

Trends and Determinants of Using Delivery Assistance by Health Workers: A Secondary Analysis Using the 2007–2017 Indonesian Health and Demographics Survey

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Abstract

Background: The World Health Organization reports that approximately 295,000 women died during or after their pregnancy and delivery in 2017. However, such deaths can be prevented by using delivery assistance from health workers. This study aims to analyze the trends and determinants of using delivery assistance by health workers in Indonesia.

Methods: A quantitative cross-sectional design is adopted to analyze secondary data from the Indonesian Health Demographic Surveys in 2007, 2012, and 2017. The sample includes married women that are selected according to inclusion and exclusion criteria: 15,011 respondents in 2007, 14,989 in 2012, and 15,179 in 2017. Data are analyzed using logistic regression statistical tests.

Results: This study shows the significant increase of using delivery assistance by health workers in Indonesia, from 53.8% in 2007, 68.8% in 2012, to 77.9% in 2017. Age, residence in the Java/Bali region, residence in urban areas, high and secondary education, high economic status, complete antenatal care visits, and knowing the signs of danger during pregnancy have significant relationships with delivery assistance by health workers among women. After being controlled by another factor, higher education is the most dominant factor associated with using delivery assistance by health workers among women in Indonesia ($p < 0.001$; Prevalence Ratio (PR) of 3.727 (3.123–4.447).

Conclusions: Women's education is the most important factor in delivery assistance by health workers utilization. Increasing knowledge regarding utilization of health worker assistance during delivery can be carried out through educational information, counseling or seminars, the Internet, and other media that are expected to increase information and awareness to take advantage of such service.

Keywords: delivery assistance, health worker, Indonesia, survey, utilization

INTRODUCTION

In a country, one indicator of public health is the maternal mortality rate (MMR). The SDG target in 2030 is to reduce the MMR to 70 per 100,000 live births. The World Health Organization (WHO) stated that in 2017, approximately 295,000 women die during and after pregnancy and delivery, and 94% of MMR occurs in low-income countries.¹ According to the WHO Report, the cause of maternal deaths are complications, 75% of which are primarily from severe bleeding (mostly after delivery), infections (mostly after delivery), high blood pressure during pregnancy (pre-eclampsia and eclampsia), complications from delivery, and unsafe abortion.² To prevent such complications such as bleeding and infection during delivery, WHO has initiated programs that provide assistance by health workers for mothers to have a safe delivery.

According to the BPS (Indonesian Statistic) in 2015, MMR

in Indonesia reached 305 per 100,000 live births,³ whereas the target of the health ministry for reducing maternal mortality in 2030 is 131 per 100,000 live births.⁴ Through 2020–2024 RPJMN, the Indonesian health ministry has exerted efforts to reduce maternal mortality by ensuring access to quality maternal health services, one of which is delivery assistance by health workers in healthcare facilities.

According to the 2020 BPS (Indonesian Statistic), approximately 95 out of 100 mothers that delivered birth in the last two years were helped by health workers. This percentage also increased from 93.63% in 2018 to 95.16% in 2020.⁵ This figure has met the 87% target of delivery coverage with health workers in healthcare facilities in 2020, but is still not evenly distributed in Indonesia. Several provinces still have coverage below 40%, such as Papua, Maluku, Riau, North Maluku, North Sulawesi, and West Papua.⁶

In this study, the conceptual framework is based on the theory of Andersen,⁷ who described the belief system known as the behavioral model of health service utilization. This model has three determinant factors: predisposing characteristics, enabling factors, and need factors.⁷ Related research has reported several factors

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that influence the utilization of delivery assistance by health workers. Ayene *et al.* stated that the place of residence, mother's education, travel time, a joint decision on the place of delivery, antenatal care (ANC) visit frequency, birth preparedness, complication readiness status, knowledge of obstetric danger signs after delivery, and knowledge of maternity waiting homes are significantly associated with skilled birth attendant utilization.⁸ In East Africa, education, economic status, ANC position, and region location also significantly affect skilled birth attendant utilization.⁹ Defure *et al.* stated that ANC visits, economic status, knowledge, and the number of children have significant relationships with skilled birth attendant utilization.¹⁰

In Indonesia, the determinants of delivery assistance by health workers' utilization has been explored by using cross-sectional data. Comprehensive data are necessary to describe the trends of delivery assistance by health workers utilization, and with this aim, the present study uses responses from three waves of the Indonesian Demographic and Health Survey (IDHS 2007, 2012, and 2017). Analysis and identification of such trends and determinants are expected to help provide good health policies to expand the utilization of delivery assistance by health workers in Indonesia.

