Why do women discontinue a modern method of contraception? A Comparative Analysis of the last two DHSs in Pakistan Using Contraceptive Calendar

Asif Wazir, Ali Raza and Yilma Malkoma

Background
Pakistan has experienced a slow decline in fertility since the onset of the 21st century, despite a substantial decline during the 1990s. The number of children per woman fell from 4.1 in 2006-07 to 3.6 in 2017-18. Only a quarter of women have access to modern contraceptive methods, a figure that has remained static between 2012 and 2017. Pakistan is one of the countries with a high rate of contraceptive discontinuation; approximately three out of every ten contraceptive users (30%) discontinued use within 12 months, a minor decrease from 37% in 2012-13.

Methods
The reproductive calendar from the last two rounds of Pakistan Demographic & Health Survey (2017-18 and 2012-13) provides an opportunity to study the dynamics of contraceptive discontinuation in Pakistan at national and subnational level. The analysis unit of this study is the segment of contraceptive use, which refers to the continuous use of a contraceptive method. We apply Gompertz proportional hazards model to the dichotomous variable, in which the outcomes are modelled as a linear combination of the predictor variables. The selected dependent variable is those women who were discontinued specific contraceptive method.

Results
The first-year discontinuation rate for all methods was high, primarily because of discontinuation of short-term methods. The contraceptive discontinuation rate while in need was also considerably high, with health concerns/fear of side effects cited as the most common reason for discontinuation.

Conclusion
This study's findings highly recommends that the inclusion of Pakistan FP Program's goal to reduce contraceptive discontinuation while women are in need.

Contribution

1. Introduction

Over the past two decades, much is known about the determinants of current contraceptive use in the developing world, however, little is known about the dynamics of changes in contraceptive status - method failure, method switching and method discontinuation. These dynamics are important because contraceptive effectiveness and duration become increasingly important determinants of fertility as desired family size declines and contraceptive prevalence increases.

Pakistan's fertility rate began to decline in the decade of the 1990s, falling by 1.8 children per woman after a long period of sustained high fertility (Feeney and Alam 2003). Pakistan's rapid fertility transition was much faster than that of East and South Asian countries. Recent empirical research has shown that the fertility rate in the country has been stagnant since the turn of the century. The rate of decline has been slow, from 4.1 children per woman in 2006-07 to 3.6 children in 2017-18 - a decline of 12 per cent, or half a child in 11 years (NIPS and Macro International 2008; NIPS and ICF International 2019).

There is a broad consensus among demographers that the transition in Pakistan began in the 1990s as a result of changes in marital fertility behaviour, with the accumulation of changes in the demand for children in combination with a decline in family size preferences (Sathar and Casterline, 2003).

Contraceptive use has also increased slowly over the last decade, growing from 28% in 2001 to 35% in 2012-13 and fells slightly to 34% in 2017-18. Traditional methods that are less effective and utilized by a significant proportion of current women in Pakistan (27%), while the prevalence of condoms (male and female) also remains high at 27%. The discontinuation of contraceptive methods is common (37% of all contraceptive use was ended in less than one year).

Couples with untimely or unwanted pregnancies are more likely to resort to induced abortion, according to research in Pakistan and South Asia in general. Saleem and Fikree (2001) found that women in low socio-economic settlements in Karachi often chose abortion over modern contraception to achieve their goal of having a smaller family. These abortions are extremely costly, as evidenced by the significant number of women who have post-abortion problems and seek treatment, as well as those who need treatment but do not receive it.

Pakistan is one of the countries with a high rate of contraceptive discontinuation; the most recent data from the PDHS 2017-18 reveal that three out of every ten contraceptive users (30%) discontinued use within 12 months, a minor decrease from 37% in 2012-13. Pills and injectables were the leading methods contributing to the higher discontinuation in Pakistan, with 47% for each method, followed by male condoms in last two surveys.

While much has been learnt about the drivers of current contraceptive usage in developing countries including Pakistan over the last 20 years or more (ref?), the dynamics of changes in

contraceptive status—failure, switching, and method discontinuation—are far less known. These dynamics are crucial because contraceptive effectiveness and duration of use are becoming increasingly important for fertility transition as desired family size decreases and contraceptive prevalence rises. Analysis of contraceptive use patterns is crucial not just for its demographic impact, but also for informing attempts to enhance service delivery in a variety of ways.

