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Original Research Article

Age at initiation of childbearing and maternal healthcare utilisation in South and Southeast Asia: a multi-country analysis of demographic and health surveys

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ABSTRACT

Background: Age at initiation of childbearing (AICB) may be associated with maternal healthcare utilisation. This study examined AICB patterns and their associations with maternal healthcare use across eight South and Southeast Asian countries.

Methods: Data were drawn from the latest available Demographic and Health Survey rounds in Bangladesh, India, Indonesia, Maldives, Nepal, Pakistan, the Philippines and Timor-Leste. The analysis included women aged 15-49 whose first live birth occurred within five years before the survey. AICB was classified as early (<20 years), mid (20-29 years) or late (≥30 years). Country-specific logistic regression models assessed the outcomes: four or more antenatal care (ANC) visits, first-trimester ANC, full ANC, institutional delivery and a postnatal check, adjusting for sociodemographic and partner-related characteristics.

Results: Mean AICB ranged from 19.98 years in Bangladesh to 24.38 years in Maldives. Early AICB was most prevalent in Bangladesh (54.3%) and Nepal (36.5%); late AICB was most common in the Philippines (15.0%) and Maldives (10.4%). Associations varied by country and outcome. Early AICB was associated with lower adjusted odds of four or more ANC visits in Bangladesh, Indonesia and Pakistan, and lower odds of first-trimester ANC in India, Indonesia, Nepal and the Philippines. Late AICB was associated with higher odds of full ANC in Bangladesh, India and Nepal. Postnatal care associations differed across countries.

Conclusions: Associations between AICB and maternal healthcare utilisation were heterogeneous across countries and service indicators. Context-specific strategies should address gaps in timely ANC, completion of recommended ANC components, institutional delivery and postnatal follow-up.

Keywords: Age at first birth, Antenatal care, Maternal healthcare utilisation, Demographic and health surveys, South and Southeast Asia

INTRODUCTION

The age at which a woman has her first child is one of the more consequential events in her reproductive life. It marks the start of exposure to pregnancy-related risk, and it is tied to schooling, marriage and household resources. Over the past five decades the timing of first birth has shifted almost everywhere, driven by wider education, better access to contraception and changing gender norms.[1-3] In high-income countries first births now commonly come at 28-30 years or later.[4] In low-and middle-income countries, the picture is split. The World Health Organisation estimates that about 21 million girls aged 15-19 become pregnant each year in these settings, resulting in roughly 12 million births.[5] Globally, about

one in five girls in low- and middle-income countries gives birth before age 18, and adolescent marriage and maternity persist alongside limited schooling.[6,7]

South and Southeast Asia contain the whole range. Maldives combines near-universal institutional delivery with late first births, while early marriage and early childbearing remain common in Bangladesh and Nepal.[8,9] In most of the region, pregnancy outside marriage is rare, so the age at first union largely sets the age at first birth.[10,11] Low education, poverty, rural residence and minority status are the most consistent correlates of adolescent pregnancy.[12-14]

The timing of the first birth matters for health because it shapes contact with the health system. Adolescent mothers are less likely than older mothers to receive adequate antenatal care, to deliver in a facility and to get postnatal care.[15,16] Analyses across 54 low- and middle-income countries show lower antenatal coverage and lower skilled-attendance and institutional-delivery coverage among adolescent mothers, with wide gaps persisting in South Asia.[17,18] At the other end of the reproductive age spectrum, later childbearing may be associated with a different set of maternal health considerations. Evidence suggests that maternal age is related to pregnancy risks and the need for appropriate antenatal monitoring, although the magnitude and nature of these associations vary across settings.[19-22] A study in Bangladesh found that both early and late childbearing were associated with a 30-31% higher risk of multiple pregnancy complications.[23] The consequences also reach the next generation: early childbearing has been linked to maternal undernutrition and to child stunting and underweight.[24,25]

Despite the growing evidence on adolescent childbearing and maternal healthcare utilisation, comparative evidence on how the timing of first birth is associated with maternal healthcare use across South and Southeast Asia remains limited. Differences in education, household wealth, residence, union formation and healthcare systems may influence these associations across countries. This study addresses this gap by examining the distribution of AICB and its association with maternal healthcare utilisation in eight South and Southeast Asian countries using the latest available Demographic and Health Survey rounds. Specifically, the study describes the distribution of early, mid and late AICB; compares the prevalence of maternal healthcare indicators across these categories; and examines country-specific associations after adjustment for relevant sociodemographic and partner characteristics.

