

# Factors affecting optimal antenatal care utilization in Indonesia: implications for policies and practices

*by* Ridhwan Fauzi

---

**Submission date:** 28-Mar-2023 05:27AM (UTC-0400)

**Submission ID:** 2048917507

**File name:** Fauzi\_et\_al-2021-Journal\_of\_Public\_Health\_Policy\_1.pdf (588.69K)

**Word count:** 6299

**Character count:** 32849



## Factors affecting optimal antenatal care utilization in Indonesia: implications for policies and practices

Ridhwan Fauzi<sup>1</sup> · Ye Paing Kyi<sup>2</sup> · Myo Mom Mon<sup>3</sup> · Lafi Munira<sup>4</sup> · Bumi Herman<sup>5</sup> · Nuchanard Hounnaklang<sup>4</sup> · Pramon Viwattanakulvanid<sup>4</sup>

Accepted: 19 October 2021

© The Author(s), under exclusive licence to Springer Nature Limited 2021

### Abstract

Most maternal deaths are preventable with good antenatal care. The study aimed to examine factors relevant to optimal frequency of Antenatal Care (ANC) visits in Indonesia using the Indonesian Demographic and Health Survey 2017 data. Our study outcome was optimal numbers of ANC visits ( $\geq 8$  visits). Predictors include age, had pregnancy termination, number of children, education level, employment status, awareness of pregnancy problems, wealth index, residence, region, health insurance coverage, and barriers to reach healthcare facilities. Of 3738 participants, about 60.2% had optimal number of ANC visits. There was an association between optimal ANC utilization and: experiencing pregnancy complications, distance to the healthcare facility, health insurance coverage, residence, region, awareness of pregnancy problems, and the number of children. Policymakers should improve healthcare facilities' availability, expand health insurance coverage, and educate women about the importance of ANC. This finding might be relevant in developing countries with similar health infrastructure situation.

**Keywords** Optimal antenatal care · Antenatal care utilization · Antenatal care services · Maternal health · Pregnant women · Pregnancy problems awareness

### Introduction

Maternal mortality, particularly in low-resource settings, is an important public health issue in many parts of the world [1]. In Indonesia, the maternal mortality ratio, approximately 177 deaths per 100,000 live births in 2017, remained remarkably higher than in neighboring South-East Asian countries [1]. One of the most crucial efforts to reduce maternal mortality is antenatal care (ANC), which comprises risk identification, prevention, and management of pregnancy-related or concurrent

✉ Pramon Viwattanakulvanid  
pramon.v@chula.ac.th

Extended author information available on the last page of the article



diseases, and health education and health promotion [2]. A mother with frequent ANC visits will likely have a safer pregnancy due to close monitoring of the condition of mother and child, and a greater likelihood of early recognition of alarming symptoms.

A question remains as to the optimum number of ANC visits [2]. In 2002, the World Health Organization (WHO) Antenatal Care Trial Research Group proposed four antenatal visits with restricted tests, clinical procedures, and follow-up actions as the new model of ANC [3]. Several studies show that the more limited four-ANC-visits model compared well to the earlier model of more frequent ANC in terms of the rate of pre-eclampsia, urinary tract infection, postpartum anemia, maternal mortality, low birth weight, and perinatal mortality [4, 5]. However, an updated review in 2010 reported an increased risk of perinatal mortality in women who attended reduced numbers (<5) of antenatal visits [6]. Subsequently, in 2016, the WHO released a new comprehensive guideline with 49 recommendations, including antenatal care models with a minimum of eight contacts, five appointments in the third trimester, one contact in the first trimester, and two contacts in the second trimester [2].

Compliance with the newer ANC model varies across countries worldwide [7]. Findings based on the Demographic Health Survey (DHS) data from 10 countries indicated that the compliance rates varied across Low- and Middle-Income Countries (LMIC), ranging from 14.9% in the Democratic Republic of Congo to 89.1% in Jordan [7]. In Indonesia, almost 60% of women in need of ANC benefit from an optimal number of ANC visits [7]. Even so, the visits included blood and urine examination and measurement of height for fewer than half of them [8]. Substantial regional disparities in ANC utilization persist between Java-Bali and other regions [9].

A theoretical framework based on Andersen and Newman's Model [10] of 'Healthcare Utilization' suggests that utilization depends on individual factors combined with enabling factors [10, 11]. Previous observational studies from Indonesia based on this theory found that the wealth index, maternal and spouse's education, working status, type of residence, and region were significantly associated with ANC service utilization [12–16]. Another study showed possession of health insurance was associated with a higher probability of having at least four ANC visits [17].

Health centers should provide ANC interventions through an integrated service delivery to strengthen health systems [18]. Despite the introduction by the WHO of a new minimum standard of person-centered ANC contact in 2016, from 2017 onward, ANC remains under-utilized in Indonesia as compared to the standard set by the 2016 guideline. This study aimed to examine factors affecting optimal numbers of ANC visits in Indonesia after the WHO updated its guideline in 2016. These study findings will provide insight for the government to develop public health strategies to improve compliance with current ANC guidelines.



## Materials and methods

7

### Data source

This study used secondary data from the Indonesia Demographic and Health Survey (IDHS) 2017. The IDHS 2017 is a nationally representative household survey conducted by the Central Bureau of Statistics Indonesia (BPS) in collaboration with the National Population and Family Planning Board (KKBPN) and the Ministry of Health of Indonesia [19]. The IDHS 2017 provided information on demographic and health indicators and an overview of Indonesia's population profile. We collected the data using a questionnaire and face-to-face interviews. The questionnaires covered background characteristics, fertility, family planning, maternal and child health, awareness about HIV-AIDS and other sexually transmitted infections, and health service utilization.

The sampling design of IDHS 2017 involved two stages of stratified sampling. First, IDHS performed a systematic selection from the census blocks of the 2010 population stratified by type of residence (urban vs. rural) and ordered by wealth index. Second, 25 households from each selected census block were selected. The final sample of IDHS 2017 included 19,740 census blocks and 49,250 households. About 49,627 women aged 15–54 years participated in IDHS 2017 [20]. This study included information from only and all women who reported giving birth to at least one child in the past year to minimize recall bias. The final sample of this study was 3,738 participants in total.

