

Artikel Penelitian

**ANTENATAL CARE ATTENDANCE AND PARENTAL EDUCATION ARE ASSOCIATED WITH UTILIZATION OF NON-TRAINED DELIVERY ATTENDANTS IN NEGERI LIMA HEALTH CENTER CATCHMENT AREAS, MALUKU PROVINCE**

Christiana Rialine Titaley<sup>1</sup>, Shafira Chaerani<sup>2</sup>, Merlin Maelissa<sup>3</sup>, Filda de Lima<sup>3</sup>, Alessandra Saija<sup>3</sup>, Yosefina Mainase<sup>3</sup>, Nathalie Kailola<sup>3</sup>, Bertha J Que<sup>3</sup>

<sup>1</sup> Faculty of Medicine, Pattimura University

Corresponding author e-mail : [christiana\\_rialine@yahoo.com](mailto:christiana_rialine@yahoo.com)

**Abstract**

**Introduction.** Maluku Province was one of the provinces in Indonesia with a high utilization of non-trained delivery attendants during childbirth. **Objective.** The study aims to examine factors associated with utilization of non-trained delivery attendants in the catchment area of Negeri Lima Puskesmas of Leihitu Peninsula in Maluku Province. **Methods.** Data were derived from a household survey conducted in November 2018, in five villages as the catchment areas of Negeri Lima Health Center. Information was collected from 99 mothers who recently delivered in the last six months. Multivariate logistic regression analyses were employed to analyze factors associated with use of non-trained delivery attendants. **Result.** More than 45% of mothers who delivered in the last six months used non-trained delivery attendants at childbirth. A significantly lower odds for using non-trained attendants was found in mothers who graduated from senior high school (aOR=0.23, 95% CI: 0.06-0.83) or academy/university (aOR=0.06, 95% CI: 0.01-0.34) than those graduated from primary school or lower. A similar pattern was found with father's education. Additionally, the odds of using non-trained attendants reduced significantly amongst mothers attending four or more antenatal care services (aOR=0.34, 95% CI: 0.12-0.96). **Conclusion.** Interventions to promote optimum use of antenatal care and improve community awareness and knowledge about mother and child health care are still essential. Involvement of different types of community members in health promotion activities, in addition to efforts to assign new roles to traditional birth attendants will help to increase the uptake of trained delivery attendants at childbirth amongst mothers in this area.

**Keywords:** antenatal care, parental education, delivery attendants, Negeri Lima Health Center, Maluku Provinces

**Abstrak**

**Pendahuluan.** Provinsi Maluku merupakan salah satu provinsi di Indonesia dengan persentase penggunaan tenaga penolong persalinan non-terlatih yang masih tinggi. **Tujuan.** Penelitian ini bertujuan untuk mengetahui faktor-faktor yang berhubungan dengan penggunaan tenaga penolong persalinan non-terlatih di wilayah kerja Puskesmas Negeri Lima, Leihitu, Provinsi Maluku. **Metode.** Data berasal dari survei rumah tangga yang dilakukan pada bulan November 2018, di lima desa wilayah kerja Puskesmas Negeri Lima. Wawancara dilakukan dengan 99 ibu yang baru melahirkan dalam enam bulan terakhir. Analisis regresi logistik multivariat digunakan untuk mengidentifikasi faktor-faktor yang berhubungan dengan penggunaan tenaga penolong persalinan non-terlatih. **Hasil.** Lebih dari 45% ibu melahirkan dengan didampingi hanya oleh tenaga penolong persalinan non-terlatih. Rasio odds penggunaan tenaga penolong persalinan non-terlatih secara signifikan lebih rendah pada ibu yang dengan pendidikan sekolah menengah atas (aOR = 0,23, 95% CI: 0,06-0,83) atau akademi/universitas (aOR = 0,06, 95% CI: 0,01-0,34) dibandingkan ibu dengan pendidikan setingkat sekolah dasar atau lebih rendah. Pola serupa dijumpai pada variabel pendidikan suami. Selain itu, rasio odds penggunaan tenaga penolong persalinan non-terlatih secara signifikan lebih rendah pada ibu yang melakukan pemeriksaan kehamilan empat kali atau lebih (aOR = 0,34, 95% CI: 0,12-0,96), dibandingkan ibu yang melakukan pemeriksaan kehamilan kurang dari empat kali. **Kesimpulan.** Intervensi untuk mempromosikan pentingnya pemeriksaan kehamilan serta upaya meningkatkan kesadaran dan pengetahuan masyarakat tentang perawatan kesehatan ibu dan anak sangat penting untuk dilakukan. Keterlibatan berbagai anggota masyarakat dalam kegiatan promosi kesehatan ibu dan anak juga sangat penting. Pemberian peran baru bagi para dukun beranak perlu diperhatikan untuk meningkatkan penggunaan tenaga persalinan terlatih.

