Effects of Low Knowledge on Anaemia, Weight Gain, and Chronic Energy Deficiency in Pregnant Women

Prevalensi dan Efek Pengetahuan Rendah Terhadap Anemia, Peningkatan Berat Badan, dan Kekurangan Energi Kronis pada Ibu Hamil

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Abstract

Introduction: High risks of pregnancy, such as anaemia, chronic energy deficiency, and hypertension at a risk of emergencies, can be prevented. However, its prevalence is still high. This situation is triggered by a low of information and lack of knowledge in pregnant women. **Purpose**: This study was to analyze the effect of the knowledge level of pregnant women with the incidence of anaemia, chronic energy deficiency, weight gain, and hypertension as a high risk of pregnancy. **Methods:** A cross-sectional study was used to design this study, involving 74 pregnant women selected according to inclusion criteria. A questionnaire measuring tool to collect data on the mother's level of knowledge about the high risk of pregnancy and the incidence of high risk of pregnancy: anaemia, chronic energy deficiency, weight gain, and hypertension. Analysis of bivariate data using a chi-square test with a confidence level of 0.05. **Results**: Low knowledge in high-risk pregnant women about one-third (34%), anaemia of 28.4%, chronic energy deficiency of 18.9%, weight gain of more than 14.9%, and hypertension of 8.1%. Low knowledge of pregnant women affects the incidence of high risk of pregnancy with anaemia (p=0.013; OR=3.996), weight gain (p= 0.004; OR=13.44), and chronic energy deficiency (p=0.012; OR=3.778). Meanwhile, the incidence of hypertension does not indicate any association (p=0.084). **Conclusion**: Less knowledgeable pregnant women contribute to an increased incidence of high-risk pregnancy and pregnancy complications. Efforts to educate about high-risk and pregnancy complications need to be increased by innovating the development of accessible and affordable educational methods, such as online media, to increase maternal knowledge.

Abstrak

Latar belakang: Risiko tinggi kehamilan, seperti anemia, kekurangan energi kronik dan hipertensi berisiko mengalami kegawatdaruratan, dapat di cegah. Namun, kenyataannya prevalensinya masih tinggi. Keadaan ini dipicu oleh kurang informasi dan pengetahuan kurang pada ibu hamil. **Tujuan**: Studi ini untuk menganalisis pengaruh tingkat pengetahuan ibu hamil dengan kejadian anemia, kekurangan energi kronis, peningkatan berat badan, dan hipertensi sebagai risiko tinggi kehamilan. **Metode:** Studi *cross sectional* digunakan sebagai desain penelitian ini yang melibatkan 74 ibu hamil yang dipilih sesuai kriteria inklusi. Alat ukur kuesioner untuk mengumpulkan data tingkat pengetahuan ibu tentang risiko tinggi kehamilan dan kejadian risiko tinggi kehamilan: anemia, kekurangan energi kronik, penambahan berat badan dan hipertensi. Analisis data bivariat menggunakan uji *chi square* dengan tingkat kepercayaan 0,05. **Hasil**: Pengetahun rendah pada ibu hamil risiko tinggi sekitar sepertiga (34%), mengalami anemia 28,4%, kekurangan energi kronik 18,9%, penambahan berat badan lebih 14,9%, dan hipertensi 8,1%. Pengetahuan rendah ibu hamil berpengaruh terhadap kejadian risiko tinggi kehamilan dengan anemia (p=0.013; OR=3.996), kenaikan berat badan (p=0.004; OR=13.44) dan kekurangan energi kronik (p=0.012; OR=3.778). Sedangkan, kejadian hypertensi tidak menunjukkan ada hubungan (p=0.084). **Simpulan**: Ibu hamil yang berpengetahuan kurang berkontribusi pada kejadian peningkatan kejadian risiko tinggi kehamilan dan komplikasi kehamilan. Upaya edukasi risiko tinggi dan komplikasi kehamilan perlu ditingkatkan dengan inovasi pengembangan metode edukasi yang mudah dan terjangkau, seperti media online untuk meningkatkan pengetahuan ibu.

