

Original article

Skilled birth attendance in Balochistan, Pakistan

Sathirakorn Pongpanich^a, Abdul Ghaffar^{a,b}, Najma Ghaffar^c, Tahir Mehmood^{d,e}

^aCollege of Public Health Sciences, Chulalongkorn University, Bangkok 10330, Thailand

^bPlanning Cell, Health Department, Government of Balochistan, Quetta 87300, Pakistan

^cDepartment of Gynaecology and Obstetrics, Bolan Medical Complex Hospital, Quetta 87300, Pakistan

^dStatistics, Basic Science, Riphah International University, Islamabad 44000, Pakistan

^eBiostatistics, Department of Chemistry, Biotechnology and Food Sciences, Norwegian University of Life Sciences, s 1432, Norway

Background: Pakistan faces high maternal and neonatal mortality despite interventions from government, national, and international organizations.

Objective: To assess factors associated with the use of skilled birth attendance in Balochistan.

Methods: A logistic regression model was used to identify factors influencing use of skilled birth attendance from data obtained from the Balochistan Multiple Indicator Cluster Survey 2010, together with social and economic determinants..

Results: Only 25.7% of the expectant mothers in Balochistan Province used skilled birth attendance. Women from rural areas were less likely to use skilled attendance compared with those from urban areas (odds ratio (OR) = 0.73, 95% confidence interval (CI) = 0.51–0.95). Poverty was negatively associated with use (OR = 0.26, 95% CI = 0.02–0.51). Lack of education was negatively associated with skilled birth attendance (OR = 0.38, 95% CI = 0.09–0.67). Women from 25 to 34 years old were more likely to use skilled birth attendance than younger women (OR = 1.51, 95% CI = 1.03–2.81). Women who justified being beaten by their husbands were less likely to use skilled attendance (OR = 0.64; 95% CI = 0.39–0.89).

Conclusions: There are gaps in use of skilled birth attendance between women in urban and rural settings, rich and poor, the educated and those with no schooling. Their age, age at first marriage, number of children ever born, attitude toward being beaten by their husband, and source of skilled antenatal care significantly influenced the expectant mothers to use skilled birth attendance.

Keywords: Balochistan, determinants, multiple indicator cluster survey, skilled birth attendant, utilization

The year 2010 claimed approximately 287,000 lives of mothers during pregnancy or giving birth. According to the World Health Organization, South Asia contributes 27% of these maternal deaths globally. The South Asian maternal mortality rate (MMR) is 14 times higher than in industrialized countries [1]. Almost 99% of neonatal deaths take place in developing countries. Africa and South Asia contribute most of these deaths and they have shown the least decline during the past decade. Estimates related to worldwide under-5 year-old mortality (8.2 million deaths per year) in 2013 indicate that almost 3 million die within one week of their birth, about 2 million die on their first day, and about 3 million stillbirths occur [2].

In developing countries women face around a 250-fold higher lifetime risk of dying from a pregnancy-related complication than women in developed countries. Of the 210 million women who become pregnant each year about 14% develop complications that are fatal in 2% of cases [3].

Pakistan claims progress by reducing maternal mortality by 57% between 1990 and 2013. However, the Pakistani MMR remains highest in Balochistan province [4].

In Pakistan, neonatal mortality has risen from 51 to 55 per 1,000 live births between 1991 and 2012, and Balochistan province is included among 3 provinces showing an increase from 46 to 63 per 1,000 live births [5]. A recent global study has shown that Pakistan has the highest neonatal mortality rate globally putting Pakistan among 13 countries along with sub-Saharan Africa that have more than 30 per 1000 total births with relatively slow progress since year 2000 [6].

Correspondence to: Abdul Ghaffar, College of Public Health Sciences, Chulalongkorn University, Bangkok 10330, Thailand. E-mail: abdul.g@chula.ac.th

The major causes of perinatal MMR include excessive hemorrhage, hypertensive disorders, and sepsis. Causes of neonatal mortality include preterm labor, antepartum asphyxia, and birth asphyxia or hypoxia [7]. Most of these factors can be prevented or managed if women have access to care provided by skilled staff in a hygienic environment, with necessary back up and support [3].

It is well known that complications, which lead to maternal death and illness, also lead to the most neonatal mortality and morbidity burden. Some of these problems can be prevented with proper management of labor and birth including monitoring of prolonged obstructed labor and fetal distress [8].

