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The constraints for provision of appropriate preeclampsia screening service in health institutions in Mekelle City, Tigray, Ethiopia, 2019/20 G.C.

A Thesis Report submitted to the School of Public Health, College of Health Sciences, Addis Ababa University, in partial fulfillment of the requirements for the degree of Masters of Public Health

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Abbreviations and acronyms

ANC……Antenatal Care

ASSIST……...Applying Science to Strengthen and Improve Systems Project

BMI…….Body Mass Index

BP……....Blood Pressure

CHEW…….Community Health Extension Workers

EDHS……...Ethiopian Demographic Health Survey

FIGO……the International Federation of Gynecology and Obstetrics

FMOH……...Federal Ministry of Health

HTN……..Hypertension

IQR……...Inter Quartile Range

MAP……..Mean Arterial Pressure

MCH……..Maternal and Child Health

MCPC……Managing Complications in Pregnancy and Childbirth

PAPP-A…….Pregnancy Associated Plasma Protein-A

PE/E……...Preeclampsia/Eclampsia

PHC……...Primary Health Care

PLGF…….Placental Growth Factor

PRECOG……Preeclampsia Community Guidelines

QI……Quality Improvement

SD……...Standard Deviation

SHC……Secondary Health Center

U/A…….Urine Analysis

USAID……...United States Agency for International Development

UTPI……...Uterine artery Pulsatility Index

WHO……..World Health Organization

Abstract/summary

Background: Pre-eclampsia/eclampsia is one of the leading causes of maternal and perinatal morbidity and mortality worldwide affecting 2–8% of pregnancies. In Ethiopia severe pre-eclampsia/ eclampsia accounts for 11% of maternal deaths among the five major causes. Optimizing health care to prevent and treat women with hypertensive disorders is a necessary step towards reducing maternal and infant mortality and morbidity. Many developing countries including Ethiopia face difficulties in using world health organization recommended practices for preeclampsia screening. Therefore, the aim of this study is to assess the factors or constraints associated with preeclampsia screening.

Objective: To assess the status of appropriate preeclampsia screening service during antenatal care follow-ups and the constraints for the provision of this service in health institutions in Mekelle, Tigray, Ethiopia from April to September 2020 G.C.

Method: Institution based quantitative cross sectional study design with internal comparison was applied in Mekelle city, Ethiopia from April to September 2020 G.C. A total of 268 samples; Doctors, health officers, midwives and nurses in antenatal care unit of the governmental and private health institutions in Mekelle were interviewed. The data collection was done through observation, reviewing of clients' charts and interviewer administered questionnaires by trained data collectors. Quota sampling method was used to select the health workers in the antenatal care stream. Multiple logistic regression was applied to identify the factors and adjusted odds ratio (AOR) with corresponding 95% confidence interval was used to show the strength of association and a P value of <0.05 was used to declare statistical significance.

Result: The magnitude of appropriate preeclampsia screening service among the health professionals was 140 (52.2% with 95% CI: 46.1-58.4). The factors significantly associated with appropriate preeclampsia screening were; profession type for one category i.e. nurses (AOR=0.045, 95% CI: 0.01-0.197), level of knowledge (AOR =4.17, 95% CI: 1.903-9.142), resources i.e. health workers in the ANC unit, BP cuffs, urine containers, dipsticks and laboratory (AOR =2.55, 95% CI: 1.091-5.965) and guideline 22.14 (AOR=22.14, 95% CI: 6.539-74.947).

Conclusion: Around half i.e. 47.8% of the health professionals were not providing appropriate preeclampsia screening service due to different reasons from lack of knowledge to lack of resources and guideline issues which indicates that work still needs to be done on these areas in order to improve appropriate preeclampsia screening service.

1. Introduction

1.1. Background

Pre-eclampsia is a pregnancy-specific hypertensive disorder that occurs after 20 weeks of gestation and is characterized by new onset of hypertension i.e. blood pressure of 140/90 mm hg or more and the presence of total protein in 24 hours urine of more than 0.3 gm. If undetected early, it can lead to eclampsia which is a complication of pre-eclampsia and one of the top five direct causes of maternal and infant adverse outcomes (1,2). Preeclampsia is a multisystem disorder that affects the liver, kidney and cause clotting in pregnancy as well as potential fetal growth restriction and premature delivery (3). Its severest form eclampsia is defined as the new onset of grand mal seizure(s) and/or unexplained coma during pregnancy or postpartum in a woman with pre-eclampsia (4).

Although the exact cause of preeclampsia is not known there are some risk factors which are believed to cause preeclampsia. These are; Primigravida or first pregnancy i.e. first time exposure to chorionic villi, young age, previous and/or family history of hypertension, placental abnormalities, molar pregnancy, multiple pregnancy, diabetes, obesity: BMI >35 kg/M2, pre-existing vascular disease, new paternity and thrombophilias. The definitive treatment of preeclampsia is delivery of the placenta and it usually completely subsides after that (5). For women at high risk of developing preeclampsia low-dose acetylsalicylic acid (aspirin, 75 mg) is recommended for its prevention and should be initiated before 20 weeks of pregnancy. Women with severe hypertension during pregnancy should receive treatment with antihypertensive drugs. Magnesium sulfate is recommended for the prevention of eclampsia in women with severe pre-eclampsia and for the treatment of women with eclampsia in preference to other anticonvulsants (6).

Preeclampsia has adverse outcomes both to the mother and to the child if undetected early. Not only immediate complications but it's also associated with long term morbidities. The immediate adverse outcomes are well known like preterm birth, low birth weight of the born child and asphyxia; increased chance of cesarean delivery, post-partum hemorrhage to the mother. The long term effects include; the hypertension might persist even after delivery, renal impairment, metabolic syndrome and diabetes for the mother (7). For the born child; it results in increased risk of insulin resistant diabetes mellitus, coronary artery disease and hypertension (8). It also affects its neurobehavioral development in the long run; it results in delay in the developmental mile stones (9, 10).

Pre-eclampsia/eclampsia is one of the leading causes of maternal and perinatal morbidity and mortality worldwide and it affects 2–8% of pregnancies. It is an important cause of severe morbidity, long term disability and death among both mothers and their babies. Globally, 76,000 women and 500,000 babies die each year from this disorder (11). It is associated with 10–15% of

direct maternal deaths and up to 25% of stillbirths and newborn deaths in developing countries (12). In Africa and Asia, nearly one tenth of all maternal deaths are associated with hypertensive disorders of pregnancy (13). In Ethiopia the major direct obstetric complications (hemorrhage, obstructed labor, pre-eclampsia/eclampsia, unsafe abortion, sepsis) account for 85% of the maternal deaths and several acute and chronic illnesses (14). Among the five major causes of maternal deaths; severe pre-eclampsia/ eclampsia (PE/E) accounts for 11% of the deaths reported in 2013 (15). The pooled prevalence of preeclampsia in Ethiopia as reported in 2018 is 5.47%. (16).

The majority of deaths due to pre-eclampsia/eclampsia are avoidable through the provision of timely and effective care to the women presenting with these complications. Optimizing health care to prevent and treat women with hypertensive disorders is a necessary step towards reducing maternal and infant mortality and morbidity (17). Hence; the aim of screening is to identify and diagnose the condition early in its course to allow closer monitoring and effective management. Blood pressure measurement and testing for protein uria have long been routine primary care screening tools for preeclampsia and are core components of the diagnostic criteria (18).

1.2. Statement of the problem

Studies show that many developing countries including Ethiopia have low preeclampsia screening practices unlike the developed countries.

A survey study done in the developed country United States of America on the screening practice for preeclampsia shows that 80% of pregnant women had a medical history taken, and 98% had their weight and height measured in the first or second prenatal visit, 96% received blood pressure measurement and urine dipstick tests at every prenatal visits were 94% (18).

A research done in six sub Saharan African countries including our country Ethiopia, Kenya, Madagascar, Mozambique, Rwanda, Tanzania and Zanzibar, observed ANC consultations and labor & delivery cases showed low use of WHO recommended practices for PE/E screening and management. The study used different sample sizes for all of the counties the lowest being 9 institutions from Zanzibar and the highest 409 institutions from Kenya. In all of the countries both hospitals and lower level health institutions were included except in Ethiopia which were all hospitals. The study used observation checklists based on WHO Managing Complications in Pregnancy and Childbirth (MCPC), Edition 1, where ANC consultations and deliveries were observed at each health facility.

In Ethiopia 19 study facilities were included. Total deliveries observed, initial assessment observed, ANC consults observed during the study were 192, 107 and 126 respectively. During history taking asking about headache or blurred vision was 32%, asking for at least one danger

sign and taking BP with a proper technique was 32%, performing or referring for urine test was 66%, which are higher than the rest except for Zanzibar's 51%, 55% and 86% respectively. Asking about swollen hands or face was 16% which is the lowest compared to the rest of the countries. Taking clients BP with a proper technique was 89%; this is higher than the rest except for Kenya's 96%. Up on admission to labor and delivery, though the initial blood pressure check was the highest along with Zanzibar's 85%, testing urine for the presence of protein was lower (8%) than Zanzibar's and Kenya's. Recording BP at least 4 hours apart when diastolic >90mmhg was the lowest (8%) than all of the countries (19).

The above results are from hospitals which are believed to be more resourceful than lower level health centers. The percentage of screening by asking about danger signs of pregnancy was less than half. On the contrary taking blood pressure with the proper technique during ANC was as high as 89%.

According to the 2016 EDHS (Ethiopian Demographic Health Survey) report also, from the 62% of pregnant women that had at least one ANC visit; 75% of them had their blood pressure measured and 66% had a urine test (20).

Therefore this particular thesis tends to assess and fill the gap in knowledge about the constraints to providing appropriate preeclampsia screening; including national policy factors, health workers' knowledge and perception as well as resources since there are no previous studies regarding this issue in our country's context. It is observed that our country faces difficulties in using WHO recommended practices for preeclampsia screening and hence providing early management. So, this study considered this particular statement of problem as a basis for initiation.

1.3. Rationale/ significance of the study

Preeclampsia has adverse effects to the mother and the child both immediately and in the long run but its effect could be prevented through early detection and management. Therefore more focus needs to be given to identifying preeclampsia early during pregnancy so as to improve the birth outcome. But a previous study done in six African countries where Ethiopia was included shows that there is low level of preeclampsia screening in our country. So the aim of this study is to identify the factors associated with preeclampsia screening; the constraints or barriers to appropriate screening so as to work on them and improve.

This study will be helpful for health providers, policy makers and other concerned bodies for giving insight about whether more focus to early detection i.e. screening of preeclampsia during ANC follow up is currently being given, for identifying the hindering factors to appropriate preeclampsia screening in the health institutions in order to improve and integrate the screening activities. And it will also be helpful as a base for further studies on this area.

