Original Research

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POLICIES TO REDUCE HOME DELIVERY IN INDONESIA: WHO SHOULD BE THE TARGET?

Kebijakan Mengurangi Persalinan di Rumah Di Indonesia: Siapa yang Seharusnya Menjadi Target?

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Abstract

Introduction: Home delivery increases the chance of maternal death.
Aims: The study examines suitable targets for developing policies to reduce home births.
Methods: This cross-sectional study analyzed 15,357 mothers through stratification and multistage random sampling, including 13 independent variables: age, education, employment, marital, parity, insurance, knowledge of pregnancy danger signs, antenatal care (ANC), residence, the autonomy of health and family finance, household head sex, and wealth. We examined the data using binary logistic regression.
Results: About 23.8% of mothers deliver at home. Older age, higher education, primiparous, insured, knowing the pregnancy danger signs, living in an urban area, and doing ANC ≥4 times were protective factors to not home delivery. Being employed, married, having a male household head, and being poor were risk factors for home delivery. Mothers without health autonomy are less likely to deliver at home than those with health autonomy. Mothers with family finance autonomy are 1.239 times more likely than those without to give home birth.
Conclusion: The target to reduce home deliveries: young, low education, employed, married or divorced/widowed, having many children, uninsured, do not know pregnancy danger signs, doing ANC <4 times, living in a rural area, have no health autonomy, have no family finance autonomy, having a male household head, and poor.

Keywords: big data, home delivery, maternal health, maternity care, population health, public health.

Abstrak

Latar Belakang: *Persalinan di rumah meningkatkan kemungkinan kematian ibu.*
Tujuan: *Studi menganalisis target yangtepat untuk mengembangkan kebijakan mengurangi kelahiran di rumah.*
Metode: *Studi cross-sectional ini menganalisis 15.357 ibu melalui stratification dan multistage random sampling. Penelitian ini menggunakan 13 variabel bebas: usia, pendidikan, pekerjaan, perkawinan, paritas, asuransi, pengetahuan tentang tanda bahaya kehamilan, ANC, tempat tinggal, otonomi kesehatan dan keuangan keluarga, jenis kelamin kepala rumah tangga, dan kekayaan. Analisis menggunakan regresi logistik biner.*
Hasil: *Sekitar 23,8% ibu melahirkan di rumah. Usia yang lebih tua, pendidikan tinggi, primipara, asuransi, mengetahui tanda bahaya kehamilan, tinggal di perkotaan, dan melakukan ANC ≥4 kali merupakan faktor protektif bagi untuk tidak melahirkan di rumah. Bekerja, menikah atau janda, memiliki kepala rumah tangga laki-laki, dan miskin merupakan faktor risiko untuk melahirkan di rumah. Wanita tanpa otonomi kesehatan lebih kecil kemungkinannya dibandingkan mereka yang memiliki otonomi kesehatan untuk melahirkan di rumah. Wanita dengan otonomi keuangan keluarga 1,239 kali lebih mungkin dibandingkan wanita tanpa otonomi keuangan keluarga untuk melahirkan di rumah.*
Kesimpulan: *Target kebijakan untuk mengurangi persalinan di rumah adalah ibu yang berumur muda, berpendidikan rendah, bekerja, menikah atau janda, memiliki banyak anak, tidak memiliki asuransi kesehatan, tidak mengetahui tanda bahaya kehamilan, ANC kurang dari empat kali, tinggal di pedesaan, tidak memiliki otonomi kesehatan, memiliki otonomi keuangan, memiliki kepala rumah tangga laki-laki, dan miskin.*
Kata kunci: *persalinan di rumah, asuhan persalinan, big data, kesehatan ibu, kesehatan masyarakat, kesehatan penduduk.*

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Introduction

Maternal Mortality Rate (MMR) indicates women's health efforts (the Minister of Health of the Republic of Indonesia, 2018). Based on World Bank data, the MMR in Indonesia in 2017 was 117 maternal mortality per 100,000 were caused by pregnancy and childbirth up to 42 days after giving birth (World Health Organization, 2019). Maternal mortality is a serious health issue that impacts the growth of children and families.

