Trends and the Relationship between Maternal Health and Empowerment in Pakistan, 2012-2018
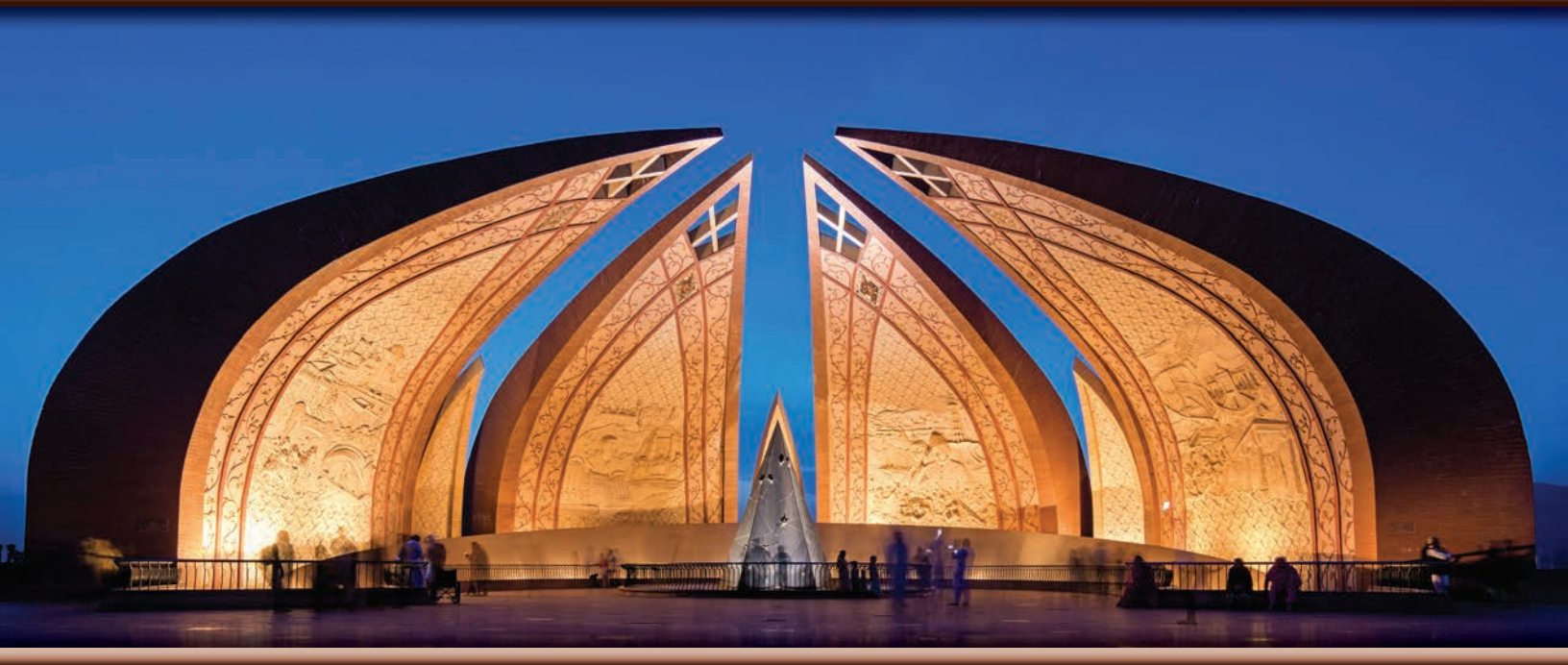
DHS Further Analysis Reports No. 128

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Trends and the Relationship between Maternal Health and Empowerment in Pakistan, 2012-2018

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March 2020

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Recommended citation:

Mallick, Lindsay, Rabia Zafar, Christina Juan, and Johanna Useem. 2020. *Trends and the Relationship between Maternal Health and Empowerment in Pakistan, 2012-2018*. DHS Further Analysis Reports No. 128. Rockville, Maryland, USA: ICF.

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ABSTRACT

Background: Access to and receipt of high-quality care during pregnancy and childbirth is critical for preventing maternal mortality. In male-dominated societies, women's lack of autonomy can be a barrier to accessing maternal health care. However, research often defines autonomy narrowly, although multiple components of empowerment may play a role. Our study assessed the relationship between maternal health care-seeking and measures of empowerment among women in Pakistan in order to identify persistent disparities in the utilization of maternal health services.

Methods: We analyzed data from currently married women with a recent live birth who were interviewed in Demographic and Health Surveys conducted in Pakistan in 2012-13 and 2017-18. We examined trends in antenatal care, skilled birth attendance, postnatal care, and a composite indicator of all three. We also assessed trends in empowerment using the validated, survey-based Women's emPowERment (SWPER) index, which included three domains: attitude to violence, social independence, and decision making. We included an additional empowerment measure based on women's report of problems accessing care. We conducted tests of association to examine the significance of the differences in care-seeking between survey years, and by levels of empowerment and background characteristics. Finally, we fitted adjusted logistic regression models to identify the magnitude of these associations after controlling for key sociodemographic characteristics.

Results: The results showed the social independence and decision-making domains of empowerment were each significantly and positively associated with maternal health care-seeking. However, the strength and magnitude of the relationship between wealth and care-seeking was greater than empowerment, with a nearly 15-fold increase in the odds of receiving all three maternal health care contacts if a woman was in the wealthiest quintile compared with the lowest wealth quintile. In addition, earlier maternal health care-seeking was associated with increased odds of skilled attendance at birth and postnatal care.

Conclusions: Although higher empowerment is independently related to increased maternal health care-seeking, wealth was a stronger determinant. Because empowerment may also work through wealth, stakeholders should consider evidence of "pro-poor" policies, in tandem with efforts towards empowerment, to encourage timely use of services during pregnancy and childbirth.

Key words: Pakistan, maternal health, care-seeking, empowerment, gender

ACRONYMS AND ABBREVIATIONS

AJK   Azad Jammu and Kashmir
ANC   antenatal care
AOR   adjusted odds ratio

BISP   Benazir Income Support Program

CI   confidence interval

DHS   Demographic and Health Survey

FATA   Federally Administered Tribal Areas

GDI   Gender Development Index

ICT   Islamabad Capital Territory

LHW   lady health worker

MDGs   Millennium Development Goals
MNCH   maternal, newborn, and child health

NIPS   National Institute of Population Studies

PDHS   Pakistan Demographic and Health Survey
PNC   postnatal care

SBA   skilled birth attendant
SDGs   Sustainable Development Goals
SWPER   Survey-based Women's emPowERment index

UN   United Nations
UNICEF   United Nations Children Fund
UNFPA   United Nations Population Fund
UNPD   United Nations Population Division
UOR   unadjusted odds ratio

WHO   World Health Organization

1   INTRODUCTION

The World Health Organization (WHO) recently reported that in 2017, approximately 300,000 women died of mostly preventable causes directly related to pregnancy and childbirth (WHO et al. 2019). Hence, there is an urgent need for the global health agenda to focus on enhancing the accessibility of health services and programs and improving the quality of care for mothers and their newborns. Access to quality services of reproductive health during pregnancy, delivery, and the postnatal period can make the difference between survival and death for both mother and baby (WHO 2015).

During the past two decades, considerable progress has been made to improve the maternal health indicators, including maternal mortality, in Pakistan. In April 2005, the Government of Pakistan introduced the National Maternal, Neonatal, and Child Health (MNCH) Strategic Framework that outlined interventions which address the needs of mother and child health (Government of Pakistan 2010). The MNCH Strategic Framework also aims to meet global development targets. Pakistan's MNCH Programme was launched nationally in 2007 to focus on the United Nations' (UN) Millennium Development Goals (MDGs) 4: *Reduce maternal mortality to 140 maternal deaths per 100,000 live births by 2015* (Planning Commission 2010). Pakistan has shown considerable effort, with a 51% reduction between 2000 and 2017, reaching 140 deaths per 100,000 live births by 2017 (WHO et al. 2019).

Currently, Pakistan is contributing to the UN's Sustainable Development Goals (SDGs), which replaced the UN's MDGs. Pakistan is committed to achieving SDG 3: *Ensure healthy lives and promote well-being for all at all ages* and Target 3.1: *Reduce the global maternal mortality ratio to less than 70 per 100,000 live births by 2030* (Government of Pakistan 2016). However, to reach this goal, maternal mortality will need to be reduced by half again in the next decade. To reach the SDGs, Pakistan's MNCH Programme's primary focuses are improving emergency obstetric services and the placement of community midwives, as well as promoting safe deliveries by skilled birth attendants (SBA) (Technical Resource Facility 2013). One initiative, entitled the Lady Health Workers (LHWs) Programme, created a cadre of female health workers to help address the health system's needs, including providing MNCH services for people in rural and slum areas (Hafeez et al. 2011; NIPS/Pakistan and ICF 2019). The LHWs support women by improving various health areas including personal hygiene, sexual and reproductive health, and pregnancy care with iron supplementation, fetal growth monitoring, and vaccinations.

In male-dominated societies like Pakistan (Akram 2018), women's inequitable status in society limits their autonomy in decision making about health care-seeking (Osamor and Grady 2016). Thus, a focus on empowering girls and women is needed. Several studies have demonstrated the link between constructs of empowerment and maternal health care-seeking globally (Ahmed et al. 2010; Ewerling et al. 2017; Osamor and Grady 2016). In Pakistan, research that focused on the role of select domains of empowerment and health care utilization found that use of services expanded when a woman has a greater autonomy in decision making (Agha 2011; Hearld, Anderson, and Budhwani 2018; Hou and Ma 2012; Khan, Zaheer, and Shafique 2017). Many of these studies, however, both globally and within the South Asian context specific to Pakistan, focused on narrow definitions or limited aspects of empowerment, such as autonomy in decision making.

Although autonomy is often used interchangeably with the term empowerment, empowerment is a multi-dimensional, complex construct (Ewerling et al. 2017; Kishor and Subaiya 2008; Upadhyay and Karasek 2012). Although many definitions exist (Do and Kurimoto 2012; Ewerling et al. 2017), seminal work by Kabeer defines empowerment as a process in which an individual or group transcends from a once limited status to a state where they can make the choices that result in their desired outcomes (Kabeer 2001). Kishor (2000) defines empowerment in a way that can be measured with cross-sectional data by using the concepts of *evidence* and *sources*. Although empowerment is conceptually a process, cross-sectional surveys such as the Demographic and Health Surveys (DHS) can capture the end result of the process, or *evidence* of empowerment and the access to *sources* that enable action on these choices (Kishor 2000). Evidence of empowerment in cross-sectional studies has been defined by using questions that assess autonomy in decision making, as well as acceptance of inequitable gender-norms, such as attitude to spousal violence (Do and Kurimoto 2012; Kishor and Subaiya 2008). Other research has defined empowerment in terms of freedom of movement (Al Riyami, Afifi, and Mabry 2004). Further, empowerment is a multidimensional construct that spans economic, social and cultural (including familial), legal, political, and psychological domains, and also exists within multiple levels of society, including the household, community, and broader contexts (Malhotra and Schuler 2005).

To better capture this complex construct, researchers have developed an index that captures multiple dimensions of empowerment with the survey-based Women's emPowERment (SWPER) index (Ewerling et al. 2017; Ewerling et al. 2019). The authors empirically identified the three most dominant dimensions based on 15 items captured by surveys. These dimensions reflect attitudes about gender violence, social independence, and household decision making. To construct the SWPER index, DHS data was used to identify a common set of questions across 34 African nations. This was validated with the widely-used Gender Development Index (GDI). The SWPER aims to quantify the state of women's empowerment and allows for trends and analyses both within and across countries over time. The SWPER also provides a means for researchers to investigate the effect of women's empowerment on health interventions and outcomes (Ewerling et al. 2017). Recently, the SWPER was validated more broadly—across 62 low and middle-income countries—and a global standardization of the index was developed (Ewerling et al. 2019). In this recent version of the index, one item related to employment was dropped, and fourteen were retained.

Our study employs the novel, multidimensional, and validated SWPER index to examine the relationships between women's empowerment and utilization of maternal health services in Pakistan over time. We also include a measure of autonomy that reflects women's problems in accessing healthcare as a proxy for a domain not included in the index, freedom of mobility. To identify persistent, problematic disparities in utilization of maternal health services, we test determinants of maternal health care-seeking, including empowerment, as well as sociodemographic characteristics across multiple time points using the two most recent Pakistan DHS surveys. This study aims to provide direction, insight, and targeting for future interventions related to the utilization of maternal health services and women's empowerment.

2 DATA AND METHODS

2.1 Data

We use publicly available data from the two most recent Pakistan DHS (PDHS) surveys collected in 2012-13 and 2017-18 (NIPS/Pakistan and ICF 2019; NIPS/Pakistan and ICF International 2013). A two-stage sample design provided the framework for the sample. In the first stage, provinces (or other included territories or regions, as described below) were stratified by urban and rural areas. Enumeration blocks within each stratum were selected based on a probability proportional to their size. In the second stage, households were systematically selected within enumeration blocks with an equal probability of selection. Sampling weights were calculated for use during analysis to ensure that the sample was representative at the national level.

