Evaluating Provider's Knowledge Level on Basic Emergency Obstetric and Neonatal Care (BEmONC)), West Pokot County, Kenya.

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Abstract: *Approximately 15% of expected births worldwide will result in life-threatening complications during pregnancy, delivery, or the postpartum period (WHO, UNICEF, UNFPA, and World Bank, 2012). Most maternal and neonatal deaths in low-income countries, including Kenya, are attributable to a handful of preventable causes. Emergency obstetric and newborn care (EmONC) is an integrated strategy that aims to equip health workers with skills, life-saving medicines, and equipment to manage the leading causes of maternal and newborn death. It is on this basis that this study was conducted to find out how the BEmONC training impacted on the reproductive health services that the people of West Pokot are receiving despite the several challenges the county is facing to include a high burden of maternal and newborn mortality.The broad objective of the study was to examine provider's knowledge in service delivery of BEmONC services, following the training program that was rolled out in the year 2014, in West Pokot County, Kenya.Quantitative approach adopted a descriptive cross sectional ex post facto design of 49 randomly selected health facilities. The customized Averting Maternal Death and Disability (AMDD) tool adopted from Columbia University was used to collect quantitative data. Completed questionnaires were coded and data entry was done in STATA V.13 for analysis. The sample size was purposively determined when saturation of the data was reached and data was analyzed thematically. Findings indicated that the Basic Emergency Obstetrics and Neonatal training program was effective but the level of its effectiveness varied by facility type, designation, geographical setting and operating agency. Higher proportion of health providers from county hospitals (87.5%) had higher level of knowledge on BEmONC compared to (33.3%) from health centres and (60.7%) from dispensaries. The service providers had fair knowledge of immediate newborn care (55%) but there was tremendous lack of skills for newborn resuscitation (p-value-0.318). Overall, majority (61.9%) of the respondents had high level of knowledge, an average (31%) exhibited medium level of knowledge while (7.1%) demonstrated low level of knowledge. Facility readiness varied significantly by designation and facility type (p<0.05). The AMPATH sponsored BEmONC training was effective as it led to improved care and better BEmONC outcomes, however, its effectiveness varied by facility type, designation, geographical location of facility and operating agency. Higher proportions of staff from county hospitals were knowledgeable compared to staff from health centres and dispensaries. This study recommends advocating for a complete BEmONC system by: Improving strategies to sustain knowledge of the providers. Tapping on the knowledge of the Traditional Birth Attendance and training them is very critical in such an environment given the several challenges affecting the region.*

Keywords: *BEmONC, knowledge, life-threatening complications,*

I. Introduction

1.1Background

Approximately 15% of expected births worldwide will result in life-threatening complications during pregnancy, delivery, or the postpartum period (WHO, UNICEF, UNFPA, & World Bank, 2014). Since the landmark Safe Motherhood Conference was convened in Nairobi in 1987, maternal, newborn, and child health has gained increasing international recognition as a major global health priority. The commitment to end all preventable maternal and child deaths was most recently expressed during the launch of a financing facility by global partners, who committed more than US$4 billion to scale up and sustain essential services for women and children (WBG, 2015). In spite of these efforts, recent data indicate that progress toward reducing maternal and neonatal mortality is likely to fall short of the targets set by Millennium Development Goals (MDGs) 4 and 5, particularly in sub-Saharan Africa, where two-thirds of the world's maternal deaths and half of the world's child

deaths are estimated to occur (Echoke, Kombe, Dubourg, Evjen-Olsen, & Mwangi, 2013). Postpartum hemorrhage (PPH), hypertension, infections, obstructed labor, and complications of abortion are the leading causes of maternal death, representing more than two-thirds of the estimated 289,000 global annual mortalities related to pregnancy and childbirth (UNICEF U. N., 2009). Up to three-quarters of neonatal deaths are attributable to infections, pre-term birth, and intrapartum complications (GoK, 2014). These top causes of maternal and newborn mortality are all largely preventable through the effective use of highly cost-effective interventions that should be available at the primary care level.

