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Detection Mapping of Women with High-Risk Pregnancy in Antenatal Care in Kamonji Public Health Center, Palu City, Indonesia

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ABSTRACT
High-risk pregnancy induces complications, which threaten both mother and fetus during childbirth. Therefore, it is important to detect such cases during antenatal using Geographic Information Systems (GIS). This study aims to map the detection of women with high-risk pregnancy based on age, parity, obstetric history, and the relationship between these three factors. This is analytic, quantitative research with a cross-sectional approach used to carry out its design. The Lemeshow Formula was used to obtain data from 283 respondents and analyzed using the spatial techniques and the Chi-Square test with p> 0.05. The results of spatial analysis using a map scale of 1: 65,000 cm showed that: (1) the highest distribution of women with high-risk pregnancy was discovered in Lere Village, (2) the lowest were found in Ujuna Village, (3) based on age, the highest was detected in Lere Village, (4) in accordance with parity, the highest were found in Ujuna Village, and (5) regarding obstetric history, the majority were discovered in Baru Village. The age (p = 0.010) and obstetric history (p = 0,000) correlated with high-risk pregnancy cases. Meanwhile, parity (p = 0.232) had no significant relationship with this health issue. It can be concluded that Lere Village has the largest number of women with high-risk pregnancy cases, while Ujuna village has the least. Age and obstetric history effect the rate of this high-risk pregnancy.

Keywords: Mapping, high-risk pregnancy, antenatal, care

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INTRODUCTION
According to the IDHS data, the maternal mortality rate (MMR) in Indonesia is relatively high. In Central Sulawesi Province, the rate increased from 358 / 100.000 live births [1] to 359 / 100.000 in 2017[2]. Pregnant women are included in the high-risk group assuming they are in the following categories (a) less than 20 years old or more than 35 years old, (b) have three or more children, (c) have previous problems associated with pregnancy and childbirth, (d) height less than 145 cm, (e) low body weight, (f) the range time of pregnancy is too close, (g) history of anemia, (h) bleeding during pregnancy, (i) experience high blood pressure, (j) abnormalities in fetal location, and (k) history of chronic diseases[3].

Therefore, accurate data is required in order to handle and reduce the high-risk associated with pregnancy properly. When complications are not early detected, they continually grow into serious complexity, thereby threatening both mother and fetus. This leads to an increase in morbidity and mortality rates [4],[5].

The development of geographic information systems (GIS) plays an important role in the data processing of MCH service programs. This system is expected to provide pre-information on pregnant women at risk. GIS has a very good ability to visualize spatial data and its attributes, such as the modification of colors, shapes, and sizes of symbols to represent the elements of the earth's surface. Spatial data is geographically oriented with a specified coordinate system. It can also be presented in the form of a map that illustrates health services' ability in communities [6].

In 2018, the Maternal Mortality Rate at Kamonji Health Center reached 28 per 100.000 live births, with most cases due to severe preeclampsia and bleeding during labor. Furthermore, in September 2019, approximately 1074 pregnant women registered at this Health Center with no information system in the form of thematic map layouts. This study, therefore, aims to provide a thematic map layout of women with high-risk pregnancies.

RESEARCH METHODS
Type, Location and Period of Research
This is analytic, quantitative research with a cross-sectional approach. The survey was conducted at Kamonji Public Health Center, Palu City, from January-February 2020, using Geographic Information Systems (GIS).

Population and Sample
The population consists of a total of 1074 pregnant women that performed antenatal care at the Kamonji Public Health Center. From the population, as many as 283 respondents were obtained by using the Lemeshow formula with Proportionate Stratified Random Sampling technique.

Data Collecting Technique
Data were collected by distributing questions to pregnant women within the research location's coordinates (Longitude and Latitude).

Data Analysis
Geographic Information Systems (GIS) was used for data analysis. This process was carried out by making buffers around points, lines, and areas (polygons). It was also conducted by overlaying and Chi-Square tests.

RESULTS
Characteristics of Respondents
Characteristics of respondents in this study were the Ideal Age of Pregnancy, Parity, Obstetric History, and High Risk of Pregnancy.