The sampled areas varied by survey. Because this study focuses on trends, we examine only comparable provinces and areas. In 2012-13, four provinces of Pakistan (Punjab, Sindh, Khyber Pakhtunkhwa, and Balochistan), the Islamabad Capital Territory (ICT Islamabad), and the region of Gilgit Baltistan were covered by the survey as part of the national sample. In 2017-18, the four provinces and ICT Islamabad were sampled, as well as the Federally Administered Tribal Areas (FATA). National estimates were based on these areas. Although Gilgit Baltistan was also sampled in 2017-18, this area, along with Azad Jammu and Kashmir (AJK), was sampled with a different sampling frame. Thus, sampling statisticians constructed separate weights for these areas, and they are not included in the national estimates.

In total, our analysis included 4,145 women in 2012-13 PDHS and 3,792 women in the 2017-18 PDHS. Because our outcomes of interest reflect maternal health care, this sample includes only women who had a live birth. We limit this sample to women who have had a live birth in the past 2 years to reduce the effects of recall bias. Finally, we restrict our analysis to women with sufficient data (women without "don't know" or missing values) for key items included in the empowerment index used in this study, SWPER. Since the SWPER is based on currently married women, our study was further restricted to this population. In summary, our analysis includes currently married women who reside in consistently sampled and comparable provinces and regions over time (the four provinces and ICT Islamabad), who had a live birth in the past 2 years, and had sufficient data to calculate the empowerment index used in this analysis. Given the different sample of women analyzed in this study, the results of the study will not match the final reports of either survey.

2.2 Methods

This study utilizes several methodological approaches, described below, to understand the trends in maternal health care-seeking in Pakistan, trends in empowerment, and trends in the relationships between them. The following sections detail these steps.

2.2.1 Measures

This analysis includes several key measures of maternal health care and empowerment, defined in Table 1. Our dependent (outcome) variables include indicators of maternal health care-seeking, such as four or more antenatal care (ANC) contacts (4+ ANC visits), skilled attendance at birth (SBA), postnatal care (PNC)—

defined as a postnatal check for the mother within 2 days of delivery—and a composite indicator of all three critical maternal health contacts. Although institutional delivery is a critical point of contact with the health system, according to both surveys, nearly all women who had an SBA delivered in a facility, and the percent agreement between the two is nearly perfect (over 95% in each survey).

Our four main independent variables of interest in this analysis reflect aspects of women's empowerment. We used the SWPER, and the corresponding publicly available Stata programming[1], to construct three domains of women's empowerment that included attitude to violence, social independence, and women's decision making (Ewerling et al. 2019). Ewerling et al. (2017) originally developed the SWPER with principal components analysis to first identify these three domains. They then developed separate sub-indices, one for each of the three domains. For each domain, all 14 items in the SWPER were assigned weights based on the loading of that item within the respective domain. The items that most represented each domain (the items with the highest PCA loadings in each component) are described in Table 1. Social independence is heavily weighted by women who frequently read the newspaper or magazines, as well as, to a lesser extent, have higher education, a later age at first birth, and smaller gaps in age and education between the woman and her husband. For the domain that reflected attitude to violence, women who reported a husband was not justified in beating his wife for instances listed in Table 1 received a higher empowerment score than women who reported beating was justified, while holding other items constant. Similarly, women who reported participating in household decisions received higher scores for the decision-making domain.

In the recent SWPER adaptation, a global standardization was developed, which was applied in this study. The authors also provided established cut-points that roughly divided global scores into terciles, while accounting for either normal or multimodal distribution of the data. We applied these standard cut points to categorize our scores into low, medium, and high levels of empowerment according to the authors' recommendation (Ewerling et al. 2019).

We also include a measure of empowerment that is not part of the SWPER. This measurement is based on women's report of problems in accessing health care, which encompass constructs of empowerment as well as physical and financial barriers to care (Table 1). This represents a construct not included in the SWPER index, freedom of movement (Al Riyami, Afifi, and Mabry 2004). If a woman has no problems (coded as "0"), this is considered "more empowered" than if she has at least one problem, which is coded as "1".

2.2.2   Analysis

To understand how use of maternal health care and women's empowerment has changed over time, we examined overall levels and trends between 2012-13 and 2017-18 for each of the four indicators of maternal health care-seeking (4+ ANC visits, SBA, PNC, and the composite of all three). In addition, we assessed and compared the four measures of empowerment. We tested the statistical significance of the difference in the proportions in each of the two surveys by using unadjusted logistic regression.

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[1] We slightly modified the publicly available Stata code as (at the time of this analysis) this code did not account for the country-specific response option about decision making solely by "family elders", a category in the Pakistan 2012-13 survey. Our code includes this option within the "husband or other alone" category and women selecting this response are assigned a score of -1 for each of the three decision-making variables.

Next, to examine disparities in maternal health care-seeking, for each maternal health outcome, we tested the bivariate associations with each empowerment indicator, as well as sociodemographic characteristics among women in each survey. We used chi-square tests of independence to assess the significance of these associations. The background characteristics included place of residence, region, wealth quintile, education (none, primary, secondary or more), age at the birth (<19, 20-34, and 35 and above), and parity (1, 2-3, 4-5, 6 or more). To assess the significance in the change in relationship between each characteristic and empowerment indicators, we again conducted unadjusted logistic regressions.

The results that show the significance of the trends in maternal health care-seeking, empowerment, and the bivariate relationships between these pairs of indicators are presented in figures as well as tables. In this report, the figures show the estimates according to each survey plotted on a graph (y-axis is time, x-axis is proportion), connected by either a solid line or a dotted line. A solid line between the two survey time points indicates that the analysis identified a significant difference (p-value<0.05), while a dotted line indicates no significant difference.

Finally, we conducted multivariable logistic regression for each of the four dependent variables for each survey to assess the magnitude of the associations between the maternal health care-seeking dependent variables and key independent variables related to women's empowerment, as well as to account and control for the multiple socioeconomic and demographic determinants. In addition to these characteristics, we included variables for earlier maternal care-seeking along the continuum of care. For the dependent variable SBA, we included an independent variable for 4+ ANC visits. For PNC, we included both 4+ ANC visits as well as SBA. We present the adjusted odds ratios (AOR), 95% confidence interval (CI), and p-values (categorized as less than 0.001, less than 0.01, and less than 0.05) for each independent variable. Using Pearson's R correlation coefficient and a variation inflation factor, we ensured that correlation and multicollinearity were not problematic in the adjusted models. Education was highly correlated with wealth. Since education was included as a variable in the SWPER index, we did not include it in our regression analysis.

We conducted all analyses using Stata 16, adjusting for the complex survey design and probability sampling using individual weights, primary sampling unit, and strata for each survey using the *svyset* command. For all statistical tests, we set α=0.05.

Table 1   Key dependent and independent variables

Variable	Definition
Dependent variables	
Four or more antenatal care visits (ANC)	Percentage of women with four or more ANC visits for their most recent pregnancy that resulted in a live birth in the past 2 years
Women whose birth was assisted by a skilled birth attendant (SBA)	Percentage of women whose most recent live birth in the past 2 years was assisted by an SBA
Postnatal care (PNC) for the mother	Percentage of women who received a postnatal check-up within 2 days of delivering their most recent birth in the past 2 years
Critical maternal health care contacts	Percentage of women with all three of the above maternal health care services: four or more ANC visits, delivery assisted by an SBA, and PNC within 2 days of delivery among women with a live birth in the past 2 years.
Key independent variables	
SWPER (1): Attitudes towards violence	This domain of empowerment includes all empowerment variables included in SWPER but is most heavily weighted by five variables that represent women's attitude to violence. These include responses to the questions:
	In your opinion, is a husband justified in hitting or beating his wife in the following situations:
	1) If she goes out without telling him? 2) If she neglects the children? 3) If she argues with him? 4) If she refuses to have sex with him? 5) If she burns the food?
	Responses are categorized as follows: Justified=–1; don't know=0; not justified=1
SWPER (2): Social independence	This domain of empowerment includes all empowerment variables included in SWPER but is most heavily weighted by six variables that represent social independence. These include:
	1) Frequency of reading newspaper or magazine 2) Woman's education in completed years of schooling 3) Education difference (woman's minus husband's completed years of schooling) 4) Age difference (woman's age minus husband's age) 5) Age at first cohabitation 6) Age of woman at first birth
SWPER (3): Decision making	This domain of empowerment includes all empowerment variables included in SWPER, but is most heavily weighted by three variables that represent women's role in household decision making related to the following questions:
	1) Who usually decides on respondent's health care? 2) Who usually decides on large household purchases? 3) Who usually decides on visits to family or relatives?
	Responses are coded as follows: joint decision or respondent alone (1) or husband or other (including family elder) alone (–1)
At least one problem in accessing health care	This variable was coded as (1) if the respondent said any of the following was a big problem in response to the questions:
	When you are sick and want to get medical advice or treatment, is each of the following a big problem or not?
	a) Getting permission to go to the doctor? b) Getting money needed for advice or treatment? c) The distance to the health facility? d) Not wanting to go alone?
	If the respondent responded no to all questions, they were coded as (0).

SWPER = Survey-based Women's emPowERment index

3   RESULTS

This chapter presents the results of the study. First, we present the background characteristics of the women in the analysis. We then examine the overarching or national trends of maternal health care-seeking behavior, and trends in empowerment.

Table 2 shows the background characteristics of the analytic sample. In both surveys, the majority of women lived in rural areas, with a decrease in rural residence between the two surveys from 70% in 2012-13 to 66% in 2017-18. In 2012-13 and 2017-18, the regions where respondents lived were consistent, with the majority of respondents living in Punjab (58% and 54% respectively), followed by Sindh (23% and 24% respectively), Khyber Pakhtunkhwa (15% and 17% respectively), Balochistan (4% and 5% respectively), and the fewest number of respondents living in ICT Islamabad, at less than 1% each year. Respondents' education improved from 2012-13 to 2017-18, with the proportion of women with no education decreasing (54% in 2012-13 to 46% in 2017-18), some with primary education remaining stable (17% in 2012-13 and 16% in 2017-18), and at least some with secondary education increasing (28% in 2012-13 to 38% in 2017-18). Age at birth remained consistent, with little change across the higher risk age at birth categories; 8% in 2012-13 and 9% in 2017-18 were younger than age 20, and 11% were age 35-49 in both the 2012-13 and 2017-18 surveys. The number of children born in 2012-13 and 2017-18 was similar, with 23% and 24%, respectively, having one child, 38% and 40%, respectively, two to three children, 22% and 23%, respectively, four to five children, and 17% and 13%, respectively, having six children or more.

Table 2   **Sample of women analyzed by background characteristics, Pakistan 2012-13 and 2017-18**

	2012-13		2017-18	
	%	N	%	N
Place of residence				
Urban	29.7	1,231	33.7	1,277
Rural	70.3	2,914	66.3	2,516
Region				
Punjab	57.7	2,392	53.8	2,038
Sindh	22.9	949	23.7	900
Khyber Pakhtunkhwa	14.6	607	16.6	629
Balochistan	4.4	181	5.1	194
ICT Islamabad	0.4	16	0.8	31
Wealth quintile				
Lowest	21.9	907	20.5	776
Second	21.2	878	18.7	711
Middle	20.4	846	22.0	832
Fourth	20.7	856	19.0	721
Highest	15.9	658	19.8	752
Education				
None	54.4	2,255	46.3	1,755
Primary	17.3	715	15.9	602
Secondary +	28.3	1,175	37.9	1,435
Age at birth				
<20	8.2	340	9.0	341
20-34	80.4	3,332	80.4	3,049
35-49	11.4	472	10.6	402
Parity				
1	23.4	969	23.6	897
2-3	38.2	1,582	39.7	1,504
4-5	21.7	900	23.4	887
6+	16.7	694	13.3	505
Total	**100.0**	**4,145**	**100.0**	**3,792**

*Note: due to rounding, percents may not add up to 100.

3.1　Trends in Maternal Health Care-Seeking and Empowerment

3.1.1　Trends in maternal health

Overall, maternal health care-seeking increased between 2012-13 and 2017-18 in Pakistan, as seen in Figure 1 with supporting information provided in Appendix Table 1. Figure 1 displays the percentage of currently married women age 15-49 with a recent live birth who reported maternal health care utilization with 4+ ANC visits, SBA, and PNC services, as well as the trends in maternal health care-seeking across all three types of services. For 4+ ANC visits and SBA, the increases were significant and noteworthy. The 4+ ANC visits increased from 38% to 53%, while SBA increased by 16 percentage points (from 58% to 74%). However, there was only a slight, nonsignificant increase in PNC, from 61% to 63%. Combining all three indicators, the percentage of women who obtained all three services significantly increased from 28% to 40%, a total of 12 percentage points.