Providers skilled in emergency obstetric and newborn care (EmONC) services are essential, particularly in countries with a high burden of maternal and newborn mortality (WHO, UNICEF, UNFPA, & World Bank, 2014). Improving provision of emergency obstetric care remains the cornerstone of Kenya's maternal health strategy as well as global safe motherhood strategies. Although most obstetric complications (defined as acute conditions such as Postpartum Hemorrhage, Sepsis, Eclampsia, and Obstructed Labor that can cause maternal death cannot be predicted, the majority can be treated with timely provision of a package of evidence-based interventions known as emergency obstetric care (EmONC) (WHO, Monitoring the building blocks of health systems, 2010). The availability of EmOC is considered to be an indicator of how well a health system is prepared to manage conditions leading to acute maternal/Neonatal morbidity and mortality (Travis, Bennett, Haines, Pang, Bhutta, & Hyder, 2004).

In the year 2014, AMPATH PLUS and its consortia partners embarked on a scale up of EmONC services across the Western region of the country, Kenya that carries a population of about 4.3 million people. The program is the USAID Implementing Partner [IP] for eight counties namely: Busia, Bungoma, Elgeyo Marakwet, West Pokot, Kisumu, Nandi, Trans-Nzoia and Uasin Gishu. It sought to implement global programs to build provider capacity in providing Basic and comprehensive EmONC services to women and newborns in poor- resource settings. The primary objective of this intervention was to make sure that at least half of the target group of facilities had capacity to offer all the signal functions for BEmONC. BEmONC training program was rolled out for the health care providers in West Pokot County with the overall aim of capacity building the health care facilities and help reduce the ever-increasing maternal and neonatal deaths. Basic training and equipment at the dispensaries and health centers were provided to enable providers to perform normal vaginal deliveries, neonatal resuscitation, and initiate referrals in the event of a complication.

The West Pokot County of Western Kenya borders the former North Frontier District in North Eastern Province with recurrent secessionist conflicts that deteriorated into disorganized banditry resulting into a large scale disruption to the way of life, huge loss of lives and thousands of casualties. It is a, rural, marginalized county whose primarily ethnic minority population has limited access to health services and development infrastructure, and faces a heavy burden of health problems including high maternal and neonatal mortality, frequent malaria outbreaks, and a growing HIV/AIDS prevalence. It is estimated that 53% of the County's population is poor and that 35% live in absolute poverty.

1.2.Broad objective
To assess the effectiveness of Basic Emergency Obstetric and Neonatal Care (BEmONC) training program in West Pokot County, Kenya.
1.2.1Specific Objectives
1.To examine the provider's knowledge on Basic Emergency Obstetrics and Neonatal Care (BEmONC) in the health facilities of West Pokot County.
1.2.2Research Questions
1.What knowledge did the provider gain for the provision of Basic Emergency Obstetrics and Neonatal Care (BEmONC) services in the health care facilities of West Pokot County?

II. Research Methodology
2.1Research Design
The study adopted a a descriptive cross sectional ex post facto design. The reason why this technique was chosen was because the researcher was only observing the outcomes of a treatment (BEmONC training by AMPATH Organization) that had earlier been rolled out in the year 2014. The study adopted the Averting Maternal Death and Disability Program (AMDD) model of Columbia University and from the UNICEF, WHO, UNFPA "Guidelines for Monitoring the Availability and Use of Obstetric Services". This summarized AMDD tool was customized to fit the low resource environment and developed according to order of modules i.e. this module evaluates cesarean deliveries, which is not one of the signal functions in Basic Emergency Obstetrics and Neonatal Care but in Comprehensive Emergency Obstetrics and Neonatal Care (CEmONC). Stressing on the Provider Knowledge and Competency for Maternal and Newborn Care.

2.1: Study Site

West Pokot County is located in the Rift Valley region of Kenya. It covers an area of 8,418.20 Km^2 and has a population of 512,690 people (2009 census). The county headquarters is located in Kapenguria Town. The county comprise of four sub counties (constituencies) divided into 20 electoral wards as illustrated in table 3.2.The Pökoot people form a section of the Kalenjin ethnic group and speak the Pökoot language, which is broadly similar to the related Marakwet, Nandi, Tuken and other members of the Kalenjin language group. Based on areal and cultural differences, the Pokot people can be divided into two groups; the Hill Pokot and the Plains Pokot (Rottland & Franz 1982). The Hill Pokot live in the rainy highlands in the west and in the central south of the Pokot area and are both farmers and pastoralists. The Plains Pokot live in the dry and infertile plains, herding cows, goats and sheep, thus are pastoralists.

