The Open Public Health Journal
DOI: 10.2174/0118749445303154240403084428, 2024, 17, e18749445303154
ISSN: 1874-9445

RESEARCH ARTICLE **OPEN ACCESS**

A New Model for Improving Quality of Hypertension's Determinant Factors in Pregnancy

Megawati Sinambela[1], Hardisman Dasman[1,*], Yusrawati Yusrawati[2], Adang Bachtiar[3], Masrul Muchtar[2], Mudjiran Mudjiran[4], Hema Malini[5] and Defrin Defrin[2]

[1]*Doctoral Programme in Public Health Department, Faculty of Medicine, Universitas Andalas, West Sumatra, Indonesia*
[2]*Department of Obstetrics and Gynecology, Faculty of Medicine, Universitas Andalas, West Sumatra, Indonesia*
[3]*Department of Public Health Sciences, Faculty of Health, Universitas Indonesia, Jakarta, Indonesia*
[4]*Department of Education, Universitas Negeri Padang, West Sumatra, Indonesia*
[5]*Department of Nursing, Faculty of Nursing, Universitas Andalas, West Sumatra, Indonesia*

Abstract:

Background: Hypertension in pregnancy should be detected earlier to prevent possible complications of pregnancy such as preeclampsia. Pregnancy hypertension could transform into preeclampsia if unmonitored and untreated, it can even be bad for eclampsia.

Purpose: This research aims to identify the determinant factors of hypertension during pregnancy and to develop a suitable model to prevent hypertension in the future.

Methods: The research was developed using a mixed method with an embedded design approach. This study has adopted the ADDIE concept including Analysis, Design, Development, Implementation, and Evaluation steps. Purposive sampling based on knowledge proportion has designated 164 pregnant women as key participants. Qualitative analysis was applied through in-depth interviews. Quantitative analysis was conducted with SEM-PLS.

Results: The determinant variable components of late detection of hypertension in pregnancy are knowledge and understanding, self-efficacy, intentions, and attitudes of pregnant women. Other variables are also considered as psychosocial support of husband/family and midwives, antenatal care, and service facilities.

Conclusion: The data shows that the MEGA model is proven to be effective in evaluating the determinant factors of hypertension in pregnancy.

Keywords: New model, Hypertension, Pregnancy, ADDIE, Mixed method, Fatalities.

*Address correspondence to this author at the Doctoral Programme in Public Health Department, Faculty of Medicine, Universitas Andalas, West Sumatra, Indonesia; E-mail: hardisman@med.unand.ac.id

Cite as: Sinambela M, Dasman H, Yusrawati Y, Bachtiar A, Muchtar M, Mudjiran M, Malini H, Defrin D. A New Model for Improving Quality of Hypertension's Determinant Factors in Pregnancy. Open Public Health J, 2024; 17: e18749445303154. http://dx.doi.org/10.2174/0118749445303154240403084428

Received: January 09, 2024
Revised: March 17, 2024
Accepted: March 20, 2024
Published: May 03, 2024

1. INTRODUCTION

In 2020, about 800 women per day passed away from pregnancy- and childbirth-related avoidable causes. In low- and lower-middle-income countries, maternal fatalities accounted for about 95% of all deaths in 2020 [1]. In 2021, the Ministry of Health reported the number of maternal deaths of 7,389 in Indonesia. Based on the causes, the majority of maternal deaths in 2021 were