Kata kunci: pemeriksaan kehamilan, pendidikan orang tua, penolong persalinan, Puskesmas Negeri Lima, Provinsi Maluku

## Introduction

Maternal mortality remained one of the main health issues globally that requires urgent attention. In 2015, there were 303,000 women died from pregnancy or childbirth-related complications and most of them occurred in low-resource settings.<sup>1,2</sup> Indonesia is one of the countries with a consistent high maternal mortality ratio (MMR) in the last decade.<sup>3-5</sup> According to the 2007 Indonesia Demography and Health Survey (IDHS), the national MMR was 228 and then increased to 359 per 100,000 live births, five years later in the 2012 IDHS.<sup>3,5</sup>

The importance of reducing maternal mortality ratio globally is reflected in one of Sustainable Development Goals (SDGs) target, i.e. to reduce the global mortality ratio to less than 70 per 100,000 live births by 2030.<sup>6</sup> Previous literature showed that most of the causes of maternal death are preventable, such as hemorrhage, hypertensive disorders and sepsis.<sup>2</sup> Various strategies have been proposed and implemented to reduce maternal deaths, worldwide. Pregnant women's attendance at antenatal care service has been recommended to prevent not only maternal but also newborn deaths. Health education as well as regular screening to detect and prevent early complications provided through antenatal care visit are vital for mothers and their unborn babies.<sup>7</sup> Appropriate antenatal care also was also reported to increase the chance of using trained delivery attendants at childbirth,<sup>7</sup>

another of the intervention aimed at preventing maternal and newborn deaths. Skilled or trained delivery attendants at childbirth is vital to ensure a prompt management and treatment for women who require urgent attention and treatment.<sup>8</sup>

The Ministry of Health Republic of Indonesia has setup a target of having 90% of deliveries assisted by trained delivery by 2012.<sup>9</sup> However, in 2012 the percentage was still below the target (83.1%).<sup>3</sup> Although the coverage increased based on the report from the 2013 Indonesia Basic Health Survey to 87%,<sup>9</sup> it was still lower than the national target. The percentages also varied widely between provinces in Indonesia. According to the data from the 2012 IDHS, the highest rate of skilled birth attendance at delivery was found in DKI Jakarta and Bali (99%); while the lowest was reported in West Sulawesi Province (43%).<sup>3</sup>

Maluku Province, one of the archipelago provinces consisting of more than 1000 islands, was amongst the provinces of Indonesia with a low percentage of trained delivery attendance during childbirth.<sup>3</sup> According to the Data from the Provincial Health Office of Maluku (2015),<sup>10</sup> the maternal mortality rate in the province was 260 per 100,000 live births, which was higher than the national target of 102 per 100,000 live births in 2015. One of the reasons mentioned for this condition included the limited facilities and infrastructures available. Furthermore, the 213 Basic Health Research

reported that 40% of deliveries in Maluku assisted by non-trained delivery attendants, mostly traditional birth attendants.<sup>9</sup> Therefore, this study aims to examine factors associated with utilization of non-trained delivery attendants in the catchment areas of Negeri Lima Puskesmas, Leihitu Peninsula, Maluku Province in 2018. The results of this study could be used to assist policy makers in developing evidence-based interventions to increase the use of trained delivery attendants during childbirth in this area.

## Method

### Data source

Data used in this study were derived from a household survey conducted in November 2018 by researchers from Faculty of Medicine Pattimura University. The survey was carried out in the five villages of the catchment area of Negeri Lima Health Center, namely Negeri Lima, Ureng, Asilulu, Larike and Wakasih Village. The catchment areas of this health centers included some hamlets located Seram Island. However, this study only collected information from respondents who lives on Ambon Island.

