

Exploring Indonesian Midwife's Experience of Preeclampsia Screening and Community Health Volunteer's Role to Prevent Maternal and Fetal Complications: A Qualitative Study at the Community Level

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ABSTRACT

Background: Preeclampsia is one of the causes of maternal death in Indonesia in recent years. Midwives are the foremost health worker in the community. Preeclampsia screening is an important step to prevent maternal and infant deaths.

Aims: This study aimed to investigate the experience of midwives in screening preeclampsia and the possibility of involving community health volunteer's in community-level monitoring.

Methods: A descriptive qualitative study was conducted to determine the midwife's experience of preeclampsia screening at the community level. Data were collected using semi-structured in-depth interviews with midwives and community health volunteers in the public health centers of Kroya and Adipala, Central Java, Indonesia and analyzed using content analysis.

Results: There were 3 main themes revealed in this study: 1) lack of guidance of screening and monitoring of preeclampsia in the community, 2) Community Health Volunteers have a role in assisting midwives' duties in the community; and 3) lack of family support for pregnant women. A lack of guidance was stated by all midwives in this study. Furthermore, screening has been done based on "maternal cohort registers" and the Maternal and Child Health (MCH) book. These findings suggest that community health volunteers can be involved in the community monitoring of preeclampsia high-risk pregnancies.

Conclusion: The results of the study indicate screening for preeclampsia in Indonesia at the community level is not being done effectively. Community health volunteers have been involved in helping midwives work in the community but there is a lack of family involvement in management in mothers at risk of preeclampsia.

Keywords: experience, midwife, CHVs, screening, preeclampsia, community

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ARTICLE INFO

Problem of issue

The high mortality due to preeclampsia in almost all developing countries, including Indonesia is related to delays in treatment. Until now, no preeclampsia screening model can be applied by midwives at the community level in Indonesia.

What is already known

Identification of high-risk pregnancy at the first visit by midwives at the community level is important to prevent mother and baby complications.

What does the paper add

Evidence that preeclampsia screening, in particular, was not done by midwives. A new model of preeclampsia screening by incorporating the involvement of CHVs in monitoring.

INTRODUCTION

The World Health Organization (WHO) estimates that 16% of maternal deaths occur due to hypertensive disorders in pregnancy, where eclampsia is the most common cause¹. Preeclampsia is a leading cause of death accounting for almost 30% of maternal deaths in Indonesia². The majority of maternal deaths in developing countries occur at the community level, therefore interventions should be focused at this

level³. One of the causes of the high mortality rate is a failure to identify the risks during antenatal care and lack of proper monitoring at 20 weeks' gestation⁴.

Community-level identification and appropriate referral are needed to reduce complications due to preeclampsia and eclampsia⁵. Health workers at the community level play an important role and become an entry point for improving pregnancy outcomes⁶.

Midwives are health care professionals who have a unique position in conducting health promotion and health education through antenatal care, and have a role as an advocate for pregnant women⁷. Midwives in Indonesia who work at the community level are assisted by community health volunteers (CHVs) in maternal and child health services as health information provider and community mobilizers.

Antenatal care (ANC) visit standards in Indonesia require at least four times during pregnancy. High-risk screening for pregnancy was done at the first visit⁸. The first visit examination standard consists of 10 steps, which are examination of uterine fundus height, weight, blood pressure measurement, giving TT immunization, giving blood tablets at least 90 tablets, testing for sexually transmitted diseases, and interview and case management⁹. Pregnancy assessment that must be done in the first-trimester in accordance with current

Exploring Indonesian Midwife's Experience of Preeclampsia Screening and Community Health Volunteer's Role to Prevent Maternal and Fetal Complications: A Qualitative Study at the Community Level

standards are identity, history of contraception, obstetric history, history of current pregnancy, other medical history and socioeconomic history⁹. Based on the results of interviews with midwives, it was found that the high number of patients visiting the public health center (*Puskesmas*), and the high workload of midwives, make this complete assessment not possible.

Early detection for high risk of preeclampsia in Indonesia was done by midwives through blood pressure checks and proteinuria test. There has not been screening based on the mother characteristics, because of no guideline for preeclampsia screening and the lack of basic knowledge about preeclampsia¹⁰. To date, no study of midwives' experiences in preeclampsia screening in Indonesia has been done. The purpose of this study was to evaluate the community preeclampsia screening based on midwives' experiences and the possibility of involving CHVs in screening preeclampsia at the community level.