related to COVID-19 with 2,982 cases, 1,330 cases of bleeding, and 1,077 cases of hypertension in pregnancy. Cases of preeclampsia in North Sumatra Province contributed to 23.7% of maternal deaths, especially in Deli Serdang Regency of 21.1% [2]. Several efforts by the Indonesian Government to reduce Maternal Mortality Rate (MMR) include the "Safe Motherhood Initiative" which focuses on the concept of death prevention by providing antenatal care [3], deliveries performed by health personnel, family planning, and managing complications [2]. Currently in Indonesia, Mother & Child Health Book, and Health Score-card are used together to determine the risk level of pregnancy in mothers. Because it is only used by doctors and midwives during antenatal visits, so there is no involvement of pregnant women in knowing whether their pregnancy is classified as at risk and experiencing complications of hypertension in pregnancy. The participation of pregnant women, families, communities, and health workers is crucial to success as an effort to prevent delays in detection [4]. A recent study has developed a prediction model using a combination of biomarkers that had good discriminatory performance for hypertension in pregnancy [5]. A recent study discovered that the majority of high-risk pregnancies in rural areas—nearly one-fifth of all pregnancies—were caused by maternal age and pregnancy-induced hypertension. High-risk pregnancies were independently correlated with parity and socioeconomic level [6,7]. A limitation of the safe motherhood program is the challenge of accessing healthcare services in various regions of Indonesia, attributable to geographical constraints and the unequal distribution of healthcare personnel. Furthermore, comprehensive and consistent antenatal care fails to encompass all areas of Indonesia, resulting in unmet targets for antenatal visits. Consequently, prioritizing the implementation of early detection for pregnancy hypertension becomes imperative [8]. The proposed model can be applied in the public health service centers as primary care for the prevention of complications of pregnancy hypertension. Hence, this study focuses on the improvement of determinant factors that empower pregnant women to know the risk factors for the occurrence of hypertension in pregnancy, recognize the early signs of hypertension in pregnancy, and efforts to increase antenatal visits so that mothers' pregnancies are maintained with standard antenatal services [9,10].

2. METHODS

This research used a mixed method with an embedded design approach, which means that qualitative and quantitative data were collected simultaneously. A qualitative method was employed *via* in-depth interviews to identify existing problems and to assess the needs, thus determinant factors of delay in the detection of hypertension could be recognized. The quantitative method has been used to test the validity and reliability of data obtained by questionnaires. Simple random sampling was applied where the participants were midwives, midwives' coordinators, and pregnant women. Inclusion criteria are pregnant women in trimesters I, II, and III and having spouses. The sample size was 164 people selected by considering the protocol of Lemeshow, 1997 [11]. All participants were then classified by sociodemographic background of age, education, occupation, parity, gestational age, economic level, history of hypertension, obesity, and exercise. This research was conducted in rural areas, so there is no classification between urban and rural. In-depth interviews were conducted at the community health center. This study chose married women because married women are the focus of antenatal care and these women want to have children and are obliged to maintain a healthy pregnancy without complications. Data from randomly selected respondents was obtained from the results of anamnesis that the respondent had a history of hypertension before pregnancy, there was no connection between hypertension in menopausal women and the research sample. Respondents were taken from 164 married women in the working areas of the Deli Tua, Talun Kenas, and Biru-biru health centers by randomly drawing numbers. This model was designed entirely by the author based on literature, hypothesis testing results and expert discussions. Training in this research was carried out four times for 1 month. The participants were interviewed to examine the determinant factors of hypertension risk such as their level of knowledge, self-efficacy, attitude, family support, midwife support, antenatal care, and healthcare family. The determinant factors were measured by ordinal scales. After checking the questionnaire's fulfillment, the data entry was done by using EpiData Entry 3.1. We also used SPSS ver.24 to analyze the statistical data. Data obtained were tested by univariate, bivariate, and multivariate analyses with confidence level 95% and alpha 5% on both sides. The establishment of a new model in this research has surpassed the five steps of the ADDIE method; analysis, design, development, implementation, and evaluation [12]. The feasibility study of the MEGA-model was based on assessment criteria on the quality of the developed module, including; Introduction, Presentation, Closing, Glossarium. The feasibility study of module construction has involved the module experts, midwife coordinators, and midwives. The effectiveness of MEGA-model was evaluated by the quality improvement of determinant factors before and after implementation ($p < 0.05$). This research was conducted from June to October 2022 in Deli Serdang Regency, Province of North Sumatra, Indonesia. The experimental method was approved by the Ethics Committee of the Faculty of Medicine, Andalas University, under approval number 817/UN.16.2/KEP-FK/2022.