### Study sites

Negeri Lima Health Center was located in Central Maluku District that covers more than 22,000 people (Figure 1). The catchment areas consist of five villages with some sub-hamlets located outside Ambon Island. In total, there were 46 health workers working,

including 13 midwives.<sup>11</sup> No medical doctor was available in Negeri Lima Health Center areas. However, in each village, there were village midwives responsible for conducting maternal and child health services.

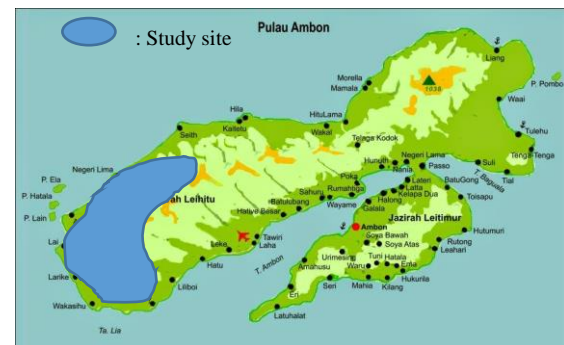


Figure 1. Map of study sites (Negeri Lima Health Center)

### Population and sampling method

The study population in this study was mothers with children aged 0-6 months at the time of interview. Using a total sampling method, all respondents who met the inclusion criteria (i.e. mother of children aged 0-6 months at the time of the interview living in the catchment area of Negeri Lima Health Center on Ambon Island) and did not meet the exclusion criteria (i.e. refused to participate in the study) were invited to participate in the study. In total, there were 99 respondents interviewed from all five villages visited. Information from all potential respondents were retrieved from coordinator of midwives at the Negeri Lima Health Center. The information was verified later at the village level, with village midwife who lived in the village.

### **Fieldwork team and data collection process**

Data were collected by students from Faculty of Medicine, Pattimura University. Prior to data collection, a two-day training program was held with all field workers. The training covered different aspects of the survey, including detailed explanation about the questionnaire, survey methodology, as well as a try-out session with the local community in Ambon area. Try-out was conducted to ensure interviewers had considerable comprehension about the questionnaire and survey methods. In total, six enumerators conducted household interviews, led by one field coordinator. Regular supervision was also conducted by researchers from Faculty of Medicine, Pattimura University.

Prior to the interviews, enumerator<sup>12</sup>s contacted coordinator of midwives at Negeri Lima Health Center to gather information about potential respondents who met the inclusion criteria. List of women delivered in the last six months in the five villages was obtained and further verified by the village midwife. This was followed by house visit to conduct interviews. Informed consent was obtained from each respondents before each interview. Permission to conduct interviews was also obtained from each local village administrators.

### **Questionnaire**

A pre-tested structured questionnaire was used during interviews. The questionnaire used in this study was adopted from 2012 Indonesia Demographic and Health Survey questionnaire.<sup>3</sup> Demographic and Health

Survey (DHS) is a standardized questionnaire widely used in more than 90 countries.<sup>12</sup> The questionnaire covered different aspects of socio-demography as well as maternal and child health-related characteristics. The questions were grouped into six parts: (1) Part 1: Identity; (2) Part 2: education and income; (3) Part 3: Socio-economic background; (4) Part 4: Knowledge and practice of antenatal, delivery, and early initiation of breastfeeding; (5) Part 5: Autonomy and justification towards beating; and (6) Part 6: Family planning. Data used in this analysis were mainly derived from Part 1 to 5 of the questionnaire.

### **Outcome variable and potential predictors**

The outcome variable of this analysis was utilization of non-trained delivery attendants. Mothers were considered as having a non-trained delivery attendant at delivery when she answered traditional birth attendants, friends/ family or other type of non trained personal to assist her delivery with her last child.

The potential predictors of utilization of non-trained delivery attendants analyzed in this study were: mother's age; village where mother lived; mother's education, father's education; mother's occupation; number of children in the household; status of national health insurance; knowledge of antenatal care, number of antenatal care visit and maternal autonomy.

An index of maternal autonomy was constructed to reflect the extent to which mother was involved in the decision making <http://ojs3.unpatti.ac.id/index.php/moluccamed>

process in the household. Four questions were used in the index which were: decision making process of respondent health care, purchase of durable good of the households, visit to family or friends and use of household income. Score "0" was assigned to respondent who was not involved in the decision-making process, and score "1" if respondent was involved; whether as a single decision maker or jointly with other family members (husband, family members and other). The total scores ("0" to "4") were then categorized into two groups using median score of the total score distribution as the cut-off point. Low autonomy indicated those with total score lower than the median distribution and high autonomy for those with total score was equal to median or above median distribution.