METHODS

a. Design

A descriptive phenomenological study was conducted¹¹ using semi-structured interviews. This research

explored the experience of midwives in screening preeclampsia and the possibility of involving CHVs at the community level.

b. Participants and setting

This study was done in large public health centers of Kroya and Adipala, Cilacap district, Central Java, Indonesia. Cilacap has the largest population of residents in Central Java Province, Indonesia. The incidence of preeclampsia in Cilacap Regency is around 7.2% of 32,000 pregnant women¹². This study was taken in the public health centers with the highest number of first visits and the largest maternal deaths due to preeclampsia in Cilacap district.

Participants consisted of midwives and CHVs who worked in the public health centers' of Kroya and Adipala. The inclusion criteria for midwives were: a minimum of D3 Midwifery education, worked at least 10 years, and managed patients with preeclampsia in the past six months. CHVs were chosen based on the inclusion criteria: minimum of junior high school education and actively participated in pregnancy classes.

Table 1. Participant Demographic of Midwives

Participant	Age (years)	Work Experience (years)	Status of Midwives
1	45	20	Village 'midwife
2	50	23	Primary health Center's midwife
3	31	12	Village 'midwife
4	46	22	Midwife Coordinator
5	45	22	Midwife Coordinator
6	34	12	Village 'midwife
7	47	21	Primary health Center's midwife
8	42	17	Village 'midwife
9	47	22	Primary health Center's midwife
10	47	21	Village 'midwife

Table 2. Participants of Demographic of Community Health Volunteers (CHVs)

Participant	Age	Education Level	Time for work
1	37	Senior High School	7
2	32	Junior High School	6
3	45	Junior High School	10
4	39	Senior High School	8

c. Data collection

This study was approved by the Medical and Health Research Ethics Committee of the Faculty of Medicine, Public Health and Nursing, University of Gadjah Mada on July 3rd, 2018 with Ref:KE/FK/0640/EC/2018. All participants signed an informed consent form at the beginning of the first meeting before fully participating in the study process. Health professional meetings were counted as work time, and participants were rewarded for attending.

Midwives and CHVs who met the inclusion criteria participated in several in - depth interviews using semi-structured questionnaire. The researchers coordinated with the midwife coordinator at each public health center for midwives' interview. The midwife coordinator approached the midwives who met the inclusion criteria and then asked permission for an interview. The midwives who agreed to interviews, the researchers made an appointment for a suitable time and place of the interview. For CHVs, the researchers coordinated with village midwives to select CHVs who met the criteria. CHVs who agreed to become participants were asked for a mobile phone number and then the researcher made an appointment for an interview.

The researchers met with the midwives and CHVs in accordance with the agreement of time and place, and explained the description of the study and the possibility to become a participant, including explaining that the participant was allowed to withdraw as a participant at any time. Informed consent forms were signed by midwives and CHVs who were willing to become research participant. Interviews were conducted outside of the midwives' and CHVs' working hours, so as not interfere their service at the community.

Exploring Indonesian Midwife's Experience of Preeclampsia Screening and Community Health Volunteer's Role to Prevent Maternal and Fetal Complications: A Qualitative Study at the Community Level

In-depth interviews were conducted by the principal investigator on July to August 2018. Each interview lasted from 30 minutes up to 1 hour with an average of 40 minutes using the Bahasa (Indonesian), digitally recorded and transcribed verbatim. Initial data analysis was undertaken in Bahasa and transcripts were translated into English and back-translated into Bahasa to ensure accuracy in meaning.

d. Instrument

A semi-structured questionnaire was developed by the researchers, and probing questions were asked in accordance with the participants' responses. The questions focused on the experience of midwives in preeclampsia screening, including: what factors are examined in K1, when to screen for preeclampsia, what is done when meeting mothers at high risk, how is the midwife monitoring mothers at high risk, and what is the role of CHVs in monitoring pregnant woman. For CHVs, the questions focused on: what is the role CHVs in monitoring pregnant women, what is done for high-risk pregnant women, and what training needs to be given to CHVs if requested.

e. Data analysis

Thematic analysis was conducted to analyze data. Each interview was transcribed and analysis was done directly through verbatim making. Using Open Code software 3.6, transcription results that were relevant to the purpose of the study were coded thematically. In the coding process, the author was assisted by an independent coder to reduce bias. Discussions were always held when finding differences in codes, until

reaching consensus. Then, similar codes were grouped into a category. Categories that have the same meaning were grouped into sub-themes, which are then grouped into themes.

