulted in programs becoming self-sustaining should be used.

Wynne et al. (1990) in assessing disparity between confidence and competence in cardiopulmonary resuscitation training, reported that they did not find a correlation between the amount of training and perceived confidence, and noted that a rise in confidence is not necessarily reflected by a rise in competence.

In assessing cardiopulmonary resuscitation (CPR) skills retention and self-confidence of preclinical medical students, it was observed that confidence and CPR skills deteriorate significantly within a year post training, reaching an unacceptable level two years post- training (Avisar et al. 2013).

In a study comparing the impact of a training program in pediatric cardiopulmonary resuscitation on the knowledge and skills of in-service and pre-service nurses at specified time points, it was determined that the in-service nurses seemed to fare better at skills at the beginning as well as at the end of the study (Sankar et al. 2013).

According to Nori et al. (2012) in evaluating how often nurses need CPR training, it was determined that significant deterioration in both CPR knowledge and psychomotor skills was observed two years after the training program.

Evaluating staff’s retention of ACLS and BLS knowledge and skills by written and performance tests (initial, post-training, and final testing), it was found

that only 30% and 14% of participants passed ACLS tests taken at 3 and 12 months respectively (Smith et al 2008).

In a study evaluating the impact of ALSO in Honduras, it was suggested that ALSO improves clinician comfort of managing obstetrical emergencies (Dresang et al, 2015).

## **THEORETICAL FRAMEWORK**

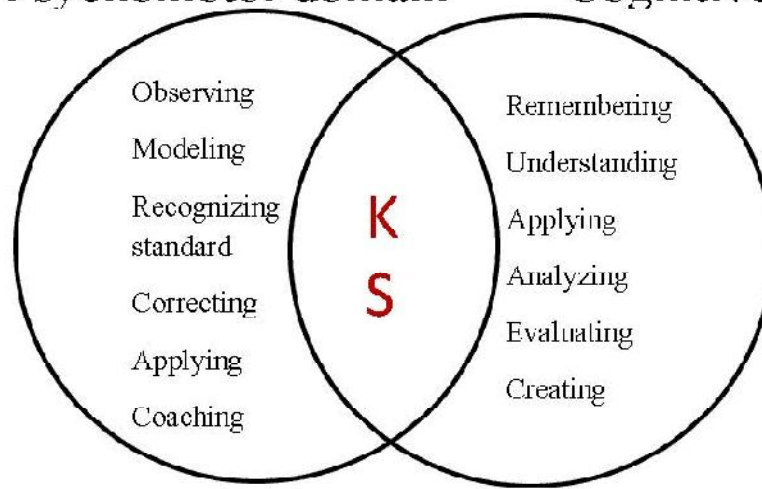
It draws upon educational theory such as Bloom's work on the different domains of learning. It divides educational objectives into two "domains": cognitive, and psychomotor (sometimes loosely described as "knowing/head", and "doing/hands" respectively. Bloom's attributes the qualities of remembering, understanding, applying, analyzing evaluating and creating to the cognitive domains, those of observing, modeling, recognizing standard, correcting, applying and coaching as psychomotor, manual or physical skills. Within the domains, learning at the higher levels is dependent on having attained prerequisite knowledge and skills at lower levels. A goal of Bloom's Theory is to motivate educators to focus on creating a more holistic form of education (Bloom et al 1956).

Bloom et al (1956)

Psychomotor domain

Cognitive domain

- Bloom et al (1956)
- Psychomotor domain      Cognitive domain



## **CHAPTER THREE: METHODOLOGY**

### **Study Area and Setting**

This study took place in Cameroon. Cameroon is a Central African country situated at the end of the Gulf of Guinea. It has a total surface area of 475650km<sup>2</sup> and is bordered to the West by Nigeria, to the North East by Chad, to the East by The Central African Republic, to the South by Congo, Gabon and Equatorial Guinea, and to the South-West by the Atlantic Ocean (UNICEF, 2013).

Cameroon is a bilingual country with French and English as its official languages. The constitution divides the country into 10 semi-autonomous regions, each under the administration of an elected Regional council. Each region is headed by a presidentially appointed governor. The Northwest and Southwest regions were once part of British Cameroon; the other eight regions were in French Cameroun. The regions are subdivided into 58 divisions headed by presidentially appointed divisional officers who perform the governor's duties on a smaller scale. The divisions are further subdivided into subdivisions, headed by assistant divisional officers. The districts, administered by district heads are the smallest administrative units (Decret No 2008/376 du 12 November 2008).

According to UNICEF (2013), Cameroonian population was estimated in 2012 at 20,386,799 inhabitants with economic growth of 4.4% and poverty rate 40% in 2007.

The national health system in Cameroon is pyramidal in setup comprising administrative and/or management structures and healthcare structures. In term of organization, it is organized into three levels, namely:



The Central or Strategic level is made up of the central services of the ministry of Public Health and national hospitals, charged with formulating the health policy of the country.

The Intermediate level or Technical Support level comprises regional delegations of public health and regional and related hospitals, tasked with the programming and supervision of activities in the field and provision of technical support to the health districts.

The Peripheral level or level of Operationalization of programme activities comprises district health services, district hospitals, sub divisional medical centers and integrated health centers. The health center is the first level of contact for the population, and offers a minimum package of activities; this level constitutes the interface between the health care services and beneficiary communities (WHO, 2013).

“There are a total of 191 health districts, 3677 health facilities and a ratio of 1.07/1000 health personnel to inhabitants” (UNICEF, 2013). The types of health personnel in Cameroon working in maternal and child health units includes obstetricians, surgeons, pediatricians, general practitioners, bachelor’s level (BNS) nurses, midwives, nurse/midwives, state registered nurses, assistant nurses (2 years of training), nursing assistants (1 year of training), nursing auxiliaries, community maternal child health aide(ComCHA) and traditional birth attendants.

“The epidemiologic profile of Cameroon is dominated by transmissible diseases and the prevalence of disease tends to increase over time” (WHO, 2009). “ The leading causes of death in Cameroon include: AIDs, malaria, lower respiratory tract infections, diarrheal disease, cancer, stroke, ischemic heart disease, road injuries, meningitis and sepsis” (CDC, 2013).

“The Cameroonian national health system consists of various public and private entities, institutions, and organizations that provide health services, under the regulation of the Ministry of Public Health” (MoPH, 2010). The principal provider of health care in Cameroon is the public sector, and then faith based organizations. “Recently, there has been an overwhelming presence of traditional Cameroonian medicine and Chinese traditional medicine” (Adidja Amani, 2010).

More than half of the population in Cameroon lives in urban areas. Maternal mortality remains very high and has not significantly decreased since 1990. “ The maternal mortality rate (MMR) of Cameroon is 690 maternal deaths per 100,000 live births, the ninth highest MMR in the world, and classified as making no progress to achieving the 5<sup>th</sup> MDG” (WHO, 2012).

The CBCHS is one of the faith based organizations that provide healthcare in six out of the ten regions in Cameroon. It has 5 hospitals, 26 integrated health centers staffed by nurses, and more than 50 primary health centers. The 3 largest hospitals (Banso Baptist Hospital, Mbingo Baptist Hospital and Mboppi Baptist Hospital) have surgeons and general medicine doctors; Banyo has one doctor, but provides minor surgeries done by a nurse. Mbem has no doctor. The only hospital with an obstetrician/gynecology doctor is Mboppi, and the only one with a pediatrician is Mbingo. The health centers are staffed by nurses and, provide low-risk obstetric delivery, refer high-risk cases to hospitals, and do not offer surgical services. The ALSO providers came from all CBCHS hospitals and several integrated health centers and only one from a primary health center. Government and other faith-based ALSO providers came from district and regional hospitals plus multiple health centers. Apart from the big hospitals with some ALSO equipment, most of

the health units do not have equipment. The CBCHS has developed a sustainable plan for facilities to purchase appropriate equipment through the CBCHS Central Pharmacy as often as needed.

### **Study population**

The participants involved in this study were ALSO providers trained under the CBCHS 6 to 30 months before data collection. A total of 156 ALSO providers from 6 regions in Cameroon of mixed cadre and from different types of facilities were trained during the period. A total population of ALSO trainees was 156 and those who turned up for this exercise were 100. This was a significant proportion (at 64% turn up) of the entire population of the trainees.

### **Study design**

The participants were picked consecutively to the optimal availability in terms of turning up for the study. Those who turned up (100) participated in the mega delivery exercise and their scores were matched with their initial scores soon after the training. The two scores were compared. Even though the study intended to survey participants from 6 to 30 months, by the time of data collection, the interval between the initial training and this period was 11 to 30 months.

**Inclusion Criteria**

The study targeted those who took the ALSO course and had worked for more than six months.

**Exclusion Criteria**

The study excluded health workers who took the ALSO course elsewhere apart from under the CBCHS training.

**Validity of Study**

Types of validity to be considered in this study are content and face validity. Content validity was achieved by formulating a checklist similar to a standardized ALSO checklist which has been tested in many studies and consistently use in ALSO trainings to facilitate consistent scoring of each participant's performance on the practical skill assessment. A questionnaire was formulated from the post course evaluation form by the AAFP. The questionnaire was also given to an Epidemiologist, who is the Associate Director for AIDS care and Prevention Programme for CBCHS, Professor of Maternal-Fetal Medicine Division & Centre for Women's Reproductive Health at University of Alabama at Birmingham and a Nurse/Midwife Consultant in the U.S for review before being implemented.