Introduction

Pregnancy is a physiological condition, but some conditions can have an impact on the health hazards of the mother or fetus. So, the state of pregnancy turns into a high-risk pregnancy (Medeiros et al., 2016). Pregnant women who face a high risk of pregnancy are almost 22% (Mirzakhani et al., 2020). A high risk of pregnancy is any condition associated with pregnancy that can result in actual and potential risks to the mother and fetus in the womb (Holness, 2018). Mothers can experience pregnancy complications. Globally worldwide, in 2017, due to pregnancy or childbirth complications, around 800 women died every day, and the majority of deaths (94%) occurred in developing countries with middle and low-income (Williamson et al., 2023), including Indonesia maternal mortality is still high (Kementerian Kesehatan RI, 2022).

The maternal mortality rate (MMR) in Indonesia is still high; the results of the population census in 2020 were 189/100,000 live births; in 2020, there were 4627 maternal deaths, and in 2021 there was a sharp increase to 7389 maternal deaths (Kementerian Kesehatan RI, 2022). Similarly, the maternal mortality rate in Lampung Province recorded 115 cases of maternal mortality in 2020; in 2021, there were 187 cases of death, and in 2022, there was a decrease to 96 cases of maternal deaths (Dinas Kesehatan Provinsi Lampung, 2023). Meanwhile, in Central Lampung district, in 2019, there were 17 maternal deaths. In 2020, there was an increase of 22 maternal deaths (Dinas Kesehatan Lampung Tengah, 2021).

The main causes of maternal death in Indonesia are mostly the condition of pregnant women with complications or high-risk pregnancies; in 2021, the second cause of bleeding was 1,330 cases, and hypertension in pregnancy was 1077 cases (Kementerian Kesehatan RI, 2022). The cause of maternal death in Lampung Province of 96 cases of death was recorded in 2022; the most common cause of bleeding was 26 cases (27%), and hypertension disorders were 25 cases (26%) (Dinas Kesehatan Provinsi Lampung, 2023). Meanwhile, the cause of maternal death in Central Lampung district was 22 cases of maternal death, 12 cases (54.55%) due to pregnancy complications, namely bleeding, 7 cases (31.82%), and 3 cases (13.55%) of bleeding system disorders and infections (Dinas Kesehatan Lampung Tengah, 2021).

The causes of high maternal mortality include the quality of health services for pregnant women and maternity that has not been maximized, the health condition of pregnant women is not prime, and other determinants (Dinas Kesehatan Provinsi Lampung, 2022). Efforts to reduce maternal mortality in Indonesia are strengthening health services, especially at the level of basic health services or community health centers. It is the beginning of health care for pregnant women (Suarayasa, 2020). In the Community Health Center, pregnant women can get health services in preventing pregnancy and childbirth complications and early detection activities for at-risk pregnant women.

A high-risk pregnancy is a pregnancy with one or more risk factors, both maternal and fetal factors that can have a less beneficial impact on the mother and fetus, namely having an emergency risk even though it is not an emergency (Rochjati, 2011). The high risk of pregnancy can be minimized, including by increasing the knowledge of pregnant women through education about pregnancy and prevention of how to overcome pregnancy complications; providing education on knowledge about pregnancy risks and how to overcome them can be obtained through classes for pregnant women (Gagnon & Sandall, 2017; Ayiasi et al., 2014). The pregnant women class is a means of group learning for pregnant women in the form of face-to-face about health; the aim is to improve the knowledge and skills of mothers regarding pregnancy care, childbirth, postpartum care, newborn care, and maternal gymnastics (Kementerian Kesehatan RI, 2014). This class for pregnant women is

aimed at all conditions of mothers carried out classically. The high-risk expectant mother class application model RESTIKOL (Risiko Tinggi dengan Penerapan Interprofessional Kalaborasi) is a class for pregnant women who are at high risk which is carried out by several health professionals working periodically in providing education to pregnant women (Sudarmi, 2023). The Class Model for Pregnant Women RESTIKOL at the beginning of the activity was carried out "Screening", and there was an education on material for early handling of high risks in pregnancy, as well as assistance to pregnant women until pregnant women undergo their delivery period (Sudarmi, 2022).

