

Relationship between ANC Service Components (10 T) and Pregnancy Complications (Secondary Data from Demographic Survey) Indonesian Health 2017)

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Abstract : Globally, women dying from pregnancy complications decreased by almost 50% from 1990-2013, but the number of deaths remains high where 99% of deaths occur due to complications. Deaths caused by pregnancy complications cannot be avoided, but can be prevented through Antenatal Care (ANC) services as explained by previous studies that ANC services can reduce MMR by up to 20%. This study aims to determine the relationship between the 10T ANC Service Components and Pregnancy Complications. Quantitative research design with a *cross-sectional approach*. The population in this study were all Women of Childbearing Age (WUS) who gave birth to their last child in the last 5 years. Sample selection was determined based on the ratio using stratification and *total sampling* of 14,437. Bivariate analysis using the *Chi-Square test* and multivariate analysis using logistic regression. The results of the analysis showed that there were 2,539 (17.5%) women who experienced complications. Bivariate analysis showed a significant relationship between the components of ANC 10T services, education, wealth index, and residence with pregnancy complications, *p-value* <0.05, while parity showed no significant relationship with complications *p* = 0.378 . The results of multivariate analysis showed that women who did not receive the 10T service components according to standards had a 1,438 times higher risk of experiencing pregnancy complications after being controlled with the variables of parity, education, wealth index, and residence. This study provides important information for the next step in developing an ANC service strategy, namely providing services based on SOPs, improving skills and providing education to mothers and families about the importance of ANC services, in addition to policy making and increasing cooperation between *stakeholders* need to be done to optimize quality ANC services.

Keywords : 10T Service Components, Antenatal Care, ANC Service Quality, Pregnancy Complications.

1. INTRODUCTION

Globally, the number of women dying from complications during pregnancy and childbirth decreased by almost 50% from 1990 to 2013, but the number of deaths remains high, especially in low-income countries where 99% of these deaths are due to complications. (Rurangirwa et al., 2017) . WHO, UNICEF and UNFPA data, 2019 also shows that the number of maternal deaths decreased by 38% from 2000 to 2017, namely from 342 to 211 deaths per 100,000 live births. This is still less than the target of the *Sustainable Development Goals* (SDGs) (World Health Organization, UNICEF, UNFPA, 2019) . Pregnancy complications usually occur in pregnant women aged 15 to 49 years in developing countries. Around 287,000 women in the world die each year due to pregnancy. Based on previous research, 99% of these deaths come from countries that are categorized as poor. (Haftu et al., 2018) .

Many studies have reported that the lack of utilization of ANC (*Antenatal Care*) services by pregnant women in developing countries and low-income countries is a

fundamental health problem in society. (Mugo et al. 2015) . Data also shows that only 51% of pregnant women make ANC visits according to the standard, namely 4 times or more during pregnancy, in addition in countries that are categorized as poor or low-income, such as Sub-Saharan Africa, only 44% of pregnant women receive 4 or more ANC services. (United Nations, 2011) . Deaths caused by pregnancy complications are inevitable, but they can be prevented through ANC services during pregnancy. The quality of services and regular ANC visits can reduce maternal mortality by up to 20%, in addition, based on the 2010 Cochrane review, ANC visits that do not meet standards can have a negative impact on health. Therefore, to evaluate that ANC visits are an effective preventive measure, monitoring of the components and quality of ANC services is needed. (Islam & Masud, 2018) .

In Indonesia, the Maternal Mortality Rate (MMR) has decreased from 390 to 305/100,000 live births. Although there has been a decrease, it has not succeeded in achieving the MDGs target that must be achieved, namely 102 per 100,000 live births in 2015 and the SDGs target of less than 70 per 100,000 live births in 2030. (Ministry of Health of the Republic of Indonesia 2019 ; World Health Organization 2019) Based on data from the 2017 SDKI, bleeding increased from 3% to 5%. Pregnancy complications in women are more likely to be detected if they have a minimum of 4 pregnancy check-ups compared to those who have less than 4 pregnancy check-ups. (SDKI, 2017) .

