FACTORS ASSOCIATED WITH THE FOUR-VISIT ANC IN INDONESIA: A POPULATION-BASED STUDY

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ABSTRACT

INTRODUCTION:

The number of maternal, neonatal and child mortality remains high in developing countries, including Indonesia. Antenatal care (ANC) coverage is an indicator of health-care use and access during pregnancy. Receiving at least four visits of ANC increases the chances of receiving appropriate maternal health interventions as one of the tracer indicators for universal health coverage in the Global Strategy for Women's, Children's, and Adolescents' Health Monitoring Framework (SDG indicator 3.8.1). The study aims to investigate the distribution and the factors associated with the four-visit ANC across urban and rural areas in Indonesia.

METHODS:

We used data from the 2017 Indonesia Demographic and Health Survey which is a large-scale nationally representative cross-sectional survey of women aged 15–49 years old (n=15,288). The use of ANC for the MNCH system is the dependent variable. The determinants are individual characteristics, family factors, and community factors.

RESULTS:

Age, parity, household income, and distance from health facilities are significant factors associated with the four-visit ANC, as the first step in achieving continuum of care for MNCH. Urban women who had been pregnant 1–2 times or 3–4 times were 6.475 (95% Confidence Interval (95%CI) = 4.750–9.306) and 3.109 (95% CI = 2.268–4.262) times more likely to have at least four ANC visits than those who had been pregnant five times or more.

CONCLUSION:

Developing a health system, human resources, health facilities, and infrastructure are crucial for overcoming maternal and child health problems, especially in rural areas to make ANC universally affordable and accessible.

KEYWORDS

pregnancy; Indonesia; antenatal care; population-based study

INTRODUCTION

Over the years, maternal child health has improved ever since countries worldwide have committed to reducing Maternal Mortality Ratio (MMR) as a result the Sustainable Development Goals (SDGs) of the United Nations [1]. SDGs encourage every country to achieve SDG target 3.1 (i.e. reduce the global MMR to less than 70 per 100,000 live births by 2030) and target 3.2 (i.e. end preventable deaths of newborns and children under 5 years of age by 2030, with all countries aiming to reduce neonatal mortality to at least 12 per 1,000 live births and under-5 mortality to at least 25 per 1,000 live births) [2]. By 2017, the global MMR is 211 per 100,000 live births with 295,000 cases of maternal death. This rate has decreased by 38% with a 2.9% reduction annually since 2000 (342 per 100,000 live births). More than three-fourth of maternal deaths are related to direct obstetric causes, such as hemorrhage, sepsis, abortion, ruptured uterus and hypertensive pregnancy diseases, which are easily preventable and treatable. Moreover, 77% of death occur during or shortly after birth (within 24 h) [3]. However, MMR remains high across the world. Notwithstanding national and global initiatives, the indices of maternal and newborn morbidity or mortality have indicated no improvement or only modest declines over the last five years.

In parallel with the global trends, Indonesia was unable to reach the SDG target as the MMR was 305 per 100,000 live births in 2015 [6]. This notion is demonstrated by the WHO in 2017 at 177 per 100,000 live births with 8,600 deaths. This number is higher than that for South-east Asia, which is 152 per 100,000 live births [7]. With this progress, Indonesia became one of the developing countries with high maternal, neonatal and child mortality. In 2016, the United Nations Children's Fund reported that the under-five mortality rate in Indonesia was 27 per 1,000 live births, whereas neonatal mortality rate reached 14 per 1,000 live births [8]. Furthermore, the WHO recommended that all pregnant women should undergo at least four Antenatal Care (ANC) visits during pregnancy [7] to maintain and monitor the health of the mother and fetus, detect pregnancy complications early and react accordingly, respond to complaints, prepare for childbirth and promote a healthy lifestyle [9].