The quality of care offered by family planning programs is frequently connected with high contraceptive dropout. The analysis is significant not only for its impact on total contraceptive use, but also for informing attempts to enhance service delivery in a variety of ways. For example, cessation of a method owing to side effects may signal that counselling needs to be improved and knowledge about the method needs to be communicated more effectively. High levels of discontinuance owing to access and availability issues suggest that supply distribution techniques should be investigated further.

Thus, it is critical to investigate the levels and trends in contraceptive switching, contraceptive failure, and contraceptive discontinuation in Pakistan while still in need of pregnancy prevention. Furthermore, the reasons for the discontinuation of modern contraceptive methods, as well as the characteristics of the women who discontinue contraception, are required for the evaluation of family planning programs and the resource allocation required to ensure the quality and equitable access to information and services. Unsurprisingly, the impact of contraceptive failure and cessation on unplanned fertility is significantly greater. Reduced failure and discontinuation rates can make a significant contribution to lowering undesired fertility. So far, no published study has incorporated the most recent DHS calendar data on contraceptive discontinuation.

The current study addresses the two sets of questions. First, document at the subnational level the overall trend and levels of discontinuation, as well as method-specific and reason-specific rates of discontinuation, 2) To assess the connections between discontinuation and specific socioeconomic and demographic variables, as well as the quality-of-care services.

Literature Review

Access to quality sexual and reproductive health services, including modern contraceptives, is strongly linked to womens' and childrens' health, poverty, education, gender equality and human rights (New et al., 2017). Women and girls who have access to contraceptives are more likely to achieve higher socioeconomic status through education, employment and empowerment. This accelerates the progress of the country by reducing health expenditure (Kaye et al., 2014). Lack of access to and inconsistent use of contraceptives by women results in the majority of unintended pregnancies and unsafe abortions, which ultimately lead to poor maternal and child health outcomes and impact on a country's progress (Kaye et al., 2014).

Despite the desire of women to delay or limit the number of children they have, contraceptive discontinuation is an important public health concern (Belete et al., 2018). Discontinuing contraception is indicative of a pressing reproductive health problem with negative consequences for women's reproductive health outcomes (Ali et al., 2012). A higher percentage of contraceptive discontinuation, which occurs when women do not want to become pregnant, is often associated

with unintended pregnancies, unwanted births and unsafe abortions, which increase the threat of pregnancy- and childbirth-related maternal morbidity and mortality and poor infant and child health outcomes (Ersek et al., 2011; Sedgh et al., 2014). The impact of FP programmes can be negatively affected by contraceptive discontinuation, which has implications for economic growth.

Only a few studies have been carried out on the patterns and determinants of discontinuation of contraceptive use in developing countries. One of the reasons is that studying contraceptive discontinuation requires monthly calendar data on contraceptive use. Monthly calendar data are very complicated and more difficult to handle and analyze than most types of data. than most other types of data. Furthermore, the analytical methods used to study contraceptive discontinuation, such as the life table technique and the hazard model, are new to most researchers.
Contraceptive dynamics, including discontinuation, switching and failure, are important indicators for identifying gaps in public health programmes in relation to women's and couples' FP needs (Ali et al., 2012). In an analysis of the Demographic and Health Survey (DHS) conducted in 34 countries, the authors found that among women who had ever used a modern method, approximately 38% discontinued using a modern method despite a continued desire for FP; and past use accounted for more than 50% of all women with unmet need in 16 of the countries (Jain et al., 2013). In addition, unmet need was found to be high where contraceptive discontinuation was high and contraceptive prevalence was low (Jain et al., 2014). In contrast, an analysis of DHS records in 14 countries reported that a significant number of women who had not switched to another method remained at higher risk of becoming pregnant (Hameed et al., 2015).

Studies on the correlates of contraceptive discontinuation in Pakistan have been very limited. Mahmood & Saman Naz, 2008 examined the causes and consequences of contraceptive discontinuation using the baseline survey of the FALAH project, which was conducted in 2008-09 in 29 districts across Pakistan. The analysis focused on 6,026 women who had used at least one reversible contraceptive method during this four-year period. The authors concluded that side effects were the main reason for discontinuation of hormonal methods. The results show that 12-month discontinuation rates are highest among younger, rural and low-birthweight women. They are also higher among women in the poorest population groups. These women mainly use public facilities to meet their family planning (FP) needs.