METHODS

Ethics Approval and Consent to Participate

The Ethical Review Committee of Universitas Sumatera Utara (Ethic Number: 2445/XII/SP/2021) reviewed and approved this study. All participants gave informed consent. Interviews and data collection were anonymous. The transcriptions and recordings were secured and coded in a protected file. Refusal to participate in the study entailed no penalties whatsoever.

Instrument

As stated above, this study uses a quantitative method with a cross-sectional design. Data are derived mainly from the IDHS data for 2007, 2012, and 2017. IDHS is a national survey conducted jointly by the Central Statistics Agency (Indonesian Statistics), BKKBN (Indonesian National Population and Family Planning Agency), and the Ministry of Health of Indonesia. The surveys are held on the following dates: June 25 to December 31, 2007; May 7 to July 31, 2012; and July 24 to September 30, 2017. The United States Agency funds the IDHS program for International Development. The unit of analysis include respondents who were successfully interviewed by the IDHS team from 34 provinces in Indonesia.

Sample

From the 34 provinces, the study population included all women aged 15–49 years, providing respondents numbering 15,011 in 2007, 14,989 in 2012, and 15,179 in

2017. The sample merged into one data and thus the total is 45,179 respondents. The main inclusion criterion for the sample is women who had given birth in the last five years, whereas the exclusion criteria included those with missing data or uncertain answers (do not know).

Measurement

In this study, the independent factors were ANC visits, region, location, education, occupation, economic status, age, and knowing danger signs during pregnancy. The dependent variable was the utilization of delivery assistance by health workers. The latter is a person chosen by the mothers to help them during delivery, and thus the sample was divided into two categories: "yes" with delivery assistance by health workers (doctors, nurses, midwives, and obstetricians) and "no" with the delivery assistance carried out by non-health workers (shamans and others). The dependent factors were as follows. Age was divided into three categories that are 35–49, 25–34, and 15–24. ANC visits during the pregnancy period were divided into two categories, namely, complete with four or more ANC visits and incomplete with less than four or no ANC visits. Region factors were divided into three locations where the respondents live, namely, in the islands of Sumatra, Java/Bali, and in Sulawesi, NNT, Papua, and Kalimantan islands that are considered from the eastern category. The type of residence was divided into two categories, urban and rural. The level of education was divided into three categories, low (with no schooling, incomplete primary education, and complete primary education), secondary (with incomplete or complete high school), and high (with college education). Occupation status was divided into three categories, namely, "yes" if the respondent has a job or worked in the last 12 months, and "no" otherwise. Economic status was divided into five categories: very rich, rich, middle, poor, and very poor. Knowing the signs of danger during pregnancy was divided into two categories, namely, "yes" the respondent knows the danger signs during pregnancy, and "no" otherwise.

Data was subjected to several analyses: univariate analysis to see the trend of delivery assistance in 2007, 2012, and 2017; bivariate analysis to determine the relationship between the dependent and independent factors; and multivariate analysis to identify the most dominant factor in the utilization of delivery assistance by health workers. The data analysis was carried out using SPSS 23.0 for Windows.

RESULTS

The results of this study are obtained from secondary data regarding women who have given birth from the IDHS in 2007, 2012, and 2017. Figure 1 shows the trend of using delivery assistance by health workers in Indonesia.

Utilization of health workers during delivery among women in Indonesia increased significantly from 53.8% in 2007 to 77.9% in 2017.

The highest delivery assistance was carried out by midwives and the lowest was carried out by doctors. In 2007, midwives' delivery assistance was 46.1%, which increased by 13.8% to reach 59.5% in 2017. Meanwhile, delivery assistance by doctors in 2007 and 2012 increased to 0.3% and decreased again in 2017 to 0.2%. Table 1 shows that age, region, type of residence, level of education, economic status, ANC visits, and knowing the signs of danger during pregnancy have significant

relationships with the utilization of delivery assistance by a health worker ($p < 0.05$).