MMR in Indonesia in this decade has decreased. It has, however, yet to meet the 2030 Sustainable Development Goals (SDGs) objective of 70 per 100,000 live births (Susiana, 2019; Laksono and Wulandari, 2022).

At the ASEAN regional level, Indonesia has the third-highest MMR. Myanmar is the first-highest country, with 250 deaths, while Laos is the second-highest country, with 185 deaths per 100,000 live births. Indonesia still has a higher MMR than other emerging countries. In 2017, MMR in Uzbekistan was 29 deaths; in China, 29 deaths; in Mongolia, 45 deaths; in Iran, 16 deaths; in the Maldives, 53 deaths; and Jordan, 46 deaths per 100,000 live births. MMR is substantially lower in wealthy nations than it is in Indonesia. In 2017 MMR in Japan, five deaths; in the Republic of Korea, eleven deaths; in the United Kingdom, seven deaths; in Canada, ten deaths; in the Netherlands, five deaths; in France, eight deaths; and in Germany, seven deaths per 100,000 live births (World Health Organization, 2019). MMR at the global level shows that many countries have achieved the SDGs 2030 target.

All maternal deaths are caused by severe bleeding after delivery, infection after delivery, pre-eclampsia, eclampsia throughout pregnancy, and complications from childbirth. These maternal complications are increasingly at risk, with delays in referring to health facilities and poor quality of care (Mahmood *et al.*, 2018; Sageer *et al.*, 2019). The factor that supports the hesitation in referring to a health facility is the place of delivery at home. Several studies have found that home delivery is preferred for women and families compared to delivery in health facilities because of the understanding that childbirth is a natural process. Furthermore, delivery in health facilities is considered necessary only for complicated deliveries. Other factors related to delivery place choice are sociocultural issues, economic problems, health facilities (Konje *et al.*, 2020), preference for home as a place of delivery (Delibo *et al.*, 2020), inability to meet the minimum requirements for WHO ANC services (Tsegay *et al.*, 2017), limited means and costs of transportation, distance, delivery costs (Moindi *et al.*, 2016; Scott *et al.*, 2018; Ou *et al.*, 2021), poverty, low ANC, no formal education (Ahinkorah *et al.*, 2021), and not getting permission from the family (Ou *et al.*, 2021).

In some places in Indonesia, home delivery is still relatively standard (Nurrachmawati *et al.*, 2018). However, the coverage of delivery in health facilities varies greatly. Maluku has the lowest percentage of delivery in health facilities (45.18%), whereas Jakarta has the highest rate (100%) (Putri and Laksono, 2022). Based on data from the 2017 IDHS states that of 17.401 births five years before the survey, 44.8% still occurred in non-health facilities (Efendi *et al.*, 2019). The National Strategic Plan targets deliveries in healthcare facilities at 82% in 2018. A study in the Riau region of Indonesia stated that 45.6% of deliveries occurred in non-health facilities. Midwives helped nearly two-thirds of non-health deliveries at home (Sukirman, Wahyono and Shivalli, 2020). Home delivery assistance has a disadvantage, namely the risk of experiencing delays in handling in the event of childbirth complications. This delay has the potential to increase maternal mortality during childbirth.

Minister of Health Regulation Number 97 of 2014 Article 14, paragraph 1 states that mothers in Indonesia must carry out childbirth in a health facility (The Ministry of Health of The Republic of Indonesia, 2014). This measure is part of the government's policy to improve maternal health and minimize maternal mortality. Therefore, policymakers in Indonesia must formulate policies to reduce

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the incidence of delivery at home or encourage deliveries by health workers in health facilities. This condition requires that policymakers understand the policy targets and who specifically has a higher risk of delivering at home. For this reason, the study analyzes the right policy target to reduce maternal deliveries at home in Indonesia.

