Conference Paper

Determinants of Birth Delivery Assistance in Six Indonesian Provinces, 2012

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Abstract

To address the high maternal mortality rate, the Indonesia government requires that birth deliveries be attended by skilled birth attendants at health facilities. However, some studies still show gaps. To improve strategy and policy, the question has arisen whether the determinants of birth delivery assistance exist at the individual or the sub-national level. This study was aimed at determining its contextual determinants. Secondary data from the 2012 Indonesia Demographic and Health Survey on a sample of 2542 females who gave birth in six provinces in Indonesia were analysed. The dependent variable was a composite of delivery location and the presence of birth attendants. Multilevel multinomial logistic regression analysis was performed to calculate the adjusted odds ratio (OR) and decrease in variation. The results showed that 43% of the respondents gave birth at health facilities assisted by skilled birth attendants. Individual factors that predisposed or enabled individuals to use healthcare service affected birth delivery assistance with an OR of 2 to 3. The provincial-level factors of the health facility ratio, population density and hospital beds to births ratio had substantially less effect. Nevertheless, these contextual variables produced a positive 24% decrease in variations of delivery location and the presence of birth attendants, with an OR of 1.7. These results support the conclusions that the programme needs to focus more on rural areas, promote the importance of birth delivery at healthcare facilities, especially during antenatal care and improve the distribution of healthcare professionals and the provision of healthcare facilities by taking into account population density.

Keywords: birth delivery assistance, individual level, province level

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1. INTRODUCTION

Maternal death is an important indicator in the Human Development Index (HDI) and reflects the well-being of a population [13]. In Indonesia, the maternal mortality rate has been estimated to be high for decades, and in 2012, the country recorded 346 deaths per 100,000 live births [3]. The Indonesian government has responded to this

problem by issuing regulations requiring that the quality of antenatal care meet minimum standards issued in 2008, that birth delivery be assisted by skilled attendants and midwives be assigned to every village under 1990 regulations and that basic and comprehensive health facilities provide obstetric emergency care and postnatal care for mothers and new-borns [7], in addition to family planning as established in 1970 by Presidential Decree No. 8 (BKKBN.go.id).

However, these problems have persisted. For instance, antenatal care coverage was around 82% for the first visit and 70% for the fourth visit, both less than the national targets of 98% and 95%, respectively. Based on the 2012 IDHS, approximately 63% of births took place at healthcare facilities, while others were at home. About 83% of birth deliveries were assisted by healthcare professionals with the highest qualifications, while 68% were attended by personnel with lowest qualifications, with both figures gradually rising to the national standard of 89% [3]. Moreover, treatment for birth complications was found to be 77%, lower than the expected 80% (IDHS, 2012).

Notably, recent regulations have emphasised that all births must be served in healthcare facilities providing quality services and skilled attendants (Ministry of Health Decree No. 97/2014). This regulation requires support from by individual- and higher-level strategic and tactical policies. The study question, therefore, was what the contextual determinants of birth delivery assistance at the individual and the sub-national levels are.

2. METHODS

Birth delivery assistance comprises the birth delivery attendant (person) and the birth delivery place, which were sorted as the use of healthcare services and facilities. A conceptual framework was developed based on Andersen's theory on the influence of service utilisation from various predisposing, enabling and need factors [1]. Secondary data analysis was performed using 2012 IDHS cross-sectional data. The defined population was women of childbearing age who had given birth, either live or stillbirth. Multistage probability sampling was used to select the sample, and weighted analysis was applied. The sample consisted of 2,542 individuals from six provinces (of 34 Indonesia provinces) with the lowest HDI to target the most disadvantaged populations.

To identify the level of determinants (individual or provincial), multilevel multinomial logistic regression analysis was performed. The dependent variable was birth delivery assistance in three categories: delivery at a health facility, delivery at home assisted by

a skilled birth attendant (SBA) and delivery at home assisted by a non-SBA. The final model calculated the percentage of risk reduction resulting from birth delivery assistance performed by non-SBAs at home caused by the individual- and the provincial-level factors.

3. RESULTS

Of the respondents, 45.3% gave birth at home with the assistance of non-SBAs, while 12.2% gave birth at home with the assistance of healthcare professionals. The respondents were young women with an average age of 29 years with an average parity of two. More than half had a high school education or higher, and half were also housewives. The participants had barely adequate knowledge on maternal health (composite score for 10 items), with a mean score of 75 of 100.