### Study variables

We obtained all variables of interest of this study from the IDHS 2017 dataset; we needed no additional data collection. The primary outcome was the frequency of ANC visits during the last pregnancy. We only included individuals who received ANC services from health professionals such as general practitioners, obstetricians, nurses, midwives, or village midwives. The WHO had recently recommended ANC visits at least eight times during pregnancy [2]. Thus, we categorized this variable into three categories: 0–3, 4–7, and 8+ visits. Some cases might need more frequent ANC visits due to the presence of comorbidities, however, ANC visits of more than 4 in special cases (such as preeclampsia), was sufficient to provide better maternal and perinatal outcomes [21]. Hence, following recent guidelines, we considered the last category to represent the optimal number of visits.

The explanatory variables included age, experienced pregnancy termination, number of children at home, education level of participants of husband or partner of each, current employment status, awareness of pregnancy problems or complications, wealth index, place of residence, region, health insurance coverage, distance to the healthcare facility, husband's permission to visit healthcare, having money to pay medical treatment, and number of complications during pregnancy.

We assessed the pregnancy termination variable by asking whether participants had ever had an abortion, stillbirth, or miscarriage. We evaluated the awareness and



experience of pregnancy complications by asking the participants to identify types of signs of danger or complications that frequently occur during pregnancy and whether they had experienced any of those complications, such as prolonged labor, vaginal bleeding, fever, convulsions, faint, baby in the wrong position, swollen limbs, breathlessness, or tiredness. We scored each of the signs of danger or complications identified as 1 point. As a result, the scores of awareness level and pregnancy complications ranged from 0 to 9. We assessed barrier to medical treatment variable by asking participants' opinions about the distance to the health facility, obtaining permission to visit the health facility, and getting the money needed to pay for treatment. The questionnaire called for participants to answer using binary options (not a big problem vs. a big problem). The wealth index referred to composite multivariate components of the living standard, including assets, property ownership, type of services and amenities used, access to the internet, and education level. The IDHS 2017 constructed living standards based on the participants' residence as urban or rural.

### Sample size and statistical analysis

We assumed that the clustering effect would likely affect the results as this study used stratified sampling. The effect of clustering on the sample size calculation is important. Using one sample mean formula with  $\alpha=0.05$ ,  $\beta=0.2$ , allowable difference of population mean of ANC visit=0.25, Population variance of ANC visit=21,  $\delta$  or equivalence limit=0.0005, and number of people per small cluster 2.5, the total sample size needed is 2889. We estimated the design effect to accommodate the clustering effect. The intraclass correlation of ANC visits was 0.1674. We estimated the design effect to be 1.25. Adjusted by the design effect, the total sample size increased to 3662 participants.

We used Stata 16.0 MP-Parallel Edition for the statistical analysis. The characteristics of respondents were described in frequency and percentage in a cross-tabulation table based on the frequency of ANC visits. We also presented the proportion of the type of ANC services received during pregnancy. To accommodate the clustering effect and to take into consideration the source of heterogeneity in each cluster or stratification, we treated the stratification level (region, and place of residence, which is urban and rural) as a fixed variable. When analyzing the data including 'weight' as suggested by the DHS guideline.

The DHS calculated the wealth index of Indonesia based on 74 items including the possession of certain assets, housing condition, access to basic necessities (electricity, water, fuel) combined with the living area (urban and rural). Using principal component analysis, the DHS calculated the value of each items to calculate the wealth index adjusted by the location. The DHS separated the value of wealth index into 5 classification following the percentiles (20, 40, 60, 80) to classify the wealth index of the participants.

The three-level of ordinal categories: 0–3, 4–7, and 8+visits, formed the outcome variable. Thus, we employed ordinal logistic regressions to estimate factors affecting optimal of the number of ANC visits and to accommodate some variables



that violated the proportional odds/parallel-lines model assumptions. The method applied a partial proportional odds assumption that allowed the outcome variable to have varied odds ratios depending on the comparison. Using autofit gamma command in Stata, we initially put all variables into the model. We evaluated the quality of models' fit by examining the Akaike Information Criterion (AIC) values to find the best model with the suitable predictors. Finally, we presented the results in estimated adjusted odds ratios with a 95% confidence interval.

### Ethical statement

The IDHS 2017 obtained ethical approval from the Institutional Review Board (IRB) of the National Institute of Health Research and Development Ministry of Health. All participants provided written statements of informed consent prior interview. We removed identifiable information from the datasets. The ICF international granted approval to use datasets for this study as shown in the Supplementary Material 1.

### Results

This study included 3738 participants in the final analysis. The mean age of the participants was 29.06 years old (SD ± 6.3). About half of the participants lived in Java (54.1%). Only 17.4% of participants had any tertiary (higher) educational background. Most of the participants (61.7%) came from low and middle economic levels. Health insurance covered 63.7% of participants. Among all participants, 60.2% visited health professionals for antenatal care at least eight times.

36

#### Characteristics of participants

Table 1 depicts the characteristics of participants by frequency of antenatal care visits. Participants aged 15–19 showed a lower percentage of optimal numbers of antenatal visits. Participants who had experienced pregnancy termination has higher percentage of optimal frequency of ANC visits than those who had not (62.1% vs. 59.9%) although this is not significantly different ( $p=0.344$ ). Among participants with three or more children, 47.8% of them had at least eight ANC visits. Fewer than half of participants (45.7%) who had primary or no education background visited ANC services at least eight times. As to differences in terms of the wealth index, the proportion of those having visited ANC eight or more times among wealthy participants was most double (75.5% vs. 39.0%) that of participants from the poorest households. The percentage of participants with at least 8 ANC visits was higher among participants who: lived in Java and Bali, had health insurance, experienced pregnancy complications, reported no problem with distance to the health facility, had permission to visit health facilities, and, had money to pay health services.



