Jurnal Aisyah: Jurnal Ilmu Kesehatan

Volume 7, Issue1, March 2022, p. 125–132
ISSN 2502-4825 (print), ISSN 2502-9495 (online)

# The Determinant Factors of Labor. Data Analysis of "Maternal Card Cohort" in Tawangharjo Community Health Center, Grobogan

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ARTICLE INFO

*Article history:*

Received 11 December 2021
Accepted 21 February 2022
Published 10 March 2022

*Keyword:*

Maternal card
Risk factors
Poedji rochjati score
Determinant of labor

A B S T R A C T

ANC data in the maternal card cohort register at the Puskesmas can be used to detect risk factors for pregnancy and labor that can prevent maternal death, but this data has never been analyzed. This study aims to analyze the determinants of labor in mothers who received ANC by a midwife according to the data in the maternal card cohort. This research is a descriptive-analytic study design using the observational method. Data sourced from the maternal card cohort register that meets the standards of accuracy and completeness of ANC results in records until labor in the 2019 time period. A total of 172 data used as samples. Maternal characteristics, maternal mortality risk factors, levels of maternal risk factors based on the Poedji Rochjati score as independent variables, and the act of labor is the dependent variable. Univariate and bivariate analysis was carried out descriptively and analytically using chi-square test. The majority of mothers aged 20-35 years (81.4%), had basic education (94.2%), normal nutritional status (84.9%), hadn't anemia (80.2%), had normal blood pressure (70, 9%), hadANC visits 5-10 times (65.7%), categorized as low-risk pregnancy (86.6%), and almost all received normal labor in the previous (96.0%). Previous labor and maternal risk factors were associated with the last laboract received by the mother (ρ-value=0.040; ρ-value=0.043).



*Kata kunci:*

Kartu ibu
Faktor risiko
Skor poedji rochjati
Penentu tindakan persalinan

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DOI: 10.30604/jika.v7i1.822

A B S T R A K

Data pelayanan kehamilan (antenatal care) pada register kohort kartu ibu di Puskesmas dapat digunakan untuk mendeteksi faktor risiko kehamilan dan tindakan persalinan yang dapat mencegah kematian ibu, namun belum pernah dilakukan analisis pada data tersebut. Penelitian ini bertujuan menganalisis faktor-faktor penentu tindakan persalinan pada ibu yang mendapat ANC oleh bidan sesuai data pada kohort kartu ibu. Penelitian ini merupakan rancangan studi deskriptif analitik menggunakan metode observasional. Data yang digunakan bersumber pada register kohort kartu ibu yang memenuhi standar ketepatan dan kelengkapan catatan hasil ANC sampai persalinan dalam periode waktu 2019. Sebanyak 172 data memenuhi standar digunakan sebagai sampel. Variabel karakteristik ibu, faktor risiko kematian ibu, tingkatan faktor risiko ibu berdasar skor Poedji Rochjati sebagai variabel bebas, sedangkan variabel terikat adalah tindakan persalinan. Analisis data univariat dan bivariat dilakukan secara deskriptif dan analitik menggunakan uji chi square. Mayoritas ibu berumur 20-35 tahun (81,4%), berpendidikan dasar (94,2%), berstatus gizi normal (84,9%), tidak menderita anemia (80,2%), memiliki tekanan darah normal (70,9%), frekuensi kunjungan ANC antara 5-10 kali (65,7%), termasuk kategori kehamilan risiko rendah/KRR (86,6%), dan hampir seluruh ibu menerima tindakan persalinan normal pada persalinan sebelumnya (96,0%). Tindakan persalinan sebelumnya dan faktor risiko ibu berhubungan dengan tindakan persalinan terakhir yang diterima ibu (ρ-value=0,040; ρ-value=0,043).