METHODS

Data source and countries

The study used nationally representative data from the latest available Demographic and Health Survey (DHS) round for each of eight South and Southeast Asian countries: Bangladesh, India, Indonesia, Maldives, Nepal, Pakistan, the Philippines and Timor-Leste. The respective survey fieldwork periods were 27th June 2022 to 12th December 2022 in Bangladesh; 17th June 2019 to 30th January 2020 (Phase I) and 2nd January 2020 to 30th April 2021 (Phase II) in India; 24th July to 30th September 2017 in Indonesia; 17th March 2016 to 27th November 2017 in Maldives; 5th January 2022 to 22nd June 2022 in Nepal; 22nd November 2017 to 30th April 2018 in Pakistan; 2nd May 2022 to 22nd June 2022 in the Philippines; and 16th September to 22nd December 2016 in Timor-Leste. Overall, the survey data used in this study were collected between March 2016 and December 2022.

DHS employs standardised questionnaires and a stratified, multistage sampling design to collect information on fertility, maternal healthcare and household characteristics. The Kids record (KR) files were used to identify eligible first births and obtain information on maternal healthcare utilisation. The analysis was conducted separately for each country to account for differences in population characteristics, survey contexts and healthcare systems.

Study population and eligibility criteria

The study population comprised women aged 15-49 years whose first live birth occurred within the five years preceding the respective DHS interview. This restriction ensured that the analysis focused on recent first-time mothers for whom information on maternal healthcare utilisation was available.

Women were included if they were aged 15-49 years, had experienced a first live birth within the five-year reference period, and had the information required for the relevant analysis. Women who had not experienced a first live birth during this period or who did not meet the eligibility criteria were excluded. The analytical sample comprised 59,962 women in India, 5,008 in Indonesia, 1,939 in Bangladesh, 1,338 in Pakistan, 1,330 in the Philippines, 1,148 in Nepal, 1,059 in Timor-Leste and 889 in Maldives.

Exposure variable

AICB is the age, in completed years, at which a woman gave birth to her first child.[26] Mean AICB is the average of this age across eligible women.[27] For regression, we used three groups. Early AICB is a first birth before age 20. Late AICB is a first birth at 30 years or older, the threshold used for low-and middle-income settings. Mid AICB (20-29 years) is the reference.

Outcome variables

The study examined maternal healthcare utilisation across antenatal care (ANC), delivery care and postnatal care. The outcomes included four or more ANC visits,

initiation of ANC during the first trimester, full ANC, institutional delivery and a postnatal check within two months of delivery. Full ANC was defined as the receipt of all four recommended components: at least four ANC visits, initiation of ANC during the first trimester, consumption of at least 100 iron-folic acid (IFA) tablets or an equivalent syrup during pregnancy, and receipt of at least two tetanus toxoid (TT/Td) injections before delivery. Women were classified as having received full ANC only when all four criteria were satisfied. Institutional delivery was defined as childbirth in a health facility. Postnatal care was assessed by whether a postnatal check was received within 2 months of delivery.

Covariates

The adjusted models included age at first cohabitation, place of residence, women's educational attainment and occupation, household wealth index, religion where recorded, exposure to mass media, partner's age, education and occupation, and co-residence with the husband or partner.

Statistical analysis

Analyses were conducted separately for each country using Stata/SE 17.0. Frequency distributions and percentages were used to describe the distribution of AICB and maternal healthcare utilisation across AICB categories. Appropriate sampling weights were applied to account for the DHS sampling design. AICB was classified as early (less than 20 years), mid (20-29 years) and late (30 years or older), with mid-AICB serving as the reference category in regression analyses. Country-specific unadjusted and adjusted logistic regression models were fitted to examine associations between AICB and maternal healthcare indicators. Adjusted models included the covariates described above. Results were expressed as odds ratios with 95% confidence intervals.

RESULTS

Frequency distribution of AICB

The distribution of AICB varied across the eight South and Southeast Asian countries. The mean age at first birth ranged from 19.98 years in Bangladesh to 24.38 years in Maldives. Early childbearing, defined as a first birth before age 20, was most prevalent in Bangladesh (54.3%), followed by Nepal (36.5%) and Pakistan (26.6%). The corresponding proportions were 25.2% in the Philippines, 22.9% in India, 22.8% in Indonesia and 21.4% in Timor-Leste. Maldives had the lowest prevalence of early childbearing, at 5.9% (Figure 1).