**Table 1** Characteristics of participants by frequency of ANC visits (*n* = 3738)

Variables	Frequency of ANC Visits		
	0–3 <i>n</i> (%)	4–7 <i>n</i> (%)	8+ <i>n</i> (%)
<b>Predisposing factors</b>			
Age group (years)			
15–19	38 (19.1)	76 (38.2)	85 (42.7)
20–24	81 (11.1)	212 (29.1)	435 (59.8)
25–29	88 (9.1)	223 (23.2)	651 (67.7)
30–34	83 (9.3)	273 (30.5)	539 (60.2)
≥35	82 (11.0)	248 (33.3)	415 (55.7)
Ever had the pregnancy terminated			
No	324 (10.8)	880 (29.3)	1,799 (59.9)
Yes	47 (9.0)	152 (29.0)	326 (62.1)
Number of children at home			
0–1	127 (9.8)	311 (24.0)	860 (66.3)
2	120 (8.7)	398 (29.0)	855 (62.3)
≥3	124 (14.5)	324 (37.8)	410 (47.8)
Participant's level of education			
≤Primary	151 (18.2)	300 (36.1)	379 (45.7)
Secondary	191 (9.2)	595 (28.6)	1,297 (62.3)
Higher	29 (4.7)	137 (22.3)	449 (73.0)
Husband/partner's education level			
≤Primary	127 (13.9)	346 (37.9)	439 (48.1)
Secondary	190 (9.6)	537 (27.0)	1,262 (63.4)
Higher	27 (5.0)	115 (21.1)	402 (73.9)
Participant's current working status			
Not working	268 (11.4)	707 (30.0)	1,379 (58.6)
Working	103 (8.8)	324 (27.7)	743 (63.5)
Participant's awareness of pregnancy complications (scores)			
No (0)	206 (16.8)	418 (34.2)	600 (49.0)
Yes (1–9)	164 (7.1)	615 (26.7)	1525 (66.2)
<b>Enabling factors</b>			
Wealth index percentile			
<20	162 (21.5)	297 (39.4)	294 (39.0)
20–40	82 (12.3)	220 (33.1)	363 (54.6)
40.01–60	75 (9.9)	207 (27.3)	477 (62.8)
60.01–80	35 (5.1)	164 (23.7)	494 (71.3)
>80	17 (2.6)	144 (21.9)	497 (75.5)
Place of residence			
Urban	133 (7.7)	426 (24.8)	1,158 (67.4)
Rural	237 (13.1)	607 (33.5)	967 (53.4)
Region			
Sumatera	138 (16.0)	313 (36.4)	409 (47.6)
Java	126 (6.8)	403 (21.5)	1,342 (71.7)



Table 1 (continued)

Variables	Frequency of ANC Visits		
	0–3	4–7	8+
	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)
Lesser Sunda Island	14 (7.1)	72 (35.6)	116 (57.3)
Kalimantan	20 (9.5)	78 (37.8)	108 (52.7)
Sulawesi	34 (13.1)	124 (46.4)	108 (40.5)
Maluku Island & Papua	38 (30.9)	43 (35.1)	42 (34.0)
Covered by health insurance			
No	196 (15.3)	384 (30.0)	700 (54.7)
Yes	175 (7.8)	649 (28.9)	1425 (63.4)
Distance to the health facility			
Not a big problem	280 (9.1)	871 (28.4)	1921 (62.5)
Big problem	90 (19.8)	160 (35.2)	204 (44.9)
Money to pay for medical treatment			
Not a big problem	265 (9.0)	819 (28.0)	1845 (63.0)
Big problem	106 (17.7)	213 (35.6)	280 (46.7)
Husband's permission to visit health facility			
Not a big problem	330 (10.0)	953 (28.9)	2009 (61.0)
Big problem	40 (16.9)	80 (33.9)	116 (49.2)
Need factors			
Experienced complications in pregnancy			
No	252 (9.0)	865 (30.9)	1679 (60.1)
Yes	39 (6.0)	166 (25.5)	446 (68.5)

### Type of antenatal care services in pregnancy

Overall, clinicians provided the majority of participants: abdominal palpation (98.9%), blood pressure measurement (98.8%), height measurement (97.7%), fetal heart monitoring (97.6%), fundal height measurement (88.5%), iron supplementation (87.0%) and routine medical consultation (86.7%). Participants who reported having had checks of blood and urine samples during the last pregnancy were 55.0% and 41.6%, respectively (Fig. 1).

### Factors affecting optimal number of antenatal visits

After removing the variable of permission to visit a health facility, the model showed the low Akaike Information Criterion (AIC) value. Table 2 presents the final model of factors affecting the frequency of ANC visits. Level of awareness about pregnancy complications or problems, distance to the health facility, place of residence, health insurance coverage, number of complications during pregnancy, and wealth index were significantly associated with the frequency of antenatal visits.





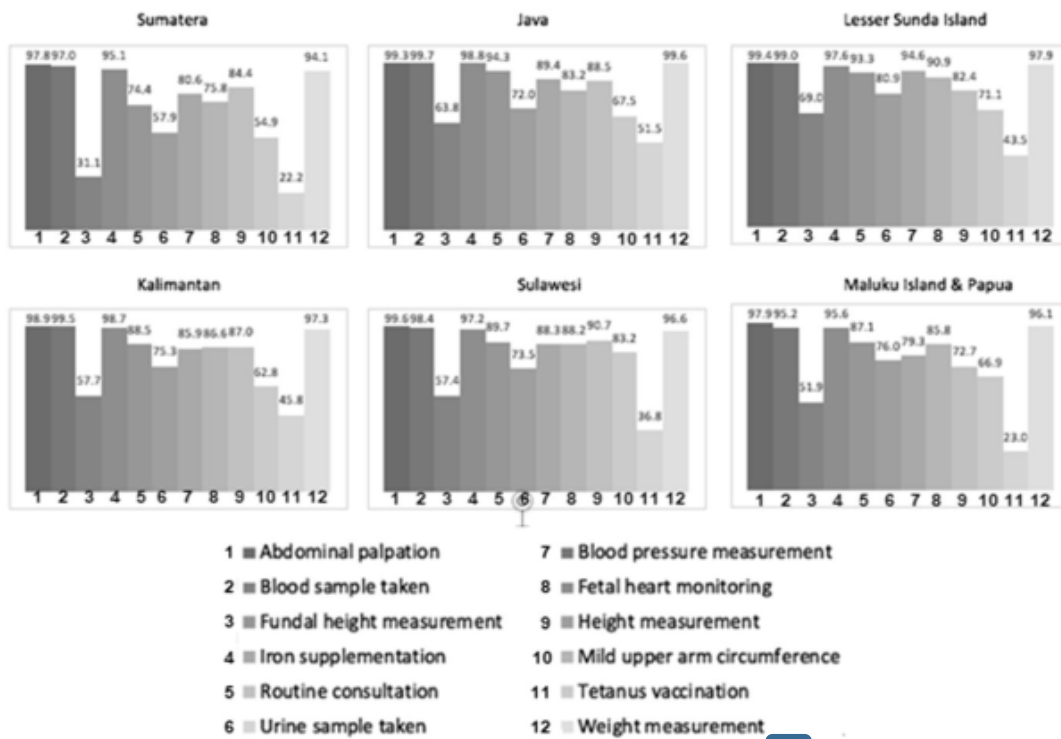


Fig. 1 Type of ANC service received during pregnancy by region, 2017. The Y-axis shows the percentage, and X-axis represents the type of antenatal care service as explained in the legend

