Assessment of Midwife Knowledge, Practice, and Associated Factors towards Active Management of the Third Stage of Labor at Governmental Health Institutions in Tigray Region, Northern Ethiopia, 2018

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Introduction. Globally, postpartum hemorrhage is the most common cause of maternal mortality and morbidity, and it accounts for more than 25% of all maternal deaths. The majority of death due to postpartum hemorrhage is caused by uterine atony. Routine and correct usage of active management of the third stage of labor decreases the occurrence of postpartum hemorrhage by 60% when compared to expectant management of the third stage of labor. The purpose of this study was to assess midwife knowledge, practice, and associated factors towards active management of the third stage of labor at governmental health institutions in the Tigray region, 2018. Results. These study results showed that from the total study participants (N = 278), 170 (61.2%) were good in knowledge and 121 (43.5%) were good in practice towards active management of the third stage of labor. Training related to active management of the third stage of labor (AOR = 2.119, 95%CI = 1.141, 3.937) and practice level of midwives (AOR = 8.089, 95%CI = 4.103, 15.950) became significantly associated with the knowledge level. The educational level of midwives (AOR = 3.811, 95%CI = 2.015, 7.210), training related to active management of the third stage of labor (AOR = 2.591, 95%CI = 1.424, 4.714), and knowledge level of midwives towards active management of the third stage of labor (AOR = 7.324, 95%CI = 3.739, 14.393) were significantly associated with the practice level. This study showed that training related to active management of the third stage of labor was significantly associated with the knowledge and practice level of midwives. The educational level and knowledge level of midwives were significantly associated with the practice level of midwives towards active management of the third stage of labor. Therefore, midwives should update their academic level and knowledge. Health institutions in collaboration with the Tigray Regional Health Bureau should arrange training for all midwives to bring change.

1. Introduction

Labor is defined as consecutive events that take place in the genital organs to expel products of conception out of the womb through the vagina into the outer world. The process of labor involves four stages. The first stage starts from the onset of true labor and ends with full dilatation of the cervix. The second stage is from the full dilatation of the cervix to the expulsion of the fetus. The third stage is the stage of labor that is demarked by the delivery of the fetus and expulsion of the placenta and membrane, which lasts from five to fifteen minutes and the most hazardous stage of labor due to the risk of profuse bleeding. And the fourth stage is the stage of labor that extends to one hour after delivery of the placenta [1]. The main complication associated with the third stage of labor is postpartum hemorrhage (PPH) which is generally described as blood loss greater than or equal to 500 ml within
24 hours after birth, but in severe condition, blood loss is greater than or equal to 1000 ml within 24 hours [2].

Developing countries account for a higher percentage of global maternal mortality estimate of 2015, and they account for 99% (302,000) of the estimated global maternal deaths in 2015, with sub-Saharan Africa alone accounting for roughly 66% (201,000). The overall MMR in developing regions is 239 per 100,000 live births which is much higher than that of developed regions, where it is just 12 per 100,000 live births, and sub-Saharan Africa has a very high maternal mortality rate (MMR) of 546 per 100,000 live births [3, 4].

Every year, more than a half-million women die from complications of pregnancy and childbirth, and most of this death occur in developing countries due to many factors mostly such as inability to access quality emergency obstetrical services, lack of transportation, lack of awareness, lack of trained health professionals, and other factors [5, 6].

A large number of maternal death related to pregnancy and childbirth are due to postpartum hemorrhage. According to the World Health Organization (WHO), it accounts for worldwide annual 127,000 maternal deaths. Even if PPH is a preventable and manageable problem in a developed country, it accounts for 60% of all maternal deaths in developing countries [7].

Similar to developing countries, trends of maternal mortality in Ethiopia are also very high. The present estimates of the pregnancy-related mortality ratio are approximately 412 per 100,000 live births. Although there is a decrement of the maternal mortality rate from 2000 to 2015 which was from 871 to 412, still we are within the range of the high maternal mortality rate [8].

Even though it is not easy to find the correct number of maternal death secondary to postpartum hemorrhage (PPH), it is estimated that around 25-30% maternal death was due to PPH in Ethiopia [9].