2.3 Study Population

The target population was the registered midwives, nurses, clinical officers and obstetricians and doctors from the facilities that had benefited from the 2014 BEmONC training program. The county has a total of one hundred and twenty three (123) health care facilities; One (1) county Hospital, Four (4) Sub-county hospitals; Seven (7) Health Centers; One hundred and eleven (111) dispensaries. The facilities operate theoretically within a primary health care approach, which rests on three fundamental pillars namely; equity for all, community involvement and inter-sectoral coordination. The (111) dispensaries are just basic centers while the sub- county and County facilities have been upgraded to basic obstetric care (BEmOC) service delivery levels. These facilities are also frontline providers in delivering all public health interventions.The total number of staff trained on BEmONC therefore was one hundred and thirty three (133); One Obstetrician, Four Medical officers, five clinical officers and one hundred and twenty three nurses.

2.3.1 Inclusion Criteria: The health care providers who benefited from 2014 sponsored BEmONC training program and working at humanitarian link facilities in West Pokot County. Staff who had been moved within the last two years but working in any of the selected facilities and had benefited from AMPATH 2014 training were included in the study.

2.3.2 Exclusion Criteria: Other health care facilities and its staff that did not benefit from AMPATH sponsored 2014 BEMONC training. New Health care facilities and new staff in West Pokot County that did not benefit from AMPATH sponsored 2014 BEMONC training. Other health care facilities outside West Pokot County. The healthcare providers who may have undergone other trainings but not BEmONC training or by other trainers were not included in the study because the researcher was specific on the BEMONC training program to the healthcare staff offered by AMPATH in the year 2014.

2.4 Sampling Procedures

All the seven sub-county health centres, 4 sub-county hospitals and one county hospital were purposely selected because the number was less. Given the high levels of insecurity to access most parts of the region, one third of the remainder one hundred and eleven (111) dispensaries were sampled out from each sub-county (Pokot North, Pokot Central, Pokot West and Pokot South). This gave thirty seven (37) dispensaries. A simple random sampling technique was used to get the thirty seven (37) dispensaries. This gave a total sample size of forty nine health facilities. All the staff from the sampled facilities that fitted the inclusion criteria participated in the study.

2.4.1 Variables
The following variables played a key role in the study:
Independent variable:- BEmONC Training;
Dependent variable:- Facility readiness; staff's competencies and knowledge

2.5 Research Instruments
The research instruments used in the study to collect the data included the AMDD tool (questionnaires). Validity and reliability of these instruments were tested by conducting a pilot study.

2.6 Pilot Study

To assess the feasibility and effectiveness of the tools, field testing was carried out in facilities that had similar characteristics with the facilities that participated in the main study in West Pokot. The pilot study was conducted at Chepkiriar health center in East Pokot on the 13th September, 2015 in East Pokot, Baringo County. One health center and a sub county Hospital were selected for this purpose. Due to acute security reasons in this area, the researcher requested to join the African Inland Church missionary Screening Project that was conducted on the 12th to 15th September, 2015. The researcher was able to comfortably administer the data collection tools during the function given the high level of security provided.

This process helped in the identification of gaps and overlaps in the tool. One observation made during data collection process was that the implementation of AMDD tool which is quite an extensive instrument, required more time to complete all the modules (upto4 hours). The researcher therefore took some mitigation strategies to address this concern by ensuring that the assistants understood the tool perfectly before going to the field and booking appointments with the facilities during less busy hours.

2.7 Training of Research Assistants
The researcher organized for one week training for the assistant researchers to understand and internalize the tool. This made it easy for the team to collect data in the shortest time possible (one and half to two hours maximum).

2.8 Data Management
Completed questionnaires were coded and data were entered in Microsoft Excel dashboards and transmitted electronically. Later exported to STATA version 13 (Stata Corp LP, College Station, Texas) for analysis. Descriptive statistics (frequencies, means and standard deviation) were used to summarize the data. Chi-square test of independence was used to check for significant relationship between knowledge level. **P>0.05** was considered significant. Findings are presented in form of tables, pie-chart and bar-graphs.

2.9Ethical considerations
An approval from Institutional Research and Ethics Committee (IREC) of Moi University was obtained prior to the commencement of the research. Clearance letter to conduct the study was obtained from the Minister of Health, and Medical Officer of Health (MOH),West Pokot County. The respondents' privacy was respected. Anonymity and confidentiality was assured in that under no circumstances would the researcher identify the informants or make it public. Participation were voluntary recruited and signed an informed consent. They were reminded of their right to withdraw from the study at any time. Management of information: The questionnaires, tape recordings of the interviews as well as the transcripts of the recordings were kept in a safe place for security purposes as it awaited data analysis.

