Continuity of maternal healthcare services utilisation in Indonesia: analysis of determinants from the Indonesia Demographic and Health Survey

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ABSTRACT

Objective WHO recommends that every pregnant woman and newborn receive quality care throughout the pregnancy, delivery and postnatal periods. However, Maternal Mortality Ratio in Indonesia for 2015 reached 305 per 100 000 live births, which exceeds the target of Sustainable Development Goals (<70 per 100 000 live births). Receiving at least four times antenatal care (ANC4+) and skilled birth attendant (SBA) during childbirth is crucial for preventing maternal and neonatal deaths. The study aims to assess the determinants of ANC4 +and SBA independently, evaluate the distribution of utilisation of ANC4 + and SBA services, and further investigate the associations of two levels of continuity of services utilisation in Indonesia

Design Data from the Indonesia Demographic and Health Survey, a cross-sectional and large-scale national survey conducted in 2017 were used.

Setting This study was set in Indonesia.

Participants The study involved ever-married women of reproductive age (15–49 years) and had given birth in the last 5 years prior to the survey (n=15 288). The dependent variables are the use of ANC4 + and SBA. Individual, family and community factors, such as age, age at first birth, level of education, employment status, parity, autonomy in healthcare decision-making, level of education, employment status of spouses, household income, mass media consumption residence and distance from health facilities were also measured.

Results Results showed that 11 632 (76.1%) women received ANC4 + and SBA during childbirth. Multivariate analysis revealed that age, age at first birth, and parity have a statistically significant association with continuity of services utilisation. The odds of using continuity of services were higher among women older than 34 years (adjusted OR (aOR) 1.54; 95% CI 1.31 to 1.80) compared with women aged 15–24 years. Women with a favourable distance from health facilities were more likely to receive continuity of services utilisation (aOR 1.39; 95% CI 1.24 to 1.57).

Conclusions The continuity of services utilisation is associated with age, reproductive status, family influence and accessibility-related factors. Findings demonstrated the importance of enhancing early reproductive health education for men and women. The health

Key points

Question
► What are the determinants of continuity of maternal healthcare services utilisation in Indonesia?

Finding
► Overall, continuity of services utilisation reached 76.1% amongst the respondents in Indonesia. The utilisation of at least four times antenatal care and skilled birth attendant at delivery services is associated with age, reproductive status, family influence and accessibility-related factors.

Meaning
► Future health programmes should concentrate on improving the quality of care provided by healthcare practitioners. Multisectoral engagement should be enforced to enhance accessibility to health facilities and reduce financial and geographical barriers, such that high-quality care can be provided to all mothers.

system reinforcement, community empowerment and multisectoral engagement enhance accessibility to health facilities, reduce financial and geographical barriers, and produce strong quality care.

INTRODUCTION

Although pregnancy and childbirth are natural phenomena and frequently eventful processes that majority of women aspire to undergo at a certain point in their lives, this normal life-affirming process presents risks and complications to the mother and newborn. WHO estimated that the global maternal mortality ratio (MMR) is 211 deaths per 100 000 live births. In 2017, the total number of maternal deaths reached 295 000. Many researchers documented that more than three-fourth of maternal deaths are related to direct obstetric causes, which are easily preventable and treatable, such

as haemorrhage, sepsis, abortion, ruptured uterus and hypertensive pregnancy diseases and 77% of deaths occur during or shortly after birth (within 24 hours).[1] However, the rates of maternal mortality remain high across the world. Notwithstanding national and global initiatives, the indices of maternal and newborn morbidity or mortality showed modest declines, which suggests that the Millennium Development Goals by 2015 could not be met using the current strategies.[2] One explanation for the poor health outcomes among women and newborns is the non-use of modern healthcare services by a large proportion of women.[3]

The majority of maternal death globally can be prevented if pregnant women received at least four antenatal care (ANC4+) visits and were assisted by a skilled birth attendant (SBA) during delivery.[4] ANC is care for pregnant women and female adolescents provided by skilled healthcare professionals, such as doctors, nurses and midwives, to ensure the optimal health of pregnant women and babies.[5] Conversely, SBAs plays a significant role in the prevention of maternal and neonatal deaths and increases the probability of safe delivery given that most fatal obstetric complications occur during labour.[6] SBA is defined as an accredited health professional who has been educated and trained to proficiency in the skills needed to manage normal (uncomplicated) pregnancies, childbirth and the immediate postnatal period, and in the identification, management and referral of complications in women and newborns.[7]

Playing the role as the foundation of Indonesia's health service since the 1960s, community health centres in all subdistricts (*Puskesmas*) and villages (*Pustu*) have been playing an important part in maternal health services as primary healthcare both in urban and rural area.[8] Maternal health services have been integrated through the monthly community health post (*Posyandu*), which is attended by community volunteers, to expand the scope of ANC utilisation and raise awareness of skilled care. Birth centres (*Polindes*) have been set up in all villages to improve access to qualified care where village midwife (*Bidan di Desa*) were stationed there.[9] These programmes were established to support Maternal, Neonatal and Child Health (MNCH) services to decrease maternal and infant morbidity and mortality.