Table 1: Distribution of Respondents by Ideal Age for Pregnancy, Parity, Obstetric History and High Risk of Pregnancy

Age	Frequency	Percentage
Ideal	219	77.4
Unideal	64	22.6
Total	283	100.0
Parity		
Ideal	248	87.6
Unideal	35	12.4
Total	283	100.0
Obstetric History		
Good	150	53.0
Bad	133	47.0
Total	283	100.0
High-risk Pregnancy		
Low	144	50.9
High	139	49.1
Total	283	100.0

Source: Primary Data, 2020

Table 1 showed that more than 77.4% of pregnant women have an ideal age compared to 22.6% with unideal time. Based on parity, approximately 87.6% of the respondents have an ideal number of children, as opposed to 12.4%. Furthermore, from the previous obstetric history, 53% had a good experience, and 47% had a bad experience. Approximately 49.1% of respondents have a high risk of pregnancy.

Distribution Map of Women with High-Risk Pregnancy

The figure below shows a map of the distribution of women with high-risk pregnancy in 7 villages located in the Kamonji Public Health Center. It appears that Lere Village has the highest level of high-risk pregnancy, while Ujuna has the lowest level of cases.

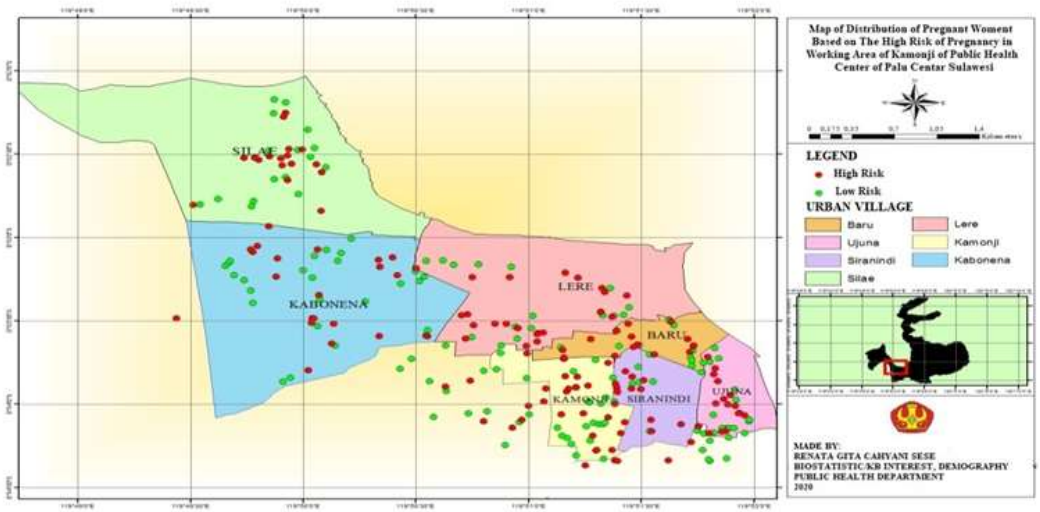

Figure 1: Distribution of Respondents Based on High-Risk Pregnancy

Distribution Map of Pregnant Women by Age

The map of pregnant women distribution by age in Figure 2 shows that the highest number of those with unideal age was found in Lere Village. Meanwhile, the lowest number was in Siranindi.

