

Education Role in the Institutional Delivery in the Islands Area: A Study in Maluku Region, Indonesia

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Abstract. This study analyzed the education role in institutional delivery in the Maluku Region, Indonesia. The 2018 Indonesian Basic Health Research data were analyzed using a cross-sectional approach. 1,913 Moluccan women ages 15 and older who experienced delivery during the last five years were included. Institutional birth was the outcome variable, while education level was the exposure variable. Additionally, eight control variables were considered: province, residency, age, marriage status, occupation, wealth, number of births, and antenatal care. The associations among these variables were examined using binary logistic regression. The findings indicate that education significantly influences institutional birth. Secondary-educated women had 1.8 times higher odds of delivering in a medical facility than primary-educated women (AOR 1.800; 95% CI 1.761-1.839). Women with higher education were nearly three times more likely to use facility-based delivery services compared to those with primary education (AOR 2.891; 95% CI 2.808-2.976). Education plays a crucial role in institutional delivery rates in the Maluku Region. The higher a woman's education level, the greater the likelihood of utilizing healthcare facilities for childbirth. Enhancing community awareness and expanding access to formal education are essential strategies for improving facility-based delivery services in this region.

1 Introduction

The World Health Organization (WHO) recommends institutional delivery to prevent maternal and neonatal mortality. All women must have access to proficient care to prevent, identify, and solve problems during pregnancy and delivery. Well-trained health personnel operating in supportive settings are essential to prevent avoidable maternal and newborn deaths. Governments at national and local levels are expected to establish minimum targets for this indicator, and in many countries, achieving 100% institutional deliveries has become the central strategy to lower maternal mortality [1].

The Indonesian maternal mortality rate is estimated at 177 per 100,000 live births in 2017. This number has decreased, decreasing from 272 in 2000 to 228 in 2010 to 192 in 2015. Although there has been a trend toward decline, this amount is still high when compared with comparable countries like Malaysia and the Philippines [2]. At the national level, 88.8% of pregnant women received at least four antenatal visits according to the recommended schedule for each trimester, and 90.9% of women delivered with the assistance of a health

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worker or health facility. Coverage of at least four antenatal visits during pregnancy in Maluku Province was lower than the national rate at 77.5%, and in North Maluku, it was 67.6%. Meanwhile, the coverage of childbirth in healthcare facilities in 2021 in Maluku and North Maluku was 66.0% [3].

Many factors affect the choice of whether to deliver in a healthcare facility. A systematic review conducted in South Asia, highlighted that women's utilization of maternal health services, particularly institutional delivery, is strongly influenced by sociocultural norms, community participation, and family decision-making dynamics. The review found that involving family members and the broader community improved awareness and acceptance of facility-based births, suggesting that social and cultural contexts play a central role in shaping women's choices [4]. Positive maternal attitudes, adequate antenatal care (ANC) attendance, and better knowledge consistently contributed to increased utilization of institutional delivery services across different regions of Ethiopia [5]. The educational level and frequency of antenatal care are essential factors for institutional delivery at the individual level [4,6]. Meanwhile, at the community level, it is influenced by community media exposure and community antenatal coverage factors [6]. Other influential sociodemographic factors are partner age, marriage age, living in urban areas, family income, occupation, and type of family [5].

Maluku Region, which consists of Maluku and North Maluku provinces in Eastern Indonesia, is characterized by unusual geographic features, including an archipelagic landscape. Moreover, Maluku Province contains at least 1,286 islands divided into eleven regencies/cities. Meanwhile, North Maluku Province has 395 islands dispersed over ten districts and cities [7]. There are differences in health development between the western region of Indonesia and the eastern region of Indonesia. Districts or cities in the western region tend to have higher public health development index values than or equal to the national human development index than districts and towns in the eastern region [8]. The Human Development Index (HDI) in Maluku Province in 2021 is 69.71. This number has increased from previous years. Maluku Province is ranked 27th nationally at the HDI level in 2021. Maluku's average district/city has a moderate human development status [9].