Table 1 shows the crude effect of the predisposing factors. Age and marital status did not have a clear relation with birth delivery assistance, whereas the variables of parity and mothers' education level, occupation and knowledge of maternal health did. Table 2 shows that the enabling factors did not clearly relate to decision making regarding birth delivery assistance, whereas all the other studied variables (husbands' education and occupation, socioeconomic status, health insurance and urban or rural residence) had associations, with odds ratios (OR) of up to approximately 3.4. The need factors represented by antenatal care had a strong link with birth delivery assistance but not birth complications or the desire for children. Thus, tables 1, 2 and 3 demonstrate the relationships of the variables at the individual level, which the final model confirmed.

Table 1: Effect of predisposing factors on birth delivery assistance

Predisposing Factors		Birth delivery assistance			Total	P-value
		At healthcare facilities	At home, assisted by SBAs	At home, assisted by non-SBAs		
Age (year)	Mean	30	29.9	29.5	29.8	0.086
	Median	29	29	29	29	
	SD	6.5	6.7	7.1	6.8	
	Min./Max.	16 -49	16 – 47	16 – 49	16 - 49	
(%)	<20 years	44 (38.6%)	12 (10.6%)	58 (50.8%)	114 (4.5%)	0.822
	20–35 years	804 (42.7%)	235 (12.5%)	843 (44.8%)	1882 (74.0%)	
	>35 years	232 (42.5%)	63 (11.5%)	251 (46.0%)	546 (21.5%)	
Marital status	Married	996 (43.0%)	280 (12.2%)	1039 (44.9%)	2315 (91.1%)	0.183
(%)	Divorced	27 (56.1%)	3 (6.9%)	18 (37.1%)	48 (1.9%)	
	Widowed	9 (32.5%)	5 (17.0%)	15 (50.6%)	29 (1.1%)	

	Unmarried	46 (31.0%)	21 (13.8%)	83 (55.2%)	150 (5.9%)	
Parity	Mean	2.29	2.71	2.95	2.64	<0.001
	Median	2	2	2	2	
	SD	1.49	1.75	2	1.79	
	Min./Max.	12.Jan	11.Jan	12.Jan	12.Jan	
(%)						
	Prime	410 (51.2%)	90 (11.2%)	301 (37.6%)	801 (31.5%)	<0.001
	Multi	622 (40.4%)	197 (12.8%)	721 (46.7%)	1540 (60.6%)	
	Grande	44 (22.0%)	24 (11.7%)	133 (66.3%)	201 (7.9%)	
Mothers' education (%)	Senior high	216 (72.1%)	28 (9.2%)	56 (18.7%)	300 (11.8%)	<0.001
	Junior high	605 (52.7%)	154 (13.4%)	390 (33.9%)	1149 (45.2%)	
	Elementary	27 (12.7%)	104 (11.9%)	496 (56.5%)	878 (34.5%)	
	No education		24 (11.0%)	164 (76.2%)	215 (8.5%)	
Mothers' occupation	Housewife	539 (49.5%)	137 (12.5%)	414 (38.0%)	1090 (42.9%)	<0.001
	Professional	116 (69.7%)	13 (7.8%)	37 (22.4%)	166 (6.5%)	
	Employee	277 (63.6%)	58 (13.3%)	101 (23.1%)	436 (17.2%)	
	Informal non-agriculture	99 (35.4%)	24 (8.6%)	156 (56.0%)	279 (11.0%)	
	Agriculture					
	Missing	110 (19.3%)	78 (13.8%)	380 (66.9%)	568 (22.3%)	
		1 (33.3%)	1 (33.3%)	1 (33.3%)	3 (0.1%)	
Level of knowledge of maternal health	Mean	25.54	21.71	20.95	22.55	<0.001
	Median	24	20	18	21	
	SD	5.46	4.5	4.44	5.18	
	Min./Max.	18 -44	18 – 39	16 – 40	16 -44	
	Sufficient	81 (63.8%)	11 (8.8%)	35 (27.4%)	127 (5.0%)	<0.001
	Insufficient	984 (41.0%)	297 (12.3%)	1118 (46.7%)	2381 (93.7%)	
	Missing	11 (68.7%)	2 (12.5%)	3 (18.7%)	16 (0.6%)	