(Ali et al., 2012) investigated the causes and consequences of discontinuing contraceptive usins the several rounds of the DHS in developing countries. They found that method-related reasons were the main causes of contraceptive discontinuation, followed by side effects/health concerns. Using the 2017 Demographic and Health Survey in Indonesia, (Bulan Samosir et al., 2019) also assessed the determinants of contraceptive discontinuation. The 12-month contraceptive discontinuation rate is highest for the pill, followed by injectables. The main reason for contraceptive discontinuation is side effects/health concerns, followed by the desire to become pregnant. The 12-month contraceptive discontinuation rate due to side-effects/health concerns is highest for the pill, followed by injectables.

Level and trends of contraceptive prevalence rate in Pakistan

Pakistan is one of the countries in South Asia that still faces significant challenges in accessing family planning (Gupta et al., 2020). The country has a contraceptive prevalence rate of modern methods stood at 25% (29% in urban vs 23% in rural areas). The unmet also remains high at 17% with significant urban – rural divid, 15% and 19% respectively. This contributes to high maternal mortality ratios (MMRs), estimated at between 300 per 100,000 in urban areas and 900 per 100,000 in rural areas (Mola & Kirby, 2013). As a result, consistent contraceptive use has been proposed by WHO as one of the strategic approaches to maternal mortality reduction in the country (Ahmed et al., 2019; Alkema et al., 2013; Sanga et al., 2014; WHO, 2015). To understand why past national contraceptive rollouts and programmes in Pakistan have not yet yielded the best results, we sought to assess some factors associated with contraceptive discontinuation in Pakistan to inform policies and programmes aimed at increasing family planning use among women of reproductive age.

Pakistan's national family planning programme experienced a "turning point" in the early 1990s (Hakim 2001; Hakim and Miller 2001). The political environment improved steadily during the 1990s and successive regimes consistently supported family planning. Pakistan's contraceptive prevalence rate (CPR) was only 11.4 per cent in 1990, but conditions have certainly changed dramatically since then. The CPR increased rapidly in the 1990s, rising by about 1.3 per cent per year at the national level between 1990 and 2000, with considerable provincial variation, as high as 1.7 per cent per year in Punjab and as low as 1 per cent per year in Balochistan over the same period.

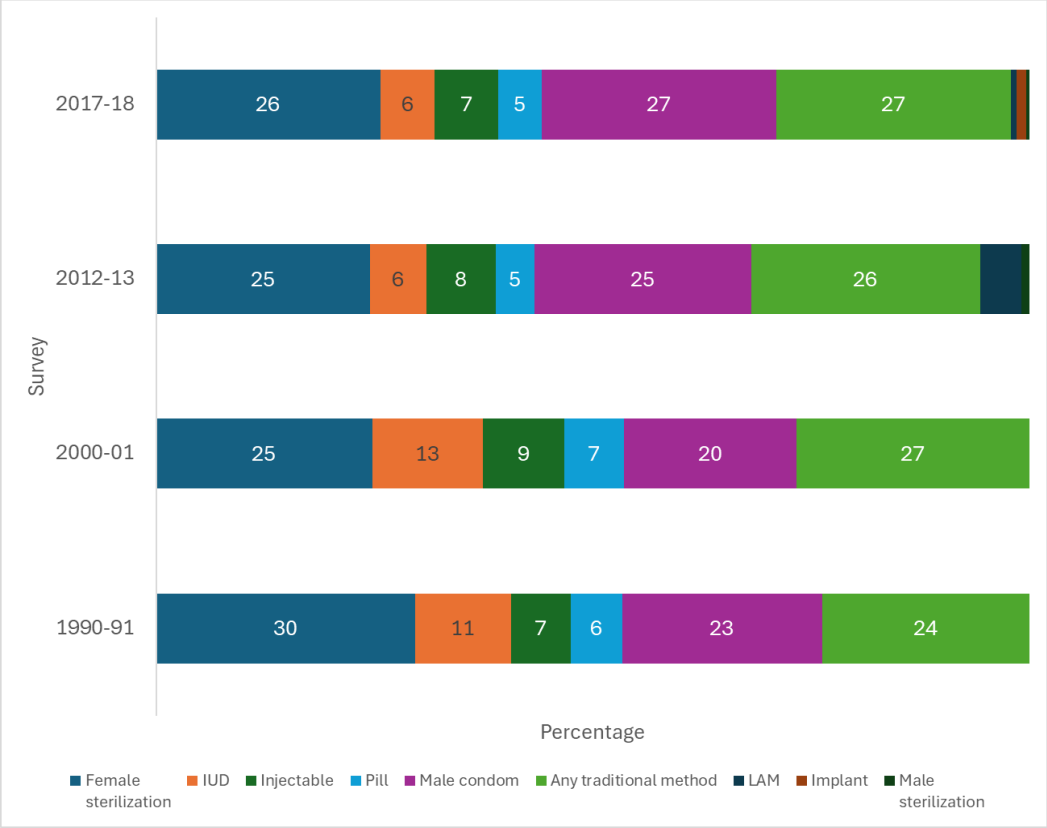
Recent empirical evidence shows that Pakistan's CPR is low compared to other South Asian countries, standing at 34% in 2017-18, and has remained stable over the past decade. Only 25% of women have access to modern methods of contraception, and there has been a slight decrease between 2012 and 2017. Pakistan's modern contraceptive prevalence rate is low compared to India (48 per cent in 2015), Indonesia (64 per cent in 2017) and Bangladesh (54 per cent in 2014).