An increase of 1 year age was significantly associated with more likelihood of having attended 4 or more antenatal visits (OR 1.04, 95% CI 1.01–1.06). When using cut off of 8 visits, the increase of 1 year of age is not significantly associated with attending  $\geq 8$  visits (OR 1.02, 95% CI 0.99–1.03). Regional differences were significantly associated with having attended at least eight ANC visits. Participants who lived in Java were two times more likely (OR 2.42, 95% CI 1.95–2.99) to have eight or more ANC visits than those who lived in Sumatera. Participants who perceived a big problem with the distance to health facilities were 31% less likely to have at least eight ANC visits. The mothers who lived in rural areas were 22% less likely (OR 0.78, 95% CI 0.64–0.93) to have eight or more ANC visits than those in the urban area.

## Discussion

The current study found that about 9.9% of the participants had 0–3 antenatal care visits, and only 60.2% of the participants visited the ANC services at least eight times, the number of visits the WHO, in 2016, deemed to be optimal. Insufficient, or fewer than eight ANC visits may lead to a devastating effect on the mother and child. A study of IDHS 2006–2007 showed that the higher frequency of ANC visits was associated with lower risk of neonatal mortality. A multi-country study also found that lack of ANC visits increased the relative risk of maternal mortality (RR 1.8, 95% CI 1.2–2.5). In addition,



**Table 2** Multivariate analysis for optimal antenatal care visits

Explanatory variables	Frequency of ANC Visits	
	0–3 vs. 4–7, 8+	0–3, 4–7 vs. 8+
	OR (95% CI)	OR (95% CI)
<b>Predisposing factors</b>		
Age (years)	1.04 (1.01–1.06)*	1.02 (0.99–1.03)
Ever had the pregnancy terminated		
No	1	1
Yes	1.21 (0.94–1.56)	1.21 (0.94–1.56)
Number of children at home	0.74 (0.67–0.82)*	0.74 (0.67–0.82)*
Participant's Level of education		
≤ Primary	1	1
Secondary	1.11 (0.95–1.50)	1.20 (0.95–1.50)
Higher	1.37 (0.96–1.95)	1.37 (0.96–1.95)
Husband/partner's education level		
≤ Primary	1	1
Secondary	1.12 (0.90–1.39)	1.12 (0.90–1.39)
Higher	1.12 (0.78–1.61)	1.12 (0.78–1.61)
Participant's current working status		
No	1	1
Working	0.96 (0.80–1.16)	0.96 (0.80–1.16)
Participant's awareness on pregnancy problem/complications	1.21 (1.12–1.31)*	1.21 (1.12–1.31)*
<b>Enabling factors</b>		
Wealth index percentile		
< 20	1	1
20–40	1.33 (1.04–1.70)*	1.33 (1.04–1.70)*
40.01–60	1.88 (1.46–2.43)*	1.88 (1.46–2.43)*
60.01–80	2.34 (1.77–3.10)*	2.34 (1.77–3.10)*
4 → 80	6.05 (3.07–11.96)*	2.65 (1.92–3.68)*
Place of residence		
Urban	1	1
Rural	0.78 (0.64–0.93)*	0.78 (0.64–0.93)*
Region		
Sumatera	1	1
Java & Bali	2.42 (1.95–2.99)*	2.42 (1.95–2.99)*
35 → ntral & Eastern Indonesia	1.71 (1.31–2.23)*	1.11 (0.91–1.37)
Covered by health insurance		
No	1	1
Yes	1.82 (1.38–2.39)*	1.32 (1.09–1.59)*
Distance to the health facility		
Not a big problem	1	1
Big problem	0.69 (0.53–0.89)*	0.69 (0.53–0.89)*
Money needed to pay for medical treatment		
Not a big problem	1	1
Big problem	0.85 (0.67–1.08)	0.85 (0.67–1.08)
<b>Need factors</b>		
Number of who experienced complications during pregnancy	1.28 (1.11–1.47)*	1.28 (1.11–1.47)*

\*Statistically significant ( $p < 0.05$ )

the frequency of ANC visits according to the WHO guideline was associated with maternal satisfaction [2]. Therefore, the WHO recommended at least eight ANC contacts during pregnancy to reduce maternal and child mortality and improve women's experience of care [2].

The results show that women who lived in Java and Bali (referring to Sumatra as reference) had a higher probability of making a minimum of eight ANC visits (OR 2.42, 95% CI 1.95–2.99) than in Central and Eastern Region. This finding is similar to previous studies in Indonesia that showed significant regional differences in ANC visits between Java-Bali and the rest of the region (outside Java and Bali) [9, 11]. The regional disparity in frequency of ANC visits may be caused by a bigger structural problem. There is a significant disparity in health workforce density, availability of healthcare facilities, and equipment between regions [24]. Although decentralization provides a glimpse of a positive impact on local health system performance, some local governments do not have sufficient financial capacity to fund the health system adequately [25]. They could not provide supportive healthcare facilities and decent incentives to attract a sufficient healthcare workforce. Also, a wide gap in infrastructure development progress between regions persists. For instance, many areas outside Java and Bali still have inadequate infrastructure for roads, transportation, communication, electricity, water, and sanitation [24]. Hence, health workers may feel reluctant to stay in the less developed regions due to limited opportunities for continuing education, social mobility, and career promotion.

In addition to regional disparities, our study also found that residence and perceived distance to health facilities were significantly associated with ANC utilization. This result is consistent with a study conducted in Ethiopia, which showed that place of residence influenced ANC utilization [26]. Percentage of maternal health care services utilization is higher among urban women [26]. This finding may relate to the accessibility of health facilities in urban areas and to urban people having closer connections to maternal healthcare services than those in rural areas [24]. A total of 430 from 6826 subdistricts in Indonesia (6.3%) do not have a primary healthcare center or *Puskesmas*. There are 380 *Puskesmas* without any medical doctor in place. Most of these problems occur in rural areas outside Java [24].

