JMCH Journal of Maternal and Child Health (2024), 09(05): 764-778
Masters Program in Public Health, Universitas Sebelas Maret

Meta Analysis
Open Access

Determinants of Pregnancy Complications in Indonesia (Analysis of Indonesian Health Survey 2023)

Bella Safhira, Nurmalia Ermi

Department of Public Health, Faculty of Public Health,
Universitas Sriwijaya, Palembang, Sumatera Selatan

Received: 31 August, 2024; Accepted: 08 September, 2024; Available online: 16 September 2024

ABSTRACT

Background: Data from the Central Bureau of Statistics (2020) shows that MMR in Indonesia reached 189 deaths per 100,000 live births, which is higher than in countries in Southeast Asia such as Malaysia, Brunei, Thailand, and Vietnam. Maternal deaths are often caused by complications during pregnancy and childbirth, most of which are preventable or treatable (WHO, 2020). This study aims to identify factors that influence the occurrence of pregnancy complications in Indonesia
Subjects and Method: This type of research is analytical observational with a cross-sectional study design. The target population was women aged 10-54 years who had given birth in Indonesia. The total sample of this study was 50,221 respondents. The dependent variable studied was pregnancy complications, and the independent variables were age, mother's education level, employment status, mother's region of residence, parity, multiple pregnancy, antenatal care (ANC) frequency, and ANC examination components. Data were obtained through direct interviews and the MCH book then analyzed using the Complex Sample method.
Results: Maternal age (aOR= 1.23; 95% CI= 1.11 to 1.36; p<0.001), maternal education (aOR= 0.90; 95% CI= 0.81 to 0.99; p= 0.038), maternal occupation (aOR= 0.88; 95% CI= 0.80 to 0.96; p= 0.008), maternal area of residence (aOR= 0.73; 95% CI= 0.66 to 0.81; p <0.001), multiple pregnancies (aOR= 1.83; 95% CI= 1.19 to 2.80; p= 0.005), and ANC examination components (aOR= 1.17; 95% CI= 1.06 to 1.29; p= 0.001) were statistically significantly associated with pregnancy complications.
Conclusion: To reduce the risk of pregnancy complications, pregnant women are strongly advised to regularly perform ANC visits and ultrasounds according to the latest regulations and conduct pregnancy examinations according to the 10T standard. Mothers with multiple pregnancies must ensure adequate nutritional intake due to higher nutrition needs.

Keywords: antenatal care, indonesian health survey, multiple pregnancies, pregnancy complications.

Correspondence:
Nurmalia Ermi. Department of Public Health, Faculty of Public Health, Sriwijaya University, Palembang, South Sumatera. Mobile: 081381394320. Email: nurmalia_ermi@fkm.unsri.ac.id.

Cite this as:
Safhira B, Ermi N (2023). Determinants of Pregnancy Complications in Indonesia (Analysis of Indonesian Health Survey 2023). *J Matern Child Health*. 09(05): 764-778. https://doi.org/10.-26911/thejmch.2024.09.05.01.

BACKGROUND

Indonesia is one of the developing countries that still faces challenges related to maternal and child health. Based on the annual report

UNICEF (2023), the maternal mortality rate, stillbirths and neonatal deaths in Indonesia are ranked eighth highest in the world. Data from the Central Bureau of Statistics 2020 shows that the MMR in Indonesia reached 189 deaths per 100,000 live births, higher than in Southeast Asian countries such as Malaysia, Brunei, Thailand, and Vietnam. Meanwhile, IMR is around 16.85 deaths per 1,000 births. To achieve the SDGs target by 2030, Indonesia must reduce the maternal mortality rate (MMR) to 70 per 100,000 live births and the infant mortality rate (IMR) to 12 per 1,000 births (BPS, 2020).

Maternal deaths are often caused by complications during pregnancy and childbirth, most of which are preventable or treatable (WHO, 2020). Based on the results of Riskesdas (2018), complications during pregnancy in Indonesia are dominated by complaints of persistent vomiting/diarrhea, hypertension, and premature discharge of amniotic fluid. In 2022, hypertension in pregnancy dominated the cause of maternal death in Indonesia, followed by bleeding, heart disease, and other causes (Profil Kesehatan Indonesia, 2023). In 2023, hypertension in pregnancy is still the leading cause, followed by obstetric hemorrhage and other obstetric complications (Profil Kesehatan Indonesia, 2024).

According to data Riskesdas (2018), the proportion of mothers who experienced one or more pregnancy complications in Indonesia was 28% and decreased to 19.7% in 2023 (SKI, 2023). There are still several provinces with proportions that exceed the national level, namely DKI Jakarta (26.6%), West Java (25.4%), East Kalimantan (24.5%), East Java (24%), Central Java (22.4%), DI Yogyakarta (22.8%), and Gorontalo (20.3%) (SKI, 2023). Although there has been a significant decrease over the past five years, this is still a major challenge.

Complicated pregnancies can be detrimental to maternal health and fetal development. Several studies have revealed that mothers with a history of pregnancy complications are at risk of developing various other health problems. A study by Baijery (2023), found that mothers with pregnancy complications were 3.9 times more at risk of giving birth to children with motor development disorders. In addition, according to Manurung and Helda (2021), a history of pregnancy complications doubles the risk of LBW. Pregnancy complications also increase the likelihood of labor complications. Research by Hulwatullaini (2022), showed that mothers who had a history of complications during pregnancy had a 1.7 times higher risk of experiencing complications during childbirth. This is also associated with an increased section cesarean delivery rate, as Sudarsih et al. (2023) found, with a 52 times greater risk. This operation has a higher risk of death, complications, and a longer duration of recovery than standard delivery (Marthia and Siti, 2019).