Face validity was achieved by formulating a questionnaire and checklist that were clear. These tools also underwent reviews before were used.

## **Reliability**

To ensure reliability, a structured checklist similar to a standardized ALSO checklist was used to score the mega delivery performance. The questionnaire contained questions that were not ambiguous but clearly stated what was needed. The words were simplified to avoid misinterpretation. The results of each participant were discussed by the investigator and the research assistant after the participant completed the mega delivery exam.

## **Data Collection and Procedure**

The researcher worked together with the CBCHS and the North West Regional Delegation for Health to get participants from several nearby facilities to attend at central locations where data was collected by the principal investigator, assisted by trained research assistants. Since the study involved a lot of health workers, the investigator discussed the study with the CBCHS, and the Cameroon ALSO faculty, the owner of the programme for support and cooperation. Their full cooperation was received. Participants were called by the investigator to six different locations: Mbingo, Bamenda, Bango, Mutengene, Mboppi and Banyo where data was collected. This was to brief them on the study and to obtain their verbal consent. The invitation letters to the central locations were prepared and sent to the participants who gave their verbal consent by the CBCHS from the office of the Director of Health Services. The invitation letters were sent together with the consent form and equipment check list to enable them check all the equipment they have in their inventory in their various centers to avoid errors. Participants were invited to health facilities nearest to their respective work stations to avoid problems of accommodation. Only the instructors from distant locations and very few providers

from places where the central areas were not close to their work stations were accommodated during the survey. The instructors were first surveyed and then trained as research assistants immediately after their survey. They immediately went back to their various stations and were then used as research assistants in their various stations or close to their stations. Most of the movements were made by the investigator to the central locations where research assistant were already deployed as their work stations. Most of the participants only covered short distances from their stations which enabled them to go back the same day after data collection.

Data was collected in six central locations (Banso, Mbingo, Banyo, Bamenda, Mutengene and Mboppi). The investigator first trained the ALSO Programme Manager for Cameroon as a research assistant. The investigator and the programme manager then administered the skills assessment exam which was the same with the one the participants took immediately after the ALSO training alongside questionnaire to the ALSO instructors. After collecting data from the instructors, the instructors were then trained as research assistants by the investigator to collect data in the six locations listed above. Each participant was administered a practical skills exam similar to the one taken immediately after training to assessed critical tasks, including: ability to recognize the need for assisted vaginal delivery; demonstration and knowledge of manual skills with vacuum extraction; ability to recognize and manage shoulder dystocia; and ability to recognize and manage postpartum haemorrhage. A standardized ALSO checklist which has been tested in many studies as indicated in the literature review was used to facilitate consistent scoring of each participant's performance on the practical skills assessment. Points were awarded for each of the critical tasks, and a total score out of 100 were calculated for each participant. The

same standard ALSO mega delivery post-test was re-administered to each individual and comparison of their scores with their original mega delivery post-test scores immediately after they took the course, was done using archived records of their initial post-test results. This helped to answer specific objective 1.

A qualitative survey questionnaire evaluating the participant's demographics, profession, level of education, comfort levels in managing various obstetric emergencies, feedback on ALSO training and ALSO equipment checklist was developed and administered. Retention of knowledge and skill were defined as maintenance or improvement of baseline knowledge and practical skills demonstrated from post mega delivery test to final mega delivery assessment. The questionnaire data was linked to the mega delivery test scores for each individual, in order to correctly stratify them according to prior professional training and level of facility in which they work. The responses were marched with the result of the mega delivery exams to take care of objectives 2 and 3.

### **Pilot study**

Before data collection, the questionnaire was pretested on 10 ALSO providers who have not worked for up to 6 months after training. The pilot study was conducted in Mboppi Baptist Hospital in Cameroon. The participants included in the pilot were not part of those recruited for the assessment. The result of the pilot was used to modify the evaluation tools. Through the pilot testing, the investigator assessed comprehension, acceptance, and feasibility of the study. Further refinement was done after the pilot.

## **Data Management**

The collected data was put into 2 data sets: Excel – Survey Questionnaire and Excel – Equipment Listing of windows 8 of the investigator personal computer. The information is kept in a file code that is only known by the investigator. The data is also saved in a flash drive for backup. The hardcopies are kept under lock and key.

## **Data Analysis**

The entered data was cleaned by scrutinizing for inconsistencies, errors and omissions. The ones that were not clear or had inconsistencies were reviewed by the investigator from the hard copies and the necessary corrections made.

The mega delivery scores taken immediately after the ALSO training (*score1*) and the mega delivery scores attained during the study (*score2*) were treated as continuous variables first and paired t-test was used to test the difference between these two scores. The two scores were then dichotomized as pass ( $\geq 70\%$ ) or fail ( $<70\%$ ) and McNemar's test was used to test the difference between two binary scores. Linear regression was used to determine the factors that affect the level of skill and knowledge retention several months after the training. Starting with a model with *score2* as dependent variable, and *score1* and other covariates\*as predictors, the stepwise regression method with selection criteria  $p < 0.05$  was used for model selection and the most parsimonious model was retained as the final model. Comfort level questions were collapsed from four categories (uncomfortable, neutral, fairly comfortable and very comfortable) into two categories (uncomfortable and comfortable) and Fisher's exact test was used to test the association between knowledge/skill retention and the comfort levels in handling obstetric emergencies. All the statistical analysis was done in SAS 9.3. Except for multiple



comparisons of participants' professions and KS retention that SPSS version 19 of windows 8 was used.

### **Limitations of the study**

The use of mannequins limited the assessment of the third aspect of Broom's theory (affection) thus only two aspects (cognitive and psychomotor) were assessed. There could be bias in the self-reporting method used in the survey to assess the comfort level. The scoring of the mega delivery exam was based on the subjective judgment of the investigator and the research assistant. Some of the participants did not answer all the questions. Some of the participants did not create time to go through their equipment inventory to fill the equipment checklist despite the fact that the checklist was sent to them weeks before the survey. Some stations had equipment stored in cartons without the knowledge of maternity staff that such equipment were available in their centers. Some participants confessed they did not perform to their best because of exam tension despite the clear explanations by the investigator.

### **Ethical Considerations**

Ethical approval was obtained from The Institutional Research and Ethical Committee (IREC) of Moi University, Eldoret, and the CBCHS Institutional Review Board. The following were considered in this study:

- Informed consent was obtained from all participants
- Confidentiality, privacy and anonymity were maintained by not putting the names of the participants on the checklists and questionnaire. Instead, identification codes were put on the questionnaire and checklists and it was

only the investigator who had information of names and identification numbers.

### **Dissemination of Findings**

Tables were used to present the results of this study. Explanations followed each table so as to give clear meaning. The result of this study will be presented to faculty members of Moi University for the study was a partial fulfillment of a master's degree. The results will also be presented to the Institutional Review Board of the CBCHS and will be disseminated to the ALSO faculty members of Cameroon. The results will be presented in the ALSO International conference and will be published in a midwifery journal.

## CHAPTER FOUR: RESULTS

This chapter presents the results of this study based on the objectives formulated in chapter one. The general purpose of the study was to determine knowledge and skills retention among health providers trained on ALSO 11 to 30 months after ALSO training was carried out in Cameroon and also to determine factors affecting this retention. Results were presented as per objectives. This chapter presents the findings and analysis of the variables involved in the study.

Specific objective one: To determine knowledge and skill retention 11 to 30 months after training

There were 100 subjects in the ALSO survey dataset. The percentage of respondents who passed (>70%) the second test was significantly lower than those who passed the first test (41% vs 66%,  $p < 0.0001$ ). Among the 66 (66%) respondents who passed the first test, 30 (45.5%) failed (<70%) in the second test, and among the 34 (34%) respondents who failed the first test, 5 (14.7%) passed the second test. The paired t-test for the two mega delivery scores indicated the scores in the second test were significantly lower than in the first test (95% CI (-0.22, -0.12),  $p < 0.0001$ ). The percentage of respondents who met the critical knowledge and skill retention of 70% were 32 (32%).

**Table 4.1 Comparison of scores between the before and after test**

		Paired Samples Test							
		Paired Differences					t	df	Sig. (2-tailed) Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
Lower	Upper								
Pair 1	MEGA DELIVERY RESULTS IMMEDIATELY AFTER ALSO TRAINING - MEGA DELIVERY RESULTS DURING SURVEY	17.3	24.7	2.5	12.3	22.2	6.9	98	0.000

Analysis of the scores immediately after training and during survey was compared for any significant difference using the paired t-test approach. The results are as presented in table 4.1 above. There was a significant difference in the scores before and during the survey  $p=0.000$ ,  $t=6.94$ ,  $df=98$ .

**Table 4.2 Mega delivery score and retention by time interval**

Time interval	N observations	Mean Score 1	Mean Score 2	Mean Score 2- mean Score 1	Retention ,%
11	12	66	48	-18	72.73
14	22	57	37	-20	64.91
17	16	79	74	-5	93.67
21	14	73	37	-36	50.68
24	3	88	61	-27	69.3
25	13	85	62	-23	72.94
30	20	79	76	-3	96.2

This table shows knowledge and skills retention at various time intervals with 30 months interval being the highest with KS retention of 96.2% and 21 months interval being the lowest with KS retention of 50.68%.

Specific objective two: factors that influence knowledge and skills retention 11 to 30 months after training.