A contraceptive method mix is an indicator of how effectively women and couples can avoid unintended pregnancy, an important factor in enabling women and their partners to exercise their reproductive rights. While Pakistan's contraceptive prevalence rate rose sharply in the 1990s, it is not clear which methods are contributing most to the increase in prevalence. A comparison of the two surveys (1990-91 and 200-01) shows that female sterilisation and traditional methods (mainly withdrawal-based), followed by the male condom, remained the most widely used methods throughout the 1990s.The Pakistan Reproductive Health and Family Planning Survey (RHFPS) of 2000-2001 shows that the prevalence of female sterilisation declined from 30 per cent to 25 per cent and that of male condoms from 23 per cent to 20 per cent between 1990 and 2000, as shown in Figure 1. Over the same period, the prevalence of traditional methods increased slightly from 24 to 27 per cent. In addition, the prevalence of the IUD increased slightly from 11 to 13 per cent between 1990 and 2000. In contrast, the prevalence of pills and injectables increased only slightly, by 1 per cent and 2 per cent respectively.

The contraceptive method mix in Pakistan has remained the same since 1990. The Pakistan DHS 2017-18 found that the most commonly used modern contraceptive methods among currently married women in Pakistan are male condom (27 percent), traditional methods (27 percent), followed by female sterilisation (26 percent). Pills and injectables remain the least popular modern

contraceptive methods, at 6 per cent and 7 per cent respectively. Although the use of implants is only 1 per cent, this is the first time that women in Pakistan have used implants.

Figure 1: The contribution of the contraceptive methods in Pakistan from 1990 to 2017



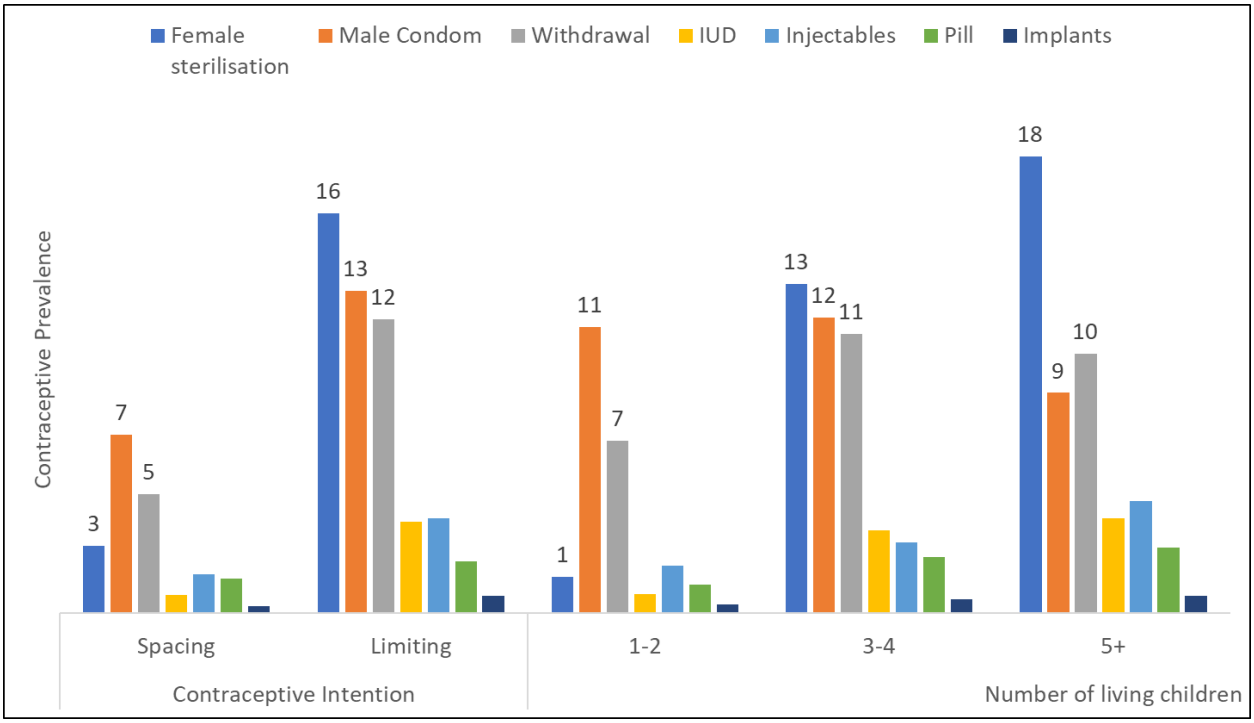
Source: Four rounds of Pakistan Demographic and Health Survey.