Research on one of the islands in Maluku shows that the teaching staff and educational facilities are inadequate, which is influenced by the problem of a lack of awareness among parents about the importance of education [10]. However, other information states that the average length of schooling in Maluku Province is 10.03 years and has increased yearly [9]. The literacy rate for the population aged 15-24 years in 2021 and 2022 is 99.89 and 99.91 in Maluku and 99.85 and 99.87 in North Maluku, respectively. This number is above the national rate [11]. An interesting illustration shows that the gap between education problems is seen from the literacy rate in Maluku, which is already relatively high, and the decision to deliver a baby in health services is not optimal. This context could be one barrier to the implementation of policies to promote institutional delivery. Based on the background, this research analyzed the role of education level in institutional delivery in the Maluku Region, Indonesia.

2 Methods

This research examined the 2018 Indonesian Basic Health Survey data from the Indonesian Ministry of Health. The survey gathered data between May and July 2018. The study population was women in the Maluku Region who were 15 or older and had delivered within five years prior to the interview. The study evaluated 1,913 women in a cross-sectional study as a weighted sample.

Data were collected through interviews using household and individual questionnaires, applying a multistage and stratified random sampling approach. The outcome variable that we used was institutional delivery. Institutional delivery in this study refers to childbirth in healthcare facilities. We divide institutional delivery into "yes" and "no". The exposure variable was the level of education. Education comprises primary, secondary, and higher levels.

We included eight control variables: province, residential type, age, marital status, employment status, wealth status, parity, and the completeness of antenatal care (ANC). The area comprises Maluku and North Maluku Provinces. The categorization of residence is based on Statistics Indonesia, comprising urban and rural areas. The age ranges for this study are ≤ 19 , 20-24, 25-29, 30-34, 35-39, 40-45, and ≥ 45 . The status of marital includes married, divorced/widowed. The research divided employment status between the unemployed and employed groups.

This study assessed household wealth using the wealth quintile of its ownership. Principal component analysis was used in the research to calculate the score. These scores divided the population into national wealth quintiles, each representing 20% of households. Wealth status includes the poorest, poorer, middle, richer, and richest groups.

The parity is divided into three categories: primiparous (1), multiparous (2-4), and grand multiparous (>4). Furthermore, despite the 2016 WHO recommendation to raise the minimum number of ANC contacts from four to eight, the Indonesian government maintains an alternative ANC standard. Under this model, routine pregnancies should receive six ANC visits: one in the first trimester, two in the second, and three in the third, with physician examination required at the first and fifth visits. The study classified ANC completeness into two groups: incomplete (<6 visits) and complete (≥ 6 visits).

Data analysis involved Chi-square testing for bivariate associations, collinearity diagnostics and binary logistic regression (enter method). Results were reported as adjusted odds ratios (AOR) with 95% confidence intervals (CI). Statistical analyses were performed in IBM SPSS 26, while spatial mapping of institutional delivery proportions in Maluku was conducted using ArcGIS 10.3 with shapefiles from Statistics Indonesia.

The 2018 Indonesian Basic Health Survey received approval from the National Ethics Committee of the National Institute of Health Research and Development (LB.02.01/2/KE.024/2018). All participants had to fill out an informed consent form. To use these data, the author obtained access authorization through the website <http://www.litbang.kemkes.go.id/layanan-permintaan-data-riset/>.

3 Results And Discussion

3.1 Result

The result shows that the average proportion of institutional delivery in the Maluku Region was 33.8%. Figure 1 indicates the distribution of institutional delivery proportion maps based on cities/regencies in the Maluku Region. The map displays the lowest proportion of institutional delivery in many areas of Maluku Province and nearly half of the southern part of North Maluku Province.