**Table 4.3 Relationship between KS retention and location of practice instructors inclusive**

Location of practice	Odds Ratio Estimate	95% Wald Confidence interval
Urban vs Rural	5.86	1.34 25.71

This table shows that at 95% confidence level, participants who worked in urban areas were 5.9 times more likely to retain knowledge and skills than those in rural areas.

**Table 4.4 Relationship between KS retention and location of practice after adjusting for instructors**

<b>Effects</b>	<b>Odds Ratio Estimates</b>	<b>95% Wald confidence limits</b>
Urban vs. Rural	<b>4.91</b>	<b>1.26 19.06</b>

On excluding instructors from the logistic model, the odds of KS retention based on location of practice was 4.9 thus indicating that, ALSO providers who worked in urban area were 4.9 times more likely to retain their knowledge and skills than those who worked in rural area.

**Table 4.5 Relationship between KS retention and being an instructor**

<b>Effect</b>	<b>Odds Ratio</b>	<b>95% Wald Confidence intervals</b>
Instructor vs. non-instructor	8.33	2.20 31.52

This table shows that at 95% confidence level, instructors were 8 times more likely to retain their knowledge and skills than non-instructors

**Table 4.6 Knowledge and skill retention based on participants' profession**

		Sum of Squares	df	Mean Square	F	Sig.
MEGA DELIVERY RESULTS IMMEDIATELY AFTER ALSO TRAINING	Between Groups	547.422	5	109.484	.938	.469
	Within Groups	3969.553	34	116.752		
	Total	4516.975	39			
MEGA DELIVERY RESULTS DURING SURVEY	Between Groups	585.687	5	117.137	1.881	.124
	Within Groups	2117.088	34	62.267		
	Total	2702.775	39			

This table shows that overall, there was no significant difference in KS retention among the professions. However, as shown below, on disaggregating the professions, there was significant difference in KS retention between General practitioners and Brevete Midwives and between General practitioners and Nursing Assistants.

**Table 4.7 Knowledge and skill retention based on comparison of participants' professions**

Profession	95% confidence interval		p-value
General practitioner vs. Brevete midwife	-25	-0.5	0.04
General Practitioner vs. Nursing Assistant	-29.14	-1.36	0.03

This table shows that at 95% confidence level, there was a significant difference in KS retention of General practitioners versus with Brevete midwives with p-value 0.04 as compared to General practitioner versus nursing assistant with p-value of 0.03.

**Table 4.8 Association between knowledge and skills retention and the number of vacuum deliveries performed**

	Value	df	Sig. (2-sided)
Pearson Chi-Square	21.195 <sup>a</sup>	13	.049
Likelihood Ratio	24.500	13	.027
N of Valid Cases	99		

This table shows that at 95% confidence level, there was a significant association between KS retention and the number of vacuum deliveries performed:  $\chi^2 = 21.195$  (p=0.049, df=13).

Specific objective three: relationship between KS retention and confidence in managing obstetric emergencies.

**Table 4.9 Association between KS retention and confidence in managing obstetric emergencies between participants who meet criteria for KS retention and those who did not using Fisher's exact test at significant level of 0.05.**

Condition	Retained (N=32) n (%)	Not retained (N=68) n (%)	$\chi^2_1$	df	p-value
First trimester bleeding	26 (81.3)	49 (72.2)	0.98	1	0.32
Preeclampsia/eclampsia	25 (78.1)	48 (70.6)	0.63	1	0.43
Third trimester bleeding	27 (84.4)	48 (70.6)	2.21	1	0.14
Preterm labour and PROM	27 (84.4)	47 (69.1)	2.63	1	0.10
Labour dystocia	25 (78.1)	46 (67.6)	1.16	1	0.28
Malpresentation	26 (81.3)	42 (61.8)	-	1	0.07*
Multiple fetuses	29 (90.6)	55 (80.9)	1.54	1	0.22
Vacuum delivery	24 (75.0)	36 (52.9)	4.41	1	0.04
Shoulder dystocia	24 (75.0)	49 (72.1)	0.10	1	0.76
Postpartum haemorrhage	29 (90.6)	61 (89.7)	-	1	>0.99*
Maternal resuscitation	22 (68.8)	51 (75.0)	0.43	1	0.51
Neonatal resuscitation	26 (81.3)	55 (80.9)	0.002	1	0.97

This table shows that participants who retained their knowledge and skill tend to feel more comfortable in managing obstetric emergencies than those who didn't retain their



knowledge or skill, except for maternal resuscitation. However, only the association between KS retention and the comfortable level in managing vacuum delivery is statistically significant (Fishers exact = 4.41,  $p=0.04$ ).

**Table 4.10 Relationship between KS retention or non-retention and confidence in managing obstetric emergencies**

**Variables in the Equation**

	B	S.E.	Wald	df	Sig.	Exp(B)
VACCUMDELIVERY(1)	2.277	.887	6.592	1	.010	9.749
F1STTRIMESTERBLEEDING(1)	1.011	1.141	.786	1	.375	2.748
PREECLAMPSIA(1)	1.881	.991	3.603	1	.058	6.558
PRETERMLABOUR(1)	1.111	1.253	.787	1	.375	3.038
LABOURDYSTOCIA(1)	.671	1.009	.442	1	.506	1.956
Step 1 <sup>a</sup> MAPRESENTATION(1)	-.211	1.253	.028	1	.866	.810
MULTIPLEFETUSES(1)	-.433	1.164	.138	1	.710	.649
SHOULDERDYSTOCIA(1)	-1.399	1.084	1.665	1	.197	.247
POSTPATUHEMORAGE(1)	-.800	1.371	.340	1	.560	.449
MATERNALRESUSCISOTATION(1)	-.574	.961	.356	1	.551	.564
NEONATALRESOSCITATION(1)	-1.429	1.313	1.184	1	.276	.240
Constant	-1.529	1.095	1.948	1	.163	.217

From the table above, the only significant predictor for KS retention or non-retention and confidence in managing OB emergencies was vacuum delivery p-value of 0.01.

**Table 4.11: Association between KS retention and confidence in managing the various obstetric emergencies**

Emergency condition		CONFIDENCE				ODDS RATIO
			YES	NO	TOTAL	
First trimester bleeding	KS	Yes	26	6	32	1.7
		No	49	19	68	
Preeclampsia/eclampsia	KS	Yes	25	7	32	1.5
		No	48	20	68	
Third trimester bleeding	KS	Yes	27	5	32	2.3
		No	48	20	68	
Preterm labour and PROM	KS	Yes	27	5	32	2.4
		No	47	21	68	
Labour dystocia	KS	Yes	25	7	32	1.7
		No	46	22	68	
Malpresentation	KS	Yes	26	6	32	2.7
		No	42	26	68	
Multiple fetuses	KS	Yes	29	3	32	2.3
		No	55	13	68	
Vacuum delivery	KS	Yes	24	8	32	2.7
		No	36	32	68	
Shoulder dystocia	KS	Yes	24	8	32	1.2
		No	49	19	68	
Postpartum haemorrhage	KS	Yes	29	3	32	1.1
		No	61	7	68	
Maternal resuscitation	KS	Yes	22	10	32	0.7
		No	51	17	68	
Neonatal resuscitation	KS	Yes	26	6	32	1.0
		No	55	13	68	

The table above shows that, except for maternal and neonatal resuscitation, those who retained skills and knowledge were more confident in managing obstetric emergencies than those who did not.

**Table 4.12 Logistic model showing the relationship between KS retention or non-retention and confidence in managing vacuum delivery**

	B	S.E	Wald	Df	Sig.	Exp
Vacuum delivery	1.674	0.519	10.404	1	0.001	5.33
Constant	-1.540	0.450	11.725	1	0.001	0.214

From the table above, it shows that the probability of getting an individual who had retained KS among those who were comfortable in performing vacuum delivery was 0.534. It follows that the probability of getting an individual who has not retained KS and yet comfortable with performing vacuum delivery was  $=1-0.534=0.466$ . That is 46.4% of those who were comfortable with vacuum delivery had not retained critical skills.

## CHAPTER FIVE: DISCUSSION

### Introduction

This chapter will discuss the findings of the study. The discussion has been done in sections according to the objectives of the study.

### **Differences between knowledge and skill retention, 11 to 30 months after training as compared to immediately after training**

Thirty two participants (32%) met the criteria for critical KS retention (70%). This is defined as maintenance or improvement of baseline knowledge and practical skills demonstrated between post mega delivery test (score 1) and final mega delivery assessment (score 2) of  $\geq 70\%$ . This study revealed a significant difference in the scores before and during the survey ( $t=6.94$ ,  $p=0.000$ ,  $df=98$ ) thus signifying low KS retention by participants trained on ALSO 11 to 30 months after training. Given that the retention of ALSO knowledge and skills is a key factor in determining competence in managing obstetric emergencies and there are not ALSO specific studies focusing on knowledge and skills retention alone over time, the findings of other studies will be considered in this aspect. In a similar study by Dynes et al. (2011), assessing knowledge testing of community health research workers, it was revealed that there was strong retention with an increase in mean scores between immediate post-training and one year post training (from 78.7% to 92.7%). A study by Smith et al (2008) evaluating staff's retention of Advanced Cardiac Life Support (ACLS) and Basic Life Support (BLS) knowledge and skill by written and performance test found that only 30% and 14% of participants passed ACLS test taken at 3 and 12 months respectively. In another study by Crofts et al. 2013, training was associated with sustained retention of factual knowledge of obstetric emergencies care

for at least one year but decay was small compared to the original gain in knowledge. The findings of this study are consistent with that of Janusz, et al 1998 who observed that there was deterioration in both neonatal skills and knowledge as the overall participants had significantly lower scores at follow-up than at the baseline scores and a study by Smith et al (2008), which found that only 30% and 14% of participants passed ACLS tests taken at 3 and 12 months respectively. Landauer et al (1978) in a psychological research study showed that a decline in knowledge is not unexpected as forgetting is a natural psychological phenomenon.