Pregnancy complications refer to health problems or disorders experienced by the mother during pregnancy. Various factors can cause these complications, such as medical conditions, maternal age, lifestyle, nutritional intake, environment, mental health, and family history of disease (Fadhilla and Puspitasari, 2024). Meanwhile, according to Sulastri and Nurhayati (2021), the factors that influence the occurrence of complications during pregnancy include several aspects, namely socio-demographic conditions, previous pregnancy history, non-obstetric history, and access to health services. Restuti et al. (2020) research revealed a significant relationship between age and parity with the incidence of HDP pregnancy complications. In contrast,

Purwitaningtyas and Nuzula (2024) showed that the number of pregnancies (gravida) was associated with the incidence of pregnancy complications at a young age (p=0.013). Another study conducted by Ali et al. (2021) stated that employment status affects the incidence of pregnancy complications. Other findings conducted by Mahendra et al. (2019), showed that ANC compliance was associated with the incidence of pregnancy complications. As is known, efforts to prevent pregnancy complications in pregnant women have been carried out by the government and health workers, one of which is through the Antenatal Care (ANC) program. However, the proportion of visits shows that not all pregnant women do ANC.

From the description above, various factors can cause pregnancy complications. In addition, there are limited recent studies on the incidence of pregnancy complications in Indonesia today. Therefore, further analysis is needed regarding the determinants that contribute to pregnancy complications to prevent maternal and infant mortality due to complications during pregnancy.

SUBJECTS AND METHOD

1. Study Design

This type of research is analytic observational with a cross-sectional design. Secondary data was sourced from the Indonesian Health Survey (IHS) 2023, consisting of 38 Provinces and 514 Districts / Cities.

2. Population and Sample

The study population consisted of women aged 10-54 years who had given birth in Indonesia during the 2023 IHS interview with the last childbirth unit of analysis. The total sample obtained was 50,221 respondents and has been weighted. The inclusion criteria in this study were women aged 10-54 years who filled in or answered the questions entirely according to the variables studied. The exclusion criteria must be completed data (missing data) and respondents answering no to know. The IHS 2023 sampling technique was carried out in two stages: the first stage was to select census blocks using proportional-to-size sampling (PPS), and the second was to choose ordinary households using Systematic Sampling and Implicit Stratification.

3. Study Variables

The dependent variable studied was the incidence of pregnancy complications. The types of pregnancy complications experienced by mothers during pregnancy included continuous vomiting or diarrhea, high fever, hypertension, lack of fetal movement, heavy bleeding in the birth canal, premature discharge of amniotic fluid, pain when urinating, coughing for more than 2 weeks, shortness of breath, heart palpitations and chest pain, and seizures. The independent variables studied were age, mother's education level, employment status, mother's region of residence, parity, multiple pregnancies, ANC frequency, and ANC examination components.

4. Operational Definition of Variables

Age at delivery was categorized into at-risk (<20 years and or >35 years) and not at-risk (20-35 years) (Umniyati et al., 2022). Education was categorized into low (no school - junior high school equivalent) and high (senior high school equivalent - university) (Nurmalasari et al., 2020).

Employment status is categorized into working and not working (Agustina et al., 2022). Parity is categorized into at-risk (1 or ≥ 4 children) and not at-risk (2-3 children), and multiple pregnancies are categorized into two, namely yes and no (Restuti et al., 2020).

Antenatal care (ANC) frequency was categorized into incomplete (< 4 times, not according to 1-1-2 pattern) and complete (≥ 4 times, according to at least 1-1-2 pattern).
ANC examination components were categorized into not according to standard (if < 10T) and according to standard (if getting all 10T examinations).
Pregnancy complications is categorized into two; namely, there are complications (if you have ≥1 pregnancy disorder, and there are no complications if you choose the answer no (Simarmata et al., 2015).

5. Study Instruments

The instrument of this study was the questionnaire used in the 2023 Indonesian Health Survey (IHS), namely the household (RUTA) and individual (Maternal Health) questionnaires. The SKI data collection was conducted through direct interviews and information from the Maternal and Child Health (MCH) book.

6. Data analysis

The data analysis process involved three stages using a Complex Sample. Before analysis, weighting was carried out by creating standard weight variables. The first stage was to conduct univariate analysis, and the second stage was to analyze bivariate data using the kai squared test by looking at the p-value (95% CI). For multivariate analysis using multiple logistic regression, the predictive factor model goes through three steps: complete modeling selection, confounding assessment, and final model.

7. Research Ethics

The Health Research Ethics Commission, Public Health Study Program, Faculty of Public Health, Sriwijaya University has approved this research and passed the ethical review with number 418/UN9.-FKM/TU.KKE/2024.

RESULTS

1. Characteristics samples

Table 1 presents the results of a univariate analysis, showing that 14.2% of the 50,221 respondents experienced pregnancy complications. The majority were aged 20-35 years (80.7%), had completed high school or equivalent education (39.5%), were not employed (62.1%), and resided in urban areas (57.5%). The majority had a parity of 2-3 children (60.2%) and did not experience multiple pregnancies (99%). Mothers with a complete ANC visit frequency with a 1-1-2 pattern were (70.4%), and (64.3%) mothers had not received ANC examination components according to the 10T standard.