The Pakistan Demographic Health Survey (PDHS) 2013 and other surveys conducted show that only 52% of deliveries were conducted by skilled birth attendants [5]. The latest PDHS in Balochistan showed that only 16% of all births took place in a health facility and about 83% took place at home. A total of 18% of the women had skilled birth attendance in the 5 years preceding the survey [5, 9].

Factors favoring use of skilled attendants included older maternal age, easy access to a health care facility, maternal occupation, higher wealth index [10], large family size, and religious and traditional beliefs. Maternal education also influences the use of skilled attendants and health facility services [11]. The likelihood of having a birth at a health care facility is increased by antenatal care visits and the presence of a health worker providing antenatal care. This also increases skilled birth attendance in the community [12, 13].

Balochistan is one of 4 provinces of Pakistan and represents about 45% of the land nationwide. The population of Balochistan is 5% of Pakistan's total, and mostly live in scattered settlements. About 76% of the area is rural without a well-developed infrastructure. The literacy rate is very low compared with that of other provinces. During the past decades Balochistan suffered security disturbances [5]. Per capita income is low and the growth rate is lower than other provinces. About 70% of the population belongs to the Baloch tribe and the remaining are Pashtoons, Hazaras, and settlers from other provinces. Men are dominant in the community and have all the decision power. The female literacy rate is very low because of socioeconomic, cultural, and religious norms. Women mostly help men in housekeeping, agriculture, and animal husbandry or related professions. Their

mobility is limited and women depend on men's decisions for their health seeking and other needs [14].

The Multiple Indicator Cluster Survey (MICS) Balochistan in 2010 also showed that 73% of pregnant mothers in Balochistan gave birth at home; women in urban areas were more likely to give birth in a health care facility (49%) compared with those in rural areas (16%). Approximately 29% of births in the 2 years preceding the MICS survey were attended by skilled birth attendants. Traditional birth attendants assisted in more than half of all births (53%) and about 15% were delivered by relatives or friends (9).

Considering these alarming indicators in Balochistan, new strategies are needed to improve this situation. This MICS is the only survey that represents Balochistan and was conducted to assess maternal and child health and track Millennium Development Goals (MDG) 4 and 5.

The aim of the this study was to define specific factors related to skilled birth attendance during birth in Balochistan Province through an analysis of MICS Balochistan 2010.

Methods

This study used the MICS Balochistan 2010 for data analysis. Survey data SPSS files were approached in 2014 at the Planning and Development Department Civil Secretariat Quetta, Government of Balochistan, Pakistan. Permission to reanalyze the survey data was granted by the Head of Health department (Secretary Health), Government of Balochistan (Notification No. SO-VI(H)2-206/2014/2370-77). The survey was previously approved and published November 2011 in collaboration with UNICEF (United Nations Children's Fund).

Data

Data regarding skilled birth attendance in Balochistan, together with social and economic determinants, were taken from the MICS conducted in 2010. A two-stage stratified sampling design was used. A total of 844 primary-sampling units (PSU), of 241 urban and 603 rural sites were included in the survey. The clusters were selected with the probability proportional to size of the district. Systematic random sampling was done to select 12 households from an urban PSU and 16 households from a rural PSU. The questionnaires were based on the MICS-4 model, and were adapted according to social and cultural norms of Balochistan. Pakistani citizens were included in the

survey; a total of 17,732 women aged 15–49 years were interviewed. The data were adjusted for multistage sampling.

Variables

Women giving birth during the 2 years preceding the survey were selected. Data of 2,358 respondents was extracted from the survey and analyzed.

Dependent variable

The main outcome of the analysis was utilization of skilled birth attendants for births at any source and place. The skilled birth attendants at birth included doctors, staff nurses, mid wives, lady health worker (LHW), lady health visitors (LHV), traditional birth attendant, relatives of pregnant women, friends, and others. In this analysis, we classified assistance at birth in two groups as skilled and unskilled birth attendants. Response options for doctors, staff nurse, midwife, LHW, and LHV were combined as skilled birth attendants, and assistance at birth from all others was grouped as nonskilled.

Dependent variables were computed to a binomial response i.e. had any skilled or unskilled birth attendant during last pregnancy (Yes = 1, No = 0).