### **Factors determining the level of skill and knowledge retention**

This study showed that participants who worked in urban areas were more likely to retained their knowledge and skills than those who worked in rural areas as shown in table 4.4 (odds 4.9 at 95% confidence level). The higher retention rates among staff in urban areas probably reflected more repetition due to their higher volume of patients with obstetric emergencies. In a study by Gobezyayehu et al. (2014), it was observed that health workers scored lowest on steps that involved non-action. The same study demonstrated an overall strong retention among health extension workers compared to guide team members. Another reason why participants in urban areas maintained adequate knowledge and skill could be because of the availability of equipment use in managing obstetric emergencies as well as facilities with caesarean capabilities in the urban areas than in the rural areas. This study is limited in assessing the relationship between equipment versus knowledge and skills retention due to the relatively small sample size compared to the number of equipment and the number of missing values for each equipment. It is therefore recommended that the equipment list be reclassified into a smaller categories before the

association between equipment availability and KS retention can be analyzed. In a study evaluating the use of life saving skills along with the introduction of new equipment in Ghana, it was found that the life threatening obstetric conditions improved at the primary (rural equivalent) and secondary (urban equivalent) health facility levels, and the management of such conditions improved only in secondary level (Sloan et al 1998). The study however has a limitation because it did not have a control group and therefore the baseline knowledge and skills of the participants could have influenced the post training assessment results. Based on these findings, it would be recommended that participants be rotated between rural and urban areas so as to maintain adequate knowledge and skills in managing obstetric emergencies.

There was excellent retention among instructors at any time between 11 and 30 months after ALSO training as shown in table 4.5 (odds ratio 8.33 at 95% confidence level). This could be because instructors were constantly preparing and teaching the provider courses thereby building progressive experience which enhanced their performance. Consequently, they had a higher chance of remembering what was taught during the ALSO provider course than the non-instructors thus giving them high chances for knowledge and skill retention than the non-instructors. High knowledge and skills retention by the instructors can be of great benefit if they are distributed in all facilities to ensure effective implementation of the knowledge and skills in managing obstetric emergencies. In a study by Deutchman, Dresang & Winslow, 2007, it was revealed that characteristics of self-sustaining ALSO programs include a strong organizational structure, use of a train-the trainer model to introduce the course, and encouragement of competing groups to work together. In a study by Crofts et al. 2013, it was observed that repeating

the simulation after training brought about additional improvement to physicians skills in managing Intra-partum emergencies. The findings of this study is consistent with a study assessing the long term knowledge retention following simulation training that resident and attending physicians scored significantly higher overall following the second simulation training than they did following the first simulation training (Vadnais et al 2012). Frequent planning of refresher courses every year could bring additional improvement to knowledge and skills retention among participants.

The study also revealed a significant knowledge and skills retention among physicians as compared to Brevete midwives ( $p=0.04$  at 95% confidence level) and nursing assistants ( $p=0.03$  at 95% confidence level). This could be because physicians had more obstetric training during their professional training, were usually called to attend to obstetric emergencies and they always had frequent didactics that may contribute to knowledge and skills retention on management of obstetric emergencies than did Brevete midwives and nursing assistants. The poor knowledge and skill retention by the nursing assistants could be because they had the least professional training and subsequently obstetric training. According to the maternal and child health policy of Cameroon, nursing assistants are not licensed to conduct delivery or manage any obstetric emergency condition. They are supposed to identify and refer cases whenever they encountered some but because of the shortage of human resource for health in Cameroon, nursing assistants conduct deliveries in health centers as well as manage obstetric emergencies. To be able to close the knowledge and skills retention gap, it will be recommended that nursing assistant be trained on basic life support in obstetrics which is one of the package of Global ALSO. In a study by Deutchman, Dresang & Winslow, (2007) it was observed that when the ALSO

program was introduced to a new country or region, methods that have resulted in programs becoming effective should be used. In a study by Vadnais et al. 2012, physicians demonstrated improved knowledge immediately after training while residents maintained improved knowledge at one year. A study comparing the impact of a training program in pediatrics cardiopulmonary resuscitation on knowledge and skills on in-service and pre-service nurses demonstrated that the in-service nurses seemed to fare better at skills at the beginning as well as at the end of the study probably because in-service nurses learned skills during their nursing curriculum or service period. This study is limited to the fact that it did not have a control group, and therefore the baseline knowledge and skills of physicians, Brevete midwives and nursing assistants could have been assessed to see whether they influenced knowledge and skills retention. To enable effective evaluation of profession on knowledge and skill retention, it will be recommended that pre-course evaluation should be used as a control group when conducting similar studies.

From the results, it was evident that there was a significant association between the number of vacuum deliveries performed and knowledge and skill retention ( $X^2 = 21.2$ ,  $df = 13$ ,  $p = 0.049$ ). It is generally known that as the skills are put into practice an individual will eventually become perfect. Consequently, those who made good use of their skill managed to maintain knowledge and skills. A study by Vadnais et al. 2012 observed that simulation training can result to short-term and contribute to long term improvement of objective measure of knowledge and skills in managing uncommon but critical obstetrical events and that repeat exposure to simulation training can yield additional benefits. A meta-analysis on skill decay revealed a loss of acquired skills from non-use or a lack of practice (Bennett 1998). Ensuring the availability of equipment in all units where ALSO



participants were working gave them the opportunity to make good use of the learnt skills and knowledge.

Participants with the longest time interval (30 months) had the highest percentage of knowledge and skills retention (96.3%) while those with 21 months' time interval had the least knowledge and skills retention. This is not because longer time interval helps improve knowledge and skills retention but because of the inclusion of the instructors in the category of 30 months interval since they were the first to be trained. Instructors were eight times more likely to retain their knowledge and skills than non-instructors. In addition, most of the participants in the 30 months interval group worked in urban areas and the study showed that those who worked in urban areas were five times more likely to retain their knowledge and skills than those in the rural area. Majority of the participants in the 21 months interval worked in rural areas and as such were five times less likely to retain their skills than their counterparts in the urban areas. In a study by Vadnais et al 2012, residents maintained improved knowledge for one year. Knowledge testing of community health research workers showed strong retention with an increase in mean scores between immediate post-training and one year post training (from 78.7% to 92.7%). Another study by Walker, Fetherston & McMurray (2013) observed a significant decrease in knowledge for many emergency situations from immediately post-course to six weeks post course ( $p < 0.05$ ). A study by Nori et al (2012) demonstrated a significant deterioration in both cardiopulmonary resuscitation knowledge and skills two years after training. All these facts could probably explain the poor correlation observed in this study between time interval and knowledge and skills retention. More studies controlling for confounding

factors such as being an instructor and working in rural and/or urban area would perhaps be required to give more conclusive results in this respect.

### **The impact of knowledge and skill retention in maintaining confidence in managing obstetric emergencies**

Participants who retained their knowledge and skill tended to feel more comfortable in managing obstetric emergencies than those who didn't retain their knowledge and skill, except for maternal resuscitation. However, the only significant predictor for knowledge and skill retention or non-retention and confidence in managing obstetric emergencies was vacuum delivery (Fisher's exact test = 4.41,  $df = 1$ ,  $p = 0.04$ ). Results in Table 4.11 showed that, except for maternal and neonatal resuscitation, those who retained knowledge and skills were likely more confident in managing obstetric emergency than those who did not. Table 4.12, showed that the probability of getting an individual who had retained knowledge and skills at critical level and was comfortable in performing vacuum delivery was 0.534. It followed that the probability of getting an individual who had not retained knowledge and skills and yet was comfortable with performing vacuum delivery was 0.466 ( $1-0.534$ ). This meant that 46.4% of those who were comfortable with vacuum delivery had not retained critical knowledge and skills. It is likely that high confidence with low knowledge and skill retention can lead to case mismanagement thereby reflecting a risk. According to a cohort study evaluating the impact of ALSO in Honduras, it was suggested that ALSO improves clinician comfort of managing obstetrical emergencies (Dresang, et al 2015). A study by Sloan et al. (1998) evaluating the negative effects of training intervention revealed that increase confidence accompanied by poor level of understanding had resulted in case mismanagement. A study by Wynne et al (1990) reported that they did

not find a correlation between the amount of training and perceived confidence, and noted that a rise in confidence is not necessarily reflected by a rise in competence. Another study by Avisar et al. (2013) revealed that confidence and cardiopulmonary resuscitation skills of preclinical medical students deteriorated significantly within one year post-training, reaching an unacceptable level two years post training. It was established that, there was a significant improvement in confidence and perceived knowledge of the recommended management of all the 17 emergency situations immediately post course ( $p < 0.001$ ) (Walker et al. 2013). Roth et al (2015) also reported that the course increased self-confidence of obstetric nurses in their ability to perform advanced cardiac life support algorithms. From the above findings, a poor negative correlation between knowledge/skill retention and confidence in managing obstetric emergencies was demonstrated thus signifying risk. However, this study was limited in that the confidence was being perceived by the participants and the use of mannequins for the mega delivery exams could not have given the proper opportunity to assess the affective domain of care where confidence could be effectively measured through observing participants performance with human being. It is therefore recommended that further studies be carried out using human beings where affective domain of care could be adequately evaluated.