High risks or obstetric complications that often occur include anaemia, hypertension, less or excess weight gain, and chronic energy deficiency (Hariyani & Wijayanti. 2019). The high risk of pregnancy in 2020 in Central Lampung Regency was recorded at 4,714 cases and handled by 4,013 cases (85.1%), while those referred had reached 100% (Dinas Kesehatan Lampung Tengah, 2021). Hami mothers who actively participate in the pregnant women class program in the working area of the Pujokerto Community Health Center, Central Lampung Regency in July 2023, out of 166 pregnant women, only 101 pregnant women (37.5) are active, and there are 65 mothers (62.5%) are inactive. The results of the examination of 23 pregnant women who experienced the risk of pregnancy with anaemia 5 cases (22%). There is an age of pregnant women at risk of < 20 years and > 35 years found four mothers (17%) (Puskesmas Pujokerto, 2023). Pregnant women who experience a high risk of pregnancy do not yet know the level of maternal knowledge about high risks in pregnancy because the level of knowledge has not been evaluated on the possibility of affecting the incidence of pregnancy complications. Through research, it can be evaluated the influence of maternal knowledge level on high-risk events in pregnancy so that efforts can be made to reduce and prevent pregnant women with high-risk and other pregnancy complications.

Methods

The research is an analytical survey with a cross-sectional study design. The research design was used to answer the influence of the level of knowledge of pregnant women about the high risk of pregnancy with the incidence of high risk in pregnancy. The study was conducted at the Pujokerto Community Health Center, Central Lampung Regency, in April – July 2023. All pregnant women who met the calculation criteria, namely gestational age > 32 weeks, could read and write a total of 74 pregnant women as a sample from a population of 166 pregnant women. Sample selection was done using a consecutive sampling technique, where all subjects who met the selection criteria were selected as research samples.

Data collection was done using examination methods of pregnant women and interviews for respondents' characteristics data. Inspection using meters, standard scales, tension meters, and digital Hb meters. Examination to obtain independent variable data, namely the level of knowledge of the mother about high risk in pregnancy. Meanwhile, the dependent variables, namely high-risk events in pregnancy, include anaemia in pregnant women if the measurement of Hb levels < 11 mg%, chronic energy deficiency if the results of the measurement of upper arm circumference < 23.5 cm, increased weight risk if there is an increase in > 16 kg and hypertension if the results of the examination ≥ 140/90 mmHg.

Development of measuring instruments for maternal knowledge tests from the book Maternal and Child Health by the Ministry of Health (Kementerian Kesehatan RI, 2023). The validity test and reliability test of knowledge-level data met the requirements of being valid and reliable as a measuring tool. The knowledge test consists of 25 multiple-choice 4-option questions; each correct

answer is given a score of four. The results of measuring the level of knowledge are categorized as good if the score is ≥ 75, and knowledge is low if the score is < 75.

Univariate data analysis uses percentages (%), while bivariate analysis *uses a chi-square test* to answer the research hypothesis, namely, there is an influence that pregnant women who have a lower level of knowledge can experience high risk in pregnancy. The research has earned a worthy ethical test. Pass the Health Research Ethics (KEPK) review obtained from the Health Polytechnic of the Ministry of Health (Poltekkes Kemenkes Tanjung Karang) with the following register number: 196. B /KEPK-TJK/IV/2023. The research procedure was carried out by fulfilling research permits, providing informed consent, and ensuring respondents' rights.

Result
Characteristics of Respondents
The characteristics of respondents in Table 1 show that pregnant women aged 20-35 years are more dominant (75.7%), higher education level 73.6%, and housewives (not working) 82.4%. Meanwhile, pregnant women with multiparity are almost three-quarters (70.3%).

Table 1.
Characteristics of Respondents

Characteristics of Respondents	Category	F	Percentage (%)
Age	<20 > 35 Years	18	24.3
	20-35 th	56	75.7
Education	Low	20	27.0
	Tall	54	73.6
Work	Yes	13	17.6
	No	61	82.4
Paritas	Primipara	22	29.7
	Multiparitas	52	70.3

### Overview of the Prevalence of Pregnant Women at High Risk of Pregnancy
The prevalence of pregnant women at high risk of pregnancy was 28% of 74 pregnant women (Figure 1). Meanwhile, details of 74 pregnant women at high risk of pregnancy with a prevalence of anaemia amounted to 28.4%, experienced weight gain of 18.9%, chronic energy deficiency at 11%, and hypertension at 6% (Table 2).