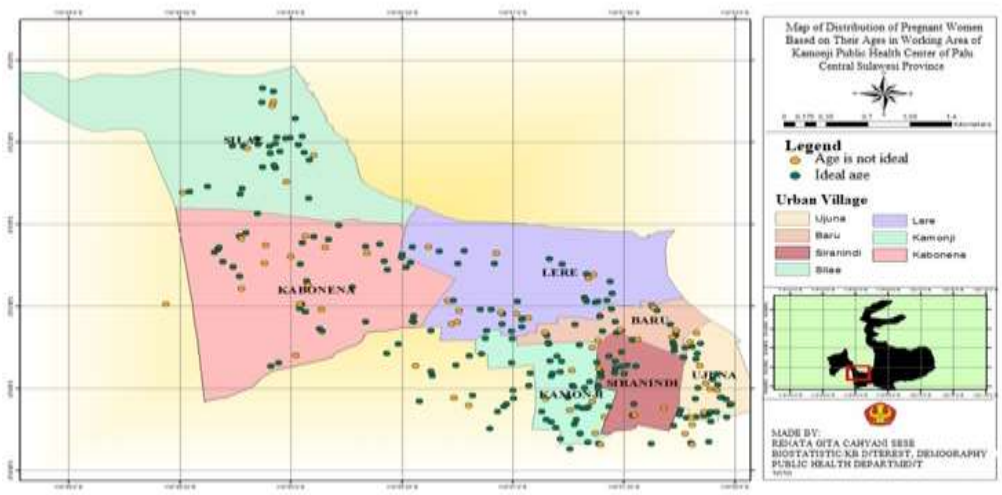

Figure 2: Distribution of Respondents by Age

Distribution Map of Pregnant Women Based on Parity

The map above shows that pregnant women with the highest level of non-ideal parity were found in Ujuna Village and the lowest in Siranindi Village

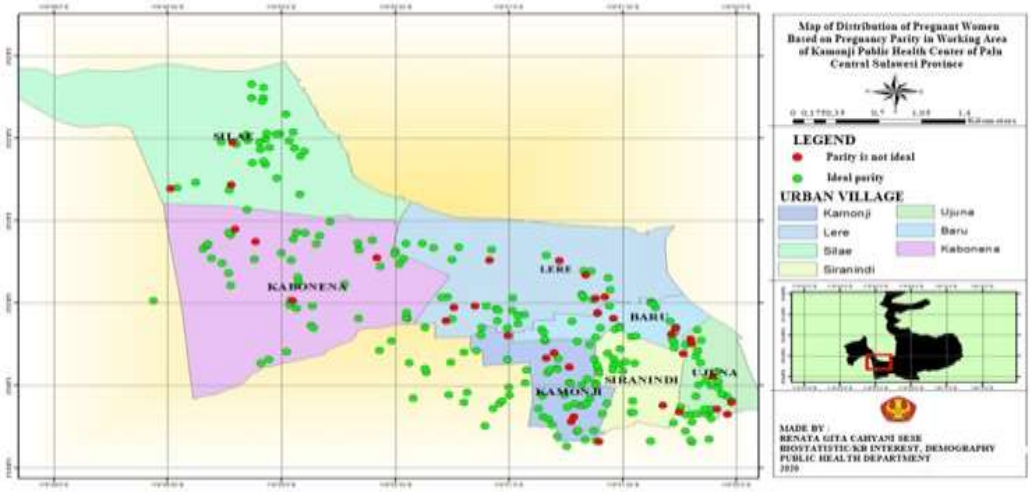

Figure 3: Distribution of Respondents Based on Parity

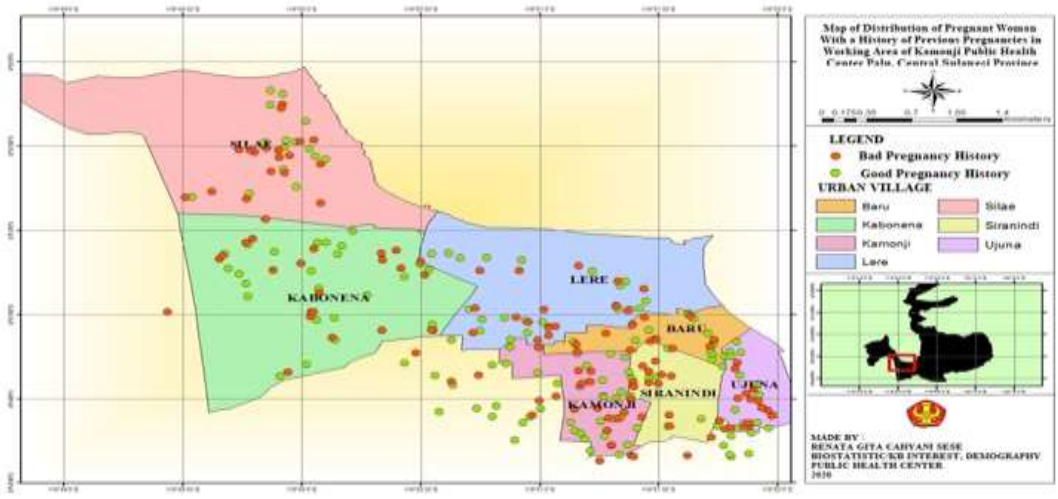

Figure 4: Distribution of Respondents by Previous Obstetric History

Relationship between Age, Parity, Obstetric History with High-Risk Pregnancy

The relationship between age and high-risk pregnancy in the Kamonji Public Health Center was analyzed using cross-tabulation in the Chi-square test. The results are shown in Table 2 as follows.