Method

A cross-sectional study was used in this investigation. Secondary data from the 2017 Indonesian Demographic and Health Survey (IDHS) were used by the author. The IDHS was a component of the Inner City Fund's global survey as part of the Demographic and Health Survey (DHS) program. To select the required samples, the IDHS used stratification and multistage random sampling. The analytic unit of the study consisted of reproductive-age women (15-49 years) who delivered birth in Indonesia in the five years prior to the survey. The total number of respondents that took part in the survey was 15,357.

Maternal delivery at home mentioned respondents' recognition of maternity sites throughout the previous five years. The site of maternal delivery at home consists of two categories: no and yes.

The study involved two groups of independent variables in the analysis. The first, individual characteristics, consist of eight variables: age groups, education level, employment status, marital status, parity, health insurance, the knowledge of pregnancy danger signs, and antenatal care (ANC). The second family characteristics consist of five variables: the type of residence, the autonomy of health, the autonomy of family finance, the sex of the household head, and wealth status.

The study divided the age into 15-19, 20-24, 25-29, 30-34, 35-39, 40-44, and 45-49. Meanwhile, education comprises no education, primary, secondary, and higher education. Regarding employment status, we split into unemployed and employed. The three marital groups are never married, married, and divorced/widowed. There are three forms of parity: primiparous (one), multiparous (two to four), and grand multiparous (more than four). There are two health insurance forms: uninsured and insured.

The study characterized respondents' pregnancy knowledge as danger signs from problems such as extended labor, vaginal bleeding, fever, seizures, incorrect fetal position, swollen limbs, faintness, breathlessness, weariness, and so on (Wulandari and Laksono, 2020). The respondents' knowledge consists of not knowing and knowing. The study used the frequency of visits to antenatal care (ANC) in a healthcare institution during pregnancy to calculate ANC. There are two types of ANC visits: < four and ≥ four.

Even though the latest policy of Minister of Health Regulation 21/2021 states that ANC examinations are carried out at least six times, this study still uses the old rules. We take this step because the ICF carried out the 2017 IDHS before enacting the new regulations.

The residence type comprises urban and rural. Meanwhile, the autonomy of health referred to respondents' independence in determining required health services. The autonomy of health consists of two types; no and yes. Moreover, the autonomy of family finance describes respondents' independence to allocate money to family financial resources, consisting of no and yes.

The 2017 IDHS assessed the wealth status based on the affluent quintiles of the family. The poll measured the amount and kind of ordinary things, such as TVs, bicycles, and vehicles, as well as housing amenities such as drinking water, sanitary facilities, and home floors. Critical factor analysis is used in the study to assess the outcomes of these factors. National wealth quintiles were ordered for each family member based on household scores and then split by distribution into the same five categories. It split the population into 20 percent quintiles: poorest, poorer, middle, richer, and richest (Wulandari *et al.*, 2019, 2022).

We used chi-square to examine differences in mother delivery at home proportions. Meanwhile, The author examined all variables to verify that there was no evidence of collinearity between

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independent variables. The study used binary logistic regression for multivariate analysis.