3. RESULTS

3.1. Step 1. Analysis

The social background of hypertension in pregnancy can be seen in the sociodemographic data presented in Table **1**. All risk factors showed a significant correlation with hypertension in pregnancy (sig. < 0.05).

Table 1. Sociodemographic data of participants.

No	Risk Factors	f	%	Sig.
1	**Age**	-	-	0.011
-	≥ 20 and ≤ 35	72	43.9	-
	<20 and >35	92	56.1	-
2	**Education**	-	-	0.002
-	High (College/Univ)	73	54.5	-
	Low (Elementary-Mid School)	91	55.5	-
3	**Occupation**	-	-	0.007
-	Working	76	46.3	-
	No Work	88	53.7	-
4	**Parity**	-	-	0.004
-	Primipara	53	32.3	-
	Multigravida	111	67.7	-
5	**Gestational Age**	-	-	0.013
-	Trimester I	75	45.7	-
	Trimesters II and III	89	54,3	-
6	**Economic level**	-	-	0.008
-	Low	75	48.2	-
	Adequate	89	54.3	-
7	**History of Hypertension**	-	-	0.007
-	Yes	79	48.2	-
	No	85	51.8	-
8	**History of Hypertension in Family**	-	-	0.002
-	Yes	67	40.9	-
	No	97	59.1	-
9	**Obesity**	-	-	0.004
-	Yes	30	18.3	-
	No	134	81.7	-
10	**Sport/Exercise**	-	-	0.007
-	Not Active	72	43.9	-
	Active	92	56.1	-

Table 2. Determinant factors of hypertension in pregnancy.

No.	Determinant Factors	f	%	Sig.
1	**Knowledge**	-	-	0.001
-	Good	63	38.4	-
	Not Good	101	61.6	-
2	**Self-efficacy**	-	-	0.002
-	Good	78	47.6	-
	Not Good	86	52.4	-
3	**Attitude**	-	-	0.001
-	Positive	74	45.1	-
	Negative	90	54.9	-
4	**Family Supports**	-	-	0.001
-	Good	79	48.2	-
	Not Good	85	51.8	-
5	**Midwives Support**	-	-	0.001
-	Good	90	54.9	-
	Not Good	74	45.1	-
6	**ANC (Antenatal Care)**	-	-	0.001
-	Good	92	56.0	-
	Not Good	72	44.0	-
7	**Healthcare Facility**	-	-	0.001

(Table 2) contd.....