## INTRODUCTION

Maternal death is becoming a health issue worldwide, even though during the period of 2000-2017 maternal death cases were declining by 38 %(World Health Organization, 2019).In 2017, maternal death cases occurred during pregnancy and labor was around 295.000 (World Health Organization, 2018), the ratio of Maternal Mortality Rate (MMR)was still 177 per 100.000 live births(Susiana, 2019).Maternal Mortality Rate in Indonesia indicates downward trend. During 2018-2019 mortality cases have dropped from 4,226 to 4221 (Kementrian Kesehatan Republik Indonesia, 2019). Grobogan Regency of Central Java Province contributes in maternal mortality cases, however maternal mortality rate have declined during the period of 2015-2019 from 111.16 to 76.9 per 100.000 live births,yet it is still the second highest in maternal mortality cases (Dinas Kesehatan Provinsi Jawa Tengah, 2019).

In Indonesia, to end maternal mortality during pregnancy and labor turns out to be one of the national commitments (Susiana, 2019),it even becomes the performance target of health sector(Kementrian Kesehatan Republik Indonesia, 2019).Central Java Province, as one of the contributors of high maternal mortality cases in Indonesia, determines the reduction efforts of maternal mortality rate (MMR) as one of the important indicators in measuring the successful health development (Humas Jateng, 2018).

The government has performed various efforts in preventing maternal mortality because most of the causes of the deaths are preventable. Efforts are made to ensure all mothers receive quality healthcare service during pregnancy and childbirth attendance by competent health professionals in healthcare facilities (Kementrian Kesehatan Republik Indonesia, 2019), (Dinas Kesehatan Provinsi Jawa Tengah, 2019). Death prevention can be implemented through the healthcare system strengthening in a quality data collection to respond maternal and female child needs and priorities as well as to ensure the service quality improvement (World Health Organization, 2018).

Data collection by documenting the ANC results conducted by health professionals can be used to monitor maternal health condition and the quality of the provided ANC. The result of ANC data records in maternal card cohort register at Community Health Center (Puskesmas) conducted by midwivescan be used to detect pregnancy risk factors and labor act that may prevent maternal deaths, however not all major risk factors are recorded in the register (Purnami et al., 2017). On the other hand, the data can be used as the base to perform screening by health professionals. Pregnancy screening turns out to be an important tool to reduce maternal deaths if the death cause can be detected(Mortensen et al., 2019).In the effort, the role of midwives is critical in determining the accuracy of healthcare treatment should be given to pregnant women. Midwives are one of the health professionals who are competent in giving ANC service and 85% of pregnant women are examined by midwives during ANC (Badan Penelitian dan Pengembangan Kesehatan, 2018).

A study in Grobogan Regency of Central Java Province proves that pregnancy complication and disease history turns to be maternal deaths predictor (p=0.003 OR = 5.455; p = 0.0001, OR = 17.333) (Kustriyan, 2019). Poedji Rochyati standard categorizes the causes of maternal death into Low-Risk Pregnancy, High-Risk Pregnancy, and Very High-Risk Pregnancy (Aeni, 2013; Widarta et al., 2015; Yanti et al., 2020). Pregnancy complications are correlated with act of labor(Yego et al., 2013).Mothers at risk will influence the labor process and act that should be performed by health professionals, whether it will be natural labor or it has to undergo C-section(Aldo et al., 2010; Yanti et al., 2020).

Intervention during labor may lead to medical consequences for mothers, however an ineffective and unnecessary intervention is still conducted in in many healthcare facilities. The intervention is a caesarean section (C-section). Meanwhile, any healthy pregnant women have the right to give birth through natural labor(Ikatan Bidan Indonesia, 2012). C-section is performed when it is impossible to conduct natural vaginal birth and threatening the life of both mother and baby (Jhonsons, 2020),(Human Reproductive Health, 2021). The result of data analysis of Indonesian Demography and Health Survey 2017 (SDKI 2017) indicates that C-section intervention is performed not only for medical indications. The chance for C-section to be performed due to pregnancy complication indication is 9.5% (Sulistianingsih & Bantas, 2018).