2. MATERIALS AND METHODS

This study is a quantitative study using a *cross-sectional approach* conducted on the 2017 Indonesian Demographic Health Survey data. The 2017 Indonesian Demographic Health Survey was conducted nationally from July 2017 to September 30, 2017 throughout Indonesia. Research and data analysis were conducted in Lombok, NTB from October to November 2024. The selection of samples in this study was determined based on the ratio using stratification and *total sampling*, namely sampling was carried out based on the number of population. The population in this study were women aged 15-49 years who had given birth to their last child in the last 5 years and were completely recorded in the 2017 Indonesian Demographic Health Survey, which was 15,357. The sample in this study was women in the IDIR71SV data set, then adjusted to the inclusion and exclusion criteria, which were 14,473 women who met the criteria and could be used as samples in

this study. This study is a secondary data analysis conducted on the 2017 SDKI data using the 2017 SDKI questionnaire.

Data collection was conducted by accessing raw data from WUS samples aged 15-49 years. Furthermore, data processing was carried out through several stages, namely editing, coding, and cleaning. (Notoatmodjo, 2014) Statistical analysis using the assistance of *IBM SPSS Computer* program software (*Statistical Package for the Social Sciences*) for windows version 22 to examine the hypothesis and research objectives. The analysis used in this study is univariate analysis to describe the characteristics of each variable, then bivariate analysis using *the chi-square test* to determine the relationship between variables, namely the 10T ANC service components with pregnancy complications. The strength of the relationship is seen based on *the Prevalance Ratio* (PR) value with a 95% *Confidence Interval* (CI). The next stage is to conduct a multivariate analysis using *logistic regression* , which is carried out to determine the relationship between more than one independent variable with the dependent variable at once to determine the most dominant variable related.

3. RESULTS AND DISCUSSION

In Table 1 it can be seen that the percentage of women who experienced complications was 2,539 (17.5%) and as many as 11,229 (77.6%) women who did not receive the ANC 10T service components according to standards . Percentage based on maternal parity, as many as 2,313 (16.0%) mothers with risky parity (having given birth to >3 live or dead children). The highest level of education was found in women with secondary education, namely 8,244 (57.0%) and the lowest was found in women who had no history of education (did not attend school), namely 139 (1.0%). Based on the wealth index, the highest was found in women with a low wealth index of 6,449 (44.6%) and the lowest in women with a moderate wealth index. While based on place of residence, the highest was found in women living in urban areas, as many as 7,264 (50.2%).

Table 1. Distribution of 10T ANC Service Components, Pregnancy Complications, Parity, Education, Wealth Index, and Place of Residence

Variables	n	%
Pregnancy Complications		
Yes	2539	17.5
No	11934	82.5
Component 10 T		
Not Up to Standard	11229	77.6

According to Standard	3244	22.4
Parity		
At risk	2313	16.0
No Risk	12160	84.0
Education		
Highly Educated	2595	17.9
Secondary Education	8244	57.00
Elementary Education	3495	24.1
No education	139	1.0
Wealth Index		
Low	6449	44.6
Currently	2792	19.3
Tall	5232	36.2
Residence		
Rural	7209	49.8
Urban	7264	50.2

Based on the results of statistical tests in Table 2 , it shows that, based on the level of achievement of the 10T components, the incidence of pregnancy complications is more common in women who do not receive the 10T service components according to the standard, which is 1,810 (71.3%) with a *p-value* of 0.000. Pregnancy complications in women based on the number of parities, were mostly found in women with non-risk parities, which were 2,148 (17.7%) with a *p-value* of 0.378 (>0.05). Based on education level, pregnancy complications are more common in women with a history of secondary education, which is 1,476 with a *p-value* of 0.000. In addition, the incidence of pregnancy complications based on wealth index and place of residence, was more common in women with a high wealth index, which is 1050 (41.4%), and living in urban areas , which is 1405 (55.3%) with a *p-value* of 0.000 . The results of the analysis in Table 2 show that there is a significant relationship between 10T components, education, wealth index , and place of residence , with pregnancy complications, *p-value* = <0.05 , while in women based on parity there was no significant relationship (*p-value* >0.05) .