Mid-age initiation of childbearing (20–29 years) constituted the largest category in most countries. Based on the reported percentages, this group accounted for approximately 83.7% of women in Maldives, 71.2% in India, 71.1% in Timor-Leste, 67.7% in Indonesia, 65.6% in Pakistan, 59.8% in the Philippines, 59.0% in Nepal and 43.3% in Bangladesh. Late childbearing, defined as a first birth at age 30 years or older, was most prevalent in the Philippines (15.0%), followed by Maldives (10.4%), Indonesia (9.5%), Pakistan (7.8%), Timor-Leste (7.5%), India (5.9%), Nepal (4.5%) and Bangladesh (2.4%).

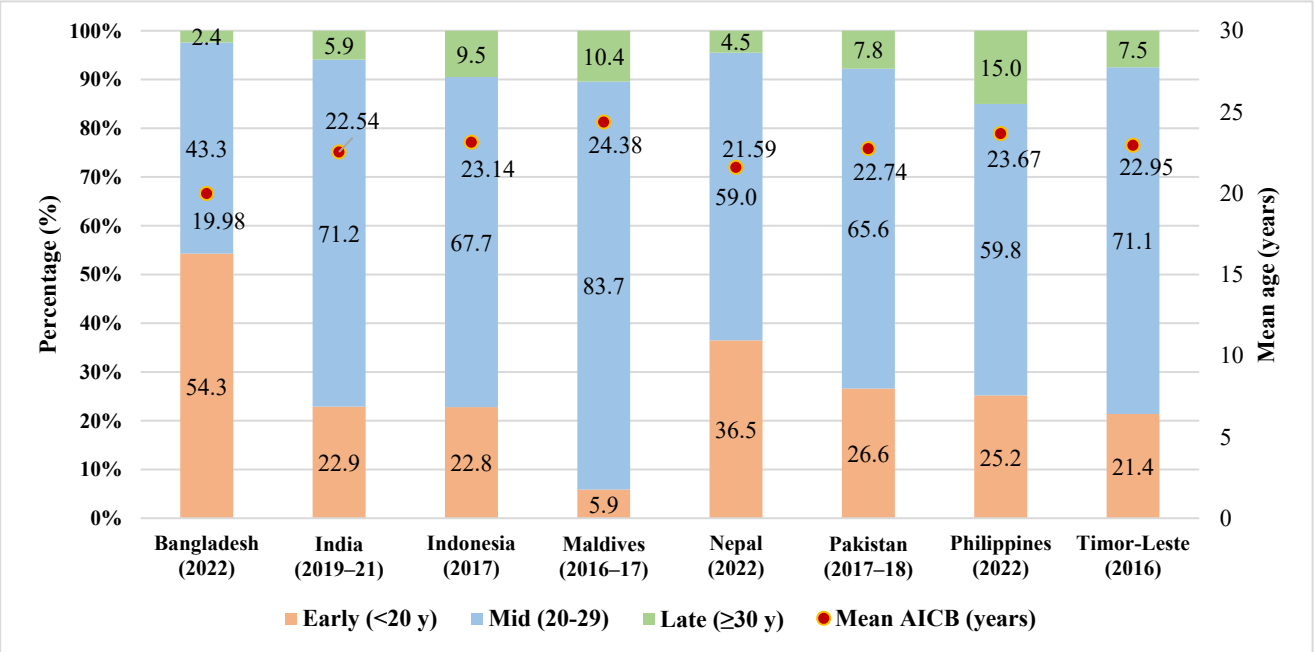


Figure 1: Distribution and mean AICB across eight South and Southeast Asian countries.

*Stacked bars represent the percentage distribution of early (<20 years), mid (20-29 years) and late (≥30 years) initiation of childbearing. Red markers indicate the mean AICB.

Maternal healthcare utilisation by AICB category

Maternal healthcare utilisation varied considerably across countries and AICB categories (Table 1). The differences were evident in antenatal care coverage, completion of full ANC and institutional delivery.