Interestingly, when the provincial-level factors were added to the final model shown in Table 4, the variation decreased from 0.417 to 0.316, or approximately 24%. This figure demonstrates that the provincial-level variables made a notable contribution (less than 50%) to birth delivery assistance. Thus, the provincial-level variables had some influence, although not significant, on birth delivery assistance, with an overall OR of 1.7. This OR means that in provinces with low (insufficient) ratios of midwives, community health centres and hospital beds for birthing, mothers had a 1.71 chance of giving birth at home with the assistance of non-SBAs.

OR higher than 1 indicate variation in birth delivery assistance across provinces. The 95% of confidence interval (CI) of the OR of the three contextual variables fell within the value of 1, indicating that influence of inter-cluster variation was more significant than the influence of contextual variables. Contextual variables (population density and ratios of midwives, community health centres and hospital beds for birthing) served as protective factors against birth delivery assistance at home. Table 4 shows that adding one more midwife would reduce the risk of at-home birth delivery by 0.98, while adding one community health centre would reduce the risk of at-home birth delivery by 0.87. The ratio of hospital beds for birthing contributed to risk reduction of 0.78.

4. DISCUSSION

The data used for this analysis showed that less than half (42.5%) of women of childbearing age gave birth at healthcare facilities. This indicates that the implementation of government policy, particularly the Ministry of Health's Decree Number 97 of 2014, has not yet been successful. This has been caused by both individual- (factors related to individuals and family members during pregnancy) and provincial-level (regional policy) factors.

At the individual level, all the factors tested tended to contribute to birth delivery attendance. Multilevel multinomial logistic regression analysis supported the importance of antenatal care, for example, as mothers who made at least four antenatal care visits had a nearly 3 (2.87) times higher chance of giving birth at home with the assistance of non-SBAs; with a 95% confidence level, it increased up to approximately 4. Although standards hold that antenatal care visits must be made once each in the first and the second trimesters and twice in the third trimester, this research counted the number of antenatal care visits without regard to the time of the visits. Table 4 shows that 51% of the mothers who made four or more antenatal care visits gave birth at healthcare facilities, while 74.9% of the mothers who made less than fur antenatal care visits gave birth at home with the assistance of non-SBAs. The choice to use healthcare services and facilities during birth delivery was influenced by previous experiences of using healthcare services and facilities, as mentioned by Andersen and Babitsch et al. (2012). This result is in line with the finding of Titaley et al. (2010) that mothers who made four or more antenatal care visits had a 3.33 times higher chances of giving birth at home with the assistance of village midwives than those who gave birth at home with the assistance of traditional birth attendants, with AOR 3.33 and 95% CI 2.78–3.84. The increasing frequency of encounters of healthcare professionals

and pregnant mothers is an indicator of good outcomes for both healthcare professionals and pregnant mothers. The health education provided throughout antenatal care increase expectant mothers' awareness of safe child delivery, encouraging them to give birth at healthcare facilities.

Table 2: Effect of enabling factors on birth delivery assistance

Enabling factors		Birth delivery assistance (%)			Total (%)	p-value
		At healthcare facilities	At home assisted by SBAs	At home assisted by non-SBAs		
Husbands' Education	Senior high	219 (69.2)	20 (6.2)	78 (24.6)	317 (12.5%)	<0.001
	Junior high	615 (48.1)	182 (14.2)	482 (37.7)	1279 (50.3%)	
	Elementary	259 (33.1)	98 (12.5)	424 (54.4)	781 (30.7%)	
	No education Missing	20 (14.0)	9 (6.1)	117 (79.9)	146 (5.7%)	
		7 (36.8)	1 (10.5)	10 (52.6)	19 (0.7%)	
Husbands' Occupation	Professional	170 (67.5)	20 (7.9)	62 (24.6)	252 (9.9%)	<0.001
	Employee	295 (61.8)	60 (12.6)	122 (25.6)	477 (18.8%)	
	Informal, non-agriculture	418 (49.0)	97 (11.3)	339 (39.7)	854 (33.6%)	
	Agriculture					
	Unemployed	207 (24.3)	120 (14.1)	525 (61.6)	852 (33.5%)	
	Missing	32 (30.7)	9 (8.9)	63 (60.4)	104 (4.1%)	
		1 (33.3)	1 (33.3)	1 (33.3)	3 (0.1%)	