2. Literature review

2.1. Appropriate preeclampsia screening

According to the PRECOG (preeclampsia community guidelines) assessment of risk should be performed before 20 weeks of gestation and women should be referred for expert evaluation by specialist if they have either had a previous preeclampsia, a multiple pregnancy, preexisting underlying medical conditions like renal disease or chronic hypertension or any two other risk factors from a list. Assessments done after 20 weeks of gestation by identifying possible onset of preeclampsia from signs and symptoms including new hypertension, new protein uria, headache, visual disturbance, epigastric pain, vomiting, reduced fetal movements and an infant that is small for gestational age can help identifying high risk cases for referral to specialist care (21).

Also FIGO (the international federation of gynecology and obstetrics) initiative on preeclampsia outlines standard guides for first trimester screening of preeclampsia based on high quality evidence. FIGO calls for universal screening of all pregnant women at first trimester by combined test with maternal risk factors and biomarkers as a one-step procedure. The best combined test being one that includes maternal risk factors, measurement of Mean Arterial Pressure (MAP), serum Placental Growth Factor (PLGF), Pregnancy Associated Plasma Protein A (PAPP-A) and Uterine artery Pulsatility Index (UTPI) during 11-13 weeks of gestation. It also states that where it's not possible to measure PLGF and UTPI due to limited resources the baseline screening should be a combination of maternal risk factors with MAP and not maternal risk factors alone (22).

Another study suggests that screening for preeclampsia, risk assessment and classification according to the level of risk begins at the first prenatal visit that takes place after 20 weeks of gestation. Particular emphasis is given to the identification of risk factors for developing preeclampsia and to the screening process. As clinical risk factors have a low positive predictive value they should be supplemented by other measures such as taking blood pressure and assessing protein in the urine (23). The WHO ANC model is in support of this study. It calls for a blood pressure check in the second ANC visit in addition to testing protein uria in nulliparous women or in women with previous preeclampsia (21).

Even though the guides to screen for preeclampsia before 20 weeks of gestation proposed by PRECOG and FIGO are important for preventing it and should be further strengthened in the future, currently they are not suitable for resource limited areas and they are non specific. Giving focus to the specific aspects of preeclampsia since it develops after 20 weeks of gestation and trying to detect it at this stage is also early and can prevent its progression through closer monitoring and effective management. So this study will focus on preeclampsia screening after 20 weeks of gestation.

2.2. Factors associated with preeclampsia screening

2.2.1. Socio-demographic factors

A study done in Pakistan as a result of the USAID missions around the globe in reducing maternal mortality and morbidity which was carried out in two districts in two provinces of Pakistan, which used desk review of documents, qualitative and quantitative methods for the data collection and which stated that there were critical gaps in provision of ANC i.e. service providers frequently missed important steps, such as taking a proper history of the patient, advising urine tests (protein) and blood tests (hemoglobin), measuring height, and checking for edema especially among providers at secondary healthcare facilities showed that education level was important in preeclampsia screening i.e. doctors were more knowledgeable with regard to the risk factors that are associated with the occurrence of PE/E and when to prescribe prophylactic drugs (24).

2.2.2. Knowledge of health personnel

The study done in Pakistan showed that very few service providers were aware of policy directives (Aspirin as prophylaxis, diagnostic laboratory tests, and use of MgSO4) for preventing, detecting, and managing PE/E. According to WHO recommendations, aspirin is the drug of choice for PE/E prophylaxis and the study found that nearly half of the doctors and a tenth of other providers correctly mentioned aspirin as a drug for prophylaxis. It also found that in the two districts, 85 percent of doctors and 65 percent of other service providers can correctly define hypertension during pregnancy.

Overall the study found history taking to be a very weak area of performance among most service providers in all surveyed facilities. Most of the service providers rarely attempted to find out whether the client had any history of hypertension or other diseases, or was experiencing any signs and symptoms of PE/E as a result of lack of knowledge (24).

An intervention done in Jinja, Uganda from June 2015 through March 2017 where the USAID ASSIST (Applying Science to Strengthen and Improve Systems Project) implemented an improvement activity in a “slice” of the health care system with an emphasis on improving screening, diagnosis, treatment and referral of preeclampsia/eclampsia as one of the major causes of preventable maternal deaths. The improvement intervention was implemented in 10 high-volume health facilities, which were randomly selected from the catchment area of the Jinja regional referral hospital. Nine additional randomly selected facilities were included to serve as a control group. Baseline and end line assessments were conducted in both the intervention and control groups to measure the impact of the interventions.

The study first identified obstacles that were present and then successful tested changes to improving screening for PE/E were performed. So accordingly, weak knowledge and skills of health personnel was one factor or obstacle to preeclampsia screening among the many obstacles they found (25).

2.2.3. Resources

The study done in Pakistan also found that basic medical equipment was available within all facilities assessed in both districts, such as sphygmomanometers, normal saline and intravenous (IV) cannulas. However, urine testing equipment essential for testing of protein uria that helps in the diagnosis of Preeclampsia was not available at one basic health unit in Chakwal and two rural health centers in Thatta (24).

The other factors identified in the study done in Jinja, Uganda were; heavy workload of midwives, scarce blood pressure cuffs, long wait times at laboratory so mothers leave without being tested, scarce availability of dipsticks and lack of urine containers for testing protein in urine (25).

Another study done in Ogun state, Nigeria which combined qualitative (focused group discussions and in depth interview) and desk review methods to collect data from health personnel and health institutions found the non-availability of health personnel as major challenge, and that this resulted in a high proportion of facility-based care being performed by community health extension workers (CHEW). The study stated that the knowledge and ability of CHEWs to perform basic clinical assessments, such as measure blood pressure was not in doubt though there were divergent views by senior and junior cadres of health practitioners about CHEWs' abilities in providing obstetric care.

It also found that unlike blood pressure, protein uria assessment was rarely performed during antenatal screening by CHEWs due to lack of equipment. CHEWs relied heavily on observed symptoms associated with pre-eclampsia and eclampsia to assess risk (26).

2.2.4. Guideline

As mentioned by the study done in Pakistan, the positive finding was that protocols for preventing and managing eclampsia have been developed and were widely available at all health facilities even though they recommended provision of an ANC checklist because it was absent at the time of the study and many of the health personnel missed steps such as taking clients' history during ANC visits, BP measurement and advising urine test for protein which are

important parts of preeclampsia screening (24). The study done in Jinja Uganda also showed that the availability of guideline was associated with proper preeclampsia screening (25).

According to the above studies in our continent Africa and Asia, the major constraints to appropriate preeclampsia screening identified in the study places were; lack of health personnel who are knowledgeable and even if there were, they missed essential steps in the diagnosis of preeclampsia during ANC visits, lack of equipment for laboratory testing of urine and lack of clear guidelines or checklists of what to do in order to detect preeclampsia during ANC visits.

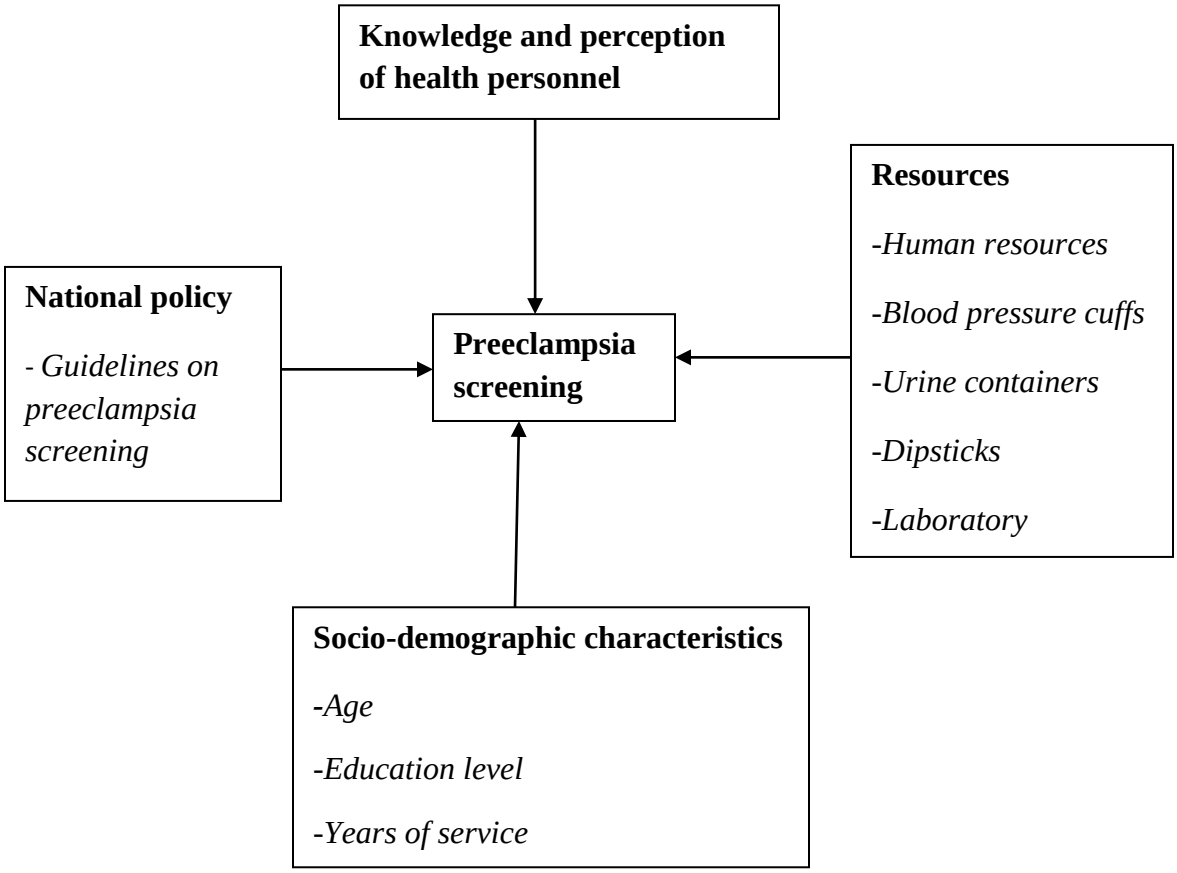

Figure1: Conceptual frame work of the factors associated with preeclampsia screening service; developed after reviewing related literature, 2019/20 G.C.

3. Objectives

3.1. General objective

- To assess the status of appropriate preeclampsia screening service during ANC follow-ups and the constraints for the provision of this service in the health institutions in Mekelle, Ethiopia from April to September 2020 G.C.

3.2. Specific objectives

- To determine the status of appropriate preeclampsia screening service during ANC follow ups in the health institutions in Mekelle, Ethiopia from April to September 2020 G.C.

- To identify the constraints to providing appropriate preeclampsia screening service during ANC follow ups in the health institutions in Mekelle, Ethiopia from April to September 2020 G.C.