Adequate ANC visits can be used as an indicator for SDGs to ensure coverage of maternal health services. Previous research demonstrated a negative correlation between ANC and maternal mortality (r = −0.5; P < 0.0001). Mothers who did not receive ANC had 3.9 higher odds of neonatal death (95% Confidence Interval [CI] = 2.3–6.3) than mothers with four or more ANC visits. Moreover, neonates with mothers who had one to three ANC visits had 1.3 higher odds of death (95% CI = 1.0–1.8) than mothers who had four or more ANC visits [10]. Despite this result, a gap in the four-visit ANC continues to occur due to demographic, geographical, cultural and socioeconomic differences in developing countries, such as Indonesia. Disparities occur as a result of inability to access services, service affordability and service quality [11]. The study aims to investigate the distribution and the factors associated with the four-visit ANC across urban and rural areas in Indonesia.

METHODS

Data were derived from the Indonesia Demographic and Health Survey (IDHS), a national survey conducted in 2017 using a cross-sectional method. The sample of the survey includes 1,970 census blocks with 49,250 households in rural and urban areas. The IDHS sample design uses two-stage probability sampling. The first stage selects a number of blocks using the probability proportional to size system based on the listing result of Population Census 2010. The second stage then systematically selects 25 households from the abovementioned census blocks.

Data from IDHS covered a total of 49,267 women aged 15–49 years old. The criteria for inclusion in the survey were ever-married women aged 15–49 years who had given birth in the last 5 years prior to the survey. After screening, data from 15,288 women were used for the study. The reason for selecting women who gave birth in the last 5 years prior to the survey was to avoid memory bias from mothers.

The use of ANC for the maternal, neonatal and child health (MNCH) system is designated as the dependent variable. The determinants of the dependent variable are individual characteristics, such as respondent's age, age at first birth, educational level, employment status, parity, and autonomy in health care decisions. Apart from individual factors, the family also plays a role in the use of ANC. Thus, social demographic characteristics were measured through the educational level and employment status of husbands, household income and mass media exposure (frequency of watching television, listening to the radio or reading newspapers). Lastly, community factors denote

the form of geographical conditions that divide the respondents into urban or rural areas and distance from health facilities.

SPSS (version 25) was used for data analysis. Frequency and percentage from descriptive statistics are used to report the outcomes of MNCH services during ANC. The relationships among factors are defined by logistic regression with simple, bivariate, and multivariate analyses. The relationship is analyzed at three levels: odds ratio (OR), adjusted odds ratio (aOR) with 95% CI, and p-value with significance at p-value < 0.05.

The IDHS program collects data periodically for policy development and program planning, monitoring and evaluation. Respondents provided written informed consent before each interview. The statements include voluntary participation, refusal to answer question or termination of participation at any time and confidentiality of identity and information. Consent prior to a child's participation is provided by a parent or guardian. The Institutional Review Board (IRB) of the Inner-City Fund International Inc., Fairfax, VA, USA, reviewed and approved

the procedures and survey protocols. After the IDHS provided authorization to use the dataset, additional ethical review approval was obtained from the IRB at Universitas Indonesia, Indonesia.

RESULTS

There were 13,510 (88.4%) women who obtained at least four ANC visits (ANC4+). Table 1 provides the socioeconomic and demographic characteristics of the respondents. Women aged 25–34 years old (51.9%), aged 20–29 years old (66.5%) and above 29 years old (6.5%) at first birth, who had secondary (57.4%) and higher (18.3%) levels of education, have husbands with secondary (57.9%) and higher (15.7%) levels of education, have employed husbands (99.3%), had 1–2 parity (67.8%), have autonomy in health care decisions (44.2%), had any two (28.0%) and all three (27.7%) types of mass media exposure, belonged to the richest (18.4%), Q4 (19.2%) or Q3 (19.5%) household income, without issues regarding distance from health facilities (89.3%) and lived in urban areas (51.4%) tend to have at least four ANC visits during pregnancy.