Maternal death due to postpartum hemorrhage occurs in health facilities of low-income countries where there are no adequate obstetric care providers or where they lack the necessary knowledge, skill, and supplies to prevent and manage the problem [10].

The majority of death due to postpartum hemorrhage (PPH) is caused by uterine atony (a condition when the uterine muscle failed to contract and legate uterine blood vessels after delivery of the placenta). Most of the time, maternal mortality and morbidity due to postpartum hemorrhage (PPH) take place within the first 24 hrs after delivery within the time frame of primary PPH. Around 88% of maternal death due to postpartum hemorrhage takes place within the first 4 hrs of delivery which indicates the severity of this period because of complications of the third stage of labor [11–13].

The two known protocols used for management of the third stage of labor are the active management of the third stage of labor and expectant (physiological) management of the third stage of labor. Active management of the third stage of labor involves the provision of prophylactic uterotonics, controlled cord traction for delivery of the placenta, and immediate uterine fundus massage unlike that of expectant management of the third stage of labor [14].

Active management of the third stage of labor is recognized globally and supported for more than decades as a management package for reduction of maternal mortality and morbidity secondary to postpartum hemorrhage in many countries, and it is incomparable to that of expectant management of the third stage of labor in which the risk of postpartum hemorrhage (PPH) is more than 60% lower when we compare it with expectant management of the third stage of labor. It is the only option which is easy, cost-effective, and applicable management package for the third stage of labor to prevent postpartum hemorrhage and its complications, and this management package is aimed at hastening delivery of the placenta by increasing the frequency and strength of uterine contraction, preventing the occurrence of uterine atony and other causes of postpartum hemorrhage, and minimizing the numbers of maternal death [4, 15].

Even if active management of the third stage of labor (AMTSL) plays a great role in the prevention and management of postpartum hemorrhage, there is a gap of knowledge and practice of midwives towards active management of the third stage of labor [16, 17]. However, little has been known about midwife knowledge, practice, and associated factors towards active management of the third stage of labor in our country, and no study is conducted in the current study area, so this study was aimed at finding out midwife knowledge, practice, and associated factors towards active management of the third stage of labor in the Tigray region.

2. Methods and Materials

2.1. Study Design and Period. Institutional-based cross-sectional study design was conducted from November 15/2017 to January 12/2018 to assess midwives’ knowledge, practice, and associated factors towards active management of the third stage of labor.

2.2. Study Area and Population. The study was conducted at all governmental health institutions found in two zones of the Tigray region. The Tigray region is the northernmost of the nine regions of Ethiopia. It is also known as Region 1 according to the federal constitution. The state’s capital and largest city is Mekelle. Tigray is bordered by Eritrea to the north, Sudan to the west, Afar region to the east, and the Amhara region to the south and southwest [18]. Based on the projection made from the Ethiopian census of 2007, the region had a total population of 4,806,843 of whom 2,441,158 (50.8%) were female in 2015. The region is administratively divided into 7 zones including one special zone (Mekelle). The Tigray regional state has a total of 24 hospitals and 254 health centers, and the total number of midwives in the region is 918. The study was conducted in two zones of the Tigray region, the central zone and Mekelle specialized zone which contains 73 governmental health institutions (62 health centers and 11 hospitals), and the total number of midwives in the two zones was 304 [19]. So, all midwives who were working in the delivery room of selected governmental health institutions (62 health centers and 11 hospitals) in the Tigray region during data collection were included.
2.3. Sample Size and Sampling Procedure. The sample size was determined using a single population proportion formula at 95% confidence interval with the assumption of the prevalence of AMTSL knowledge in Ethiopia 37.7% [20]. With α = 0.05, marginal error d = 0.05. After using the correction formula, the final sample size became 285 midwives. Seven zones of the Tigray region were clustered, and two of them (30%) were taken by simple random sampling, and all midwives (285) working in the governmental health institutions (11 hospitals and 62 health centers) that are found in the two selected zones of the Tigray region who fulfilled the inclusion criteria were included in the study.

2.4. Data Collection Tool and Procedure. Data was collected by face-to-face interview questionnaires and observation by using a semistructured questionnaire and observational checklist. Semistructured questionnaires were adapted and adopted from different literature, while the observational checklist was adopted from ICM and FIGO guidelines. The face-to-face interview using a questionnaire was used to assess study participant sociodemographic information and knowledge, and an observational checklist was used to assess midwife practice. Data was collected by 20 degree midwives who had experience in data collection and 3 supervisors.