The prevalence of four or more ANC visits was relatively low among early initiators in Bangladesh (35.9%), Indonesia (34.5%) and Pakistan (46.7%). In comparison, the corresponding proportions among women with mid-AICB were 51.7%, 37.6% and 70.7%, respectively. In Nepal, four or more ANC visits were reported by 81.8% of early initiators and 89.7% of mid initiators. Coverage was also high in the Philippines, at 81.3% and 89.5%, respectively, and in Timor-Leste, at 74.0% and 80.8%. Maldives showed a different pattern, with 87.5% of early initiators and 81.8% of mid initiators reporting four or more visits.

Initiation of ANC during the first trimester also differed across AICB categories. In Bangladesh, 1st trimester ANC was reported by 34.2% of early initiators, compared with 49.2% of mid initiators and 65.4% of late initiators. In Nepal, the corresponding proportions were 68.5%, 83.9% and 96.5%. In Indonesia, first-trimester ANC coverage was lower, at 8.6% among early initiators, 14.1% among mid initiators and 12.8% among late initiators. In contrast, coverage was high in Maldives, where the proportions were 93.3%, 98.0% and 95.9%, respectively.

Institutional delivery was reported by 65.6% of early initiators in Bangladesh, compared with 79.2% of mid initiators and 76.9% of late initiators. In Timor-Leste, institutional delivery was reported by 57.1% of early initiators, 71.6% of mid initiators and 62.5% of late initiators. In India, the corresponding proportions were substantially higher, at 92.8%, 96.3% and 97.7%. Institutional delivery was also high in Maldives (97.9%, 93.9% and 89.0%, respectively) and the Philippines (91.3%, 98.0% and 96.5%, respectively).

Full ANC coverage showed substantial cross-country variation. Among early, mid and late initiators, respectively, full ANC was reported by 4.4%, 7.1% and 17.6% in Bangladesh; 26.1%, 31.1% and 38.7% in India; 68.0%, 73.4% and 70.4% in Indonesia; and 12.7%, 19.0% and 22.2% in Maldives. In Nepal, the corresponding proportions were 51.4%, 64.4%, and 89.1%, while in Pakistan, they were 10.0%, 20.5%, and 26.4%. Full ANC coverage in the Philippines was 19.1% among early initiators, 33.6% among mid initiators and 30.1% among late initiators. Timor-Leste recorded the lowest coverage, at 2.3%, 6.2% and 5.1%, respectively.

Postnatal care also varied across countries and AICB categories (Table 1). The proportion of women receiving a postnatal check within two months was highest in Maldives, at 74.0% among early initiators, 81.0% among mid initiators and 91.8% among late initiators. In contrast, coverage was comparatively low in Nepal, at 17.0%, 20.2% and 25.1%, respectively, and in Timor-Leste, at 16.4%, 21.2% and 25.7%. In Pakistan, postnatal check coverage increased across the three categories, from 27.2% among early initiators to 37.2% among mid initiators and 45.1% among late initiators. The pattern was not uniform across countries; for example, in India, coverage was similar across the early, mid, and late AICB groups (46.5%, 48.2%, and 47.4%, respectively).

Overall, the descriptive findings show that maternal healthcare utilisation varied by country and AICB category, with no uniform pattern across all indicators. In particular, the low prevalence of full ANC in Bangladesh, Pakistan and Timor-Leste highlights the distinction between receiving individual components of antenatal care and completing the full recommended set of services.

Early AICB and maternal healthcare utilisation after adjustment

Table 2 presents the adjusted associations between early AICB (first birth before age 20) and maternal healthcare utilisation, using women with mid-AICB (20-29 years) as the reference group. The associations varied across countries and healthcare indicators.

Antenatal care

Early AICB was associated with lower odds of receiving four or more ANC visits in Bangladesh (AOR 0.73; 95% CI 0.57-0.95), Indonesia (AOR 0.58; 95% CI 0.43-0.79) and Pakistan (AOR 0.68; 95% CI 0.46-0.99). In contrast, compared with women whose AICB was 20-29 years, women with early AICB (<20 years) had lower adjusted odds of first-trimester ANC in India (AOR 0.93, 95% CI 0.88-0.98), Indonesia (AOR 0.46, 95% CI 0.37-0.58), Nepal (AOR 0.65, 95% CI 0.43-0.98), and the Philippines (AOR 0.63, 95% CI 0.42-0.95). The association with first-trimester ANC was not statistically clear in Bangladesh (AOR 0.82; 95% CI 0.63-1.06). Full ANC was associated with lower odds among early initiators in Indonesia (AOR 0.73; 95% CI 0.55-0.96), the Philippines (AOR 0.55; 95% CI 0.36-0.85) and Timor-Leste (AOR 0.27; 95% CI 0.09-0.81). The estimate for Bangladesh was imprecise, and its confidence interval included 1 (AOR 0.63; 95% CI 0.38-1.04).