4. Methodology

4.1. Study design

Institution based quantitative analytical cross sectional study design was applied.

4.2. Study area and period

The study was conducted in Mekelle, the capital city of Tigray which is located in northern part of Ethiopia; starting from April to September, 2020 G.C. There are seven sub cities with a total population of 376,533 and around 76 health institutions in Mekelle.

4.3. Population

4.3.1. Source population

The source population was health workers (Doctors, health officers, nurses, midwives and others) who work in the antenatal care unit of private and governmental health institutions found in Mekelle.

4.3.2. Study population

The study population was health workers in the antenatal care unit of private and governmental health institutions who were selected through quota sampling.

4.4. Sample size

Sample size was calculated using EPI info for each of the objectives with 95% level of confidence.

For the first objective i.e. determining the status of appropriate preeclampsia screening service: - sample size was calculated using expected frequency of the outcome; inappropriate preeclampsia screening of 78% in Rwanda, taken from a study done in six sub-Saharan African countries (19). The sample size became 263.

For the second objective i.e. identifying the constraints: - sample size was calculated using 80% power and ratio of exposed to unexposed of 1; with the assumptions of 38% among controls who were unexposed to sharing of BP machines, periodic training etc..., taken from a study done in Jinja, Uganda (26) and the odds ratio of 2. The sample size became 268. Sample size calculated by Kelsey was taken for each.

Taking the maximum of the two samples, the final sample size was 268.

4.5. Sampling procedures

There were 13 governmental and 27 private health institutions included in this study. Quota method of sampling was used to include the health workers. The health professionals working in the ANC units ranged from 2 (in some of the private health institutions) to 20 (in the governmental hospitals) totally i.e. not at a time. Five governmental health institutions found in the small towns surrounding Mekelle city were also included in order to reach the final sample size.

4.6. Eligibility criteria

- Health workers in the ANC unit of the health institutions which provide ANC services.
- The first clients met whose first ANC visit beyond 20 weeks of gestation (NB. not necessarily their first ANC visit i.e. they might have had a previous visit while they were less than 20 weeks of gestation) was on the day of data collection were selected for observation.

4.7. Data collection procedures

The data collection was conducted by observing the first ANC visit of pregnant women after 20 weeks of gestation with observation checklist, looking at the clients' charts to check for history of risk assessment of preeclampsia if they had a previous visit and interviewing the health workers. The observation check list was adopted from an observational cross sectional study done in six sub Saharan African countries which was based on the WHO's Management of Complications in Pregnancy and Childbirth (MCPC) reference manual (19). The questionnaire was prepared in English and translated in to Tigrigna and then translated back to English to check for consistency. The knowledge and perception questions on the questionnaire were adopted from a study done in Nigeria (27). The data collection was done by the Tigrigna version of the questionnaire.

4.8. Data quality management

To ensure data quality and the externality of the data collectors which were interns; two days of intensive training was provided by the researcher. The training was also aimed at gathering the correct information by reducing observation bias and Hawthorne effect. The observation check list had clearly defined and objective components which reduce observation bias. Hawthorne effect was possibly reduced by creating a non-threatening environment because the data collectors were interns; which helped in them not being considered as outsiders and also because

of the relaxed approach of the data collectors to the health workers in order to help them act naturally.

In order to check the validity of the questionnaire, it was reviewed by two external reviewers and revised based on the comments. Pre testing was done on 20 health professionals. The questionnaire was revised based on the pretest and unclear questions were rewritten and also the consistency of data collection among the data collectors was checked. The reliability analysis of the questionnaire was done using cronbach's alpha which was 0.71 for the perception section and 0.697 for the knowledge section. The data from pretesting wasn't included in the analysis. During the data collection supervisors checked each questionnaire and observation check list for their completeness. Data was entered carefully through EPI data, which was provided with checks so that only the correct data is entered.

4.9. Dependent and independent variables

4.9.1. Dependent variable

- Appropriate preeclampsia screening

4.9.2. Independent variables

Presence or absence of;-

- Human resources
- Blood pressure cuffs
- Urine containers
- Dipsticks
- Laboratory
- Knowledge and perception of health personnel
- Guidelines for preeclampsia screening
- Socio-demographic characteristics of health personnel

4.10. Operational definition of appropriate preeclampsia screening

- Asking about at least one of the following danger signs of pregnancy

  - ✓ Severe headache
  - ✓ Blurring of vision
  - ✓ Drowsiness
  - ✓ Severe difficulty of breathing

- ✓ Upper abdominal pain
- ✓ Loss of consciousness or convulsions

- Measuring client's blood pressure in sitting or lateral position with arm at heart level

- Ordering urine for testing protein in urine

4.11. Outcome measurement

Appropriate preeclampsia screening was said to have been performed when three of the following activities were fulfilled. These are; when at least one danger sign of pregnancy was asked and/or counseled, BP was measured and urine analysis was done based on the observation checklist. Questions on possible factors that could affect appropriate preeclampsia screening were prepared to identify the constraints. Knowledge and perception levels of the health professionals towards preeclampsia were computed based on nine questions that assess their knowledge and seven questions that assess their perception respectively.

Knowledge scores

For the first question on what preeclampsia is; 2 marks were given for those who answered elevated BP and protein uria, 1 for those who answered elevated BP only and 0 for those who didn't answer correctly. For the second and third questions i.e. at which trimester PE occurs and the BP considered to be hypertensive respectively, 2 marks were given for those who answered correctly and 0 for those who didn't. For questions starting from number four through seven, i.e. what are the symptoms of PE, risk factors of PE, complications of PE on the mother and effects of PE on the fetus; 2 marks were given for those who mentioned more than one, 1 for those who mentioned only one and 0 for those who didn't mention any symptoms, risk factors, complications of PE on the mother and effects of PE on the fetus respectively. For the eighth question i.e. what are the screening tests for the prediction of PE; 3 marks for those who mentioned three of the screening methods (taking client's history, BP measurement and U/A), 2 marks for those who mentioned two and 1 mark for those who mentioned only one from the three. For the last question on the interventions that have been tested globally to detect, prevent and manage PE currently being implemented in Ethiopia, 3 marks for those who mentioned three of the activities i.e. detection, prevention and management, 2 for those who mentioned two of the activities, 1 for those who mentioned only one and 0 for those who didn't mentioned any. Hence the total score was out of 20. The mean score of the respondents was 15.37 and those who scored below the mean were labeled as having low level of knowledge while those who scored above it, were labeled as having high level of knowledge.

Perception scores

Perception scores were computed out of 14. For the seven questions; 2 marks were given for those who replied "strongly agree", 1 for those who replied "agree" and 0 for those who replied "disagree" or "strongly disagree". The mean score was 9.07, hence those who scored below the mean were labeled as having low perception while those who scored above, were labeled as having high level of perception.

4.12. Data processing and analysis

The questionnaires and observation check list were coded, and data were entered using EPI data 3.1 which later were exported to SPSS version 23 for cleaning and analysis. First, descriptive statistics of the study variables was done and data was presented using tables, and figures. Normality for the distribution of continuous variables was checked with histogram and for non-normally distributed data, the median and inter quartile range was reported. Bivariate analysis was carried out using the binary logistic regression to select explanatory variables that fit the final model at a p-value of 0.05 and confidence interval (CI) of 95%. Finally, all variables with a P value less than 0.05 in the bivariate analysis were entered to multivariable analysis to control the possible effect of confounders. Multivariable logistic regression analysis was employed to identify factors associated with appropriate preeclampsia screening service, Adjusted odds ratio (AOR) with corresponding 95% confidence interval was used to show the strength of association and a P value of <0.05 was used to declare statistical significance.

4.13. Ethical consideration

The study was conducted after getting ethical approval from Addis Ababa University's institutional review board as well as support letters from Tigray Regional Health Bureau and heads of each health institutions. The participation was based on written informed consent and totally voluntary. The information gathered from the respondents was kept confidential and coded and no personal identifiers like name were used. The observation was also confidential, history or personal information of the mothers was not taken.

4.14. Dissemination of results

The results of this research will be disseminated to the ministry of health and other concerned bodies. They will be available in Addis Ababa University for anyone who wants to review them and they will also be available for further publication in peer reviewed journals.

5. Results

5.1. Socio-demographic characteristics of respondents

A total of 268 health professionals who work in the ANC unit were included in this study; 114 (42.5%) were males and 154 (57.5 %) were females. The age of the participants ranged from 22 to 59 with a median age of 28 and IQR of 10. Large quantity of these participants i.e. 151 (56.3%) were midwives, while the rest79 (29.5%), 28 (10.4%) and 10 (3.7%) were Doctors, Nurses and Health officers respectively. The number of health professionals from governmental health institutions was 135 (50.4%) while 133 (49.6%) were from private. The length of service of these professionals in the ANC unit ranged from 1 month to 15 years with a median of 2 years and IQR of 5. Most of them i.e. 200 (74.6%) fall under the category 5 or less years of service (Table 1).

Table 1: Socio demographic characteristics of the respondents, Mekelle, Tigray, Ethiopia, 2020 (n=268)

Variables	Category	Frequency	Percentage (%)
Sex	Male	114	42.5
	Female	154	57.5
Age of participants	<=30	173	64.6
	31-40	48	17.9
	41-50	40	14.9
	>=51	7	2.6
Profession type	Doctor	79	29.5
	Health officer	10	3.7
	Nurse	28	10.4
	Midwife	151	56.3
No of health professionals working in health institutions	Governmental	135	50.4
	Private	133	49.6
length of service in years	<=5	200	74.6
	6-10	51	19.0
	>=11	17	6.3

5.2. Daily ANC experience of respondents

The average ANC attendees per day given service to by the health professionals ranged from 2 to 60 with a median of 15 and IQR of 15. More than half of the health professionals i.e. 183 (68.3%) replied that most of the pregnant women come to ANC visit for the first time at their second trimester while 78 (29.1%) and 7 (2.6%) of them replied first and third trimester respectively. As additional information (since this study is not aimed at making comparisons between private and governmental health institutions) out of the 78 who replied first trimester 57

of them were from private health institutions. Most of these health professionals i.e. 238 (88.8%) have came across a pregnant woman with elevated BP at least once in their life time (Table 2).