### Data analysis

At the initial stage, the distribution of all variables was examined using frequency distribution tables. Contingency tables were then used to examine the distribution of all potential predictors against the study outcome (use of non-trained attendants). At the next stage, bivariate logistic regression was performed to calculate the unadjusted odds ratio of all potential predictors for utilization of non-trained delivery attendance, without controlling for other covariates. Finally, multivariate logistic regression was performed to examine the association between all potential predictors and utilization of non-trained delivery attendance after adjusting for other covariates. The association between variables was reflected by the adjusted OR (aOR).

Backward elimination was employed in the multivariate analyses to eliminate factors not significantly related to utilization of non-trained delivery attendants at childbirth using the significance level of 0.05. All analyses were performed using STATA/MP 15.1 (serial number: 501506348062).

The ethics approval of the survey was issued by the Ethics Committee of the Faculty of Medicine, Pattimura University, Ambon. Research permit was obtained from the Provincial Government (*Kesbangpol*) of Maluku Province, as well as administrative leaders from each village where the study was conducted. Potential respondents were requested to sign an informed consent sheet prior to interviews for their willingness to participate in the study.

### Results

This analysis was based on information collected from 99 respondents who recently delivered in the last six months in the catchment area of Negeri Lima Puskesmas. We found that more than 45% of respondents in our study sites used non-trained attendants at childbirth (Figure 2). Most of the mothers who used non-trained attendants, used the service of traditional birth attendants or commonly called as "*mama biang*" in the local language.

Table 1 shows the distribution of all respondents based of different variables analyzed. Approximately 70% of mothers and their husband of graduated from senior high school or above. It was found that as either

mother' or father's level of education increased, the percentage of reducing non-trained delivery attendants at delivery reduced. Majority of mothers were housewives.

Based on attendance of antenatal care services, less than 80% had four or more

attendances. The percentage of mothers using non-trained delivery attendance was higher in those attending less than four antenatal care services (65.2%) compared to those attending for our ore antenatal care services (39.5%).

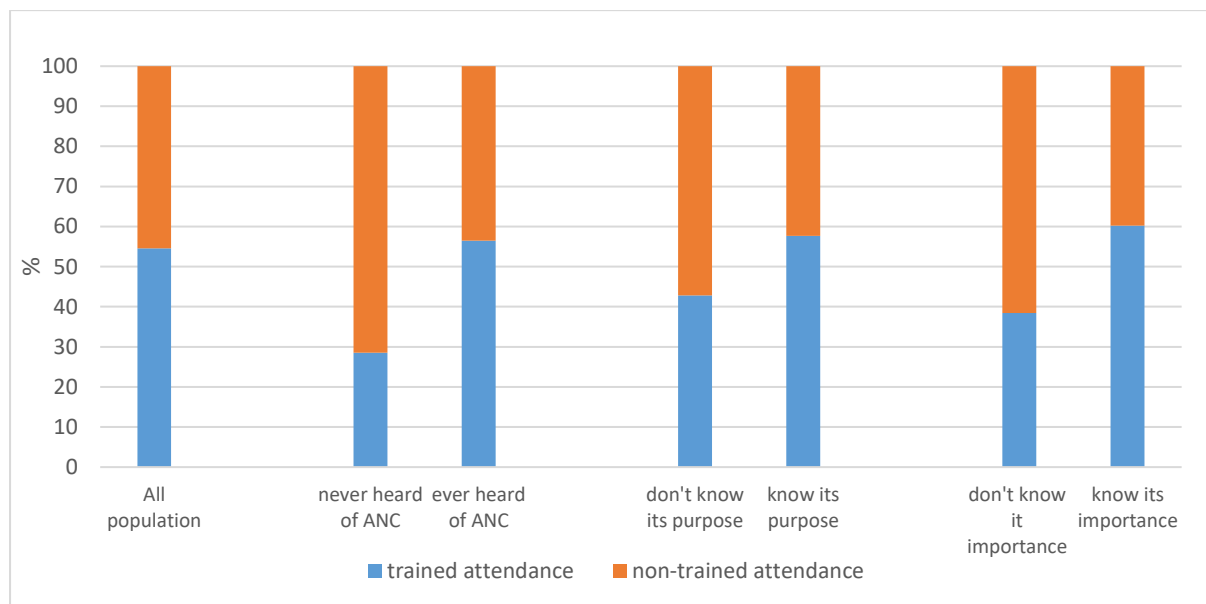


Figure 2. Use of delivery attendants in Negeri Lima Health Center, Maluku Province

during pregnancy. Around 33% respondents had lower than median distribution of mother's score of knowledge for antenatal care services. The use of non-trained attendance was also higher amongst mothers with lower level of knowledge. Figure 2 shows that in general, use of non-trained attendants was higher in mothers with lack of knowledge in each component of knowledge of ANC.