MMR in Indonesia for 2015 reached 305 per 100 000 live births, which exceeds the target of Sustainable Development Goals (less than 70 per 100 000 live births). In terms of ANC4 + and SBA utilisation, several reports pointed out that Indonesia has displayed commendable performance in increasing service utilisation across the country. A study based on the data of the Indonesia Demographic and Health Survey (IDHS) revealed a 14% increase in ANC utilisation from 81% in 1986 to 95% in 2012.[10] WHO and UNICEF reported a substantial increase in SBA utilisation from 64% in 2000 to 93% in 2017.[11] Despite the high percentage of usage of ANC and SBA in Indonesia, UNFPA suggested that the reason for the high MMR is the low quality of SBA care.[1] Vacancies and absenteeism

in maternal health services due to difficult geographical location, small incentive packages, and lack of career development opportunities, may also explain why MMR is slowly declining, even though the percentage of home delivery is declining.[10 12]

The presence of an SBA during delivery is critical, especially in cases of catastrophic complications during labour, where timely treatment is required to prevent maternal and neonatal morbidity and mortality.[7] Studies from several developing countries (eg, Uganda, Nigeria and Nepal) revealed that women who attended at least four ANC visits are more likely to use SBA during labour.[13–15] Therefore, continuity of care from ANC4 + to SBA is an important issue should be addressed to prevent maternal and neonatal mortality. Furthermore, it will increase the level of SBAs by encouraging quality ANC, providing skilled assistance to mothers during childbirth and enhancing the capacity of community health workers and community development army to carry out emergency obstetric care. This study aims to assess the determinants of ANC4 + and SBA independently, evaluate the distribution of utilisation of ANC4 + and SBA services, and further investigate the associations of two levels of continuity of maternal healthcare services utilisation in Indonesia.

METHODS
Data sources
We used data from the IDHS collected from 24 July 2017 to 30 September 2017. IDHS is a national-scale cross-sectional survey held once in 5 years and conducted by Statistics Indonesia, National Family Planning Coordinating Agency, and Ministry of Health. The sample design for the survey was two-stage stratified probability sampling. First, the numbers of census blocks were selected using probability proportional to size sampling within the size of households based on the Population Census 2010 lists. The number of census blocks used for the survey is 1,970, out of which 25 households were selected systematically from each block, which resulted in 49 250 households (25 300 households in urban areas and 23 950 households in rural areas).

Measurements
From a total of 49 627 women aged 15–49 years that were interviewed using a DHS standard questionnaire, we selected 15 288 respondents based on the following criteria: ever-married and had given birth in the last 5 years prior to the survey. The last criterion was set to avoid bias in the memory recall of the respondents. All respondents provided informed consent.

The outcome variable is the two levels of continuity of maternal healthcare services utilisation. A binary variable: 'complete', when the mother reported receiving services at the two levels (ANC4 + and SBA) and 'discontinued,' if the mother only used ANC and was not attended by SBA during childbirth. Each level was described as follows:

► Level 1: ANC4+—At least four ANC visits to MNCH health service providers during the pregnancy.
► Level 2: ANC4 + and SBA—At least four ANC visits and a trained and qualified health professional (ie, doctor/nurse/midwife) who assist mothers during the childbirth

The determinant of the dependent variables is related to the individual characteristics of the respondents, such as age, age at first birth, level of education, employment status, parity and autonomy in healthcare decision making. Apart from individual characteristics, family factors were measured, such as level of education and employment status of spouses, household income and mass media consumption to access relevant information (eg, frequency of reading newspapers, watching television or listening to the radio). Lastly, community factors, such as the geographical division of respondents divided into urban and rural areas and respondent's perceived distance from health facilities were also measured.[10 15–19] Backward elimination was used as the variable selection procedure in addition to significant covariates to keep important confounding variables, resulting in a slightly richer model. The likelihood ratio test and Akaike's information criterion (AIC) were used to further evaluate the overall model's goodness of fit. In the model building process, AIC is a reliable model selection estimator of prediction error to find the best quality of statistical models for a given set of data.

Statistical analyses
SPSS V.25 was used to analyse data from the 2017 IDHS. The proportions and chi-squared tests were used to see any differences in demographic and socioeconomic characteristics between ANC4 + and SBA. The results of MNCH services in ANC4 + and SBA were presented through descriptive statistics. To determine the relationship between factors of ANC4 + and SBA, simple and multiple binary logistic regression analyses were used to calculate the OR and adjusted OR (aOR) using 95% CI and p values with a level of significance at p<0.05.