TABLE 1. SOCIOECONOMIC AND DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS WITH ADEQUATE AND INADEQUATE ANTENATAL CARE

	Pregnancy level (ANC4+)		p
	≥4 visits n (%) (n = 13,510)	<4 visits n (%) (n = 1,778)	
Age			<0.001
15–24	2,402 (17.8)	396 (22.3)	
25–34	7,005 (51.9)	790 (44.4)	
>34	4,103 (30.4)	592 (33.3)	
Age at First Birth			<0.001
<20	3,652 (27.0)	755 (42.5)	
20–29	8,984 (66.5)	942 (53.0)	
>29	874 (6.5)	81 (4.6)	
Educational Level			<0.001
No education	116 (0.9)	88 (4.9)	
Primary	3,159 (23.4)	683 (38.4)	
Secondary	7,759 (57.4)	832 (46.8)	
Higher than secondary	2,476 (18.3)	175 (9.8)	
Husband's Educational Level			<0.001
No education	171 (1.3)	84 (5.0)	
Primary	3,289 (25.0)	603 (36.1)	
Secondary	7,613 (57.9)	853 (51.0)	
Higher than secondary	2,067 (15.7)	131 (7.8)	

Employment Status				0.005
Employed	6,201 (45.9)		878 (49.5)	
Unemployed	7,299 (54.1)		897 (50.5)	
Husband's Employment Status				<0.001
Unemployed	94 (0.7)		26 (1.6)	
Employed	12,909 (99.3)		1,636 (98.4)	
Parity				<0.001
5 or more	645 (4.8)		275 (15.5)	
3–4	3,699 (27.4)		570 (32.1)	
1–2	9,166 (67.8)		933 (52.5)	
Autonomy in Health Care Decisions				<0.001
No	7,321 (55.8)		1,022 (61.2)	
Yes	5,809 (44.2)		648 (38.8)	
Mass Media Exposure				<0.001
Not at all	413 (3.1)		181 (10.2)	
Any one	5,572 (41.2)		805 (45.3)	
Any two	3,784 (28.0)		407 (22.9)	
All three	3,741 (27.7)		385 (21.7)	
Household Wealth				<0.001
Q1 (poorest)	3,144 (23.3)		893 (50.2)	
Q2	2,661 (19.7)		361 (20.3)	
Q3	2,628 (19.5)		255 (14.3)	
Q4	2,588 (19.2)		166 (9.3)	
Q5 (richest)	2,489 (18.4)		103 (5.8)	
Distance from Health Facilities				<0.001
With issues	1441 (10.7)		362 (20.4)	
Without issues	12,059 (89.3)		1,415 (79.6)	
Residence				<0.001
Urban	6,938 (51.4)		610 (34.3)	
Rural	6,572 (48.6)		1,168 (65.7)	

Table 2 indicates that women aged 25–34 years (aOR = 1.368; 95% CI = 1.168–1.603) and older than 34 years (aOR = 1.678; 95% CI = 1.363–2.065) were more likely to have ANC4+ than women aged 15–25 years. Women who give first birth at 20–29 years old (aOR = 1.270; 95% CI = 1.123–1.436) are more likely to have ANC4+ than those who gave birth before 20 years. Women with secondary education are 2.327 (95% CI = 1.645–3.292) times more likely to have ANC4+ than those without education. Women who had been pregnant for 1–2 times or 3–4 times were 3.617 (95% CI = 2.916–4.486) and 2.127 (95% CI = 1.761–2.568) times more likely to have ANC4+ than those who had been pregnant five times or more. Compared with women without exposure to any mass media, women with two mass media exposures are 1.553 (95% CI = 1.230–1.963) times more likely to have ANC4+. Women with higher household wealth (Q2 to Q5) were 1.587 (95% CI = 1.369–1.839), 1.953 (95% CI = 1.648–2.314), 2.767 (95% CI = 2.255–3.397) and 4.131 (95% CI = 3.187–5.355) times, respectively, more likely to have ANC4+ than the poorest group. Women without issues regarding distance from health facilities (aOR = 1.463; 95% CI = 1.270–1.686) were more likely to have ANC4+ than those with issues.