Independent variables

Reviews [15] identified many sociodemographic factors influencing use of skilled birth attendance; such as places where living, age, education, wealth index, family size, and domestic problems. In this survey, living place was considered as urban and rural, and one of 6 regions of Balochistan; age was considered as a categorical parameter with 3 groups; education was considered at 4 category levels; relation with wealth index was assessed in 5 quintiles from poorest to richest; children related parameters like total number of children and children under 5 years old were included for assessment. In the survey, we also included wife-beating history.

Missing values were treated through imputation [16]. Some of the variables were computed for a binomial response converting multiple variables to one variable.

Statistical analysis

Analysis was started online with 'R' software with descriptive statistics to calculate percentages and frequencies of the population. Applying clusters and

weights bivariate analysis was conducted separately for every independent variable of interest and dependent variable through logistic regression. The multivariate model was selected through stepwise backward elimination procedure where model performance was evaluated with the Akaike information criterion (AIC) [17]. The response was dichotomous (yes or no), and it was more appropriate to use a generalized linear model for the classification [18], where response is assumed to follow a binomial distribution.

In the model, analysis considered the women having assistance at delivery constitute the primary response (Y) and was coded as follows:

$$\text{Assistance at delivery (Y)} = \begin{cases} 1, & \text{Doctor, nurse, midwife, LHV or LHW} \\ 0, & \text{Traditional birth attendant, relative, or friend} \end{cases}$$

The statistics are presented as odds ratios (ORs), and were calculated to measure association between socioeconomic and other independent parameters and utilization of skilled birth attendants. To estimate how much sample means vary from the standard deviation of sampling distribution, standard error (SE) was used to estimate mean. Effects of independent variables were measured at the 0.01, 0.05, and 0.1 levels. *P* was calculated using Wald test statistics to show the significance of independent variables. Significance was assessed at the 0.01, 0.05, and 0.1 levels.

Statistical Software

All computations and model fitting was conducted through freely available statistical software 'R' (www.r-project.org/).

Ethical considerations

This is a secondary data analysis of a survey conducted by the Government of Balochistan. Permission to use the data was granted from the Planning and Development Department and Head of Health Department (Secretary Health) Government of Balochistan through Notification No.SO-VI(H)2-206/2014/2370-77. The anonymity of participants was assured. Documents supporting this are on file at Chulalongkorn University.

Results

We started with 13 factors as listed in **Table 1**. A further stepwise backward elimination procedure based on AIC resulted in a 10 independent variable model influencing skilled birth attendance in Balochistan. The bivariate odds ratio together with multivariate odds ratio, their confidence intervals, and logistic regression coefficients are presented in **Table 2**. We found that urbanization, region, wealth index quintiles, age of woman, level of education, children ever born, women who justified being beaten by their husband, age at first marriage, and skilled source of antenatal care, were all significantly associated with the use of skilled birth attendance.

Table 1 shows the prevalence and results of bivariate analysis of the variables included in the analysis. Overall, prevalence of skilled birth attendance was only 25.7% among respondents in the survey in the entire province of Balochistan. Among regions, the Kalat region had maximum prevalence of skilled birth attendance, and the Sibi region had the least prevalence. According to bivariate analysis women in urban and rural areas were significantly different, and compared with urban areas, women in rural areas showed negative odds ratios with $P < 0.001$.

Quetta is the most urbanized region and capital city of Balochistan. Compared with Quetta, only the Kalat region showed a positive association with the use of skilled birth attendance. Wealth index quintiles showed the poorest wealth quintiles had less skilled

birth attendance and showed significantly negative associations. Education was an influential factor in bivariate analysis. Among respondents who never attended school only 20.7% had skilled birth attendance. Respondents who had higher education had 46.6% skilled birth attendance, and respondents with only primary education and no education showed negative associations with skilled birth attendance.

Among 3 age groups <24 years, 25–34 years, and >35 years, the younger women and those respondents in the 25–34 year age group showed no significant associations, but older women showed significantly negative associations. Age at marriage was also assessed in 3 groups and older age at marriage showed a negative association with use of skilled birth attendance.

Antenatal care, one of the strongest predictors of skilled birth attendance showed negative associations among respondents who did not have any antenatal care during their pregnancies in bivariate analysis. The frequency of antenatal care was assessed in 2 groups, namely those having antenatal care ≤ 4 times and ≥ 5 times. In bivariate analysis respondents who had ≥ 5 antenatal care visits had a significant positive association.

Use of skilled birth attendants was decreased significantly among respondents with greater number of children ever born. Women who justified beatings by their husband tended to have less prevalence of skilled birth attendance, but this was not significant in bivariate analysis.