Table 2 shows factors associated with the use of non-trained attendants amongst respondents using logistic regression analysis. We found a significantly lower odds for using non-trained attendants amongst mothers

graduated from senior high school (aOR=0.23, 95% CI: 0.06-0.83;  $p=0.025$ ) and academy/university (aOR=0.06, 95% CI: 0.01-0.34;  $p=0.001$ ) than mothers graduated from primary school or lower. Furthermore, the odds of using non-trained attendants reduced significantly amongst mothers who attended four or more antenatal care services from mothers attending less than four antenatal care services (aOR=0.34, 95% CI: 0.12-0.96;  $p=0.042$ ).

It is interesting to see that when mother's education was replaced by father's education, there was a significantly lower odds of using

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non-trained attendants amongst women whose husband graduated from senior high school (aOR=0.29, 95% CI: 0.09-0.97;  $p=0.044$ ) and

academy/university (aOR=0.09, 95% CI: 0.01-0.59;  $p=0.012$ ) than the odds of children whose father graduated from primary school or lower.

Table 1. Frequency distribution of respondents included in the analyses

Variable	n	%	No skilled attendance	
			n	%
<b>Age of mother</b>				
>=30	42	42.4	21	50.0
<30	57	57.6	24	42.1
<b>Village</b>				
Asilulu	25	25.3	17	68.0
Larike	24	24.2	10	41.7
Negeri Lima	13	13.1	2	15.4
Ureng	26	26.3	11	42.3
Wakasihu	11	11.1	5	45.5
<b>Mother's education</b>				
Primary school or lower	16	16.2	12	75.0
Junior high school	12	12.1	8	66.7
Senior high school	52	52.5	22	42.3
Academy/university	19	19.2	3	15.8
<b>Father's education</b>				
Primary school or lower	16	16.2	11	68.8
Junior high school	15	15.2	10	66.7
Senior high school	56	56.6	22	39.3
Academy/university	12	12.1	2	16.7
<b>Mother's occupation</b>				
Housewife/not working outside the house	81	81.8	40	49.4
Working outside the house	18	18.2	5	27.8
<b>Number of children in the household</b>				
4+ children	17	17.2	9	52.9
3 children	23	23.2	10	43.9
2 children	25	25.3	12	48.0
1 child	34	34.3	14	41.2
<b>Status of national health insurance</b>				
Non-subsidized premium	82	82.8	38	46.3
Subsidized premium	17	17.2	7	41.2
<b>Knowledge of antenatal care (ANC)</b>				
Less than median	33	33.3	20	60.6
Median or above	66	66.7	25	37.9

Number of ANC visit

Variable	n	%	No skilled attendance	
			n	%
<4 times	23	23.2	15	65.2
>= 4 times	76	76.8	30	39.5
<b>Maternal autonomy</b>				
High autonomy	25	25.3	35	47.3
Low autonomy	74	74.8	10	40.0

Table 2. Factors associated utilization of non-trained birth attendance in community living in the coastal area of Ambon, 2018

Variable	Bivariate			Multivariate		
	OR	95%CI	p-value	OR	95%CI	p-value
<b>Age of mother</b>						
>=30	1.00					
<30	0.73	0.33	1.62	0.436		
<b>Village</b>						
Asilulu	1.00					
Larika	0.34	0.10	1.08	0.067		
Negeri Lima	0.09	0.02	0.48	0.005		
Ureng	0.35	0.11	1.08	0.069		
Wakasihu	0.39	0.09	1.68	0.207		
<b>Mother's education</b>						
Primary school or lower	1.00			1.00		
Junior high school	0.67	0.13	3.47	0.630	0.12	3.52
Senior high school	0.24	0.07	0.86	0.028	0.06	0.83
Academy/university	0.06	0.01	0.33	0.001	0.06	0.34
<b>Father's education</b>						
Primary school or lower	1.00					
Junior high school	0.91	0.20	4.10	0.901		
Senior high school	0.29	0.09	0.96	0.043		
Academy/university	0.09	0.01	0.58	0.011		
<b>Mother occupation</b>						
Housewife/not working outside the house	1.00					
working outside the house	0.39	0.13	1.21	0.103		
<b>Father occupation</b>						
Not working outside the house	1.00					
Working outside the house	0.66	0.19	2.34	0.523		
<b>Number of children in the household</b>						
4+ children	1.00					
3 children	0.68	0.19	2.41	0.554		
2 children	0.82	0.24	2.82	0.753		