TABLE 2. FACTORS ASSOCIATED WITH USE OF ANTENATAL CARE

	Care at pregnancy (ANC4+)			
	Bivariate OR	p	Multivariate aOR (95% CI)	P

Age				
15–24	1		1	
25–34	1.462	<0.001	1.368 (1.168–1.603)	<0.001
>34	1.143	0.056	1.678 (1.363–2.065)	<0.001
Age at First Birth				
<20	1		1	
20–29	1.972	<0.001	1.270 (1.123–1.436)	<0.001
>29	2.231	<0.001	1.083 (0.813–1.444)	0.585
Educational Level				
No education	1		1	
Primary	3.509	<0.001	1.805 (1.289–2.526)	0.001
Secondary	7.075	<0.001	2.327 (1.645–3.292)	<0.001
Higher than secondary	10.733	<0.001	1.821 (1.221–2.174)	0.003
Husband's Educational Level				
No education	1		1	
Primary	2.679	<0.001	1.693 (1.238–2.315)	0.001
Secondary	4.384	<0.001	1.625 (1.182–2.234)	0.003
Higher than secondary	7.751	<0.001	1.896 (1.294–2.777)	0.001
Employment Status				
Unemployed	1		1	
Employed	1.152	<0.005	1.186 (1.061–1.324)	0.003
Husband's Employment Status				
Unemployed	1		1	
Employed	2.183	<0.001	1.972 (1.234–3.150)	0.005
Parity				
5 or more	1		1	
3–4	2.767	<0.001	2.127 (1.761–2.568)	<0.001
1–2	4.189	<0.001	3.617 (2.917–4.486)	<0.001
Autonomy in Health Care Decisions				
No	1		1	
Yes	1.251	<0.001	1.138 (1.020–1.270)	0.021
Mass Media Exposure				
None	1		1	
Any one	3.033	<0.001	1.427 (1.147–1.775)	0.001
Any two	4.075	<0.001	1.553 (1.230–1.963)	<0.001
All three	4.258	<0.001	1.396 (1.098–1.774)	0.006
Household Wealth				
Q1 (poorest)	1		1	
Q2	2.094	<0.001	1.587 (1.369–1.839)	<0.001
Q3	2.927	<0.001	1.953 (1.648–2.314)	<0.001
Q4	4.428	<0.001	2.767 (2.255–3.397)	<0.001
Q5 (richest)	6.684	<0.001	4.131 (3.187–5.335)	<0.001
Distance from Health Facilities				
With issues	1		1	
Without issues	2.141	<0.001	1.463 (1.270–1.686)	<0.001
Residence				
Urban	1		1	
Rural	0.495	<0.001	0.919 (0.810–1.043)	0.190