Table 4: Final model of multilevel multinomial logistic regression of the determinants of birth delivery assistance

Variables	Level 1 and Level 2			
	At home assisted by SBAs		At home assisted by Non-SBAs	
	OR	95% CI	OR	95% CI
Intra-group fixed effect ANC				
≥ 4 times	Ref		Ref	
< 4 times	1.01	0.69–1.47	2.87*	2.15–3.83
Birth complications				
With complications	Ref		Ref	
Without complications	1.35	0.88–2.08	1.23	0.89–1.71
Area of residence				
Urban	Ref		Ref	
Rural	1.51*	1.11–2.11	1.77*	1.37–2.30
Health insurance				
Has health insurance	Ref		Ref	
Does not have health insurance	1.27	0.96–1.68	1.25*	1.01–1.57
Socioeconomic status				

Table 3: Effect of need factors on birth delivery assistance

Need factors		Birth delivery assistance (%)			Total	P-value
		At healthcare facilities	At home assisted by SBAs	At home assisted by non-SBAs		
Desire to have children	Yes, soon	965 (42.4)	275 (12.1)	1035 (45.5)	2275 (89.5%)	0.726
	Yes, later	63 (40.6)	24 (15.4)	69 (43.9)	156 (6.1%)	
	No more	51 (47.1)	11 (9.8)	47 (43.2)	109 (4.3%)	
	Missing	0 (0.0)	1 (50.0)	1 (50.0)	2 (0.1%)	
Birth complication	With	143 (51.0)	27 (9.8)	110 (39.3)	280 (11.0%)	0.016
	Without	937 (41.5)	282 (12.5)	1039 (46.0)	2258 (88.8%)	
	Missing	1 (25.0)	0 (0.0)	3 (75.0)	4 (0.2%)	
Antenatal care	≥ 4 times	971 (50.9)	246 (12.9)	691 (36.2)	1908 (75.1%)	<0.001
	< 4 times	98 (15.3)	63 (9.9)	475 (74.9)	634 (24.9%)	
	Meets standards	807 (53.4)	173 (11.5)	531 (35.2)	1511 (59.4%)	
	Does not meet standards	222 (35.1)	99 (15.7)	312 (49.3)	633 (24.9%)	
	Missing	48 (12.1)	42 (10.5)	308 (77.4)	398 (15.7%)	

Variables	Level 1 and Level 2			
Upper	Ref		Ref	
Upper-middle	1.82	0.96–3.46	1.07	0.59–1.94
Middle	1.27	0.67–2.45	1.13	0.64–2.01
Lower-middle	2.48*	1.31–4.71	2.63*	1.51–4.57
Lower	3.28*	1.71–6.31	3.40*	1.93–5.97
Husbands' education				
Senior high school	Ref		Ref	
Junior high school	1.77*	1.04–2.99	0.98	0.65–1.50
Elementary school	1.75	0.95–3.19	1.09	0.67–1.74
No education	1.76	0.63–4.91	1.63	0.78–3.40
Husbands' occupation				
Professional	Ref		Ref	
Employee	1.65	0.94–2.89	1.13	0.72–1.78
Informal non-agriculture	1.74*	1.04–3.04	1.33	0.85–2.07
Agriculture	2.28*	1.26–4.16	2.10*	1.33–3.34
Unemployed	1.26	0.48–3.28	1.73	0.88–3.41
Mothers' education				
Senior high school	Ref		Ref	
Junior high school	1.08	0.64–1.83	1.33	0.84–2.12
Elementary school	0.99	0.54–1.81	2.10*	1.26–3.50
No education	2.03	0.82–4.98	2.97*	1.45–6.13