Table 2. Relationship between 10T ANC Service Components, Parity, Education, Wealth Index, and Place of Residence with Pregnancy Complications

Variables	Pregnancy Complications				Amount	PR	Confidence Interval(CI) 95%	p-value
	There are complications		No complications					
	n	%	N	%				
10T Components								
Not Up to Standard	1810	16.1	9419	83.9	11229	0.903	0.880-0.927	0,000
According to Standard	729	22.5	2515	77.5	3244			
Parity								

At risk	391	16.9	1922	83.1	2313	0.956	0.865-1.057	0.378
No Risk	2148	17.7	10012	82.3	12160			
Education								
No school	18	12.9	121	87.1	139			0.000
basic education	532	15.2	2963	84.8	3495	1,299	0.780-2.166	
Secondary Education	1476	17.9	6768	82.1	8244	1.169	1.011-1.352	
higher education	513	19.8	2082	80.2	2595	1,051	0.936-1.180	
Wealth Index								
Low	1001	15.5	5448	84.5	6449			0.000
Currently	488	17.5	2304	82.5	2792	1.161	1.035-1.302	
Tall	1050	20.1	4182	79.9	5232	1,098	0.970-1.242	
Residence								
Rural	1134	15.7	6075	84.3	7209	0.877	0.837-0.919	0.000
Urban	1405	19.3	5859	80.7	7264			

Table 3. Results of Logistic Regression Analysis, Relationship between 10T ANC Service Components and Pregnancy Complications Based on Respondent Characteristics

Variables	Sig.	Exp(B)	95% CI for EXP(B)	
			Lower	Upper
10T Components	0.000	1,438	1,304	1,586
No school	0.144	-	-	-
basic education	0.315	1,299	0.780	2.166
Secondary Education	0.036	1.169	1.011	1,352
higher education	0.402	1,051	0.936	1.180
Low Wealth Index	0.037	-	-	-
Medium Wealth Index	0.011	1.161	1,035	1.302
High Wealth Index	0.139	1,098	0.970	1.242
Residence	0.006	1.145	1,040	1,261

The results of the multivariate analysis in Table.3 show that the ANC 10T service components have a close relationship with pregnancy complications. Women who do not receive the ANC 10T service components according to standards have a 1,438 times higher risk of experiencing pregnancy complications with a 95% CI: 1,304-1,586.

4. DISCUSSION

A. Relationship between 10T Service Components and Pregnancy Complications

Health services during pregnancy aim to fulfill the rights of every pregnant woman to receive quality health services, so that she can go through her pregnancy and have a healthy and quality birth. (Ministry of Health of the Republic of Indonesia, 2014) . Professional health workers need to understand the importance of providing routine and standard services for all pregnant women. This is because the care is designed to monitor and improve the welfare of the mother and fetus, detect early

complications in pregnant women that may occur such as placental retention, postpartum hemorrhage, eclampsia, preeclampsia, hypertension, and anemia. (Yeoh et al., 2016) . Most health problems that arise during pregnancy can be overcome by taking preventive measures provided through ANC visits.

In this study, the proportion of women who received all components of the 10T ANC service was 22.4%, while those who did not receive the standard 10T ANC service were 77.6%. This can be seen that the percentage of women who received the 10T ANC service components that did not meet the standard was greater. The results of the *chi-square analysis* showed that there was a significant relationship between the 10T ANC service components and pregnancy complications. The proportion of women who experienced complications was greater in women who did not receive the standard 10T ANC service, which was 1,810 (16.1%). In line with research conducted in Kenya which revealed that the number of pregnant women who received complete ANC components was 842 (32%) and pregnant women who did not receive incomplete ANC components were 1,793. This shows that the proportion of women who received the 10T ANC service components that did not meet the standard was greater. This is caused by women being late in making ANC visits due to a lack of awareness regarding the importance of ANC care, the distance between their homes and health facilities being too far, and being constrained by transportation costs, so that pregnancy complications cannot be detected. (Anne-Beatrice Kihara et al., 2015) . Quality ANC services are very important to prevent and detect early pregnancy complications and prevent newborn deaths. (Arsenault et al., 2018) .