No.	Determinant Factors	f	%	Sig.
-	Good	81	49.4	-
	Not Good	83	50.6	-

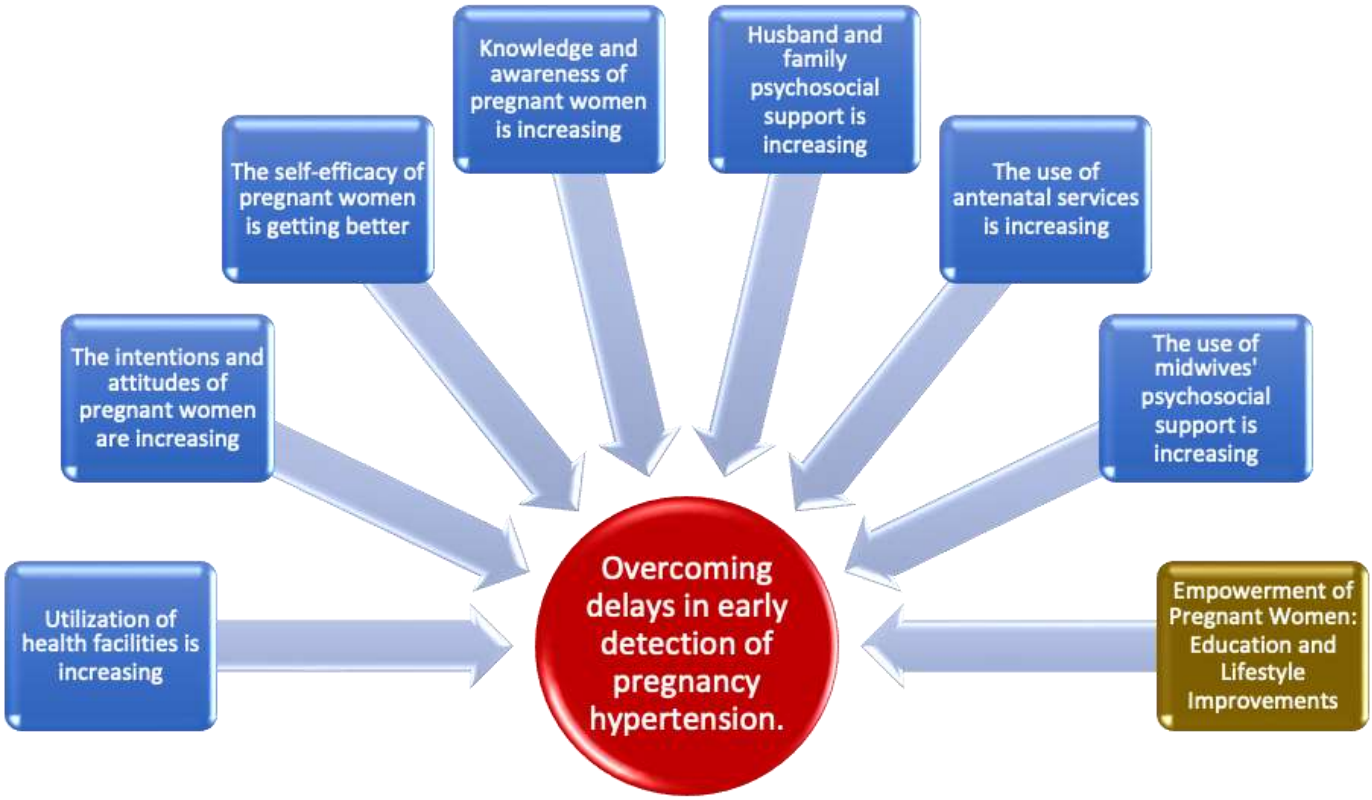

Fig. (1). Diagram of MEGA-model for early detection of hypertension in pregnancy.

Furthermore, the data showed several factors that influence the determinant factors of hypertension in pregnancy as presented in Table **2**. All determinant factors showed a significant correlation with early detection of hypertension in pregnancy (sig. < 0.05).

3.2. Step 2. Design

The early detection model for hypertension in pregnancy was designed by using a questionnaire instrument that involved 7 variables exogen of determinant factors and 1 variable endogen of early detection of hypertension in pregnancy. The results of the convergent validity test show that all exogenous (X) and endogenous (Y) variable indicators have an R-count validity value greater than the outer loading value (0.7), meaning that all variables are valid. The reliability test showed that Cronbach's alpha > 0.6, which means all variables are reliable. The results of the Smart-PLS analysis showed that the structural model path coefficients of sociodemographic early detection, sociodemographic empowerments, and empowerments early detection had estimated coefficients of 0.450, 0.984, and 0.564, respectively. Results of the R-square analysis also showed that the variables of early detection and empowerment had R-squares of 0.987 and 0.981, respectively. The goodness-of-fit analysis showed that the total adjusted R-square was 1.950, indicating a high category of the combined performance of the outer and inner models.

3.3. Step 3. Development

The incorporation of moderating variables is intended to enhance the efficacy of early detection, thereby mitigating the complications associated with hypertension. The moderating variable employed in the model development pertains to the empowerment of pregnant women. Expert consultation endeavors aim to ascertain the appropriate applications aligned with a predetermined model. Through consensus and collaborative decision-making, it was determined that the implementation of the early detection model in this study would entail a structured module centered around midwives, who serve as agents in empowering pregnant women throughout their pregnancies *via* an educational model and self-assessment. This module assumes a critical role as a valuable tool, facilitating the enhancement of early detection outcomes for both midwives and pregnant women. The module is then named as **"MEGA-model"**. Instead of the author's name, the MEGA-model stands for

Table 3. Feasibility test of MEGA-model.