2.5. Data Quality Assurance. Questionnaires and checklist were prepared in the English language by the principal investigator and reviewed by the advisors. These questionnaires and checklist were pretested on 10% of the calculated sample size outside the selected study area (Machew Hospital, Adigudom Primary Hospital, and Hewane Health Center), and one-day training was given by the principal investigator for data collectors and supervisors concerning the research objective, data collection tools, procedures, and how to fill the questionnaire and checklist properly. Moreover, data quality was assured by designing a data collection instrument, and 10% of the collected data was checked by the supervisor daily for completeness, and finally, the principal investigator monitored the overall quality of data collection.

2.6. Data Entry and Analysis Procedure. The collected data was cleaned, coded, and entered into Epi Info version 3.5.1 and transported to SPSS (Statistical Package for the Social Sciences) version 20 for analysis. Descriptive statistical analysis was used to compute frequency, percentage, and others such as measures of central tendency. Binary logistic regression analysis was used to identify the association between dependent and independent variables. Variables with a significant association in the bivariate analysis were entered into multivariate analysis to determine the knowledge and practice of midwives towards AMTSL, and variables with a p-value less than 0.2 and 0.05 were considered statistically significant for bivariate and multivariate regression, respectively. The overall results were presented in texts, tables, and figures.

2.7. Independent Variables. These are sociodemographic characteristics such as religion, ethnicity, age, sex, and others such as year of experience, place of work, level of education, in-service training, access to reading material, and availability of uterotonics drugs.

2.8. Dependent Variables. The dependent variables are knowledge and practice.

2.9. Operational Definitions. Knowledge refers to the level of awareness and understanding of midwives regarding active management of the third stage of labor. Good in knowledge is defined as those who knew 5 and above from seven questions prepared to assess the knowledge level of midwives towards AMTSL. Poor in knowledge is defined as those who answered less than five questions from seven questions prepared to assess knowledge of midwives on AMTSL.

Practice refers to the ability of midwives to carry out the management of the third stage of labor. Good in practice is defined as those who performed 13 steps correctly in the proper sequence from 15 steps prepared to assess midwives’ skill. Poor in practice is defined as those who performed less than 13 steps correctly in the proper sequence from 15 steps prepared to assess midwife skill.

3. Results

3.1. Sociodemographic Characteristics of Midwives. From a total of 285 study subjects, 278 midwives participated in the study with a response rate of 97.5%. The majority of the 119 (42.8%) were between 31 and 40 years old. The mean age of study participants was 35 years ± 7.28 (SD). More than half of the midwives (215, 77.3%) were female, and almost all of the study participants were Orthodox religion followers and Tigray in ethnicity. Regarding their marital status, 188 (67.6%) were married and 156 (56.1%) were diploma midwives. More than half of them (181, 65.1%) were from hospitals and 155 (55.8%) had no training related to AMTSL. From the total study participants, 111 (39.9%) had 5-9 years of experience years in attending labor and 146 (52.5%) reported that they did not have reading material related to AMTSL in their health institutions. All of them (278, 100%) had uterotonics in their health facilities (Tables 1 and 2).

3.2. Knowledge of Midwives on Active Management of the Third Stage of Labor. The study found that from the total midwives included in the study (N = 278), more than half of them (170, 61.2%) were good in knowledge towards AMTSL and 108 (38.8%) were poor in the knowledge of AMTSL. The majority of them (230, 82.7%) knew all the essential components of AMTSL. Around 246 (88.5%) correctly answered the recommended dose of oxytocin for the management of AMTSL as 10 IU. The majority of midwives (246, 88.5%) knew the time of administration of oxytocin for management of AMTSL which is within one minute of delivery of the baby. More than half of them (179, 64.4%) knew that the frequency of uterine massage after delivery of the baby is every 15 minutes for the 1st 2 hrs (Table 3 and Figure 1).