2. Analysis Bivariate

According to Table 2, the variables of maternal age (p<0.001), maternal education (p= 0.011), maternal occupation (p= 0.007), region of residence (p<0.001), multiple pregnancies (p= 0.004), and ANC examination components (p=0.001) showed a significant relationship with the incidence of pregnancy complications.

3. Multivariate analysis

In the initial multivariate modeling, maternal age, maternal education, maternal occupation, region of residence, multiple pregnancies, and ANC examination components were associated with the incidence of pregnancy complications (p<0.05). Furthermore, variable exclusion was carried out in stages, starting from the variable with the most significant p-value (p>0.05). The variables of ANC frequency (1-1-2) and parity did not have a significant association (p>0.05), so they were excluded from the modeling. These variables were also not identified as confounding variables (Table 3).

The final multivariate modeling showed that maternal age (AOR= 1.23; 95% CI= 1.11 to 1.36; p<0.001), maternal education (AOR = 0.90; 95% CI = 0.81 to 0.99; p

= 0.038), maternal occupation (AOR = 0.88; 95% CI = 0.80 to 0.96; p = 0.008), maternal region of residence (AOR= 0.73; 95% CI = 0.66 to 0.81; p <0.001), multiple pregnancy (AOR= 1.83; 95% CI= 1.19 to 2.80; p= 0.005), and ANC examination component (AOR = 1.17; 95% CI= 1.06 to 1.29; p= 0.001) had a statistically significant association with the incidence of pregnancy complications. Multiple pregnancies was the most dominant factor affecting the incidence of pregnancy complications. Mothers with multiple pregnancies had a 1.83 times greater risk of experiencing pregnancy complications than mothers with singleton pregnancies after controlling for the variables of maternal age, maternal education, maternal occupation, region of residence, and ANC examination components.

Table 1. Univariate analysis of determinants of pregnancy complications in Indonesia

Variable	Frequency (n)	Percentage (%)
Pregnancy Complications		
Complications	7,131	14.2
No Complication	43,090	85.8
Maternal Age		
<20 years	1,977	3.9
20-35 years	40,552	80.7
>35 years	7,692	15.3
Maternal Education		
Never attended school	736	1.5
Did not finish elementary school	1,727	3.4
Elementary School	8,318	16.6
Junior High School	11,636	23.2
Senior High School	19,851	39.5
Diploma 1/2/3	3,412	6.8
University	4,541	9
Maternal Occupation		
Not working	31,208	62.1
School	291	0.6
PNS/TNI/POLRI/BUMN/BUMD	1,470	2.9
Private Employee	4,936	9.8
Self-employed	4,469	8.9
Farmer	2,271	4.5
Fisherman	36	0.1
Laborer/Driver/Household Helper	1,002	2
Others	4,538	9
Region of Residence		
Rural	21,326	42.5
Urban	28,895	57.5
Parity		
At risk (1 or >= 4 children)	20,012	39.8
Not at risk (2-3 children)	30,209	60.2
Multiple Pregnancies		
Yes	512	1
No	49,709	99
ANC Frequency (1-1-2)		
Incomplete	14,885	29.6
Complete	35.336	70.4

Variable	Frequency (n)	Percentage (%)
ANC Examination Components		
Not up to standard (<10T)	32,295	64.3
Standardized (10T)	17,926	35.7

Source: Secondary Data of Indonesian Health Survey (IHS) 2023

Table 2. Bivariate analysis of determinants of pregnancy complications in Indonesia

Variable	Pregnancy Complications		Total	OR (95% CI)	p
	Yes	No			
Maternal Age					
At-risk (<20 and/ >35 years)	1,559	8,110	9,669	1.20 (1.09-1.33)	<0.001
Not at risk (20-35 years)	5,572	34,980	40,552		
Maternal Education					
Low	2,998	19,419	22,417	0.88 (0.80-0.97)	0.011
High	4,133	23,671	27,804		
Maternal Occupation					
Employed	2,520	16,493	19,013	0.88 (0.80-0.96)	0.007
Not Employed	4,612	26,596	31,208		
Region of Residence					
Rural	2,551	18,775	21,326	0.72 (0.65-0.79)	<0.001
Urban	4,580	24,315	28,895		
Parity					
At Risk	2,949	17,063	20,012	1.07 (0.98-1.17)	0.119
Not at Risk	4,182	26,027	30,209		
Multiple Pregnancies					
Yes	119	393	512	1.85 (1.21-2.83)	0.004
No	7,012	42,697	49,709		
ANC Frequency (1-1-2)					
Incomplete	2,105	12,780	14,885	0.99 (0.90-1.09)	0.893
Complete	5,026	30,310	35,336		
ANC Examination Components					
Not up to standard (<10T)	4,818	27,477	32,295	1.18 (1.07-1.30)	0.001
Standardized (10T)	2,313	15,613	17,926		

Table 3. Multivariate analysis of determinants of pregnancy complications in Indonesia