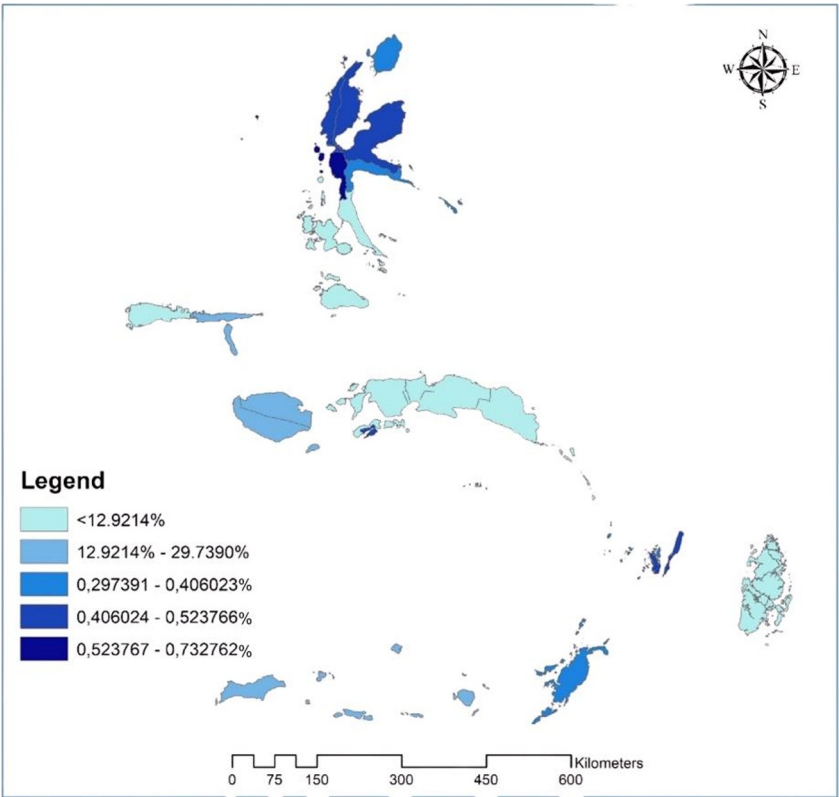


Fig 1. Map showing the proportion of institutional births by city/regency in the Maluku Region, Indonesia, 2018

Table 1 displays the findings of the bivariate analysis. Regarding institutional delivery, the higher the education level, the higher the institutional delivery proportion. When compared by province, Maluku Province has a larger percentage of institutional delivery than North Maluku Province in all categories. In the higher education group, urban residents demonstrate a higher proportion than those in rural areas. Among age categories, 30-34 has the highest percentage of institutional delivery compared to other groups. Married women dominated at all education levels. Employed women are about three times more likely than unemployed women to pursue higher education.

Table 1. The results of bivariate analysis (n=1,913)

Variables	Education Level			p-value
	Primary (n=1,035)	Secondary (n=591)	Higher (n=287)	
Institutional Birth				<0.001
No	798 (77.1)	374 (63.3)	114 (39.6)	
Yes	237 (22.9)	217 (36.7)	173 (60.4)	
Province				<0.001
Maluku	532 (51.4)	404 (68.3)	156 (54.2)	
North Maluku	503 (48.6)	187 (31.7)	131 (45.8)	
Residence				<0.001
Urban	197 (19.0)	275 (46.6)	160 (55.9)	
Rural	838 (81.0)	316 (53.4)	127 (44.1)	