Overview of the Level of Knowledge of pregnant women about the high risk of pregnancy
Maternal knowledge of the high risk of pregnancy from 74 study samples with low knowledge was 34% (Figure 2).
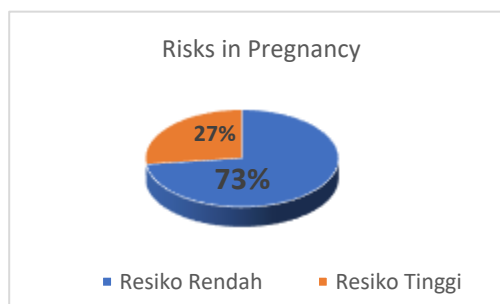
Figure 1. High-Risk Prevalence of Pregnancy
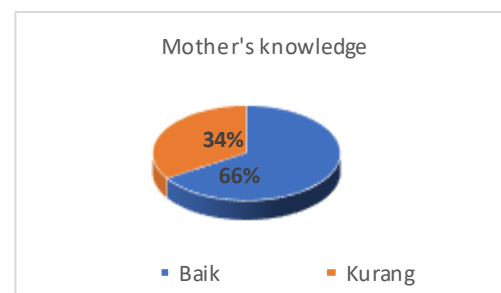
Figure 2. Level of Knowledge of Pregnant Women about the High Risk of Pregnancy

Table 2.
Distribution and frequency of High Risk in pregnant women

High-Risk Characteristics of Pregnancy	Catagei	F	Percentage (%)
Anemia	Yes	21	28.4
	No	53	71.6
Risky of body weight Ascension	Yes	14	18.9
	No	60	81.1
Chronic energy deficiency	Yes	11	14.9
	No	63	85.1
Hypertension)	Yes	6	8.1
	No	68	91.1

Bivariate Analysis

Bivariate analysis to identify the relationship between the level of knowledge of pregnant women about the high risk of pregnancy and the incidence of high risk in pregnancy, namely anaemia of pregnant women, risky weight gain, chronic energy deficiency, and hypertension. The results of statistical tests in Table 3 show that there is an influence on the level of knowledge of pregnant women on the incidence of anaemia in pregnant women (p-value 0.013), risky weight gain (p-value. 0.004), chronic energy deficiency (p-value 0.012), and no effect on hypertension in pregnant women (p-value 0.084).

Table 3.
Effect of Maternal Knowledge Level on High Risk in Pregnancy (anaemia, risky weight gain, chronic energy deficiency, and hypertension)

Mother's Knowledge Level	High risk in pregnancy				Total		OR (95%CI)	P-value
	n	%	n	%	n	%		
	No Anaemia		Anaemia					
Good	43	87.8	6	12.2	49	100	3.996	0.013
Low	10	40.0	15	60.0	25	100	1.393-11.454	
Sum	53	71.6	21	28.4	74	100		
	No risly weight gain		Yes					
Good	46	93.9	3	6.1	49	100	13.44	0.004
Less	14	56.0	11	44.0	25	100	1.730-10.464	
Sum	60	81.1	14	18.9	74	100		
	No Cake		Some					
Good	45	91.8	4	8.2	49	100	3.778	0.012
Low	18	72.0	7	28.0	25	100	1.402-10.176	
Sum	63	85.1	11	14.9	74	100		
	No Hypertension		Hypertension					
Good	45	91.8	4	8.2	49	100	1.310	0.084
Low	23	92.0	2	8.0	25	100	0.431-3.983	
Sum	68	91.9	6	8.1	74	100		

Discussion

The effect of low knowledge of pregnant women about high risk in pregnancy on anaemia in pregnancy

Pregnancy anaemia is still a high-risk part of pregnant women, which is a global problem, especially in developing countries (Alflah et al., 2017). This study was to prove the effect of knowledge on the high risk of pregnancy according to the incidence of anaemia. The results of the study found a significant relationship between the level of knowledge of pregnant women about the high risk of pregnancy and the incidence of anaemia. Large associations of analysis results show that pregnant women who have less knowledge about high-risk pregnancy have a risk of experiencing 3,996 times anaemia compared to pregnant women who have good knowledge (OR=3,996) because pregnant

women are more obedient to apply prevention of anaemia in pregnancy. Almost two-thirds (60%) of knowledgeable pregnant women are less anaemic than well-informed pregnant women are anaemic by more than one-tenth (12.2%).

