

ORIGINAL ARTICLE

DETERMINANTS OF PREGNANCY LOSS AMONG WOMEN OF REPRODUCTIVE AGE IN INDONESIA

Determinan Kehilangan Kehamilan Pada Wanita Usia Reproduksi di Indonesia

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ABSTRACT

Background: Both miscarriage and stillbirth occur in almost 20% of clinical pregnancies, resulting in pregnancy loss. The incidence has been associated with several risk factors and events of maternal adverse health outcomes.

Purpose: This study was conducted to analyze some associated factors of pregnancy loss in Indonesia. **Methods:** This cross-sectional study used the 2017 Indonesia DHS data involving 18,882 female participants aged 15–49 years who had ever had a gestation. Pregnancy loss was the dependent variable, whereas the independent variables included education, employment, wealth status, advanced maternal age, grand multiparity, and cigarette smokers. Finally, the author used binary logistic regression to calculate the determinants. **Results:** The adjusted risk of pregnancy loss was significantly higher in respondents with lower education levels (AOR=1.25; 95% CI: 1.11-1.41) and employed (AOR=1.19; 95% CI: 1.10-1.29). The lower the wealth status of women, the higher the chance of pregnancy loss. The adjusted risk of pregnancy loss was higher in women of advanced maternal age (AOR=2.03; 95% CI: 1.37-3.02), those with grand multiparity (AOR=1.91; 95% CI: 1.74-2.09), and those who cigarette smokers (AOR=1.53; 95% CI: 1.25-1.87). **Conclusion:** The study concluded that six variables i.e., education, employment, wealth status, advanced maternal age, grand multiparity, and cigarette smokers are strong predictors of pregnancy loss in Indonesian women. Therefore, the government should make a policy to address the determinants of the pregnancy issue.

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ABSTRAK

Latar belakang: Keguguran maupun lahir mati terjadi pada sekitar 20% kehamilan yang diketahui secara klinis sebagai penyebab kehilangan kehamilan, telah dikaitkan dengan beberapa faktor risiko dan kejadian yang berdampak buruk pada kesehatan ibu. **Metode :** Penelitian cross-sectional ini menggunakan data DHS Indonesia tahun 2017 dengan partisipan terdiri dari 18.882 yang wanita pernah hamil berusia 15–49 tahun. Kehilangan kehamilan sebagai variabel terikat, sedangkan variabel bebasnya adalah pendidikan, pekerjaan, status kekayaan, kehamilan geriatri, grande multipara, dan merokok. Pada tahap akhir, penulis menggunakan regresi logistik biner untuk menghitung determinannya. **Hasil :** Risiko yang telah disesuaikan dari kehilangan kehamilan secara signifikan lebih tinggi pada kelompok pendidikan rendah (AOR=1,25; 95% CI: 1,11-1,41) dan pekerja (AOR=1,19; 95% CI: 1,10-1,29). Semakin rendah status kekayaan wanita, semakin tinggi kemungkinan terjadinya keguguran. Risiko yang telah disesuaikan dari kehilangan kehamilan lebih tinggi pada wanita yang termasuk dalam kehamilan geriatri (AOR=2,03; 95% CI: 1,37-3,02), grande multipara (AOR=1,91; 95% CI: 1,74-2,09), dan merokok (AOR=1,53; CI 95%: 1,25-1,87). **Simpulan:** Studi ini menyimpulkan enam variabel, seperti pendidikan, pekerjaan, status kekayaan, kehamilan geriatri, grande multipara, dan merokok pada wanita di Indonesia, merupakan prediktor kuat untuk kehilangan kehamilan. Pemerintah harus membuat kebijakan untuk mengatasi masalah ini.

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INTRODUCTION

Pregnancy loss happens due to miscarriages and stillbirths (1,2). Globally, as many as 26% of pregnant women end in miscarriage or fetal death that occurs spontaneously before the 28th week of gestation (2,3). The risk of miscarriage increases by around 20% after one miscarriage and 28% after two consecutive miscarriages. This increases to 43% for women after three or more consecutive miscarriages (4). While the causes of these losses are numerous. What causes losses at the first or second miscarriage is rarely investigated and often remains unknown (5).