Some questions remain: Do regional disparities in terms of social cohesion and local cultural context affect the ANC utilization? Do regional disparities in terms of social cohesion and local cultural context affect the ANC utilization? As Java and Bali are the most populated regions, people live close to each other, with a greater extent of social cohesion than elsewhere. In Bali, the 'Banjar' system consists of a small homogenous population. Banjar itself is considered a subset of a village. The Banjar system incorporates traditional values to bond members to one another and coordinates all aspects of living, including religious ceremony, economic and health system. Hence, it creates strong social cohesion. The health staff who live in Banjar are prominent figures trusted by the people, as they live together and share values. It is not difficult for them to convince the pregnant mother to attend ANC services. The cultural context, however, is a double-edged sword: different effects may be seen, particularly in ethnic groups living



in inaccessible and underdeveloped areas such as in the eastern part of Indonesia. Local-born health workers who understand the local context of people will be essential to success.

This study reveals that mothers with more children were unlikely to attend ANC visits more than eight times (OR 0.74, 95% CI 0.67–0.82). This result is also similar to a study that found women in a first pregnancy to be about twice more likely to participate in early ANC visits than those with more children [27]. Parity may affect the initiation of ANC as the more children the mother has, the more experience she carries from previous pregnancies. Women with more children might feel more confident and safer. As such, they may consider antenatal care to be less urgent.

In this study, women from the high percentile of wealthy index were more likely (OR 2.65, 95% CI 1.92–3.68) to attend a minimum of eight ANC visits than those in the least percentile. This finding is similar to those in a study showing women in higher wealth quintiles to have been more likely to make more ANC visits than women in the lowest one [28]. These findings indicate that socioeconomic inequality in accessing maternal health services remains high even though Indonesia has launched a comprehensive national health insurance program since 2014 [29].

In addition to the wealth of households, health insurance coverage will need to increase to counter low utilization of maternal health care services by lowering the financial barrier. Women covered by health insurance were more likely to attend eight or more antenatal care visits (OR 1.32, 95% CI 1.14–1.59). Results in a study conducted in Tanzania are similar in showing a linear relationship between low health insurance coverage and lower utilization of maternal health care services [30].

It is important to note that a previous history of reproductive consequences is a crucial factor. Mothers who experienced more complications during a previous pregnancy tended to have more than eight ANC visits (OR 1.28, 95% CI 1.11–1.47). This finding is similar to that in a study, where frequent use of ANC services was associated with pregnancy complications [31]. The experience of pregnancy termination was not significantly associated with ANC utilization in the final model. This result is different from the finding elsewhere that previous experience of suffering miscarriages or stillbirths was a powerful predictor for utilization of ANC services [27].

### Strengths and limitations

This study is the first in Indonesia to examine factors affecting ANC services utilization based on current WHO's guidelines. It also covers essential explanatory variables in the analysis, another strength. Hence, we could determine the factors influencing optimal ANC utilization. A limitation is the cross-sectional study design that is less powerful for depicting a causal relationship between independent and dependent variables. Also, the study only included the mother who had used ANC services in the past year in the final analysis to minimize the recall bias. This reduced the number of participants from 49,627 to 3738 (7.5% of women aged



15–54 years). The IDHS 2017 survey covered six bigger islands and archipelago in Indonesia. However, the dataset did not explain the distribution data across 34 provinces, something we should acknowledge when stating that this survey is nationally representative. In terms of analysis, it is important to do further analysis, treating the frequency of ANC as a number and analyzed with linear regression, hence, it will accommodate the people with no ANC visit during their pregnancy. However, following the objective to assess the factor associated with optimum number of ANC visits, we did the analysis using the ordinal regression and classified the number of ANC visits accordingly.

## Conclusion and implications for policy and practice

The number of children, awareness of pregnancy complications, wealth index, pregnancy complications, residence, region, health insurance and distance to health facility were associated with frequency of ANC visits. The findings showed inequity between regions for accessing and utilizing ANC services, even though national health insurance has existed since 2014 in Indonesia to reduce the financial hardship and to standardize and improve the delivery and the quality of health service.

The implications of this study for policies and practices include.

- (1) Expanding the availability of ANC services and health professionals, particularly outside Java and Bali, and adjusting the service concerning the local context of each area;
- (2) Introducing mobile ANC clinics in rural areas to reach more pregnant women and to reduce their travel costs;
- (3) Educating pregnant women and their families about the importance of ANC services to avoid pregnancy complications and adverse outcomes;
- (4) Promoting family planning program again; and
- (5) Expanding the coverage and benefits package of national health insurance, particularly for maternal care.

**Supplementary Information** The online version contains supplementary material available at <https://doi.org/10.1057/s41271-021-00307-9>.

**Acknowledgements** All authors express gratitude to Mr. Bridgette Wellington, Data Archivist of The Demographic and Health Surveys (DHS) program, for the permission to use the DHS data.

## Declarations

**Conflict of interest** On behalf of all authors, the corresponding author states that there is no conflict of interest.



