Determinants of The Incidence of Childbirth Complications in Bandar Lampung City

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ABSTRACT

In 2021, the Maternal Mortality Ratio (MMR) in Lampung Province increased significantly, rising from 115 to 187 cases compared to 2020. Bandar Lampung emerged as one of the areas with the fourth highest MMR, recording 15 cases (8.02%). This study aims to identify determinants of childbirth complications among mothers in Bandar Lampung in 2024. This type of research is analytical-descriptive, with random sampling, so that samples are obtained from 432 post-natal mothers. This research method uses interviews and observations of post-natal mothers analyzed through a quantitative cross-sectional approach with a random sampling of 432 participants. Results indicate a correlation between birth spacing (p=0.015, OR=2.725), history of pregnancy complications (p=0.000, OR=2.049), and parity (p=0.011, OR=1.764) with childbirth complications. Recommendations include improving healthcare services at the primary level and educating pregnant women and families on risk factors to reduce maternal mortality.

INTRODUCTION

The quantity of maternal fatalities documented through the Nutrition and Health of Mothers and Children program at the Ministry of Health generally exhibits an annual increase yet experienced a decline in 2022. The total number of fatalities in 2022 recorded 3,572 deaths in Indonesia, reflecting a reduction from 2021, which had 7,389 deaths. The predominant causes of maternal fatalities in 2022 included hypertension in pregnancy, accounting for 801 cases; bleeding, with 741 cases; heart disease, comprising 232 cases; and other causes, totaling 1,504 cases (Arisandi et al., 2016; Ministry of Health Republic Indonesia, 2022).

The Maternal Mortality Rate (MMR) in Lampung Province in 2021 indicates that the number of maternal fatalities has risen in comparison to 2020, specifically from 115 cases to 187 cases. The causes of maternal fatalities in Lampung Province in 2021 included bleeding, accounting for 39 cases of hypertension, which involved 27 cases of infection, with 5 cases of circulatory system disorders, totaling 2 cases of metabolic disorders, also amounting to 2 cases of heart issues, with 8 cases Covid, comprising 82 cases, and other causes contributing 22 cases (Health Office of Lampung Province, 2021).

At present, the challenges confronting us are the elevated MMR and the prevalence of maternal complications. If inadequately addressed during pregnancy, childbirth, and the postpartum period, these complications have the potential to result in maternal death (Tanuwijaya & Susanto, 2022).

In addition to the direct factors associated with maternal health during pregnancy, childbirth, and postpartum care, indirect causes are tied to social, economic, and geographic conditions and the cultural behaviors of the community. This can be analyzed through the

framework of four types of "too" (too young, too old, too many children, too close pregnancies) and three types of "delayed" (delayed decision-making, delayed visits to health facilities, delayed receipt of medical care) (Simarmata et al., 2015).

The risk of maternal mortality may arise from early pregnancy through the postpartum period, with the most significant risk manifesting during the labor phase. Obstetric complications refer to the issues that arise during pregnancy, labor, or the postpartum phase, wherein the mother confronts a life-threatening obstetric emergency that has the potential to lead to the demise of both the mother and her fetus (Artinanda et al., 2023).

Several factors that can lead to high-risk births include the age of the mother, the educational attainment of the mother, the mother's occupation, familial income, awareness regarding antenatal care (ANC) examinations, the mother's perspective on ANC examinations, the mother's practices concerning ANC examinations, parity, spacing of pregnancies, medical background, obstetric history, and the quality of ANC services (Arisandi et al., 2016).

This research aims to determine the determinants of the incidence of labor complications experienced by mothers giving birth in Bandar Lampung in 2024. The factors of childbirth complications studied were the incidence of childbirth complications, age, parity, birth interval, nutritional status, and history of pregnancy complications.

METHOD

This study employs a quantitative research methodology utilizing a cross-sectional approach. The research was carried out by collecting variable data at a single time. For the collection of secondary data, specifically concerning respondent biodata, the study was conducted across ten inpatient health facilities situated within the jurisdiction of the Bandar Lampung City Health Office. These facilities include Kedaton, Kemiling, Sukaraja, Simpur, Kampung Sawah, Panjang, Sukabumi, Kota Karang, Sukamaju, and Way Laga.