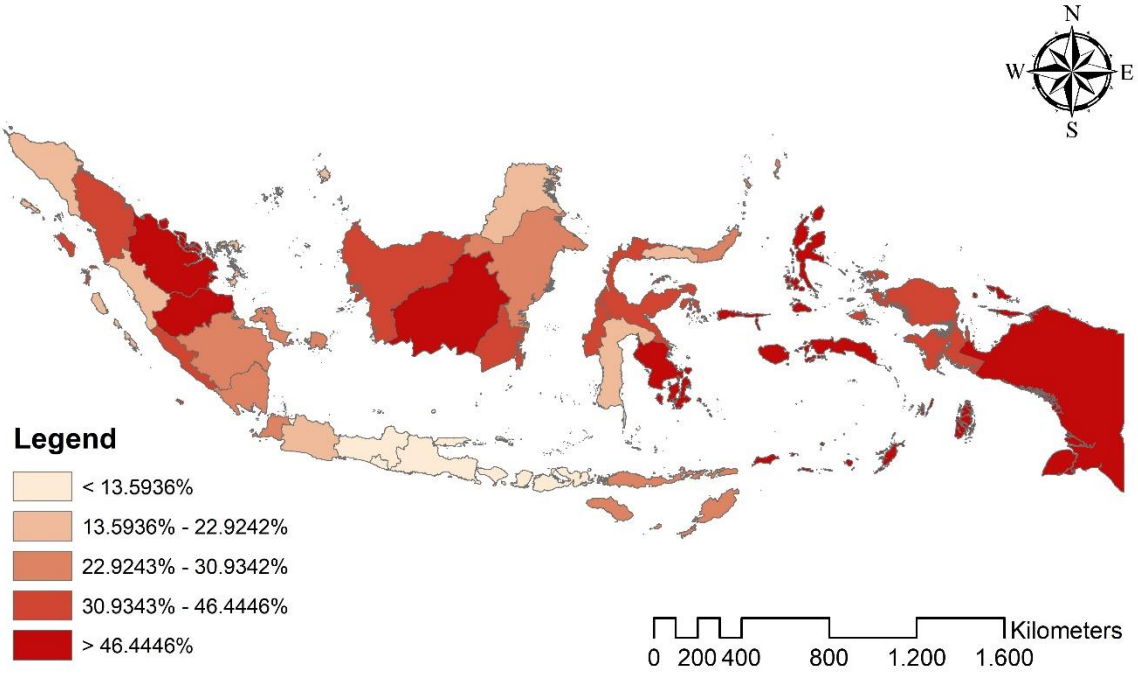
In addition, the author used the SPSS 26 program for every statistical examination. The study also utilized ArcGIS 10.3 to map maternal deliveries at home in Indonesia by the province in 2017 (ESRI Inc., Redlands, CA, USA). For this work, we got a shapefile of administrative border polygons from the Indonesian Bureau of Statistics.

The study used secondary data from the 2017 IDHS as a materials analysis. The 2017 IDHS did not seek ethical certification from Indonesia's Ethics Commission. In 2017, the Inner City Fund (ICF) International Institutional Review Board approved the Standard DHS survey procedure under The Demographic and Health Surveys (DHS) Program (DHS-7), which the ORC Macro IRB first assessed and approved the DHS in 2002. DHS surveys that correspond to the Standard are approved by the DHS-7 Program; the approval form is provided. The Institutional Review Board of ICF International follows the regulations for "Protection of Human Subjects" established by the US Department of Health and Human Services. (45 CFR 46).

Result and Discussion

The result informs about 23.8% of pregnant women in Indonesia deliver at home. Figure 1 reports that apart from the Java-Bali region, almost all areas have relatively high coverage of maternal deliveries at home spatially.

Table 1 informs the 30-34 age group dominated in both groups for maternal delivery categories, either at home or not (25.7% and 24.9%). Based on education level, women with secondary education dominated both groups for maternal delivery, either at home or not (61.4% and 48.4%). Moreover, unemployed women were also ruled in both groups for maternal delivery, either at home or not (54.3% and 54.7%).



Source: Mapped from data from the 2017 Indonesian Demographic and Health Survey

Figure 1. Map of home delivery distribution by the province in Indonesia in 2017

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Table 1. Descriptive statistics of respondents individual factors