Table 2 shows that the most influential factor based on the highest adjusted Prevalence Ratio (PR) is education. The results of the multivariate analysis show that the influence of education can be seen in the PR of 3.281 (2.834–3.798), indicating that women with high education have 3.2 times higher chances of utilizing health worker assistance during delivery compared with those with low education (CI 3.123–4.447) after controlling for other factors (age, region, type of residence, economic status, ANC visits, and knowing the signs of danger during pregnancy).

TABLE 1. Bivariate analysis of utilization of delivery assistance by health workers

Variables	Yes		No		n	p	PR (95% CI)
	n	%	n	%			
Age							
35–49	8,533	70.3	3,604	29.7	12,137	0.000	1.517 (1.388–1.657)
25–34	15,760	68.1	7,381	33.9	23,141	0.000	1.368 (1.268–1.475)
15–24	6,035	61.0	3,866	39.0	9,901	Ref	
Region							
Sumatera	7,042	71.4	2,819	28.6	9,861	0.000	2.009 (1.813–2.226)
Java/Bali	17,986	69.8	7,768	30.3	25,754	0.000	1.863 (1.667–2.082)
Eastern Region	5,300	55.4	4,264	44.6	9,564	Ref	
Type of residence							
Urban	16,591	78.2	4,625	21.8	21,216	0.000	1.364 (1.318–1.412)
Rural	13,737	57.3	10,226	42.7	23,963	Ref	
Level of education							
College	4,561	86.8	692	13.2	5,253	0.000	6.741 (5.884–7.723)
Secondary education	18,005	74.3	6,223	25.7	24,228	0.000	2.958 (2.741–3.192)
Primary education	7,762	47.6	7,936	52.4	15,698	Ref	
Occupation status							
Working	15,663	67.4	7,562	32.6	23,225	0.404	1.010 (0.987–1.049)
Not working	14,665	65.6	7,289	34.4	21,954	Ref	
Economic status							
Richest	7,259	83.5	1,431	16.5	8,690	0.000	6.036 (5.287–6.889)
Rich	6,954	75.7	2,228	24.3	9,182	0.000	3.713 (3.288–4.193)
Middle	6,416	69.9	2,764	30.1	9,180	0.000	2.762 (2.483–3.071)
Poor	5,492	61.6	3,421	38.4	8,913	0.000	1.910 (1.741–2.096)
Poorest	4,208	45.7	5,006	54.3	9,214	Ref	
ANC visits							
Complete	28,340	70.0	12,167	30.0	40,507	0.000	1.644 (1.555–1.738)
Not complete	1,988	42.6	2,684	57.4	4,672	Ref	
Knows the sign of danger during pregnancy							
Yes	19,471	73.2	7,131	26.8	26,602	0.000	1.252 (1.220–1.285)
No	10,857	58.4	7,720	41.6	18,577	Ref	

Ref: Reference; PR: Prevalence Ratio; CI: Confidence Interval

TABLE 2. Final model of determinants of using delivery assistance by health workers

Variables	<i>p</i>	PR (95% CI)
Age		
35–49	0.000	1.521 (1.382–1.675)
25–34	0.001	1.150 (1.060–1.274)
15–24		<i>Ref</i>
Region		
Sumatera	0.000	1.765 (1.604–1.943)
Java/Bali	0.003	1.180 (1.059–1.314)
Eastern Region		<i>Ref</i>
Type of residence		
Urban	0.000	1.788 (1.601–1.998)
Rural		<i>Ref</i>
Level of education		
College	0.000	3.281 (2.834–3.798)
Secondary education	0.000	2.117 (1.956–2.291)
Primary education		<i>Ref</i>
Economic status		
Richest	0.000	2.386 (2.074–2.744)
Rich	0.000	1.953 (1.727–2.209)
Middle	0.000	1.789 (1.611–1.988)
Poor	0.000	1.465 (1.334–1.609)
Poorest		<i>Ref</i>
ANC visits		
Complete	0.000	1.997 (1.800–2.217)
Not Complete		<i>Ref</i>
Knows the sign of danger during pregnancy		
Yes	0.000	1.243 (1.157–1.335)
No		<i>Ref</i>