## **CHAPTER SIX: CONCLUSIONS**

The following conclusion and recommendations were drawn from this study:

- Thirty two percent (32%) of the participants retained critical knowledge and skills
- Five potential predictors of knowledge and skill retention were: being an instructor, number of vacuum deliveries performed, interval between two tests, location of practice, and profession of participants.
- Participants who retained their knowledge and skills at critical level tended to felt more comfortable in managing obstetric emergencies than those who did not except for maternal resuscitation.
- 54 percent of those who retained knowledge and skills felt comfortable managing obstetric emergencies while 46 percent of those who did not retained knowledge and skills felt comfortable performing vacuum deliveries which signify a risk.

## **RECOMMENDATIONS**

For ALSO participants to be able to retained adequate knowledge and skills in managing obstetric emergencies in Cameroon, the researcher recommends the following:

- There is need to develop ALSO training policy that covers criteria of selection of participants for suitable package for each professional group, and yearly refresher courses
- There is need for rotation of participants between rural and urban areas
- Subsequent studies should consider pre-training test result as a control group and consider assessing the three components of Bloom's Theory (cognitive, psychomotor and affective aspects) using human beings.

- Impact of availability of equipment on KS retention should be carried out reclassifying equipment into few categories.
- Effect of time interval on KS retention should be investigated controlling for confounding factors such as being an instructor and working in urban or rural areas.
- Studies on outcome of patients with vacuum assisted delivery by health workers who did not retain knowledge and skills but were comfortable in vacuum delivery should be carried out.

## REFERENCES

- Alexandre D., Gaye A., Patricia M., & Marie H (2005) Emergency Obstetric Care in developing countries: *impact of guidelines implementation in a community hospital in Senegal*. BJOG: an International Journal of Obstetrics and Gynaecology, vol.112, pp.1264-1269.
- Ameh C., Adetoro A., Hofman J. Fouzia M.F., Ahmed F.M., Nynke V.D. 2012. The impact of emergency obstetric care training in Somaliland, Somalia. International Journal of Gynecology and Obstetrics 117: 283-287. [www.elsevier.com/locate/ijgo](http://www.elsevier.com/locate/ijgo)
- American Academy of Family Physician (2012). ALSO Instructor Manual. University of Wisconsin
- American Academy of Family Physician (2009). ALSO International
- American Academy of Family Physician (2014). International and Global ALSO
- Avisar L, Shiyovich A, Limor A.D & Nesher L (2013). Cardiopulmonary Resuscitation skills Retention and Self Confidence of Preclinical medical students. IMAJ. 15. October 2013.
- Beasley J., Dresana L., Winslow D., & Damos J. (2005). The Advanced Life Support in Obstetrics Program: fourteen years of progress. Prehospital and Disaster Medicine; (20(4): 271-5. (Level 3).
- Bennett, W. (1998). Factors that influence skill decay and retention : A quantitative review and analysis. Human Performance, 11(1), 57-101.  
doi:10.1207/s15327043hup1101\_3
- Bhuyian A.B. (1997). Safe Motherhood Asia 1997 workshop, April 6-11, UNICEF and CIDA
- Bloom B.S, (1956). Taxonomy of Educational Objectives, Handbook1: *The Cognitive Domain*. New York: David Mckay Co Inc. [www.manchester.edu](http://www.manchester.edu)
- Campbell O. (1999). Measuring progress in safe motherhood programmes: *Uses and limitationsof health outcomes indicators in: Berer M, Sundar, Ravindran T.K*

(eds). *Safe Motherhood initiative critical issues*. London: Blackwell Science Ltd  
for Reproductive Health Matters

Centre For Disease Control (CDC) in Cameroon (2013). Factsheet.  
[www.cdc.gov/globalhealth](http://www.cdc.gov/globalhealth)

Celine M., Taylor H., Baxley E. (2002). *Advanced Life Support in Obstetrics Instructor Manual*. Shawnee Mission (KS): *American Academy of FamilyPhysicians*: 1-175  
(level 2).

Crofts J.F, Fox R, Draycot T.J, Winter C, Hunt L.P, Akanda V.A, (2013). Retention of  
factual knowledge after practical training for Intrapartum emergencies. *Int J*  
*Gynaecol obstet*. Oct; 123(1):81-5, doi:10.1016/j.ijgo.2013.04.015

Crofts J. F., Ellis D., Draycott T.J., Winter C., Hunt L. P. and Akande V. A (2011).  
Change in knowledge of midwives and obstetricians following obstetrics  
emergency training: *arandomized controlled trial of local hospital, simulation*  
*centre and teamwork training*. *International Journal of Obstetrics and Gynecology*  
RCOG Do1:10.1111/j.1471-0528.2011.03175.x. [www.bjog.org](http://www.bjog.org)

Decret No 2008/376 du 12 November 2008, accessed 14 July 2014. [www.state.gov](http://www.state.gov)

Deutchman M., Dresang L., Winslow D. (2007). *Advanced Life Support in Obstetrics*  
(ALSO) *International Development*. *Family Medicine*: 39:618-22

Dresang L.T, et al, The impact of Advanced Life Support in Obstetrics (ALSO) training in  
low-resource countries. *Int. J Gynecol Obstet* (2015).  
<http://dex.doi.org/10.1016/j.ijgo.2015.05.015>

Dynes M, Rahman A, Beck D, Moran A, Rahman A, Pervin J, Yunus M, Rashid K,  
Buffington S, Kanti B.K, Petterson J.M, Sibley L (2011). Home-based lifesaving skills in  
Matlab, Bangladesh: a process evaluation of a community-based maternal child  
health programme. *Midwifery* Feb, 27(1): 15-22.doi:10.1016/j.midw.2009.07.009

Gobezayehu A.G, Mohammed H, Dynes M.M, Desta B.F, Barry D, Aklilu Y, Tessema H,

Tadesse L, Mikilich M, Buffington S.T, Sibley L.M. (2014). Knowledge and skills

- retention among frontline health workers: Community Maternal and newborn health training in rural Ethiopia. *J Midwifery Womens Health*. Jan, 59 suppl 1:S21-31.doi:10.1111/jmwh.12146
- Homaifar N, Mwesigye D, Tchwenko S, Worjolah A, Joharifard S, Kyamanywa P, Wilkinson J, Rulisa S, & Thielman N.M (2013). Emergency Obstetrics Knowledge and Practical Skills Retention among Medical Students in Rwanda following a short training course *International Journal of Gynecology and Obstetrics* 120: 195-199. [www.elsevier.com](http://www.elsevier.com)
- Janusz K, Cheryl L, & Merryl H, (1998). Retention of Neonatal Resuscitation Skills and Knowledge: A Randomized Controlled Trial *Family Medicine* 30(10):705-11.
- Jurjus R.A, Lee J, Ahle S, Brown K.M, Butera G., Goldman E.F, Krapf J.M (2014). Anatomical Knowledge retention in third-year medical students prior to obstetrics and gynecology and surgery rotation. *Anat sci Educ* Nov-Dec; 7(6):461-8.doi.10.1002/ase.1441
- Landauer T.K, Bjork R.A, Optimum rehearsal patterns and name learning (1978). In: Gruneberg M.M, Morris P.E, Sykes R.M, editors. *Practical Aspects of Memory*. New York, N.Y: Academic Press.p 625-32
- Marteau T.M, Wynne G, Kaye W, Evans T.R (1990). Resuscitation: experience without feedback increases confidence but not skill. *BMJ (Clin Res Ed)* 300(6728):849-50
- Mireskandari M, Peimani M, Kianoosh H, Fardin Y, Roya P. (2012). An educational electronic package on retention of CPR knowledge in residents of Anesthesiology. *South-East Asian J of Med. Edu*. Vol 6 no 2
- Munro M.L. Lori J.R, Boyd C.J, Andreatta P. (2014). Knowledge and Skills retention of a mobile phone data collection protocol in rural Liberia. *J midwifery women's Health*. Mar-Apr, 59(2):176-83. Doi.10.1111/jmwh.12155
- Ngah N., Kingue, Ndi and Bela (2013) Understanding the labour market of Human resources for Health in Cameroon: *working paper*. WHO.