Acts of labor given by health professionals that become maternal mortality risk factors arehistory of C-section birth (OR= 2.54) (Diallo et al., 2020)andC-section intervention (RR=1.9)(Bauserman et al., 2015). Factors that influence C-section intervention are age> 35 years (OR= 1.68), primipara (OR=2.49), history of pregnancy complication (OR=1.29), complete ANC (OR=1) (Sihombing et al., 2017), comorbidity (p=0.03; OR=6.382) (Siregar, 2016), (Wahyuni, R dan Rohani, 2019). Demography characteristics of mothers who obtained C-section birth are work as employees (20.9%) and highly educated(Sihombing et al., 2017).

Based on the background, it indicates the increased incidence rate of C-section and many factors that affect it. The condition may become public health issue therefore it requires a study to identify the demography characteristics, risk factors of pregnant women based on Poedji Rochjati score, and act of labor received by mothers who obtain ANC by midwives. The study was conducted toward ANC result data recorded in maternal card cohort register at community health center. The study turns to be critical to identify act of labor received by mothers and the descriptions of act of labor determinant factors hence the cause of maternal death can be prevented.

## METHOD

### *Participant characteristics and research design*

The study used analytic descriptive design, with cross sectional observational method. The data sourced of maternal card cohort register which is a record of ANC result performed by midwives in Tawangharjo Community Health Center, Grobogan Regency, Central Java Province. Population of the study was all mothers who were recorded in maternal card cohort register from they started to get pregnant up to labor, during the period of year 2019.

### *Sampling procedures*

A purposive sampling technique was used. The inclusion criteria of the study was all maternal card cohort registers that met the standards of accuracy and completeness of ANC result in records until labor, whereas the exclusion criteria was data of mothers in labor who died or only live births. A sample of 172 maternal card cohort register were obtained

that met the inclusion and exclusion criteria. The study had obtained ethical clearance from Research Ethics Committee of Faculty of Public Health, Diponegoro University No: 236/EA/KEPK-FKM/2020.

### *Data analysis*

Data analysis was conducted by using analytic descriptive for independent variables maternal characteristics, health status, maternal death risk factors, level of maternal risk factor based on Poedji Rachjati, and for dependent variable act of labor. Categories determined during data processing referred to the standard used in data recording in maternal card cohort register. Descriptive analysis was conducted in univariate (frequency distribution) and bivariate (a cross table). Whereas analytical analysis by using chi-square ($\alpha$=5%) to measure the correlation between variables of pregnancy risk factors and act of labor.

## RESULT AND DISCUSSION

Table 1 presents the description of demography characteristics, health status, ANC history, childbirth history, risk factors, and act of labor of the study. Majority of mothers aged 20-35 years old (81.4%). Most of the mothers had basic education (94.2%). More than ¾ had normal nutritional status (84.9%), were not anemic (80.2%), had normal blood pressure (70.9%), primipara (71.5%), ANC visit frequency around 5 – 10 times (65.7%). Almost all of them received natural act of labor in the previous labor (97.1%) and the last labor (93.0%). The data of labor indicated the decreased natural act of labor conducted by health professional. The result of risk factors assessment by using Poedji Rochjati indicated that the majority of mothers were categorized as Low risk pregnancy (LRP) (86.6%).