3.3. Practices of Midwives on Active Management of the Third Stage of Labor. In this study, the overall good practice and poor practice of midwives towards active management of the third stage of labor were 121 (43.5%) and 157 (56.5), respectively. All of them (278, 100%) were observed while they administer 10 IU of oxytocin in the IM route of
administration. Almost all of them (270, 97.1%) gave oxytocin within one minute of the delivery of the baby. The majority of them (199, 71.6%) correctly applied CCT as per protocol. Regarding immediate uterine massage and extraction of the membrane gently with lateral movement, the majority, 206 (74.1%) and 199 (71.6%), of midwives, respectively, were observed while they did the procedure correctly (Table 4 and Figure 2).

3.4. Factors Associated with Knowledge of Midwives towards AMTSL. On multiple logistic regressions, training related to AMTSL and practice level of midwives became significantly associated with the knowledge level. Accordingly, those midwives who had training related to AMTSL were 2 times more likely to be knowledgeable when compared with their counterparts (AOR = 2.119, 95%CI = 1.141-3.393). Those midwives who were good in practice were 8 times more likely to be knowledgeable than those who were poor in practice towards AMTSL (AOR = 8.089, 95%CI = 4.103-15.950) (Table 5).

3.5. Factors Associated with the Practice of Midwives towards AMTSL. On multiple logistic regression analysis, three variables (educational level of midwives, training related to AMTSL, and knowledge level of midwives towards AMTSL) were significantly associated with the practice level of midwives. Degree midwives were 4 times more likely to be good in practice than diploma holders (AOR = 3.811, 95%CI = 2.015-7.210). Those midwives who took training related to AMTSL were 3 times more likely to be good in practice than their counterparts (AOR = 2.591, 95%CI = 1.424-4.714). Moreover, those midwives who were good in knowledge were 7 times more likely to be good in practice than those who were poor in knowledge (AOR = 7.324, 95%CI = 3.739-14.393) (Table 6).

4. Discussion
The main aim of this study was to assess midwife knowledge, practice, and associated factors towards active management of the third stage of labor at governmental health institutions in the Tigray region, 2018. In this study, the overall knowledge and practice of midwives towards active management

| Variables | Frequency (n = 278) | Percentage (%) |
|-----------|-------------------|----------------|
| Age       |                   |                |
| 20-30     | 107               | 38.5           |
| 31-40     | 119               | 42.8           |
| 41-50     | 45                | 16.2           |
| Greater than 50 | 7     | 2.5            |
| Sex       |                   |                |
| Female    | 215               | 77.3           |
| Male      | 63                | 22.7           |
| Religion  |                   |                |
| Orthodox  | 277               | 99.6           |
| Muslim    | 1                 | 0.4            |
| Ethnicity |                   |                |
| Tigray    | 278               | 100            |
| Marital status |   |                |
| Single    | 69                | 24.8           |
| Married   | 188               | 67.6           |
| Divorced  | 18                | 6.5            |
| Widowed   | 3                 | 1.2            |
| Educational level | |                |
| Diploma midwife | 156 | 56.1          |
| Degree midwife | 122 | 43.9          |
| Workplace |                   |                |
| Health center | 97 | 34.9          |
| Hospital  | 181               | 65.1           |
| Years of experience in attending labor | |
| 6 months-4 years | 102 | 36.7          |
| 5 years-9 years | 111 | 39.9          |
| Greater than 9 years | 65 | 23.4          |

| Variables | Frequency (n = 278) | Percentage (%) |
|-----------|-------------------|----------------|
| Training related to AMTSL | | |
| No        | 155               | 55.8           |
| Yes       | 123               | 44.2           |
| Availability of reading material in health institutions | | |
| No        | 146               | 52.5           |
| Yes       | 132               | 47.5           |
| Availability of uterotonic drugs | | |
| No        | 0                 | 0              |
| Yes       | 278               | 100            |
of the third stage of labor were 61.2% and 43.5%, respectively. This finding is in line with the study conducted in Nigeria and Ethiopia, Addis Ababa, which showed that the overall knowledge and practice of midwives towards AMTSL were 66.7%, 41.7% and 51.5%, 47%, respectively [21, 22].