## References


1. World Health Organization, United Nations Children's Fund, United Nations Population Fund, World Bank Group, United Nations Population Division. Trends in maternal mortality 2000 to 2017: estimates by WHO, UNICEF, UNFPA, World Bank Group and the United Nations Population Division. Geneva: World Health Organization; 2019.
2. World Health Organization. WHO recommendations on antenatal care for a positive pregnancy experience. Geneva: WHO Press; 2016.
3. World Health O. WHO antenatal care randomized trial: manual for the implementation of the new model. Geneva: World Health Organization; 2002.
4. Carroli G, Villar J, Piaggio G, Khan-Neelofur D, Gülmezoglu M, Mugford M, et al. WHO systematic review of randomised controlled trials of routine antenatal care. *The Lancet*. 2001;357(9268):1565–70.
5. Villar J, Ba'aqeel H, Piaggio G, Lumbiganon P, Miguel Belizán J, Farnot U, et al. WHO antenatal care randomised trial for the evaluation of a new model of routine antenatal care. *The Lancet*. 2001;357(9268):1551–64.
6. Dowswell T, Carroli G, Duley L, Gates S, Gülmezoglu AM, Khan-Neelofur D, et al. Alternative versus standard packages of antenatal care for low-risk pregnancy. *Cochrane Database Syst Rev*. 2010(10):CD000934.
7. Benova L, Tunçalp Ö, Moran AC, Campbell OMR. Not just a number: examining coverage and content of antenatal care in low-income and middle-income countries. *BMJ Glob Health*. 2018;3(2):e000779.
8. Statistics Indonesia - Badan Pusat Statistik (BPS), National Population Family Planning Board (BKKBN), Ministry of Health - Kementerian Kesehatan (Kemenkes), ICF International. Indonesia Demographic and Health Survey 2012. Jakarta, Indonesia: BPS, BKKBN, Kemenkes, and ICF International; 2013.
9. Laksono AD, Rukmini R, Wulandari RD. Regional disparities in antenatal care utilization in Indonesia. *PLoS ONE*. 2020;15(2):e0224006.
10. Andersen R, Newman JF. Societal and individual determinants of medical care utilization in the United States. *Milbank Mem Fund Q Health Soc*. 1973;51(1):95–124.
11. Tripathi V, Singh R. Regional differences in usage of antenatal care and safe delivery services in Indonesia: findings from a nationally representative survey. *BMJ Open*. 2017;7(2):e013408.
12. Titaley CR, Dibley MJ, Roberts CL. Factors associated with underutilization of antenatal care services in Indonesia: results of Indonesia Demographic and Health Survey 2002/2003 and 2007. *BMC Public Health*. 2010;10:485.
13. Kurniati A, Chen CM, Efendi F, Berliana SM. Factors influencing Indonesian women's use of maternal health care services. *Health Care Women Int*. 2018;39(1):3–18.
14. Hardhantyo M, Chuang YC. Multilevel factors associated with pregnancy-related health behaviors in Indonesia: evidence from the 2007, 2012, and 2017 Indonesian demographic health surveys. *Asia Pac J Public Health*. 2019;2019:1010539519872346.
15. Efendi F, Chen CM, Kurniati A, Berliana SM. Determinants of utilization of antenatal care services among adolescent girls and young women in Indonesia. *Women Health*. 2017;57(5):614–29.
16. Nababan HY, Hasan M, Marthias T, Dhital R, Rahman A, Anwar I. Trends and inequities in use of maternal health care services in Indonesia, 1986–2012. *Int J Women's Health*. 2018;10:11–24.
17. Anindya K, Lee JT, McPake B, Wilopo SA, Millett C, Carvalho N. Impact of Indonesia's national health insurance scheme on inequality in access to maternal health services: a propensity score matched analysis. *J Glob Health*. 2020;10(1):010429.
18. WHO. Primary health care systems (PRIMASYS): case study from Indonesia, abridged version. 2017.
19. Statistics Indonesia - Badan Pusat Statistik (BPS), National Population Family Planning Board (BKKBN), Ministry of Health—Kementerian Kesehatan (Kemenkes), ICF International. Indonesia Demographic and Health Survey 2017. Jakarta, Indonesia: BPS, BKKBN, Kemenkes, and ICF International; 2018.
20. National Population and Family Planning Board (BKKBN), Statistics Indonesia (BPS), Ministry of Health (Kemenkes), ICF. Indonesia Demographic and Health Survey 2017. Jakarta, Indonesia: BKKBN, BPS, Kemenkes, and ICF; 2018.



21. Mohamed Shaker El-Sayed Azzaz A, Martínez-Maestre MA, Torrejón-Cardoso R. Antenatal care visits during pregnancy and their effect on maternal and fetal outcomes in pre-eclamptic patients. *J Obstet Gynaecol Res.* 2016;42(9):1102–10.
22. Ibrahim J, Yorifuji T, Tsuda T, Kashima S, Doi H. Frequency of antenatal care visits and neonatal mortality in Indonesia. *J Trop Pediatrics.* 2012;58(3):184–8.
23. Bauserman M, Lokangaka A, Thorsten V, Tshetu A, Goudar SS, Esamai F, et al. Risk factors for maternal death and trends in maternal mortality in low- and middle-income countries: a prospective longitudinal cohort analysis. *Reprod Health.* 2015;12(Suppl 2):S5.
24. Mahendradhata Y, Trisnantoro L, Listyadewi S, Soewondo P, Marthias T, Harimurti P, et al. The Republic of Indonesia Health System Review. *Health Systems in Transition, Vol-7 No.1 ed.* New Delhi: WHO Regional Office for South-East Asia; 2017.
25. Rakmawati T, Hinchcliff R, Pardosi JF. District-level impacts of health system decentralization in Indonesia: a systematic review. *Int J Health Plann Manag.* 2019;34(2):e1026–53.
26. Terefe AN, Gelaw AB. Determinants of antenatal care visit utilization of child-bearing mothers in Kaffa, Sheka, and Bench Maji Zones of SNNPR, Southwestern Ethiopia. *Health Serv Res Manag Epidemiol.* 2019;6:2333392819866620.
27. Aziz Ali S, Aziz Ali S, Feroz A, Saleem S, Fatmai Z, Kadir MM. Factors affecting the utilization of antenatal care among married women of reproductive age in the rural Thatta, Pakistan: findings from a community-based case-control study. *BMC Pregnancy Childbirth.* 2020;20(1):355.
28. Arthur E. Wealth and antenatal care use: implications for maternal health care utilisation in Ghana. *Heal Econ Rev.* 2012;2(1):14.
29. Agustina R, Dartanto T, Sitompul R, Susiloretni KA, Achadi EL, et al. Universal health coverage in Indonesia: concept, progress, and challenges. *The Lancet.* 2019;393(10166):75–102.
30. Kibusi SM, Sunguya BF, Kimunai E, Hines CS. Health insurance is important in improving maternal health service utilization in Tanzania-analysis of the 2011/2012 Tanzania HIV/AIDS and malaria indicator survey. *BMC Health Serv Res.* 2018;18(1):112.
31. Hijazi HH, Alyahya MS, Sindiani AM, Saqan RS, Okour AM. Determinants of antenatal care attendance among women residing in highly disadvantaged communities in northern Jordan: a cross-sectional study. *Reprod Health.* 2018;15(1):106.