**Table 1**
**Description of Demography Characteristics, Health Status, Risk Criteria, and Act of labor (n=172)**

| Characteristics and Frequency Distribution | Number of Mothers (n) | Percentage (%) |
|---|---|---|
| **Maternal age (years)** | | |
| < 20 and> 35 | 32 | 18.6 |
| 20-35 | 140 | 81.4 |
| **Maternal level of education** | | |
| Basic Education (SD-SMP) | 162 | 94.2 |
| Secondary Education | 8 | 4.7 |
| High Education | 2 | 1.2 |
| **Nutritional Status** | | |
| Normal | 146 | 84.9 |
| Insufficient | 26 | 15.1 |
| **Anemic** | | |
| Yes | 34 | 19.8 |
| No | 138 | 80.2 |
| **Blood pressure** | | |
| Normal | 122 | 70.9 |
| Hypotension | 48 | 27.9 |
| Hypertension | 2 | 1.2 |
| **Obstetrics Status** | | |
| Primipara | 123 | 71.5 |
| Multipara | 49 | 28.5 |
| **ANCfrequency** | | |
| <4 times | 27 | 15.7 |
| 5-10 times | 113 | 65.7 |
| > 10 times | 32 | 18.6 |
| **Risk criteria of Poedji Rochjati** | | |
| LRP | 149 | 86.6 |
| HRP | 22 | 12.8 |
| VHRP | 1 | 0.6 |
| **Previous act of labor** | | |
| Normal | 167 | 97.1 |
| C- section (Caesarean section) | 5 | 2.9 |
| **The last act of labor** | | |
| Normal | 160 | 93.0 |
| C- section (Caesarean section) | 12 | 7.0 |

In obstetrics,too young (<20 years) and too old (>35 years) become the cause of maternal death(Firmansyah, 2018).From the study result it was revealed that the biggest percentage of age was 20-35 years, age groups that are not at risk of death. It is in accordance with the recommendation from BKKBN (National Population and family Planning Agency) and Ministry of Health that the safe age for women to undergo childbirth is above the age of 20 (Suriani, 2017),and it is supported by Law of the Republic of Indonesia No. 16 year 2019 concerning the Amendment of Law No. 1 year 1974 concerning Marriage is only allowed if a man and a woman have reached the age of 19 years old to reduce the

risk of maternal deaths.The optimum reproductive age for women is between 20-35 years, it is because women's body organs are ready to endure pregnancy and undergo labor. Women in labor at the age of under 20 and above 35 years are very likely to undergo C-section intervention for their childbirth process due to unready body organs or too old age.(Mortensen et al., 2019; Nelissen et al., 2013).Various health threats also may take place if mothers who are less than 20 or more than 35 years of age give birth. (Byrne et al., 1993; Mbalinda et al., 2015; Yego et al., 2013).

The description of maternal health status in accordance with the study result indicated that health status was included into good criteria, and not included into risk factors. The mothers obtained ANC more than minimal required standard, normal nutritional status dan blood pressure. Various pregnancy risks can be prevented if mothers are in healthy condition and good nutritional status also obtain ANC from health professionals (Firmansyah, 2018). Mothers with normal blood pressure are also allowed to receive natural act of labor(Haidar, 2019).Table 2 presents the result of bivariate analysis to indicate the correlation between pregnancy risk factors and act of labor received by mothers.

**Table2**
***Correlation between Pregnancy Risk Factors and Act of Labor***

| Pregnancy Risk Factors | Act of Labor | | | | p-value |
|---|---|---|---|---|---|
| | Natural | | C-Section | | |
| | n | % | n | % | |
| **Demography Factors** | | | | | |
| Maternal Age (years) | | | | | |
| - < 20 and > 35 | 31 | (96.9) | 1 | (3.1) | 0.469 |
| - 20-35 | 129 | (92.1) | 11 | (7.9) | |
| Education | | | | | |
| - Basic Education | 150 | (92.6) | 12 | (7.4) | |
| - Secondary Education | 8 | (100.0) | 0 | (0.0) | 0.672 |
| - High Education | 2 | (100.0) | 0 | (0.0) | |
| **Maternal Health** | | | | | |
| Blood pressure | | | | | |
| - Normal | 115 | (94.3) | 7 | (5.7) | |
| - hypotension | 43 | (89.6) | 5 | (10.4) | 0.414 |
| - Hypertension | 2 | (100.0) | 0 | (0) | |
| Nutritional Status | | | | | |
| - Normal | 135 | (92.5) | 11 | (7.5) | 0.696 |
| - Sufficient | 25 | (96.2) | 1 | (3.8) | |
| Anemia Status | | | | | |
| - Yes | 31 | (91.2) | 3 | (8.8) | 0.057 |
| - No | 129 | (93.5) | 9 | (6.5) | |
| **Frequency of ANC** | | | | | |
| - < 4 times | 27 | (100.0) | 0 | (0.0) | |
| - 5-10 times | 106 | (93.8) | 7 | (6.2) | 0.057 |
| - > 10 times | 27 | (84.4) | 5 | (15.6) | |
| **Obstetrics Status** | | | | | |
| - Primipara | 115 | (93.5) | 8 | (6.5) | 0.743 |
| - Multipara | 45 | (91.8) | 4 | (8.2) | |
| **Previous Act of Labor** | | | | | |
| - Natural | 157 | (94.0) | 10 | (6.0) | 0.013 |
| - C-section | 3 | (60.0) | 2 | (40.0) | |
| **Risk Categories Based on Poedji Rochjati Score** | | | | | |
| - LRP | 139 | (93.3) | 10 | (6.7) | |
| - HRP | 20 | (90.1) | 2 | (9.9) | 0.043 |
| - VHRP | 1 | (100.0) | 0 | (0.0) | |