The perinatal mortality rate in the five years preceding the 2017 Indonesian Demographic and Health Survey (DHS) was 21 deaths per 1,000 pregnancies. The highest perinatal mortality rate occurred in women aged 40-49 years at the time of delivery (38 deaths/1,000 pregnancies) (6). It has been established that advanced maternal age is more susceptible to miscarriage and stillbirth (7,8). However, it can be difficult to distinguish whether death is attributable to one cause or the other (6). The risk of early neonatal death is a complication that may happen in 1 out of 5 pregnant women (3).

Stillbirths take place with fluctuating frequency in many nations. Over 5,000 newborns were stillborn at least 28 weeks of gestation every

day in 2021. In just one year, there were at least 1.9 million stillbirths worldwide with an estimated stillbirth rate of 13.90 stillbirths per 1,000 total births. It means 1 in 72 babies were stillborn, and almost 1 in 3 stillborn babies (29%) was found in low-income countries. Almost half of the estimated stillbirths worldwide were reported in India, Pakistan, Nigeria, the Democratic Republic of the Congo, Ethiopia, and Bangladesh, and 36 percent of all live births worldwide. There are large variations in the risk of stillbirth globally. In 2021, the highest national stillbirth rate was twenty times higher than the lowest rate. In Indonesia, the estimated stillbirth rate was 5,6 times higher than the lowest national rate (9.1 stillbirths per 1,000 total births) (9).

This study was conducted to analyze factors related to pregnancy loss among women of reproductive age in Indonesia without distinguishing between types of pregnancy loss based on the 2017 Indonesian DHS. The authors expect that the research findings may be used by policymakers to reduce the pregnancy loss rate in Indonesia.

METHODS

Data Source

Raw data from the 2017 Indonesian DHS were used in this cross-sectional study. Stratified two-stage sampling was employed in the 2017 Indonesia DHS. In the first stage, the number of households from the 2010 population census listing was retrieved from the data; then, several census blocks were systematically selected with a probability proportionate to size. The survey sorted census blocks according to the wealth index category of the 2010 population census data using an implicit stratification technique based on urban and rural areas. In the second stage, 25 typical households were chosen from each census block where the families gave their updates (10). Thirty-four provinces in Indonesia participated in the 2017 Indonesia DHS. This study focuses on women of childbearing age between 15 and 49 years old who had a gestation. The women's data utilized in this study were weighted to collect 18,882 samples.

Data Analysis

The dependent variable in this study was pregnancy loss among women of reproductive age. This study examined women who had experienced pregnancy loss by miscarriage or stillbirth, in any pregnancies they ever had (2).

Following the 2017 Indonesian DHS, the sociodemographic characteristics of the respondents were women who were in five age groups: 15–19, 20–24, 25–29, 30–34, 35–39, 40–44, and 45–49 years old. The respondents' residence was categorized as urban or rural residence based on the de facto type of place of residence. The independent variables included the educational level consisting of two categories such as lower (no education, primary, and secondary) and higher (diploma and above). The categories of employment status were unemployed and employed. The wealth status in this study included five quintiles: quintile 1 as the poorest group, quintile 2 as the poorer group, quintile 3 as the middle group, quintile 4 as the richer group, and quintile 5 as the richest group.

Advanced maternal age was defined as women aged 35 years and above when giving birth. Advanced maternal age had two categories: not-advanced maternal age and advanced maternal age (11). Grand multiparity was defined as parity ≥ 5 , and it was divided into two categories: non-grand multiparity and grand maternal age (12). The type

of smoke was divided into two categories: non-cigarette smokers and cigarette smokers.