RESULTS
Table 1 depicts the sociodemographic characteristics of respondents at the pregnancy level (ANC4+) and delivery level (SBA). In comparison with respondents who attended less than four ANC visits, respondents aged 25–34 years (51.9%), whose age at first birth was 20–29 years (66.5%), who finished secondary (57.4%) or higher (18.3%) level of education, whose husband finished secondary (57.9%) or higher (15.7%) level of education and is employed (99.3%) were more likely to receive ANC4+. Moreover, women with 1–2 pregnancies (67.8%), high levels of healthcare decision-making (44.2%), exposed to two (28%) or three (27.7%) forms of mass media, belonging to the middle (19.5%), upper (19.2%) or richest (18.4%) household income, whose distance from health facilities is favourable (89.3%)

and who live in urban areas (51.4%) were more likely to attend ANC4+.

Compared with women who did not use SBA, women aged 25–34 years (51.4%), older than 34 years (31.0%), whose age at first birth was 20–29 years (67.3%) and more than 29 years (6.8%), finished secondary (58.6%) or higher (19.4%) level of education and whose husband finished secondary (59.4%) or higher (16.6%) level of education were more likely to use SBA. Additionally, women who had 1–2 pregnancies (67.8%), high levels of healthcare decision-making (44.4%), were exposed to two (28.1%) or three (29.1%) forms of mass media, belong to the middle (20.3%), upper (20.1%) or richest (19.5%) household income, whose distance from health facilities was favourable (89.7%) and live-in urban areas (54.3%) were more likely to use SBA (table 1).

Table 2 indicates that 88.4% of women attended ANC4+. Out of 15 283 women, 83.4% were assisted by SBAs. Lastly, the majority (76.1%) received both ANC4 + and SBA. Regarding continuity of services utilisation in table 3, women who were 25–34 years (52.1%) and older than 34 years (30.8%), gave birth to their first child at 20–29 years (68.3%) or older than 29 years (7%), finished secondary (59.0%) or higher (20%) education, whose husband finished secondary (59.6%) or higher (17.3%) education, had 1–2 pregnancies (69%), high levels of autonomy in healthcare decision-making (44.7%), were exposed to two (28.6%) or three (29.3%) forms of mass media, came from the middle (20.5%), high (20.8%) or richest (20.6%) household income, whose distance from health facilities is favourable (90.3%) and live in urban areas (55.3%) were more likely to have more than four ANC visits and used SBA at delivery.

From table 4, we found wealth as the strongest determinant of ANC4 + and SBA. The aOR of ANC4 + and SBA gradually increased with the increase in the level of wealth. Compared with women from Q1, those from Q2 (aOR 1.59 95% CI 1.37 to 1.84), Q3 (aOR 1.95; 95% CI 1.65 to 2.31), Q4 (aOR 2.77; 95% CI 2.26 to 3.40) and Q5 (aOR 4.13; 95% CI 3.19 to 5.36) were more likely to attend ANC4+. Moreover, women in Q2 (aOR 1.79; 95% CI 1.60 to 2.00), Q3 (aOR 2.54; 95% CI 2.23 to 2.88), Q4 (aOR 3.30; 95% CI 2.83 to 3.83) and Q5 (aOR 4.66; 95% CI 3.85 to 5.64) were more likely to receive both ANC4 + and SBA. Furthermore, women aged 25–34 years (aOR 1.37; 95% CI 1.17 to 1.60) and older than 34 years (aOR 1.68; 95% CI 1.36 to 2.07) were more likely to receive ANC4 + compared with those aged 15–24 years. The odds of using continuity of services were higher among women older than 34 years (aOR 1.54; 95% CI 1.31 to 1.80) compared with women aged 15–24 years. Women who gave birth to their first child between the ages of 20 and 29 years (aOR 1.27; 95% CI 1.12 to 1.44) were more likely to attend ANC4 + compared with those who gave birth to their first child when they were less than 20 years. Women aged 20–29 years at first birth (aOR 1.36; 95% CI 1.23 to 1.49) or older than 29 years (aOR 1.57; 95% CI 1.25 to 1.98) tended to use ANC4 +

Table 1 Sociodemographic characteristics of respondents at the pregnancy level and delivery level