Figure 1　National trends in maternal health care-seeking in Pakistan, 2012-2018
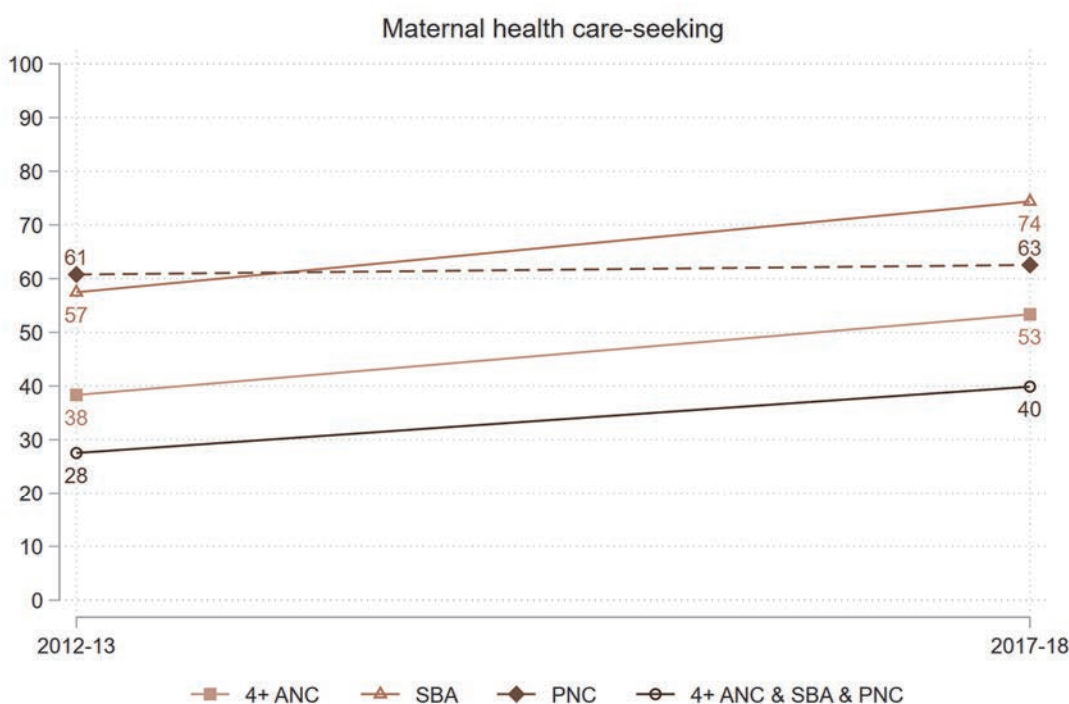
Note: A solid line indicates a significant change between two surveys, while a dotted line indicates no significant change. ANC = antenatal care; SBA = skilled birth attendance; PNC = postnatal care.

3.1.2　Trends in high empowerment

Figure 2 displays the percentage of currently married women age 15-49 with a birth in the past 2 years who reported high empowerment in terms of no problems accessing care and high empowerment related to attitude to violence, social independence, and decision-making SWPER domains. Unlike trends in maternal health care utilization, reported levels of high empowerment among Pakistani women between 2012-13 and

2017-18 have remained unchanged, except for one domain. For social independence, there was statistical evidence of an increase, from 31% to 36%.

Figure 2   Trends in empowerment indicators in Pakistan, 2012-2018

Note: A solid line indicates a significant change between two surveys, while a dotted line indicates no significant change.

3.2 Trends in the Relationship between Maternal Health Care-Seeking and Women's Empowerment over Time

This section presents an analysis of the relationship between dependent variables that reflect maternal health care-seeking and key independent variables of interest including the four domains of empowerment and the sociodemographic variables.

3.2.1 Four or more antenatal visits

Figure 3 (with supporting information in Appendix Table 1) shows that, as expected, there was a positive relationship between increasing levels of empowerment and having 4+ ANC visits, with the exception of the decision-making domain. Women with medium and high levels of empowerment for decision making had similar levels of 4+ ANC visits in 2017-18 (59% each). In 2012-13, unexpectedly, the use of 4+ ANC visits was highest among the medium empowerment domain (46%); however, based on non-overlapping confidence intervals (Appendix Table 1), this was not a significant difference. In 2017-18, there was a 24-percentage point disparity in the use of ANC between high empowerment related to social independence (73%) and medium empowerment (49%), and a 40-percentage point difference in having 4+ ANC visits between women in high and low empowerment categories (33%). In 2017-18, there was a higher percentage of women who presented for four or more ANC visits if they reported having no problems accessing care (66%) than for women who reported at least one problem (48%).

The disparities in care-seeking for ANC persisted over time, and as seen among all women, ANC utilization among women in each category of empowerment significantly increased over time. More specifically, among women with the highest level of empowerment on attitude to violence, 47% reported having 4+ ANC visits in 2012-13 compared with 63% in 2017-18, a 16-percentage point increase between the survey periods (p-value <0.001). Similarly, there was a 12-percentage point difference among women with low empowerment in the same domain, although only 37% of women in the low empowerment domain had 4+ ANC visits by 2017-18.

Appendix Table 2 provides supporting information, including estimates, 95% CI, and the significance of the differences between independent factors, including sociodemographic characteristics, and 4+ ANC visits. Within each sociodemographic characteristic, the proportion of women with 4+ ANC visits varied significantly, and there was evidence of significant increases within each category between the two surveys, with the exception of the grand multiparous women (6 or more births), where there was not sufficient evidence of a significant increase.

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Figure 3 **The percentage of women with 4 or more antenatal care visits for their last pregnancy resulting in a live birth, according to domains and levels of empowerment**
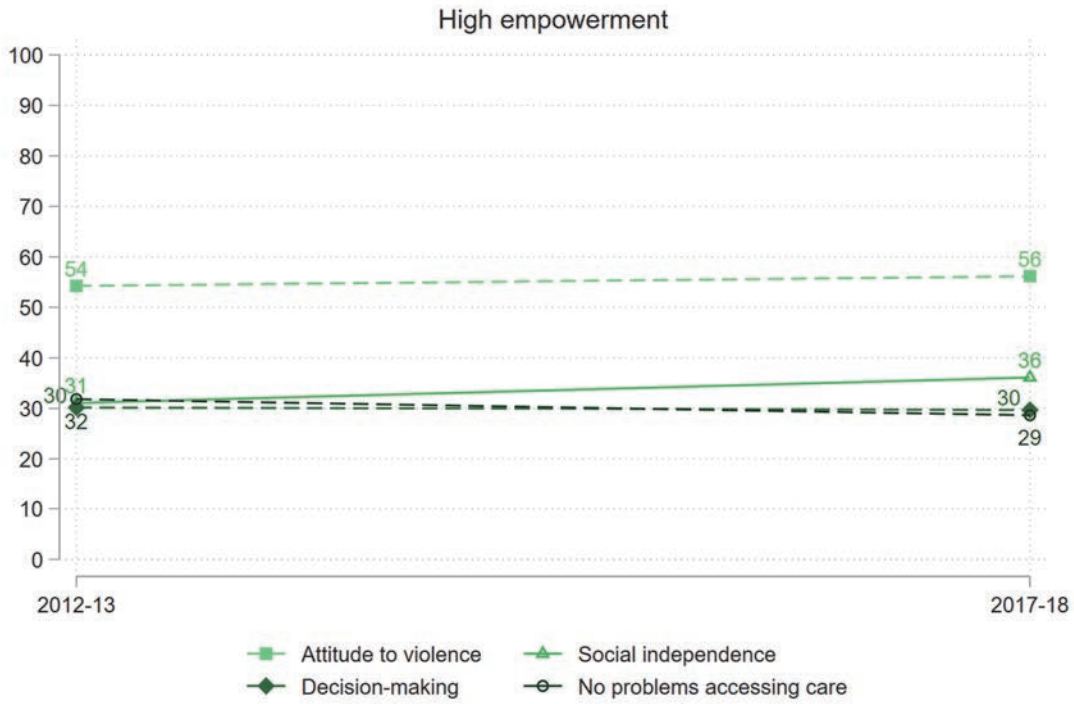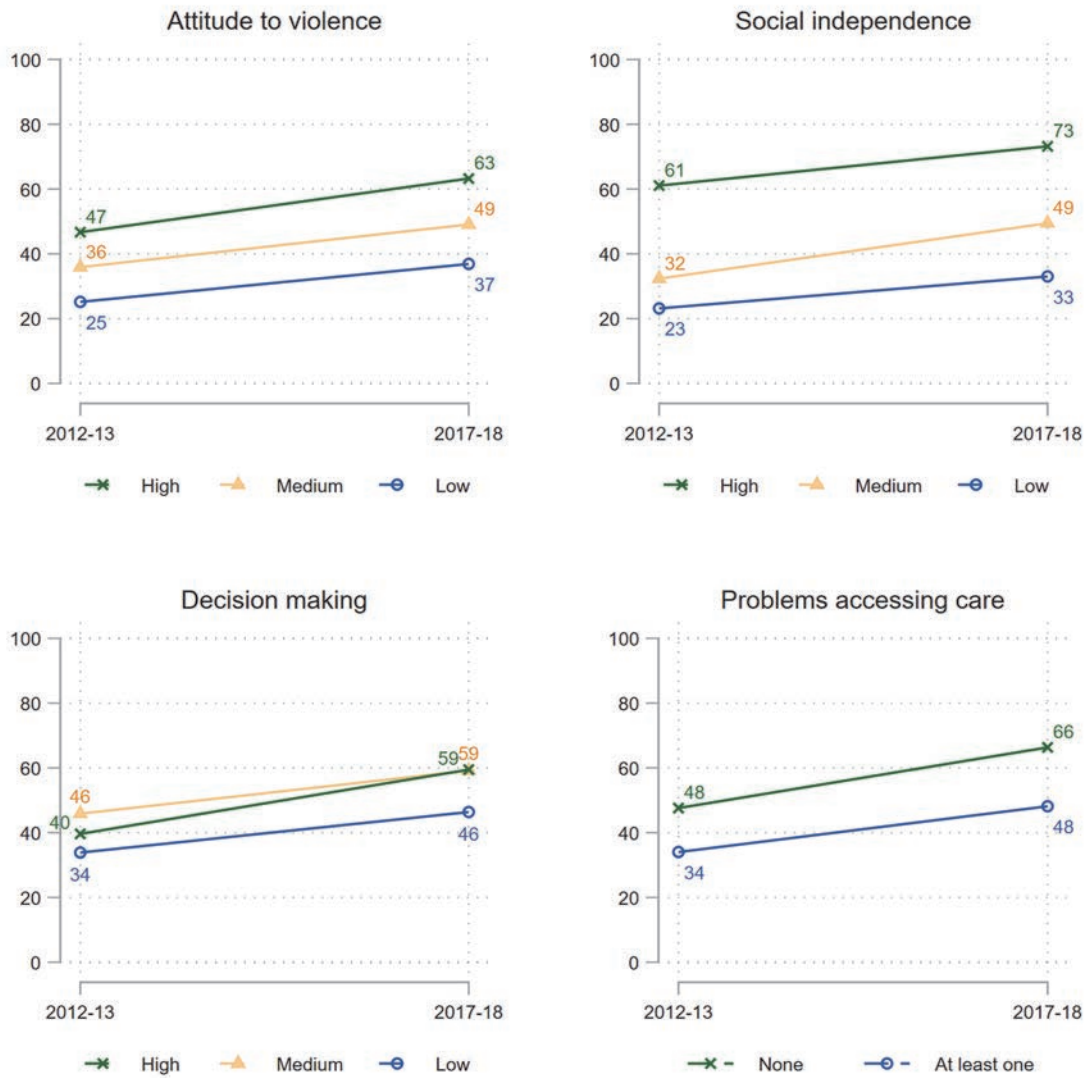

Note: A solid line indicates a significant change between two surveys, while a dotted line indicates no significant change.

The logistic regressions conducted in 2012-13 and 2017-18 (Table 3) show the significance of disparities between low, medium, and high empowerment with four or more ANC visits. In the unadjusted models, women with medium and high levels of empowerment were statistically more likely to have 4+ ANC visits compared with women with low empowerment. However, after controlling for region, wealth, and parity, which were also associated with the dependent variable in the adjusted models, women with high empowerment in the social independence and decision-making domains strongly predicted having 4+ ANC visits. Thus, in both 2012-13 and 2017-18, women with high social independence empowerment had twice the odds of having 4+ ANC visits compared with the least empowered women in this domain (2012-13 AOR: 2.0; 95% CI: 1.5-2.8; 2017-18 AOR: 2.0, 95% CI: 1.4-2.7). Women in the high decision-making domain had a 30% increase in the odds in 2012-13 and a 40% increase in the odds in 2017-18 of having 4+ ANC visits than women in the low category of decision-making domain (2012-13 AOR: 1.3, 95% CI: 1.0-1.7; 2017-18 AOR: 1.4, 95% CI: 1.1-1.9). In 2017-18 only, having no problems accessing care was associated (p<0.05) with a 30% increase in the odds of ANC (AOR: 1.3, 95% CI: 1.0-1.6); although the relationship was not significant in 2012-13 after controlling for covariates. Although these relationships were significant in adjusted models, the strength and magnitude were much attenuated compared with the unadjusted models.