Table 2: Relationship between Age, Parity, Obstetric History with High-Risk Pregnancy

Age	High-Risk Pregnancy				Total	*p*	
	High	%	Low	%	n	%	
Unideal	41	64.1	23	35.9	64	100	0.010
Ideal	98	44.7	121	55.3	219	100	
Total	139	49.1	144	50.9	283	100	
Parity							
Unideal	21	60.0	14	40.0	35	100	0.232
Ideal	118	47.6	130	52.4	248	100	
Total	139	49.1	144	50.9	283	100	
Obstetric History							
Bad	111	83.5	22	16.5	133	100	0.000
Good	28	18.7	122	81.3	150	100	
Total	139	49.1	144	50.9	283	100	

Source: Primary Data, 2020

The data in table 2 shows that the Chi-Square test on age factor results in a p-score of 0.010 or p <0.05. Therefore, H0 is rejected, which means that a relationship exists between age and high-risk pregnancy. Similarly, the obstetric history obtained a p-value of 0.000 or below 0.05. Therefore, H0 was rejected, which shows a relationship between the previous obstetric history and the high-risk pregnancy. Meanwhile, the test on parity obtained a p-value of 0.232 and above 0.05. This shows that Ha was also rejected and implies that there is no relationship between parity and high-risk pregnancy.

DISCUSSION

Mapping of High-Risk Pregnancy Women Based on Age, Parity and Obstetric History

Figure 1 shows that high-risk pregnancy is generally found in Lere Village, and this condition is associated with early marriage. Data from the Department of Health (2016), showed that the age of first marriage in this village is 19.6 years, which is still very early for women to give birth [7].

Consequently, it tends to affect the number of children and their obstetric history. This is in line with the research conducted by the Department of Health (2016), which stated the highest chance of complications detected between the ages of 11-18 years, are premature labor, chorioamnionitis, endometriosis, and mild preeclampsia. Pregnant women between the ages of 15-19 years have a greater chance of experiencing severe preeclampsia, eclampsia, postpartum hemorrhage, poor fetal growth, and fetal distress [7]. Moreover, those above the above 35 years also have a higher chance of complications such as preterm labor, hypertension, superimposed preeclampsia, severe preeclampsia, and reduced risk of chorioamnionitis. Research carried out by Cavazos-rehg (2016) also stated that maternal age above 40 years stands the risk of having complications such as inducing preterm birth, hypertensive disorders, gestational diabetes mellitus, and abnormal fetuses (p <0.05) [8].

The condition above is similar to Figure 2, where the highest numbers of pregnant women with unideal age were discovered in Lere Village. The study carried out by Londero (2019) stated that mothers below the age of 20 years do not have mature reproductive organs. However, they get pregnant at a high-risk age and tend to generate complications for themselves and their baby. Moreover, those above the age of 35 years are also likely to experience pregnancy complications due to decreased reproductive health [9].

Furthermore, Figure 3 showed that pregnant women with the highest level of unideal parity were found in Ujuna Village. This means that the use of modern contraceptives in this area is still low. Women in childbearing age feel reluctant to use contraceptives. According to Maryani (2016), parity is one of the factors that cause high-risk pregnancies. The higher the mothers' parity levels, the risker the pregnancy. The weakness of the uterine muscles in older mothers results in bleeding during labor and after delivery [10].

The safest parity number is 2 or 3, with the ability to reduce the risk associated with maternal death and complications. Parity is high when a woman gives birth to four or more children. In addition, a mother's fifth or more child tend to suffer from iron disorders [11], [12].