Trustworthiness of this study was conducted through several steps. Credibility was done by member checking, where the results of the transcription were reviewed by the participants, to ensure that the transcription was in accordance with conveyed at the interview. Triangulation was done as a strategy to increase credibility in this research. Triangulation was done with the head of the family health section as the person in charge of maternal and child health services in Cilacap district and with mothers who a history of preeclampsia in previous pregnancy. Transferability testing was done by making research reports in a systematic, detailed, clear and reliable manner. Dependencies and confirmability were done through peer review by the research team starting from the research process until the data analysis.

RESULTS

A total of 14 participants joined in this study, consisting of 10 midwives and 4 CHVs (Tables 1 and 2) The longest working period of a midwife was 23 years, while the shortest was 12 years, with an average work period of 19.2 years. Two CHVs completed junior high school education, 2 others finished their high school, and all of them have been CHVs for more than 5 years with an average service time of 7.75 years. Almost all of the CHVs taught classes of pregnant women as much as ≥90% of the total class of pregnant women was held in their villages.

Table 3: Themes and subthemes

Themes	Subthemes
There are no preeclampsia screening guidelines at the community level	Factor screening based on "maternal cohort registers" General risk factor screening Anamnesa in accordance with the MCH book
Community Health Volunteers have a role to assist midwives in the community	Midwife workloads overload Distance constraints CHVs understand the community better CHVs can take blood pressure checks
Lack of family support for pregnancy	Referring requires family approval Cost and transportation constraints The health of pregnant women is not yet a priority

a. There are no community preeclampsia screening guidelines

There are no preeclampsia screening guidelines in the community, and this was concluded from the results of interviews with midwives who answered that they have not done preeclampsia-specific screening at the first visit. Screening is a high-risk screening in general. The factors examined are in accordance with contained in the MCH handbook and the "register of the cohort of the mother", namely: age, parity, pregnancy distance, and blood pressure > 130/90. The age of screening for these risk factors is <20 years and > 35 years, while for parity is parity more than 4 (grandemultiparaus) and pregnancy spacing <2 years. This shows that the maternal risk factor for preeclampsia is not yet fully assessed, because the pregnancy interval referred to in

preeclampsia screening is the pregnancy interval >10 years and the parity meant for the risk of preeclampsia is primipara. This is evidenced by the statements of several participants below:

... according to the rules of Indonesian Ministry of Health, it is mandatory to conduct early detection of high-risk when K1 visit, whether the patient has 4T: too young, too old, that is, patients older than 35 years, too near, if the pregnancy distance is less than 2 years, or too much, mothers with pregnancy more than 4, yes according to what is listed in the maternal cohort register ... (participants 5, 45 years old, midwife coordinator)

All participants said that screening by specific risk factors of preeclampsia had not been done, and they were screening for high risk of pregnancy in general, as stated below:

Exploring Indonesian Midwife's Experience of Preeclampsia Screening and Community Health Volunteer's Role to Prevent Maternal and Fetal Complications: A Qualitative Study at the Community Level

"... indeed, so far there were no specific guidelines for preeclampsia screening, screening is done by screening for high-risk pregnancy in general, in which there may be preeclampsia factors... (participant 4, 45 years old, midwife coordinator)

Furthermore, the midwives said that following the ANC standard, an examination of the risk of preeclampsia was done by checking blood pressure and proteinuria in the third trimester. This was proven by the following statement of participants:

... according to the standard ma'am, early detection of preeclampsia was done through blood pressure measurements, urine protein examination in trimester 3, but if before trimester 3 the blood pressure is extremely high, for example, 150 mmHg, then proteinuria would be checked ..(participants 10, 47 years, village midwives)

Some midwives said at the first visit of ANC, they did administer care according to patient requests such as vomiting, and dizziness.