Delivery and postnatal care

Early AICB was associated with lower odds of institutional delivery in Bangladesh (AOR 0.63; 95% CI 0.48-0.84), India (AOR 0.83; 95% CI 0.75-0.92) and Philippines (AOR 0.32; 95% CI 0.13-0.79). Adjusted associations were not statistically significant in Indonesia, Maldives, Nepal, Pakistan and Timor-Leste. For postnatal care, early AICB was associated with lower odds of receiving a postnatal check within 2 months in Indonesia (AOR 0.81; 95% CI 0.68-0.98). Estimate for India was borderline (AOR 0.95; 95% CI 0.91-1.00) (Table 2).

Late AICB and maternal healthcare utilisation after adjustment

Table 3 presents the adjusted associations between late AICB (first birth at age 30 years or older) and maternal healthcare utilisation, using women with mid-AICB (20-29 years) as the reference group. Associations varied across countries and service indicators. Late AICB was associated with higher odds of full ANC in Bangladesh (AOR 3.20; 95% CI 1.19-8.59), India (AOR 1.12; 95% CI 1.03-1.22) and Nepal (AOR 3.02; 95% CI 1.09-8.37). Higher odds of four or more ANC visits were observed in India (AOR 1.14; 95% CI 1.04-1.25), while higher odds of first-trimester ANC were observed in Pakistan (AOR 2.76; 95% CI 1.41-5.40). Conversely, late AICB was associated with lower odds of first-trimester ANC in Indonesia (AOR 0.56; 95% CI 0.37-0.85) and the Philippines (AOR 0.45; 95% CI 0.25-0.79). In the Philippines, late AICB was also associated with lower odds of full ANC (AOR 0.52; 95% CI 0.31-0.86) and a postnatal check within two months (AOR 0.56; 95% CI 0.34-0.91). In Maldives, late AICB was associated with higher odds of a postnatal check (AOR 3.10; 95% CI 1.23-7.87) (Table 3).

Table 1: Prevalence of maternal healthcare utilisation indicators by AICB in the latest DHS round.

Country (round)	Four or more ANC visits (%)	ANC in first trimester (%)	Full ANC (%)	Institutional delivery (%)	Postnatal check (%)
Bangladesh (2022)	35.9 / 51.7 / 57.2	34.2 / 49.2 / 65.4	4.4 / 7.1 / 17.6	65.6 / 79.2 / 76.9	41.3 / 41.8 / 48.9
India (2019-21)	60.9 / 66.1 / 73.3	69.8 / 75.7 / 78.2	26.1 / 31.1 / 38.7	92.8 / 96.3 / 97.7	46.5 / 48.2 / 47.4
Indonesia (2017)	34.5 / 37.6 / 33.4	8.6 / 14.1 / 12.8	68.0 / 73.4 / 70.4	86.8 / 94.7 / 94.2	37.1 / 44.7 / 41.0
Maldives (2016-17)	87.5 / 81.8 / 78.5	93.3 / 98.0 / 95.9	12.7 / 19.0 / 22.2	97.9 / 93.9 / 89.0	74.0 / 81.0 / 91.8
Nepal (2022)	81.8 / 89.7 / 99.0	68.5 / 83.9 / 96.5	51.4 / 64.4 / 89.1	82.6 / 93.2 / 96.0	17.0 / 20.2 / 25.1
Pakistan (2017-18)	46.7 / 70.7 / 74.3	57.3 / 73.0 / 86.2	10.0 / 20.5 / 26.4	75.3 / 84.0 / 88.4	27.2 / 37.2 / 45.1
Philippines (2022)	81.3 / 89.5 / 90.2	57.6 / 75.1 / 71.5	19.1 / 33.6 / 30.1	91.3 / 98.0 / 96.5	58.0 / 64.5 / 61.7
Timor-Leste (2016)	74.0 / 80.8 / 81.2	55.0 / 62.5 / 65.0	2.3 / 6.2 / 5.1	57.1 / 71.6 / 62.5	16.4 / 21.2 / 25.7

*Values are percentages presented in the following order: early AICB (<20 years), mid AICB (20-29 years), and late AICB (≥30 years). AICB, age at initiation of childbearing; ANC, antenatal care; PNC, postnatal care.