Variables	Level 1 and Level 2			
Mothers' occupation				
Housewife	Ref		Ref	
Professional	0.77	0.39–1.48	1.14	0.67–1.94
Employee	0.91	0.64–1.28	0.61	0.45–0.84
Informal, non-agriculture	0.81	0.48–1.38	1.28	0.90–1.83
Agriculture	1.52*	1.01–2.31	1.81*	1.31–2.51
Parity				
Prime	Ref		Ref	
Multi	1.48*	1.08–2.02	1.59*	1.23–2.03
Grande	2.10*	1.09–4.01	3.10*	1.82–5.16
Age				
20–35 years	Ref		Ref	
<20 years	0.7	0.34–1.46	1.45	0.87–2.44
>35 years	0.78	0.55–1.11	0.60*	0.45–0.80
Provincial level				
Midwives per 100,000 people			0.98**	0.97–1.00
Community health centres per 100,000 people			0.87*	0.81–0.94
Hospital beds for births per 1000 people				
Population density (km2)			0.78*	070.–0.88
			0.99*	0.99–.00
Random effect	0.316			
Provincial-level variance				
Intra-class correlation	8.80%			
Provincial level				
Proportional change in variation				
Inter-province random effect	1.71			
Inter-group fixed effect				
Midwife ratio	0.34–2.94			
Community health centre ratio	0.36–3.20			
Hospital beds for births ratio	0.30–2.46			
Population density	0.34–2.69			
Note: **= p-value < 0.10. *= p-value < 0.05				

Women's socioeconomic status was also a strong enabling factor. In this study, 61.9% of the mothers in the lowest quintile gave birth at home, had 3.28 times higher chances of giving birth at home with the assistance of healthcare professionals (AOR = 3.28; 95% CI 1.71–6.31) and had 3.40 times higher chances of giving birth at home with the assistance of non-medical attendants (AOR = 3.40; 95% CI 1.93–5.97). These results are in line with those of Hagos et al. (2014), who found that women in the highest

economic class had 16 times higher chances of giving birth at healthcare facilities than those in lower economic classes (AOR = 16.28; 95% CI 7.96–35.54).

One means to tackle financial issues related to birth delivery is the provision of health insurance for pregnant mothers. Accordingly, this study showed that health insurance was a significant factor in child delivery assistance. Women of childbearing age who did not have health insurance had a 1.25 times higher chances of giving birth at home with the assistance of non-medical attendants (AOR = 1.25; 95% CI 1.01–1.57), and indeed, 48% did so. A study conducted in South Halmahera in 2011 yielded similar results. Women of childbearing age who had Indonesian health insurance for the poor had a 3.28 times higher chances of giving birth at healthcare facilities (AOR = 3.28; 95% CI 1.86–5.81). Health insurance coverage reduced the costs of using healthcare services, and the insured only had to provide for personal needs during their treatment at healthcare facilities [4].

Furthermore, the results of the multilevel analysis demonstrated that the provincial-level variables significantly influenced birth delivery assistance. These contextual variables produced a positive 24% decrease in variation in delivery location and the presence of birth attendants, with an OR of 1.7. The effect of midwives, community health centres and hospital beds for births ratios on birth delivery assistance revealed that the government has adopted suitable policies. Nevertheless, current policy requires that a minimum of four community health centres (CHC) offer basic emergency obstetric neonatal care (BEONC) services in every district in Indonesia [7, 8], but this target has not been completed achieved. Some studies have uncovered non-compliance with BEONC criteria among CHC [6, 11]. Instead of using the criteria of four BEONC per district, therefore, it is suggested that the ratio of CHCs with BEONC to the population be considered. Similar thinking also applies to the hospital beds provided for births as population density is a potential indicator for the establishment of health facilities.

The type of skilled birth attendance in Indonesia varied. The average of general practitioners at each CHC was 1.83, but they were not well distributed. The ratio of nurses to the population in the six studied provinces with the lowest HDIs in Indonesia was at 94.07 per 100,000 citizens, less than the standard. In 2014, only two provinces met the minimum standard [9]. This problem in the health workforce was also supported by this study, which found that the midwife ratio in six studied provinces was at 49.56 per 100,000 citizens, less than the minimum standard.

5. CONCLUSIONS

Individual factors were shown to have an important role in birth delivery assistance, while provincial-level factors (population density, health facility ratio and hospital bed for birthing ratio) had considerably less effect. Despite strengthening of policies addressing individual-level factors, those provincial-level contextual determinants linked to population density should be seriously considered to increase birth delivery assistance at health facilities.

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