Anaemia is a condition of decreased haemoglobin concentration caused by pathological and physiological multifactors. One of the causes is pregnancy (Amalia, 2016). Pregnant women show anaemia with standard examination results obtained haemoglobin levels < 11 g / dl (Manuaba, 2012). Most commonly, the occurrence of anaemia in pregnancy is caused by a lack of iron, low folic acid, and bleeding that occurs due to the interaction between the two (Astriana, 2017). Some literature shows a relationship between knowledge and the incidence of anaemia in pregnant women. Women with a lower level of anaemia knowledge have a three times greater risk of developing anaemia compared to those with the highest level of knowledge. Similarly, women who were in the third trimester of pregnancy were four times more likely to develop anaemia compared to those in the first trimester at the time of the interview. Therefore, a good understanding of anaemia and pregnancy rates can help prevent and overcome anaemia in Tanzanian pregnancy (Margwe & Lupindu, 2018; Wemakor, 2019).

The results of this study are consistent with previous studies by Teja et al. (2021), Muryani (2023), Margwe & Lupindu (2018), and Alflah et al. (2017) that increased anaemia in pregnancy is associated with low knowledge. Search results from 15 articles (83.3%) showed the prevalence of anaemia in pregnant women is more common in pregnant women who have low knowledge and poor attitudes. (Susilo et al., 2021). This study reinforces the finding of the importance of improving health education in the prevention of pregnancy and childbirth complications.

The high incidence of anaemia in pregnant women is caused by the lack of understanding of pregnant women about the impact of haemoglobin deficiency and low fulfilment of iron-containing food needs during pregnancy (Edison, 2019). Anaemia in pregnant women is classified as a high-risk pregnancy, which, if not treated immediately, will lead to bleeding complications during pregnancy or childbirth (Sasono et al., 2021). To prevent anaemia in pregnant women, the government conducts a program that gives 90 Fe tablets during the pregnancy period (Ministry of Health of the Republic of Indonesia, 2015). The results of this study indicate the importance of increasing knowledge of the prevention and treatment of anaemia in pregnant women. Efforts to overcome anaemia include increasing the provision of education to pregnant women through various innovations in the use of online and offline media to prevent and reduce the incidence of anaemia in pregnant women.

The effect of maternal knowledge on risky weight gain in pregnancy

Maternal weight gain that is not ideal (> 16 kg) is part of the high risk in pregnancy (Kementerian Kesehatan RI., 2017). This study obtained the results of pregnant women who experienced weight gain with low maternal knowledge, which was 44%. Less knowledge in pregnant women about the high risk of pregnancy affects the incidence of weight gain in pregnant women (p-value = 0.004). There is a large association of pregnant women who have less knowledge about high-risk pregnancy risk, 13.44 times the increase in risk weight in mothers compared to pregnant women who have good knowledge (OR=13.44).

Excess weight gain in pregnant women aged > 32 weeks can have an impact on the birth weight of a large baby. This situation is at risk for experiencing labor complications, namely difficulties during labor. In addition, excess weight gain is a dangerous sign of the risk of preeclampsia, while the impact on pregnant women is the risk of not developing the fetus in the

womb (Susilowati, 2016). Efforts to prevent the increase in excess weight of mothers during pregnancy include the need to be educated knowledge about a balanced menu for pregnant women and monitor ideal weight gain during pregnancy. As the results of research conducted by Sudarmi et al. (2020) show, there is a significant influence on providing food assistance education on the weight gain of pregnant women > 32 weeks (p = 0.003). This study reinforces the results of previous research by Khasanah (2020) that there is a relationship between knowledge of pregnant women in meeting nutritional needs to increasing the weight of pregnant women.

This study reinforces the finding that health education is essential in increasing pregnant women's knowledge of the regulation of weight addition during pregnancy. Providing education about balanced nutrition can have an impact on increasing maternal knowledge in regulating diet, as well as both the quantity and quality of food consumed by pregnant women. The education movement to increase pregnant women related to high-risk pregnancy better the level of knowledge of pregnant women. Pregnant women can be motivated to be positive and behave positively in regulating their diet to prevent complications that may occur during pregnancy.

The effect of maternal knowledge on chronic energy deficiency in Pregnancy

Chronic energy deficiency is part of the high risk of pregnancy and pregnancy complications. This study aims to prove the influence of knowledge on the incidence of chronic energy deficiency. We found that pregnant women's level of knowledge about risk is high in pregnancy, with the incidence of chronic energy deficiency. Low knowledge of mothers about the high risk in pregnancy experienced with the incidence of chronic energy deficiency as much as 28.0%. Pregnant women who had less knowledge about the high risk of pregnancy had 3,778 times the incidence of chronic energy deficiency compared to pregnant women who had good knowledge (OR=3,778). Pregnant women who have good knowledge can be more obedient to implementing the prevention of chronic energy deficiency in pregnancy.