- Nori J.M, Saghafinva M, Matamedi M.H.K & Khademal S.M, (2012). CPR Training for Nurses: How often is it Necessary? Iran Red Crescent Med. J. 2012 Feb; 14(2):104-107
- Ojha R, Liu A, Linton B.C, Hibbert E & Kay R.H.N (2014). Spaced scenario demonstrations improve knowledge and confidence in pediatric acute illness management. Frontiers in paediatric Vol 21 Ant. 1331.  
Doi:10.3389/fped.2014.00133
- O'Rourke K. (1995). The effect of hospital staff training on management of obstetrical patients referred by traditional birth attendants. International Journal of Gynecologists and Obstetricians; 48 (suppl: s95-102): S95-102.
- Penny S. & Murray S.F. (2000). *Training initiatives for essential obstetric care in developing countries a "state of the art" review. Health policy planning*. London: Oxford University Press.
- Phelan J.P, Ouzounia J.G. Gherman R.B (1997). Shoulder dystocia and permanent Erbs palsy: the role of fundal pressure. AMJ Obste. Gynecol 176:S138.
- Reseir (2011). Helping Babies Breathes: Assessing Providers' skill retention
- Roth C.K, Parfitt S, Brewer M, (2015). Effectiveness of an Obstetrics- Based Advanced Cardiac Life Support Education Program. J. Obstet Gynaecol Neonatal Nurs, Jul; 44(4): 518-26:doi:10.1111/1552-6909.12661.
- Ruchi Puri (2011). Knowledge, Attitudes and Practices of obstetric care providers in Bugesera District, Rwanda
- Sankar J, Vijayakanthis, Jeeva S, Dubey N (2013). Knowledge and skill Retention of In-service versus Pre-service Nursing Professionals following an informal Training Program in Pediatric Cardiopulmonary Resuscitation: A Repeated measures Quasiexperimental study – Biomed Research International vol.2013. Article ID 403415, 7pages
- Shereen P. & Murray S.F. (2000). Training initiatives for essential obstetric care in

- developing countries: a “state of the art” review. *Health Policy and Planning*; 15(4): 386-393. Oxford University Press
- Smith K.K, Gilcreast D & Pierce. K (2008). Evaluation of staff’s retention of ACLS and BLS skills, resuscitation, 78.pp59-65
- Sullivan R. & McIntosh N. (1996). The competency-based approach to training. *Medical Journal of Indonesia*
- Taylor H.A. (1998). Reported comfort with obstetrical emergencies before and after participation in the advanced life support in obstetric course. *Family Medicine* 30(2):103-7. (Level 2)28.
- Theron G.B. (1997). Improved Cognitive Knowledge of midwives practicing in the Eastern Cape Province of the Republic of South Africa through the study of a self education manual. *Midwifer* 15.66-71
- United Nations International Children Emergency Fund(2013). Information by country. [www.unicef.org/infobycountry/index.htm/](http://www.unicef.org/infobycountry/index.htm/). Site last visited on June 13, 2014 (level 2).
- United Nations International Children Emergency Fund (2013). Newborn Health in Cameroon: *Regional consultation of Global “Every Newborn Action Plan”* Daker.
- Vadnais M.A, Dodge L.E, Awtrey C.S, Ricciolti H.A, Golen T.H & Hacker M.R (2012). Assessment of long-term knowledge retention following single-day simulation training for uncommon but critical obstetrical events. *J Matern Fetal Neonatal Med.* 2012 September; 25(9): 1640-1645.doi:10.3109/14767058.2011.648971.
- Yang C.W, Yen Z.S, McGowan J.E, Chen H.C, Mancini M,E, Soar J, Lai M.S, Ma M.H (2012). A systematic review of retention of adult advanced life support knowledge and skills in healthcare providers. *Resuscitation* Sep,83(9); 1055-60.doi:10.1016/j. Elsevier Ireland Ltd.
- Walker L.J, Fetherston C.M, McMurray A (2013). Perceived Changes in the knowledge and confidence of doctors and midwives to manage obstetric emergencies following

completion of an Advanced Life Support in Obstetrics Course in Australia Aut NZJ  
obstet Gynaecol Dec; 53(6): 525-31.doi: 10.1111/ajo.12110

World Health Organization (2012). Demographic and Information System: *Maternal and perinatal Health Profile*. Department of Maternal, Newborn, Child and Adolescence Health (MCA/WHO)

## APPENDICES

### APPENDIX 1: CONSENT TO PARTICIPATE IN ALSO TRAINING STUDY

Participant's code:

#### **Introduction**

This research study is being conducted by Ngoran Grace Bongban, a Masters Program student in the College of Health Sciences, School of Nursing, Department of Midwifery and Gender, at Moi University, Eldoret, Kenya. This study is being done to determine the impact of the Advanced Life Support in Obstetrics (ALSO) training program which you attended. Your participation in this study is essential to help determine the adequacy of the training you received in managing common obstetrical complications. In addition, your retention of the knowledge and skills you learned will be evaluated, which will lead to establishing recommendations as to if or how frequently the ALSO course should be repeated to maintain skills and knowledge. Finally, your comments will assist to evaluate the adequacy of the required supplies and equipment in your obstetrical care facility which is necessary to provide obstetrical emergency care.

#### **How are you going to participate?**

You will be asked to complete a survey questionnaire. This questionnaire consists of questions which include your demographic information, your opinion of the ALSO Program, your assessment of your comfort in management of obstetrics emergencies as well as outcome of care, and the equipment and supplies which are available in your health unit. In addition, you will be asked to complete a post-test mega delivery exam similar to the one you took after receiving the ALSO training. This will take a maximum of 45 minutes of your time.

**What are the risks involved?**

There are minimal risks for participation. However, you may feel some emotional discomfort if the questions asked make you think about some of the challenges you have faced in managing obstetrical emergencies.

**What are the benefits?**

There will be no immediate or direct benefits to you for participating in this study. However, it is hoped that your participation will help to determine how to tailor future ALSO training to best meet the obstetrical staff needs. This study will also help to identify if obstetrical care units have and can obtain the required supplies and equipment needed. The lack of adequate emergency obstetrical care has been shown to contribute to increased maternal and infant morbidity and mortality. It is important that each woman who presents to our obstetrical units is provided the best care possible to decrease the morbidity and mortality in all the mothers and infants.

**Confidentiality**

All information you provide will be kept confidential and used only for the purpose of this study. Your name and other identifiers will not be written on the questionnaire. At the time you complete the survey questionnaire, your questionnaire will be given a code which will be used only to collate and analyze the information you provide. This code will also allow the matching to and comparison of only your original “mega delivery” training score to your survey “mega delivery” score. This is done to enable an analysis of retention of knowledge by all ALSO participants which will provide an indication of how often refresher courses should be offered. There will be no way in which any information you provide can be traced back to you. All information will be kept in a secure location and

only those directly involved with the research will have access to the data. Upon completion of the study, the results will be made available to participants in staff presentations and upon individual requests. After the study is completed, the questionnaires will be destroyed and the information will not be used for any other purpose.

### **Right to withdraw**

Taking part in this study is voluntary. You have the right to withdraw at any time or select to not participate in the entire survey. If you withdraw, you will not be asked to identify the reasons for your withdrawal, and there is no penalty for your withdrawal or decision to not participate in the study.

### **Questions about the Research**

In case of any further inquiries, you may contact the principal investigator, Ngoran Grace @ +254708339277 or +23777022470. If there is any problem concerning your rights in participation in this study, you can contact The Institutional Research and Ethical Committee of Moi University, Eldoret, Kenya Chairman Prof. E. WERE, and The CBCHS Institutional Review Board Chair person Dr Nancy Palmer @ +237 77500480.

I \_\_\_\_\_ have read and understood  
(print name)

the above consent. And, I voluntarily accept to participate in this research study.

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

I have read and understood the above consent. And, I decline to participate in this research study.

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

**APPENDIX 2: SURVEY QUESTIONNAIRE**

Participant's code

- 1) Today's date dd/mm/yy\_\_\_\_\_
- 2) Participant code/ID number: \_\_\_\_\_
- 3) Age: \_\_\_\_\_ years
- 4) Gender (circle)    M    F
- 5) Date last took ALSO:    dd/mm/yyyy\_\_\_\_\_
- 6) Location of last ALSO course: \_\_\_\_\_
- 7) Level of education (circle):    a) Primary    b) Secondary    c) High School  
    e) University    f) Medical School    g) other training
- \_\_\_\_\_
- 8) Profession (circle):    a)Obstetrician    b) Surgeon    c) General Practitioner  
    d) Registered Midwife    e) Brevete` Midwife    f) Registered Nurse    g)APNA  
    h) Nursing Assistant    i) Other \_\_\_\_\_
- 9) Number of years in practice: \_\_\_\_\_
- 10) Are you currently working in maternity (circle)?    a) Yes    b) No
- 11) Approximately how many deliveries do you usually perform per month:\_\_\_\_\_
- 12) How many deliveries did you perform within the last month? \_\_\_\_\_
- 13) In what facility do you currently work? \_\_\_\_\_
- 14) What best describes the location of your practice (circle):    a) Urban    b) Suburban    c)  
 Rural

15) In which type of health facility you currently work (circle): a) Referral hospital  
b) District hospital c) Integrated health center d) Primary health center  
e) Other\_\_\_\_\_

16) Does your health facility have C- section capability (circle)? a) Yes b) No

17) Do you think that the ALSO training increased your knowledge of the management of obstetrical complications (circle)? a) Yes b) No c) Neutral

18) Since completing the ALSO training if you used the emergency skills you learned (circle)? a) Yes b) No

If yes, what was the condition (s)? \_\_\_\_\_

---

19) What do you think was of most benefit in the ALSO training?

---

---

20) What do you think was of least benefit in the ALSO training?

---

---



**LEVEL OF COMFORT WITH EMERGENCY MANAGEMENT QUESTIONS**

HOW COMFORTABLE WOULD YOU FEEL IF YOU WERE MANAGING THE FOLLOWING CONDITIONS IN A PREGNANT WOMAN IN THE LABOUR ROOM?