Ref: Reference; PR: Prevalence Ratio; CI: Confidence Interval

DISCUSSION

This study finds that education is the most dominant factor affecting the utilization of health workers during delivery in Indonesia. Women with high education have 3.7 higher chances of utilizing health workers than those with low education. The findings are similar to a study in Ghana, where women with senior high and above education level are three times more likely to use skilled delivery assistance than those with primary education.¹¹ Compared with those without education, mothers with tertiary or university education are more likely to use health worker assistance during delivery, with adjusted OR 8.657, 95% CI, (1.445–51.853), as stated by Gitimu *et al.*,¹² while in Ethiopia, those with secondary and above education are four times more likely to utilize skilled birth attendants during delivery.⁸ Based on the above explanation, educational level can be concluded as one of the most important and influential factors of family planning utilization, allowing a person to absorb information and understand and apply this in daily behavior. Moreover, educated women may have better jobs and higher socioeconomic status, enhancing their negotiation power and confidence in making informed decisions regarding the place of delivery and utilization of skilled birth attendants. Educated women seek higher

quality services and have greater ability to use healthcare inputs to improve their wellbeing.¹³

Another factor that affects health worker utilization during delivery among women is age. The results indicate that women under 35 years have 1.5 times higher chance of utilizing health workers than women under 24 years. Similarly, Saaka *et al.* shows that mothers aged at least 35 years are more likely to use skilled birth attendants compared with those of other age groups.¹⁴ The probability of women who are 35 years and above delivering in a health facility is also 8% more than those who are 20 and 34 years in rural. The positive association between older women and institutional delivery in rural areas confirms the proposition by Grossman that older people are more likely to demand health care services than younger ones because health degenerates faster as one grows older.¹⁵ However, the findings differ from those in Ethiopia where mothers 21–25 years are 1.5 times (AOR = 1.56, 1.204–3.516) more likely to deliver their babies in a health facility than those above 30 years of age. The difference can be caused by the improved access to reproductive health information for the young generation through media such as TV, radio, or the Internet than for older mothers.¹⁶

Region also influences the health worker utilization during delivery among women in Indonesia. This study indicates that women who live in Sumatera and Java/Bali have 2.0 and 1.8 times higher chances of utilizing health workers during delivery than those who live in the eastern region, respectively. This finding is similar to that in Ethiopia, where approximately 86% of mothers living in the Addis Ababa region use delivery assistance from health workers.¹⁷ Addis Ababa is the capital of the State of Ethiopia, which provides easy access to maternal health services, including the use of health workers during the delivery. By comparison, in eastern Indonesia, one of the causes of the low utilization of delivery assistance by health workers is their lack of availability for maternal health services. Yang Nababan *et al.* stated that mothers who live in Java/Bali have higher chances of utilizing maternal health services, including deliveries by health workers.¹⁸ Suryanto *et al.* also stated that the provinces in Java Island have a higher ratio of health care providers than those in eastern Indonesia. The distributions of nurses, midwives, nutritionists, and sanitarians are also still uneven.¹⁹ The reason is that most health workers are not willing to serve in rural areas due to communication problems, inadequate basic and social facilities, reduced remuneration and no further benefits, security problems due to living in rural areas, and career uncertainty. One of the government's programs, Nusantara Sehat, is a health-related effort that includes preventive, promotive, and curative aspects through special assignments for health workers based on teams with specific numbers and types to improve the access to and quality of services at Health

Service Facilities in underdeveloped regions, borders, and island areas, especially in problem areas. The aim is to reduce disparities in the allocation of health workers, which is also in fact not achieved. Nusantara Sehat does not meet the current demand for medical personnel, and the lack of coordination with local authorities causes inadequate monitoring and supervision, ultimately affecting the program's effectiveness.²⁰ On the other side, the results of this study indicate that the trend of childbirth among health workers in eastern Indonesia shows a significant increase from 2007 to 2017. The percentage of respondents living in the eastern region and assisted by health workers when giving birth was 42.9% in 2007, 55.4% in 2012, and 67.8% in 2017. Despite this positive trend in childbirth in eastern Indonesia, the numbers are still below the national percentage of delivery assistance by health workers (95.16%).⁵