This might be due to the similarity in sociodemographic status of study participants in which midwives from both health center and hospitals were included in the study but higher than the study conducted in Ethiopia, Hawassa, and study conducted in Sudan which showed that 33.3%, 16.7% and 15.6%, 26.7% of study participants were good in knowledge and good in practice, respectively [16, 17]. This difference might be due to the difference in the educational level of study participants conducted among midwives where there were a large number of diploma holders.

Again, the finding of this study was much higher than the result of the study conducted in Sudan which showed that only 48% knew the variable [25]. This difference might be due to the absence of training and educational level of study participants in Tanzania; from 87 midwives involved in the study, only one midwife was a degree holder.

This study result regarding overall knowledge of midwives towards AMTSL was much lower than the study result conducted in Southwest Nigeria which showed that 90.6% of the respondents had good knowledge in AMTSL [24]. The study was conducted only in public tertiary hospitals, and this might be what brought the difference.

This study found that knowledge of study participants concerning the recommended time of oxytocin administration which is within one minute of delivery of the baby as per guideline of FIGO/ICM was 88.5%. This finding is higher than the result of the study conducted in Sudan which showed that only 48% knew the variable [25]. This difference might be due to the absence of training and educational level of study participants in the study area.

Regarding knowledge of three essential components of AMTSL in this study, 82.7% of the study participants knew

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Table 3: Knowledge of midwives towards active management of the third stage of labor in governmental health institutions in the Tigray region, Ethiopia, 2018.

| Variables                                      | Response options                                      | Frequency (n = 278) | Percentage (%) |
|------------------------------------------------|-------------------------------------------------------|---------------------|----------------|
| Essential components                           | (i) Administer uterotonic drugs                       | 34                  | 12.2           |
|                                                 | (ii) Apply CCT                                        | 6                   | 2.2            |
|                                                 | (iii) Uterine massage                                 | 8                   | 2.9            |
|                                                 | (iv) All                                               | 230                 | 82.7           |
| Role immediately after delivery of the 1st baby | (i) Administer uterotonic drugs                       | 91                  | 32.7           |
|                                                 | (ii) Check the presence of another baby               | 170                 | 61.2           |
|                                                 | (iii) Uterine massage                                 | 17                  | 6.1            |
| Recommended dose of oxytocin for active management of third stage of labor | (i) 0.5 mg                                             | 14                  | 5.0            |
|                                                 | (ii) 10 IU                                            | 246                 | 88.5           |
|                                                 | (iii) 10 mg                                           | 10                  | 3.6            |
|                                                 | (iv) 0.5 IU                                           | 8                   | 2.9            |
| Recommended route of oxytocin for management of AMTSL | (i) IV                                                 | 33                  | 11.9           |
|                                                 | (ii) IM                                                | 245                 | 88.1           |
| Time of administration of oxytocin for active management of third stage of labor | (i) After delivery of anterior shoulder of baby       | 6                   | 2.2            |
|                                                 | (ii) Within one minute of delivery                    | 246                 | 88.5           |
|                                                 | (iii) Within 3 minutes of delivery                    | 14                  | 5.0            |
|                                                 | (iv) More than 3 minutes                              | 12                  | 4.3            |
| How often you perform uterine massage          | (i) Every 10 minutes for the 1st 2 hrs                 | 62                  | 22.3           |
|                                                 | (ii) Every 15 minutes for the 1st 2 hrs                | 179                 | 64.4           |
|                                                 | (iii) Every 30 minutes for the 1st 2 hrs               | 31                  | 11.2           |
|                                                 | (iv) Every 1 hr for the 1st 2 hrs                      | 6                   | 2.2            |

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Figure 1: Knowledge of midwives towards three uterotonic agents in governmental health institutions in the Tigray region, Ethiopia, 2018.
all of the essential components. This result is much higher than the result of the study conducted in Tanzania which showed that only 9% of the study participants were knowledgeable on three essential components of AMTSL [25]. This difference might be due to the time difference between these two studies and the difference in the national guideline.

Concerning the recommended dose and route of oxytocin administration knowledge, this study found that 88.5% and 88.1% of midwives were knowledgeable, respectively. This finding is similar to the study conducted in Hawassa City, Ethiopia, which indicated that 86.1% and 81.9% of the study participants were knowledgeable [16]. This study showed that those midwives who took training related to AMTSL were 2 times more likely to be knowledgeable compared to their counterparts and those midwives who were good in practice were 8 times more likely to be knowledgeable compared to those midwives who were in a poor practice level. This result is in line with the study conducted in Addis Ababa which showed a significant association between midwives’ practice level and knowledge [26]. This similarity might be due to the fact that those who had good skills update themselves daily and reason out why and how they perform every step in their skill.