The strongest predictor of 4+ ANC visits in both years was wealth. Women in higher wealth quintiles were substantially more likely to have 4+ ANC visits. In 2017-18, women in the highest wealth quintile had nearly 16 times the odds of having 4+ ANC visits compared with women in the lowest wealth quintile (AOR: 15.7, 95% CI: 9.5-26.0). Parity also strongly and consistently predicted 4+ ANC visits in both surveys. Women who were pregnant or gave birth to higher order children of any grouping (2-3, 4-5, or 6 or more) were less likely to have 4+ ANC visits compared with women whose pregnancy resulted in their first live birth. In 2017-18, women with 6 or more births had 50% reduced odds of completing 4+ ANC visits compared with women in their first pregnancy (AOR: 0.5; 95% CI: 0.3-0.7).

The relationship between 4+ ANC visits and empowerment, wealth, and parity remained relatively constant between the two surveys, although the magnitude of the relationship between lowest and each of the higher (second, middle, second highest, highest) wealth quintiles grew over time. However, the magnitude of relationship between region and 4+ ANC visits diminished over time. In 2017-18, women in Balochistan had a 50% reduced odds of having 4+ ANC visits compared with women in Punjab (AOR: 0.5; 95% CI: 0.3-0.7), while women in both Sindh and ICT Islamabad had greater odds of receipt of care compared with women in Punjab, although the significance was marginal (p-value<0.05).

Table 3   Unadjusted odds ratios (UOR), adjusted odds ratios (AOR), and 95% confidence
intervals (CI) of attending 4 or more antenatal care visits during the last pregnancy

	2012-13				2017-18			
Variable	UOR	95% CI	AOR	95% CI	UOR	95% CI	AOR	95% CI
Empowerment								
Problems accessing care (ref=at least one)								
None	1.8***	[1.4,2.2]	0.9	[0.7,1.2]	2.1***	[1.7,2.6]	1.3*	[1.0,1.6]
SWPER								
Attitude to violence (ref=low)								
Medium	1.7**	[1.2,2.3]	1.1	[0.8,1.6]	1.6**	[1.2,2.3]	1.2	[0.9,1.7]
High	2.6***	[2.1,3.3]	1.3*	[1.0,1.7]	2.9***	[2.3,3.7]	1.3	[1.0,1.7]
Social independence (ref=low)								
Medium	1.6***	[1.2,2.1]	1.2	[0.9,1.6]	2.0***	[1.6,2.5]	1.2	[0.9,1.6]
High	5.2***	[4.0,6.8]	2.0***	[1.5,2.8]	5.5***	[4.3,7.2]	2.0***	[1.4,2.7]
Decision making (ref=low)								
Medium	1.7***	[1.3,2.1]	1.3	[1.0,1.7]	1.7***	[1.3,2.1]	1.4*	[1.0,1.8]
High	1.3*	[1.0,1.6]	1.3*	[1.0,1.7]	1.7***	[1.4,2.1]	1.4*	[1.1,1.9]
Background characteristics								
Place of residence (ref= rural)								
Urban	4.3***	[3.2,5.7]	1.2	[0.9,1.6]	3.3***	[2.5,4.4]	1.1	[0.8,1.5]
Region (ref=Punjab)								
Sindh	1.1	[0.8,1.4]	1.7***	[1.3,2.2]	0.7	[0.5,1.1]	1.4*	[1.0,1.9]
Khyber Pakhtunkhwa	0.5***	[0.4,0.7]	0.8	[0.6,1.0]	0.6*	[0.4,0.9]	1.2	[0.8,1.6]
Balochistan	0.2***	[0.1,0.3]	0.4***	[0.2,0.6]	0.2***	[0.1,0.3]	0.5**	[0.3,0.7]
ICT Islamabad	6.0***	[4.0,9.0]	2.7***	[1.8,4.1]	3.1***	[1.9,5.1]	1.6*	[1.0,2.4]
Wealth quintile (ref=lowest)								
Second	2.0***	[1.4,2.9]	2.1***	[1.4,3.1]	2.3***	[1.6,3.2]	2.4***	[1.7,3.4]
Middle	3.1***	[2.2,4.3]	2.7***	[1.8,4.0]	3.9***	[2.8,5.6]	3.4***	[2.3,5.1]
Fourth	7.0***	[5.1,9.7]	5.0***	[3.3,7.6]	10.3***	[7.1,14.7]	7.2***	[4.6,11.2]
Highest	26.1***	[17.4,39.3]	14.6***	[9.0,23.7]	27.7***	[18.1,42.4]	15.7***	[9.5,26.0]
Age at birth (ref=20-34)								
<20	0.8	[0.6,1.1]	1.0	[0.6,1.5]	0.7**	[0.5,0.9]	0.9	[0.6,1.3]
35-49	0.6***	[0.5,0.8]	0.9	[0.6,1.2]	0.6**	[0.4,0.8]	1.0	[0.7,1.5]
Parity (ref=first child)								
2-3	0.6***	[0.5,0.8]	0.6**	[0.5,0.8]	0.7**	[0.5,0.9]	0.6**	[0.5,0.8]
4-5	0.4***	[0.3,0.5]	0.5***	[0.3,0.7]	0.5***	[0.4,0.6]	0.6**	[0.4,0.8]
6+	0.3***	[0.2,0.4]	0.6*	[0.4,0.9]	0.3***	[0.2,0.3]	0.5**	[0.3,0.7]

Notes: *p<0.05, **p<0.01, ***p<0.001

3.2.2   Skilled birth attendance

The overall percentage of Pakistani women who experienced SBA increased as did the percentage of women with SBA according to each domain and category of empowerment (see Figure 4). Appendix Table 3 provides estimates, confidence intervals, the percentage point differences between surveys, and the p-values that represent the significance of the differences between characteristics and the dependent variable, as well as the significance of change over time. In terms of attitude toward violence, social independence, and problems accessing care, women with high empowerment had higher utilization of SBA compared with women in medium and low empowerment categories in the respective domains. The largest disparities, which persisted across the two surveys, were apparent within the domain of social independence. In 2012-13, there was a 32-percentage point gap between the highest and the lowest levels of empowerment (77% and 45%, respectively). This gap narrowed slightly to 27 percentage points by 2017-18, although both categories of empowerment showed a significant increase in utilization of SBA (87% among the high empowerment category and 60% among low empowerment). In terms of decision making, while there was a similar pattern of an increase of utilization of SBA services, there was no significant difference between categories of empowerment in 2012-13. By 2017-18, however, this disparity widened,

in which 80% of women with high empowerment had an SBA compared with 69% of women with low empowerment.

As shown in Appendix Table 3, utilization of maternal health care services rose by over 10 percentage points among nearly all characteristics. There was strong statistical evidence of a change in women's SBA utilization in Balochistan, with the largest surge of 24 percentage points relative to observed increases in SBA utilization in other regions in our analysis (p<0.001). In addition, there is strong statistical evidence of an association (p<0.001) between SBA and wealth, education, and parity across the 5-year period.

Figure 4   The percentage of women reported skilled birth attendance during their last live birth, according to domains and levels of empowerment
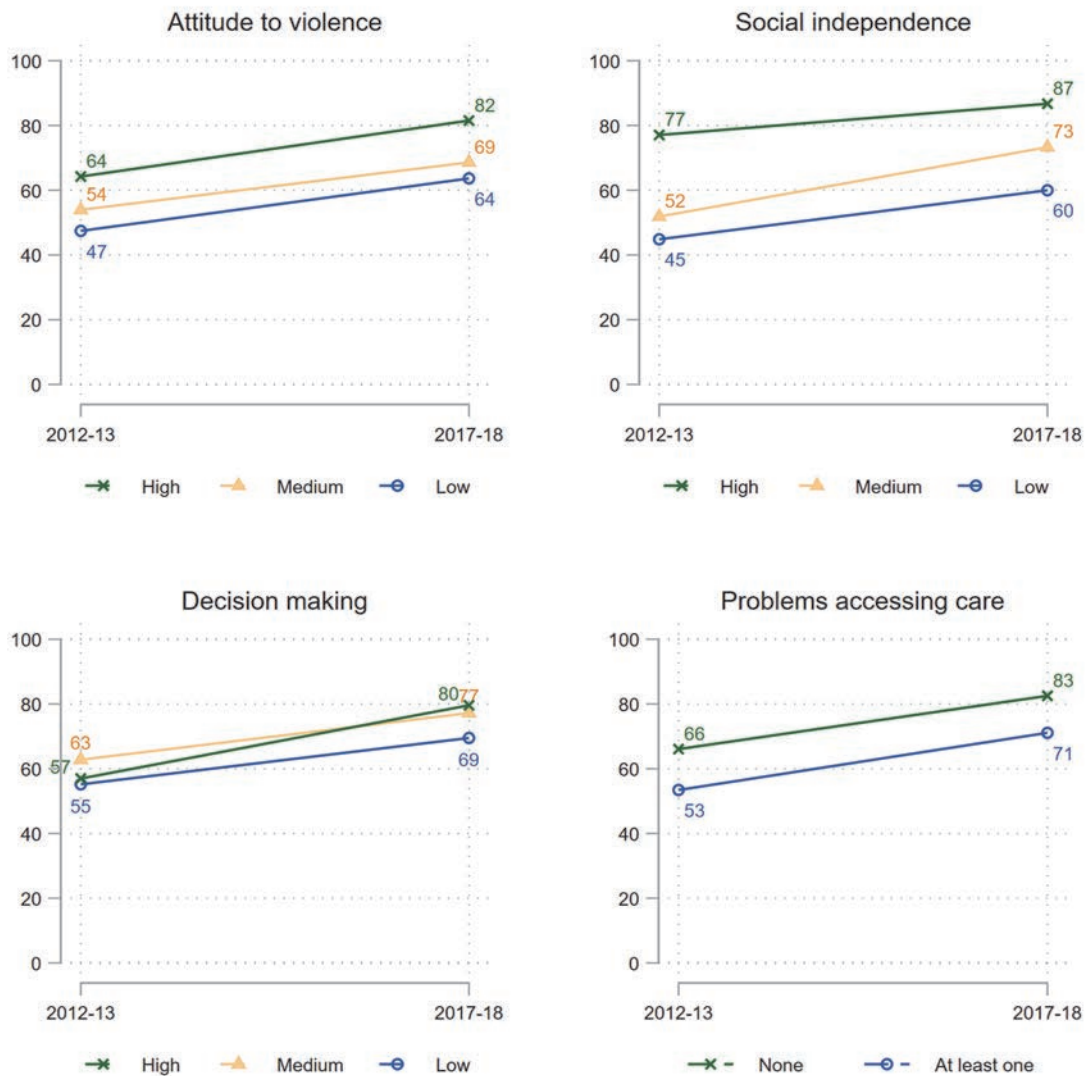
Note: A solid line indicates a significant change between two surveys, while a dotted line indicates no significant change.

The differences between levels of empowerment in SBA, as seen in Figure 4, Appendix Table 3, and in the unadjusted logistic regression models in Table 4, were largely not significant after controlling for key sociodemographic variables in both surveys, except for high social independence. In 2012-13 and 2017-18, women with high social independence empowerment had a 70% and 60% increase in the odds of having an SBA compared with the women with low social independence, respectively (2012-13 AOR: 1.7, 95% CI: 1.2-2.2; 2017-18 AOR: 1.6, 95% CI: 1.1-2.4). Similar to 4+ ANC visits, the magnitude of the association between higher wealth and SBA was large. In 2017-18, for example, women in the highest wealth quintile had eight times higher odds of having an SBA at delivery compared with women in the lowest wealth quintile (AOR: 8.1, 95% CI: 4.4-14.9). Unlike 4+ ANC visits, however, higher parity was not a stronger predictor of having an SBA, a relationship that may have been attenuated given the inclusion of earlier maternal care-seeking. This model also controlled for having had 4+ ANC visits in the pregnancy resulting in this birth. In both surveys, we found that women who had 4+ ANC visits had 3 times the odds or higher of delivering with an SBA compared with women who had fewer than 4 visits (2012-13 AOR: 3.0, 95% CI: 2.4-3.8; 2017-18 AOR: 3.5, 95% CI: 2.7-4.6).

Between the two surveys, the relationships between the independent variables and SBA did not change across most covariates, except for region and parity. In 2012-13, women residing in ICT Islamabad were significantly more likely to deliver with an SBA compared with women in Punjab (AOR: 2.1, 95% CI: 1.2-3.5) and in 2017-18, there was no difference. Women with higher parity were significantly less likely to deliver with an SBA in 2012-13, while in 2017-18 the relationship trended in the same direction. The associations were largely not significant in the adjusted model.