The dominance of just two methods - condoms and female sterilization - in the method mix suggests that the expansion of the availability of a wide range of methods, including injectables, IUDs and pills, is warranted to increase method choice in Pakistan. However, a large proportion of women who want to limit their contraceptive use and are using contraception are still dependent on a short-acting method. This suggests that there is scope to increase the availability of long-acting methods such as IUDs and implants for these women.

However, the choice of contraceptive method highly correlates with increasing intensity of the desire to delay or avoid pregnancy. Figure 2 illustrates modern contraceptive prevalence among married women disaggregated by the contraceptive intentions (using for spacing and limiting the family size) and number of living children in Pakistan using the Pakistan DHS 2017-18.
It is evident that women in Pakistan have preferred to use male condom and withdrawal, if they want to delay the pregnancy. However, once the women achieved the ideal family size (4 or higher children), they preferred to opted female sterilization.

For example, the prevalence of male condoms and withdrawal is 13 per cent and 12 per cent respectively among women who want to limit their family size. Among women who want to have 3-4 children, the prevalence of male condoms and withdrawal is 12% and 11% respectively.

Figure 2. Percentage of married women who currently use selected modern contraceptive methods by contraceptive disaggregated by intention to use and number of livings childing in Pakistan.



Source: Author's computation from Pakistan DHS 2017-18.

2. Data Sources and Methodology

The prime focus of this in-depth analysis is to analyze the rates of contraceptive discontinuation, failure, and switching, including reasons for discontinuation particularly from the quality-of-care perspective, at selected provincial level. We further estimate the associations with selected socioeconomic and demographic characteristics. We utilized the last two Pakistan Demographic & Health Survey: PDHS 2012-13 and PDHS 2017-18, where birth histories and contraceptive calendar is available ((NIPS and ICF 2014); (NIPS and ICF 2019)). This result implies that as fertility declines, family planning programs would profit from a shift in emphasis from providing methods to new clients towards providing services to existing clients, such as counselling, that may help reduce failure and discontinuation rates.

The analysis unit of this study is the segment of contraceptive use, which refers to the continuous use of a contraceptive method. A woman could contribute multiple segments if she used multiple methods or zero segments if she did not use any method during the observation period. The five-year study period chosen for this study is 3-62 months before the interview month, which is commonly used in calculating contraceptive discontinuation and failure rates based on calendar data. Data within three months of the interview date were not used to avoid potential underestimation of the contraceptive failure rate because of unrecognition of a pregnancy in early

pregnancy. Segments started before the calendar period were also excluded because information on the duration of use is not available. Segments that started within the observation period but ended outside the observation period were right-censored.