**α = 5%, chi square test**

Based on the demography characteristics of age and education, it revealed C-section intervention received by mothers who underwent ANC in community health center, that the percentage of those who received natural birth in age 20-35 years was bigger (7.9%) than in age<20 and>35 tahun (3.1 %). The finding is similar with a study by Wahyuni, 2019 in which mothers who underwent C-section are more at the age of 21 -34 years (71.8%) (Wahyuni, R dan Rohani, 2019). The information indicates that among mothers who give birth at risk age there are less who undergo C-section, however statistically it was not significantly correlated (ρ-*value* = 0.469). Age is not an indication for a C-section intervention, however the risk among the age group may become the foundation of C-section intervention (Mylonas & Friese, 2015). No mother (0%) with higher education received C-section intervention, however there was a total of 7.2% mothers with basic education who received C-section intervention. Education was proven to be significantly not correlated with C-section intervention received by mothers (ρ-*value*=0.672), however education will influence one's knowledge. Maternal knowledge about childbirth is critically important since it give impact toward labor decision making. Knowledge is proven to be a factor that influence mother in choosing C-section labor without medical indications (Salfariani M & Nasution, 2012), meanwhile C-section labor should remain aware of patient's safety as a form of health

ethics (*beneficence*) (Ayuningtyas et al., 2018). A study conducted by Lubis, 2018 discovers that among mothers with insufficient knowledge, there are more who received C-section intervention without indication compared to mothers with good knowledge (Lubis, 2018). The finding is different from the previous results of studies that more mothers with higher education gave birth by C-section. Mothers with higher education was a risk factor of C-section intervention (Sihombing et al., 2017). Higher maternal knowledge contributed in increasing C-section rate (Ashar & Kusrini, 2020).

Descriptively it indicated the highest percentage among mothers who gave birth by C-sectionwere having low blood pressure (hypotension) during pregnancy, however in the study the occurrence of correlation between blood pressure history and act of labor received by mothers was not statistically proven (ρ-*value*=0.414). Maternal low blood pressure (hypotension) condition approaching labor should remain be noticed since mothers are more at risk of heavy nausea or vomiting, threatened abortion due to bleeding at the early stage of pregnancy and anemia (Bánhidy et al., 2011).

More mothers with normal nutritional status received C-section intervention compared to mothers with insufficient nutritional status (7.5%; 3.8%), however the correlation between nutritional status and C-section intervention was not statistically proven (ρ-*value* =0,696). The determination of maternal nutritional status among pregnant women based on the size of upper arm circumference was proven not to be a risk to types of labor received by mothers (ρ-*value*=0,171) (Laili & Andriyani, 2020). Although, the study result proved that there was no correlation between nutritional status and acts of labor, however, the nutritional status during pregnancy should remain be aware of. It is proven that nutritional status is a risk to the incidences of complication during labor (OR=2.862) (Kasminawati et al., 2015).Pregnant women with good nutritional status may prevent the incidence of iron-deficiency anemia during pregnancy. The result of the study proved that maternal anemia status was not significantly correlated with C-section intervention (ρ-*value*=0.057), although descriptively it indicated that more mothers with anemia received C-section intervention compared to those who did not have histories of anemia (8.8%; 6.5%). Therefore, the nutritional status and anemia among pregnant women should remain be noticed. It is supported by a previous study that women in labor anemia is correlated with the incidence of long first stage of labor. The condition of anemia generates uterine muscle is easily getting tired that may lead to interrupted contractions (Ayuningtyas et al., 2018). Anemic mothers during pregnancy is a risk factor to C-section labor and adverse events among mothers and newborns (Chu et al., 2020), (Drukker et al., 2015). Relatively good nutritional status is an indicator of natural labor, however Chronic Energy Deficiency among mothers during labor may cause mothers should undergo surgery intervention during childbirth process (Ernawati et al., 2019; Muthoharoh et al., 2016).