Circle your best answer

- 21) First trimester bleeding... a) Uncomfortable    b) Neutral    c) Fairly comfortable  
d) Very comfortable
- 22) Preeclampsia/eclampsia... a) Uncomfortable    b) Neutral    c) Fairly comfortable  
d) Very comfortable
- 23) Third trimester bleeding....a) Uncomfortable    b) Neutral    c) Fairly comfortable  
d) Very comfortable
- 24) Preterm labour and PROM.a) Uncomfortable    b) Neutral    c) Fairly comfortable  
d) Very comfortable
- 25) Labour dystocia.....a) Uncomfortable    b) Neutral    c) Fairly comfortable  
d) Very comfortable
- 26) Malpresentation.....a) Uncomfortable    b) Neutral    c) Fairly comfortable  
d) Very comfortable
- 27) Multiple fetuses..... a) Uncomfortable    b) Neutral    c) Fairly comfortable  
d) Very comfortable
- 28) Vacuum delivery.....a) Uncomfortable    b) Neutral    c) Fairly comfortable  
d) Very comfortable
- 29) Shoulder dystocia..... a) Uncomfortable    b) Neutral    c) Fairly comfortable  
d) Very comfortable
- 30) Postpartum haemorrhage...a) Uncomfortable    b) Neutral    c) Fairly comfortable

d) Very comfortable

31) Maternal resuscitation.....a) Uncomfortable    b) Neutral    c) Fairly comfortable

d) Very comfortable

32) Neonatal resuscitation.....a) Uncomfortable    b) Neutral    c) Fairly comfortable

d) Very comfortable

33) In total, how many vacuum deliveries have you performed? \_\_\_\_\_ (If 0, skip to Q 38).

34) How many vacuum deliveries have been performed in your facility in the past one year?

35) In thinking about your last vacuum delivery, did any complications occur? (check all that apply) a) Cephalhematoma b) infant bruising c) vaginal laceration d) excessive blood loss d) others.

36) Compared to previous similar patients for whom vacuum was not done, what was the time interval from application to delivery? a) Less time b) About the same time c) More time

37) Did the infant require resuscitation beyond routine stimulation and drying? a) Yes b) No

38) How many shoulder dystocia have you managed in the past year? \_\_\_\_\_

39) When was the last time you were the main caregiver responsible for managing a shoulder dystocia?

a) 1-30 days    b) 30 days - 6 months    c) 6-12 months    d) More than 1 year  
e) Never (skip to question40)

40) In thinking of your last patient with shoulder dystocia, what maneuvers did you use to deliver the infant?(check all that apply)      a) Head traction      b) Fundal pressure

c) McRoberts maneuver

d) Forceps/vacuum    e) Cephalic replacement      f) Suprapubic pressure

g) Turned patient over to hands and knees    h) Woods screw      i) Other

\_\_\_\_\_

41) Compared to previous similar patients, what was the time interval from diagnosis of shoulder dystocia to delivery?      a) Less time    b) About the same time

c) More time

42) Did infant require resuscitation beyond routine stimulation and drying?      a) Yes

b) No

43) What was the last time you were the main caregiver responsible for managing a client with postpartum haemorrhage?

a) 1-30 days    b) 30-60 days    c) 6-12 months      d) >1 Year

e) Never (skip to question 44)

44) In thinking of your last patient with postpartum haemorrhage, what interventions did you use? (Check all that apply)      a) Cytotec (misoprostol)      b) Fundal

massage      c) IV fluids

d) Bimanual compression    e) Frequent vital signs      f) Blood transfusion

g) Pitocin before delivering head    h) Repair bleeding laceration    i) other

\_\_\_\_\_

45) Compared to previous patients with postpartum hemorrhage, has your overall management improved since taking ALSO? a) Yes, a lot    b) Yes, a little    c) Not at all

46) Compared to previous patients with postpartum hemorrhage, what was the amount of maternal blood loss? a) Less blood loss    b) About the same blood loss    c) More blood loss

47) How many patients with spontaneous abortion or with complications after induced abortion have you cared for in the past year? \_\_\_\_ (if none, skip to Q48)

48) How did you care for patients undergoing spontaneous abortion or with complications after induced abortion? (Check all that apply)

a) Expectant management    b) Antibiotics    c) Cytotec (misoprostol)    d) Ultrasound  
e) Manual vacuum aspiration (MVA)    f) other \_\_\_\_\_

49) How many abortion patients had heavy bleeding? \_\_\_\_\_

50) What were some of the major complications of your patients with spontaneous abortion or complications of induced abortion?

a) Maternal death    b) Shock    c) Anaemia    d) Infection    e) Other \_\_\_\_\_

51) Do you have access to a computer that you could use to study ALSO slides before the course?    a) Yes    b) No

52) How did you feel about the level of information given in the ALSO course?

- a) Too hard. The information was too far above what I could understand.
- b) Just right for me to learn
- c) Too easy

53) In your opinion, how can we improve ALSO training? (Circle all that apply)

- a) Keep the course the same (3 days)
- b) Keep the same topics as a single course, but make the course longer

- c) Divide the course into separate modules (topics) and train 1 module per month over several months
  - d) Send out the ALSO manual to study a longer time before the course starts
  - e) Send out the Power Point slides on a CD to study before the course starts
  - f) Make the course more basic, with fewer topics or less detailed information
  - g) Other suggestions:
- 
-

## AVAILABILITY OF ALSO EQUIPMENT

### AT YOUR FACILITY

55) After you completed the ALSO course, were you able to identify adequate obstetrical emergency equipment and supplies at your facility (circle)?      a) Yes      b) No

56) Have there been any problems in obtaining equipment and supplies for emergency obstetrical care (circle)?      a) Yes      b) No

If yes, what equipment or supplies have been difficult to obtain?

---



---

57) Which of the following equipment do your facility presently have available? If yes, circle Y. If No, circle N. If you don't know, circle DK. Note that several types of equipment, such as laryngoscope blades, endotracheal tubes, and MVA cannula have multiple sizes listed in the 3d column. Be sure you respond to each as noted above for each size.

Type of equipment	Item	Size	Circle one for each
Neonatal Resuscitation	Ambu Bags		Y N DK
	Infant mask with inflatable cushion	Preterm	Y N DK
		Term	Y N DK
	Toddler mask		Y N DK
	Laryngoscope		Y N DK
	Miller blade	0	Y N DK

Type of equipment	Item	Size	Circle one for each
		1	Y N DK
	Endotracheal Tubes	2.5	Y N DK
		3	Y N DK
		3.5	Y N DK
	Delee suction		Y N DK
	Meconium aspirator		Y N DK
	Ambu disposable pressure monitor		Y N DK
	Stylette for ET tube		Y N DK
	Feeding tube		Y N DK
	Umbilical vein catheter		Y N DK
	Electric suction pumps		Y N DK
	Suction		Y N DK
Intrapartum			
	Vacuum Delivery VR Omni cups		Y N DK
	Pudendal Block (Lowa Trumpet)		Y N DK
Incomplete Abortion			
	MVA Syringe		Y N DK
	Cannula	7mm	Y N DK
		8mm	Y N DK
		9mm	Y N DK
		10mm	Y N DK
		12mm	Y N DK
	Needle Extender (paracervical block)		Y N DK
	Cervical Dilators	7	Y N DK
		8	Y N DK
		9	Y N DK
		10	Y N DK
		11	Y N DK
		12	Y N DK
Maternal Resuscitation	Adult Ambu Bag		Y N DK
	Adult Face Mask (cushioned)		Y N DK
	Adult Endotracheal tubes		Y N DK

Type of equipment	Item	Size	Circle one for each
	Adult Face Mask for Mouth-to-mask		Y N DK
	Suction catheters	7.5	Y N DK
		8	Y N DK
Medications	Oxygen (with tubing)		Y N DK
	IV fluids (with tubing)		Y N DK
	Pitocin (oxytocin)		Y N DK
	Cytotec (misoprostol)		Y N DK
	Magnesium sulphate	20% solution	Y N DK
		50% solution	Y N DK
	Ergometrine/ergonovine		Y N DK
	Calcium Gluconate	1mg of 10% in 10ml	Y N DK
	Nifedipine		Y N DK



**APPENDIX 3: TRAINING MATERIAL FOR RESEARCH ASSISTANTS ON USE  
OF CHECKLIST FOR PRACTICAL (MEGA DELIVERY) EXAM**

- The participants will be tested with a ratio of one examiner to one participant
- Another research assistant will carry out the scoring
- Each test will be completed in a maximum of 15 minutes
- Equipment: pelvic mannequin, fetal mannequin, vacuum device, straight catheter

Scoring

- If prompting by the examiner is required, half the points should be deducted for the item.
- If an item is omitted despite a suitable prompt, all the points should be deducted for the item.
- Demonstration of manual skills
  - ✓ Safe and effective performance (in a timely manner) - all points
  - ✓ Safe but possibly ineffective skills (or slow to recognize and treat complication(s)) - half points
  - ✓ Unsafe – no point

In order to pass the mega delivery test, participants are required to score 70% in all the 4 modules

**Scenario to be read to the participants**

This is a healthy pregnant woman who will experience some complications during her birth that you will be expected to manage. Mrs. Tah Mary is a 28 years old G2P1 woman who

had a spontaneous vaginal delivery of a 3.5kg male infant under your care 2 1/2 years ago. Six hours ago, you admitted her in early labour, monitored by intermittent auscultation. Thirty minutes earlier, you noticed the fetal heart rate (FHR) dropping during contractions to 80 beats per minute. A vaginal examination at that time confirmed Mary was fully dilated with presenting part at +2 to +3 station. Mary has been pushing with each contraction. After 30 minutes of pushing, the FHR has suddenly dropped to 60bpm, with no variability and has not recovered after 5 minutes despite side switching, IV fluid bolus and Oxygen by face mask. What do you do now?

Examiner should assess if the participant:

- 1) Recognizes the tracing is category 111 and that this represents fetal compromise
  - Summons help and specifically, what kind of help (neonate resuscitation, extra nurses, obstetric back up)
  - Initiates and carries out assisted vaginal delivery using the ABC mnemonic (with attention to skills)

After delivery of the head, the examiner should simulate shoulder dystocia and say: “The head is delivered, now what do you do?”