The data analysis was conducted using IBM SPSS Statistics® version 25.0 in 3 stages. The first stage, to describe the socio-demographic characteristics of the participants, was carried out using simple descriptive statistics. In the second stage, all independent variables on pregnancy loss among women of reproductive age were cross-tabulated. The collinearity test was used to ensure that there was no multicollinearity between an independent variable and another in the prior regression model. The final step involved using binary logistic regression to examine the multivariate relationship between the independent variables and the pregnancy loss. An association was interpreted using the odds ratio with a 95% confidence interval (CI), and a p-value of less than 0.05 was considered significant.

Ethic Approval

The ICF Institutional Review Board (IRB) had examined and approved the procedures and questionnaires for standard DHD surveys. Permission to use the data from the DHS Program was obtained (<https://dhsprogram.com/Methodology/Request-for-documentation-of-ethical-review.cfm>). The 2017 Indonesia DHS was categorized under the broader IRB approval of The Demographic and Health Survey (DHS) Program (DHS-7). The Institutional Review Board used the findings form of ICF IRB FWA00000845 with ICF Project Number 132989.0.000.

RESULTS

Figure 1 presents the percentage distribution of pregnancy loss among women of reproductive age in Indonesia. The pregnancy loss in the present study refers to both miscarriages and stillbirths. Approximately 82.68% of the 18,882 women who participated in the survey had never suffered from any kind of pregnancy loss.

Table 1 presents the socio-demographic characteristics among women of reproductive age in Indonesia. Approximately 28.50% of the respondents are aged 30–34 years, and this age category is the highest among others. Concerning residence, the respondents live mostly in rural areas (52.70%), and more than half have low education levels (84.70%). About employment, a greater proportion of unemployed respondents (56.80%) were found than that of employed ones.

The poorest category was the most dominant (30.80 %) among other wealth categories, and the richest category (15.50%) was the least.

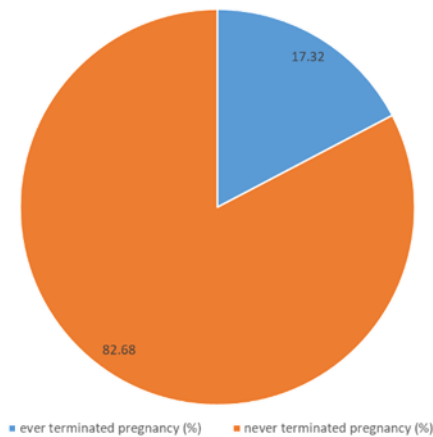


Figure 1. Distribution of pregnancy loss among women of reproductive age in Indonesia

Table 2 presents the association of χ^2 analyses between variables and pregnancy loss experienced by women of reproductive age in Indonesia. Six variables were found to be significantly associated with pregnancy loss in this study. According to the bivariate analysis, education, employment, wealth status, advanced maternal age, grand multiparity, and cigarette smokers were found to be significantly associated with pregnancy loss among women of reproductive age in Indonesia at a p-value of < 0.05 .

Table 3 presents the results of the binary logistic regression of pregnancy loss among women of reproductive age in Indonesia. The binary logistic regression test showed that six variables were significantly associated with pregnancy loss in this study. They include education, employment, wealth status, advanced maternal age, grand multiparity, and cigarette smokers. Compared to women who had higher education, those with lower education (AOR=1.25; 95% CI: 1.11-1.41) had a higher chance of losing their pregnancy. Furthermore, employed women (AOR=1.19; 95% CI: 1.10-1.29) were more likely to experience pregnancy loss than the unemployed ones. Besides, the women at the poorest (AOR=1.30; 95% CI: 1.17-1.45), poorer (AOR=1.18; 95% CI: 1.05-1.33), and richer (AOR=1.50; 95% CI: 1.32-1.70) category had a higher possibility of pregnancy loss compared to those at the richest category. Speaking about another variable, women at the advanced maternal age (AOR=2.03; 95% CI: 1.37-3.02) were more likely to experience pregnancy loss compared to women who were at the non-advanced maternal

age. The women who experienced grand multiparity (AOR=1.91; 95% CI: 1.74-2.09) had a higher chance of experiencing pregnancy loss compared to those passing non-grand multiparity. Finally, compared to non-cigarette smokers, women who were cigarette smokers. (AOR=1.53; 95% CI: 1.25-1.87) had a higher risk of pregnancy loss.