Table 2: Adjusted odds ratios (95% CI) for maternal healthcare utilisation among women with early AICB (<20 years) compared with mid AICB (20-29 years).

Countries	Four or more ANC visits	ANC in the first trimester	Full ANC	Institutional delivery	Postnatal check
Bangladesh	0.73 (0.57-0.95)	0.82 (0.63-1.06)	0.63 (0.38-1.04)	0.63 (0.48-0.84)	0.97 (0.76-1.23)
India	1.06 (1.01-1.11)	0.93 (0.88-0.98)	1.05 (1.00-1.11)	0.83 (0.75-0.92)	0.95 (0.91-1.00)
Indonesia	0.58 (0.43-0.79)	0.46 (0.37-0.58)	0.73 (0.55-0.96)	1.04 (0.83-1.30)	0.81 (0.68-0.98)
Maldives	1.24 (0.51-3.04)	0.32 (0.07-1.54)	0.82 (0.33-2.03)	2.65 (0.38-18.53)	0.68 (0.33-1.38)
Nepal	0.74 (0.44-1.23)	0.65 (0.43-0.98)	0.91 (0.64-1.29)	0.81 (0.46-1.43)	0.75 (0.49-1.15)
Pakistan	0.68 (0.46-0.99)	0.76 (0.53-1.09)	1.06 (0.64-1.77)	1.35 (0.90-2.04)	0.79 (0.56-1.12)
Philippines	0.83 (0.49-1.40)	0.63 (0.42-0.95)	0.55 (0.36-0.85)	0.32 (0.13-0.79)	0.93 (0.64-1.35)
Timor-Leste	1.00 (0.61-1.63)	1.21 (0.80-1.82)	0.27 (0.09-0.81)	0.91 (0.57-1.46)	0.70 (0.42-1.16)

*Adjusted for age at first cohabitation, residence, education, occupation, wealth index, religion (where recorded), media exposure, partner's age, education and occupation, and co-residence with the husband or partner. AICB, age at initiation of childbearing; ANC, antenatal care; AOR, adjusted odds ratio; CI, confidence interval.

Table 3: Adjusted odds ratios (95% CI) for maternal healthcare utilisation among women with late AICB (≥30 years) compared with mid AICB (20-29 years).

Countries	Four or more ANC visits	ANC in the first trimester	Full ANC	Institutional delivery	Postnatal check
Bangladesh	0.99 (0.48-2.03)	1.28 (0.60-2.69)	3.20 (1.19-8.59)	0.79 (0.35-1.82)	1.34 (0.69-2.58)
India	1.14 (1.04-1.25)	0.98 (0.89-1.08)	1.12 (1.03-1.22)	1.08 (0.85-1.38)	0.98 (0.91-1.06)

Continued.

Countries	Four or more ANC visits	ANC in the first trimester	Full ANC	Institutional delivery	Postnatal check
Indonesia	0.65 (0.38-1.14)	0.56 (0.37-0.85)	0.71 (0.49-1.04)	0.66 (0.44-1.00)	0.91 (0.69-1.20)
Maldives	1.01 (0.50-2.03)	Not reported (unstable)	1.03 (0.51-2.07)	0.58 (0.23-1.48)	3.10 (1.23-7.87)
Nepal	Not estimated	4.33 (0.70-26.81)	3.02 (1.09-8.37)	0.77 (0.12-4.78)	1.55 (0.67-3.60)
Pakistan	0.98 (0.52-1.83)	2.76 (1.41-5.40)	1.03 (0.57-1.86)	1.06 (0.51-2.20)	1.18 (0.74-1.90)
Philippines	0.78 (0.36-1.69)	0.45 (0.25-0.79)	0.52 (0.31-0.86)	0.38 (0.08-1.75)	0.56 (0.34-0.91)
Timor-Leste	0.84 (0.37-1.92)	0.80 (0.41-1.56)	0.96 (0.20-4.75)	0.76 (0.35-1.66)	1.51 (0.72-3.18)

*Adjusted for age at first cohabitation, residence, education, occupation, wealth index, religion (where recorded), media exposure, partner's age, education and occupation, and co-residence with the husband or partner. AICB: age at initiation of childbearing; ANC: antenatal care; AOR: adjusted odds ratio; CI: confidence interval. Nepal four or more visits was not estimable because of the small cells.