Table 4   **Unadjusted odds ratios (UOR), adjusted odds ratios (AOR), and 95% confidence intervals (CI) of skilled attendance at birth during the last live birth**

	2012-13				2017-18			
Variable	UOR	95% CI	AOR	95% CI	UOR	95% CI	AOR	95% CI
Empowerment								
Problems accessing care (ref=at least one)								
None	1.7***	[1.3,2.2]	1.1	[0.9,1.5]	1.9***	[1.4,2.7]	1.0	[0.7,1.4]
SWPER								
Attitude to violence (ref=low)								
Medium	1.3	[1.0,1.8]	1.0	[0.7,1.4]	1.2	[0.9,1.7]	0.9	[0.6,1.2]
High	2.0***	[1.6,2.5]	1.2	[1.0,1.6]	2.5***	[1.9,3.3]	1.2	[0.9,1.6]
Social independence (ref=low)								
Medium	1.3*	[1.1,1.7]	1.0	[0.8,1.3]	1.8***	[1.4,2.3]	1.3	[1.0,1.7]
High	4.1***	[3.1,5.5]	1.7**	[1.2,2.2]	4.4***	[3.3,5.7]	1.6*	[1.1,2.4]
Decision making (ref=low)								
Medium	1.4*	[1.0,1.9]	1.1	[0.8,1.5]	1.5**	[1.1,2.0]	1.1	[0.8,1.5]
High	1.1	[0.9,1.4]	1.1	[0.8,1.5]	1.7***	[1.3,2.2]	1.2	[0.9,1.7]
Earlier maternal health care-seeking								
Antenatal care, 4 visits (ref=no)								
Yes	5.7***	[4.5,7.3]	3.0***	[2.4,3.8]	7.0***	[5.5,9.0]	3.5***	[2.7,4.6]
Background characteristics								
Place of residence (ref= rural)								
Urban	2.9***	[2.1,4.0]	0.7	[0.5,1.1]	3.3***	[2.4,4.7]	1.2	[0.8,1.7]
Region (ref=Punjab)								
Sindh	1.3	[1.0,1.8]	2.2***	[1.5,3.3]	1.0	[0.7,1.5]	1.9**	[1.2,2.8]
Khyber Pakhtunkhwa	0.8	[0.5,1.1]	1.3	[0.9,1.8]	0.7*	[0.4,1.0]	1.0	[0.7,1.6]
Balochistan	0.2***	[0.1,0.3]	0.3***	[0.2,0.5]	0.2***	[0.1,0.3]	0.4***	[0.3,0.7]
ICT Islamabad	5.5***	[3.3,9.4]	2.1**	[1.2,3.5]	2.5**	[1.3,4.7]	1.0	[0.6,1.9]
Wealth quintile (ref=lowest)								
Second	1.5**	[1.1,2.1]	1.5*	[1.0,2.1]	1.5**	[1.1,2.0]	1.5*	[1.1,2.0]
Middle	2.5***	[1.8,3.7]	2.2***	[1.5,3.3]	3.6***	[2.6,5.0]	2.9***	[2.0,4.1]
Fourth	5.2***	[3.6,7.4]	3.7***	[2.4,5.7]	5.9***	[3.8,9.0]	3.0***	[1.8,4.8]
Highest	14.8***	[8.9,24.8]	7.0***	[3.7,13.2]	23.0***	[13.7,38.5]	8.1***	[4.4,14.9]
Age at birth (ref=20-34)								
<20	1.1	[0.8,1.5]	1.2	[0.8,1.9]	0.9	[0.6,1.3]	1.3	[0.8,2.0]
35-49	0.6***	[0.5,0.8]	0.9	[0.7,1.2]	0.6*	[0.4,0.9]	0.9	[0.6,1.4]
Parity (ref=first child)								
2-3	0.6***	[0.5,0.7]	0.7*	[0.5,0.9]	0.7**	[0.5,0.9]	0.8	[0.5,1.1]
4-5	0.4***	[0.3,0.5]	0.5***	[0.4,0.7]	0.4***	[0.3,0.6]	0.6*	[0.4,0.9]
6+	0.3***	[0.2,0.3]	0.5**	[0.3,0.7]	0.3***	[0.2,0.4]	0.7	[0.4,1.1]

Notes: *p<0.05, **p<0.01, ***p<0.001

3.2.3 Postnatal care

Unlike 4+ ANC visits and SBA, levels of PNC utilization within 2 days of delivery generally have not increased between 2012-13 and 2017-18. Overall levels of PNC, as well as levels of PNC within nearly all domains and levels of empowerment, remain unchanged at both time points (see Figure 5). The one exception was the SWPER decision-making domain. There was good evidence (p<0.01) of an 8-percentage point increase in PNC utilization among women with high decision-making empowerment from 2012-13 to 2017-18, at 63% and 72%, respectively.

As Appendix Table 4 shows, although changes over time were not significant, similar to 4+ ANC visits and SBA, there are significant gaps in PNC between the most and least empowered. Again, the largest disparities were noted in the SWPER domain of social independence, where in 2017-18, 76% of women with high empowerment received PNC versus 48% of women with low empowerment. Within both surveys, there was evidence of an association between PNC and most sociodemographic characteristics, including place of residence, region, wealth quintile, education, age at birth, and parity (2017-18 only). We identified

notable differences in the receipt of PNC based on earlier maternal health care-seeking behavior, including 4+ ANC visits as well as SBA.

Figure 5   The percentage of women receiving a postnatal check within 2 days of delivery, according to domains and levels of empowerment
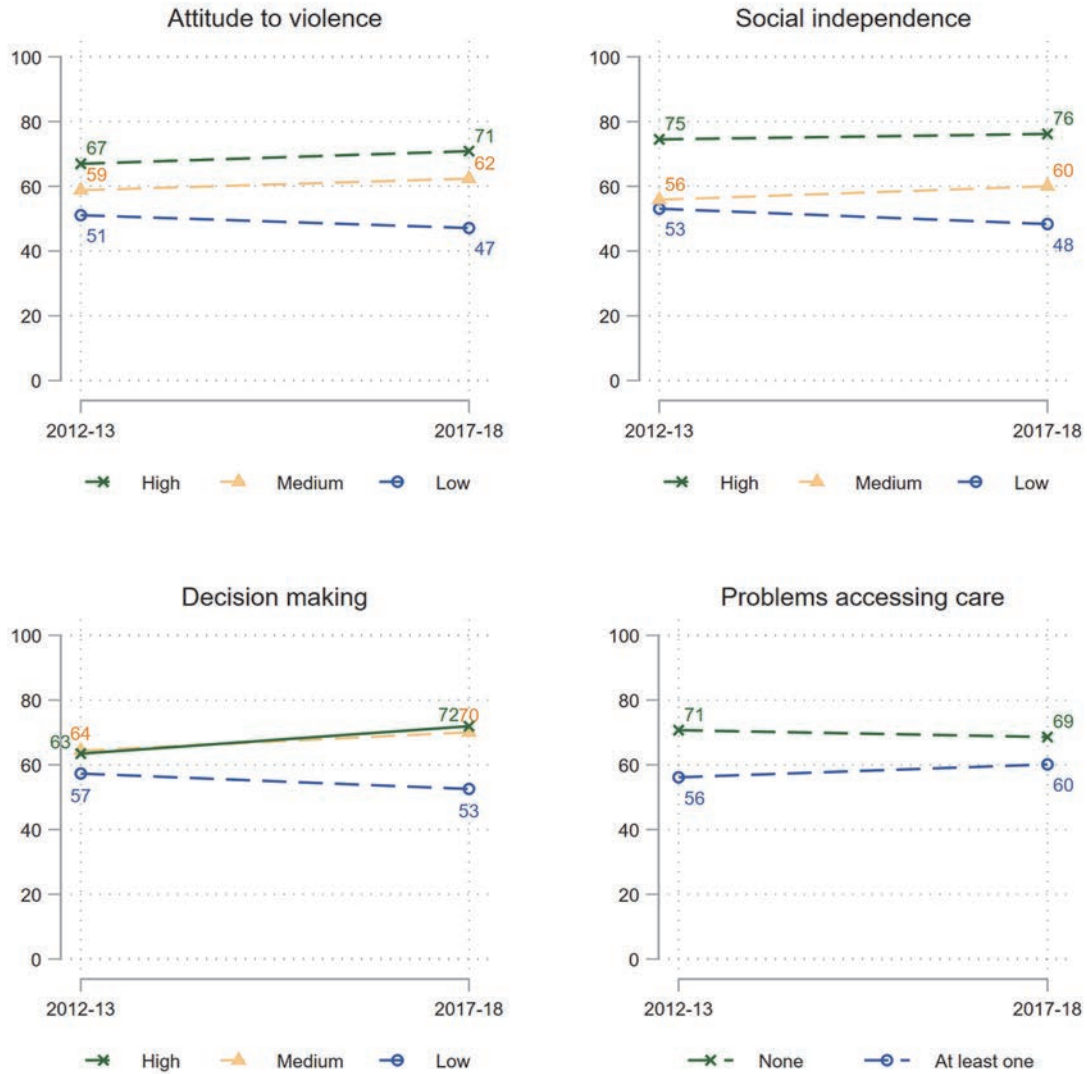
Note: A solid line indicates a significant change between two surveys, while a dotted line indicates no significant change.

As Table 5 shows, after controlling for a number of factors that could be associated with PNC care in logistic regression models, we found associations that diverted from those seen when examining 4+ ANC visits and SBA. For measures of empowerment, we found that decision-making empowerment was strongly associated with receipt of PNC within 2 days of delivery, but only in 2017-18. Women who had either medium or high empowerment related to decision making had a 70% increase in the odds of receiving PNC compared with women in the low empowerment category (both medium and high AOR: 1.7, 95% CI: 1.3-2.3). In 2012-13, this was not significantly related in the adjusted model. Interestingly, the odds of having PNC were 30% lower for women who reported no problems in accessing care compared with those who reported having problems (AOR: 0.7, 95% CI: 0.5-0.9). The odds changed direction from the unadjusted model (AOR: 1.4, 95% CI: 1.1-1.9), indicating that the model includes an interaction between this variable and one or more covariates.

Unlike 4+ ANC visits and SBA, however, wealth was not as strong of a predictor of receipt of PNC, although still significantly associated. The only quintile significantly different from the lowest quintile was the highest; women in the highest quintile had 3 times the odds of receiving PNC compared with women in the lowest (AOR: 2.9, 95% CI: 1.6-5.0). Although this is still high, the odds are lower than for other maternal health care services. Women in Khyber Pakhtunkhwa were more likely to receive PNC than women in Punjab in both years (2012-13 AOR: 0.3, 95% CI: 0.2-0.4; 2017-18 AOR: 0.5, 95% CI: 0.3-0.7).

For these models that predict receipt of PNC, we included receipt of other maternal health care services, including 4+ ANC visits and SBA. Having delivered with an SBA was associated with a nearly 10-fold increase in the odds of receiving PNC, compared with women who delivered without an SBA in both surveys (2012-13 AOR: 9.4, 95% CI: 7.1-12.5; 2017-18 AOR: 9.7, 95% CI: 7.1-13.3). The large magnitude of this relationship likely attenuated that of the relationship between wealth and PNC. Having 4+ ANC visits was also significantly associated with receipt of PNC in both years as well, although not to the degree of having an SBA (2012-13 AOR: 1.6, 95% CI: 1.2-2.1; 2017-18 AOR: 1.5, 95% CI: 1.1-1.9). In addition to changes in the relationship between PNC and empowerment, the relationship between PNC and wealth grew stronger, which indicated growth in disparities as also seen in Figure 5.