Table 1. Variables included (n = 2358) with the dependent variable ‘skilled attendants at birth’. The bivariate analysis with count (percentage %) and odds ratio is presented.

Variable	Levels	Total	Non skilled attendance	Skilled attendance	Bivariate odds ratio
			1708 (74.3)	591 (25.7)	
Living Area	Urban	573 (24.9)	317 (55.3)	256 (44.7)	Reference
	Rural	1726 (75.1)	1391 (80.6)	335 (19.4)	0.3**
Region	Quetta	608 (26.5)	411 (67.6)	197 (32.4)	Reference
	Kalat	143 (6.2)	88 (61.5)	55 (38.5)	1.3
	Makran	331 (14.4)	247 (74.6)	84 (25.4)	0.71 ^{NS}
	Naseerabad	372 (16.2)	281 (75.5)	91 (24.5)	0.68**
	Zohb	318 (13.8)	245 (77.0)	73 (23.0)	0.62**
	Sibi	527 (22.9)	436 (82.7)	91 (17.3)	0.44**
	Quetta	608 (26.5)	411 (67.6)	197 (32.4)	Reference
Wealth index quintiles	Richest	438 (19.1)	197 (45.0)	241 (55.0)	Reference
	Poorest	428 (18.6)	380 (88.8)	48 (11.2)	0.1**
	Second	509 (22.1)	438 (86.1)	71 (13.9)	0.13**
	Middle	464 (20.2)	369 (79.5)	95 (20.5)	0.21**
	Fourth	460 (20.0)	324 (70.4)	136 (29.6)	0.34**

Table 1. Variables included (n = 2358) with the dependent variable 'skilled attendants at birth'. The bivariate analysis with count (percentage %) and odds ratio is presented. (Cont)

Variable	Levels	Total	Non skilled attendance	Skilled attendance	Bivariate odds ratio
			1708 (74.3)	591 (25.7)	
Ever attended school	Yes	409 (17.8)	210 (51.3)	199 (48.7)	Reference
	No	1890 (82.2)	1498 (79.3)	392 (20.7)	0.28**
Education	Higher	191 (8.3)	102 (53.4)	89 (46.6)	Reference
	No education	1985 (86.3)	1524 (76.8)	461 (23.2)	0.35**
	Primary	123 (5.4)	82 (66.7)	41 (33.3)	0.57*
Age of woman (years)	<24	493 (21.4)	355 (72)	138 (28)	Reference
	25–34	1226 (53.3)	894 (72.9)	332 (27.1)	0.96
	>35	580 (25.2)	459 (79.1)	121 (20.9)	0.68**
Age at first marriage (years)	<25	2076 (90.3)	1525 (73.5)	551 (26.5)	Reference
	25–34	81 (3.5)	62 (76.5)	19 (23.5)	0.85
	>34	142 (6.2)	121 (85.2)	21 (14.8)	0.48**
Received antenatal care	Yes	1088 (47.3)	629 (57.8)	459 (42.2)	Reference
	No	1211 (52.7)	1079 (89.1)	132 (10.9)	0.17**
Skilled source of antenatal care	Yes	894 (38.9)	455 (50.9)	439 (49.1)	Reference
	No	1405 (61.1)	1253 (89.2)	152 (10.8)	0.13**
Times received antenatal care	≤4	1947 (84.7)	1501 (77.1)	446 (22.9)	Reference
	≥5	352 (15.3)	207 (58.8)	145 (41.2)	2.36**
Children ever born	1–2	786 (34.2)	525 (66.8)	261 (33.2)	Reference
	3–4	632 (27.5)	494 (78.2)	138 (21.8)	0.56**
	≥4	881 (38.3)	689 (78.2)	192 (21.8)	0.56**
Number of children under 5 years old	1–2	1682 (73.2)	1262 (75)	420 (25)	Reference
	3–4	493 (21.4)	363 (73.6)	130 (26.4)	1.08
	>5	124 (5.4)	83 (66.9)	41 (33.1)	1.48*
Beating by husband justified	No	1968 (85.6)	1452 (73.8)	516 (26.2)	Reference
	Yes	331 (14.4)	256 (77.3)	75 (22.7)	0.82

^{NS} $P < 0.1$ * $P < 0.05$, ** $P < 0.01$

In the multivariable logistic regression model whose results are reported in **Table 2**, we found that the women from rural areas are 0.73 times less likely to have skilled birth attendance at delivery than women in urban areas. Women from the Kalat, Naseerabad, and Makran regions were more likely to have skilled birth attendance compared with women in Quetta. Women from Sibi and Zohb regions were less likely to have skilled attendance than women in Quetta. We found the women from the poorest, second middle and fourth wealth quintile less likely to have skilled attendance compared with the richest women. The women from middle and younger age groups were more likely to use skilled attendance at delivery than older women.