One of the ways to prevent adverse events among mother and fetus during pregnancy is mothers should have regular pregnancy checkups or ante natal care (ANC). The result of the study indicated that mothers who had ANC>10 times mostly received C-section intervention (15.6%), even though statistically it was proven that there was no correlation between ANC visits frequency and and C-section act of labor (ρ-*value*=0.057). Based on the description, in terms of frequency, the ANC visits had met the required standard that was 4 times at the minimum (Unicef, 2021), however, the service quality of ANC should also be kind of concerned. ANC is very critical to protect mothers and infants. ANC is one form of services by competent health professionals to ensure health condition of mothers and babies through risks identification, disease-related pregnancy prevention and management (WHO, 2018).

Obstetric status indicated by primipara or multipara condition during the last childbirth obtained a description that mothers with multipara status were more likely to undergo C-section (8.2%) compared to mothers with primipara status (6.5%), however, it was statistically proven that obstetric status was not correlated with act of labor received by mothers (ρ-*value*= 0.743). C-section intervention is simultaneously influenced by many risk factors namely parity (OR = 23.217), nutritional status (OR = 13.439) and ANC (OR = 11.708) (J et al., 2020) and the first pregnancy (nullipara) (WHO, 2018).

Percentage of mothers who received C-section was higher among mothers with a history of C-section before compared to mothers who had natural labor before (40%; 6%). The description statistically significantindicating the occurrence of correlation between previous C-section history and C-section intervention (ρ-*value*= 0.013). Similarly, the condition of pregnant women with risks in accordance with Poedji Rochjati standards was also proven to receive C-section intervention (ρ-*value*= 0.043). The finding is supported by the previous study that stated previous act of labor is correlated with the risk factors assessment of Poedji Rochjati. (Widarta et al., 2015; Yanti et al., 2020). Complication history among mothers at risk is for labor in C-section to be done (Kasminawati et al., 2015),(Sihombing et al., 2017). C-section is a surgery procedure that is effective to prevent maternal and infant death if there is medical indication occur (WHO, 2018). Medical indications influence labor in C-section by 35times (95% CI = 12.970 – 95.924) (Novita et al., 2018). Experience of previous C-section becomes one of the reasons for mothers to plan giving birth in C-section. Sense of secure from doctors and mothers appears to be the factor that generates repeated C-section labor (Mylonas & Friese, 2015).

Previous act of labor and maternal risk factors based on Poedji Rochyati are the determinant factors of the act of labor received by mothers who obtained ANC service from midwives (p value=0.043 dan p value=0.013).

## CONCLUSION AND SUGGESTIONS

Midwives' increased awareness and competence in the completeness and accuracy of ANC result data record into maternal card cohort register becomes the surveillance tools of maternal risk factors and determinants of labor that contribute in the incidence of maternal and newborn deaths.

## Acknowledgment

We would like to send our gratitude toward the Head of Faculty of Public Health who has supported in funding the study as one of the efforts to improve the ability in health study related to public health issues. Our gratitude also goes to the Head and Midwives of Tawangharjo Community Health Center who have allow us to use the place and the data source for the study.

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 ISSN 2502-4825 (print), ISSN 2502-9495 (online)