**Publisher's Note** Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

## Authors and Affiliations

Ridhwan Fauzi<sup>1</sup> · Ye Paing Kyi<sup>2</sup> · Myo Mom Mon<sup>3</sup> · Lafi Munira<sup>4</sup> · Bumi Herman<sup>5</sup> · Nuchanard Hounnaklang<sup>4</sup> · Pramon Viwattanakulvanid<sup>4</sup> 

Ridhwan Fauzi  
ridhwan.fauzi@hotmail.com

Ye Paing Kyi  
yemhtike@gmail.com

Myo Mom Mon  
dr.myomon@gmail.com

Lafi Munira  
ukhtilafi@gmail.com

Bumi Herman  
bumiherman@med.unhas.ac.id

Nuchanard Hounnaklang  
nhounnaklang@yahoo.com

<sup>1</sup> Faculty of Public Health, University of Muhammadiyah, Jl. K.H. Ahmad Dahlan, Cireundeu, Ciputat, Jakarta 15419, Indonesia



- <sup>2</sup> University of Medicine, 30th Street, bet:73rd and 74th Street, Chan Aye Thar Zan Township, Mandalay 05024, Myanmar
- <sup>3</sup> Department of Public Health, Maternal and Reproductive Health Division, Ministry of Health and Sport, Office No.4, Nay Pyi Taw 90245, Myanmar
- <sup>4</sup> College of Public Health Sciences, Chulalongkorn University, Institute building 3 (10th–11th floor), Chulalongkorn soi 62, Phyathai Rd, Bangkok 10330, Thailand
- <sup>5</sup> Clinical Epidemiology, Research Development and Publication, Faculty of Medicine Hasanuddin Univesity, Hasanuddin University Hospital, Perintis Kemerdekaan Km 10, Makassar 90245, Indonesia





# Factors affecting optimal antenatal care utilization in Indonesia: implications for policies and practices

## ORIGINALITY REPORT

19%

SIMILARITY INDEX

15%

INTERNET SOURCES

16%

PUBLICATIONS

5%

STUDENT PAPERS

## PRIMARY SOURCES

1	Berhanu Woldeamanuel, Tadesse Belachew. "Risk Factors Associated With Frequency of Antenatal Visits, Number of Items of Antenatal Care Contents Received and Timing of First Antenatal Care Visits in Ethiopia: Multilevel Mixed-Effects Analysis", Research Square, 2020 Publication	1%
2	<a href="https://journals.plos.org">journals.plos.org</a> Internet Source	1%
3	<a href="https://bmcpregnancychildbirth.biomedcentral.com">bmcpregnancychildbirth.biomedcentral.com</a> Internet Source	1%
4	<a href="https://bmcpublichealth.biomedcentral.com">bmcpublichealth.biomedcentral.com</a> Internet Source	1%
5	<a href="https://researchonline.lshtm.ac.uk">researchonline.lshtm.ac.uk</a> Internet Source	1%
6	<a href="https://www.dovepress.com">www.dovepress.com</a> Internet Source	1%
7	Submitted to King's College Student Paper	1%
8	<a href="https://dspace.alquds.edu">dspace.alquds.edu</a> Internet Source	1%
9	<a href="https://www.tandfonline.com">www.tandfonline.com</a> Internet Source	1%
10	Aklilu Habte, Aiggan Tamene, Demelash Woldeyohannes. "The uptake of WHO-	1%

recommended birth preparedness and complication readiness messages during pregnancy and its determinants among Ethiopian women: A multilevel mixed-effect analyses of 2016 demographic health survey", PLOS ONE, 2023

Publication

11

[www.dhsprogram.com](http://www.dhsprogram.com)

Internet Source

<1 %

12

[www.researchsquare.com](http://www.researchsquare.com)

Internet Source

<1 %

13

M. Mazharul Islam, Mohammad Shahed Masud. "Determinants of frequency and contents of antenatal care visits in Bangladesh: Assessing the extent of compliance with the WHO recommendations", PLOS ONE, 2018

Publication

<1 %

14

[repository.tudelft.nl](http://repository.tudelft.nl)

Internet Source

<1 %

15

[research-repository.uwa.edu.au](http://research-repository.uwa.edu.au)

Internet Source

<1 %

16

[www.science.gov](http://www.science.gov)

Internet Source

<1 %

17

Belarmina Reis-Muleva, Ana Luiza V Borges, Luciane S Duarte, Carolina Cavalcante da Silva dos Santos et al. "Assessment of the quality of antenatal care in Mozambique", Midwifery, 2023

Publication

<1 %

18

[www.mdpi.com](http://www.mdpi.com)

Internet Source

<1 %

19

Eric Arthur. "Wealth and antenatal care use: implications for maternal health care

<1 %

utilisation in Ghana", Health Economics  
Review, 2012

Publication

---

20 Tommaso Agasisti, Aleksei Egorov, Pavel Serebrennikov. "Universities' efficiency and the socioeconomic characteristics of their environment — Evidence from an empirical analysis", Socio-Economic Planning Sciences, 2023  
Publication

---

21 [link.springer.com](https://link.springer.com)  
Internet Source

---

22 Submitted to University of Western Sydney  
Student Paper

---

23 Anissa Rizkianti, Tin Afifah, Ika Saptarini, Mukhammad Fajar Rakhmadi. "Women's decision-making autonomy in the household and the use of maternal health services: An Indonesian case study", Midwifery, 2020  
Publication

---

24 [rep.ksu.kz](https://rep.ksu.kz)  
Internet Source

---

25 [serval.unil.ch](https://serval.unil.ch)  
Internet Source

---

26 [www.rho.org](https://www.rho.org)  
Internet Source

---

27 Ijeoma Nkem Okedo-Alex, Ifeyinwa Chizoba Akamike, Obumneme Benaiah Ezeanosike, Chigozie Jesse Uneke. "Determinants of antenatal care utilisation in sub-Saharan Africa: a systematic review", BMJ Open, 2019  
Publication

---

28 [www.repository.cam.ac.uk](https://www.repository.cam.ac.uk)  
Internet Source

---

29	Submitted to Prince of Songkla University Student Paper	<1 %
30	Submitted to University of Birmingham Student Paper	<1 %
31	Ashish Kumar Upadhyay, Abhishek Singh, Swati Srivastava. "New evidence on the impact of the quality of prenatal care on neonatal and infant mortality in India", Journal of Biosocial Science, 2019 Publication	<1 %
32	repository.ubn.ru.nl Internet Source	<1 %
33	www.diva-portal.org Internet Source	<1 %
34	Frehiwot Birhanu, Gachana Mideksa, Kiddus Yitbarek. "Are Ethiopian women getting the recommended maternal health services? The analysis of Ethiopian mini Demographic and Health Survey 2019", Health Science Reports, 2022 Publication	<1 %
35	Submitted to University College London Student Paper	<1 %
36	archpublichealth.biomedcentral.com Internet Source	<1 %
37	pure.rug.nl Internet Source	<1 %
38	Vishnu Khanal, Jonia Lourenca Nunes Brites da Cruz, Shiva Raj Mishra, Rajendra Karkee, Andy H. Lee. "Under-utilization of antenatal care services in Timor-Leste: results from Demographic and Health Survey 2009–2010", BMC Pregnancy and Childbirth, 2015 Publication	<1 %