The population targeted in this research comprises all mothers who delivered at the health services of Bandar Lampung City, with a sample size of 432 mothers selected for the study. The research variables analyzed include the occurrence of labor complications (categorized as either normal or abnormal), maternal age (with mothers aged 35 years and older classified as at risk, while those aged 20 to 35 years are deemed not at risk), parity (considered at risk for mothers with three or more children, and not at risk for those with one to two children), birth spacing (classified as at risk if the interval between births is ten years or more), and nutritional status (deemed insufficient if the Mid-Upper Arm Circumference [MUAC] measurement is below the relevant threshold of 23.5 cm), history of pregnancy complications (yes/no). The Tanjung Karang Health Polytechnic's Health Research Ethics Committee has certified that this study is ethically feasible, as shown by certificate No.398/KEPK-TJK/IV/2024.

RESULTS

The number of respondents in this study was 432 based on primary data sources from 10 Inpatient Health Centers in the Work Area of the Bandar Lampung City Health Office. Table 1 indicates that 50.9% of respondents experienced normal childbirth, while 49.1% faced complications. The majority (74. 8%) were aged 20-35, with 25.2% under 20 or over 35. Most respondents had a parity of 2 (70.1%), and 92.4% reported a birth interval of ≥2 years. Nearly all (93.8%) had normal nutritional status, with 6.2% being malnourished. Additionally, 52.8% had no history of pregnancy complications.

Table 1. Distribution of respondent characteristics

Respondent characteristics	f	%
Childbirth complications		
No	220	50.9
Yes	212	49.1
Mother's age		
20-35	232	74.8
<20 dan >35	109	25.2
Parity		
2	303	70.1
>2	129	29.9
Birth distance		
≥ 2 year	399	92.4
< 2 year	33	7.6
Nutritional status		
Normal nutrition	405	93.8
Malnutrition	27	6.2
History of pregnancy complications		
No risk	228	52.8
Risky	204	47.2

Table 2 reveals significant differences in maternal characteristics based on childbirth complications. Among mothers with complications, 29.2% were <20 or >35 years, compared to only 21.4% in those without complications; conversely, 78. 6% of non-complicated births were from mothers aged 20-35. Additionally, 62.0% of mothers with complications had a parity of >2, while over half (56. 4%) of those without complications had a parity of two. In terms of birth intervals, a mere 11.3% of mothers with complications had intervals <2 years, contrasting to 95.9% of their counterparts. Nutritional status also varied, with only 8.0% of mothers with complications categorized as malnourished, while 95.5% of non-complicated mothers were normally nourished. Furthermore, 57.1% of mothers with complications had a high-risk history, versus 62.3% in the non-risk category for those without complications.

Table 2. The correlation between an independent variable and the incidence of childbirth complications among mothers delivering

Independent variable	Incidence of childbirth complications				Total	p	OR (95%CI)
	No		Yes				
	n	%	n	%	n		
Mother's age							
20-35	173	78.6	150	70.8	323	0.076	-
<20; >35	47	21.4	62	29.2	109		-
Parity							
2	171	56.4	132	43.6	303	0.001*	2.115
>2	49	38.0	80	62.0	129		(1.387-3.225)
Birth distance							
≥ 2 year	211	95.9	188	88.7	399	0.008*	2.993
< 2 year	9	4.1	24	11.3	33		(1.357-6.601)
Nutritional status							
Normal	210	95.5	195	92.0	405	0.196	-
Malnutrition	10	4.5	17	8.0	27		-
History of pregnancy complications							
No risk	137	62.3	91	42.9	228	0.000*	2.195
Risky	83	37.7	121	57.1	204		(1.493-3.226)

The results of the statistical analysis indicated that the variables of maternal parity (p=0.001), birth spacing (p=0.008), and history of pregnancy complications p=0.000) each produced p-values less than the significance level of α=0.05. This finding suggests a significant relationship between maternal parity, birth spacing, and the history of pregnancy complications

with the incidence of childbirth complications among mothers delivering in Bandar Lampung City in 2024.

Table 3. Bivariate analysis results identification of candidate models

Variable	P	Result
Mother's Age	0.060 (< 0.25)	Model Candidate
Parity	0.001 (< 0.25)	Model Candidate
Birth Distance	0.007 (< 0.25)	Model Candidate
Nutritional Status	0.141 (< 0.25)	Model Candidate
History of Pregnancy Complications	0.000 (< 0.25)	Model Candidate

The potential variables for the model are chosen based on simple logistic regression bivariate analysis between independent and dependent variables. Variables with a p-value≤0.25 qualify for inclusion, while those with p>0.25 may still be considered if their significance is substantiated. Table 3 summarizes the bivariate analysis results for identifying model candidates.

The bivariate analysis indicates that all variables have a p-value less than 0.25, suggesting they may all be included in the Multivariate Model.