No.	Module's Assessment Criteria	Results		
		Module Expert	Midwife Coord Expert	Midwife Expert
1	Introduction	82	79	80
2	Presentation	75	74	75
3	Closing	80	82	83
4	Glossarium	77	75	81
-	**Average**	**78.5**	**77.5**	**79.75**
-	Summary:	This module deserves to be a followed up.	This module needs to be more systematic so that it's easier to understand	This module has improved education for pregnant women so they can prevent complications of hypertension from an early age

Table 4. Effectiveness of MEGA-model on improving quality of determinant factors.

No.	Variables	Mean		Sig-p
		Pre	Post	
1	Knowledge	33.11 ± 5.62	38.76 ± 7.55	0.001
2	Self-efficacy	18.01 ± 3.52	21.15 ± 4.99	0.001
3	Attitude	18.40 ± 3.60	20.96 ± 4.91	0.001
4	Family supports	24.90 ± 3.90	27.73 ± 4.45	0.001
5	Midwives support	25.14 ± 3.74	27.04 ± 3.82	0.001
6	Antenatal care	25.90 ± 3.97	28.46 ± 4.50	0.001
7	Healthcare facility	33.11 ± 5.62	38.76 ± 7.55	0.001

M*odule of* ***E****ducation* ***G****iven at* ***A****ntenatal Care*. The chosen phrase represents a brief concept of a module that was developed to educate pregnant women during antenatal care and represents the inventor's name.

The development of an early detection model was carried out with reinforcing factors in the form of empowering pregnant women, including educating pregnant women and improving lifestyles, as described in Fig. (**1**).

Based on the results of quantitative data analysis with moderating tests using the Smart-PLS program, qualitative analysis with expert consultation, and model feasibility tests according to experts and consensus as shown in Table **3**.

3.4. Step 4. Implementation

Prior to implementing the model, a pretest questionnaire was administered to a sample of 164 pregnant women, who served as respondents. The empowerment session spanned a single day and encompassed comprehensive explanations regarding the MEGA-model for the early detection of hypertension in pregnancy. Subsequent to the completion of the training, participants were once again presented with a questionnaire to assess potential improvements in knowledge, understanding, self-efficacy, intentions, and attitudes among pregnant women. Additionally, the questionnaire sought to evaluate the extent of utilization of various support systems, including husband/family psychosocial support, midwife support, quality antenatal care, and healthcare facilities, all aimed at preventing delayed detection of early gestational hypertension.

3.5. Step 5. Evaluation

Following the empowerment of pregnant women by midwives, notable improvements were observed in various social indicators, including enhanced knowledge and understanding among pregnant women, increased self-efficacy, positive shifts in intentions and attitudes, heightened utilization of husband's support, greater utilization of midwife support, increased utilization of antenatal services, and improved utilization of health facilities. These findings were substantiated through a comprehensive analysis of the pretest and posttest models, yielding the effectiveness of MEGA-model as represented in Table **4**.

4. DISCUSSION

Based on our data, the majority of respondents have low education (Table **1**). Insufficient educational attainment implies that pregnant women may have limited awareness and knowledge regarding the criticality of self-detection in pregnancy hypertension. In line with previous studies reported, the majority of pregnant women in Ethiopia initiate their ANC late [14]. Most of the complications of gestational hypertension are related to the lack of knowledge of pregnant women and the negative attitude of pregnant women toward early detection and lack of prevention practices [15,16]. Occupation exhibits a substantial correlation with early detection, wherein individuals in lower occupational strata are more prone to delayed initiation of gestational

hypertension early detection. Empirical data on the association between employment and the risk of experiencing a high-risk pregnancy is scarce; however, existing evidence generally indicates that women are capable of handling work-related tasks effectively [17].