Characteristics	Home Delivery		p-value
	No (n=10,975)	Yes (n=4,382)	
Age			*<0.001
- 15-19	2.2%	3.3%	
- 20-24	16.3%	17.3%	
- 25-29	25.5%	24.5%	
- 30-34	25.7%	24.9%	
- 35-39	20.3%	19.2%	
- 40-44	8.3%	8.5%	
- 45-49	1.8%	2.2%	
Education			*<0.001
- No Education	0.5%	2.6%	
- Primary	22.2%	38.5%	
- Secondary	61.4%	48.4%	
- Higher	16.0%	10.5%	
Employment			*<0.001
- Unemployed	54.3%	54.7%	
- Employed	45.7%	45.3%	
Marital			*<0.001
- Never married	0.1%	0.1%	
- Married	97.1%	96.8%	
- Divorced/Widowed	2.9%	3.2%	
Parity			<0.001
- Primiparous	34.7%	28.9%	
- Multiparous	61.3%	61.2%	
- Grandemultiparous	4.0%	10.0%	
Health insurance			<0.001
- Uninsured	39.2%	48.4%	
- Insured	60.8%	51.6%	
Know the danger signs of pregnancy			<0.001
- No	27.6%	44.0%	
- Yes	72.4%	56.0%	
ANC visits			<0.001
- < four times	6.1%	20.2%	
- ≥ four times	93.9%	79.8%	

Table 2. Descriptive statistics of family factors of respondents in Indonesia

Characteristics	Home Delivery		p-value
	No (n=10,975)	Yes (n=4,382)	
Residence			*<0.001
- Urban	54.6%	29.1%	
- Rural	45.4%	70.9%	
The autonomy of health			<0.001
- No	56.1%	59.2%	
- Yes	43.9%	40.8%	
The autonomy of family finances			<0.001
- No	86.7%	85.0%	
- Yes	13.3%	15.0%	
Sex of household head			<0.001
- Male	90.4%	92.0%	
- Female	9.6%	8.0%	
Wealth			<0.001
- Poorest	14.1%	38.1%	
- Poorer	19.7%	21.7%	
- Middle	21.6%	17.4%	
- Richer	22.7%	13.5%	
- Richest	21.9%	9.4%	

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Married women ruled both groups for maternal delivery—multiparous women led both groups for maternal delivery, either at home or not (97.1% and 96.8%). Meanwhile, the insured occupied both types of maternal delivery (60.8% and 51.6%). On the other hand, women who profess to be aware of pregnancy danger signs prevalent in both categories of maternal delivery (72.4% and 56.0%). Moreover, women who claim ≥4 times during pregnancy occupied both groups for maternal delivery (93.9% and 79.8%).

Table 2 shows women who lived in rural areas ruled the home delivery group. Women with no autonomy are prevalent in both categories of maternal delivery. Meanwhile, based on the sex of the household head, males occupied both groups for maternal delivery. Moreover, regarding wealth status, the poorest women dominate maternal delivery at home.

Table 3 shows that women in all age groups are likelier to do home delivery than the 45-49. Older age is synonymous with broader knowledge, making them prefer to minimize risks by not giving birth at home (Putri and Laksono, 2022).

Based on education, no education and primary have a likelier of home delivery than higher education. Education is very influential on a person's decision-making behavior in determining attitudes. Higher education is related to women's autonomy to increase self-confidence and ability to make decisions regarding efforts to maintain health compared to women with lower levels of education (Ou *et al.*, 2021). This condition is similar to the study in India, which explains that women without education tend to give birth at home rather than in health services (Das, Chaplot and Azamathulla, 2021). Other studies in Ghana and Ethiopia also explain that women's education influences the decision to give birth in a specific location (Bedilu and Niguse, 2017; Novignon *et al.*, 2019).

The result informs that the employed are 1.077 times more likely than the unemployed to do home delivery (95% CI 1.077-1.078). Regarding marital status, married women are 2.323 times more likely than those who were never in the union to do home delivery (95% CI 2.319-2.326). This condition is contrary to the situation that should be. Women who work should have a better financial ability to access good-quality health services than women with lower economic skills. In addition, women with better economic independence can support or encourage other women to choose private health services (Ndugga, Namiyonga and Sebuwufu, 2020).

Meanwhile, based on marital status, divorced/widowed have a 2.265 times higher probability than married or living with a partner of doing home delivery (95% CI 2.262-2.268). This condition is also considered contrary to what it should be, and the husband's presence should be a support for choosing better facilities for childbirth. This situation is not in line with previous studies (Moindi *et al.*, 2016; Megatsari *et al.*, 2021; Laksono *et al.*, 2022).