Table 5   Unadjusted odds ratios (UOR), adjusted odds ratios (AOR), and 95% confidence intervals (CI) of a postnatal check after the last live birth

Variable	2012-13				2017-18			
	UOR	95% CI	AOR	95% CI	UOR	95% CI	AOR	95% CI
Empowerment								
Problems accessing care (ref=at least one)								
None	1.9***	[1.5,2.3]	1.2	[1.0,1.6]	1.4**	[1.1,1.9]	0.7*	[0.5,0.9]
SWPER								
Attitude to violence (ref=low)								
Medium	1.4*	[1.0,1.8]	1.0	[0.7,1.4]	1.9***	[1.4,2.5]	1.6*	[1.1,2.2]
High	1.9***	[1.5,2.4]	1.0	[0.7,1.3]	2.7***	[2.2,3.4]	1.3	[1.0,1.7]
Social independence (ref=low)								
Medium	1.1	[0.9,1.4]	0.8	[0.6,1.1]	1.6***	[1.3,2.0]	1.0	[0.7,1.3]
High	2.6***	[2.0,3.3]	0.9	[0.7,1.3]	3.4***	[2.6,4.4]	1.2	[0.8,1.7]
Decision making (ref=low)								
Medium	1.3*	[1.0,1.7]	1.0	[0.7,1.3]	2.1***	[1.7,2.7]	1.7***	[1.3,2.3]
High	1.3*	[1.1,1.6]	1.1	[0.8,1.4]	2.3***	[1.8,2.9]	1.7***	[1.3,2.3]
Earlier maternal health care-seeking								
Antenatal care, 4 visits (ref=no)								
Yes	3.8***	[3.1,4.6]	1.6***	[1.2,2.1]	3.9***	[3.1,4.9]	1.5**	[1.1,1.9]
Skilled attendant at birth (ref=no)								
Yes	10.9***	[8.4,14.0]	9.4***	[7.1,12.5]	13.7***	[10.1,18.6]	9.7***	[7.1,13.3]
Background characteristics								
Place of residence (ref= rural)								
Urban	2.4***	[1.8,3.2]	1.1	[0.7,1.8]	2.5***	[1.9,3.3]	0.9	[0.7,1.3]
Region (ref=Punjab)								
Sindh	1.0	[0.7,1.4]	0.9	[0.6,1.4]	1.2	[0.9,1.7]	1.6*	[1.1,2.4]
Khyber Pakhtunkhwa	0.3***	[0.2,0.4]	0.3***	[0.2,0.4]	0.4***	[0.3,0.5]	0.5**	[0.3,0.7]
Balochistan	0.3***	[0.2,0.4]	0.9	[0.5,1.5]	0.3***	[0.2,0.5]	0.9	[0.6,1.4]
ICT Islamabad	1.8**	[1.2,2.8]	0.6	[0.4,1.0]	1.9**	[1.2,3.0]	0.9	[0.6,1.6]
Wealth quintile (ref=lowest)								
Second	1.6**	[1.2,2.2]	1.5*	[1.1,2.1]	1.1	[0.8,1.4]	0.9	[0.6,1.3]
Middle	1.9***	[1.4,2.6]	1.2	[0.8,1.7]	1.8**	[1.3,2.6]	1.1	[0.7,1.6]
Fourth	3.6***	[2.4,5.2]	1.4	[0.9,2.2]	3.3***	[2.2,4.8]	1.5	[1.0,2.4]
Highest	6.2***	[4.2,9.0]	1.4	[0.8,2.4]	8.5***	[5.5,13.1]	2.9***	[1.6,5.0]
Age at birth (ref=20-34)								
<20	0.9	[0.7,1.3]	0.9	[0.5,1.5]	0.6**	[0.5,0.9]	0.8	[0.5,1.2]
35-49	0.8	[0.6,1.0]	1.2	[0.8,1.7]	0.7*	[0.5,0.9]	1.1	[0.7,1.6]
Parity (ref=first child)								
2-3	0.7**	[0.6,0.9]	0.9	[0.7,1.1]	0.9	[0.7,1.1]	1.0	[0.7,1.4]
4-5	0.5***	[0.4,0.7]	0.8	[0.6,1.2]	0.6**	[0.5,0.8]	0.9	[0.6,1.3]
6+	0.5***	[0.4,0.6]	0.8	[0.5,1.3]	0.4***	[0.3,0.5]	0.6	[0.4,1.0]

Notes: *p<0.05, **p<0.01, ***p<0.001

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3.2.4 All three critical maternal health contacts

Figure 6 shows that the disparities between measures of empowerment were more pronounced when examining our composite indicator of receipt of critical maternal health care services for 4+ ANC visits, SBA, and PNC. In each survey, higher levels of empowerment among the domains of attitude to violence, social independence, decision making, and problems accessing care show strong statistical evidence of an association with utilizing all four maternal health care services. For example, there was a 41-percentage point difference between women with high empowerment of social independence (60% had all three services) than women with low empowerment (19%), which was greater than the disparities seen when examining empowerment and any of the three services separately. Women with both medium and high levels of empowerment for decision making had similar attainment of all three critical maternal health care contacts in 2017-18, and both groups had greater attainment than women with lower decision-making empowerment. However, in 2012-13, medium decision making had the highest attainment (35%), though overlapping confidence intervals suggest the difference was not necessarily significant (Appendix Table 6).

All sociodemographic characteristics and empowerment domains of interest were strongly associated with all three critical maternal health contacts. Further, we saw significant gains in the use of all three services over time across most characteristics and within empowerment domains. Only use among grand multiparous women (women with 6+ children) and women in ICT Islamabad lacked evidence of a significant change. Appendix Table 6 presents additional information about these characteristics.

Combining all three critical points of service for women during pregnancy, childbirth, and the early postpartum period, we found amplified associations between critical maternal health care and measures of empowerment and wealth (Table 6). High empowerment among every SWPER domain of empowerment, and medium empowerment for social independence and decision making were significantly associated with receipt of all three services compared with low empowerment in the respective domains. For social independence, the odds of receiving all three services in 2017-18 were two times higher among the highly empowered women (AOR: 2.1, 95% CI: 1.5-2.9), compared with the least empowered women, and 40% higher when comparing the medium category to the lowest (AOR: 1.4, 95% CI: 1.0, 2.0). For both medium and high empowered women in the decision-making domain, the odds were 50% greater comparing each with the least empowered (medium and high AOR: 1.5, 95% CI: 1.2-2.0;). For the attitude towards violence as well, women in the highest empowered group had a 60% increase in the odds of having all three contacts compared with the lowest empowered group (AOR: 1.6, 95% CI: 1.2-2.0). The magnitude of the associations between higher wealth quintiles compared with the lowest quintile reference group were considerably large. In 2017-18, the odds of receiving all three health services were 15 times those of women in the lowest quintile, although less than the odds in 2012-13, where women in the wealthiest quintile had nearly 19 times greater odds of receiving all three services (2012-13 AOR: 18.7 95% CI: 11.1-31.5; 2017-18 AOR: 14.9, 95% CI: 9.0-24.8). Parity and region were also significantly associated in these models in both years.
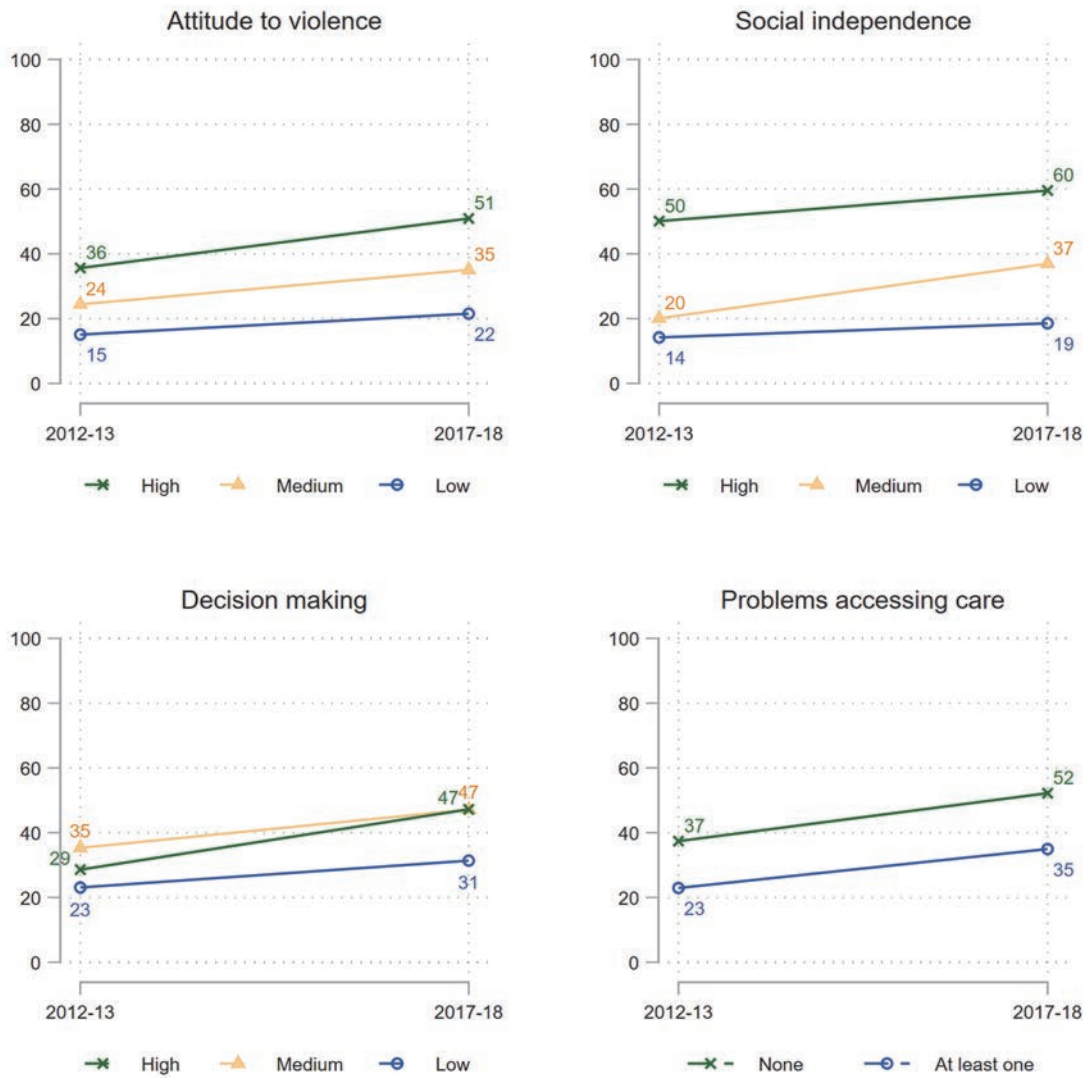
Note: A solid line indicates a significant change between two surveys, while a dotted line indicates no significant change.

Table 6   Unadjusted odds ratios (UOR), adjusted odds ratios (AOR), and 95% confidence intervals (CI) of receipt of 3 critical maternal health services

Variable	2012-13				2017-18			
	UOR	95% CI	AOR	95% CI	UOR	95% CI	AOR	95% CI
Empowerment								
Problems accessing care (ref=at least one)								
None	2.0***	[1.6,2.6]	1.0	[0.8,1.3]	2.0***	[1.6,2.5]	1.1	[0.9,1.4]
SWPER								
Attitude to violence (ref=low)								
Medium	1.8**	[1.3,2.6]	1.1	[0.8,1.6]	2.0***	[1.4,2.7]	1.4	[1.0,1.9]
High	3.1***	[2.4,4.1]	1.4*	[1.1,1.9]	3.8***	[3.0,4.8]	1.6**	[1.2,2.0]
Social independence (ref=low)								
Medium	1.5**	[1.2,2.0]	1.0	[0.8,1.4]	2.6***	[1.9,3.5]	1.4*	[1.0,2.0]
High	6.1***	[4.6,8.0]	2.2***	[1.5,3.1]	6.5***	[5.0,8.4]	2.1***	[1.5,2.9]
Decision making (ref=low)								
Medium	1.8***	[1.4,2.4]	1.4*	[1.1,1.9]	2.0***	[1.5,2.5]	1.5**	[1.2,2.0]
High	1.3*	[1.1,1.7]	1.4*	[1.0,1.8]	2.0***	[1.6,2.4]	1.5**	[1.2,2.0]
Background characteristics								
Place of residence (ref= rural)								
Urban	4.4***	[3.2,5.9]	1.0	[0.7,1.3]	3.2***	[2.4,4.3]	1.0	[0.8,1.3]
Region (ref=Punjab)								
Sindh	1.2	[0.9,1.6]	2.0***	[1.5,2.7]	0.8	[0.6,1.2]	1.6**	[1.1,2.1]
Khyber Pakhtunkhwa	0.5***	[0.3,0.6]	0.8	[0.6,1.1]	0.4***	[0.3,0.6]	0.8	[0.5,1.1]
Balochistan	0.1***	[0.1,0.2]	0.3***	[0.2,0.5]	0.2***	[0.1,0.3]	0.4***	[0.3,0.7]
ICT Islamabad	4.9***	[3.3,7.2]	2.0***	[1.4,2.9]	2.9***	[1.9,4.4]	1.6*	[1.0,2.4]
Wealth quintile (ref=lowest)								
Second	2.4***	[1.6,3.6]	2.5***	[1.6,3.8]	1.9***	[1.4,2.7]	2.1***	[1.4,3.2]
Middle	3.6***	[2.3,5.7]	3.3***	[2.1,5.1]	3.5***	[2.4,4.9]	3.2***	[2.1,4.8]
Fourth	9.7***	[6.4,14.8]	7.4***	[4.7,11.5]	9.5***	[6.5,13.8]	6.8***	[4.3,10.9]
Highest	32.2***	[20.3,51.1]	18.7***	[11.1,31.5]	24.6***	[16.7,36.2]	14.9***	[9.0,24.8]
Age at birth (ref=20-34)								
<20	0.7*	[0.5,1.0]	0.9	[0.6,1.5]	0.6***	[0.4,0.8]	0.9	[0.6,1.3]
35-49	0.6**	[0.5,0.8]	1.0	[0.7,1.5]	0.6**	[0.4,0.8]	1.0	[0.6,1.5]
Parity (ref=first child)								
2-3	0.7**	[0.5,0.8]	0.7*	[0.5,0.9]	0.7*	[0.6,0.9]	0.7*	[0.5,1.0]
4-5	0.4***	[0.3,0.5]	0.5***	[0.3,0.7]	0.5***	[0.4,0.6]	0.6**	[0.4,0.8]
6+	0.3***	[0.2,0.4]	0.6*	[0.4,0.9]	0.2***	[0.2,0.3]	0.5**	[0.3,0.7]

Notes: *p<0.05, **p<0.01, ***p<0.001

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4   DISCUSSION AND CONCLUSION

4.1   Overview and Findings in Context

This study examined trends in maternal health care-seeking, empowerment, and their relationships over time. Overall, we found maternal health care-seeking among currently married Pakistani women has increased between the 2012-13 and 2017-18 Pakistan DHS surveys for 4+ ANC visits and SBA, but not for PNC care within 2 days of delivery. We also found evidence of significant gains for the percent of women who obtained all three services. In contrast, evidence of women's empowerment has not shown marked improvement, except for the domain of social independence, which reflects reading the newspaper or magazines, age at first birth, education, and age and education differentials between husband and wife. Further, with the exception of PNC, social independence was significantly associated with receipt of the maternal health care indicators examined in this study, even after controlling for sociodemographic characteristics. For PNC, the empowerment domain that most strongly predicted receipt of care was decision making. Although decision making also predicted ANC and the composite indicator of all three services, the magnitude and strength of the association were greater for social independence in these models. However, the adjusted logistic regressions revealed that the strongest predictor of receipt of care was wealth, where increasing wealth was associated with drastically increased odds of care-seeking. In addition, prior maternal health care-seeking was strongly associated with receipt of maternal care along the continuum of services, such as having an SBA at delivery, which was associated with much higher odds of receiving PNC than delivering without an SBA. Finally, women pregnant or delivering higher order children versus the first child were less likely to obtain care, even for PNC, and after controlling for wealth, previous care-seeking, and empowerment.