The significance of this study lies in its pioneering approach of empowering pregnant women as a moderating factor, influencing various social conditions, namely, the knowledge and understanding of pregnant women, self-efficacy, intentions and attitudes of pregnant women, husband/family psychosocial support, midwives' psychosocial support, access to and quality of antenatal care, as well as healthcare facilities [13].

Our research findings also demonstrate a notable correlation between parity and early detection, indicating that lower parity is associated with a higher likelihood of delayed initiation of gestational hypertension early detection. This finding was consistent with Behrens *et al.*'s (2017) claim that parity was a confounding factor in the connection between hypertensive diseases of pregnancy [18]. Moreover, gestational age exhibits a relationship with early detection, whereby lower gestational age is linked to a higher probability of delayed initiation of gestational hypertension early detection [19]. A previous study reported that older women (≥40 years old) had increased odds of mild preeclampsia, fetal distress, and poor fetal growth [20]. Strategic implementation related to the relationship between economic factors and early detection of pregnancy hypertension is important for pregnant women, realizing that economic factors greatly affect health conditions, especially during pregnancy [21]. Therefore, for pregnant women with unfavorable economic factors, it is advisable to limit their pregnancies [22].

Our study indicated that respondents who have a history of hypertension are more anticipative by emphasizing pregnancy checks so that they avoid the risk of severe preeclampsia [23]. The results of the data analysis showed that the majority of respondents who were late for early detection of pregnancy hypertension were respondents with a family history of family hypertension [24]. Pregnant women who are obese or who have the potential to get body fat should strategically apply strategies related to the association between obesity and early identification of prenatal hypertension to reduce the number of pregnancies and control their lifestyle, particularly concerning eating [25] and sports or exercise [26].

The MEGA model for early detection of gestational hypertension has a significant effect on preventing delays in the implementation of early detection of gestational hypertension. Before the development of the early detection model (pre), out of 164 research samples, there were 68 people (41.5%) who were late and 96 people (58.5%) did early detection of pregnancy hypertension. After developing the model by empowering pregnant women, out of 164 research samples, only 27 people (16.5%) were late and 137 people (83.5%) were not late for early detection of pregnancy hypertension. This means that there is an increase in the number of samples (pregnant women) who are not late for early detection of gestational hypertension. On the other hand, there was a decrease in the number of samples (pregnant women) who were late for early detection of gestational hypertension.

With the application of the MEGA model, pregnant women experience the benefits of empowering pregnant women such as education in increasing the understanding and knowledge of pregnant women about early detection of hypertension in pregnancy, lifestyle improvements, and antenatal services so that pregnant women recognize that empowering pregnant women has succeeded in increasing the delay of pregnant women early detection of gestational hypertension.

CONCLUSION

Based on the research results, we conclude that the design of the early detection model has a moderating factor in the form of empowering pregnant women, which includes education with counseling to increase knowledge and lifestyle improvement. The empowerment intervention in this study encompassed educational sessions highlighting the importance of early detection of pregnancy hypertension, lifestyle enhancement, and counseling regarding midwives' services.

LIST OF ABBREVIATIONS

MEGA	=	*Module of Education Given at Antenatal Care*
ADDIE	=	*Analysis, Design, Development, Implementation, and Evaluation.*
SEM-PLS	=	*Structural Equation Model-Partial Least Square*
MMR	=	*Maternal Mortality Rate*
ANC	=	*Antenatal Care*

ETHICAL STATEMENT

The experimental method was approved by the Ethics Committee of the Faculty of Medicine, Andalas University, Ethical Approval No. 817/UN.16.2/KEP-FK/2022. All clinical investigations have been conducted according to the Declaration of Helsinki principles.

CONSENT FOR PUBLICATION

Informed consent was obtained from all participants in this study according to Ethical Approval No. 817/UN.16.2/KEP-FK/2022. All participants agreed to participate in this study and that the results will be published.