Table 4. Bivariate analysis results identification of candidate models

Variable	p	Result
Mother's Age 1[a]	0.314	Not included in Model Candidate 2[a]
Parity 1[a]	0.037	Model Candidate 2[a]
Birth Distance 1[a]	0.016	Model Candidate 2[a]
Nutritional Status 1[a]	0.153	Model Candidate 2[a]
History of Pregnancy Complications 1[a]	0.000	Model Candidate 2[a]
Parity 2[a]	0.010	Model Candidate 3[a]
Birth Distance 2[a]	0.018	Model Candidate 3[a]
Nutritional Status 2[a]	0.145	Not included in Model Candidate 3[a]
History of Pregnancy Complications 2[a]	0.000	Model Candidate 3[a]
Parity 3[a]	0.011	Model Candidate
Birth Distance 3[a]	0.015	Model Candidate
History of Pregnancy Complications 3[a]	0.000	Model Candidate

In the model selection process outlined in Table 4, five initial variables were considered: maternal age, parity, birth spacing, nutritional status, and history of pregnancy complications. Two insignificant variables were discarded based on their p-values. Ultimately, three significant variables remained: parity (p=0.011), birth spacing (p=0.015), and history of pregnancy complications (p=0.000).

Table 5. Prediction models associated with the incidence of labor complications in mothers' childbearing

Variable	p	OR
Parity	0.011	1.764
Birth Distance	0.015	2.725
History of Pregnancy Complications	0.000	2.049

The results of the statistical test indicate that the logistic model or equation that has statistical significance is:

$Z = \alpha + \beta_1 X_1 + \beta_2 X_2 + ... + \beta_i X_i$

= -0,616 + 1,002(Birth Distance) + 0,717(History of Pregnancy Complications) + 0,568(Parity)

The study's internal factor multivariate inference analysis identified a logistic model for predicting childbirth complications in mothers in Bandar Lampung City for 2024. The model includes three significant variables: birth distance (p=0.015, or=2.725), history of pregnancy complications (p=0.000, or=2.049), and parity (p=0.011, or=1.764), indicating that birth distance is the most dominant factor influencing complications.

DISCUSSION

Childbearing at a young age (i.e., ≤19 years) or at an advanced age (i.e., ≥35 years) is correlated with heightened maternal and perinatal health risks. These risks include complications such as postpartum hemorrhage, eclampsia, and cephalopelvic disproportion, as well as negative effects on infant health outcomes, including preterm birth, impaired fetal growth, low birth weight, and neonatal mortality. The likelihood of delivery complications is significantly elevated in women aged 11–18 years when compared to those aged 25–29 years, with identified complications including preterm delivery, chorioamnionitis, endometritis, and mild preeclampsia. Furthermore, pregnant individuals aged 15–19 years exhibit a higher likelihood of severe preeclampsia, eclampsia, postpartum hemorrhage, poor fetal growth, and fetal distress. Pregnant women aged 35 years or older face increased risks of preterm delivery, hypertension, superimposed preeclampsia, and severe preeclampsia; however, they may also experience a reduced risk of chorioamnionitis. Among older women (≥40 years), there is a greater probability of encountering mild preeclampsia, fetal distress, and impaired fetal growth (Cavazos-Rehg et al., 2015).

Although this study found no significant association between maternal age and labor complications (p=0,076), the findings may contribute to managing risks during pregnancy. Early detection and monitoring of signs and symptoms of complications by healthcare professionals and expectant mothers can facilitate the prevention of labor complications at the earliest possible stage.

The study revealed a significant relationship between maternal parity and labor complications in Bandar Lampung City, 2024 (p=0. 001). The results of this study are supported by the results of studies by Arisandi et al. (2016), where parity is related to the incidence of childbirth complications. The odds ratio (OR=2.115) indicates that mothers with more than two births have twice the risk of experiencing complications compared to those with two births.

Mothers with high parity are at increased risk of complications during childbirth, particularly postpartum hemorrhage. This heightened risk is attributed to the repeated stretching of the uterine wall, which may lead to its thinning and result in weakened uterine contractions. Conversely, in the case of primigravida (first-time mothers), there is a higher incidence of complications such as preeclampsia and eclampsia, which are less frequently observed in subsequent deliveries (Khairani et al., 2024).

In primiparous women, complications frequently arise; however, it is important to note that not all primiparous mothers are at risk of encountering such issues. The likelihood of complications largely depends on the physical and psychological preparedness of the pregnant individual. In contrast, in grand multiparous women, the factors that influence and pose a threat to maternal health are associated with diminished functionality of the reproductive organs, which may result in complications during both pregnancy and childbirth. The management of primiparity may involve ensuring that pregnancy and childbirth care adhere to physiological standards and best practices. In the case of high parity, the risk of complications can be mitigated or prevented by implementing family planning measures (Hariyani et al., 2019).