Variable	Initial Model			Final Model		
	p	OR	(95% CI)	p	aOR	(95% CI)
Maternal Age	<0.001	1.22	1.10-1.35	<0.001	1.23	1.11-1.36
Maternal Education	0.048	0.90	0.82-0.99	0.038	0.90	0.81-0.99
Maternal Occupation	0.008	0.88	0.80-0.96	0.008	0.88	0.80-0.96
Region of Residence	<0.001	0.73	0.66-0.81	<0.001	0.73	0.66-0.81
Parity	0.131	1.07	0.97-1.17			
Multiple Pregnancies	0.005	1.83	1.20-2.81	0.005	1.83	1.19-2.80
ANC Frequency (1-1-2)	0.813	0.98	0.89-1.09			
ANC Examination Components	0.001	1.17	1.06-1.29	0.001	1.17	1.06-1.29

DISCUSSION

1. Relationship between Maternal Age and the Incidence of Pregnancy Complications in Indonesia

Statistical analysis showed a significant relationship between maternal age and pregnancy complications. Mothers in the high-risk age groups (<20 years or >35 years) had a 1.23 times higher likelihood of experiencing pregnancy complications compared to mothers aged 20-35 years.

This finding aligns with research by Dayani and Widyantari (2023) which identified a connection between maternal age and hypertension during pregnancy. Mothers aged <20 or >35 years were found to have a fourfold higher risk of developing hypertension compared to those aged 20-35 years. 20-30 years is considered the ideal age range for a healthy pregnancy. Meanwhile, women under 20 years old face a higher risk because their physical and psychological conditions are not fully prepared. This risk is further increased by psychosocial pressure and unpreparedness to become a mother at a young age.

Another study conducted by Luh et al. (2024) also showed that maternal age had a significant association with the incidence of premature rupture of membranes, with an OR of 3.82 (95% CI= 1.73 to 8.44). This is due to the unpreparedness of immature reproductive organs at the age of <20 years, as well as decreased organ function and increased risk of degenerative diseases in mothers aged >35 years, which affects the smooth running of pregnancy and childbirth.

2. Relationship between Maternal Education and the Incidence of Pregnancy Complications in Indonesia

Based on the results of statistical tests, there is a significant relationship between maternal education and the incidence of pregnancy complications. Low education is a protective factor for the occurrence of pregnancy complications (OR<1). This phenomenon may occur because most pregnant women with low education tend to have more routine pregnancy checks and receive health-related services and education from midwives at the health center or village midwives (Wirakhmi et al., 2023).

Education is closely related to knowledge, as the level of education affects a person's understanding of various things, including health and pregnancy. However, knowledge of pregnancy complications does not depend only on formal education. Health information can also be obtained from multiple sources, such as health services at the health center, family experience, social media, or health counseling conducted by related institutions.

According to Mutoharoh and Indarjo (2024), knowledge stored in memory is not necessarily applied in real action. If pregnant women do not implement the knowledge they have in their daily lives, it will not have an impact on the prevention or management of pregnancy complications. From the description above, the researcher assumes that education level influences a person's knowledge and health behavior. However, the availability of easily accessible information through adequate health services is also an essential factor in preventing pregnancy complications, regardless of the formal education level of pregnant women.

3. Relationship between Maternal Employment Status and the Incidence of Pregnancy Complications

The results of the statistical tests indicated a significant association between maternal employment status and the occurrence of pregnancy complications. Working mothers are a protective factor for the occurrence of

pregnancy complications compared to mothers who do not work (OR<1).

This is in line with research Wilda (2020), which states that almost all pregnant women who experience pregnancy disorders, such as preeclampsia, are housewives who do not have jobs. This is caused by stress due to lack of activity outside the home, boredom, and economic and family problems. Another study conducted by Nikmathul et al. (2021) also assumed that the type of work affects the incidence of pregnancy complications, namely premature rupture of membranes, with p = 0.044 and OR 4.16. From this data, 14 pregnant women did not work who experienced BPD. Although not working, pregnant women who act as housewives still have many activities, often even busier than mothers who work in the office. This is due to the repetitive nature of household chores.

4. Relationship between Mother's Area of Residence and the Incidence of Pregnancy Complications

Statistical tests showed a significant relationship between the region of residence and the incidence of pregnancy complications. Mothers who live in rural areas are a protective factor for the occurrence of pregnancy complications compared to mothers who live in urban areas. This may be related to healthier food consumption patterns in rural areas compared to urban areas. However, limited access to adequate health facilities can also factor in obtaining appropriate medical treatment when complications occur. According to Nurfitriyani and Amran (2023), pregnant women in rural areas tend to adopt a natural and low-fat diet. They are active in daily physical activities to fulfill their life needs. Another study conducted by Putri (2020) also supports these findings by showing that place of residence significantly influences complications such as bleeding p= <0.001 (OR= 0.66; 95% CI= 0.55 to 0.88). Accessibility to quality health services, such as regular ANC check-ups and prompt medical treatment, is crucial in improving maternal and child health, especially in rural areas.

5. Relationship between Parity and Pregnancy Complications

Based on the results of statistical tests, there is no significant relationship between parity and the incidence of pregnancy complications. Research conducted by Hermawati (2020), also showed that there was no correlation between maternal parity and one of the complications of pregnancy, namely the incidence of preeclampsia in pregnant women (p=0.489).