TABLE 3 FACTORS ASSOCIATED WITH USE OF ANTENATAL CARE IN URBAN AND RURAL AREAS

| | Care at pregnancy (ANC4+) | | | | | | | |
| | Urban | | | | Rural | | | |
	Bivariate OR	p	Multivariate aOR (95% CI)	p	Bivariate OR	p	Multivariate aOR (95% CI)	p
Age								
15–24	1		1		1		1	
25–34	1.394	0.004	1.341 (1.015–1.772)	0.039	1.398	<0.001	1.366 (1.125–1.659)	0.002
>34	1.117	0.363	1.857 (1.303–2.647)	0.001	1.043	0.630	1.559 (1.204–2.019)	0.001
Age at First Birth								
<20	1		1		1		1	
20–29	2.172	<0.001	1.247 (1.007–1.545)	0.043	1.686	<0.001	1.280 (1.102–1.487)	0.001
>29	2.535	<0.001	0.874 (0.558–1.371)	0.558	1.625	0.003	1.227 (0.841–1.789)	0.288
Educational Level								
No education	1		1		1		1	
Primary	2.783	0.009	2.440 (1.064–5.596)	0.035	3.397	<0.001	1.677 (1.162–2.421)	0.006
Secondary	5.644	<0.001	3.411 (1.485–7.839)	0.004	5.939	<0.001	2.126 (1.448–3.121)	<0.001
Higher than secondary	9.097	<0.001	2.985 (1.231–7.239)	0.016	7.827	<0.001	1.535 (0.964–2.444)	0.071
Husband's Educational Level								
No education	1		1		1		1	
Primary	1.102	0.815	0.907 (0.378–2.177)	0.826	3.015	<0.001	1.890 (1.344–2.658)	<0.001
Secondary	1.585	0.257	0.746 (0.312–1.786)	0.511	4.455	<0.001	1.953 (1.375–2.773)	<0.001
Higher than secondary	3.063	0.008	0.903 (0.356–2.294)	0.831	6.276	<0.001	2.151 (1.374–3.367)	0.001
Employment Status								
Employed	1		1		1		1	
Unemployed	1.232	0.013	1.147 (0.952–1.382)	0.148	1.110	0.100	1.208 (1.052–1.387)	0.007
Husband's Employment Status								
Unemployed	1		1		1		1	
Employed	3.496	<0.001	2.852 (1.487–5.417)	0.002	1.533	0.191	1.340 (0.678–2.646)	0.399

Parity								
5 or more	1		1		1		1	
3–4	5.854	<0.001	3.109 (2.268–4.262)	<0.001	2.226	<0.001	1.787 (1.413–2.260)	<0.001
1–2	3.538	<0.001	6.475 (4.505–9.306)	<0.001	3.183	<0.001	2.699 (2.067–3.525)	<0.001
Autonomy in Health Care Decisions								
No	1		1		1		1	
Yes	0.856	0.080	1.134 (0.945–1.360)	0.177	0.824	0.004	1.144 (0.977–1.314)	0.055
Mass Media Exposure								
None	1		1		1		1	
Any one	2.378	<0.001	1.448 (0.801–2.617)	0.220	2.620	<0.001	1.426 (1.125–1.807)	0.003
Any two	3.037	<0.001	1.476 (0.808–2.696)	0.205	3.392	<0.001	1.609 (1.239–2.089)	<0.001
All three	3.036	<0.001	1.317 (0.719–2.412)	0.372	3.514	<0.001	1.464 (1.115–1.922)	0.006
Household Wealth								
Q1 (poorest)	1		1		1		1	
Q2	1.584	<0.001	1.305 (0.983–1.733)	0.066	2.292	<0.001	1.743 (1.457−2.084)	<0.001
Q3	2.426	<0.001	1.738 (1.301–2.320)	<0.001	2.988	<0.001	2.065 (1.651–2.582)	<0.001
Q4	3.891	<0.001	2.668 (1.950–3.650)	<0.001	3.955	<0.001	2.539 (1.881–3.429)	<0.001
Q5 (richest)	5.926	<0.001	3.865 (2.704–5.526)	<0.001	5.636	<0.001	3.712 (2.327–5.923)	<0.001
Distance from Health Facilities								
With issues	1		1		1		1	
Without issues	1.187	<0.001	1.549 (1.180–2.035)	0.002	1.994	<0.001	1.451 (1.229–1.714)	<0.001

Source: Add source

Table 3 illustrates the differences in the use of ANC between urban and rural areas. Women from rural areas who gave first birth at more than 29 years old (aOR = 1.227; 95% CI = 0.841–1.789) were more likely to have ANC4+ than those who gave birth before 20 years old. In addition, women with primary, secondary and higher levels of education were 2.440 (95% CI = 1.064–5.596), 3.411 (95% CI = 1.485–7.839) and 2.985 (95% CI = 1.231–7.239) times, respectively, more likely to have ANC4+ than urban women without education. However, husband's educational level (i.e., primary, secondary and higher levels of education) in rural areas had higher aOR compared with those in urban areas. Women with husbands who worked and lived in urban areas were 2.852 times (95% CI = 1.487–5.471) more likely to have ANC4+ than unemployed husbands. Urban women who had been pregnant 1–2 times or 3–4 times were 6.475 (95% CI = 4.750–9.306) and 3.109 (95% CI = 2.268–4.262) times more likely to have ANC4+ than those who had been pregnant five times or more.