The type of residence is also known to be a factor that influences the utilization of delivery assistance by health workers. This study indicates that women who live in urban areas have 1.3 times higher chances of utilizing health workers in the delivery than those who live in rural areas. Similarly, Dickson *et al.* shows that women who live in rural residences are less likely to utilize skilled delivery services than those in urban areas.²¹ In addition, women living in rural areas were less likely to be delivered by skilled birth assistants.²² Other research found that skilled birth attendants are used five times higher by urban residents than by their rural counterparts. The reason may be that rural areas are still influenced by traditional practices.²³ Another factor that can affect the low utilization of health workers during delivery in rural areas is that transportation is a barrier. Mothers who live in urban areas can easily access health facilities that provide health workers for delivery assistance, whereas those in rural areas lack transportation services or good roads and telecommunications infrastructure, thus affecting their use of health workers during delivery.⁸

Economic status is also known to influence the use of health workers in childbirth. Women with high economic status have 3.7 times higher chances of utilizing health workers in the delivery than women with poor economic status. Similarly, in Bangladesh, women from higher wealth quintiles have higher proportions of skilled attendants during deliveries than those from low wealth quintiles.²³ Economic status is a supporting and reinforcing factor in accessing health and maternal services in terms of costs. Poor households or women have a small financial capacity, and face difficulties to utilize health workers in their delivery. More affordable traditional birth attendants provide alternative assistance for women with poor economic status. This finding is similar to a study in Ghana, which also states that household wealth plays a significant role in utilizing skilled birth attendants at delivery.²⁴ Wealthy women

certainly do not face cost barriers, given their available funds to pay for maternal healthcare services. An appropriate delivery service method is needed that includes local community-based interventions for poor women.²⁵

ANC visits also influence the use of health workers in the delivery. Women with a history of complete ANC visits have 1.6 times higher chances of utilizing health workers in the delivery than those with incomplete ANC visits. Similarly, Islam *et al.* stated that ANC visits are significant determinants of delivery by skilled birth attendants. Women who receive ANC by skilled birth attendants are 2.62 times higher to have their delivery conducted by these health workers compared with those who did not have such visits.²⁶ Tesfaye *et al.* also found that women who had ANC visits have two times higher chances of using skilled delivery service than those who never received ANC.²⁷ Another research stated that women who do not attend ANC visits are 3% less likely to utilize skilled birth attendants during delivery than those who attend ANC. The reason is that ANC is the first step of the continuum of services provided during pregnancy.¹¹ Women who regularly carry out ANC visits receive direction by health workers to provide maternal health services, including delivery and postpartum care to ensure the wellbeing of mothers and newborns.

Knowing the signs of danger during pregnancy is also one of the factors related to the use of health workers in the delivery. Women who know the signs of danger during pregnancy have 1.2 times higher chances of utilizing health workers in the delivery than those without such knowledge. Similarly, in Nigeria, women who know about critical danger signs of pregnancy are more likely to seek skilled attendants for their delivery than those who do not know.²⁸ This knowledge is also closely related to ANC visits, which serves as the only source of information related to danger signs during pregnancy and post-delivery period from healthcare providers.²⁹ During ANC visits, health workers tend to recommend the use of assistance to mothers to achieve a safe delivery, which can affect their actual utilization. Knowledge of danger signs during pregnancy is also very influential on maternal decision making to utilize health services. Mwilike *et al.* stated that most women who recognize signs of complications during pregnancy visit a health facility for care and management, possibly due to fears for the life of their infant.³⁰ Increasing knowledge related to danger signs during pregnancy is vital. Women have many discussions with health workers, encouraging them to choose to use health workers in the delivery.

However, a limitation of this study is the inability to infer causality because of the cross-sectional survey design. Data related to service availability and quality of health service are not collected, and thus excluded in our

analysis. Recall bias might also occur in this study, where women might have difficulty remembering events that happened during the last five years preceding the survey.

CONCLUSIONS

Factors that influence the utilization of delivery assistance by health workers are age, region, type of residence, level of education, economic status, ANC visits, and the signs of danger during pregnancy. Education is the most influential factor for delivery assistance by health worker utilization. Increasing knowledge about the importance of delivery by health workers is crucial. This might be achieved through educational information, counseling, or seminars. The Internet or other media are expected to increase information and awareness to utilize health workers during delivery.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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