Figure 4 showed that most pregnant women with bad obstetric history are found in Lere Village. It generated by early marriage and low antenatal care coverage without the use of the detection process during early pregnancy. This is consistent with findings conducted by Al-Shaikh (2017), which stated that a high number of neonatal complications occur due to incomplete compliance of antenatal care visits. It also has confirmed that the cases of postpartum hemorrhage in pregnant women with full adherence to antenatal care visits are approximately 1.6% and 6.9% for those with incomplete compliance [13].

Relationship between Age, Parity and Obstetric History with High-Risk Pregnancy

The statistical analysis results show a significant relationship between age and the high-risk pregnancy caused by a low level of knowledge. The average pregnant women do not understand the importance of pregnancy planning at an ideal age. The mother's age is related to female reproductive function. A healthy and safe reproductive age is between 21-35 years, which includes the ideal age category for pregnancy [13], [14]. According to Bai (2016), the best age of women to give birth is 20-30 years[15].

This is in line with research by Natarajan (2016), which stated that there is a relationship between age and high-risk pregnancy (p = 0.046) [14]. The better the age of women during pregnancy, the lower the risk. Research conducted by also stated a relationship between age and high-risk pregnancies [16], [17].

According to Muniro (2019) and Qubro (2018), pregnant women below 18 (high-risk) experience a higher risk than between 18 to 35 years. They stand a higher chance of bleeding, having a c-section, and dying during pregnancy [17], [18]. Therefore, the risks are age-related. In contrast to the above findings, Taghizadeh (2017), stated that there is no relationship between age and high-risk pregnancies (p-value 0.497). Moreover, the risk due to maternal age can be overcome with early detection [19].

Parity is one of the important risk factors in determining the maternal condition during pregnancy and childbirth. This condition is risky for those that have not experienced childbirth before. However, assuming the repeated childbirth is too frequent, the uterus becomes weakened due to scarring, leading to complications during pregnancy and childbirth [20],

The chi-square test result shows a p-value of 0.232 or above 0.05, indicating that there is no relationship between parity and high-risk pregnancy. This occurs because the average respondents had ideal parity. According to Maulinda (2018), the study, the majority of pregnancy complications more frequently occur in the grand multiparity (GMP) group compared to other parity sub-groups [21]. A research carried out by Abdelhady (2015), stated that GMP is associated with maternal and perinatal complications, such as ruptured membranes before birth, stillbirth, and premature birth [22].

In line with the statement above, Maryani (2016) and Luke (2007) stated that mothers with parity 0 (Nulipara) had an increased risk of obstetric complications compared to those in parity 1 (p <0.001). Meanwhile, mothers with parity 2 and 3 are generally similar to those in parity 1[10], [23].

History of bad obstetrics such as IUFD (fetus dying in utero), premature birth, and PPH in previous labor is a high-risk factor for pregnant women. These are prone to have an impact on subsequent pregnancy and childbirth [24].

Chi-Square test on obstetric history results using a p-value of 0,000 or below 0.05, implying a relationship between the obstetric history with the high-risk pregnancy. Respondents with a bad obstetric history had a higher risk of pregnancy than those with good records. They did not have a pregnancy check in the Antenatal Care service, which led to problems such as miscarriages and cesarean sections (CS). The above findings are in line with the research carried out by [25], which stated that an obstetric history is significantly related to high-risk pregnancies (p = 0.004). Similarly, Temu (2016) and Karlsson (2015), also found a relationship between obstetric history and high-risk pregnancies (p = 0.001). The results of the study showed that 90.2% of the respondents were in high-risk pregnancy categories. Some of

the factors responsible for this is a recurrent miscarriage, pregnancy with placenta previa, intrauterine death, and infection. [25], [26], [27].

CONCLUSION

In conclusion, women with high-risk pregnancy are mostly located in Lere Village, with the lowest number of cases found in Ujuna Village. In accordance with age, the highest number was also found in Lere Village, while in terms of parity, numerous cases were discovered in Ujuna Village. Moreover, regarding obstetric history, Baru Village also has a high level of risk. Therefore, age and obstetric history affect the occurrence of high-risk pregnancies.

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