Table 2:Respondents' replies on daily ANC experience related questions, Mekelle, Tigray, Ethiopia, 2020 (n=268)

Variables	Category	Frequency	Percentage (%)
Average ANC attendees seen per day	<=20	186	69.4
	>=21	82	30.6
Stage of pregnancy most of them come at	First trimester	78	29.1
	Second trimester	183	68.3
	Third trimester	7	2.6
Ever seen a pregnant woman with elevated BP during your life time	Yes	238	88.8
	No	30	11.2

5.3. Knowledge and perception of preeclampsia of respondents

On the first question 191 (71.3%) of the respondents correctly answered that preeclampsia was a pregnancy specific hypertensive disorder characterized by elevated blood pressure and protein uria of 0.3 gm or more/24 hour urine, 76 (28.4%) mentioned only elevation of blood pressure and 1 (0.4%) didn't answer correctly. On the second question, 215 (80.2%) answered correctly that PE usually occurs on the second trimester. On the third question, 259 (96.6%) correctly answered the blood pressure that is considered to be hypertensive. Majority i.e. 213 (79.5%) of the respondents mentioned more than one symptoms of preeclampsia. The symptoms of preeclampsia mentioned were severe headache, blurring of vision, upper abdominal pain, edema of the face, hands or extremities, shortness of breath, drowsiness and others (decreased urine output, low platelet count etc.) with frequencies 220 (82.1%), 200 (74.6%), 158 (59%), 142 (53%), 75 (28%), 42 (15.7%) and 42 (15.7%) respectively. On the question about risk factors of PE, 215 (80.2%) mentioned more than one risk factors. The most frequently mentioned risk factors were previous history of preeclampsia, chronic hypertension, obesity or overweight, medical illnesses like diabetes and renal disease, advanced age and multiple pregnancy with frequencies 125 (46.6%), 118 (44%), 108 (40.3%), 97 (36.2%), 90 (33.6%) and 85 (31.7%) respectively. Most of the respondents i.e. 214 (79.9 %) mentioned more than one complications of preeclampsia that the mother could face. The three most frequently mentioned complications were loss of consciousness and convulsions (eclampsia), maternal death and hemorrhage with frequencies of 175 (65.3%), 175 (65.3%) and 129 (48.1%) respectively. On the question about effects of PE on the fetus, 233 (86.9%) mentioned more than one effects. The most frequently mentioned effects of PE on the fetus were intra uterine fetal death, premature delivery, intra uterine growth restriction and low birth weight with frequencies 222 (82.8%), 183 (68.3%), 164 (61.2%) and 93 (34,7%) respectively. More than half i.e. 161 (60.1%) mentioned two of the

following screening activities which are taking client's history, blood pressure measurement and urine analysis while 39 (14.6%) mentioned three of them. From these 159 (59.3%) mentioned BP and urine analysis while only 41 (15.4%) mentioned taking client's history. Less than half of the health workers i.e. 66 (24.6%) mentioned three of the activities i.e. detection, prevention and management that have been tested globally to detect, prevent and manage PE that are currently being implemented in Ethiopia (Table 3).

The respondent's mean ± SD score for knowledge of preeclampsia was 15.37 ± 3.32. From the total respondents; 125 (46.6%) scored below the mean, hence had low level of knowledge regarding preeclampsia while 143 (53.4%) scored above the mean hence had high level of knowledge.

The mean ± SD score for their perception of preeclampsia was 9.07 ± 2.83. More than half i.e. 154 (57.5%) had a score below the mean hence low perception while 114 (42.5%) scored above the mean and hence had high perception. Table 3 also shows the respondents' replies on each perception questions.

Table 3: Respondents' replies on Knowledge and perception of preeclampsia related questions, Mekelle, Tigray, Ethiopia, 2020 (n=268)

	Variables	Category	Frequency	Percentage (%)
Knowledge	What is preeclampsia (PE)	Elevated BP & protein uria	191	71.3
		Elevated BP	76	28.4
		Didn't answer correctly	1	0.4
	Trimester PE usually occurs	Correctly answered	215	80.2
		Didn't answer correctly	53	19.8
	BP considered to be hypertensive	Correctly answered	259	96.6
		Didn't answer correctly	9	3.4
	Symptoms of PE	Mentioned one	21	7.8
		Mentioned more than one	213	79.5
		Didn't mention	34	12.7
	Risk factors of PE	Mentioned one	24	9
		Mentioned more than one	215	80.2
		Didn't mention	29	10.8
	Complications of PE on the mother	Mentioned one	48	17.9
		Mentioned more than one	214	79.9

		Didn't mention	6	2.2
	Effects of PE on the fetus	Mentioned one	30	11.2
		Mentioned more than one	233	86.9
		Didn't mention	5	1.9
	Screening tests of PE	Mentioned one from BP, U/A & client's history	68	25.4
		Mentioned two of the above	161	60.1
		Mentioned three of them	39	14.6
	Interventions that have been tested globally to detect, prevent & manage PE that are currently being implemented in Ethiopia	Mentioned one of the activities	40	14.9
		Mentioned two of the activities	47	17.5
		Mentioned three of them	66	24.6
		Didn't mention any	115	42.9
Perception	Preeclampsia is a serious or severe Condition	Strongly agree	197	73.5
		Agree	64	23.9
		Disagree/strongly disagree	7	2.6
	The fact that preeclampsia is a rare condition doesn't affect it's screening	Strongly agree	87	32.5
		Agree	105	39.2
		Disagree/strongly disagree	76	28.4
	Young women less than 20 years are susceptible to preeclampsia	Strongly agree	86	32.1
		Agree	119	44.4
		Disagree/strongly disagree	63	23.5
	Convulsion during pregnancy is not attributable to heredity	Strongly agree	80	29.9
		Agree	148	55.2
		Disagree/strongly disagree	40	14.9
	Preeclampsia can be prevented	Strongly agree	109	40.7
		Agree	136	50.7
		Disagree/strongly disagree	23	8.6
	Prevention of PE is primarily the duty of the healthcare provider	Strongly agree	107	39.9
		Agree	87	32.5
		Disagree/strongly disagree	74	27.6
	Preeclampsia can be managed	Strongly agree	174	64.9
		Agree	92	34.3

	Disagree/strongly disagree	2	0.7

5.4. Availability of resources and guideline

Out of the 268 respondents; 99 (36.9%) mentioned that they had lack of resources in their health institution. From those who had lack of resources 63 (23.5%) mentioned that they had lack of BP cuffs, 51 (19%) mentioned lack of health workers in the ANC unit, 46 (17.2%) mentioned lack of urine containers, 34 (12.7%) mentioned lack of dipsticks and 5 (1.9%) mentioned lack of laboratory. Majority i.e. 95 (35.4%) of those with lack of resources mentioned that lack of the above resources was a barrier to preeclampsia screening service in their institution while the 4(1.5%) didn't and their reasons were that they shared BP cuffs with other OPDs and they send them to private for urine analysis so the lack of resources weren't a barrier to them. Other possible barrier mentioned by the health professionals was lack of refreshing training to help with perception problems and lack of knowledge. More than half of the health professionals i.e. 144 (53.7%) mentioned that they had a guideline of preeclampsia screening during ANC visits while 124 (46.3%) mentioned they didn't have (Table 4).

Table 4: Respondents' replies on availability of resources and guideline related questions, Mekelle, Tigray, Ethiopia, 2020 (n=268)

Variables	Category	Frequency	Percentage (%)
Lack of resources in your institution	Yes	99	36.9
	No	169	63.1
Is lack of these resources a barrier	Yes	95	35.4
	No	4	1.5
Guideline of preeclampsia screening	Yes	144	53.7
	No	124	46.3

5.5. Summary of the data derived from the observation check list

According to the observation and clients' charts inquiry about medical illnesses like hypertension, diabetes mellitus and renal disease was 100% while only 85 (31.7%) of the respondents asked about family history of hypertension. From the 154 health workers who saw pregnant women who weren't primigravida; 152 (56.7%) asked about history of HTN during previous pregnancy and 148 (55.2%) asked about history of loss of consciousness and convulsions during previous pregnancy. More than half i.e. 187 (69.8%) of the respondents asked and/or counseled about at least one danger sign of pregnancy. Measuring BP among the health workers was 100% and most of them i.e. 249 (92.9%) measured only once. Higher proportion of the health workers i.e. 263 (98.1%) and 237 (88.4%) checked for edema of the extremities and for swollen face and hands respectively. All (100%) of them measured weight

while 100% didn't measure height. Ordering urine analysis among the health workers was 66% (Table 5).

Table 5: Respondents' practices of activities on the observation check list, Mekelle, Tigray, Ethiopia, 2020 (n=268)

Variables	Category	Frequency	Percentage (%)
Asked about family history of HTN	Yes	85	31.7
	No	183	68.3
Asked about history of HTN during previous pregnancy	Yes	152	56.7
	No	2	0.7
	Not applicable (primigravida)	114	42.5
Asked about history of loss of consciousness or convulsion during previous pregnancy	Yes	148	55.2
	No	6	2.2
	Not applicable (primigravida)	114	42.5
Asked or counseled about the following danger signs of pregnancy	Yes	187	69.8
	No	81	30.2
Checked for edema of the extremities	Yes	263	98.1
	No	5	1.9
Checked for swollen face and hands	Yes	237	88.4
	No	31	11.6
Ordered urine analysis	Yes	177	66
	No	91	34

5.6. Prevalence of appropriate preeclampsia screening service

According to data gained from the observation checklist and operational definition of appropriate preeclampsia screening which includes inquiry about at least one danger sign of pregnancy, measuring blood pressure and checking urine for protein uria of pregnant women beyond 20 weeks of gestation; the prevalence of appropriate preeclampsia screening service among the health professionals was 140 (52.2%, 95% CI: 46.1-58.4) while the other 128 (47.8%, 95% CI: 41.6-53.9) was the prevalence of inappropriate preeclampsia screening service.

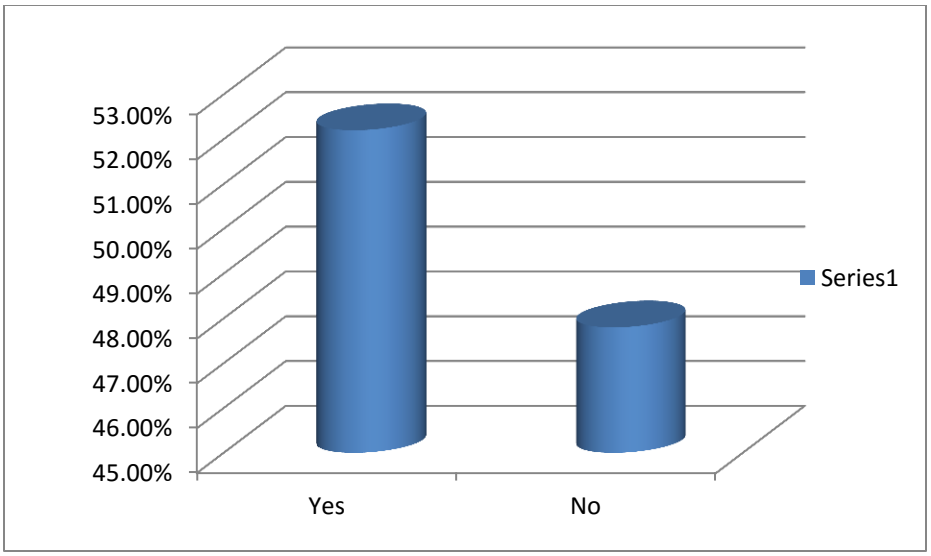

Figure 2: The prevalence of appropriate preeclampsia screening service, 2020 (n=268)

5.7. Factors associated with appropriate preeclampsia screening service

To determine possible associations of explanatory variables with appropriate preeclampsia screening, binary logistic regression analysis was applied. The variables entered in to the binary logistic regression were sex, age, profession type, length of service in years, average ANC attendees seen per day, knowledge of respondents, perception of respondents, lack of resources and availability of guideline. Hence, sex, profession type, average ANC attendees per day, knowledge, perception, lack of resources and availability of guideline were significantly associated with appropriate preeclampsia screening service at a p-value below 0.05.