Variables	Education Level			p-value
	Primary (n=1,035)	Secondary (n=591)	Higher (n=287)	
Age group				<0.001
≤ 19	46 (4.4)	11 (1.8)	0 (0.0)	
20 - 24	152 (14.7)	187 (31.6)	17 (6.0)	
25 - 29	203 (19.6)	149 (25.2)	72 (25.1)	
30 - 34	228 (22.0)	104 (17.6)	90 (31.4)	
35 - 39	235 (22.7)	94 (15.9)	70 (24.4)	
40 - 44	116 (11.2)	43 (7.2)	32 (11.3)	
≥ 45	58 (5.6)	4 (0.7)	5 (1.9)	
Marital status				<0.001
Married	1,013 (97.9)	568 (96.1)	274 (95.5)	
Divorced/Widowed	22 (2.1)	23 (3.9)	13 (4.5)	
Employment status				<0.001
Unemployed	434 (41.9)	336 (56.9)	67 (23.2)	
Employed	601 (58.1)	255 (43.1)	220 (76.8)	
Wealth Status				<0.001
Poorest	324 (31.3)	99 (16.8)	15 (5.3)	
Poorer	299 (28.9)	100 (17.0)	32 (11.1)	
Middle	245 (23.7)	160 (27.0)	55 (19.2)	
Richer	126 (12.2)	157 (26.5)	87 (30.4)	
Richest	40 (3.9)	74 (12.6)	98 (34.0)	
Parity				<0.001
Primiparous	157 (15.2)	197 (33.4)	104 (36.3)	
Multiparous	666 (64.3)	366 (62.0)	172 (59.9)	
Grande multiparous	212 (20.5)	28 (4.7)	11 (3.8)	
ANC				<0.001
Incomplete	635 (61.4)	370 (62.6)	128 (44.7)	
Complete	400 (38.6)	221 (37.4)	159 (55.3)	

Based on wealth status, Table 1 displays that the wealthier, the higher the proportion of their higher education category. Meanwhile, based on parity, multiparous women have the highest ratio of education level compared to other parities. Moreover, regarding the ANC completeness, women with full ANC have a higher proportion than those with incomplete ANC in the higher education group.

The analysis then conducted a collinearity test in the second step. The test results indicate no significant associations among the independent variables. All factors have tolerance values greater than 0.10. Furthermore, every variable's variance inflation factor (VIF) was below 10.00. The result indicates that there is no multicollinearity in the regression model.

Table 2. The results of binary logistic regression (n=1,913)

Variables	Institutional Birth			
	p-value	AOR	95% Confidence Interval	
			Lower Bound	Upper Bound
Education: Primary	-	-	-	-
Education: Secondary	<0.001	1.800	1.761	1.839
Education: Higher	<0.001	2.891	2.808	2.976
Province: Maluku	-	-	-	-
Province: North Maluku	<0.001	2.281	2.238	2.325
Residence: Urban	<0.001	2.274	2.227	2.321
Residence: Rural	-	-	-	-

Variables	Institutional Birth			
	p-value	AOR	95% Confidence Interval	
			Lower Bound	Upper Bound
Age: ≤19	<0.001	2.863	2.635	3.110
Age: 20 – 24	<0.001	0.830	0.774	0.890
Age: 25 – 29	<0.001	1.337	1.251	1.428
Age: 30 – 34	<0.001	1.259	1.180	1.345
Age: 35 – 39	<0.001	1.176	1.102	1.256
Age: 40 – 44	<0.001	1.457	1.361	1.559
Age: ≥45	-	-	-	-
Marital: Married	<0.001	1.600	1.512	1.693
Marital: Divorced/Widowed	-	-	-	-
Employment: Unemployed	-	-	-	-
Employment: Employed	<0.001	1.082	1.062	1.103
Wealth: Poorest	-	-	-	-
Wealth: Poorer	<0.001	1.064	1.033	1.096
Wealth: Middle	<0.001	1.314	1.277	1.352
Wealth: Richer	<0.001	1.576	1.529	1.624
Wealth: Richest	<0.001	2.629	2.533	2.729
Parity: Primiparous	-	-	-	-
Parity: Multiparous	<0.001	0.816	0.795	0.837
Parity: Grande multiparous	<0.001	0.844	0.810	0.880
ANC: Incomplete	-	-	-	-
ANC: Complete	<0.001	2.311	2.268	2.354

AOR=adjusted odds ratio.

Table 2 indicates the binary logistic regression findings of institutional delivery among Moluccan women in Indonesia. Moluccan women who have completed secondary education have 1.800 times greater probability of giving birth in an institution than those who have only completed primary education (AOR 1.800; 95% CI 1.761-1.839). Moreover, Moluccan women with higher education are 2.891 times more likely than those with primary education to achieve institutional delivery (AOR 2.891; 95% CI 2.808-2.976).