The results of the multivariate analysis using logistic regression showed that the 10T service components had a close relationship with pregnancy complications after being controlled for education, wealth index and place of residence. The 10T service components had a greater chance of 1,438 (CI 95% = 1,304-1,586) times not getting the 10T service components according to standards. The 10T components are the quality standards of ANC services that must be met, the 10T components include weighing, height, blood pressure, measuring the upper arm circumference, Uterine Fundus Height (TFU), abdominal palpation, DJJ, laboratory tests, urine tests, and consultations. (SDKI, 2017) . The Berg Report on Prenatal Care in Developing Countries contains four objectives of the ANC service components, namely, to detect pregnant women who are at risk of experiencing potential complications early. (Bayou et al., 2016) .

Based on the Regulation of the Minister of Health of the Republic of Indonesia No. 4 of 2019, it states that the achievement of minimum service standards is 55%. Therefore, it is necessary to evaluate the lack of information regarding ANC services, difficult access to health care facilities, unreported services, pregnant women receiving services at health care facilities outside the district or city work area, cost constraints, socio-cultural to carry out interventions to solve problems, so that the achievement of minimum service standards reaches 100%. (Minister of Health of the Republic of Indonesia, 2019) .

B. The relationship between parity and pregnancy complications

Many studies have revealed that maternal parity is associated with pregnancy complications. In contrast to this study, the results of bivariate analysis showed that mothers who experienced complications were more mothers who had given birth to 1-3 children, namely 17.7% with a *p-value* of 0.378, meaning that there was no significant relationship between maternal parity and pregnancy complications. Different results were shown by other studies which revealed that pregnant women with their first child and children >3 had a higher risk than pregnant women with 2-3 children. (Schutte et al., 2010) . The incidence of IUFD and preterm birth was significantly higher in primiparas compared to multiparas. (Andemel et al., 2020) . This difference is likely caused by several factors such as the quality of ANC services received during pregnancy, age being too old or too young, history of previous pregnancies, unhealthy lifestyle or history of congenital diseases such as heart disease, chronic hypertension, and others that can cause complications. Pregnant women with a history of gestational hypertension in previous pregnancies, chronic kidney disease, autoimmune disease, DM, and chronic hypertension are considered high-risk factors, while nulliparous women, age >40 years, birth interval >10 years, obesity and a family history of disease are considered moderate risk factors. (Poon et al., 2018) . Long-term complications can result in recurrent seizures, mental retardation, and can cause delays in fetal development. (Subarto et al., 2020) .

The number of parities can affect poor birth outcomes in certain age groups. This is because pregnancy complications in older women can increase the risk of preeclampsia, placental abnormalities, and abnormal fetal growth quality. While in young women are not physiologically or psychologically ready and the possibility of making ANC visits is very low, so it can increase the risk of complications in teenage

pregnancy. (Luo et al. 2020 ; Lin et al. 2021) . Pregnant women with high risk (having given birth 4 times or more) tend not to receive standard ANC service components. This is because mothers who have given birth 4 times or more receive less attention because they are considered to have experience from previous pregnancies or childbirths, so it can be a detrimental risk factor if they do not receive standard ANC services and preventive measures. The reason for not making ANC visits is also due to women's perceptions that ANC care is only carried out on mothers who have health problems. (Afulani et al., 2019) .

C. Relationship between Maternal Education and Pregnancy Complications

Women's educational status is an important factor in their social empowerment to access health services. Educated women are able to collect health information through electronic media such as social media, radio, TV, and the internet, which are strong supporting factors in the use of health services. (Yaya et al. 2017 ; Yaya et al. 2019) . In the results of the bivariate analysis, it can be seen that education level has a significant relationship with pregnancy complications, where pregnancy complications occur more often in mothers who have a history of secondary education. Mothers with secondary education are 1,169 times more likely to experience pregnancy complications. In line with other studies that reveal that sociodemographic factors such as place of residence, education and wealth index are associated with the use of ANC services. Many studies have revealed that pregnant women from high-income and highly educated families are also more likely to make ANC visits according to standards than pregnant women from poor and uneducated families. The problems faced by women in visiting health services are due to financial problems, lack of awareness regarding ANC visits, no time to make visits, lack of confidence in the health facilities provided, and difficulty in asking for permission. As a result, pregnant women trust traditional healers more in pregnancy and childbirth care (Ogbo et al. 2019 ; Abbas et al. 2017 ; Kiruja et al. 2017 ; Muchie 2017) .