However, after adjusting for potential confounders with multivariable logistic regression analysis, variables that were independent and significant predictors of appropriate preeclampsia screening were profession type for one category, knowledge & availability of guideline at a p value < 0.001 as well as lack of resources at a p value < 0.03.

The odds of doing appropriate preeclampsia screening was 0.045 (AOR=0.045, 95% CI: 0.01-0.197) times less among nurses compared to midwives. The odds of appropriate preeclampsia screening was 4.17 (AOR =4.17, 95% CI: 1.903-9.142) times higher among those with high level of knowledge compared to those who had low level of knowledge. Similarly the odds of appropriate preeclampsia screening was 2.55 (AOR =2.55, 95% CI: 1.091-5.965) times higher among those who didn't have lack of resources i.e. lack of health workers in the ANC unit, BP cuffs, urine containers, dipsticks and laboratory compared to those who did and 22.14 (AOR=22.14, 95% CI: 6.539-74.947) times higher among those who didn't have the guideline compared to those who did (Table 6).

Table 6: Binary and multivariable logistic regression analysis of factors associated with appropriate preeclampsia screening, Mekelle, Tigray, Ethiopia, 2020 (n=268)

Variables	Appropriate preeclampsia screening		COR (95% CI)	AOR (95% CI)
	Yes (n=140) n (%)	No (n=128) n (%)		
Sex				
Male	81 (30.22)	33 (12.31)	3.952(2.352,6.641)	1.967(0.89,4.344)
Female	59 (22.01)	95 (35.45)	1	1
Profession type				
Doctor	60 (22.39)	19 (7.09)	4.411(2.399,8.11)	0.734(0.257,2.101)
Health officer	9 (3.36)	1 (0.37)	12.571(1.553,101.756)	1.889(0.055,65.024)
Nurse	8 (2.99)	20 (7.46)	0.559(0.231,1.339)	0.045(0.01-0.197)
Midwife	63 (23.51)	88 (32.83)	1	1
Average ANC attendees per day				
$\leq$ 20	124 (46.27)	62 (23.13)	8.25(4.414,15.421)	2.085(0.821,5.299)
$\geq$ 21	16 (5.97)	66 (24.63)	1	1
Knowledge level of respondents				
Low	32 (11.94)	93 (34.7)	1	1
High	108 (40.3)	35 (13.06)	8.968(5.154,15.602)	4.171(1.903,9.142)
Perception level of respondents				
Low	62 (23.13)	92 (34.33)	1	1
High	78 (29.1)	36 (13.43)	3.215(1.931,5.352)	1.027(0.45,2.343)
Lack of resources				
Yes	20 (7.46)	79 (29.48)	1	1
No	120 (44.78)	49 (18.28)	9.673(5.349,17.495)	2.551(1.091,5.965)
Availability of guideline				
Yes	35 (13.06)	109 (40.67)	1	1
No	105 (39.18)	19 (7.09)	17.211(9.263,31.977)	22.137(6.539,74.947)

COR = Crude Odds Ratio, AOR = Adjusted Odds Ratio, CI = Confidence Interval and 1: reference group.

6. Discussion

This study tried to assess the current status of appropriate preeclampsia screening service as well as the possible constraints for this service in the study place. The analysis was based on interviewing health care providers and observations of client-provider interactions during the clients' ANC visits. The positive findings of this study were that measuring blood pressure was 100% among all health professionals. Also almost all of the governmental health institutions had a guideline prepared by FMOH which the health professionals use during ANC visits that includes everything from risk assessment, danger signs of pregnancy, to BP measurement and urine test for protein even though it had some problems in relation to this study.

In this study, the magnitude of appropriate preeclampsia screening was found to be 52.2%. The constraints for the provision appropriate preeclampsia screening service were found to be; low level of knowledge, lack of resources and problems on the guideline even if it was available.

In the present study, inquiry about at least one danger sign of pregnancy was 69.8% while measuring BP was 100%. This is higher than a study done in six sub-Saharan African countries including Ethiopia. The study showed that asking about at least one danger sign of pregnancy was 38%, 30%, 33%, 60%, 30% and 31% while measuring BP was 89%, 96%, 65%, 81%, 46% and 48% in Ethiopia, Kenya, Tanzania, Zanzibar, Rwanda and Mozambique respectively (20). This might be because of the availability of a guideline which calls for inquiry of danger signs of pregnancy and measuring BP during every visit even though inquiry of danger signs might be affected by other factors hence not 100% done. For the BP measurement this might be because of BP sharing with other OPDs even if they had lack of BP cuffs (13.4% in this study) as stated by the health professionals themselves.

The constraints; lack of knowledge and lack of resources (human resources, BP cuffs, urine containers and dipsticks) were in line with a study done in Jinja, Uganda (26). And lack of resources alone was in line with a study done in Nigeria (25). Lack of knowledge is especially associated with inquiry about danger signs of pregnancy so is lack of human resources which leads to heavy workloads on the health professionals i.e. when there are many ANC seeking clients and their amount doesn't match the availability of skilled health personnel, making the health professional-client contact time short and history taking, risk assessment as well as counseling less thorough. Lack of urine containers and dipsticks on the other hand are associated with performing urine test for protein which in this study was 66% for pregnant women beyond 20 weeks of gestation.

The other constraint in this study was related to the guideline. The reason why the guideline was a constraint to appropriate preeclampsia screening was because the guideline states that urine analysis for protein should be done on the first and last visits whereas for women on their second

ANC visit which by then are beyond 20 weeks of gestation, urine analysis isn't performed as a routine exam unless the mothers' first ANC visit was beyond 20 weeks. Whereas health institutions which didn't have this guideline which were mostly private do routine urine exams at first, second and last visits and some do at four of the visits.

Since urine exam beyond 20 weeks of gestation is important and was a part of this study's operational definition of appropriate preeclampsia screening, those which had this guideline which needs some refinements and updates; weren't performing appropriate PE screening unless the clients' first ANC visit was beyond 20 weeks of gestation during observation. This finding was in contrast with the study done in Jinja, Uganda where a guideline was a facilitating factor but the study focused on urine test for protein on the first visit.

Generally, by looking at the constraints identified in this study; in order to fulfill the three components of appropriate preeclampsia screening which are history taking especially asking and counseling about danger signs of pregnancy, BP measuring during every visit and urine test for protein for all women beyond 20 weeks of gestation regardless of their visit, pre-service and frequent training of all health professionals especially nurses (if they are going to give ANC services) and midwives (because they are the ones mostly working in the ANC units of especially governmental health institutions) about the signs and symptoms, diagnosis, prevention and management of preeclampsia is important. Educating about the severity of preeclampsia and importance of early detection to avoid adverse effects is also important even though perception wasn't significant in this study. Making as many skilled human personnel who work in the ANC unit available is also important so that the ratio of a health professional to client is smaller enough for them to spend longer time in risk assessment.

Making BP cuffs available at the ANC OPDs is important so that no mother would have to leave without her BP being measured. One thing noticed in this study was, those who had automatic BP cuffs were having trouble with battery so making batteries available at each ANC OPDs for those who use automatic BP cuffs is important and making laboratories functional with enough dipsticks and urine containers (it can be by dividing dipsticks in to two and using for two occasions, sterilizing and reusing containers for urine as well as sputum just like what they did in Jinja, Uganda) to assess for protein uria of pregnant women not only in their first visit but also second visit is also important. So, appropriate preeclampsia screening service needs integration and improvement of these different areas.

7. Strength and limitation

The strengths of this study were that this study tried to address the key components of appropriate preeclampsia screening service and factors that could affect it through observation and written questionnaire, the data collection was done by interns, i.e. since they are in the health area, they know the health environment, the things written on charts whenever they had to review charts and had acceptance by the health professionals to observe and review charts, the observation checklist had clearly defined and objective components in order to reduce observation bias by the data collectors and the use of multivariable logistic regression for analysis of data to control confounders. The limitations were that since it was a cross sectional study it may not truly measure the cause and effect relations between the factors and outcome, the study relied on the health professionals' responses to assess factors associated with appropriate preeclampsia screening service other than knowledge and perception and also it might have encountered Hawthorne effect during observation which can create over estimation bias in this study.

8. Conclusion

The overall prevalence of appropriate preeclampsia screening in this study was 140 (52.2%) and around half i.e. 128 (47.8%) were not providing appropriate preeclampsia screening service indicating that work still needs to be done on this area. The factors; profession type, knowledge, resources and guideline were significantly and independently associated with appropriate preeclampsia screening service. Hence; low level of knowledge, lack of resources and problems on the guideline were the constraints identified in this study.

9. Recommendations

To Tigray regional health bureau: - in order to improve appropriate preeclampsia screening; pre service training and periodic training needs to be given to health professionals. If it is already being given, improving and further strengthening is important. Making the resources i.e. human resources, BP cuffs, urine containers and dipsticks available is also important.

To FMOH: - even though the availability of the guideline is a good thing it needs further review on parts such as 'danger signs of pregnancy' i.e. instead of putting it that way, the danger signs of pregnancy could be listed down and have a check box, this way inquiry about danger signs of pregnancy won't be prone to the different levels of knowledge of health professionals and recall bias. The other part is on the urine test for protein; it is important that all pregnant women beyond 20 weeks of gestation (which mostly would be on their second visit) have this test so updating the guideline to call for universal protein uria screening of pregnant women beyond 20 weeks regardless of their visit; or making the urine test for protein applicable on the second visit is important. It would also be better if the guideline could be adopted by the private health institutions in order to aid them with history taking and risk assessment even though they can add their own thing to it.

Further study needs to be done on why FMOH calls for urine test for protein only on the first and last visits.

To FMOH and Tigray regional health bureau:- according to this study most of the pregnant women go to ANC visits on their second trimester for the first time so further health information needs to be given to them in order to improve their health seeking behavior so that the first visit could be on their first trimester.