Women who have never attended school were less likely to use skilled attendance than women who were educated. We found the women having only primary and no education were less likely to use skilled

attendance than women having higher education. The greater the number of children born the less probability the women using skilled birth attendance. Further, women who justified being beaten by their husbands were less likely to use skilled attendance. We found that older age at first marriage decreases chances of using skilled attendance. We also found that women not using a skilled source of antenatal care were less likely to use skilled attendance at delivery.

Discussion

This secondary analysis was conducted using data from the Balochistan MICS 2010 to identify factors influencing the use of skilled birth attendance in Balochistan Province, Pakistan. Like other areas of Pakistan, the Health Department of Balochistan provides maternal health services through health facilities and community health workers that can provide skilled birth assistance.

Table 2. Multivariate logistic regression model

Variables	Levels	OR		95% CI	
				Lower limit	Upper limit
Living area	Urban	Reference			
	Rural	−0.31	0.73*	0.51	0.95
Region	Quetta	Reference			
	Kalat	0.17	1.19	0.89	1.49
	Makran	0.02	1.02	0.76	1.28
	Naseerabad	0.1	1.1	0.84	1.36
	Zohb	−0.38	0.68*	0.43	0.93
	Sibi	−0.52	0.59**	0.34	0.84
Wealth Index Quintiles	Richest				
	Poorest	−1.34	0.26**	0.02	0.51
	Second	−1.11	0.33**	0.12	0.45
	Middle	−0.88	0.42**	0.07	0.77
	Fourth	−0.67	0.51**	0.16	0.85
Ever attended school	Yes	Reference			
	No	−1.13	0.32**	0.11	0.53
Education level	Higher	Reference			
	No education	−0.95	0.38**	0.09	0.67
	Primary	−0.17	0.84	0.18	1.50
Age of woman	<25	Reference			
	25–34	0.41	1.51*	1.03	2.81
	>34	0.39	1.48 ^{NS}	1.18	1.93
Age at first marriage	<25	Reference			
	25–34	−0.06	0.94	0.17	1.64
	>35	−0.70	0.50*	0.12	0.88
Skilled source of ANC	Yes	Reference			
	No	−1.73	0.18**	0.05	0.31
Children ever born	1–2	Reference			
	3–4	−0.51	0.60**	0.28	0.92
	>4	−0.29	0.75 ^{NS}	0.51	0.99
Beating by husband justified	No	Reference			
	Yes	−0.44	0.64**	0.39	0.89

^{NS} $P < 0.1$ * $P < 0.05$, ** $P < 0.01$

In the present study, we found the overall prevalence of skilled birth assistance was low in both urban and rural areas. However, respondents living in urban areas like Quetta and Kalat were more likely to use skilled attendance, and only 20% of the respondents from rural areas used skilled birth attendance. However, in the urban group, less than 50% of respondents used skilled birth attendance. Therefore, mothers living in rural areas were less likely to use skilled birth attendance. Balochistan province has 6 regions. The capital, Quetta city is the most developed, and is located in the Quetta region. Respondents from urban areas, Kalat and Quetta were more likely to use skilled birth attendance, because of their geographic location in or near the

capital of the provinces when compared with other regions. In developing countries, inequalities between rural and urban areas exist in health, education, and development. Previous studies have mentioned this gap in developing countries [19], where there are insufficient skilled birth attendants, health facilities are not always available, and geographical distances are barriers to reaching health facilities [20, 21]. People living in urban areas always have better availability, access, and use of health services compared with rural areas [14].

Because the cost of providing maternal health services is higher in rural areas compared with urban areas, accessing health facilities or community health workers in rural areas is more expensive and time

consuming [22, 23]. Results of the present study showed that the poorest women were the least likely to use skilled birth attendance at delivery. People in higher wealth quintile groups were more likely to use skilled birth attendance than people in lower wealth quintiles. Balochistan Province is a vast land area and the scattered rural population makes it difficult to provide a sufficient number of health facilities and community health workers in the villages to decrease the availability gap between rich and poor. This finding is consistent with other studies that showed pregnant women from wealthier quintiles were more likely to use skilled birth attendant services than women from poorer quintiles [11, 24].