Chronic energy deficiency is a condition of the mother's lack of food that lasts chronically, causing health problems in pregnant women. Chronic energy deficiency is caused by an imbalance between intake and expenditure to meet energy needs (Kemenkes RI., 2017). Some direct causes of pregnant women experiencing chronic energy deficiency include lack of nutrients consumed, low quality of food consumed, and nutrients consumed failing to be absorbed and used by the body. In addition, indirect causes of pregnant women experiencing chronic energy deficiency include ignorance and lack of information about health and adequate nutrition in pregnant women or balanced nutrition in pregnant women (Triwahyuningsih & Prayugi, 2018).

This study obtained results consistent with previous research conducted by Retni (2021) and Diningsih et al. (2021), that the level of maternal knowledge about high-risk pregnancy is significantly related to the incidence of chronic energy deficiency in pregnant women. The incidence of chronic energy deficiency in pregnant women is a complex problem that requires interprofessional collaboration among health workers—early treatment to overcome chronic energy deficiency by providing education to pregnant women. Increasing knowledge of pregnant women can be obtained by participating in a class program for pregnant women with the concept of Interprofessional Educative Collaboration (Sudarmi et al., 2020). Health workers play an essential role in efforts to increase knowledge of balanced nutrition in pregnant women so that the nutrition of pregnant women can behave optimally and adequately. In addition, pregnant women are essential to assist mothers in regulating food intake that includes balanced nutrition as needed so that it can effectively prevent and overcome or reduce chronic energy deficiency in pregnant women.

The Influence of knowledge on the high risk of hypertension in pregnancy

High risks in pregnancy include hypertension. This study aims to evaluate the effect of high-risk knowledge in pregnancy on the incidence of hypertension in pregnancy. The results of statistical tests obtained no significant relationship between the level of knowledge of pregnant women about high-risk pregnancy with the incidence of hypertension in pregnancy ($p = 0.084 > 0.05$). Maternal knowledge is almost the same as shown by the results of the descriptive analysis of this study obtained as many as 8.0% of pregnant women with less knowledge of hypertension and good knowledge of 8.2% experience hypertension.

Hypertension is a state of persistently chronically elevated blood pressure in arteries with systolic blood pressure ≥ 140 mmHg and or diastolic pressure ≥ 90 mmHg (Bakris & Parati, 2019). Hypertension in pregnancy is one of the direct causes of illness and death worldwide for both mother and fetus (World Health Organization, 2015). Meanwhile, indirect causes include insufficient maternal knowledge in preventing hypertension. The importance of increasing maternal knowledge about preventing hypertension during pregnancy. Pregnant women need to be educated about preventing high-risk pregnancy.

This study found no influence on the level of knowledge of mothers with the incidence of HT in pregnant women. This situation is likely due to the lack of research samples. There are only six pregnant women who experience hypertension, and there are four pregnant women who have chronic hypertension; that is, mothers before pregnancy already suffer from hypertension. Pregnant women with hypertension before pregnancy have the potential to occur during pregnancy. This situation reinforces the absence of a relationship between the level of maternal knowledge and the incidence of hypertension complications in pregnant women (Coco & Zarbo, 2014). However, for this reason, surveillance and early detection of hypertension during pregnancy is essential for health workers in follow-up planning in order to minimize the risk to the mother or fetus at all levels of knowledge of the high risk of pregnancy and pregnancy complications.

Conclusion

The study concluded that the prevalence of high risk in pregnancy and low knowledge is still high in pregnant women. Low knowledge significantly increases the incidence of anaemia, chronic energy deficiency, and risky weight gain. Therefore, the results of this study indicate the need for increased education about the high risks of pregnancy and its prevention. Thus, increasing the knowledge of pregnant women can help them overcome and prevent pregnancy complications, according to the results of this study, with innovative educational media both online and offline that attract and motivate pregnant women to obtain information. There is room for the Midwife profession to develop educational methods in the mother class program through interprofessional collaboration to increase maternal knowledge regarding pregnancy complications or high risk of pregnancy and prevention.

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