10. References

1. American College of Obstetricians and Gynecologists. Hypertension in Pregnancy:Task force on hypertension in pregnancy. Obstet Gynecol; 2013;122(5):1122–31.
2. Green P. Update in the Diagnosis and Management of Hypertensive Disorders in Pregnancy. Michigan: Wayne State University School of Medicine; 2014.
3. National Collaborating Centre for Ws, Children's H. Hypertension in pregnancy: the management of hypertensive disorders during pregnancy.London: RCOG press; 2010. NICE Clinical Guidelines, No. 107.
4. Mattar F, Sibai BM. Eclampsia. VIII. Risk factors for maternal morbidity: Am J Obstet Gynecol; 1990;163:1049–55.
5. Hale Teka Tsegay, Yitbarek Tadesse B and Mebrihit G/meskel. Obstetrics and gynecology lecture notes for public health students; July 2016
6. WHO recommendations for prevention and treatment of preeclampsia and eclampsia implications and Actions. WHO/RHR/14.17.2013
7. McDonald SD, Malinowski A, Zhou Q, Yusuf S, Devereaux PJ. Cardiovascular squeal of preeclampsia/eclampsia: A systematic review and meta-analyses: Am Heart J. 2008; 156: 918–930.
8. Osmond C, Barker DJ. Fetal, infant, and childhood growth are predictors of coronary heart disease, diabetes, and hypertension in adult men and women: Environ Health Perspect; 2000;108 (Suppl):545–553.
9. Silveira RC, Procianoy RS, Koch MS, et al. Growth and neurodevelopment outcome of very low birth weight infants delivered by preeclamptic mothers: Acta Paediatr; 2007;96:1738–42.
10. Whitehouse AJ, Robinson M, Newnham JP, et al. Do hypertensive diseases of pregnancy disrupt neurocognitive development in offspring?: Paediatr Perinat Epidemiol; 2012;26:101–8.
11. Kuklina EV, Ayala C and Callaghan WM. Hypertensive disorders and severe obstetric morbidity in the United States: Obstet Gynecol; 2009;113: 1299–1306.
12. Duley L. The Global Impact of Pre-eclampsia and Eclampsia: Semin Perinatol; June 2009;33(3):130–7.
13. Al-Jameila N, et al. A brief overview of preeclampsia: J Clin Med Res; 2014; 6(1):1–7.
14. Federal Democratic Republic of Ethiopia Ministry of Health, Health sector development Programme IV 2010/11 – 2014/15; 2010.
15. Federal Democratic Republic of Ethiopia Ministry of Health. Maternal death surveillance and response (MDSR) technical guideline. Addis Ababa: Federal Democratic Republic of Ethiopia Ministry of Health; 2013.
16. Abadi Kidanemariam Berhe, Getachew Mullu Kassa, Gedefaw Abeje Fekadu and Achenef Asmamaw Muche. Prevalence of hypertensive disorders of pregnancy in Ethiopia: a systemic review and meta-analysis: BMC Pregnancy and Childbirth; 2018;18:34
17. World health organization. Recommendations for prevention and treatment of pre-eclampsia and eclampsia. Geneva: World health organization; 2011.
18. Jillian T. Henderson, Jamie H. Thompson, Brittany U. Burda, Amy Cantor, Tracy Beil and Evelyn P. Whitlock. Screening for preeclampsia: A systematic review for the U.S. preventive services task force: Kaiser permanente research affiliates EP; 2016:14-05211-EF-1
19. Barbara Rawlins, Marya Plotkin ,Jean Pierre Rakotovao, Ashebir Getachew, Maria Vaz, Jim Ricca, et al. Screening and management of preeclampsia and eclampsia in antenatal and labor and delivery services: findings from cross-sectional observation studies in six sub-Saharan African countries: BMC Pregnancy and Childbirth; 2018; 18:346

20. Central Statistical Agency (CSA) (Ethiopia) and ICF. Ethiopia Demographic and Health Survey key Findings. Addis Ababa, Ethiopia, and Rockville, Maryland, USA. CSA and ICF; 2016/17.
21. Rehana A. Salam, Jai K. Das, Anum Ali, Soumyadeep Bhaumik and Zohra S. Lassi. Diagnosis and management of preeclampsia in community setting in low and middle income countries: J Family Med Prim Care; 2015 oct-dec;4(4): 501-506
22. Liona C. Poon, Andrew Shennan, Jonathan A hyett, Anil Kapur, Eran Hadar, Hema Divakar, et al. The International Federation of Gynecology and Obstetrics (FIGO) initiative on preeclampsia: A pragmatic guide for first trimester screening and prevention: International Journal of Gynecology & amp; obstetrics; 20 May 2019.
23. Ricardo Perez-Cuevas, William Fraser, Hortensia Reyes, Daniel Reinharz, Ashi Daftari, Cristina S Heinz, et al. critical pathways for the management of preeclampsia and severe preeclampsia in institutionalized health care settings: BMC pregnancy and childbirth; 2003;3:6.
24. Mir. Ali Mohammad Mir, Saleem Shaikh, Mumraiz Khan, Irfan Masood, Kirk Karen, Amy Dempsey, et al. "Landscaping Report on pre-eclampsia and eclampsia in Pakistan".Washington DC: Population Council; 2016.
25. Chowfla A, Namajji C, Chitashvili T, Hermida J, Karamagi E, Holschneider S. Improving the quality of integrated and care for preeclampsia/eclampsia in Jinja, Uganda: the USAID ASSIST Project. Chevy Chase, MD: University Research Co., LLC (URC); 2018.
26. David O. Akeju1, Marianne Vidler2, J. O. Sotunsa3, M. O. Osiberu4, E. O. Orenuga4, Olufemi T, et al. Human resource constraints and the prospect of task-sharing among community health workers for the detection of early signs of pre-eclampsia in Ogun State, Nigeria: The Author(s) Reproductive Health; 2016.
27. Titilayo O, Oyewole O, Oluwatoyin J.Elebuji, Oluwapelumi O. knowledge, perception and management of preeclampsia among health care providers in a maternity hospital: International Journal of MCH and AIDS; 2019.

Annex I

Study information sheet and consent form

Study information sheet

Hello Sir, Madam;

My name is_____, I am a member of a study that is being carried out in the health institutions of Mekelle, Ethiopia which is titled, "The constraints for provision of appropriate preeclampsia screening service." The study is being conducted by Fiyori Shishay from Addis Ababa University, School of public health, department of Epidemiology and Biostatistics, Masters Program. The objective of this study is to assess the constraints for the provision of appropriate preeclampsia screening service; in order to improve birth outcome and health of the mother by adding knowledge about the possible factors that could influence preeclampsia screening. Recommendations will be provided based on the findings at the end of the study. This study will be conducted through interviewing health professionals, observation of clients' ANC visits and reviewing their charts. This study has no potential risks to the respondents since it doesn't involve any harmful procedures or any procedures at all, it's believed not to have any sensitive questions that might cause discomfort to the respondents and it will only require your cooperation and your time. By agreeing to participate, you would be serving your community and your country big time. All health workers who meet inclusion criteria during the data collection period will be kindly requested to participate in the study. The interview will take about 45 minutes of your time.

If you agree to participate in this study, you will be asked to answer questions from the prepared questionnaires which are helpful in uncovering the research question. If there are questions you are not clear with you can stop and ask the interviewer for more elaboration any time. All the data obtained will be kept strictly confidential by using only coded numbers. No one will have access to the non-coded data except the interviewer. You are not expected to give your name, address and signature. Your participation is purely voluntary, you are not obligated to answer any question you do not want to and you can withdraw from the interview any time you want.

Date: ___/____/____ Signature of the interviewer: _____

Address of the investigator: Fiyori Shishay

Cell phone: 0914022082

E-mail: fiyorishishay@gmail.com

Consent form

I have been given information about the research titled as "The constraints for provision of appropriate preeclampsia screening service" which is being conducted by Fiyori Shishay from Addis Ababa University, School of public health, department of Epidemiology and Biostatistics, Masters program.

I have been advised of the potential risks and burdens associated with this research, which includes spending with the data collectors for about _____ minutes and have had an opportunity to ask any questions I may have about the research and my participation.

I understand that my participation in this research is voluntary, I am free to refuse to participate and I am free to withdraw from the research at any time. My refusal to participate or withdrawal of consent will not affect my treatment in any way. If I have any question about the research, I can contact the investigator using her phone number or Email address.

Address of the investigator: Fiyori Shishay

Cell phone: 0914022082

E-mail: fiyorishishay@gmail.com

I'm showing my agreement by marking "X" sign below in the box which says 'Yes I'm voluntary to participate'.

Are you voluntary to participate? Yes: ☐ No: ☐

If the interviewee responds "Yes" please thank him/her and proceed and if the interviewee responds "No" thank him/her and quit the interview.

Annex II

Questionnaire (English version)

Part I		
S.no	Question	Response
1	Sex	1. Male 2. Female
2	Health institution type	1. Governmental 2. Private
3	Age of participant	_____
4	Profession type	1. Doctor 2. Health officer 3. Nurse 4. Midwife 5. Other
5	How long have you been working here (at the ANC unit)?	_____
6	On average how many ANC attendees do you see per day?	_____
7	At what stage of pregnancy do most of them come for the first time?	1. First trimester (0-12 weeks) 2. Second trimester (13-28 weeks) 3. Third trimester (29-end of pregnancy)
8	Have you ever seen a pregnant woman with elevated blood pressure?	1. Yes 2. No
9	How often do you check the BP of the pregnant mother?	1. Always in every visit 2. Sometimes in every visit 3. Rarely in every visit 4. Never
10	If the response to question number 9 is “never”, why?	_____ _____ _____ _____ _____.

Part II		
11	What is preeclampsia?	_____ _____ _____.
12	At what stage of pregnancy does preeclampsia occur?	1. First trimester 2. Second trimester 3. Third trimester 4. other
13	What is the blood pressure that is considered to be hypertensive?	_____
14	What are the symptoms of preeclampsia?	_____ _____ _____.
15	What are the risk factors for preeclampsia?	_____ _____ _____.
16	What complications of preeclampsia could the pregnant women face?	_____ _____ _____.
17	How can the fetus suffer from preeclampsia?	_____ _____ _____.
18	What are the screening tests for the prediction of preeclampsia?	_____ _____ _____.
19	What interventions that have been tested globally to detect, prevent, and manage preeclampsia are currently being implemented in Ethiopia?	_____ _____ _____ _____.