Regarding parity, Table 3 indicates that the more a woman gives birth to a live child, the higher the chances for maternal delivery at home. The situation means that women prefer to access maternal health services in their first pregnancy than in subsequent pregnancies. This condition is associated with the perceived risk of home delivery from women with more than one pregnancy. They feel comfortable giving birth at home because they think they have experienced it (Rosmala Dewi *et al.*, 2020). Women who have given birth more than twice and do not experience complications during and after childbirth most women give delivery at home. rather than in health services (Moindi *et al.*, 2016; Ou *et al.*, 2021).

Meanwhile, based on health insurance ownership, uninsured women are 1.334 times more likely than insured women to make home deliveries (95% CI 1.334-1.335). Moreover, women who didn't know the pregnancy danger signs are 1.410 times more chance than women who know it to do home delivery (95% CI 1.409-1.410). This information shows that health insurance and knowing the pregnancy danger signs were protective factors for a woman not to deliver at home. The condition means that a good understanding of the pregnancy danger signs can prevent

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a pregnant woman from giving birth at home (Andayani *et al.*, 2021; Laksono, Wulandari and Rukmini, 2021; Putri, Laksono and Rohmah, 2023). A study in India shows that respondents who do not have health insurance tend to give birth at home compared to respondents with health insurance (Ou *et al.*, 2021).

Table 3. Binary logistic regression of home delivery in Indonesia

Predictor	Home Delivery			
	p-value	95% confidence interval		
		AOR	Lower Bound	Upper Bound
Age: 15-19	*<0.001	1.776	1.775	1.776
Age: 20-24	*<0.001	1.511	1.510	1.511
Age: 25-29	*<0.001	1.336	1.335	1.336
Age: 30-34	*<0.001	1.241	1.240	1.241
Age: 35-39	*<0.001	1.063	1.062	1.063
Age: 40-44	**0.013	1.000	1.000	1.001
Age: 45-49 (ref.)	-	-	-	-
Education: No education	*<0.001	1.641	1.641	1.642
Education: Primary	*<0.001	1.008	1.007	1.008
Education: Secondary	*<0.001	0.736	0.736	0.737
Education: Higher (ref.)	-	-	-	-
Employment: Unemployed (ref.)	-	-	-	-
Employment: Employed	*<0.001	1.077	1.077	1.078
Marital: Never married (ref.)	-	-	-	-
Marital: Married/ Living with a partner	*<0.001	2.323	2.319	2.326
Marital: Divorced/ Widowed	*<0.001	2.265	2.262	2.268
Parity: Primiparous (ref.)	-	-	-	-
Parity: Multiparous	*<0.001	1.341	1.341	1.342
Parity: Grande multiparous	*<0.001	2.295	2.294	2.295
Health insurance: Uninsured	*<0.001	1.334	1.334	1.335
Health insurance: Insured	-	-	-	-
Know the danger signs of pregnancy: No	*<0.001	1.410	1.409	1.410
Know the danger signs of pregnancy: Yes (ref.)	-	-	-	-
ANC: <4 times	*<0.001	2.375	2.375	2.376
ANC: ≥4 times (ref.)	-	-	-	-
Residence: Urban (ref.)	-	-	-	-
Residence: Rural	*<0.001	1.904	1.904	1.905
The autonomy of health: No	*<0.001	1.057	1.057	1.058
The autonomy of health: Yes (ref.)	-	-	-	-
The autonomy of family finances: No (ref.)	-	-	-	-
The autonomy of family finances: Yes	*<0.001	1.239	1.239	1.240
Sex of household: Male	*<0.001	1.250	1.250	1.251
Sex of household: Female (ref.)	-	-	-	-
Wealth: Poorest	*<0.001	2.939	2.938	2.939
Wealth: Poorer	*<0.001	1.548	1.548	1.549
Wealth: Middle	*<0.001	1.364	1.364	1.365
Wealth: Richer	*<0.001	1.185	1.185	1.186
Wealth: Richest (ref.)	-	-	-	-