Variable	Bivariate			Multivariate		
	OR	95%CI	p-value	OR	95%CI	p-value
1 child	0.62	0.19	2.01	0.427		
<b>Household income</b>						
Lower than minimum wages	1.00					
Equal or more than	0.25	0.05	1.25	0.092		
Don't want to answer	1.99	0.54	7.37	0.301		
<b>Status of national health insurance</b>						
Non-subsidized	1.00					
Subsidized premium	0.81	0.28	2.34	0.697		
<b>Knowledge of antenatal care (ANC)</b>						
Less than median	1.00					
Median or above	0.40	0.17	0.93	0.034		
<b>Number of ANC visit</b>						
<4 times	1.00				1.00	
>= 4 times	0.35	0.13	0.92	0.034	0.34	0.12 0.96 0.042
<b>Maternal autonomy</b>						
High autonomy	1.00					
Low autonomy	0.74	0.30	1.87	0.527		

## Discussion

### Main findings

Our study found a high percentage of non-trained delivery attendants use in the catchment areas of Negeri Lima Health Centers of Leihitu Peninsula, Maluku Province (45%). The important role of parents' education and mothers' attendance of antenatal care during pregnancy was confirmed in our study. A significantly lower odds for using non-trained attendants was found amongst mothers who graduated from senior high school or from academy/university than those graduated from primary school or lower. When mother education was replaced by father's education, a similar pattern was observed. Mothers whose husband graduated from senior high school and

academy/university had a lower odds of using non-trained attendants than mothers whose husband graduated from primary school or lower. Moreover, the odds of using non-trained attendants reduced significantly amongst mothers attending four or more antenatal care services.

Efforts to reduce the use of non-trained delivery attendants is important to improve maternal and child health status. The findings of our study could provide additional insight to program managers and policy makers to plan and develop supportive intervention programs to increase utilization of trained delivery attendants at childbirth in Maluku, and Indonesia, in general.

### **The role of education and antenatal care services on utilization of trained delivery attendants**

The importance of antenatal care is clearly shown in our study. According to the WHO, antenatal care is *“the care provided by skilled health-care professionals to pregnant women and adolescent girls in order to ensure the best health conditions for both mother and baby during pregnancy”*.<sup>7</sup> Antenatal care includes identification of risk factors as well as prevention and management of pregnancy-related or concurrent diseases. Health promotion activities including health education are some of the essential parts of antenatal care. Pregnant women are recommended to attend at least four antenatal visit during pregnancy; at least one visit in the first and second trimester and two visits in the last trimester.<sup>7</sup>

This analysis found that women who had at least four antenatal care visits were more likely to use trained delivery attendants at childbirth than those who did not have an optimum antenatal visit. This was consistent with findings from other studies.<sup>13-16</sup> Constant health education messages and women routine encounter with health care workers during antenatal visit could potentially increase women’s awareness about mother and child health care. Routine antenatal care also encourages women and their family to have a birth complication readiness plan in case of emergency.<sup>17,18</sup> This becomes motivation to mothers and other family members to have trained-delivery attendants at childbirth.

Regular contacts with health care workers including through antenatal care, could provide positive impact to develop mothers’ habit to use professional help at childbirth. Studies showed that regular contacts increased women likelihood to deliver at health care facilities.<sup>18,19</sup>

In our study, 20% women did not attend at least four antenatal care services during pregnancy. This indicates that interventions to improve antenatal care uptake are still required. Health promotion activities could be delivered using various channels and personnel. Health care workers should use every contact opportunity to remind women and other family members to have their pregnancy checked on a regular basis. Studies also showed that husband involvement had significant association with increased use of trained delivery attendants.<sup>20,21</sup> This indicated efforts to engage husband will be beneficial to support women’s decision for maternal and child health. Community health workers (cadres) should be empowered and encouraged to motivate pregnant women living in their surroundings to use antenatal care services.