The results identified eight control variables associated with institutional delivery in the Maluku Region. According to the province, Table 2 displays that Moluccan women in North Maluku Province are 2.281 times higher than those in Maluku Province to achieve institutional delivery (AOR 2.281; 95% CI 2.808-2.976). The odds of a Moluccan woman giving birth in an institution are 2.274 times greater in urban regions than in rural ones (AOR 2.274; 95% CI 2.227-2.321). Across age groups, all categories showed greater odds of institutional delivery compared to women aged ≥45, except for the 20-24 age group, who were less likely than the ≥45 group.

Married women have a 1.600-fold higher chance of giving birth in an institution than divorced/widowed women (AOR 1.600; 95% CI 1.512-1.693). Women employed have a 1.082 times greater probability of performing institutional delivery than women without jobs (AOR 1.082; 95% CI 1.062-1.103). According to wealth level, the wealthier, the greater the possibility for Moluccan women to perform institutional birth in the Maluku Region. All parity categories are more probably than primiparous to achieve institutional birth in the Maluku Region. Moluccan women with complete ANC are 2.311 times higher than those with incomplete ANC to perform institutional birth (AOR 2.311; 95% CI 2.268-2.354).

3.2 Discussion

The Indonesian government has implemented several policies to encourage institutional delivery. Since 2011, the government has launched the Jampersal (Delivery Guarantee) program, which provides free maternal and newborn health services to mothers giving birth at health facilities. The program includes antenatal care, delivery, postpartum care, and family planning. The government has also implemented a policy mandating midwives to manage the availability of health services for mothers and newborns in their areas. This policy aims to increase the condition of maternal and newborn health facilities by ensuring that midwives are responsible for the health outcomes of their clients (The Republic of Indonesia Law, number 4 of 2019 regarding Midwifery). The government has also set up maternity waiting homes near medical facilities to accommodate older pregnant women who live far from health facilities. This policy aims to minimize delays in obtaining maternal health care and improve the health of mothers and babies. Although there are still challenges in ensuring universal access to quality maternal and newborn health services in Indonesia, particularly in remote and under-resourced areas.

The result displays that the better the education, the greater the possibility of Moluccan women performing institutional birth. More educated women tend to have better knowledge about maternal and child health and have access to knowledge and sources that can help them make decisions about their birth choices. This finding supports the broader evidence reported by Idris et al., who, through a systematic review, demonstrated that women's autonomy in healthcare decision-making significantly enhances the use of maternal health services. The review emphasized that education plays a pivotal role in empowering women to make informed choices regarding their reproductive health, thereby improving their access to and utilization of skilled maternal care. Education was particularly identified as a key determinant of autonomy, as it enhances women's awareness, confidence, and negotiation power within the household, enabling them to make informed decisions about maternal healthcare, including facility-based delivery. Educated women are also more likely to recognize the importance of professional care during childbirth and possess the resources and self-efficacy needed to access institutional delivery services [12].

The study showed that Moluccan women in North Maluku Province had higher odds of institutional delivery compared than Maluku Province. Moluccan women in urban settings were more likely than those in rural regions to perform institutional birth. Consistent with previous research findings, a review conducted by Shiferaw et al. showed that women living in urban areas are much more likely to give birth in health facilities than those living in rural areas. This difference is mainly due to better access to transportation, shorter distances to health care facilities, and the availability of health workers who cover urban areas. In addition, women in urban areas generally have higher levels of education and socioeconomic status, and are more exposed to health information, which increases their awareness of the benefits of giving birth in health facilities. Conversely, women in rural areas still encounter various obstacles, including the longer distances, limited infrastructure, and cultural norms that support home births [5].