This study found that around 64.7% of the study participants palpated the maternal abdomen to rule out the presence of another baby, which is higher than the result of the study conducted in Tanzania which showed that only 9% of the study participants were knowledgeable on three essential components of AMTSL [25]. This difference might be due to the time difference between these two studies and the difference in the national guideline.
presence of another fetus before administration of the uterine

tonic drug. This is in line with the result of the study con-
ducted in Ethiopia which was 65% [16]. This similarity
might be due to the characteristics of the study area, which
include both hospital and health center midwives.
But it is lower than the result of the study conducted in
Ethiopia (82.4%) and another study conducted in Ethiopia
(82.3%) of study participants who had palpated the maternal
abdomen before the administration of uterotonic drugs
[22, 26]. Both of the studies conducted in the capital city
of Ethiopia, Addis Ababa, brought the di-

erence. This study showed that completeness of the placenta and

membrane and assessing maternal genitalia for tear and

trauma were assessed in 67.3% and 74.5%, respectively. This
result is lower than the result of the study conducted in Nepal

which showed 98.1% and 97% of the study participants who

were observed while they did, respectively [27]. This differ-

ence might be due to the difference in the study area, which

was conducted only in the hospital which was a training
center.
According to this study result, around 74.1% of the study

participants were observed while they immediately massage
the uterus after delivery of the placenta. This finding is in line
with the study conducted in Southwest Nigeria (73.3%) and

Sudan [17, 21]. This might be due to the similarity of the

sociodemographic status of the study participants in which

midwives working in hospitals and health centers were

included especially for the first research.

The majority of these study participants (75.5%) were

observed while they ensured that the uterus did not relax
after stopping the uterine massage. This study result is in line
with the study conducted in Ethiopia which showed that

74.3% of midwives have performed the procedure [22].

According to this study result, the overall practice of

AMTSL is 43.5%. This result is in line with the study con-
ducted in Netherlands (48%) and Nigeria (42%), respectively
[28, 29], but much higher than the result of the study con-
ducted in Tanzania and study conducted in some rare devel-
oping countries in which only 7% and 5-32% were good in

practice towards AMTSL, respectively [25, 30]. This di-

ference might be due to the time di-

erence at which the study

was conducted and the national guideline of Tanzania which

supports the administration of 0.5 mg IM ergometrine or

5 IU of oxytocin rather than 10 IU of oxytocin for active

management of the third stage of labor.

The educational level of midwives, training related to

AMTSL, and knowledge level of midwives were signi-
cficantly

associated with the midwives’ practice level. Those degree
midwives were 4 times more likely to be good in practice

towards AMTSL than diploma holders. Those midwives
who took training related to AMTSL were 3 times more likely
to practice active management of the third stage of labor than