Another channel for improving antenatal care attendance is by involving traditional birth attendants in maternal health interventions, particularly if their services are still widely used. Linking traditional birth attendants into the formal health system should be taken into account, for example by developing partnership between midwives and traditional birth attendants. New roles could be assigned to traditional birth attendants from

being the only birth attendants at childbirth to providing companionship to pregnant women, for example to accompany women to attend antenatal care or during and after childbirth.<sup>22,23</sup>

Previous literature reported that in addition to individual antenatal care, group antenatal care might be considered, as it was shown effective in improving health behavior and better maternal care.<sup>24</sup> Another study from Indonesia found that antenatal care that entails group counselling between pregnant women and health providers showed better improvement in women's knowledge than those receiving routine antenatal care without group counselling.<sup>25</sup> Similar results was reported in a study from Nepal showing the benefits of women's group discussion led by community-based facilitators to discuss childbirth and newborn care.<sup>26</sup> This was reported could improve maternal and child health, including use of trained delivery attendants.

The importance of increasing knowledge and awareness on selection of delivery attendants is clearly reflected in our study. Significant association was observed between both mother and father education and utilization of of trained delivery attendants at childbirth. The relationship between maternal education and use of trained delivery attendants were repeatedly reported in different studies.<sup>13,14</sup> The benefits mother's education on maternal and child health might be due to several reasons, such as mother's better knowledge about health care, wider range of

contacts as well as higher access to modern health care services amongst high than low educated mothers.<sup>27</sup> In addition to personal education strategies, a study from Tanzania found that community-based interventions that included home visits to educate women and family members, awareness raising strategies through community meetings and video were found to be associated with an increased use of trained delivery attendants at delivery.<sup>28</sup>

When mother's education was replaced by father's education in our analysis, a similar result was identified. Mothers' whose husband was highly educated, were less likely to use the services of non-trained delivery attendants. An analysis using the pooled data of Demographic and Health Surveys found that partner's education influenced women's health care seeking behavior.<sup>29</sup> The likelihood of using trained attendants significantly increased amongst mothers whose husband had high education level. Highly educated husbands will be able to motivate their wife to involve in his social networks and supporting systems that benefit women's health care and status. Highly educated partners could provide valuable information health care that positively affect women's health.

The necessity to involve husbands was also highlighted in other study. Male involvement for example to accompany their wife during antenatal visit is important to jointly develop a birth plan and the most appropriate care for both mother and children.<sup>17</sup> Engaging husbands to raise their awareness and

knowledge about mother and child care during any health visit, community gatherings, workplaces, religious meeting should be part of the interventions to improve maternal and child health.

Previous studies including from Indonesia reported the role of different factors that influence women's decision to use trained delivery attendants at childbirth.<sup>23,30</sup> Socio-cultural tradition and trust in the community was found to motivate women to prefer using the services of traditional birth attendants at delivery.<sup>23,30</sup> Additionally, the perceived need was also reported to be an important factor. The service of trained delivery attendants is used only when women experienced any obstetric complication during pregnancy and childbirth.<sup>23,30</sup>

### **Strengths and limitations**

Using total population sampling method, the study provided considerable estimation of condition in the catchment area of Negeri Lima Health Center. The samples were restricted to women who recently delivered in the last six months, which could help to minimize recall bias of mothers. Several limitations should be noted. The selection of variables in the analyses were guided by their availability in the dataset. As in other cross-sectional studies, our results could not show any cause-and-effect relationships. Nonetheless, these limitations are unlikely will reduce the validity of analyses conducted.

### **Conclusion**

Our study shows the important role of optimum attendance of antenatal care and parental education on use of delivery attendance for mothers who recently delivered in the last six months in the catchment areas of Negeri Lima Health Center, Maluku Province. Supportive interventions to improve antenatal care attendance, and awareness raising programs not only in mothers but also fathers will be beneficial. Efforts to encourage health workers to use every contact opportunity, empower cadres and traditional birth attendants to promote utilization of antenatal care services, involving men child health care services should be taken into account. Furthermore, assigning new roles to traditional birth attendants, for example to promote antenatal care or accompanying women during and after childbirth, could provide better outcomes in maternal and child health care in this area.

### **Acknowledgement**

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