The results found that age groups were related to institutional delivery in the Maluku Region in Indonesia. This result was ascribed to the fact that the younger mothers have greater odds of being educated than their older counterparts. This finding may be explained by the higher educational attainment observed among younger women compared to their older counterparts, which contributes to greater awareness and acceptance of facility-based delivery. Similar patterns were observed in Nepal, younger women were more likely to give birth at home, particularly among marginalized groups, largely due to limited education, poor access to healthcare, and lower decision-making autonomy. In contrast, when younger women possess higher levels of education, as seen in the Maluku context, the relationship is reversed, leading to increased utilization of institutional delivery services. These contrasting

findings highlight that the influence of age on delivery practices is context-dependent and strongly mediated by education and socioeconomic conditions [13].

The research indicates that married women have a higher likelihood of delivering in health facilities compared to their divorced/widowed counterparts in the Maluku Region. Married women can have rights in society, but they may face problems if they try to exercise their legal rights to inherit or share their husbands' wealth and other property. Social factors, including family support, influence where to give birth. The better support from the family, the better the mother's health awareness will be [14].

Employed women are more prone to perform institutional delivery than unemployed women in the Maluku Region in Indonesia. This finding is consistent with research stating that employment increases women's autonomy and financial ability to access childbirth services [5], as well as with systematic insights showing that working women have higher levels of independence and reproductive health awareness [12]. Conversely, other studies report that unemployed women, especially those from marginalized groups, are at greater risk of giving birth at home due to economic constraints and dependence on family [13].

Meanwhile, based on wealth level, the richer, the greater the possibility for Mollucan women to perform institutional birth in the Maluku Region in Indonesia. It means that people with a higher socioeconomic status are more likely to be born in a health facility. This condition is possible due to the ease of access, such as transportation and cost, in communities with high socioeconomic levels. Previous research has shown that socioeconomic status is a significant factor in the use of health facilities for childbirth [13,15]. These findings highlight the disparity in access to facility-based delivery services between women of different socioeconomic statuses. Therefore, policies aimed at improving access for poorer women need to be strengthened to ensure safe and equitable delivery across Maluku.

The finding shows that all categories of parity have higher odds than primiparous women to achieve institutional delivery in the Maluku Region. It means that in Maluku communities, all types of parity tend to choose a healthcare facility as a place of delivery compared to a first-time birth. These findings are consistent with studies showing that prior birth experience increases a woman's likelihood of choosing a health facility for subsequent deliveries [13,15]. Furthermore, literature from Ethiopia also emphasizes that multiparous women are more aware of the risks of childbirth and the benefits of health facilities, and therefore are more likely to use institutional services [5]. These findings highlight the importance of considering prior birth experiences when designing interventions to improve access to and utilization of health facilities, particularly for primiparous mothers.

Finally, regarding the completion of ANC visits, Mollucan mothers who have completed ANC are at a greater likelihood than those with incomplete ANC to perform an institutional birth. It means that pregnant women with a complete ANC examination were more likely to use a health facility for delivery. It is possible due to the mothers' good knowledge and awareness during pregnancy. The ANC visit enables health workers to conduct routine assessments, identify risks of complications during childbirth, provide education on danger signs of pregnancy, and plan for safe delivery at health facilities [4,6]. In addition, women's autonomy in health decision-making also plays a role in ensuring compliance with ANC and the choice of delivery at health facilities [12]. Thus, comprehensive ANC not only serves as a routine check-up, but also as a means of education, early detection of risks, and preparation for delivery, which directly increases the probability of women choosing institutional birth.

The study's strength is that we used big data to represent facts about Indonesia's Maluku Region. However, because the survey analyzes secondary data, the variables examined are limited to relevant ones. This study does not address other factors, such as household decision-making, the value of child and family, or opinions that influence institutional delivery. The implication is that increasing community knowledge is essential for increasing access to delivery services at health facilities. In addition, it improves the community's socio-

economy and the infrastructure of health service facilities in areas far from the city (rural areas/remote areas), considering that the Maluku region has a geographical area as an archipelago.

4 Conclusion

Based on the findings, this study concluded that education level is associated with institutional birth in the Maluku Region in Indonesia. Higher levels of education were linked to an increased likelihood of giving birth in health facilities.

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