III. Findings

3.1Demographics
There was a total of 33**(78.57%)** facilities that had conducted deliveries within the last 12 months with 9 **(21.43)** facilities having not attended to any delivery. Figure 1 illustrates the above information.
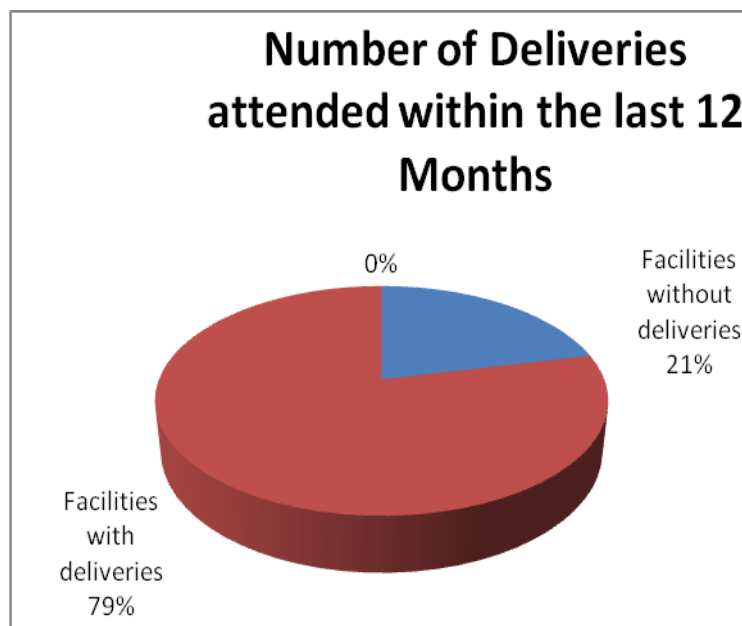
Figure 1: Identification of facilities that attended deliveries.

With the "No," responses, the team members were immediately informed that there had been no deliveries in the last 12 months and proceeded with the rest of the interview.

3.11.Facility Region

Accessing majority of these facilities was the most challenging and very risky task. Plate 4.1 below is one swinging bridge in Tamkal District, Central Pokot, Where patients have to cross as they are carried using a human stretcher to arrive at the nearest Health facility.
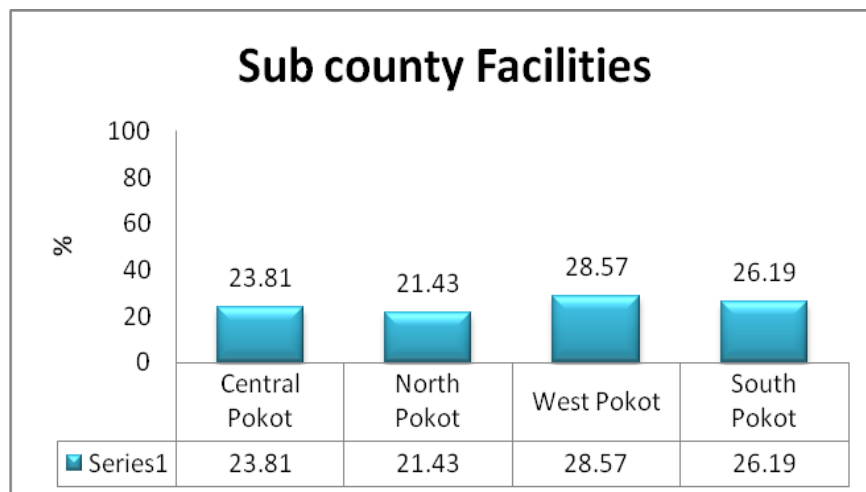

Plate 1. Tamkal Swinging Bridge.

This river transpasses West and North Pokot and patients have to cross it in order to access Kongelai and Kacheliba health facilities.

3.1.2Facilities from the 4 Sub-counties in the Region

The figure below illustrates the total number of facilities from the four sub-counties of West Pokot that participated in the study. Majority **(28.57%)** of the facilities in this study came from West Pokot Sub County while the least **(21.43%)** were from North Pokot Sub County.