In 2024, a study in Bandar Lampung City revealed a significant link between birth spacing and labor complications, showing that spacing under 2 years triples the risk (OR=2.993) compared to 2 years or more. This finding aligns with previous studies and identifies birth spacing (OR=2.725) as the most dominant internal factor affecting labor complications among mothers. The findings of this study are consistent with those of previous research by Nur and Shahnyb (2022), which indicate that birth spacing constitutes a risk factor for labor complications.

Birth spacing can be comprehensively defined as the interval between individual births and pregnancies, encompassing the duration from the previous live birth to the conception of the current pregnancy under examination. Additionally, the term "inter-pregnancy interval" is utilized to denote the time span from a preceding birth—regardless of whether the outcome was a miscarriage, stillbirth, or live birth—to the conception of the index pregnancy. Furthermore, the "inter-delivery interval" refers to the period extending from the delivery of the previous live birth to the delivery of the pregnancy being investigated (American College of Obstetricians and Gynecologists, 2019).

Optimal birth spacing constitutes a vital component of postpartum family planning criteria, offering immediate and long-term benefits for mothers and their children. To mitigate the risk of complications in subsequent pregnancies, the World Health Organization (WHO) has established

guidelines recommending that women wait at least two years following a live birth and a minimum of six months after experiencing a miscarriage or induced abortion before attempting to conceive again (Bauserman et al., 2020).

Extreme birth spacing, either less than 6 months or more than 60 months, can adversely affect maternal and infant health, leading to various complications. Conversely, optimal pregnancy spacing of 18 to 23 months promotes health benefits, while a 9-month interval shows no increased risk of premature birth for those with previous instances (Ni et al., 2023).

The study found no significant relationship between mothers' nutritional status and childbirth complications in Bandar Lampung City in 2024 (p=0.196), aligning with previous research indicating that pregnant women's nutritional status does not significantly impact complication rates (Laili & Andriyani, 2020).

Undernutrition among pregnant women adversely affects the availability of essential nutrients required by cells and tissues, thereby hindering their capacity to generate energy optimally based on the mother's physiological needs. Women with compromised nutritional status often experience negative pregnancy outcomes, which may include low birth weight and preterm birth. Conversely, women with excessive nutritional status face an elevated risk of various pregnancy complications, including miscarriage, operative delivery, preeclampsia, thromboembolism, perinatal mortality, and macrosomia (Pasaribu et al., 2021).

This study differs from previous research due to a higher proportion of mothers with normal nutritional status. Various factors affect maternal nutrition, with economic challenges being a significant contributor. Family economic conditions influence purchasing power, impacting the ability to meet nutritional needs. Moreover, when mothers are primary providers, their health often declines, increasing susceptibility to complications during pregnancy and postpartum. Education also indirectly shapes pregnant women's behaviors (Natasha & Niara, 2022).

In Bandar Lampung City, 2024, a history of pregnancy complications significantly increases the risk of labor complications in mothers (p=0.000), with an odds ratio of 2.195, indicating a twofold risk compared to low-risk pregnancies. Complications during pregnancy significantly increase risks during childbirth, making early identification of high-risk pregnancies crucial to reduce maternal and neonatal mortality. Mothers experiencing issues should seek professional medical care. All mothers need to access basic healthcare services, which include detecting warning signs, managing high-risk conditions, and providing information for healthy pregnancies and proper childbirth preparation (Hulwatullaini & Rosidati, 2023).

Assessing a woman's obstetric history is crucial for identifying potential complications in current pregnancies. Key factors include the number of pregnancies, births, miscarriages, complications, delivery locations, attendants, trauma, and surgical procedures. Mothers with previous cesarean sections should be especially cautious and seek proper healthcare support.

CONCLUSION

The research results conclude that birth spacing is a dominant factor in the occurrence of childbirth complications in Bandar Lampung City in 2024. Improving primary healthcare services, especially in health centers, is crucial. Implementing standardized antenatal care and providing thorough education on childbirth complications for pregnant women and their families can lead to early detection of issues, ultimately reducing maternal mortality in Bandar Lampung City.

AUTHOR'S DECLARATION

Authors' contributions and responsibilities
RR: Writing original draft, funding acquisition; **AO:** Writing original draft (supporting), Funding acquisition conceptualization; **NI, EB:** Review and editing.

Availability of data and materials
All data are available from the authors.

Competing interests
The authors declare no competing interest.

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