..... at the first visit ANC (K1) the midwives usually focus on patient complaints, because the majority of pregnant women at the first visit still feel nauseous, so they come to the midwife because of complaints of nausea... (participant 10, 47 years old, village midwife)

This is consistent with the head of the family health section of the Health Office Cilacap district (DKK) statement:

... there were many complaints in early pregnancy such as nausea, vomiting, so this (nausea vomiting) is preferred at the first visit, so the midwife care focused to the complaint, the details of preeclampsia screening was not visible, has not been done, the blood pressure checking was to overcome the main complaint... (Participant 16, 50 years old, Head of Family Health Section, Cilacap District Health Office)

b. Community Health Volunteer 's role in assisting the midwife in the community

Indonesia's health system was made in stages, starting with the health system at the community level, called: the Integrated Service Post (Posyandu). At each posyandu, the midwives will be assisted by CHVs. CHVs are volunteers who live in the community where the main task is carrying out the posyandu in their community. All this time, CHVs have assisted midwives' duties in the community, one of which is monitoring pregnant women in the community as concluded from the results of in-depth interviews.

Besides the main focus on maternal and child health, the village's midwives are currently also conducting several health service programs in the public health centers' such as the Early Childhood Growth and Development Intervention Stimulation Program (SDITK), elementary student immunization program and other health promotion programs. Additionally, there are many administrative tasks and task shifting assignments at the Basic Essential Neonatal Obstetric Service (PONED) room. This often makes some difficulty for the village's midwives to split time for other tasks like a visit to the high-risk pregnant woman's home. This is consistent with most participant's statements.

... I was greatly helped by the CHVs, because often I could not handle them myself, knew that we had a lot of tasks at the public health centers'. Village's midwife is status, but there were many tasks at the public health centers', as I did

today which was conduct an elementary school health check-up, additionally, we have to shift assignments in the PONED room...(Participant1, Village Midwife, 45 years old)

To increase the affordability of health services, village midwives attend Posyandu activities that are usually held every month, for maternal and child health services. The distance sometimes makes midwives unable to go directly to the patient's home to monitor maternal health in the community, especially for high-risk mothers. This is consistent with the participant's statement below:

... often our patients are living at quite difficult to reach areas, distance constraints, difficult transportation are make difficult to visit village health polyclinic (polindes), that's usually I ask the CHVs to visit patients... (participant 3, 31 years old, villages midwives)

The involvement of CHVs in maternal and child health services in Indonesia has been ongoing. CHVs are given the task to participate in the screening and monitoring of high-risk pregnant women in their area. Blood pressure checks, screen high-risk pregnancies and assess whether there are signs of pregnancy danger were some of the CHVs tasks during home visits.

... the midwife came to my house with CHVs to check my blood pressure, then CHVs came back to my house a few days later to check my blood pressure and when it was found swollen at my feet, then the CHVs told me to check at the Polindes... (Participant 15, Mother with a history of PE, 23 years)

The results showed that CHVs were received quite well by the community. CHVs originated and served in their area of residence. Pregnant women feel more comfort to express their feelings to CHVs. CHVs are better able to understand because of cultural and linguistic similarities.

... I'm closer to pregnant women because village midwives don't come every day, so sometimes pregnant women like to confide in me about their feelings.... (participant 12 CHVs , 31 years)

c. Lack of family support for pregnancy

Pregnant women who live with parents or in-laws, make them have to ask permission when they want to check their pregnancy to the midwife. The decision about whether pregnant women are allowed to be referred or not is the right of parents or in-laws. Additionally, the decision the foods can be consumed during pregnancy, must be consistent with the wishes of her husband or family. This is reflected in the participant's statement below:

... Pregnant women often obey the mother or mother-in-law or her husband, so if they know that this is a high-risk pregnancy, would not be referred if they don't get permission from the family... (Participants 8, 42 years, Village Midwife)

Lack of family support for pregnant women is seen by pregnancy health that has not become a priority for their families, according to the statement below:

... sometimes people beliefs, especially the husband is not concerned to their pregnant wife, they better to buy a good smartphone mom, but if his wife wants to check her pregnancy, he says it's not time to check, because he feels the pregnancy is good condition.. (participants 13, CHVs , 45 years)

DISCUSSION

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Preeclampsia is a common cause of maternal death in all countries. The majority of deaths in developing countries occur at the community level when the majority of women do not have access to health care facilities. Failure to identify and delays in recognizing clinical signs are the causes for more than half of the all maternal and fetal death¹. Three delays that increase mortality in mothers with preeclampsia are: late recognition, late arrival at the health facility, and late treatment^{13,14}. Early identification of mothers with a risk of preeclampsia is a priority in reducing mortality and morbidity associated with this disease, and reducing the funding^{2,15,16}. Midwives as the frontline for maternal and childcare have an important role in screening preeclampsia in the community at the first visit.