DISCUSSION

This study examined the distribution of AICB and its association with maternal healthcare utilisation among women whose first live birth occurred within five years of the latest available Demographic and Health Survey in eight South and Southeast Asian countries. The findings demonstrate substantial cross-country variation in both the timing of first birth and the use of maternal healthcare services. Early childbearing was most prevalent in Bangladesh and Nepal, whereas late initiation was most common in the Philippines and Maldives. Adjusted associations also differed across countries and service indicators. Early AICB was associated with lower odds of selected antenatal care indicators and institutional delivery in several settings. Associations between late AICB and antenatal or postnatal care were mixed, with the direction and strength of relationships varying by country and outcome. These findings indicate that the relationship between reproductive timing and maternal healthcare utilisation is context-specific rather than uniform across the region.

The findings on antenatal care are broadly consistent with previous research showing that adolescent mothers may face disadvantages in accessing and using maternal health services. A World Health Organisation multi-country study reported poorer pregnancy and childbirth outcomes among adolescent mothers.[16] A systematic review by Banke-Thomas et al identified socioeconomic, health-system, and individual barriers influencing maternal healthcare utilisation among adolescent mothers in low- and middle-income countries.[15] Analyses across 54 countries have also highlighted the importance of education, household wealth and other socioeconomic characteristics in explaining inequalities in antenatal care coverage.[17]

The present findings extend this evidence by demonstrating that the association between early AICB and antenatal care depends on the indicator considered. Early AICB was associated with lower odds of receiving four or more antenatal visits in Bangladesh, Indonesia and Pakistan, but with slightly higher odds in India. Early AICB was also associated with lower odds of first-trimester ANC in India, Indonesia, Nepal and the Philippines, while full ANC was less likely among early initiators in Indonesia, the Philippines and Timor-Leste. These differences are important because the number of visits, the timing of the first visit and completion of the recommended ANC components measure different aspects of service utilisation. A woman may attend several visits but begin care late or fail to receive all recommended components. Consequently, improvements in one indicator should not automatically be interpreted as comprehensive antenatal care coverage.

The association between early childbearing and healthcare utilisation needs to be interpreted alongside the social and demographic circumstances in which first births occur. Early childbearing may coincide with lower educational attainment, household economic disadvantage, rural residence and limited autonomy in healthcare decisions. These circumstances can affect the ability to recognise the need for care, to reach health facilities, and to complete recommended services. Previous research has documented the clustering of adolescent pregnancy and early childbearing with socioeconomic disadvantage in South Asia.[11-13] Although the present models adjust for several relevant characteristics, the persistence of some associations suggests that measured socioeconomic differences may not fully account for variation in maternal healthcare utilisation. Unmeasured factors, including the accessibility and quality of local services, social support and women's decision-making autonomy, may also be relevant; however, these mechanisms were not directly assessed in this study.

The association between early AICB and institutional delivery was not uniform across the study countries. Early initiators had lower adjusted odds of institutional delivery in Bangladesh, India and the Philippines, whereas the estimates for Indonesia, Maldives, Nepal, Pakistan and Timor-Leste did not provide similarly clear statistical evidence of an association. This pattern is consistent with research reporting lower institutional delivery and skilled birth attendance among adolescent mothers, including in South Asia.[18]

These findings reinforce the importance of interpreting AICB within the wider social and healthcare context. Age

at first cohabitation is closely related to the timing of first birth in settings where marriage and childbearing remain strongly connected. Adjusting for age at first cohabitation helps account for this relationship, but it also means that the estimated association between AICB and healthcare utilisation is conditional on union timing. The models, therefore, do not capture every pathway through which early marriage and early childbearing may be related to maternal healthcare access. The observed associations should be understood as adjusted relationships, not as evidence that reproductive timing alone determines whether a woman delivers in a health facility.

The findings among women with late AICB further demonstrate that later first birth does not consistently correspond to higher utilisation of every maternal healthcare service. Late AICB was associated with higher odds of full ANC in Bangladesh, India and Nepal, and with higher odds of four or more ANC visits in India. In contrast, late initiators in Indonesia and the Philippines had lower odds of first-trimester ANC, while those in the Philippines also had lower odds of full ANC and a postnatal check within two months. Late AICB was associated with higher odds of a postnatal check in Maldives. These differences suggest that the relationship between late AICB and healthcare utilisation varies by setting and stage of care. Greater socioeconomic resources or more deliberate pregnancy planning may facilitate service use for some women, but these explanations remain hypotheses because pregnancy planning, health-seeking preferences and service quality were not directly evaluated in this analysis.