Preeclampsia often occurs in the first pregnancy due to damage to the placental blood vessels, which is immunological in nature and is generally experienced by primigravida mothers and mothers with autoimmune conditions. However, this condition can also occur in mothers with parity >2, especially if the gestational age is older. Tambunan et al., (2020) also found no significant association between parity and the occurrence of preeclampsia, with a (OR= 1.13; 95 CI= 0.66 to 1.95; p = 0.746). Similarly, Puspita et al., (2021) reported comparable findings, showing a p of 0.41 (>0.05), indicating no relationship between parity and other pregnancy complications, such as premature rupture of membranes.

Research Rifdiani (2016) also states that parity has nothing to do with the incidence of pregnancy complications. Women with a one-time parity history usually focus more on preparing for the first childbirth to run smoothly. At 2-3 times parity, previous pregnancy experience helps them prepare for normal labor. Meanwhile, women with ≥4 parities generally have a supportive body without serious complications, and prior experience makes pregnant women more careful.

Researchers assume that the absence of an association between parity and the incidence of pregnancy complications could be influenced by other factors such as the good physical condition of the mother, adequate nutritional intake during pregnancy, and routine ANC visits, including all series of examinations.

6. Relationship between Multiple Pregnancies and the Incidence of Pregnancy Complications

Based on the results of statistical tests, there is a significant relationship between twin pregnancies and the incidence of pregnancy complications. Mothers with multiple pregnancies have a 1.834 times greater risk of developing pregnancy complications compared to singleton pregnancies. This is in line with the research of Andriani et al. (2022) which states that multiple pregnancies increase the risk of preeclampsia up to 5.13 times greater than a single pregnancy.

The additional burden of blood circulation to the fetus in multiple pregnancies is one of the factors causing the high risk of pregnancy complications such as preeclampsia. In addition, multiple pregnancies can also increase the risk of other complications, such as premature rupture of membranes due to excessive stretching of the uterine muscles, as described by Iswanti (2017). The statistical analysis revealed (p= 0.001; 95 CI: 2.93 to 76.59), shows that mothers with multiple pregnancies are 15 times more likely to experience premature rupture of membranes than mothers with singleton pregnancies. Therefore, mothers with multiple pregnancies need to pay attention to daily activities, given the more significant physical burden and nutritional needs compared to singleton pregnancies. Regular pregnancy check-ups until delivery are essential to ensure the mother's and baby's health condition and determine the safest delivery method (Meidya and Fatimah, 2019).

7. Relationship between ANC Frequency (1-1-2) with the Incidence of Pregnancy Complications

Based on the results of statistical tests, there is no significant relationship between the frequency of ANC (1-1-2 pattern) and the incidence of pregnancy complications. The frequency of ANC in question is the number of ANC visits made by the mother during the last pregnancy and provided by health workers at least four times according to the pattern (1-1-2), at least once in the first trimester, once in the second trimester, and twice in the third trimester (PMK, 2014).

This finding is in line with the research of Mardiyah et al. (2022) which stated that the frequency of ANC visits (K4) was not significantly correlated with maternal mortality due to preeclampsia complications. However, the quality of ANC services is a key factor that is more influential because high ANC visits without quality care are unable to reduce the risk of pregnancy complications. According to Astutik et al. (2018) antenatal care for every woman does not only prioritize the number of visits but also the quality of these services. Pregnant women who have fulfilled the minimum number of visits of four times but do not experience a standardized examination or complete information about their pregnancy are at risk of complications. This is due to the lack of early detection and knowledge of complications that may occur during pregnancy and labor.

In the context of regulation Permenkes RI (2024), sets a new standard of at least six ANC visits, focusing on integrated examinations involving competent health workers, including ultrasonography (USG) services. Optimal ANC services aim not only to fulfill the number of visits but also to detect early maternal health problems, obstetric complications, nutritional disorders, and infectious

and non-communicable diseases. Therefore, interventions to improve the quality of ANC services need to be prioritized to support healthy pregnancies and reduce the number of pregnancy complications. This study confirms that the effectiveness of ANC depends not only on the frequency of visits but also on the quality of care provided. Early detection of complications through quality ANC services will provide more significant opportunities for pregnant women to get timely treatment and minimize the risk of pregnancy complications.

8. Relationship between the Components of ANC Examination and the Incidence of Pregnancy Complications

Based on the results of statistical tests, there was a significant relationship between the components of ANC examination and the incidence of pregnancy complications. Mothers who did not undergo ANC examination according to the standard (<10T) had a risk of 1.17 times greater than mothers who underwent ANC examination according to the standard (10T). The components of the ANC examination in question are the types of examinations according to the 10T integrated antenatal service standards received by pregnant women every time they visit, namely measuring height and weight, blood pressure, upper arm circumference (MUAC), checking the height of the fundus uteri, location and fetal heart rate, tetanus toxoid immunization (TT), giving blood supplement tablets, laboratory tests (HIV, syphilis, hepatitis B, temporary blood sugar, blood Hb, urine protein), counseling and case management (action) (Permenkes RI, 2024).

According to a study by Sudaryo and Sam (2022), ANC visits have a relationship with the incidence of obstetric complications, where the ties remain significant after considering the factors of parity and place of delivery. ANC visits were categorized based on the mother's compliance in visits and the completeness of the 10T examination during ANC. Mothers who had poor ANC visits had a 1.34 times greater risk of experiencing obstetric complications compared to mothers who had good ANC visits. According to Rizqi and Ayu (2019), implementing optimal service standards in integrated ANC is crucial to protecting public health. This is because every service process is carried out based on clear guidelines so that it can detect various early complaints and diseases experienced by pregnant women. Improving ANC services depends not only on the number of visits by pregnant women but must also be accompanied by fulfilling service quality standards that include the 10T.