Sub county Facilities			
Central Pokot	North Pokot	West Pokot	South Pokot
23.81	21.43	28.57	26.19
Series1 23.81	21.43	28.57	26.19

Figure 2: Sub-counties in West Pokot Region

3.1.3Designation of Facilities.

Majority 37**(88.1%)** of the facilities are situated in the rural set up while only 4 (9.52%) care found in the urban environment. It was however not known where the designation of 1 (2.38%) facility belonged to.

3.1.4Level of Facilities

Dispensaries carried the larger 29 **(69.05%)** representation of the health facilities in West Pokot County followed by the health centers 7**(16.67),** the Sub-county facilities comprised 4**(9.52) and the** least 1**(2.38%)** made up the County/District hospital. See Figure 3 below.
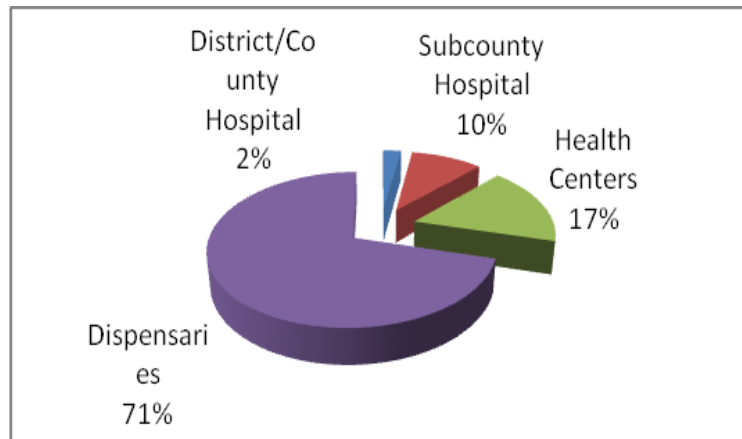
Figure 3: Level of Facilities

3.2. Providers' Knowledge and Competency for Maternal and Newborn Care

As part of BEmONC assessment, the service providers were presented with several case scenarios with varying degrees of Maternal and Neonatal Health (MNH) conditions and complications to assess their knowledge, competency and management skills to deliver the services (e.g. FANC- Focused Ante Natal Care/Post Natal Care, AMTSL- Active management of third stage of labour, Partograph and New Born Resuscitation etc.) With the help of a model checklist, the health care providers were interviewed through open-ended questions about their experience and knowledge of MNH care to assess their mastery of knowledge, judgment and decision making skills on BEm ONC. About 85.71% of the interviews were conducted with senior midwives, Senior nurses, Midwives and nurses who worked at the selected forty two health facilities. The remainder 14.29% comprised of doctors and clinical officers working at the county and sub county hospitals and one dispensary.

The interview covered specified tasks in the areas listed below and the target was to find out if the staff had been trained (during pre-service or in-service) to provide the service and if they had provided the service in the last three months. The services included:
1. Provide focused antenatal care
2. Use the Partograph
3. Do active management of the third stage of labour
4. Do manual removal of the placenta
5. Begin IV fluids
6. Check for Anaemia
7. Administer IM or IV magnesium sulfate for the treatment of severe pre-eclampsia or eclampsia
8. Do bimanual uterine compression (external)
9. Do bimanual uterine compression (internal)
10. Suture an episiotomy
11. Suture vaginal lacerations
12. Suture cervical lacerations
13. Apply vacuum extractor
14. Apply forceps
15. Perform manual vacuum aspiration (MVA)
16. Perform a dilation and curettage (D&C)
17. Administer antiretrovirals for PMTCT
18. Counsel women about family planning and contraception
19. Perform adult resuscitation
20. Resuscitate a newborn with bag and mask

Each area was further spelt out in to various questions and examples so as to assess the strengths and weaknesses of service providers. The competency and management skills for each sub area were scored in terms of percentages based on the number of correct answers to those specific questions. Among the interviewed respondents, (61.9%) had high level of knowledge on basic emergency obstetrics and neonatal care while (7.1%) had low level of knowledge. An average (31%) exhibited medium level of knowledge in BEmONC as illustrated in figure 4
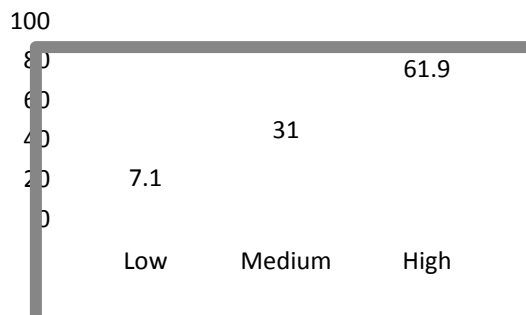
100
80
60
40
20
0