Note: *p < 0.001; **p<0.050

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Besides, women with ANC less than four times visits during pregnancy are 2.375 times more chance than women who do ANC four times visits or more to do maternal delivery at home (95% CI 2.375-2.376). Women in rural areas are 1.904 times more chance than urban women to do maternal home deliveries (95% CI 1.904-1.905). This result indicates that doing ANC four times or more during pregnancy and living in an urban area is a protective factor for a woman not to give birth at home in Indonesia. We can assume that maternal health services in urban areas are more accessible than in rural ones. The situation is similar to previous studies in several countries. The study showed that the distance of residence far from health facilities caused a woman to be reluctant and unable to give birth to health services due to limited access to transportation, including expensive transportation costs (Chungu *et al.*, 2018; Seran *et al.*, 2020; Wulandari, Laksono and Rohmah, 2021; Denny *et al.*, 2022).

Table 3 indicates that mothers without health autonomy are 1.057 times more likely than those with health independence to perform home delivery (95% CI 1.057-1.058). Contrary, mothers with the autonomy of family finance have a probability of 1.239 times higher than those without family finance independence to deliver at home (95% CI 1.239-1.239). These findings align with previous research that have informed the association of women's freedom with the choice of place of delivery (Xu *et al.*, 2022).

A male household head is 1.250 times more likely than a female to do home delivery (95% CI 1.250-1.251). This situation is possible due to the man's support making the choice of a place to give birth to a better place more likely. Several studies also reported that the man's presence positively affected the utilization of reproductive health services for women (Megatsari *et al.*, 2021; Laksono *et al.*, 2022).

Moreover, all wealth statuses have a higher possibility of home delivery than the richest. The condition means that a good economic situation will prevent a woman from giving birth at home. Women with good financial status can meet maternity care costs in public and private health facilities (San MT, 2018; Novignon *et al.*, 2019).

Study Strengths and Limitations

The study's strength was the use of big data in the study. Meanwhile, the study's limitation was the use of secondary data. We analyzed the variables that were limited to data from the ICF. Several factors informed in previous studies also influence the incidence of maternal delivery at home to be unanalyzed, including the value of pregnancy, child, childbirth, and family (Kurniawan *et al.*, 2012; Wahyudi, Intiasari and Laksono, 2016; Kusrini, Ipa and Laksono, 2019; Pratiwi *et al.*, 2019).

Conclusion

Regarding the results, the research concluded thirteen mothers' characteristics became the right policy target to reduce maternal deliveries at home. The parts were young, low education, employed, married or divorced/widowed, having many children, and uninsured. Other factors included not knowing the danger signs of pregnancy, doing ANC less than four times, living in a rural area, having no health autonomy, having family finance autonomy, having a male household head, and being poor.

Abbreviations

MMR: Maternal Mortality Rate; ANC: Antenatal Care; IDHS: Indonesia Demographic and Health Survey; ICF: Inner City Fund.

Declarations

Ethics Approval and Consent Participant

The 2017 IDHS did not seek ethical approval from the Indonesian Ethics Commission. The Inner City Fund (ICF) International Institutional Review Board authorized the Standard DHS survey methodology under The Demographic and Health Surveys (DHS) Program (DHS-7) in 2017, after the DHS was initially examined and approved by the ORC Macro IRB in

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Conflict of Interest
We declare that we have no conflict of interest.

Availability of Data and Materials
The writers are unable to disclose the data publicly because a third party and the authors do not have authorization to do so. Researchers who match the criteria for access to secret data can obtain the 2017 IDHS data at https://dhsprogram.com/data/new-userregistration.cfm.

Authors' Contribution
RDW conceptualized the study; ADL created the methodology; NR and RM wrote, reviewed, and edited the manuscript; RDW wrote the original draft.

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