Based on the analysis results, there is a significant relationship between maternal age, maternal education, maternal occupation, maternal residence area, multiple pregnancies, and ANC examination components with the incidence of pregnancy complications. Multiple pregnancy is the most influential factor in the incidence of pregnancy complications. To reduce the risk of pregnancy complications, pregnant women are strongly advised to regularly perform ANC visits and ultrasounds according to the latest regulations, as well as conduct pregnancy examinations according to the 10T standard. Pregnant women must ensure that nutritional needs during pregnancy are fulfilled, especially pregnant women with multiple pregnancies, because the number of fetuses more than one requires more nutrients and has a higher risk of complications. In addition, pregnant women should also maintain a healthy lifestyle and immediately report any complaints or disorders experienced during pregnancy. On the other hand, the government needs to improve the accessibility and quality of maternal and child health services and provide comprehensive

health education. By working together, it is hoped that the health of mothers and babies can be guaranteed and the mortality rate of mothers and babies due to pregnancy complications can decrease.

This study has several limitations, one of which is using a cross-sectional study design. In this study design, exposure and outcome measurements are carried out at one time so that it cannot explain the causal relationship. However, to overcome this limitation, researchers conducted the multivariate analysis with multiple logistic regression tests of the predictive factor model to see how the independent variables relate to the dependent variables and determine the most influential factors causing pregnancy complications after being controlled by other variables. Another limitation is recall bias because respondents were asked about pregnancy and childbirth experiences within the last five years for the previous child. Thus, if respondents are less able to remember clearly, it can lead to information bias.

Furthermore, not all variables that have substance to the incidence of pregnancy complications can be studied, such as nutritional status, pregnancy distance, and lifestyle. This is because the variables studied were adjusted to those in the IHS 2023 questionnaire. Although it has several limitations, as described above, the research instrument in IHS 2023 already has good validity and reliability. The BKPK team conducted internal validity through tiered training, supervision, monitoring, evaluation, and discussion. Enumerators were given structured training and varied teaching materials. Meanwhile, external validity was conducted from outside the Ministry of Health.

AUTHOR CONTRIBUTION

The first author played a role in drafting the article, processing the data, and creating the discussion. The second author contributed by providing guidance, input, and constructive suggestions to improve the quality of the article.

FUNDING AND SPONSORSHIP

None.

ACKNOWLEDGEMENT

The research team would like to offer their heartfelt thanks to all those who supported this research: (1) Head of Data and Information Technology Center of the Ministry of Health of the Republic of Indonesia (2) Faculty of Public Health, Sriwijaya University.

CONFLICT OF INTEREST

According to the researchers, this study was conducted without any business or financial relationships that could lead to a conflict of interest.

REFERENCES

Agustina PM, Sukarni D, Amalia R (2022). Faktor-faktor yang berhubungan dengan kejadian preeklamsia di RSUD Martapura Okut Tahun 2020 (Factors related to the incidence of preeklamsia at Martapura Okut Regional Hospital in 2020). Jurnal Ilmiah Universitas Batanghari Jambi, 22(3): 1389. https://doi.org/10.33087/jiubj.v22i3.2513

Astutik W, Dasuki D, Kurniawati HF (2018). Factors influencing maternal labor complication in Kutai Kartanegara Region (Faktor-faktor yang mempengaruhi komplikasi persalinan ibu di Kabupaten Kutai Kartanegara). Belitung Nursing Journal, 4(5): 510–517. https://doi.org/10.33546/BNJ.364

Baijery YEO (2023). Hubungan antara riwayat komplikasi kehamilan dengan gangguan perkembangan motorik kasar pada anak usia 0-36 bulan (Relationship between history of pregnancy complications and impaired gross motive development in children aged 0-36 months). Health Media, 5(1): 28–33. https://doi.org/-10.55756/hm.v5i1.165

BPS (2020). Sensus penduduk indonesia (Indonesia population census). Badan Pusat Statistik. http://sp2010.bps.-go.id/

Dayani TR, Widyantari KY (2023). The factors related to the incidence of hypertension in pregnant women (Faktor-faktor yang berhubungan dengan kejadian hipertensi pada ibu hamil). Journal of Language and Health, 4(1): 1–10. http://jurnal.-globalhealthsciencegroup.com/index.php/JLH

Fadhilla KN, Puspitasari N (2024). Faktor - faktor yang mempengaruhi komplikasi kehamilan: literature review (Factors affecting pregnancy complications: literature review). Prepotif, 8(2): 3494–3500. https://doi.org/10.3100-4/prepotif.v8i2.30061

Hermawati D (2020). Hubungan paritas dan usia ibu hamil dengan pre-eklampsia di Rumah Sakit Kota Banda Aceh (Relationship between parity and age of pregnant women with preeclampsia in Banda Aceh City Hospital). Idea Nursing Journal, XI(3): 62–69. http://202.4.186.66/INJ/article/view/20812/13839

Hulwatullaini (2022). Determinan kejadian komplikasi persalinan di Indonesia analisis data survei demografi dan kesehatan Indonesia tahun 2017 (Determinants of the incidence of complications of childbirth in Indonesia analysis of data from the 2017 Indonesian demographic and health survey). JRPH, 5(1): 1–13. https://-journal.uinjkt.ac.id/index.php/jrph/article/view/36713