The study results mentioned there are no guidelines for preeclampsia screening at the community in Indonesia. The high-risk pregnancy screening is guided by the "maternal cohort register" (guides of pregnant women record for midwives) and the Maternal and Child Health Book (MCH Book: a book that contains information and monitoring form for pregnancy, childbirth, and neonatal health). The screening model is done for a high-risk of pregnancy, but there is no specific screening model for preeclampsia. Preeclampsia risk factors screened according to the "maternal cohort register" and MCH Book are age, parity, the distance of pregnancy. This means that not all risk factors for preeclampsia are screened, even though the complete screening is an important step to prevent complications. In addition to finding disease, screening is also useful for improving pregnancy outcomes¹⁷.

Community preeclampsia screening guidelines should contain information about what factors should be examined at the first meeting of pregnant women with midwives. Furthermore, the guide can be used to increase midwives' knowledge and awareness of complications of preeclampsia/eclampsia, which can increase the ability of midwives in the screening of preeclampsia. Lack of knowledge among midwives about preeclampsia will reduce the ability of midwives to screen for preeclampsia. Results of research conducted in India (2013) showed that community health workers have awareness about pregnancy complications, but knowledge about preeclampsia and eclampsia was low¹⁸.

The absence of a reliable and effective screening model for preeclampsia recommended in developing countries¹⁹, is not a reason to not screen for preeclampsia. Screening with affordable funding can be applied in developing countries, including Indonesia, by applying preeclampsia risk assessment strategies that can be based on obstetric and medical maternal history, and maternal examination results. Among the obstetric and medical history are young age, nulliparous, first pregnancy at age > 35 years, pregnant women with obesity, multiple pregnancies, previous preeclampsia, diabetes mellitus, and hypertension, which is applied at first visit (K1)^{20,21,22}. This model can be applied by midwives or health workers who work at the community level. The multivariable prediction model has a PPV range that is quite high from 4% to 39%²³.

Preeclampsia screening guidelines can be integrated into antenatal care services at first visits of pregnant women. The screening guidelines contain factors that can be screened by midwives at the community level, and

provide referral criteria for mothers with a high risk of preeclampsia.

The study results show that early detection of preeclampsia by Indonesian midwives is through blood pressure checks performed at each pregnancy visit, while protein urine tests are done in the third trimester. This is consistent with WHO that a focused antenatal care strategy recommends preeclampsia screening during the 3rd visit of ANC at 32 weeks' gestation. The new WHO ANC Model (2001) recommends that blood pressure testing at the second visit antenatal must add a protein urine testing only to nulliparous mothers or mothers with a history of preeclampsia²⁴.

Additionally, the referral to preeclampsia is done by the midwife at severe preeclampsia sign, such as blood pressure > 150/110 mmHg. Delays of referral increase the poor outcome for the mother and fetus. One cause of late referral is the lack of antenatal examinations²⁵. For this reason, it should focus on community-level screening and timely referrals²⁶. This is consistent with The Preeclampsia Community Guidelines (PRECOG) recommendation. PRECOG provides a risk assessment guide, with early referral criteria, with provisions for monitoring after 20 weeks' gestation. This guideline can be used by midwives or health practitioners in the community and can be applied from the first contact to delivery²⁷. Because early referral to mothers at risk of preeclampsia will improve maternal and infant outcomes, preeclampsia screening guidelines should be integrated with referral guidelines for mothers at risk of preeclampsia.

Pregnant women are required to meet with the local village midwife where the woman lives. For this reason, village midwives are health workers who should screen preeclampsia at the first visit and monitor the preeclampsia high-risk pregnant women.