Our study reaffirms similar relationships found in the literature that shows similar predictors of maternal health care-seeking globally and in Pakistan. The literature has established that women's decision-making power is a strong predictor of care-seeking behavior among Pakistani women and has a positive relationship with the recommended ANC, SBA during delivery, and PNC (Agha and Carton 2011; Hou and Ma 2012). Hearld et al. (2018) find a positive association between empowerment, education, and maternal health services in Pakistan using an index of empowerment that included items related to decision making and whether a woman reports problems accessing care. Similar to Hearld's 2018 study, we found that the social independence domain of empowerment, which reflects education, reading print media, and differentials between husband and wife, was associated with ANC, SBA, and the composite indicator of all three services. In addition, there is a well-known connection between socioeconomic status and health care utilization globally (Ahmed et al. 2010; Ewerling et al. 2017). Previous national and provincial level research studies conducted in Pakistan show that wealth inequality was a constant predictor of utilization of recommended ANC as well as other maternal health services (Agha and Carton 2011; Agha and Tappis 2016; Hearld, Anderson, and Budhwani 2018; Noh et al. 2019; Sahito and Fatmi 2018).

Definitions of empowerment imply that access to resources is a critical component of a woman's agency to act upon her own choices, although Kabeer (2005) notes that programs which provide financial services for the poor do not guarantee women's empowerment. However, evidence shows that wealth is a strong, positive predictor of empowerment (Akram 2018; Osamor and Grady 2016). Although wealth and empowerment are both independently associated with the outcomes, more research is necessary to

disentangle these relationships (Ewerling et al. 2017). Both factors are important in care-seeking as seen in our study and others (Ahmed et al. 2010; Hearld, Anderson, and Budhwani 2018), and both should be addressed in tandem.

While wealth and empowerment prominently predict maternal health care-seeking, our study also supports previous research which highlights the importance of the entirety of the continuum of care, and the role of obtaining ANC in having skilled care at birth, and the importance of both in receipt of PNC (Iqbal et al. 2017). One study conducted in Islamabad found that previous care-seeking behavior leads to better utilization of maternal health care services and revealed that women who had ANC were more likely to have PNC compared to women who had no ANC (Naseem et al. 2017). Since the time around delivery—during and after labor—is the time when most maternal deaths disproportionately occur (Ronsmans, Graham, and group 2006), early and adequate ANC should also be supported as a means not only to monitor the pregnancy, but also to promote later care during that critical window around childbirth. Antenatal care is the primary, most critical component within the continuum of care for maternal health (Singh, Story, and Moran 2016).

The present study found that parity is also a strong predictor of maternal health care seeking. This finding is also well supported by other research globally (Sonneveldt, DeCormier Plosky, and Stover 2013) and in Pakistan. In accordance with the literature from the region, parity is consistently associated with the usage of maternal health care services, including ANC (Agha and Tappis 2016; Sahito and Fatmi 2018) and institutional delivery (Agha 2011). This indicates that, in this resource limited setting, women with higher parity take advantage of their previous experience, knowledge of pregnancy and delivering, and limited resources to avail themselves of health care services for their subsequent pregnancies and births, especially if they have not faced any complications during previous pregnancies (Celik and Hotchkiss 2000; Elo 1992).

4.2   Strengths and Limitations

While most studies include only one or two components of empowerment, this study uses the multidimensional SWPER index, as well as a fourth measure of empowerment, to examine the trends and the relationship between empowerment and maternal health care-seeking over time in Pakistan. After examining two rounds of surveys, the study provides novel evidence of limited changes in women's empowerment in Pakistan. Findings from this analysis highlight the need for future research and programs that focus on the multiple dimensions of empowerment, and also address the economic disparities that so strongly predict receipt of critical maternal health services.

This study has some limitations. First, although the Pakistan survey was designed to include a nationally representative sample, this study did not examine all regions that were sampled in both surveys. Given the focus on trends over time, we limited the study to areas that were sampled consistently between the two most recent surveys. Therefore, the results of our study cannot be said to represent Pakistan as a whole. In addition, the analysis was not all inclusive of all aspects of empowerment, especially at the community or societal level. For example, while community acceptability of patriarchal cultural norms may play an important role in women's empowerment, our analysis was limited by the unavailability of related factors. Finally, our adjusted regression models did not include all potential influencing factors or barriers to care,

such as proximity to health facilities, transportation, or a history of or current complications that could potentially influence a woman's care-seeking behavior.

4.3   Recommendations

As our findings imply, health care-seeking may be strengthened by increasing Pakistani women's empowerment and economic status. Future efforts, including research, should strive to understand the effect of improving both simultaneously, with concentration on the social independence domain. Ahmed et al (2010) noted the synergistic potential of a multi-pronged approach—addressing economic security, education, and empowerment—on improving maternal health care utilization. Pro-poor cash transfer programs or voucher schemes may encourage women to utilize services and would be well-suited for encouraging early ANC given the link between ANC and SBA. Earlier voucher schemes were shown to increase the use of antenatal, delivery, and postnatal services in Pakistan (Agha 2011). An impact evaluation of a cash transfer program in India successfully encouraged maternal health service utilization and reduced perinatal and neonatal deaths. However, the authors noted the program's difficulty reaching the poorest women and suggested that cultural barriers prevented women's use of care services (Lim et al. 2010).

It is critical that these pro-poor efforts also address empowerment, promote services among women with higher parity, and encourage timely use of maternal healthcare services. Ambler and De Brauw (2017) found that the Benazir Income Support Program (BISP), a program that provided income support for the poorest households, was associated with women's empowerment, while other research by Tahir et al. (2018) cited the BISP program's limited success at addressing empowerment. Both Tahir et al. and Mumtaz et al. (2014) note the need to address the underlying societal structures that prohibit women's empowerment and the ability to obtain care. Mumtaz et al. (2014) cite the challenging dynamic of the caste structure in preventing the success of cash transfer programs and other community empowerment efforts, and they suggest that programs aimed at reducing financial barriers will not reach their full potential unless the root issues of the marginalized poor are addressed.

Given the importance of earlier ANC in continued adherence to care during pregnancy and childbirth, stakeholders should consider investing in programs that promote women's empowerment—including decision making and social independence—and economic status in targeting timely, comprehensive ANC as a means of also promoting SBA and PNC. Finally, since maternal mortality is due in part to lower maternal health care-seeking among women with higher parity (Sonneveldt, DeCormier Plosky, and Stover 2013), efforts should incorporate focused targeting of this population as well.

4.4   Conclusion

This study examined the relationships between maternal health care-seeking and multiple domains of empowerment over time. Our analyses found that the social independence domain of empowerment, which reflects a women's engagement with print media, education, and differentials in age and education between a woman and her husband, was strongly associated with ANC care and skilled attendance at birth, while a woman's decision making empowerment was, to a lesser extent, also associated with care-seeking. Moreover, the magnitude and strength of the associations between wealth and each maternal health care-seeking outcome was much stronger than the associations with empowerment. Parity and previous care-seeking along the continuum of maternal care are also strongly linked to the receipt of maternal health care services. This study provides insight into specific populations to target for improving in women's access to

care, including the poorest, least empowered women who have already experienced childbirth. The results further point to the need to focus on timely initiation of ANC to promote service utilization along the continuum of care. Nevertheless, contact with the health system alone is not enough to prevent maternal morbidity and mortality. Assuring that enough sufficiently trained health workers are equipped with life-saving technologies at facilities that are accessible to women is vital to maternal health.

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APPENDIX

Appendix Table 1   **Distribution of empowerment and maternal health care-seeking indicators, Pakistan 2012-13 and 2017-18**

	2012-13		2017-18	
	%	N	%	N
Empowerment				
Problems accessing care				
None	31.8	1,320	28.6	1,086
At least one	68.2	2,826	71.4	2,706
SWPER: Attitude to violence				
Low empowerment	31.8	1,317	30.1	1,142
Medium empowerment	14.0	580	13.7	520
High empowerment	54.2	2,249	56.2	2,130
SWPER: Social independence				
Low empowerment	31.9	1,321	28.4	1,078
Medium empowerment	37.1	1,536	35.5	1,344
High empowerment	31.1	1,288	36.1	1,369
SWPER: Decision making				
Low empowerment	47.0	1,948	46.1	1,747
Medium empowerment	22.8	946	24.3	920
High empowerment	30.2	1,250	29.7	1,125
Maternal health care-seeking				
Antenatal care, 4 visits				
No	61.7	2,556	46.6	1,769
Yes	38.3	1,589	53.4	2,023
Skilled birth attendance				
No	42.5	1,763	25.6	972
Yes	57.5	2,382	74.4	2,820
PNC for the mother in 2 days				
No	39.2	1,626	37.5	1,420
Yes	60.8	2,519	62.5	2,372
All three contacts				
No	72.5	3,004	60.1	2,280
Yes	27.5	1,141	39.9	1,513
Total	100.0	4,145	100.0	3,792

*Note: Due to rounding, percentages may not add up to 100.

Appendix Table 2   Antenatal visits (4 or more) by background characteristics for both surveys

Variable	2012-13		2017-18		Difference[2]
	% [95% C.I.]	p[1]	% [95% C.I.]	p[1]	2017-18 – 2012-13
Total	38.3 [35.5,41.3]		53.4 [49.7,57.0]		14.4***
Empowerment					
Problems accessing care		***		***	
None	47.6 [42.9,52.4]		66.3 [61.8,70.6]		18.6***
At least one	34.0 [31.0,37.2]		48.2 [44.3,52.0]		13.5***
SWPER					
Attitude to violence		***		***	
Low	25.2 [21.8,28.8]		36.9 [32.5,41.5]		11.1***
Medium	35.9 [30.0,42.2]		49.1 [42.7,55.5]		12.9**
High	46.7 [42.8,50.6]		63.2 [58.9,67.4]		16.4***
Social independence		***		***	
Low	23.2 [19.6,27.1]		33.0 [29.3,37.0]		9.7***
Medium	32.3 [29.1,35.8]		49.5 [44.7,54.2]		16.6***
High	61.1 [56.7,65.3]		73.2 [68.7,77.2]		11.8***
Decision making		***		***	
Low	33.9 [30.7,37.1]		46.4 [42.0,50.8]		11.7***
Medium	45.9 [40.5,51.4]		59.2 [54.0,64.1]		13.0***
High	39.6 [35.6,43.8]		59.5 [54.1,64.6]		19.8***
Background characteristics					
Place of residence		***		***	
Urban	62.6 [56.8,68.1]		72.1 [67.7,76.2]		9.5**
Rural	28.1 [25.2,31.2]		43.8 [39.2,48.5]		15.1***
Region		***		***	
Punjab	41.4 [37.1,45.9]		58.6 [52.8,64.2]		17.2***
Sindh	43.3 [38.3,48.3]		51.4 [45.0,57.7]		8.1*
Khyber Pakhtunkhwa	25.6 [21.0,30.8]		46.8 [39.9,53.8]		21.2***
Balochistan	10.8 [6.9,16.4]		24.3 [18.1,31.7]		13.5**
ICT Islamabad	81.0 [74.7,86.1]		81.3 [73.5,87.2]		0.3
Wealth quintile		***		***	
Lowest	13.6 [10.7,17.1]		20.5 [16.6,25.0]		7.1**
Second	24.3 [20.3,28.8]		37.0 [31.6,42.7]		11.9***
Middle	32.6 [28.2,37.2]		50.4 [44.8,56.0]		17.6***
Fourth	52.4 [47.6,57.1]		72.5 [67.2,77.3]		19.9***
Highest	80.4 [75.1,84.8]		87.7 [83.6,90.9]		7.3*
Education		***		***	
None	21.7 [18.9,24.8]		31.2 [27.9,34.7]		9.3***
Primary	40.9 [35.3,46.8]		55.8 [49.4,62.0]		14.4***
Secondary +	68.7 [64.0,73.0]		79.4 [75.7,82.7]		10.7***
Age at birth		***		**	
<20	34.2 [27.6,41.6]		45.2 [38.1,52.5]		10.2*
20-34	40.2 [37.1,43.3]		55.6 [51.7,59.4]		15.0***
35-49	28.4 [23.5,33.9]		43.4 [36.0,51.1]		13.9**
Parity		***		***	
1	52.3 [47.5,57.0]		65.7 [60.7,70.3]		12.7***
2-3	40.5 [36.8,44.4]		56.4 [51.6,61.0]		15.3***
4-5	29.4 [24.1,35.3]		47.6 [43.0,52.3]		17.6***
6+	25.5 [20.9,30.7]		32.6 [27.5,38.2]		7.1