Luh N, Sri P, Komang N, Rahyani Y (2024). Relationship between age and parity of birthing mothers to the incidence of premature rupture of membranes at Bali Mandara Regional Hospital, Bali Province in 2022 (Hubungan usia dan paritas ibu bersalin dengan kejadian ketuban pecah dini di RSUD Bali Mandara Provinsi Bali tahun 2022). Jurnal Ilmiah Kebidanan, 12(2): 117–123. https://doi.org/10.33992/jik.v12-i2.3100

Manurung P, Helda H (2021). Hubungan riwayat komplikasi saat hamil dengan kejadian berat badan lahir rendah (BBLR) di Indonesia (Association between history of complications during pregnancy and incidence of low birth weight (LBW) in Indonesia). Jurnal Epidemiologi Kesehatan Indonesia, 4(2). https://doi.org/10.7454/epid-kes.v4i2.4069

Mardiyah N, Ernawati E, Anis W (2022). Antenatal care and maternal outcome of preeclampsia (Perawatan antenatal dan hasil akhir preeklampsia pada ibu). Indonesian Midwifery and Health Sciences Journal, 6(3): 298–309. https://doi.org/10.20473/imhsj.v6i3.2022.298-309

Marthia I, Siti R (2019). Hubungan antara komplikasi kehamilan dan riwayat persalinan dengan tindakan sectio caesarea di Rumah Sakit Fatimah Serang (The relationship between pregnancy complications and labor history with sectio caesarea at Fatimah

Serang Hospital). Jurnal JKFT: Universitas Muhammadiyah Tangerang, 2(1): 1–7. http://jurnal.umt.ac.id/-index.php/jkft/article/download/690/466

Mutoharoh AVN, Indarjo S (2024). Faktor risiko kejadian anemia pada ibu hamil (Risk factors for anemia in pregnant women). HIGEIA, 8(1): 22–30. https://doi.org/10.15294/higeia.v8i1.65548

Ali RN, Hiola FAA, Tomayahu V (2021). Faktor-faktor yang mempengaruhi kejadian komplikasi ketuban pecah dini (kpd) di RSUD Dr Mm Dunda Limboto (Factors influencing the incidence of complications of premature rupture of membranes at Dr. Mm Dunda Limboto Hospital). Jurnal Health Sains, 2(3): 381–393. https://doi.org/10.46799/jhs.v2i3.130

Nurfitriyani D, Amran Y (2023). Determinan kejadian hipertensi pada ibu hamil di Provinsi Jawa Barat analisis riskesdas 2018 (Determinants of hypertension among pregnant women in West Java Province riskesdas analysis 2018)). Jurnal Kesehatan Reproduksi, 13(1): 19–29. https://doi.org/10.58185/jkr.v13i1.33

Nurmalasari Y, Anggunan A, Febriany TW (2020). Hubungan tingkat pendidikan ibu dan pendapatan keluarga dengan kejadian stunting pada anak usia 6-59 bulan di Desa Mataram Ilir Kecamatan Seputih Sur (Relationship between mother's education level and family income with the incidence of stunting in children aged 6-59 months in Mataram Ilir Village, Seputih Sur Subdistrict). Jurnal Kebidanan Malahayati, 6(2): 205–211. https://doi.org/10.33024/jkm.v6i2.2409

Permenkes RI (2024). Peraturan Menteri Kesehatan Republik Indonesia No 6 Tahun 2024 (Regulation of the Minister of Health of the Republic of Indonesia No. 6 Year 2024). Kementerian Kesehatan.

PMK (2014). Peraturan Menteri Kesehatan Republik Indonesia nomor 97 tahun 2014 tentang pelayanan kesehatan masa sebelum hamil, masa hamil, persalinan, dan masa sesudah melahirkan, penyelenggaraan pelayanan kontrasepsi, serta pelayanan kesehatan seksual (Regulation of the Minister of Health of the Republic of Indonesia Number 97 of 2014 concerning health services during the pre-pregnancy, pregnancy, childbirth and post-natal period, provision of contraceptive services and sexual health services)

Profil Kesehatan Indonesia (2023). Profil kesehatan Indonesia tahun 2023 (Indonesia health profile 2023). Kementerian Kesehatan Republik Indonesia.

Profil Kesehatan Indonesia (2024). Profil kesehatan Indonesia tahun 2024 (Indonesia health profile 2024). Kementerian Kesehatan Republik Indonesia.

Purwitaningtyas R, Nuzula F (2024). Faktor - faktor yang mempengaruhi komplikasi kehamilan diusia muda (Factors affecting complications of pregnancy at a young age). Jurnal Perawat Indonesia, 8(1): 1642–1649. https://doi.org/10.32584/jpi.v8i1.1971

Puspita DF, Novianty K, Rahmadini AF (2021). Faktor-faktor yang berhubungan dengan kejadian ketuban pecah dini pada ibu bersalin di BPM Sri Puspa Kencana Kabupaten Bogor (Factors associated with the incidence of premature rupture of membranes in laboring women at BPM Sri Puspa Kencana Bogor Regency). Journal of