Postnatal care is another important component of maternal healthcare because contact after delivery provides an opportunity to assess maternal recovery and identify complications. In this study, early AICB was associated with lower odds of a postnatal check within two months in Indonesia. Late AICB was associated with lower odds of postnatal care in the Philippines but higher odds in Maldives. The different directions of these associations reinforce the finding that the relationship between AICB and maternal healthcare utilisation is not consistent across countries or across the continuum of care.

Taken together, the findings support context-specific approaches to improving maternal healthcare utilisation. For women initiating childbearing before age 20, programmes should prioritise timely entry into antenatal care, completion of recommended ANC components and access to appropriate delivery and postnatal services. The results for Bangladesh, Indonesia, Pakistan, the Philippines, and Timor-Leste indicate that certain ANC indicators or delivery-care measures may warrant attention, although the relevant service gaps differ across countries. Improving education, reducing economic and geographic barriers to care, and ensuring that services are accessible and respectful to younger mothers may help address some of the disadvantages associated with early childbearing.

For women whose first birth occurs at age 30 years or older, the findings support continued attention to timely antenatal assessment, completion of recommended ANC components and appropriate postnatal follow-up. The results do not suggest that later childbearing uniformly improves or reduces healthcare utilisation; instead, associations differed by country and service indicator. Maternal healthcare programmes should therefore be responsive to individual needs and local service gaps rather than relying on age at first birth alone to identify women who may need additional support. Across all AICB categories, improving the continuity and completeness of maternal healthcare remains important.

Strengths and limitations of the study

An important strength of this study is its comparative analysis of eight South and Southeast Asian countries using the latest available DHS round for each setting. The study applies a consistent classification of AICB and examines several dimensions of maternal healthcare utilisation, including ANC frequency, first-trimester initiation, full ANC, institutional delivery and postnatal care. Country-specific adjusted models also allow the observed associations to vary across settings rather than assuming that the relationship between reproductive timing and healthcare use is uniform throughout the region. The present study focuses specifically on how the timing of the first birth is associated with the utilisation of maternal healthcare services in recent first-time mothers.

The findings should nevertheless be interpreted in light of the study's limitations. The cross-sectional design supports conclusions about associations, not causation. Although the models adjust for several sociodemographic and partner-related characteristics, residual confounding may remain. Adjustment for age at first cohabitation also means that the estimates represent associations conditional on union timing rather than the total relationship between early childbearing and healthcare utilisation. The analysis is restricted to women whose first live birth occurred within five years before the survey; the findings may not be generalised to all women of reproductive age or to pregnancies that did not result in a live birth. In addition, the latest DHS rounds span different years, and some country-specific groups, particularly women with late AICB, are small, resulting in imprecise estimates. Multiple outcomes were examined across eight countries without a formal correction for multiple comparisons, so isolated statistically significant findings should be interpreted cautiously. Finally, the available data do not fully capture health-system quality, women's autonomy or the reasons for non-use of particular services. Further research incorporating longitudinal information and more detailed measures of service accessibility and quality would help clarify the pathways underlying the observed associations.

CONCLUSION

The distribution of AICB and maternal healthcare utilisation varied substantially across the eight South and Southeast Asian countries. Early childbearing was most prevalent in Bangladesh and Nepal, whereas late initiation was more common in the Philippines and Maldives. Coverage of antenatal care, institutional delivery and postnatal care also differed across countries and AICB categories.

In adjusted analyses, early AICB was associated with lower odds of selected antenatal care indicators and institutional delivery in several countries. Associations involving late AICB varied by outcome and setting, with both higher and lower odds of selected antenatal and postnatal care indicators. These findings highlight the context-specific relationship between reproductive timing and maternal healthcare utilisation across the region.

Maternal healthcare programmes should promote timely antenatal care, completion of recommended ANC components, access to institutional delivery and appropriate postnatal follow-up. Particular attention may be needed for women in settings where adjusted analyses indicate lower utilisation of specific services. Longitudinal studies incorporating more detailed measures of healthcare accessibility, quality and women's decision-making autonomy could help clarify the pathways underlying these associations.

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