Notes:
[1] p-value significance of the covariate in each survey, *p<0.05, **p<0.01, ***p<0.001
[2] Difference between the two surveys with the p-value of the difference

Appendix Table 3   Skilled birth attendance by background characteristics for both surveys

Variable	2012-13 % [95% C.I.]	p[1]	2017-18 % [95% C.I.]	p[1]	Difference[2] 2017-18 – 2012-13
Total	57.5 [53.8,61.1]		74.4 [70.9,77.6]		16.6***
Empowerment		***		***	
Problems accessing care					
None	66.1 [61.3,70.6]		82.5 [77.7,86.5]		16.4***
At least one	53.4 [49.1,57.8]		71.1 [67.0,74.9]		17.3***
SWPER					
Attitude to violence		***		***	
Low	47.4 [42.7,52.3]		63.6 [58.2,68.8]		16.0***
Medium	54.0 [47.6,60.2]		68.6 [62.3,74.3]		14.5**
High	64.2 [59.5,68.7]		81.5 [77.9,84.7]		17.2***
Social independence		***		***	
Low	44.8 [39.2,50.7]		60.0 [55.4,64.4]		15.2***
Medium	51.9 [47.7,56.0]		73.3 [68.3,77.8]		21.0***
High	77.1 [73.1,80.6]		86.7 [83.7,89.2]		9.5***
Decision making				***	
Low	55.2 [49.8,60.5]		69.5 [64.8,73.8]		14.0***
Medium	62.8 [57.6,67.7]		77.2 [72.7,81.1]		14.4***
High	57.0 [52.2,61.6]		79.6 [74.9,83.6]		22.5***
Earlier maternal health care-seeking					
Antenatal care, 4 visits		***		***	
No	42.8 [39.0,46.6]		56.4 [51.6,61.1]		13.4***
Yes	81.1 [77.1,84.5]		90.1 [88.0,91.9]		8.9***
Background characteristics					
Place of residence		***		***	
Urban	74.4 [68.6,79.4]		87.4 [84.1,90.1]		13.1***
Rural	50.3 [45.8,54.8]		67.7 [63.1,72.0]		17.1***
Region		***		***	
Punjab	58.6 [52.8,64.1]		77.5 [71.5,82.5]		18.9***
Sindh	65.1 [59.8,70.0]		77.5 [72.0,82.2]		12.4**
Khyber Pakhtunkhwa	52.2 [45.2,59.2]		69.2 [62.9,74.8]		17.0***
Balochistan	17.6 [11.7,25.4]		41.6 [32.8,50.9]		24.0***
ICT Islamabad	88.7 [82.8,92.7]		89.4 [82.7,93.8]		0.8
Wealth quintile		***		***	
Lowest	34.0 [27.9,40.7]		50.6 [44.2,57.0]		16.8***
Second	44.3 [38.8,50.0]		60.9 [54.9,66.5]		16.3***
Middle	56.6 [50.7,62.3]		78.6 [74.2,82.5]		21.8***
Fourth	72.8 [68.2,77.0]		85.8 [81.2,89.4]		13.0***
Highest	88.4 [83.2,92.2]		95.9 [93.7,97.4]		7.5***
Education		***		***	
None	43.1 [38.8,47.5]		60.2 [55.6,64.7]		17.0***
Primary	60.5 [55.0,65.8]		77.4 [71.0,82.7]		16.7***
Secondary +	83.1 [79.0,86.5]		90.4 [87.7,92.5]		7.3***
Age at birth		***		*	
<20	61.6 [54.0,68.7]		73.3 [66.5,79.2]		11.2*
20-34	58.7 [54.8,62.4]		75.6 [71.8,79.0]		16.7***
35-49	46.0 [39.9,52.2]		66.0 [57.7,73.4]		19.4***
Parity		***		***	
1	72.5 [68.1,76.5]		83.4 [79.3,86.9]		10.6***
2-3	60.5 [56.0,64.8]		77.4 [73.4,80.9]		16.5***
4-5	48.7 [42.9,54.7]		68.7 [63.5,73.5]		19.7***
6+	40.8 [34.8,47.1]		59.2 [53.0,65.1]		18.2***

Notes:
[1] p-value significance of the covariate in each survey, *p<0.05, **p<0.01, ***p<0.001
[2] Difference between the two surveys with the p-value of the difference

Appendix Table 4   Postnatal care by background characteristics for both surveys

Variable	2012-13 % [95% C.I.]	p[1]	2017-18 % [95% C.I.]	p[1]	Difference[2] 2017-18 – 2012-13
Total	60.8 [57.4,64.0]		62.5 [59.0,66.0]		1.4
Empowerment		***		**	
Problems accessing care					
None	70.7 [66.8,74.3]		68.6 [63.5,73.3]		-2.0
At least one	56.1 [52.4,59.8]		60.1 [56.0,64.1]		3.5
SWPER					
Attitude to violence		***		***	
Low	51.1 [46.6,55.6]		47.1 [42.2,52.1]		-4.4
Medium	58.8 [52.5,64.8]		62.4 [55.8,68.6]		3.6
High	67.0 [62.6,71.1]		70.9 [66.9,74.5]		3.9
Social independence		***		***	
Low	53.1 [48.2,57.9]		48.4 [43.1,53.6]		-5.1
Medium	55.9 [51.6,60.0]		60.0 [55.2,64.7]		3.9
High	74.5 [70.7,78.0]		76.2 [72.6,79.4]		1.6
Decision making		*		***	
Low	57.3 [52.9,61.6]		52.5 [47.9,57.2]		-5.3
Medium	64.4 [59.2,69.2]		70.1 [65.6,74.1]		5.8
High	63.5 [59.2,67.5]		71.9 [67.2,76.2]		8.6**
Earlier maternal health care-seeking					
Antenatal care, 4 visits		***		***	
No	49.5 [45.8,53.3]		46.1 [41.4,50.9]		-4.1
Yes	78.8 [75.4,81.9]		76.9 [73.9,79.6]		-1.8
Skilled birth attendance		***		***	
No	30.8 [26.2,35.9]		19.8 [15.6,24.9]		-11.5***
Yes	82.9 [80.4,85.2]		77.3 [74.6,79.7]		-5.8**
Background characteristics					
Place of residence		***		***	
Urban	74.7 [70.3,78.6]		76.2 [72.6,79.4]		1.6
Rural	54.9 [50.9,58.8]		55.6 [50.9,60.3]		0.3
Region		***		***	
Punjab	66.0 [60.7,70.9]		66.9 [60.8,72.5]		0.9
Sindh	66.3 [61.1,71.1]		71.0 [66.1,75.4]		4.7
Khyber Pakhtunkhwa	38.2 [32.7,43.9]		42.9 [36.5,49.7]		4.8
Balochistan	37.6 [31.5,44.0]		38.4 [31.6,45.6]		0.8
ICT Islamabad	78.0 [71.0,83.7]		79.3 [72.4,84.9]		1.3
Wealth quintile		***		***	
Lowest	42.6 [36.5,49.0]		45.5 [38.3,52.8]		2.3
Second	54.5 [49.4,59.5]		46.8 [41.2,52.6]		-7.9*
Middle	58.1 [52.9,63.2]		60.0 [54.1,65.5]		1.8
Fourth	72.6 [66.6,77.8]		73.2 [67.9,78.0]		0.6
Highest	82.1 [77.5,86.0]		87.6 [83.9,90.6]		5.5*
Education		***		***	
None	52.1 [48.0,56.3]		48.8 [44.0,53.6]		-3.8
Primary	59.0 [53.4,64.5]		61.6 [55.7,67.2]		2.6
Secondary +	78.4 [74.7,81.7]		79.7 [76.4,82.7]		1.5
Age at birth				**	
<20	59.7 [51.9,67.1]		53.9 [46.5,61.1]		-6.4
20-34	61.6 [58.3,64.9]		64.5 [60.7,68.1]		2.5
35-49	55.4 [48.7,61.9]		55.2 [47.5,62.6]		-0.8
Parity		***		***	
1	70.0 [65.5,74.0]		69.2 [63.9,74.1]		-1.3
2-3	62.4 [58.5,66.1]		66.6 [62.5,70.5]		4.0
4-5	54.5 [48.8,60.2]		58.9 [53.7,64.0]		4.0
6+	52.4 [46.4,58.3]		44.9 [38.9,51.0]		-7.8

Notes:
[1] p-value significance of the covariate in each survey, *p<0.05, **p<0.01, ***p<0.001
[2] Difference between the two surveys with the p-value of the difference

Appendix Table 5   Percent of women obtaining all three critical maternal health services, by background characteristics, Pakistan 2012-13 and 2017-18

Variable	2012-13 % [95% C.I.]	p[1]	2017-18 % [95% C.I.]	p[1]	Difference[2] 2017-18 – 2012-13
Total	27.5 [24.8,30.5]		39.9 [36.4,43.5]		12.0***
Empowerment					
Problems accessing care		***		***	
None	37.4 [32.9,42.1]		52.2 [47.4,56.9]		14.8***
At least one	22.9 [20.0,26.1]		34.9 [31.4,38.7]		11.6***
SWPER					
Attitude to violence		***		***	
Low	15.1 [12.5,18.1]		21.5 [18.1,25.4]		6.3**
Medium	24.4 [19.3,30.3]		35.0 [29.3,41.3]		10.5*
High	35.6 [31.6,39.9]		50.9 [46.8,55.0]		15.2***
Social independence		***		***	
Low	14.2 [11.6,17.3]		18.6 [15.5,22.0]		4.5*
Medium	20.1 [17.3,23.2]		37.0 [32.3,41.9]		16.5***
High	50.1 [45.6,54.6]		59.5 [55.4,63.6]		9.3**
Decision making		***		***	
Low	23.1 [20.0,26.4]		31.4 [27.4,35.6]		7.8**
Medium	35.3 [30.0,41.0]		47.1 [42.2,52.1]		11.8**
High	28.6 [24.9,32.6]		47.2 [42.2,52.3]		18.6***
Background characteristics					
Place of residence		***		***	
Urban	49.5 [43.7,55.3]		58.6 [53.8,63.2]		9.1*
Rural	18.3 [15.6,21.3]		30.4 [26.2,34.9]		11.8***
Region		***		***	
Punjab	29.6 [25.3,34.3]		45.8 [40.2,51.5]		16.2***
Sindh	33.4 [28.8,38.3]		40.7 [34.5,47.3]		7.3
Khyber Pakhtunkhwa	16.0 [12.4,20.3]		26.0 [20.6,32.4]		10.1**
Balochistan	5.1 [3.0,8.5]		14.0 [10.1,19.1]		8.8**
ICT Islamabad	67.2 [59.7,74.0]		70.8 [62.4,78.0]		3.6
Wealth quintile		***		***	
Lowest	6.4 [4.5,9.0]		12.3 [9.6,15.6]		6.1**
Second	13.8 [10.9,17.5]		21.3 [17.1,26.3]		7.4**
Middle	19.9 [16.2,24.2]		32.7 [28.0,37.7]		12.7***
Fourth	39.9 [35.1,44.9]		57.0 [51.1,62.8]		16.9***
Highest	68.7 [62.5,74.3]		77.5 [72.5,81.8]		8.8*
Education		***		***	
None	12.6 [10.5,15.1]		19.0 [16.2,22.2]		6.4***
Primary	25.0 [20.4,30.3]		39.1 [33.3,45.3]		13.9***
Secondary +	57.7 [52.8,62.4]		65.8 [61.6,69.7]		8.2*
Age at birth		**		***	
<20	22.0 [16.5,28.7]		29.1 [22.9,36.1]		6.7
20-34	29.2 [26.1,32.5]		42.4 [38.7,46.2]		12.9***
35-49	20.0 [15.8,24.9]		29.6 [22.6,37.7]		9.0*
Parity		***		***	
1	39.1 [34.5,44.0]		51.2 [45.9,56.5]		11.6**
2-3	30.2 [26.7,34.0]		43.9 [39.3,48.7]		13.4***
4-5	19.7 [14.9,25.4]		33.4 [28.9,38.3]		13.4***
6+	15.4 [11.8,19.9]		19.1 [14.6,24.6]		3.7

Notes:
[1] p-value significance of the covariate in each survey, *p<0.05, **p<0.01, ***p<0.001
[2] Difference between the two surveys with the p-value of the difference