	Pregnancy level (ANC4+)*†			Delivery level (SBA)*‡		
	≥4 visits	<4 visits		Yes	No	
	n (%) (n=13510)	n (%) (n=1778)	P value	n (%) (n=12740)	n (%) (n=2543)	P value
Age			<0.001			<0.001
15–24	2402 (17.8)	396 (22.3)		2246 (17.6)	550 (21.6)	
25–34	7005 (51.9)	790 (44.4)		6549 (51.4)	1245 (49.0)	
>34	4103 (30.4)	592 (33.3)		3945 (31.0)	748 (29.4)	
Age at first birth			<0.001			<0.001
<20	3652 (27.0)	755 (42.5)		3291 (25.8)	1115 (43.8)	
20–29	8984 (66.5)	942 (53.0)		8578 (67.3)	1346 (52.9)	
>29	874 (6.5)	81 (4.6)		871 (6.8)	82 (3.2)	
Level of education			<0.001			<0.001
None	116 (0.9)	88 (4.9)		98 (0.8)	106 (4.2)	
Primary	3159 (23.4)	683 (38.4)		2709 (21.3)	1131 (44.5)	
Secondary	7759 (57.4)	832 (46.8)		7467 (58.6)	1123 (44.2)	
Higher	2476 (18.3)	175 (9.8)		2466 (19.4)	183 (7.2)	
Husband's level of education			<0.001			<0.001
None	171 (1.3)	84 (5.0)		142 (1.1)	113 (4.6)	
Primary	3289 (25.0)	603 (36.1)		2818 (22.8)	1074 (43.9)	
Secondary	7613 (57.9)	853 (51.0)		7344 (59.4)	1118 (45.7)	
Higher	2067 (15.7)	131 (7.8)		2057 (16.6)	140 (5.7)	
Employment status			0.005			0.185
Not working	6201 (45.9)	878 (49.5)		5868 (46.1)	1209 (47.5)	
Working	7299 (54.1)	897 (50.5)		6859 (53.9)	1334 (52.5)	
Husband's employment status			<0.001			0.138
Not working	94 (0.7)	26 (1.6)		94 (0.8)	26 (1.1)	
Working	12 909 (99.3)	1636 (98.4)		12 126 (99.2)	2414 (98.9)	
Parity			<0.001			<0.001
Five or more	645 (4.8)	275 (15.5)		617 (4.8)	303 (11.9)	
3–4	3699 (27.4)	570 (32.1)		3485 (27.4)	784 (30.8)	
1–2	9166 (67.8)	933 (52.5)		8638 (67.8)	1456 (57.3)	
Autonomy in healthcare decision-making			<0.001			<0.001
No	7321 (55.8)	1022 (61.2)		6872 (55.6)	1468 (60.1)	
Yes	5809 (44.2)	648 (38.8)		5479 (44.4)	976 (39.9)	
Mass media consumption			<0.001			<0.001
Not at all	413 (3.1)	181 (10.2)		345 (2.7)	249 (9.8)	
Any one	5572 (41.2)	805 (45.3)		5105 (40.1)	1271 (50.0)	
Any two	3784 (28.0)	407 (22.9)		3582 (28.1)	608 (23.9)	
All three	3741 (27.7)	385 (21.7)		3708 (29.1)	415 (16.3)	
Household income			<0.001			<0.001
Q1 (poorest)	3144 (23.3)	893 (50.2)		2598 (20.4)	1437 (56.5)	
Q2	2661 (19.7)	361 (20.3)		2502 (19.6)	520 (20.4)	
Q3	2628 (19.5)	255 (14.3)		2586 (20.3)	296 (11.6)	
Q4	2588 (19.2)	166 (9.3)		2566 (20.1)	188 (7.4)	
Q5 (richest)	2489 (18.4)	103 (5.8)		2488 (19.5)	102 (4.0)	

Continued

Table 1 Continued

| | Pregnancy level (ANC4+)*† | | | Delivery level (SBA)*‡ | | |
| | ≥4 visits | <4 visits | | Yes | No | |
	n (%) (n=13510)	n (%) (n=1778)	P value	n (%) (n=12 740)	n (%) (n=2543)	P value
Distance from health facilities			<0.001			<0.001
Unfavourable	1441 (10.7)	362 (20.4)		1301 (10.3)	501 (19.7)	
Favourable	12 059 (89.3)	1415 (79.6)		11 431 (89.7)	2039 (80.3)	
Residence			<0.001			<0.001
Urban	6938 (51.4)	610 (34.3)		6916 (54.3)	631 (24.8)	
Rural	6572 (48.6)	1168 (65.7)		5824 (45.7)	1912 (75.2)	

*χ^2 test was used to measure p value.
†At least four ANC visits during pregnancy.
‡Had childbirth assisted by SBA.
ANC4+, four times antenatal care; SBA, skilled birth attendant.

and SBA compared with those aged less than 20 years at first child.