- 2) Examiner should assess if the participant:
  - Identifies shoulder dystocia
  - Initiates and carries out the maneuvers to overcome shoulder dystocia using the HELPERR mnemonic. (All maneuvers should be demonstrated for skills assessment)

After delivery of the baby, the examiner should say: “The baby’s anterior shoulder and rest of the body delivers but the cord is still intact. What do you do now?”

3) Examiner should assess if the participant:

- Initiate pitocin after delivery of the baby
- Cuts the cord and describes active management of the third stage of labour

After delivery of placenta, the examiner should say: “now you have delivered the placenta, suddenly, you notice heavy vaginal bleeding, what do you do now?”

4) Examiner should assess if the participant:

- Focuses on ABC’s and request two large bore IV cannula
- Perform and demonstrates bimanual massage
- Verbalizes causes of PPH (4Ts) and how to assess them
- Recites routes and doses of drugs to treat uterine atony

**APPENDIX 4: CHECK LIST FOR PRACTICAL (MEGA DELIVERY) EXAM**

Participant's code

Skill/knowledge tested

Score (circle)

Module 1: recognize the need to facilitate delivery

Fail

Pass

Module 11: perform assisted vaginal delivery

0 1 2

A Ask for help

0 1 2

Address the patient

0 1 2

Anesthesia adequate

0 1 2

B Bladder empty

0 1 2

C Cervix fully dilated (Demonstrate)

0 1 2

D Determine the position of the head (Demonstrate)

0 1 2

Think Dystocia

0 1 2

E Check Equipment (Demonstrate)

0 1 2

F Apply vacuum cup at flexion point (Demonstrate)

0 1 2

Feel for maternal tissues (Demonstrate)

0 1 2

G Gentle traction (Demonstrate)

0 1 2

H Halt between contractions (Demonstrate)

0 1 2

Halt if cup disengages 3 times

0 1 2

Halt if no progress in 3 pulls	0	1	2
Halt if no delivery in 20 minutes	0	1	2
I Evaluate for incision (Demonstrate)	0	1	2
J Remove when jaw visible (release suction)	0	1	2
Demonstration of manual skills above	0	8	16
Module 111 Shoulder Dystocia (order not important)			
H Call for help	0	1	2
E Evaluate for Episiotomy	0	1	2
L legs- McRoberts Maneuver (Demonstrate)	0	1	2
P External pressure (Demonstrate)	0	1	2
E Rubin: pressure on anterior aspect of ant shoulder (demonstrate)	0	1	2
Wood Screw Maneuver (Demonstrate)	0	1	2
Reverse Wood's Screw Maneuver (Demonstrate)	0	1	2
R Remove posterior arm (Demonstrate)	0	1	2
R Roll to hands and knees and deliver posterior shoulder as anterior	0	1	2
Demonstration of manual skills above	0	6	12

## Module 1V: Address PPH

Describe active management of 3 <sup>rd</sup> stage as preventive measure	0	1	2
Get help, address ABC's, including requesting 2 large bore IV cannula	0	1	2
Bimanual uterine massage (Demonstrate)	0	1	2
Can describe the causes and assessments of the 4 T's - Tone (atony)	0	1	2
-Tissue	0	1	2
-Trauma	0	1	2
-Thrombin	0	1	2
Use of drugs including dosage and routes of administration (at least 3)			
Oxytocin (Pitocin) 20-40 IU per liter IV	0	1	2
Methylergonovine (Methergine) 0.2 mg IM	0	1	2
Prostaglandin F2 (Hemabate) IM or intramyometrially (o.25mg)	0	1	2
Misoprostol 800ug per rectum, buccal or sublingual	0	1	2

Module Scores 1 Pass/Fail 11\_\_\_\_\_ 111\_\_\_\_\_ 1V\_\_\_\_\_

Examiner's signature\_\_\_\_\_ Date\_\_\_\_\_

Scorer's signature\_\_\_\_\_ Date\_\_\_\_\_

## APPENDIX 5: IREC APPROVAL LETTER



MOI TEACHING AND REFERRAL HOSPITAL  
P.O. BOX 3  
ELDORET  
Tel: 33471/1/2/3  
Reference: IREC/2014/226  
**Approval Number: 0001315**

Ngoran Grace Bongban,  
Moi University,  
School of Nursing,  
P.O. Box 4606-30100,  
**ELDORET-KENYA.**



MOI UNIVERSITY  
SCHOOL OF MEDICINE  
P.O. BOX 4606  
ELDORET  
27<sup>th</sup> November, 2014



Dear Ms. Ngoran,

**RE: FORMAL APPROVAL**

The Institutional Research and Ethics Committee has reviewed your research proposal titled:-

***"Knowledge and Skills Retention among Obstetric Care Providers Trained on Advanced Life Support in Obstetrics in Cameroon."***

Your proposal has been granted a Formal Approval Number: **FAN: IREC 1315** on 27<sup>th</sup> November, 2014. You are therefore permitted to begin your investigations.

Note that this approval is for 1 year; it will thus expire on 26<sup>th</sup> November, 2015. If it is necessary to continue with this research beyond the expiry date, a request for continuation should be made in writing to IREC Secretariat two months prior to the expiry date.

You are required to submit progress report(s) regularly as dictated by your proposal. Furthermore, you must notify the Committee of any proposal change (s) or amendment (s), serious or unexpected outcomes related to the conduct of the study, or study termination for any reason. The Committee expects to receive a final report at the end of the study.

Sincerely,

**PROF. E. WERE**  
**CHAIRMAN**  
**INSTITUTIONAL RESEARCH AND ETHICS COMMITTEE**

cc    Director    -    MTRH            Dean    -    SOP            Dean    -    SOM  
      Principal    -    CHS            Dean    -    SON            Dean    -    SOD

## APPENDIX 6: CBCIRB APPROVAL LETTER

### CAMEROON BAPTIST CONVENTION HEALTH BOARD INSTITUTIONAL REVIEW BOARD

Baptist Centre, Nkwen, P.O. Box 1, Bamenda, Northwest Region

14 January 2015

Ngoran Grace Bongban  
ngban2002@yahoo.com/ndzeGrace@gmail.com

Re: IRB2014-32, "Knowledge and skills retention among providers trained on Advanced Life Support in Obstetrics in Cameroon"

Dear Ngoran Grace,

Your study proposes to determine knowledge and skills retention among the various levels of maternity health providers 6-24 months after ALSO training and the factors affecting retention.

This study protocol was reviewed by two members of the CBC Health Board IRB and was presented to the entire Cameroon Baptist Convention Health Board Institutional Review Board. Your protocol has received Board approval and is exempt from further IRB oversight because it is a program evaluation, it does not involve patients, and there is no risk involved to the participants (hospital staff).

Please understand that this is the ethical and safety approval for your study. You must present this IRB approval letter to the Hospital Administrator and Chief Medical Officer or to the Chief of Center (if at a health Centre) for approval to do the study in that institution(s).

It is expected that the research will begin at the time specified in your protocol. If you need to delay the beginning of the research more than one month, please notify the IRB.

If you make any changes in the research protocol, please immediately send the IRB an amendment specifying the changes proposed.

Your protocol has been assigned the above reference IRB protocol number. All correspondence to us should include 1) the IRB protocol number 2) Name of the principal investigator and 3) full title of the study.

You should understand that, your file will be closed because your protocol is exempt. However, all abstracts, manuscripts, posters and presentations pertaining to the above protocol, must be submitted to the IRB for pre-publication approval.

Please feel free to contact me with any questions and/or concerns regarding the above. Copies of all correspondence regarding this proposal should be sent to me and to Zita Acha secretary, e-mail [CBCHBIRB@gmail.com](mailto:CBCHBIRB@gmail.com).

Sincerely,

Acha Zita  
for

Nancy Palmer, Ph.D.



Nancy Palmer, Ph.D., Chairperson, [palmernancylea@gmail.com](mailto:palmernancylea@gmail.com)  
Mrs. Acha Zita, Secretary, [cbchbirt@gmail.com](mailto:cbchbirt@gmail.com)



**APPENDIX 7: SAMPLE INVITATION LETTER TO THE PARTICIPANTS BY  
THE DIRECTOR OF CBCHS**



**CAMEROON BAPTIST CONVENTION  
HEALTH SERVICES**

Director of Health Services  
P.O. BOX 1 Bamenda, North West Region  
Republic of Cameroon  
TEL: (+237) 67776 4781  
Email: [piustih@cbchealthservices.org](mailto:piustih@cbchealthservices.org)  
Website: [www.cbchealthservices.org](http://www.cbchealthservices.org)

Ref.CBC/DHS-L/15/1095  
April 15, 2015

To: Mrs. Yuniwo Delphine  
Mrs. Ngoran Grace

From: Prof. Tih Pius Muffih, MPH, PhD  
Director of Health Services



**Subject: FACILITATORS FOR ALSO SURVEY**

I wish to inform you that you shall facilitate in the ALSO Survey at Baptist Hospital Banyo on April 25, 2015 beginning at 9:00 a.m.

Thank you.

Cc: The Administrators; BHB, BBH  
The Chief Medical Officers; BHB, BBH  
The Supervisors of Nursing Services; BHB, BBH  
The Chief of Centre, Ngounso  
The ALSO Coordinator  
The Chief of Administration and Finance, CBCHS