Table 1
Socio-demographic Characteristics of Women Of Reproductive Age In Indonesia

Characteristics	n (%)
Age (years)	
15-19	304 (1.60)
20-24	1,929 (10.20)
25-29	3,912 (20.70)
30-34	5,383 (28.50)
35-39	4,787 (25.40)
40-44	2,178 (11.50)
45-49	389 (2.10)
Residence	
Urban	8,923 (47.30)
Rural	9,958 (52.70)
Education	
Lower	15,986 (84.70)
Higher	2,896 (15.30)
Employment	
Unemployed	10,722 (56.80)
Employed	8,160 (43.20)
Wealth status	
Poorest	5,826 (30.80)
Poorer	3,719 (19.70)
Middle	3,338 (17.70)
Richer	3,081 (16.30)
Richest	2,918 (15.50)

DISCUSSION

The study showed that the likelihood of pregnancy loss was higher in women with lower education compared to those with higher education. Highly educated women are more likely to achieve positive pregnancy outcomes than poorly educated ones because they have easier access to healthcare and care plans for the mother and fetus (1). This is in line with the findings of another study as it showed women achieving higher education reduce the chance of experiencing a miscarriage or stillbirth (12). While low-educated women are more likely to give birth prematurely or stillbirth. To add on, women with high educational attainment were found to have more chances to identify the pregnancy danger

signs (13). A systematic review and meta-analysis conducted in Ethiopia revealed that women's knowledge of obstetric danger signs is extremely low, and this may impede their ability to receive obstetric care when they encounter complications during pregnancy (14).

The adjusted risk of pregnancy loss outcomes was higher in employed women than in those who were unemployed. Research conducted in Korea revealed that working and engaging in several different occupations while pregnant are linked to an increased risk of miscarriage and stillbirth (15). The results of this study should be interpreted with caution as more detailed data on the influence of

workplace activities on pregnancy would be required. Given the large heterogeneity in each employment category, it is imperative to specify exposures related to pregnancy loss outcomes in the employment category. Experience of miscarriage or stillbirth among women in Ghana was significantly predicted by their type of employment (1). Maternal employment status and type of employment during pregnancy should be considered independent risk factors for inadequate preventive behavior and poor outcomes for the health of the fetus (16).

Table 2

Association Between Variables and Pregnancy Loss Among Women of Reproductive Age in Indonesia

Variables	Pregnancy Loss		p-Value
	No (n = 15,613)	Yes (n = 3,269)	
Education			<0.01
Lower	84.30%	86.40%	
Higher	15.70%	13.60%	
Employment			<0.001
Unemployed	57.60%	53.10%	
Employed	42.40%	46.90%	
Wealth status			<0.001
Poorest	31.00%	30.20%	
Poorer	19.30%	21.60%	
Middle	17.80%	17.20%	
Richer	16.80%	13.80%	
Richest	15.10%	17.30%	
Advanced maternal age			<0.01
No	99.40%	98.90%	
Yes	0.60%	1.10%	
Grand multiparity			<0.001
No	83.60%	72.90%	
Yes	16.40%	27.10%	
Cigarette smokers			<0.001
No	97.50%	95.60%	
Yes	2.50%	4.40%	

Source: Calculate from 2017 Indonesia DHS

The results of the study indicated that women with lower socio-economic status had a higher chance of pregnancy loss. Mostly investigated, the chances for impoverished women to obtain prenatal care decreased. Low socioeconomic status increases the risk of pregnancy loss in women, particularly impoverished women who are often exposed to high workloads during pregnancy, thus increasing the risk of adverse reproductive effects (17,18).