D. Relationship between Maternal Wealth Index and Pregnancy Complications

Socioeconomic status is one of the important factors related to health services and the resulting health conditions. When the economic level is low, the health services received are not optimal, resulting in poor health conditions. Inadequate health services for pregnant women with low economic status can also increase the risk of complications during pregnancy. (Kim et al., 2018) . The results of statistical analysis

in this study can be seen that the maternal wealth index has a close relationship with pregnancy complications. Where pregnancy complications occur more in women with a high wealth index, but the results of multivariate analysis show that women with pregnancy complications have a higher chance of women with a moderate wealth index, namely, 1,161 (CI 95% = 1,035-1,302) times higher. In line with other studies that reveal that low- and middle-income families have a 1.15 and 1.09 times higher risk of premature birth, respectively (Lee et al., 2016) . The risk of death related to pregnancy and childbirth in developing countries is at greater risk. Poverty, social and cultural factors, gender-based violence, lack of education and lack of access to health facilities have a negative impact on maternal health. (Wilhelmson & Gerdtham, 2006).

E. Relationship between Mother's Residence and Pregnancy Complications

The results of statistical analysis show that, place of residence has a significant relationship with pregnancy complications. The proportion of women who experience pregnancy complications is greater in women who live in urban areas, which is 1,405 (19.3%). In contrast to research in Bangladesh revealed that, most women who live in rural areas experience complications during pregnancy and childbirth. This is due to the lack of utilization of health facilities in rural areas. (Yaya et al., 2017) Other studies also revealed that, most (75.4%) of respondents came from rural areas, 20.8% of respondents with a high wealth index, 32.8% of respondents were uneducated. Most of the 94.3% of the characteristics of the respondents experienced one of the complications, namely, severe abdominal pain (37.0%), severe headache 42.4%), convulsions (47.1%), blurred vision and edema (11.7%), vaginal bleeding 5.7%, and other complications that require immediate treatment (26.3%) (Khanal et al., 2015) . The results of Lee *et al.* 's study (2016) revealed that pregnant women living in rural areas have a 1.11 times higher risk of premature birth. Sociodemographic status such as education, economy, and residence are associated with poor births. This is because mothers with high education and socioeconomic status will produce better health through a healthier lifestyle, preventive and curative actions such as knowledge of care and ANC visits. (The Graaf *et al.* . 2013) .

This gap may be caused by women living in urban areas who are more likely to undergo check-ups at hospitals, so they do not receive comprehensive ANC services. Supported by other studies that reveal that the majority of maternal and child health services in government hospitals in Indonesia have less than optimal performance

(66.3%). Therefore, it is necessary for the government and health workers to be able to professionally handle emergency cases, especially in hospitals that are referral centers and prevent delays in handling (Symbol *et al* . 2013) . The results of anamnesis and examination conducted during ANC visits can be used as considerations in determining the diagnosis of whether the pregnant woman is in the high-risk or low-risk category. Early detection is an action taken on people who appear healthy and asymptomatic to find diseases early. This is part of the primary and secondary prevention program. (Jordan & Murphy, 2009) .

5. CONCLUSION

The results of this study indicate that the proportion of women who do not receive standard 10T ANC services is still high in Indonesia. The components of 10T ANC services are closely related to pregnancy complications. The quality of ANC services in the field needs to be improved and provide services based on SOP by health workers. It is expected that the relevant government will routinely evaluate the performance of midwives in the field and improve the skills of health workers through seminars, training or workshops, in addition it is expected that health workers, especially midwives, can provide education to the community, especially pregnant women, about the importance of ANC care. Policy making and increasing cooperation between *stakeholders* need to be done to optimize quality ANC services.

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