STANDARDS OF REPORTING

STROBE guidelines were followed.

AVAILABILITY OF DATA AND MATERIALS

The data and supportive information are not available within the article.

FUNDING

None.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest in this study.

ACKNOWLEDGEMENTS

Declared none.

REFERENCES

[1] Maternal mortality. World Health Organization. 2023. Available from: https://www.who.int/news-room/fact-sheets/detail/maternal-mortality

[2] Kemenkes RI. Indonesia Health Profile. Great Ministry of Health, Healthy Indonesia 2021.

[3] Mekonnen BA, Dessie Y, Baraki N, Oumer A, Gebru M. Adherence to iron and folic acid supplementation and associated factors among antenatal care attendants in Northwest Ethiopia. IJPHS 2020; 9(1): 20-8. http://dx.doi.org/10.11591/ijphs.v9i1.20385

[4] Sinkey RG, Battarbee AN, Bello NA, Ives CW, Oparil S, Tita ATN. Prevention, diagnosis, and management of hypertensive disorders of pregnancy: A comparison of international guidelines. Curr Hypertens Rep 2020; 22(9): 66. http://dx.doi.org/10.1007/s11906-020-01082-w PMID: 32852691

[5] Zhou C, Song C, Huang X, *et al*. Early prediction model of gestational hypertension by multi-biomarkers before 20 weeks gestation. Diabetes Metab Syndr Obes 2021; 14(May): 2441-51. http://dx.doi.org/10.2147/DMSO.S309725 PMID: 34103953

[6] Majella MGi. A longitudinal study on high risk pregnancy and its outcome among antenatal women attending rural primary health centre in Puducherry, South India. J Educ Health Promot 2019; (January): 1-6. http://dx.doi.org/10.4103/jehp.jehp

[7] Chaemsaithong P, Sahota DS, Poon LC. First trimester preeclampsia screening and prediction. Am J Obstet Gynecol 2022; 26(2): S1071-97. http://dx.doi.org/10.1016/j.ajog.2020.07.020

[8] Fladeby L, Raunedokken M, Fonkalsrud H, Hvidtjørn D, Lukasse M. Midwives' experiences of using the obstetric norwegian early warning system (ONEWS): A national cross-sectional study. Eur J Midwifery 2021; 5(April): 1-9. http://dx.doi.org/10.18332/ejm/134510 PMID: 33898939

[9] McDonald SW, Kehler HL, Tough SC. Risk factors for delayed social-emotional development and behavior problems at age two: Results from the All Our Babies/Families (AOB/F) cohort. Health Sci Rep 2018; 1(10): e82. http://dx.doi.org/10.1002/hsr2.82 PMID: 30623038

[10] Sa'adeh HH, Darwazeh RN, Khalil AA, Zyoud SH. Knowledge, attitudes and practices of hypertensive patients towards prevention and early detection of chronic kidney disease: A cross sectional study from Palestine. Clin Hypertens 2018; 24(1): 6. http://dx.doi.org/10.1186/s40885-018-0091-7 PMID: 29632702

[11] Lwanga SK, Lemeshow S. Sample Size Determination in Health Studies: A Practical Manual. World Health Organization 1991.

[12] Fajriya II, Supriyana S, Bahiyatun B, Widyawati MN. Developing a web-based information system in detection of high-risk pregnancies in semarang, Indonesia: Addie model. Belitung Nurs J 2017; 3(4): 390-8. http://dx.doi.org/10.33546/bnj.160

[13] Singh S, Doyle P, Campbell OMR, Murthy GVS. Management and referral for high-risk conditions and complications during the antenatal period: Knowledge, practice and attitude survey of providers in rural public healthcare in two states of India. Reprod Health 2019; 16(1): 100. http://dx.doi.org/10.1186/s12978-019-0765-y PMID: 31291968