7.1   31   61.9

Low   Medium   High

Fig 4: Level of knowledge on BEmONC

Table 1: Factors associated with level of knowledge

Factor	Level of knowledge			χ2-value	p-value
	Low	**Medium**	**High**		
Designation					
Rural	3(7.9)	13(34.2)	22(57.9)	2.069	0.472*
Urban	0(0)	0(0)	4(100)		
Type of facility					
County hospital	0(0)	1(12.5)	7(87.5)	4.505	0.312*
Health centre	1(16.7)	3(50)	2(33.3)		
Dispensary	2(7.1)	9(32.9)	17(60.7)		
Operating agency					
Government	2(5.4)	12(32.4)	23(62.2)	1.904	0.533*
Religious mission	1(20)	1(20)	3(60)		

* Fisher's exact

Level of knowledge on BEmONC did not vary significantly by type of facility, designation and type of operating agency (p>0.05). However, all the respondents from urban facilities (100%) had higher level of knowledge compared to only (57.9%) from rural facilities. Higher proportion of those from county hospitals (87.5%) had higher level of knowledge on BEmONC compared to (33.3%) from health centres and (60.7%) from dispensaries

More than half of the respondents 23(54.8%) were competent on basic emergency obstetrics and neonatal care as indicated in figure 5
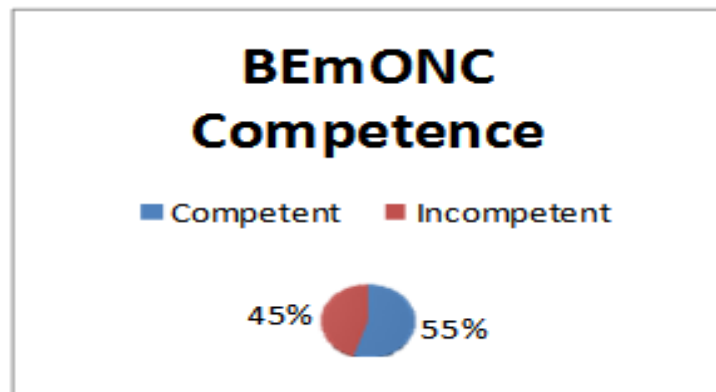
BEmONC Competence
■ Competent ■ Incompetent

45%   55%

Figure 5: Competence on BEmONC

Table 2: Factors associated with BEmONC competence

Factor	Competence		χ2-value	p-value
	Competent	Incompetent		
Designation				
Rural	20(52.6)	18(47.4)	0.731	0.613*
Urban	3(75)	1(25)		
Type of facility				
County hospital	6(75)	2(25)	1.629	0.429*
Health centre	3(50)	3(50)		
Dispensary	14(50)	14(50)		
Operating agency				
Government	20(54.1)	17(45.9)	0.063	1.000*
Religious mission	3(60)	2(40)		

As indicated in table 2, competence did not vary significantly by type of facility, designation and type of operating agency (p>0.05). However, higher proportion of those from urban facilities (75%) were competent compared to only (52.6%) from rural facilities. Higher proportion of those from county hospitals (75%) were competent compared to (50%) from health centres and dispensary.

3.2.1. Knowledge and competency in pregnancy, labour and delivery care

Majority **[42(85.71%)]** providers reported that the training was appropriate for their work, **[44(89.80%)]** reported that the training have updated their knowledge & skills, **[36(73.47%)]** reported that the mechanisms to sustain the program were unsatisfactory, while **[18 (36.74%)]** reported that the training facilities & arrangements were unsatisfactory. The mean immediate post-course knowledge score (3 months after the training) was **43.452%** and**(61.23%)** providers did not achieve knowledge-based mastery in this evaluation and this was not good considering the multiplier effects. No significant association was observed between failing post-course assessment and availability of supplies and equipment. In a multivariate logistic regression model, being a nurse, a midwife, a doctor and being a clinical officer were independent predictors for scoring a passing grade in the post-course. To examine the degree of knowledge decay over time, the immediate post-course mean knowledge score was compared with that of the three-months post training score using paired sample t-test. The result showed significant decay in providers' knowledge over the three-month period following the training.