Compared with women without any level of education, women who attended secondary education were 2.3 times (aOR 2.33; 95% CI 1.65 to 3.29) more likely to use ANC4+. The odds of ANC4 +and SBA utilisation were higher between women who achieved secondary education (aOR 2.17; 95% CI 1.5 5 to 3.05) and whose husbands were more educated (aOR 2.04; 95% CI 1.46 to 2.85). Women with 1–2 or 3–4 pregnancies were found more likely to attend ANC4+ (aOR 3.62; 95% CI 2.92 to 4.49 and aOR 2.13; 95% CI 1.76 to 2.57, respectively) and receive complete care at delivery (aOR 2.61; 95% CI 2.17 to 3.14 and aOR 1.82; 95% CI 1.54 to 2.16, respectively) compared with women with five or more pregnancies. Women with exposure to two forms (aOR 1.55; 95% CI 1.23 to 1.96) of mass media tended to use ANC4+. Moreover, women with exposure to three types of mass media were 0.5 times (aOR 1.50; 95% CI 1.21 to 1.85) more

Table 2 Measures to describe continuity of maternal healthcare services utilisation

| | IDHS 2017 n=15288 | |
Characteristics	n	%
Pregnancy level: ANC4+		
Four visits or more	13 510	88.4
Less than four visits	1778	11.6
Delivery level: SBA at delivery		
Yes	12 740	83.4
No	2543	16.6
Continuity of services utilisation		
Yes, received both ANC4 + and SBA	11 632	76.1
None	3651	23.9

ANC4+, four times antenatal care; IDHS, Indonesia Demographic and Health Survey; SBA, skilled birth attendant.

likely to receive complete care at delivery compared with those without access to mass media. Women with a favourable distance from health facilities were more likely to have ANC4+ (aOR 1.46; 95% CI 1.27 to 1.69) and receive complete care at delivery (aOR 1.39; 95% CI 1.24 to 1.57). Lastly, living in rural areas (aOR 0.70; 95% CI 0.64 to 0.77) rendered women less likely to receive complete care at delivery (table 4).

DISCUSSION

As the first stage of receiving continuum of care, ANC is an essential step for the promotion of the health, well-being and survival of mothers and babies during pregnancy.[19] ANC is also a step towards encouraging women to deliver their babies with the assistance of SBAs to ensure safety during childbirth and reduce maternal and neonatal mortality. The use of ANC4 +and SBA for MNCH services is determined by several factors. Thus, improving MNCH services to women who are young mothers, without any level of education, economically disadvantaged, living in rural areas and experiencing difficulty in accessing health services is crucial to improve the health status of mothers and their children. Hence, the study analysed the factors that influence the continuation of ANC4 + and SBA at delivery among women in Indonesia.

Our study found that results indicate an increase in the use of ANC4+ and SBA in 2017 compared with that of the 2012 IDHS.[10] More than 70% of women used continuity of services. Notably, wealth was the biggest determinant for the utilisation of ANC4 +and SBA at delivery. Women in the highest household income were 4.1 times more likely to attend ANC4 +visits compared with those in the lowest household income. Women of the lowest household income were more likely to give birth to non-skilled health workers than those with the highest household income. This finding is in line with those in Shanghai and Pakistan. Women with high household income had the highest odds to use ANC4 +and SBA at delivery because

Table 3 The two levels of continuity of services utilisation and various key determinants

	Care at pregnancy (ANC4+)*		P value	Care at delivery (ANC4 + and SBA)*		P value
	>4 visits†	≤4 visits‡		Complete §	Discontinued¶	
	n (%)	n (%)		n (%)	n (%)	
	(n=13510)	(n=1778)		(n=11632)	(n=3651)	
Age			<0.001			<0.001
15–24	2402 (17.8)	396 (22.3)		1996 (17.2)	800 (21.9)	
25–34	7005 (51.9)	790 (44.4)		6058 (52.1)	1736 (47.5)	
>34	4103 (30.4)	592 (33.3)		3578 (30.8)	1115 (30.5)	
Age at first birth			<0.001			<0.001
<20	3652 (27.0)	755 (42.5)		2876 (24.7)	1530 (41.9)	
20–29	8984 (66.5)	942 (53.0)		7942 (68.3)	1982 (54.3)	
>29	874 (6.5)	81 (4.6)		814 (7.0)	139 (3.8)	
Level of education			<0.001			<0.001
None	116 (0.9)	88 (4.9)		72 (0.6)	132 (3.6)	
Primary	3159 (23.4)	683 (38.4)		2365 (20.3)	1475 (40.4)	
Secondary	7759 (57.4)	832 (46.8)		6866 (59.0)	1724 (47.2)	
Higher	2476 (18.3)	175 (9.8)		2329 (20.0)	320 (8.8)	
Husband's level of education			<0.001			<0.001
None	171 (1.3)	84 (5.0)		120 (1.1)	135 (3.9)	
Primary	3289 (25.0)	603 (36.1)		2497 (22.1)	1395 (40.0)	
Secondary	7613 (57.9)	853 (51.0)		6745 (59.6)	1717 (49.3)	
Higher	2067 (15.7)	131 (7.8)		1960 (17.3)	237 (6.8)	
Employment status			0.005			0.001
Not working	6201 (45.9)	878 (49.5)		5296 (45.6)	1781 (48.8)	
Working	7299 (54.1)	897 (50.5)		6326 (54.4)	1867 (51.2)	
Husband's employment status			<0.001			0.007
Not working	94 (0.7)	26 (1.6)		79 (0.7)	41 (1.2)	
Working	12909 (99.3)	1636 (98.4)		11111 (99.3)	3429 (98.8)	
Parity			<0.001			<0.001
5 or more	645 (4.8)	275 (15.5)		480 (4.1)	440 (12.1)	
3–4	3699 (27.4)	570 (32.1)		3129 (26.9)	1140 (31.2)	
1–2	9166 (67.8)	933 (52.5)		8023 (69.0)	2071 (56.7)	
Autonomy in healthcare decision-making			<0.001			<0.001
No	7321 (55.8)	1022 (61.2)		6260 (55.3)	2080 (59.7)	
Yes	5809 (44.2)	648 (38.8)		5053 (44.7)	1402 (40.3)	
Mass media consumption			<0.001			<0.001
Not at all	413 (3.1)	181 (10.2)		278 (2.4)	316 (8.7)	
Any one	5572 (41.2)	805 (45.3)		4626 (39.8)	1750 (47.9)	
Any two	3784 (28.0)	407 (22.9)		3322 (28.6)	868 (23.8)	
All three	3741 (27.7)	385 (21.7)		3406 (29.3)	717 (19.6)	
Household income			<0.001			<0.001
Q1 (poorest)	3144 (23.3)	893 (50.2)		2190 (18.8)	1845 (50.5)	
Q2	2661 (19.7)	361 (20.3)		2237 (19.2)	785 (21.5)	
Q3	2628 (19.5)	255 (14.3)		2387 (20.5)	495 (13.6)	
Q4	2588 (19.2)	166 (9.3)		2422 (20.8)	332 (9.1)	
Q5 (richest)	2489 (18.4)	103 (5.8)		2396 (20.6)	194 (5.3)	