DISCUSSION

Each component of the Continuum of Care (CoC) is important for the provision of critical and lifesaving maternal services. ANC plays a key role in CoC as the first step in achieving continuity for MNCH services. Medical professionals educate expectant mothers about the importance of giving birth in health facilities through ANC, including exclusive breastfeeding, postnatal and postpartum care and family planning services. Facilitating ANC for women who live far from health facilities, are poorly educated, have financial constraints and other barriers is crucial for the reduction of the current health and healthcare access inequities [12]. The study identified several factors associated with the four-visit ANC in Indonesia.

Age, age at first birth, educational level, parity, mass media exposure, household wealth and distance from health facilities were significantly associated with the four-visit ANC. Women aged 25 years old were more likely to have ANC4+ compared with other age groups. This result is similar to findings from other studies in Nepal [13], Shanghai [14], and analysis of national survey data from Bangladesh, Cambodia, Cameroon, Nepal, Peru, Senegal and Uganda [15]. Younger women have a higher risk of inadequate ANC than older women [16]. However, a study conducted on seven regions of Indonesia found that as the age of the mother increases, they are less likely to use ANC services, especially mother aged more than 25 years [17].

Our finding was consistent with a study in Canada. Women who first gave birth at 20–29 years old tend to use ANC [16]. Women who are victims of underage marriages and gave birth at aged 19 years or less were 26% less likely to use ANC services [18]. A study in Nepal proposed that child marriage hinders access to maternal health care due to economic and social barriers. This condition drives women to gain limited autonomy in decision-making and access to maternal services [18]. Policy makers need to review the negative consequences of child marriage and set a minimum age for legal marriage to mitigate this issue.

Women with higher educational level were more likely to receive the four-visit ANC compared with the other group. A systematic review and meta-analysis in Ethiopia also revealed that educated women were more likely to use ANC compared with uneducated women [19]. Literate mothers paid more attention to health and family development [13]. Similar study using the IDHS data for 2002/2003 and 2007 in Indonesia demonstrated that the increased educational level exerted a greater impact on the four-visit ANC for women from poor households than those from the richest households [20]. Several factors of the four-visit ANC can be modified by empowering women through education and increasing decision-making power [19]. Health promotion should target women with low levels of education to increase their consciousness about the importance of ANC services [20].

Women with 1–2 and 3–4 pregnancies are more likely to use ANC than women who had been pregnant for five or more. Women with two or more pregnancies (multipara) were more likely to use ANC than women giving birth for the first time (primipara) [21]. Women who had been pregnant four times or more were likely to receive inadequate prenatal care [16]. The frequencies of ANC decreased as the number of births increased from the first to second until the fifth or more births [15]. Women with higher parity are more likely to depend on experiences from past pregnancies. As such, they feel confident about their pregnancy, which lessens the urgency to seek ANC services. Moreover, women with higher parity did not expect to become pregnant again, such that they tend to use less ANC [22]. Our study found that there was a strong connection between mass media exposure and the four-visit ANC [19]. Women with less exposure to mass media were at higher risk for the under-utilization of antenatal services [20].