39	<a href="http://balimedicaljournal.org">balimedicaljournal.org</a> Internet Source	<1 %
40	<a href="http://e-journal.unair.ac.id">e-journal.unair.ac.id</a> Internet Source	<1 %
41	<a href="http://flex.flinders.edu.au">flex.flinders.edu.au</a> Internet Source	<1 %
42	<a href="http://reproductive-health-journal.biomedcentral.com">reproductive-health-journal.biomedcentral.com</a> Internet Source	<1 %
43	<a href="http://ses.library.usyd.edu.au">ses.library.usyd.edu.au</a> Internet Source	<1 %
44	<a href="http://www.medicalnutritionindustry.com">www.medicalnutritionindustry.com</a> Internet Source	<1 %
45	<a href="http://www.ncbi.nlm.nih.gov">www.ncbi.nlm.nih.gov</a> Internet Source	<1 %
46	<a href="http://www.saegre.org.ar">www.saegre.org.ar</a> Internet Source	<1 %
47	Herwansyah Herwansyah, Katarzyna Czabanowska, Stavroula Kalaitzi, Peter Schröder-Bäck. "The utilization of maternal health services at primary healthcare setting in Southeast Asian Countries: A systematic review of the literature", <i>Sexual &amp; Reproductive Healthcare</i> , 2022 Publication	<1 %
48	Millie A. O'Dair, Andrew Demetri, Gemma L. Clayton, Deborah Caldwell et al. "Does provision of antenatal care in Southern Asia improve neonatal survival? A systematic review and meta-analysis", <i>AJOG Global Reports</i> , 2022 Publication	<1 %
49	Sanni Yaya, Olanrewaju Oladimeji, Kelechi Elizabeth Oladimeji, Ghose Bishwajit.	<1 %

"Prenatal care and uptake of HIV testing among pregnant women in Gambia: a cross-sectional study", BMC Public Health, 2020

Publication

50

Teshita Uke Chikako, Reta Habtamu Bacha, John Elvis Hagan, Abdul-Aziz Seidu, Kenenisa Abdisa Kuse, Bright Opoku Ahinkorah.

"Multilevel Modelling of the Individual and Regional Level Variability in Predictors of Incomplete Antenatal Care Visit among Women of Reproductive Age in Ethiopia: Classical and Bayesian Approaches", International Journal of Environmental Research and Public Health, 2022

Publication

<1 %

51

[mhealth.jmir.org](http://mhealth.jmir.org)

Internet Source

<1 %

52

[ogma.newcastle.edu.au](http://ogma.newcastle.edu.au)

Internet Source

<1 %

53

[www.ajol.info](http://www.ajol.info)

Internet Source

<1 %

54

[www.unicef.org](http://www.unicef.org)

Internet Source

<1 %

55

Anissa Rizkianti, Ika Saptarini, Rika Rachmalina. "Perceived Barriers in Accessing Health Care and the Risk of Pregnancy Complications in Indonesia", International Journal of Women's Health, 2021

Publication

<1 %

56

Fetene Getnet Gebeyehu, Bisrat Misganaw Geremew, Aysheshim Kassahun Belew, Melkamu Aderajew Zemene. "Number of antenatal care visits and associated factors among reproductive age women in Sub-Saharan Africa using recent demographic and

<1 %

health survey data from 2008–2019: A multilevel negative binomial regression model", PLOS Global Public Health, 2022

Publication

---

57

Heba H. Hijazi, Mohammad S. Alyahya, Amer M. Sindiani, Rola S. Saqan, Abdulhakeem M. Okour. "Determinants of antenatal care attendance among women residing in highly disadvantaged communities in northern Jordan: a cross-sectional study", Reproductive Health, 2018

Publication

---

<1 %

58

Abdon Gregory Rwabilimbo, Kedir Y. Ahmed, Andrew Page, Felix Akpojene Ogbo. "Trends and factors associated with the utilisation of antenatal care services during the Millennium Development Goals era in Tanzania", Tropical Medicine and Health, 2020

Publication

---

<1 %

59

Agung Dwi Laksono, Ratna Dwi Wulandari, Noor Edi Widya Sukoco, Suharmiati Suharmiati. "Husband's involvement in wife's antenatal care visits in Indonesia: What factors are related?", Journal of Public Health Research, 2022

Publication

---

<1 %

60

Bunga A. Paramashanti, Michael J. Dibley, Ashraful Alam, Tanvir M. Huda. "Wealth- and education-related inequalities in minimum dietary diversity among Indonesian infants and young children: a decomposition analysis", Global Health Action, 2022

Publication

---

<1 %

61

Ferry Efendi, Susy Katikana Sebayang, Erni Astutik, Setho Hadisuyatmana, Eka Mishbahatul Mar'ah Has, Heri Kuswanto. "Determinants of safe delivery utilization

<1 %

among Indonesian women in eastern part of Indonesia", F1000Research, 2020

Publication

---

62

Maereg Wagnaw Meazaw, Catherine Chojenta, Muluken Dessalegn Muluneh, Deborah Loxton. "Systematic and meta-analysis of factors associated with preeclampsia and eclampsia in sub-Saharan Africa", PLOS ONE, 2020

Publication

---

<1 %

63

Melkalem Mamuye Azanaw, Alemayehu Digssie Gebremariam, Fentaw Teshome Dagnaw, Hiwot Yisak et al. "Factors Associated with Numbers of Antenatal Care Visits in Rural Ethiopia", Journal of Multidisciplinary Healthcare, 2021

Publication

---

<1 %

64

Setegn Muche Fenta, Girum Ayenew, Berhanu Engidaw Getahun. "Magnitude of antenatal care service uptake and associated factors among pregnant women: analysis of the 2016 Ethiopia Demographic and Health Survey", BMJ Open, 2021

Publication

---

<1 %

Exclude quotes  On

Exclude matches  Off

Exclude bibliography  On



# Factors affecting optimal antenatal care utilization in Indonesia: implications for policies and practices

GRADEMARK REPORT

FINAL GRADE

**/0**

GENERAL COMMENTS

**Instructor**

PAGE 1

PAGE 2

PAGE 3

PAGE 4

PAGE 5

PAGE 6

PAGE 7

PAGE 8

PAGE 9

PAGE 10

PAGE 11

PAGE 12

PAGE 13

PAGE 14

PAGE 15