Each Indonesian village midwife who works in a village is assisted by several CHVs who are tasked with increasing community participation in health services. CHVs are volunteer people in the health sectors whose job is to assist in public health development. Indonesian CHVs are called health cadres. CHVs have assisted village midwives in providing maternal and child health services in their areas through activities that are centered on the Integrated Service Post (Posyandu).

The study results showed that CHVs were needed because of the high workload of village midwives. The average number of births in villages in Indonesia is 6-18 in 3 months²⁸. Every post partum and neonatus period must involve visits by midwives at least four times. Carrying out monitoring the growth and development of school children (SDITK) and task shifting assignment at (PONED) room are other midwives' task out of the main task. Midwives are the largest provider of maternal health services and hold almost all of the strategy programs in the community²⁹. The high workload of Indonesian village's midwives results in a lack of midwife time for home visits in the community. As for visits to high-risk pregnancies, all this time midwives have empowered CHVs.

The study results stated that CHVs have an important role in the community to overcome the constraints of distance and geographical conditions in the village. CHVs in Indonesia are geographically and culturally closer to pregnant women, so often they are easier to reach than midwives. Getting immediate services is important, since

Exploring Indonesian Midwife's Experience of Preeclampsia Screening and Community Health Volunteer's Role to Prevent Maternal and Fetal Complications: A Qualitative Study at the Community Level

often immediate services can be done by community health worker (CHWs) which are more easily affordable in the community³. Based on a systematic review it was found that CHWs were effective in reducing maternal and neonatal mortality in poor and developing countries³⁰.

The study results showed that CHVs were closer in access, culture and language to patients. Accordingly, CHVs can ask patients and their families to follow the advice given by health workers. Some studies suggest that the presence of CHVs encourages access and use of health services in the community³¹. This is consistent with research showing that the closer the mileage is, the more people will utilize CHVs³².

The language similarity makes health education done by CHVs easily accepted by patients and their families. CHVs can play a role as a communication link between patients and health workers, helping patients understand health workers' advice including conducting translation services³³, and helping with dialogues between patients and health professionals to understand patient health³⁴. CHVs are considered as a "cultural broker" between the community and the health worker because of similarities in ethnicity, language, socioeconomic level, and experience³⁵.

The results of this study found that CHVs have a role in monitoring pregnant women in the community. CHVs can give the task of making home visits when midwives cannot do it themselves. This is consistent with research that the distribution of tasks from professional health workers to community health workers can increase access to services and optimize the use of resources in developing countries³⁶.

The possibility to include CHVs in preeclampsia management has been proven in Pakistan where Lady Health Workers (LHW) can screen preeclampsia, recognize danger signs and make referrals through adequate training³⁶. Similarly, CHVs in Indonesia are routinely given a briefing on maternal and child health, especially during the implementation of pregnancy classes in each village.

The study results stated that there is a lack of family involvement in pregnancy services. Husbands and family including in-laws are proven to influence the utilization of maternal health services³⁷. Lack of family involvement in handling preeclampsia in the community increases the risk of high referral delay. Often pregnant women can't be referred, because do not get family agreement. Some of the reasons for disagreement include the cost, the perception that the pregnant woman has no problems, the distance obstetrician and afraid to visit the obstetrician. Lack of husband support for mothers with a risk of preeclampsia can be caused by a lack of knowledge, social stigma, low awareness of complications, and type of work³⁸. For these reasons, it is important to conduct regular antenatal visits, since it is in line with research in India that routine ANC's can be considered curative rather than preventive³⁹.

The results also showed a lack of family support for mothers, due to cost and transportation constraints. The majority of husbands in Cilacap district have a low to medium level of education and work as farmers, fishermen, and laborers outside the Cilacap town so that less health knowledge causes difficulty in making decisions for his wife and family⁴⁰. Often when they want to check with the midwife, the mother does not get permission from her parents-in-law or parents because

no one takes her to the midwife, while pregnant women are not allowed to go alone. In terms of distance, sociodemography is a factor related to the utilization of health services⁴¹. Besides these concerns, cost constraints become a family consideration for not allowing pregnant women to check with the midwife. This is consistent with the opinion that the low income of families with poor categories increases the likelihood of a late search for health services⁴².