In this study, respondents, having any level of education were more likely to use skilled birth attendance and this likelihood rises with increasing level of education. Educating women increases their exposure to media, information, and knowledge, leading to increased awareness of services provided for their health issues, and plays an important role in social development and empowering women to take better decisions for their health [25]. Studies from Africa also found that better educated women had more probability of using skilled birth attendants [26, 27].

Age is an inconsistent influencing factor for the use of skilled birth attendance with mixed findings reported in the literature [28]. We found that women from 25 to 34 years old had a greater probability of using skilled birth attendance than older and younger women. This finding may reflect the active reproductive age in women and that decreases in skilled attendance as they get older because of perceived experience of the older women may be related to obstetric knowledge [29]. In Muslim communities women tend to get married when they are younger, and older women were less likely to use skilled birth attendants than younger women. In Northern Nigeria there are significant negative associations of younger age with the use of skilled birth attendance [26].

The World Health Organization recommends at least 4 antenatal visits during pregnancy in normal conditions to obtain essential interventions [30]. The aims of antenatal care are birth preparedness and complication readiness, with objectives to promote the timely use of skilled maternal and neonatal care during childbirth or obstetric emergencies [31]. The overall importance of antenatal care leading to use of skilled birth attendance is evident globally [32-35]. The

present study found that pregnant women who do not have antenatal care from a skilled health worker were unlikely to use skilled birth attendance. In bivariate analysis increasing probability of using skilled birth attendance was associated with more frequent antenatal care. A review [36] has indicated that antenatal care during pregnancy leads to use of skilled birth attendance. According to estimates provided by the Pakistan Demographic and Health Survey 2013, the nationwide prevalence of antenatal care is 70% for at least one visit and then the prevalence falls to only 32% for 4 visits [5]. The Public Health Department of Pakistan provides maternal health services through community health workers, by various programs, such as the lady health worker program and maternal child health program, frequent visits of trained community health workers providing antenatal care may convince pregnant women to obtain skilled assistance at delivery [37].

A comparison of women having 1-2 children with those having 3 or more children showed that the women with more children were less likely to use skilled birth attendance. In rural areas women have a leading role in homecare, and thus a greater number of children may increase their workload, leading women to be less able to attend to their own health [38]. The use of skilled birth attendance by pregnant mothers may be related to their past experience, both increasing skilled birth attendance use or reducing it [39]. Women who have more children may rely on their past experience, and women with only 1 or 2 children more often use skilled birth attendance [37].

In male dominated societies such as Pakistan, women often suffer from abuse by their husbands that affects their life including their health. In Balochistan Province infrastructure is not highly developed and the population is scattered, thus limiting the mobility of women. In the present study, we found that women who justified being beaten by their husband were less likely to use skilled birth attendance during delivery. In areas like Balochistan, where men dominant society, this also influences the use of health services by women. The search for health care by pregnant women depends on decisions made by their husband [39]. A recent study conducted in Balochistan showed strongly significant association of support by a husband with use of antenatal care health services [40].

This analysis is limited in studying complications during previous pregnancies and problems obtaining skilled birth attendance, because these variables were

not included in the survey. Data in this survey relies on the women's recall of the last two years preceding the survey and may produce recall bias. Nevertheless, because the questions are about the births of their babies, they usually remember events of their previous pregnancies well.

Conclusion

In conclusion, the present analysis confirmed gaps between rural and urban women, rich and poor women, and women with education and those with no education in their use of skilled birth attendance. Skilled antenatal care was one of the most important factors influencing the use of skilled birth attendance. Older women were less likely to use skilled birth attendance. The number of children borne by women is negatively associated with their use of skilled birth attendance and their use of antenatal care. Women who justify beatings by their husband were less likely to use skilled birth attendance. In developing countries like Pakistan, these gaps can be filled by universal health coverage programs. Community health workers can increase the use of skilled birth attendance by increasing the frequency of visits to pregnant women in their community.

We consider that more research is warranted to determine the demand for and provision of services, and to assess the quality of services provided, to understand the constraints and positive predictors of the use of maternal health services, specifically antenatal care and skilled birth attendance.

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Conflict of interest statement

The authors have no conflicts of interest to declare.

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