| Variables                  | Knowledge | Crude OR | Adjusted OR (95% CI) | p value |
|----------------------------|-----------|----------|----------------------|---------|
| Sex                        | Good in knowledge | Poor in knowledge |          |         |
| Female                     | 124 (72.9%) | 91 (84.3%) | 1                    | 1       |
| Male                       | 46 (27.1%)  | 17 (15.7%) | 1.986                | 1.518 (0.730, 3.155) | 0.264 |
| Workplace                  | Good in knowledge | Poor in knowledge |          |         |
| Health center              | 47 (27.6%)  | 50 (46.3%) | 1                    | 1       |
| Hospital                   | 123 (72.4%) | 58 (53.7%) | 2.256                | 1.694 (0.841, 3.414) | 0.140 |
| Educational status         | Good in knowledge | Poor in knowledge |          |         |
| Diploma midwives           | 79 (46.5%)  | 77 (71.3%) | 1                    | 1       |
| Degree midwives            | 91 (53.5%)  | 31 (28.7%) | 2.861                | 1.393 (0.723, 2.682) | 0.322 |
| Training                   | Good in knowledge | Poor in knowledge |          |         |
| No                         | 77 (45.3%)  | 78 (72.2%) | 1                    | 1       |
| Yes                        | 93 (54.7%)  | 30 (27.8%) | 3.140                | 2.119 (1.141, 3.3937) | 0.017* |
| Years of experience        | Good in knowledge | Poor in knowledge |          |         |
| 0-4                        | 66 (38.8%)  | 36 (33.3%) | 1                    | 1       |
| 5-9                        | 69 (40.6%)  | 42 (38.9%) | 0.636                | 1.154 (0.540, 2.464) | 0.712 |
| Greater than 9 years       | 35 (20.6%)  | 30 (27.8%) | 0.942                | 0.942 (0.447, 1.983) | 0.875 |
| Reading materials          | Good in knowledge | Poor in knowledge |          |         |
| No                         | 83 (48.8%)  | 63 (58.3%) | 1                    | 1       |
| Yes                        | 87 (51.2%)  | 45 (41.7%) | 1.467                | 1.003 (0.511, 1.968) | 0.993 |
| Practice level             | Good in knowledge | Poor in knowledge |          |         |
| Poor in practice           | 64 (37.6%)  | 93 (86.1%) | 1                    | 1       |
| Good in practice           | 106 (62.4%) | 15 (13.9%) | 10.269               | 8.089 (4.103, 15.950) | ≤0.001* |

N.B 1 = reference category; * significance at p value < 0.05 in multivariate regression.
their counterparts. Those midwives who were in good knowledge levels were 7 times more likely to practice AMTSL when compared to those with a poor knowledge level. This result is in line with the result of the study conducted in Ethiopia which showed the association of the educational level, training, and knowledge level of midwives towards active management of the third stage of labor [26].

5. Conclusion

The overall knowledge and practice of midwives towards active management of the third stage of labor in this study were in line with the study conducted in Nigeria and the study conducted in Addis Ababa, Ethiopia. Training related to active management of the third stage of labor and practice level of midwives towards active management of the third stage of labor were significantly associated with the knowledge level of midwives. The educational level, training related to active management of the third stage of labor, and knowledge level of midwives were significantly associated with the practice level of midwives towards active management of the third stage of labor. Midwives should update their academic level and knowledge and improve their skills to provide fruitful service towards AMTSL and save mothers’ lives. Health institutions should arrange training for all midwives, and the regional government should upgrade the midwives’ educational level.

### Abbreviations

| Abbreviation | Description |
|--------------|-------------|
| AOR          | Adjusted odds ratio |
| AMTSL        | Active management of the third stage of labor |
| BEmONC       | Basic emergency obstetric and newborn care |
| CCT          | Controlled cord traction |
| EDHS         | Ethiopian Demographic and Health Survey |
| FIGO         | International Federation of Gynecology and Obstetrics |
| FMOH         | Federal Ministry of Health |
| ICM          | International Confederation of Midwives |
| SPSS         | Statistical Package for the Social Sciences |
| WHO          | World Health Organization |

### Data Availability

All data generated/analyzed during this study are included in this published article. Besides, part of the row datasets will be available from the corresponding author on a reasonable request.

### Additional Points

**Limitations.** Factors like the number of midwives in the delivery room, conduciveness of the delivery room, attitude of midwives towards AMTSL, the health status of study participants, and other unmentioned factors that might affect the knowledge and practice of midwives towards AMTSL were not addressed in this study.
Ethical Approval

Ethical clearance was obtained from the research and ethical review board of Mekelle University, and permission was obtained from the Public Health Institute of the Tigray region and all governmental health institutions where the study was conducted. The research proposal was evaluated and approved by the Research Ethics Review Committee (HRERC 1165/2018) of the College of Health Sciences.

Consent

After informing participants about the purpose of the study, the importance of their participation, and their right to withdraw at any time, verbal consent was obtained. Privacy was assured by interviewing in a separate room, and confidentiality of information given to each respondent was maintained by using codes and anonymity.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors’ Contributions

GE conceptualized the study, made a substantial contribution to the design and collection of data, and was involved in data analysis, report writing, and manuscript preparation. GW participated in the design, data collection, review of the manuscript, and final approval for publication. Both authors read and approve the final manuscript.

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