When the mother lives with her husband and family, the husband is not decision maker and must ask permission from his parents or parents-in-law, which makes the referral delayed. This is consistent with the results of research in Tanzania that the husband is a decision-maker in the search for health services for sick babies⁴².

The results showed that the lack of family in maternal health caused maternal health in not been a priority for the family. This is likely due to the lack of a husband and family knowledge about pregnancy since the husband and family are not involved in antenatal care. Antenatal care should also involve her husband³⁷, so as to increase the husband's knowledge and awareness⁴³, including about complications that might occur in mothers at risk of preeclampsia. Additionally, when a husband participates in ANC activities, there will be a transfer of knowledge from the midwife to the husband. Knowledge transfer includes developing, implementing and providing tools that are compatible with resources at the community level (to facilitate self-identification) and at Primary Health Care (PHC)⁴⁴.

High risk of preeclampsia often does not cause any symptoms in pregnant women. This is one of the reasons mothers feel they do not need to come to health services. Besides, women are often not a decision-maker for their own health. Women at risk of pregnancy need to get their family's permission to go to a health care provider. This is due to differences in the roles of women and men in the community, which affect the search for maternal and child health services⁴⁵.

The lack of husband and family in the referral to mothers with the risk of preeclampsia is caused by a lack of awareness about danger signs during pregnancy⁴⁶. This requires an approach to family and husband in increasing their awareness of danger signs of pregnancy such as preeclampsia and eclampsia. This approach can be done through engaging in antenatal class activities so that the antenatal class participants should not only be pregnant women, but also the family (mother, or mother-in-law) and husband.

Limitations

The imitations in this study are the study sites which were only 2 Public health centers' PONE'd areas, out of a total of 24 in Cilacap district. However, the authors believe that the population of the Cilacap district is relatively homogeneous and has been represented well by the public health centers' Kroya and Adipala service areas.

Implication for practice, policy and future research

The results of this study provide several recommendations. There is need for screening for risk factors for pregnant women at K1 with guidelines that can be used as a reference by all midwives in the Primary Health Center in the Cilacap Region. Empowering CHVs and families in the

Exploring Indonesian Midwife's Experience of Preeclampsia Screening and Community Health Volunteer's Role to Prevent Maternal and Fetal Complications: A Qualitative Study at the Community Level

management of pregnant women with a high risk of preeclampsia, intensive debriefing is needed, and can be integrated with classes of pregnant women involving families and CHVs .

Further research can be done with the theme of the effectiveness of preeclampsia screening through case/control methods.

CONCLUSIONS

The study revealed the need for specific guidelines on preeclampsia screening for midwives at the community level, the need to involve CHVs in monitoring mothers with high risk of preeclampsia, and improvement of the low level of family participation in high risk pregnancy care services, including in the referral process.

Abbreviations

CHVs : Community Health Volunteers, Public health centers' : *Pusat Kesehatan Masyarakat* (Primary Health Center), Posyandu : *Pos Pelayanan Terpadu* (Integrated Services Post), SDITK: *Stimulasi, Deteksi dan Intervensi Tumbuh Kembang Anak* (the Early Childhood Growth and Development Intervention Stimulation Program), DKK : *Dinas Kesehatan Kabupaten* (District Health Office), PONED : *Pelayanan Obstetri Neonatal Emergensi Dasar*(Basic Emergency Neonatal Services), BPJS : Badan Penyelenggara Jaminan Sosial (the Health Insurance Administration Agency), KKN : Kuliah Kerja Nyata (Community Service Program of Student)

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Conflict of Interest

The authors declare that they have no competing interests.

Ethical Statement

This study was approved by the Medical and Health Research Ethics Committee (MHREC) of the Faculty of Medicine, Public Health and Nursing, Gadjah Mada University Ref no: KE / FK / 0640 / EC / 2018 on July 3rd, 2018. All participants signed an informed consent at the beginning of the first meeting before fully engaged in the study process.

Credit Authorship Contribution statement

JO is a PhD student and first author of this manuscript and wrote the first draft of the manuscript. WW, ND revised the manuscript critically. All authors read and approved the final manuscript.

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Exploring Indonesian Midwife's Experience of Preeclampsia Screening and Community Health Volunteer's Role to Prevent Maternal and Fetal Complications: A Qualitative Study at the Community Level

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