[14] Wolde HF, Tsegaye AT, Sisay MM. Late initiation of antenatal care and associated factors among pregnant women in Addis Zemen primary hospital, South Gondar, Ethiopia. Reprod Health 2019; 16(1): 73. http://dx.doi.org/10.1186/s12978-019-0745-2 PMID: 31151402

[15] Ouasmani F, Engeltjes B, Haddou Rahou B, Belayachi O, Verhoeven C. Knowledge of hypertensive disorders in pregnancy of Moroccan women in Morocco and in the Netherlands: A qualitative interview study. BMC Pregnancy Childbirth 2018; 18(1): 344. http://dx.doi.org/10.1186/s12884-018-1980-1 PMID: 30134940

[16] Ralapanawa U, Bopeththa K, Wickramasurendra N, Tennakoon S, Katsuya T. Hypertension knowledge, attitude, and practice in adult hypertensive patients at a tertiary care hospital in Sri Lanka. Int J Hypertens 2020; 2020(i): 1-6. http://dx.doi.org/10.1155/2020/4642704 PMID: 33145107

[17] Karkowsky CE, Morris L. Pregnant at work: Time for prenatal care providers to act. Am J Obstet Gynecol 2016; 215(3): 306.e1-5. http://dx.doi.org/10.1016/j.ajog.2016.05.036 PMID: 27255471

[18] Behrens I, Basit S, Melbye M, *et al*. Risk of post-pregnancy hypertension in women with a history of hypertensive disorders of pregnancy: Nationwide cohort study. BMJ 2017; 358: j3078. http://dx.doi.org/10.1136/bmj.j3078 PMID: 28701333

[19] Londero AP, Rossetti E, Pittini C, Cagnacci A, Driul L. Maternal age and the risk of adverse pregnancy outcomes: A retrospective cohort study. BMC Pregnancy Childbirth 2019; 19(1): 261. http://dx.doi.org/10.1186/s12884-019-2400-x PMID: 31337350

[20] Cavazos-Rehg PA, Krauss MJ, Spitznagel EL, *et al*. Maternal age and risk of labor and delivery complications. Matern Child Health J 2015; 19(6): 1202-11. http://dx.doi.org/10.1007/s10995-014-1624-7 PMID: 25366100

[21] Gebresilassie B, Belete T, Tilahun W, Berhane B, Gebresilassie S. Timing of first antenatal care attendance and associated factors among pregnant women in public health institutions of Axum town, Tigray, Ethiopia, 2017: A mixed design study. BMC Pregnancy Childbirth 2019; 19(1): 340. http://dx.doi.org/10.1186/s12884-019-2490-5 PMID: 31533657

[22] Sialubanje C, Massar K, van der Pijl MSG, Kirch EM, Hamer DH, Ruiter RAC. Improving access to skilled facility-based delivery services: Women's beliefs on facilitators and barriers to the utilisation of maternity waiting homes in rural Zambia. Reprod Health 2015; 12(1): 61. http://dx.doi.org/10.1186/s12978-015-0051-6 PMID: 26148481

[23] Magee LA, von Dadelszen P. State-of-the-art diagnosis and treatment of hypertension in pregnancy. Mayo Clin Proc 2018; 93(11): 1664-77. http://dx.doi.org/10.1016/j.mayocp.2018.04.033 PMID: 30392546

[24] Malik R, Kumar V. Hypertension in pregnancy. Adv Exp Med Biol 2016; 956: 375-93. http://dx.doi.org/10.1007/5584_2016_150 PMID: 27957708

[25] Lintula A, Keski-Nisula L, Sahlman H. Hypothyroidism and the increased risk of preeclampsia – interpretative factors? Hypertens Pregnancy 2020; 39(4): 411-7. http://dx.doi.org/10.1080/10641955.2020.1800030 PMID: 32787605

[26] Ying W, Catov JM, Ouyang P. Hypertensive disorders of pregnancy and future maternal cardiovascular risk. J Am Heart Assoc 2018; 7(17): e009382. http://dx.doi.org/10.1161/JAHA.118.009382 PMID: 30371154