Table 3 Continued

	Care at pregnancy (ANC4+)*		P value	Care at delivery (ANC4 + and SBA)*		P value
	>4 visits†	≤4 visits‡		Complete §	Discontinued¶	
	n (%)	n (%)		n (%)	n (%)	
	(n=13 510)	(n=1778)		(n=11 632)	(n=3651)	
Distance from health facilities			<0.001			<0.001
Unfavourable	1441 (10.7)	362 (20.4)		1121 (9.6)	681 (18.7)	
Favourable	12 059 (89.3)	1415 (79.6)		10 503 (90.3)	2967 (81.3)	
Residence			<0.001			<0.001
Urban	6938 (51.4)	610 (34.3)		6434 (55.3)	1113 (30.5)	
Rural	6572 (48.6)	1168 (65.7)		5198 (44.7)	2538 (69.5)	

*χ^2 test was used to measure p value.
†Had at least four ANC visits during pregnancy.
‡Less than four ANC visits during pregnancy.
§Achieved both ANC4 +and SBA.
¶Only used ANC visits during pregnancy and was not attended by SBA during childbirth.
ANC, antenatal care; SBA, skilled birth attendant.

they can afford the expenses of going to healthcare facilities and cover the costs for family members that accompany them.[17 20] Recent studies in Indonesia also support our result. The main professions of low-income families are fishermen and farmers, who relied on marine and natural products to meet their daily needs. Pregnant women who did not prepare for childbirth costs had a 1.7 times greater chance of choosing traditional birth attendant (TBA) instead of SBA.[21 22] Although health insurance covers the cost of childbirth, pregnant women rarely take advantage of it. Pregnant mothers and their families can set up a payment plan and use crop products (such as rice, corn and cassava) instead of money to pay for TBA's services.[23]

Age was significantly associated with the use of ANC4 + and SBA at delivery. Women older than 24 years tended to undergo adequate ANC visits. The same result was observed in Manitoba, Canada[24] and in 28 African countries, showing that women older than 34 years were 1.5 times more likely to have used ANC4 + and SBA at delivery.[25] However, a study in Ethiopia found that older women (35–39 years) were more likely to have inadequate ANC visits compared with women aged 15–19 years.[26] Women in Canada aged 18 years or less were less likely to use MNCH services compared with older women.[27] In this case, services that target young mothers are required to increase the use of maternal health services because young women are more likely less educated about pregnancy issues. Thus, they need to be educated about the benefits of seeking care during pregnant.

Moreover, this study observed a significant association between level of education and utilisation of ANC4 + and SBA. Results illustrated that, women with secondary education were more likely to use ANC4 + and continuity of services. Women with secondary and higher education displayed higher odds to use ANC4 +and SBA compared with women without education.[19 28 29] This study infers that a high level of education is related to the ability to absorb more information and use it to decide on services required for pregnancy. Additionally, educated women are more likely socioeconomically advantaged; thus, their environment enables them to gain autonomy in terms of reproductive choices.