Women with exposure to mass media were 1.52 times more likely to use ANC during pregnancy than those without exposure [23]. In rural areas, health workers struggle to reach all mothers. Instead, mass media can be used to disseminate messages about the importance and availability of ANC services in their communities. In addition, advocating ANC in mass media can be a strategy for increasing the four-visit ANC [19, 24]

Household wealth has a significant association with ANC4+. A study in Lao PDR showed that women with high income were 2.6 times more likely to obtain ANC services than women with low income [25]. Another study in Brussels emphasized that women with high and moderate incomes had 14% and 9%, respectively, more antenatal visits compared with those with low income [21]. The four-visit ANC was improved with the increase in household wealth [15, 17] and 20.2% of mothers experience inadequate ANC because they often lacked money to access ANC [14]. In certain countries, ANC services are free. However, it does not completely solve the under-utilization of ANC service. In Ghana, the number of women receiving less than four ANC visits remains high because these mothers continue to face barriers related to direct (consultation and medication) and indirect (transportation and waiting time) costs [26]. In addition, long waiting hours is another barrier for expecting mothers who work in informal sectors as hours spent in health facilities may reduce their daily income. Thus, increasing the number of service providers and physicians is vital to reduce waiting time to enable women to leave early and take care of their families [26].

The opportunities for the four-visit ANC increase among mothers without distance barriers to health facilities. The under-utilization of ANC tends to occur among mothers who reported distance from health services as a major problem [20]. Pregnant women who live far from health facilities had lower rates of ANC visits than those who lived near health facilities. A study in Burkina Faso illustrated that if distance to the closest health facilities increases by 1 km, the odds of a woman receiving ANC4+ will decline by 0.05 and 0.113, respectively [27]. The availability of transportation (bicycle) at the community level was positively associated with the likelihood of women receiving any ANC. The prioritization of investment in transportation infrastructure supports the improvement of MNCH [25, 27].

The present study also assessed the urban–rural differences in the four-visit ANC. Previous studies indicated that women who live in urban areas are more likely to receive ANC services, as they have better information and access to health facilities [17, 19, 21]. Mothers from under-developed areas in Indonesia, such as the rural areas of Sumatera and Eastern Indonesia region, are more likely to under-utilize ANC services compared with women from the urban areas of the Java–Bali region. The government should prioritize the strategies for improving the distribution of human resources, health facilities, roads and infrastructure to be more accessible and available to women who lived in rural areas [20, 26].

We used the IDHS dataset, which is representative of the Indonesian population. The survey was conducted using standard procedures and measurement units to select the sampling units, respondents and household strata. Therefore, the generalizability of the study can be increased. In addition, the possibility of recall bias has been reduced by restricting the study sample only to women who had given birth in the last five years prior to the survey. The study has several limitations. The secondary data can only analyze and explain the risk factors based on available variables. The study design restricted the explanation of the causality of factors associated with the four-visit ANC. Moreover, the data used are subject to recall bias as they were based on self-reported data. Future research, such as a qualitative study, and cultural influence as a community factor can be considered to further understand women's perception as individual factors regarding the four-visit ANC.

CONCLUSION

A total of 88.4% of women in the study received ANC4+ during pregnancy. Age, age at first birth, educational level, parity, household wealth and distance from health facilities were associated with the four-visit ANC. Women living in urban areas received adequate ANC services compared with those living in rural areas. Therefore, future policies should focus on teenage pregnancy and women empowerment issues to overcome maternal health problems. Health promotion and advocacy should also be specifically tailored to reach the underprivileged population. This problem is multisectoral in nature as the distribution of human resources, health facilities and infrastructure should be built to provide rural residents with access to better healthcare services. Indonesia's national health insurance also plays a vital role in making healthcare affordable.

DECLARATIONS

Authors' contributions

Conceptualization: HA Formal analysis: SDR and VN Methodology: HA and AS Supervision: H.A Writing—original draft preparation: HA Writing—review and editing: HA, SDR, VN, and AS. All authors contributed to the drafting, review, and approval of this manuscript.

Conflicts of interest/Competing interests

The authors have no conflicts of interest associated with the material presented in this paper.

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