Part III		
20	Preeclampsia is a serious or severe condition.	1. Strongly agree 2. Agree 3. Disagree 4. Strongly disagree
21	Young women are susceptible to preeclampsia.	1. Strongly agree 2. Agree 3. Disagree 4. Strongly disagree
22	The fact that preeclampsia is a rare condition doesn't affect it's screening	1. Strongly agree 2. Agree 3. Disagree 4. Strongly disagree
23	Convulsion during pregnancy is not attributable to hereditary.	1. Strongly agree 2. Agree 3. Disagree 4. Strongly disagree
24	Preeclampsia can be prevented.	1. Strongly agree 2. Agree 3. Disagree 4. Strongly disagree
25	Preventing preeclampsia is primarily the duty of the healthcare provider.	1. Strongly agree 2. Agree 3. Disagree 4. Strongly disagree
26	Preeclampsia can be managed	1. Strongly agree 2. Agree 3. Disagree 4. Strongly disagree

Part IV		
27	Is there lack of the following resources in your institution? More than one answer is possible	1. Human resources 2. Blood pressure cuffs 3. Urine containers 5. Dipsticks 6. Laboratory 7. No there is not
28	Do you think lack of the above resources is a barrier to preeclampsia screening in your institution?	1. Yes 2. No
29	If the response to the above question is “No”, why?	_____ _____ _____.
30	What do you think are the possible barriers to preeclampsia screening?	_____ _____ _____.
31	Is there a guideline of preeclampsia screening service during ANC visits that your institution currently uses?	1. Yes 2. No

Annex III

Observation check list

1. Client's first ANC visit: Yes: ☐ No: ☐
2. Sex: _____
3. Age: _____
4. Profession type: _____
5. Health worker asked the following things:

    5.1. Client's age: ☐
    5.2. Whether its first pregnancy (primigravidity): ☐
    5.3. Past medical history of hypertension: ☐
    5.4. Past medical history of diabetes: ☐
    5.5. Past medical history of renal disease: ☐
    5.6. Family history of hypertension: ☐
    5.7. History of hypertension during previous pregnancy: ☐
    5.8. History of loss of consciousness or convulsions during previous pregnancy: ☐

6. Health worker Asked about the following danger signs of pregnancy: Yes: ☐ No: ☐

    6.1. Severe headache: ☐
    6.2. Blurring of vision: ☐
    6.3. Drowsiness: ☐
    6.4. Severe difficulty of breathing: ☐
    6.5. Upper abdominal pain: ☐
    6.6. Loss of consciousness or convulsions: ☐

7. Health worker measured BP

    Yes: ☐ No: ☐

8. How many times: _____

9. Health worker measured weight

    Yes: ☐ No: ☐

10. Health worker measured height

    Yes: ☐ No: ☐

11. Checked for edema of the extremities

    Yes: ☐ No: ☐

12. Checked for swollen face and hands

Yes: ☐ No: ☐

13. Health worker ordered urine test for protein:

Yes: ☐ No: ☐

Annex IV

Study information sheet, consent form and questionnaire (Tigrigna version)

ናይዚ መፅናዕቲ ሓበሬታ ወረቐት

ሰላም ኣቶ/ ወ/ሮ

ሽመይ _____ይብሃል። ናይዚ መፅናዕቲ እዚ፣ ማለት እውን ኣብ መቐለ ጥዕና ትካላት ዝካየድ፣ ኣባል እየ። ናይቲ መፅናዕቲ ኣርእስቲ "ትኽክለኛ ናይ ፕሪኢክላምፕሽያ ምርመራ ንምግባር ዘየኽእሉ ነገራት እንታይ እዮም" ይብል። እዚ መፅናዕቲ እዚ ብተምሃሪት ድሕረ ምረቓ መዮብ ኣብ ኣዲስ ኣበባ ዩኒቨርሲቲ፣ ሕብረተሰብ ጥዕና ክፍሊ፣ ኢፒዮምዮሎጂን ባዮስታቲስቲክስን ዝኾነት ፉዮሪ ሺሻይ እዩ ዝካየድ ዘሎ። ናይዚ መፅናዕቲ እዚ ዒላማ ትኽክለኛ ናይ ፕሪኢክላምፕሽያ ምርመራ (screening) **ንምግባር ዘየኽእሉን ነገራት ነዚርካ ብምፍላጥ ንቐፃሊ ኣብ መወዳእታ እዚ መፅናዕቲ ዝርከቡ ነገራት መሰረት ብምግባር መመሓየሺ ሓሳባት ንምሃብ እዩ። ምኽንያቱ ድማ ናይታ ኣዶን ዝውለድ ቆልዒን ጥዕና ብጥምረት ኮይንና ንምሕላው እዩ። ስለዚ ብግልፅነትን ቅንዕናን ክትተሓባበሩኒ ብትሕትና ይሓትት። እዚ መፅናዕቲ እዚ እቲ ዝተዳለወ መሕተቲ ወረቐት** (Questionnaire) **ብ ሰብ ሙያ ጥዕና ብምምላእ፣ ናይ ተሓከምቲ ቅድመ ወሊድ ክትትል ብምዕዛብን ቻርቶም ብምርኣይን ክካየድ እዩ። እዚ መፅናዕቲ እዚ ነቶም መለስቲ ኾነ ተሓከምቲ ዝኾነ ዒይነት ሓጽጋ የብሉን። ኣብዚ መፅናዕቲ ንምስታፍ ተተስማዕሚዕኹም ካብ ስራሕኹም ብተወሳኺ ንማሕበረ ሰብኩምን ሃገርኩምን ተገልግሉ ኣለኹም ማለት እዩ። ናይ ምስታፍ ረቋሒታት ዘማልኡ ኩሎም ሰብ ሙያ ጥዕና ንክሳተፉ ብትሕትና ይሕተቱ። እቲ መሕተቲ ወረቐት ካብ ጊዜኹ 30 ዮቒቓ ዝኸውን ጥራሕ እዩ ዝወስድ። ሽምኩም፣ ኣድራሻኹምን ፉርማኹምን ክትህቡ የብልኩምን።**

ዕለት ፡ _____ / _____ / _____ **ናይቲ ሓታቲ ፉርማ**: _____

ኣድራሻ ናይ በዒልቲ ዋና እዚ መፅናዕቲ፡ ፉዮሪ ሺሻይ

ስልኪ ቑፅሪ: 0914022082

ኢሜይል፡ fiyorishishay@gmail.com

ናይ ፍቓዮኛነት ቅጥዒ

ስለ ናይዚ መፅናዕቲ እዚ ማለት እውን "ትኽክለኛ ናይ ፕሪኢክላምሽያ ምርመራ ንምግባር ዘየኽእለ ነገራት" ተነጊሩኒ እዩ።

ምስዚ መፅናዕቲ እዚ ክትሓሓዙ ዝኽእሉ ሓዮጋታት ከምዘየለዉ እውን ተነጊሩኒ እዩ። ጥራሕ ምስ እቶም ሓበሬታ ዝእክቡ ዝተወሰነ ግዜ ክሕልፍ ከምዘለኒ እዩ። ኣብቲ መፅናዕትን ኣብ ተሳትፎይን ዘለኒ ዝኾነ ይኹን ሕቶ ንምሕታት ዕድል ተዋሂቡኒ እዩ። ተሳትፎይ ብፍቓድ ምኻኑ ይርድኣኒ። ናይ ዘይምስታፍን ኣብ ዝኾነ ሰዓት ካብቲ መፅናዕቲ ናይ ምውፃእን መሰል ኣለኒ። ንምስታፍ ምቅዋመይ ኣብ ልዕለይ ዘስዕቦ ነገር የለን። ብዛዕባ እቲ መፅናዕቲ ዝኾነ ሕቶ እንተሃልዩኒ ነታ መፅናዕቲ እዚ ትገብር ዘላ ብስልኪ ቑፅሪ ወይ ብ ኢሜይል ክረኽባ ይኽእል እየ።

ኣድራሻ ናይ በዒልቲ ዋና እዚ መፅናዕቲ፡ ፉዮሪ ሺሻይ

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ንክሳተፍ ከም ዝተስማዕማዕኩ ዘርኢ እወ ፍቃዮኛ እየ ዝብል ሳፁን "X" ምልክት ገይረ ኣለኽ።

ንምስታፍ ፍቓዮኛ ዲኻ/ኺ? እወ: ☐ **ኣይኮንኩን:** ☐

እቲ ተሓታቲ "እወ" እንተይሉ ኣመስግኖ/ና እሞ ቐፅል፣ "ኣይኮንኩን" እንተይሉ እዉን ኣመስጊንካ እቲ መሕትት ጠጠው ኣብል።

ክፍሊ ሓዮ:		
ታ.ቑ	ሕቶታት	መልሲ
1	ዕታ	1. ተባዕታይ 2. ኣንስተይቲ
2	ጥዕና ትካል	1. ናይ መንግስቲ 2. ናይ ግሊ
3	ዕድመ	_____
4	ናይ ስራሕ መሚርግ	1. ሓኪም 2. ጥዕና መኮንን 3. ነርስ 4. ሚድዋይፍ 5. ካልኢ (ይገለፅ) _____
5	ንክንዮይ እዋን ኣብዚ ቦታ ሰሪሕካ/ኪ? (ኣብ ቅድመ ወሊድ ክትትል)	_____
6	ብማእኸላይ ኣብ መሚልቲ ክንዮይ ናብ ቅድመ ወሊድ ክትትል (ቅ.ወ.ክ) ዝመፃ ኣዴታት ትርእይ/ኢ?	_____
7	መብዛሕቲኣን ኣብ መበል ክንዮይ ግዜ ንመጀመሪያ ግዜ ይመፃ?	1.ናይ መጀመሪያ ትራይሚስተር (0-12 ሰሙናት) 2. ካልኣይ ትራይሚስተር (13-28 ሰሙናት) 3. ሳልሳይ ትራይሚስተር (>=29 ሰሙናት)
8	ፀቅጢ ጭማ (blood pressure) ልዕል ዝኾነ ነብሰፁር ኣዶ ኣጋጢማትካ/ኪ ትፅልጥ/ጢ ዶ?	1. እወ 2. ኣይፅልጥን
9	ናይ ነብሰፁር ኣዴታት ፀቅጢ ጭም በብ ክንዮይ ግዜ ትልክዕ/ዑ?	1. ኩሉ ሻዕ ኣብ ሕድሕድ ግዜ ዝመፃሉ 2. ሓልሓሊፈ ኣብ ሕድሕድ ግዜ ዝመፃሉ 3. ነይሩ ነይሩ ኣብ ሕድሕድ ዝመፃሉ ግዜ 4. ወሲዮ (ለኪዎ) ኣይፅልጥን
10	ንሕቶ ቁፅሪ 9 መልሲ „“ ወሲዮ (ለኪዎ) ኣይፅልጥን““ እንተኾይኑ፣ ንምንታይ?	_____ _____ _____ _____::
ክፍሊክልተ፡		
11	ፕሪኢክላምፕሽያ እንታይ እዩ?	_____ _____ _____ _____::