Nonetheless, compared to poor women, wealthy women may be more likely to desire fewer children and have access to abortion services, which could account for some of their pregnancy loss. Previous evidence reported that women with the lowest wealth status had lower odds of pregnancy loss than women with the highest wealth status for a unit change in gravidity. An important relationship with gravidity discovered indicates that the association between

wealth status and pregnancy loss depends on the woman's level of gravidity (19,20).

The study displayed that women at the advanced maternal age were more likely to experience pregnancy loss. Preterm labor, gestational diabetes mellitus, chromosomal abnormalities, preeclampsia, miscarriage, and stillbirth are the risks associated with pregnancy in women at 35 years of age and older (21). The increasing rates of pregnancy loss may be attributed to the aging process of the ovaries,

which raises meiotic nondisjunction because of blood vessel malfunction brought on by advanced age (22,23). Women at the advanced maternal age were nearly three times more likely to have an adverse birth outcome (24). The current results confirmed the established link between advanced maternal age and a markedly increased risk of miscarriage and stillbirth (21,25,26).

Table 3

Binary Logistic Regression of Pregnancy Loss Among Women of Reproductive Age In Indonesia

Variables	Pregnancy Loss			
	p-Value	AOR	95% CI	
			Lower Bound	Upper Bound
Education: Lower	<0.001	1.25	1.11	1.41
Education: Higher (ref.)	-	-	-	-
Employment: Unemployed (ref.)	-	-	-	-
Employment: Employed	<0.001	1.19	1.10	1.29
Wealth: Poorest	<0.001	1.30	1.17	1.45
Wealth: Poorer	<0.01	1.18	1.05	1.33
Wealth: Middle	0.58	1.03	0.91	1.17
Wealth: Richer	<0.001	1.50	1.32	1.70
Wealth: Richest (ref.)	-	-	-	-
Advanced maternal age: No (ref.)	-	-	-	-
Advanced maternal age: Yes	<0.001	2.03	1.37	3.02
Grand multiparity: No (ref.)	-	-	-	-
Grand multiparity: Yes	<0.001	1.91	1.74	2.09
Cigarette smokers: No (ref.)	-	-	-	-
Cigarette smokers: Yes	<0.001	1.53	1.25	1.87

Source: Calculate from 2017 Indonesia DHS. AOR: adjusted odds ratio; ref: reference

An additional crucial finding in this study is that women with grand multiparity had a higher chance of experiencing pregnancy loss. Unfavorable outcomes associated with grand multiparity include preterm birth, maternal and perinatal mortality, and intrauterine fetal death (IUFD) (27). A comparative cross-sectional study in Ethiopia found that IUFD/stillbirth was higher in grand multiparity women (24). This finding is also in line with the studies done in the United States that found a higher proportion of perinatal mortality among grand-multiparity women (28).

A systematic review discovered that there was a correlation between active smoking and a higher risk of miscarriage. The risk increases with the number of cigarettes smoked, and the risk of miscarriage increases if smoking exposure occurs during the period of pregnancy (29). Regarding exposure to cigarette smokers, the adjusted risk of pregnancy loss was significantly higher in women

who smoked than those who did not. These findings strengthen the genetic data-based evidence suggesting a possible link between smoking and pregnancy loss (30). The utilization of extensive national population data, which allows the generalization of the current research findings in all women of reproductive age, is one of the study's strengths. The study, however, was limited in its ability to consider other factors (cultural, inflammatory, and immunologic dysregulation, chromosomes) at the community and national stages that could have influenced Indonesian women's experiences with pregnancy loss because of the use of secondary data.

CONCLUSION

The study concluded that six variables, i.e., education, employment, wealth status, advanced maternal age, grand multiparity, and cigarette

smokers were statistically and significantly associated with pregnancy loss among women of reproductive age in Indonesia.

CONFLICT OF INTEREST

The authors declare no conflict of interest in this study.

AUTHOR CONTRIBUTIONS

M.A.M., T.H., and S.R. conceptualized the study, coordinated data collection, and carried out the statistical analysis. M.A.M., T.H., S.R., H.D.K., D.K.M, and S.S. drafted the manuscript. All authors read and approved the final manuscript.

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