Overall, the knowledge and competency levels were similar between physicians, clinical officers, nurses and midwives. The post-course evaluation revealed knowledge gaps in seven out of the twenty topics three months after the BEmONC training with no significant difference between and after training (p-value ranging from **0.0832 to 0.8933**). Major knowledge gaps were seen on "Performing adult resuscitation", "partograph use", performing MVA, applying vacuum extractor and forceps, suture cervical lacerations, begin IV fluids and "administer IM or IV magnesium sulfate for the treatment of severe pre eclampsia". The lowest mean knowledge score was recorded on "Doing bimanual uterine compression (internal) and applying forceps" with a percentage of 2.38% and 0.00% respectively. Majority of the trainees did not correctly answer the question in sequence regarding "newborn resuscitation" with a p-value of **>0.318.**

Almost in all the facilities, providers demonstrated excellent mastery of knowledge and decision making ability in provision of FANC, active management of the third stage of labour, checking anaemia, manual removal of placenta, external bimanual uterine compression and others as indicated in the table below **(p-value 0.000 to 0.0158).**

The importance of the use of Partograph was completely lacking in the majority of the facilities **[26 (61.9%)].** The dispensaries did not practice partograph even though the health care providers had received in-service training to use this important tool to monitor the progress of labour.

4.1.2. Knowledge of immediate newborn care and guided interview for newborn resuscitation

The service providers had fair knowledge of immediate newborn care (**54.76%**) but there was tremendous lack of skills for newborn resuscitation (**p-value-0.318).** Some of the midwives **(30%)** would still hold the baby with heels and a few **(26%)** would suck the newborn's secretions through their own mouth and spit it out in an event of severe asphyxia. The possible reason for this was lack of suctioning equipment;-the neonatal suction bulb. Knowledge was significantly deficient across cadres in managing newborn infection, low birth weight and pre-term babies.

There was a deficit in levels of training across cadres, to provide care to sick newborn babies, particularly in neonatal resuscitation and neonatal sepsis. Overall, providers had reasonable knowledge **(62%)** about what to do if a baby begins to breathe after resuscitation and there was no respiratory difficulty. However, majority **[29(69.05)]** did not have any clue about how to diagnose birth asphyxia or what to do if a baby does not begin to breathe after resuscitation. There was almost no difference in the knowledge levels of doctors and midwives on any aspect of newborn resuscitation.

IV.   Conclusion

The pre-course knowledge assessment revealed that trainees had marginal knowledge on identifying and managing most obstetric emergencies. suggesting the need for in-service knowledge updating. Less than half of the trainees (**33.3%**) from this study reported having sufficient knowledge on partograph use and did not routinely use the tool in managing a mother in labour. Consistent with the findings, other studies in Addis Ababa identified providers' poor competence in using partograph for monitoring labour, although the majority reported that they are routinely using it (Yisma, Dessalegn, Astatkie, & Fesseha, 2013). Harvey and his colleagues have made similar observations in two African and three Latin American countries where knowledge about partograph use was found to be low (Harvey. Partograph when properly filled out and interpreted, can

assist providers to make correct judgment to handle obstetric complications, whereas inappropriate use of it might increase referrals and undesirable maternal and neonatal outcomes. The AMPATH sponsored BEmONC training was effective as it led to improved care and better BEmONC outcomes, however, its effectiveness varied by facility type, designation, geographical location of facility and operating agency. Higher proportions of staff from county hospitals were competent and knowledgeable compared to staff from health centres and dispensaries.

V.   Recommendation

Future research may focus on advocating for a complete BEmONC system inductions, trainings or seminars to sustain knowledge and competencies. Tapping on the knowledge of the Traditional Birth Attendance to save the lives of mothers and neonates in an event of absence of technology is very critical in such an environment. Training them (TBAs) is equally necessary because majority of the mothers as several studies indicate, still seek delivery services from the TBAs. Some other recommendations have been suggested following this comprehensive study include;

1. Developing a national training team.
2. Strengthening regional hospitals as training sites.
3. Training health care providers using a competency based training approach (it builds attitude and stresses learning by doing) and supporting improvement and improved supervision.

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