Furthermore, the current study found that the husband's level of education is significantly associated with the utilisation of ANC4 + and SBA. Women with husbands achieved high levels of education were more likely to achieve continuity of services utilisation. This finding is in line with those in Ethiopia, Pakistan and Kenya. The husband's level of education is reflective of the power of decision-making in the household, where husbands with high levels of education were more willing to discuss choices regarding MNCH services with their wives.[17 19 30] Thus, reaching out to husbands with less educational attainment to relay the importance of MNCH services is crucial because husbands make the majority of decisions in the Indonesian context.

Women with five or more pregnancies were less likely to receive ANC4 +and continuity of services utilisation. Similar findings were reported for Uganda, Ethiopia, Canada and Senegal and Tanzania.[13 19 24 31] This finding could be possibly related to the cognition that women with five or more pregnancies are considered competent to give birth without an SBA; thus, they were not motivated to attend the recommended number of ANC visits due to this experience.[13 19] Furthermore, multipara women are engaged with taking care of children and household responsibilities.[18] Nevertheless, educating grand multipara women to attend ANC and use SBA during delivery is important because they share the same risk of maternal and neonatal complications as other parity groups.[32]

Exposure to mass media is also a predictor of the utilisation of ANC4 + and SBA. Exposure to mass media stimulates women to use ANC4 + and SBA at delivery because

Table 4 Logistic regression models of the two levels of continuity of services utilisation

	Care at pregnancy (ANC4+)†‡		Complete care at delivery (ANC4 + and SBA)†§	
	Bivariate	Multivariate¶	Bivariate	Multivariate††
	OR	aOR (95% CI)	OR	aOR (95% CI)
Age				
15–24	1	1	1	1
25–34	1.46***	1.37*** (1.17 to 1.60)	1.40***	1.18** (1.05 to 1.34)
>34	1.14	1.68*** (1.36 to 2.07)	1.29***	1.54*** (1.31 to 1.80)
Age at first birth				
<20	1	1	1	1
20–29	1.97***	1.27*** (1.12 to 1.44)	2.13***	1.36*** (1.23 to 1.49)
>29	2.23***	1.08 (0.81 to 1.44)	3.12***	1.57*** (1.25 to 1.98)
Level of education				
None	1	1	1	1
Primary	3.51***	1.81** (1.29 to 2.53)	2.94***	1.55* (1.11 to 2.16)
Secondary	7.08***	2.33*** (1.65 to 3.29)	7.30***	2.17*** (1.55 to 3.05)
Higher	10.73***	1.82** (1.22 to 2.71)	13.34***	1.87** (1.29 to 2.70)
Husband's level of education				
None	1	1	1	1
Primary	2.68***	1.69** (1.24 to 2.32)	2.01***	1.36* (1.01 to 1.82)
Secondary	4.38***	1.63** (1.18 to 2.23)	4.42***	1.60** (1.19 to 2.15)
Higher	7.75***	1.90** (1.29 to 2.78)	9.30***	2.04*** (1.46 to 2.85)
Employment status				
Not working				
Not working	1	1	1	1
Working	1.15**	1.19** (1.06 to 1.32)	1.14**	1.09 (1.00 to 1.18)
Husband's employment status				
Not working	1	1	1	1
Working	2.18***	1.97** (1.23 to 3.15)	1.69**	1.00 (1.10 to 2.53)
Parity				
5 or more	1	1	1	1
3–4	2.77***	2.13*** (1.76 to 2.57)	2.52***	1.82*** (1.54 to 2.16)
1–2	4.19***	3.62*** (2.92 to 4.49)	3.55***	2.61*** (2.17 to 3.14)
Autonomy in healthcare decision-making				
No	1	1	1	1
Yes	1.25***	1.14* (1.02 to 1.27)	1.20***	1.08 (0.99 to 1.17)
Mass media consumption				
Not at all	1	1	1	1
Any one	3.03***	1.43** (1.15 to 1.78)	3.01***	1.26* (1.03 to 1.53)
Any two	4.08***	1.55*** (1.23 to 1.96)	4.35***	1.43** (1.16 to 1.75)
All three	4.26***	1.40** (1.10 to 1.77)	5.40***	1.50*** (1.21 to 1.85)
Household income				
Q1 (poorest)	1	1	1	1
Q2	2.09***	1.59*** (1.37 to 1.84)	2.40***	1.79*** (1.60 to 2.00)
Q3	2.93***	1.95*** (1.65 to 2.31)	4.06***	2.54*** (2.23 to 2.88)
Q4	4.43***	2.77*** (2.26 to 3.40)	6.15***	3.30*** (2.83 to 3.83)
Q5 (richest)	6.68***	4.13*** (3.19 to 5.36)	10.41***	4.66*** (3.85 to 5.64)

Table 4 Continued

	Care at pregnancy (ANC4+)†‡		Complete care at delivery (ANC4 + and SBA)†§	
	Bivariate	Multivariate¶	Bivariate	Multivariate††
	OR	aOR (95% CI)	OR	aOR (95% CI)
Distance from health facilities				
Unfavourable	1	1	1	1
Favourable	2.14***	1.46*** (1.27 to 1.69)	2.15***	1.39*** (1.24 to 1.57)
Residence				
Urban	1	1	1	1
Rural	0.50***	0.92 (0.81 to 1.04)	0.35***	0.70*** (0.64 to 0.77)