12	ኣብ መበል ክንዮይ ዐውት ጥንሲ እዩ ፕሪኢክላምፕሽያ ዝኽሰት?	1. ናይ መጀመሪያ ትራይሚስተር 2. ካልኣይ ትራይሚስተር 3. ሳልሳይ ትራይሚስተር 4. ካልእ (ይገለፅ)
13	ሃይፐርቴንሲቭ ወይ ድማ ልዐል ዝበሃል ናይ ቀም ዐቅጢ ክንዮይ እዩ?	_____
14	ናይ ፕሪኢክላምፕሽያ ምልክታት እንታይ እንታይ እዮም?	_____ _____ _____ _____ _____።
15	ንፕሪኢክላምፕሽያ ከቃልዐ ዝኽእሉ ነገራት ከ እንታይ እንታይ እዮም?	_____ _____ _____ _____ _____።
16	ሓንቲ ነብሰፀር ኣዶ ከጋጥምዋ ዝኽእሉ ናይ ፕሪኢክላምፕሽያ ሳዕቤናት እንታይ እዮም?	_____ _____ _____ _____ _____።
17	ብምኽንያት ፕሪኢክላምፕሽያ ነቲ ዕሸል ከጋጥምዎ ዝኽእሉ ፀገማት እንታይ እዮም?	_____ _____ _____ _____።
18	ፕሪኢክላምፕሽያ ንምፍላጥ ዝግበሩ ምርመራታት (ስክሪኒንግ ቴስትስ) እንታይ እንታይ እዮም?	_____ _____ _____ _____ _____።
19	እንታይ ብዒለም ለኸ ዮረጃ ዝተፀንዐ ናይ ፕሪኢክላምፕሽያ ምርመራ ምግባር፣ ምክልኻልን ምሕካምን ተግባራት ኣብዚ ሐዚ እዋን ኣብ ኢትዮጵያ ኣለዉ?	_____ _____ _____ _____ _____።
ክፍሊ ሰለስተ:		
20	ፕሪኢክላምፕሽያ ከቢድ ወይ ድማ ሓዮግኛ ሕማም እዩ።	1. ብጣዕሚ ይስማዕመዎለ 2. ይስማዕመዎለ

		3. ኣይስማዕመዎሉን 4. ብፍፁም ኣይስማዕመዎሉን
21	ብዕድመ ንእሽተይ ዝኾና ቍቂ ኣንስትዮ ንፕሪኢክላምፕሽያ ተቃላዕቲ እየን።	1. ብጣዕሚ ይስማዕመዎሉ 2. ይስማዕመዎሉ 3. ኣይስማዕመዎሉን 4. ብፍፁም ኣይስማዕመዎሉን
22	ፕሪኢክላምፕሽያ ብዙሕ ግዜ ዘየጋጥም ሕማም ምኻኑ ገና እናሃለወ ምርመራ ኣብ ምግባር ኣለኹዎ ፅዕንቶ የብሉን።	1. ብጣዕሚ ይስማዕመዎሉ 2. ይስማዕመዎሉ 3. ኣይስማዕመዎሉን 4. ብፍፁም ኣይስማዕመዎሉን
23	ኣብ ጥንሲ እዋን ምንቅጥቃጥ ብዘርኢ ጥራሕ ዝመዕእ ኣይኮነን።	1. ብጣዕሚ ይስማዕመዎሉ 2. ይስማዕመዎሉ 3. ኣይስማዕመዎሉን 4. ብፍፁም ኣይስማዕመዎሉን
24	ፕሪኢክላምፕሽያ ምክልኻል ይክኣል እዩ ።	1. ብጣዕሚ ይስማዕመዎሉ 2. ይስማዕመዎሉ 3. ኣይስማዕመዎሉን 4. ብፍፁም ኣይስማዕመዎሉን
25	ፕሪኢክላምፕሽያ ምክልኻል ብቀዳምነት ናይቲ በዒል ሞያ ጥዕና ሓላፍነት እዩ።	ብጣዕሚ ይስማዕመዎሉ 2. ይስማዕመዎሉ 3. ኣይስማዕመዎሉን 4. ብፍፁም ኣይስማዕመዎሉን
26	ፕሪኢክላምፕሽያ ምሕካም (ማኔጅ ምግባር) ይክኣል እዩ።	1. ብጣዕሚ ይስማዕመዎሉ 2. ይስማዕመዎሉ 3. ኣይስማዕመዎሉን 4. ብፍፁም ኣይስማዕመዎሉን
ክፍሊ ኣርባዕተ:		
27	ኣብ ጥዕና ትካልኩም ሕፅረት እዞም ዝስዕቡ ነገራት ኣሎ ዶ ? (ካብ ሓዱ ንላዕሊ መልሲ ይክኣል እዩ።)	1. ኣብ ቅድመ ወሊድ ክትትል ዝሰርሕ ሓይሊ ሰብ 2. ፀቅጢ ጥም መለክዑ መሳርሒ (ቢፒ ካፍ) 3. ሽንቲ መትሓዚ ኣቅሓ (ዩሪን ኮንተይነር) 4. ዲፕስቲክ 5. ብዛዕባ ፕሪኢክላምፕሽያ ናይ ሰብ ሞያ ጥዕና እኹል ፍልጠት 6. ላብራቶሪ 7. የለን

28	ኣብ ጥዕና ትካልኩም ሕፅረት እዞም ነገራት ምህላዉ ግቡእ ናይ ፕሪኢክላምፕሽያ ምርመራ ንምግባር ዘየኽእል ኩነታት (ዕንቅፊት) እዩ ኢልካ/ኪ ትሓስብ/ቢ ዶ?	1. እወ 2. ኣይሓስብን
29	ንላዕለዋይ ሕቶ መልሲ „“ኣይሓስብን““ እንተኾይኑ፣	_____ _____ _____ _____ _____።
30	ግቡእ ናይ ፕሪኢክላምፕሽያ ምርመራ ንምግባር ዘየኽእሉ ነገራት ኢልካ/ኪ ትሓስቦም/ብዮም እንታይ እዮም?	_____ _____ _____።
31	ኣብ ጥዕና ትካልኩም ግቡእ ናይ ፕሪኢክላምፕሽያ ምርመራ ኣብ እዋን ቅድመ ወሊድ ክትትል ግዜ ንምግባር እትጥቀምሉ መምርሒ ኣሎ ዶ?	1. እወ 2. የለን

ነዚ ቃለ መሕትት ክሳዕ መወዳእታ ንዝገበርዎ ተሳትፎ የመስግን!!!

Annex V

Checklist (Tigrigna version)

1. ናይታ ነብሰፁር ኣዶ ናይ መጀመርያ ቅድመ ወሊድ ክትትል
   እወ፡ ☐ ኣይኮነን፡ ☐
2. ዖታ፡ _____
3. ዕድመ፡ _____
4. ናይ ስራሕ መዒርግ፡ _____
5. በዒል ሞያ ጥዕና እዞም ዝስዕቡ ነገራት ሓቲቱ ዶ?
   5.1. ናይ ተሓካሚት ዕድመ፡ ☐
   5.2. መበል ክንዮይ ጥንሲ ድዩ፡ ☐
   5.3. ተሓካሚት ናይ ሃይፐርቴንሽን ታሪክ እንተሃልይዋ፡ ☐
   5.4. ተሓካሚት ናይ ሽኮር ሕማም ታሪክ እንተሃልይዋ፡ ☐
   5.5. ተሓካሚት ናይ ኩላሊት ሕማም ታሪክ እንተሃልይዋ፡ ☐
   5.6. ካብ ናይ ተሓካሚት ቤተሰብ ሃይፐርቴንሽን ዘለዎ እንተሃልዩ፡ ☐
   5.7. ኣብ ሕሉፍ ጥንሲ ሃይፐርቴንሽን ኣጋጢምዋ እንተነይሩ፡ ☐
   5.8. ኣብ ሕሉፍ ጥንሲ ውነኻ ምስሓትን ምንቅጥቃጥን ኣጋጢምዋ እንተነይሩ፡ ☐

6. በዒል ሞያ ጥዕና እዞም ዝስዕቡ ኣብ እዋን ጥንሲ ከጋጥሙ ዝኽእሉ ምልክታት ሓቲቱ ዶ? እወ፡ ☐ ኣይሓተትን፡ ☐
   6.1. ከቢድ ርእሲ ሕማም፡ ☐
   6.2. ብግልግ ዘይምርኣይ (ብዥ ብዥ ምባል)፡ ☐
   6.3. ድኻም፡ ☐
   6.4. ብጣዕሚ ትንፊስ ምሕፃር፡ ☐
   6.5. ኣብ ላዕለዋይ ክፊል ክብዲ ናይ ሕማም ስምዑት ምስማዕ፡ ☐
   6.6. ውነኻ ምስሓትን ምንቅጥቃጥን፡ ☐
7. እቲ በዒል ሞያ ጥዕና ፀቅጢ ዮም ለኪዐ ዶ?እወ፡ ☐ኣይለኮንን/ትን፡ ☐
8. ክንዮይ ግዜ ለኪዐ/ዒ? _____
9. ክብዮት ለኪዐ/ዒ ዶ? እወ፡ ☐ ኣይለኮንን/ትን፡ ☐
10. ቁመት ለኪዐ/ዒ ዶ? እወ፡ ☐ ኣይለኮንን/ትን፡ ☐
11. ኣብ እግሪ እታ ኣዶ ሕብጠት ምህላዉን ዘይምህላዉን ኣረጋጊፁ/ፃ ዶ?
    እወ፡ ☐ ኣይለኮንን/ትን፡ ☐

12. ኣብ ገጽን ኣእዳውን እታ ኣዶ ሕብጠት ምህላዉን ዘይምህላዉን ኣረጋጊፁ/ፃ ዶ?

እወ፡ ☐ ኣይለኸዎን/ትን፡ ☐

13. እቲ በዒል ሞያ ጥዕና ናይ ሽንቲ ምርመራ ኣዚዙ ዶ? እወ፡ ☐ ኣይ፡ ☐

Annex VI

Health institutions included in this study;

The governmental health institutions were; Mekelle health center, Kasech health center, Lachi health center, Adishmdhun health center, Adiha health center, Kuiha health center, Aynalem health center, Semien health center, Serawat health center, Debri health center, Mekelle general hospital, Kuiha general hospital and Ayder comprehensive specialized hospital.

The private health institutions were; Rimna hospital, Ben meskerem primary hospital, Kalkidan primary hospital, Bethelihem primary hospital, Hewan medium clinic, Amen medium clinic, Delina medium clinic, Salute higher clinic, Ado medium clinic , Romanat higher clinic, Lucy medium clinic, Fana medium clinic, Robel medium clinic, Dr. Yonas medium clinic, Birhanu Amare medium clinic, Amanuel higher clinic 1 and 2, Faris higher clinic, Temesgen higher clinic, Mahlet medium clinic, 14 medium clinic, health park medium clinic, Dr. Mulugeta medium clinic, Maleda 19 medium clinic, Family medium clinic, Debredamo medium clinic and Beteseb memriya higher clinic.

The health institutions found in the small towns surrounding Mekelle city that were also included in order to reach the final sample size were Kuiha health center, Aynalem health center, Serawat health center, Debri health center and Kuiha general hospital.