Midwifery Care, 2(01): 1–10. https://doi.org/10.34305/jmc.v2i01.364

Putri ARS (2020). Pendidikan dan tempat tinggal ibu dengan kejadian perdarahan pada kehamilan di Indonesia (Maternal education and residence with incidence of bleeding in pregnancy in Indonesia). Jurnal Riset Kebidanan Indonesia, 4(2): 38–42. https://doi.org/10.32536/jrki.v4i2.88

Restuti W, Suprapti B, Pertiwi S (2020). Faktor-faktor yang berhubungan dengan komplikasi kehamilan di Desa Sukasenang Kecamatan Tanjungjaya Kabupaten Tasikmalaya (Factors associated with pregnancy complications in Sukasenang Village, Tanjungjaya Sub-district, Tasikmalaya Regency). JoMI, 2(1): 135–151. http://www.jurnal.ibikotatasikmalaya.or.id/index.php/jomi/article/view/17

Rifdiani I (2016). Pengaruh paritas bbl, jarak kehamilan dan riwayat perdarahan terhadap kejadian perdarahan postpartum (The effect of bbl parity, gestational distance and bleeding history on the incidence of postpartum bleeding). Jurnal Berkala Epidemiologi, 4(3): 396–407. https://e-journal.unair.ac.id/index.php/JBE/article/view/1625

Riskesdas (2018). Laporan Riskesdas Nasional tahun 2018 (National Riskesdas Report 2018). Kementerian Kesehatan Republik Indonesia.

Rizqi AA, Ayu SM (2019). Hubungan pelayanan antenatal care (ANC) terpadu dengan pemeriksaan pencegahan penularan dari ibu ke anak (ppia) di Puskesmas Sleman tahun 2018 (Relationship between integrated antenatal care (anc) services and prevention of mother-to-child transmission (ppia) examination at Sleman Health Center in 2018). Kesmas Indonesia, 11(2): 116. https://doi.org/10.20884/1.ki.2019.11.2.1495

Simarmata OS, Sudikno S, Kristina K, Bisara D (2015). Determinan kejadian komplikasi persalinan di Indonesia: analisis data sekunder riset kesehatan dasar 2010 (Determinants of the incidence of complications of childbirth in Indonesia: a secondary data analysis of basic health research 2010). Jurnal Kesehatan Reproduksi, 5(3). https://doi.org/10.22435/kespro.v5i3.3894.165-174

SKI (2023). Survei Kesehatan Indonesia (SKI) dalam angka (Indonesian Health Survey (SKI) in numbers). Kementerian Kesehatan Republik Indonesia Badan Kebijakan Pembangunan Kesehatan.

Sudarsih I, Agustin, Ardiansyah (2023). Hubungan antara komplikasi kehamilan dan riwayat persalinan terhadap tindakan sectio caesarea (The relationship between pregnancy complications and history of labor to cesarean delivery). Jurnal Penelitian Perawat Profesional, 5(4): 1567–1576. https://doi.org/10.37287/jppp.v5i4.1875

Sudaryo MK, Sam AQ (2022). Hubungan kunjungan antenatal care (ANC) dengan kejadian komplikasi obstetri di indonesia : analisis data sekunder survei demografi dan kesehatan indonesia (SDKI) tahun 2017 (The association of antenatal care (ANC) visits with the incidence of obstetric complications in Indonesia: secondary data analysis of the 2017 Indonesian demographic and health survey (SDKI)). Jurnal Epidemiologi Kesehatan Komunitas, 7(2): 587–595. https://doi.org/10.14710/jekk.v7i2.11866

Sulastri, Nurhayati E (2021). Identifikasi faktor risiko ibu hamil dengan komplikasi kehamilan dan persalinan

(Identification of risk factors for pregnant women with complications of pregnancy and childbirth). Higeia, 5(2): 276–282. https://doi.org/10.-15294/higeia.v5i2.46401

Tambunan LN, Arsesiana A, Paramita A (2020). Determinan kejadian pre-eklamsia di Rumah Sakit Umum Dr. Doris Sylvanus Palangka Raya (Determinants of preeclampsia incidence at Dr. Doris Sylvanus Palangka Raya General Hospital). Jurnal Surya Medika, 6(1): 101–111. https://doi.-org/10.33084/jsm.v6i1.1625

Umniyati H, Purnamasari T, Febriani E (2022). Komplikasi kehamilan dan antenatal care (Pregnancy complications and antenatal care). Jurnal Kesehatan Vokasional, 7(1): 22–31. https://unair.ac.id/komplikasi-kehamilan-dan-antenatal-care/

UNICEF (2023). Laporan tahunan 2023. Unicef: 1–44. https://www.unicef.-org/indonesia/id/laporan/laporan-tahunan-2023-unicef-indonesia

WHO (2020). Maternal mortality (Kematian ibu). https://www.who.int/news-room/fact-sheets/detail/maternal-mortality

Wilda Y (2020). Dampak perilaku makan terhadap kejadian preeklamsia pada ibu hamil (Impact of eating behavior on the incidence of preeclampsia in pregnant women). *2*-TRIK, 10(2): 72–79. http://dx.doi.org/10.33846/2trik10201

Wirakhmi IN, Utami T, Yulianto DA (2023). Determinan kejadian hipertensi pada ibu hamil di Puskesmas Purwokerto Utara II (Determinants of hypertension in pregnant women at Purwokerto Utara II Health Center). Jurnal Ilmiah Universitas Batanghari Jambi, *23*(1): 557. https://doi.org/-10.33087/jiubj.v23i1.3215