*P<0.05, **p<0.01, ***p<0.001.
†Binary logistic regression.
‡Had at least four ANC visits during pregnancy.
§Achieved both ANC4 + and SBA.
¶Adjusted for age at first birth, level of education, autonomy in healthcare decision making, mass media consumption, household income and residence.
††Adjusted for age at first birth, level of education, employment status, parity, autonomy in healthcare decision making, mass media consumption, household incom, and residence.
ANC4+, four times antenatal care; AOR, adjusted OR; SBA, skilled birth attendant.

mass media can disseminate information regarding the importance of ANC visits and availability.[16 33] Information of SBA at delivery utilisation and other health-related behaviours could be spread through television.[34] Massive intervention through mass media is a feasible idea but requires certain considerations, such as the form of mass media used to reach remote areas without access to electricity or the internet.

Distance from health facilities and type of residence were significantly associated with the use of ANC4 + and SBA at delivery. The results of the current study are in line with those of the 2010 DHS data for Burkina Faso, which reported that the farther the distance from the nearest health centres, the lesser the odds of using pregnancy and delivery services.[35] The negative association between distance from health facilities and utilisation of ANC4 + and SBA was also reported for Nigeria and North West Ethiopia.[15 29] Previous findings demonstrated that women in urban areas had higher odds of using ANC4 + and continuity of services.[15 25 26 28 35] Urban residents may have easy access to health facilities due to several advantages, such as shorter travel distances, better roads and transportation and more information regarding reproductive health compared with rural residents.[29] Previous studies in Indonesia showed that women living in urban areas were less likely to choose delivery with the help of TBAs than women living in rural areas (p≤0.001; OR 0.70; 95% C 0.60 to 0.91).[22] Due to strong cultural beliefs, accessibility and availability of delivery facilities (long distance to health facilities), rural residents trust TBAs more than health professionals and prefer to give birth in non-health facilities or at home, regardless of the competence of birth attendants.[23] Living in urban areas allows for easier access to health facilities and information than living in rural areas. Therefore, the gap between rural and urban areas must be considered by the government regarding maternal and child health issues.[36]

In this study, we analysed the determinants of ANC4 + and SBA independently, the distribution of utilisation, and investigated the associations of two levels of continuity of maternal healthcare services utilisation (both ANC4 + and SBA) in Indonesia. Each step adds to the overall benefit of ensuring improved health for mothers and newborns. Attending ANC and giving birth with the help of an SBA has been shown to reduce pregnancy-related complications, implying that healthcare-based delivery at the primary care level, supplemented by referral-level access, is a critical approach for reducing maternal and neonatal morbidity and mortality. The findings of this study will be very relevant for policymakers as reported in the reproductive health road map for the improvement of maternal health in primary care practice and research in general.

This study takes advantage of the 2017 IDHS, which is a nationally representative survey of the Indonesian population. The most recent IDHS data were used to reduce potential bias associated with time effects. Results are generalisable because standard procedures and measurement units were used for the selection of primary sampling units, household strata and respondents. However, the data used are of a retrospective cross-sectional design. Thus, the observed associations could not be interpreted as causal relationships. Additionally, information related to ANC4 + and SBA at delivery may be prone to recall bias because information was based on self-reported data. By restricting the sample to mothers who had their childbirth within the 5 years preceding the survey, the potential of recall bias has been minimised. However, under-reporting may be possible. Future research using a prospective cohort study could be implemented to determine the

causal association between the determinants and continuity of maternal healthcare services utilisation.

CONCLUSION

The study examined the determinants of continuity of services from ANC to SBA during childbirth in Indonesia. The continuity of services utilisation reached 76.1% among the respondents. Furthermore, the utilisation of ANC4 + and SBA at delivery services is associated with age, reproductive status, family influence and accessibility-related factors. Findings demonstrated the importance of enhancing early reproductive health education for men and women. Although the utilisation of ANC4 + and SBA is relatively high, Indonesia continues to face the problem of high MMR as well. Future health programmes should concentrate on improving the quality of care provided by healthcare practitioners. Moreover, multisectoral engagement should be enforced to enhance accessibility to health facilities and reduce financial and geographical barriers, such that high-quality care can be provided to all mothers. The government and policy-makers need to increase SBA's partnership with TBAs, strengthen the primary care and independent practice of midwives in detecting complications/risk factors for pregnant women, develop mobile applications and referral information systems, and increase the role of women in health services utilisation, especially for women living in rural areas and from low-income families. Health workers are also expected to reach and monitor high-risk pregnant women through mass media, social media, online classes, private chats and regular visits to their homes.

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