Table 1A and 1B presents the distribution of women and the number of segments contributing to the analysis. The PDHS 2012-13 had 4,732 women and 62.3 percent contributed at least one segment, and the sample reduced to 3,725 in PDHS 2017-18 and 71.2 percent women contributed at least one segment. Table 1B presents the number of segments by contraceptive methods, and there is total 7,146 segments are available in PDHS 2012-13 for analysis. For PDHS 2017-18, approximately 5,136 segments are available for PDHS 2017-18 for analysis. The tables also shows that about one-third of the episodes were for male condom (34%) followed by the withdrawal (23%). Episodes for the Pills, Injectables and IUD were much lower in number (8%, 13% and 8% respectively). The number of episodes is consistent with the contraceptive method mix at the time of the 2017-18 Pakistan DHS, which shows that male's condom was the most used method of contraception.

Table 1A: Percent distribution of women by number of segments contributing to the analysis, Pakistan

Number of Segments	Number of women	%	Number of women	%
	PDHS 2017-18		**PDHS 2012-13**	
1	2,653	71.2	2,947	62.3
2	824	22.1	1,309	27.7
3	189	5.1	362	7.7
4+	59	1.6	113	2.4
Total Women	**3,725**	**100.0**	**4,732**	**100.0**
Source: Author's own calculation using micro-data set of PDHS 2012-13 and 2017-18.				

Table 1B. Percent distribution of segments analysed, by contraceptive methods

Contraceptive Method	# Of Segments	%	# Of Segments	%
	PDHS 2017-18		**PDHS 2012-13**	
IUD	382	7.5	554	7.8
Injection	663	12.9	1,010	14.1
Pill	423	8.2	583	8.2
Male condom	1,752	34.1	1,970	27.6
Rhythm	163	3.2	151	2.1
Withdrawal	1,175	22.9	1,573	22.0
Other	575	11.2	1,307	18.3
	5,136	100.0	7,146	100.0
Source: Author's own calculation using micro-data set of PDHS 2012-13 and 2017-18.				

Reproductive-contraceptive calendar questions (month-by month). Differentials in contraceptive discontinuation and switching rates (socio-economic and QoC) will be assessed using life table

approach. Cumulative incidence rates of discontinuation and confidence intervals in a multiple risk setting. All-method discontinuation rates, which measure the rate at which women stop using any method of contraception, are calculated separately for two groups of reasons: reduced need and quality related reasons. The life table approach was used to estimate the probability of discontinuation for the periods of 12 months and 24 months. A woman could discontinue a method for a variety of reasons. We used the multiple-decrement life table to determine the discontinuation rates for each method by reason, given the presence of other competing reasons.

Reasons for discontinuation were categorized into seven groups: 1) failure/become pregnant; 2) desire to become pregnant; 3) other fertility reasons, including infrequent sex or husband away, difficult to get pregnant or menopause, or marital dissolution; 4) health concerns with the method or side effects; 5) method related (inconvenience to use or wanted a more effective method); 6) cost of or access to the method; 7) other reasons, including husband's disapproval.

Contraceptive failure was one of the seven competing reasons in the calculation. A woman was considered to have contraceptive failure when she reported the reason for discontinuation was "became pregnant while using". Contraceptive failure rates were then calculated based on this response. The contraceptive failure rates calculated here are gross failure rates, which account for the confounding effects of discontinuation for reasons other than pregnancy (Farley 1983; (Bongaarts and Potter, n.d.)).

Contraceptive switching behavior was also examined. Women who reported use of a different method in the following month after discontinuation were considered to have a method switching event. The discontinuation rates and switching rates, for each method and all methods combined, were examined by women's background characteristics. All analyses accounted for the DHS sampling weights.

3. Results and Discussion

3.1. Contraceptive discontinuation by methods and reasons

Figure 3 illustrate the 12-month contraceptive discontinuation rate disaggregated by methods at national and selected provincial levels from two rounds survey. Even though overall discontinuation rate in Pakistan has declined from 2012-13 to 2017-18, however 30 percent (95% CI: 26.5 – 34.3) contraceptive episodes are discontinued within 12 months in 2017 compared to the 37 percent (95% CI: 33.6 – 40.9) discontinued episodes in 2012-13. Similarly, the overall discontinuation rate in Punjab dropped from 39 percent (95% CI: 34.7 – 43.8) in 2012-13 to 34 percent (95% CI: 28.9 – 39.5) in 2017-13; and declined from 33.3 percent 3 (95% CI: 26 – 42.5) to 19.5 percent (95% CI: 33.6 – 40.9) in Sindh over the same period.

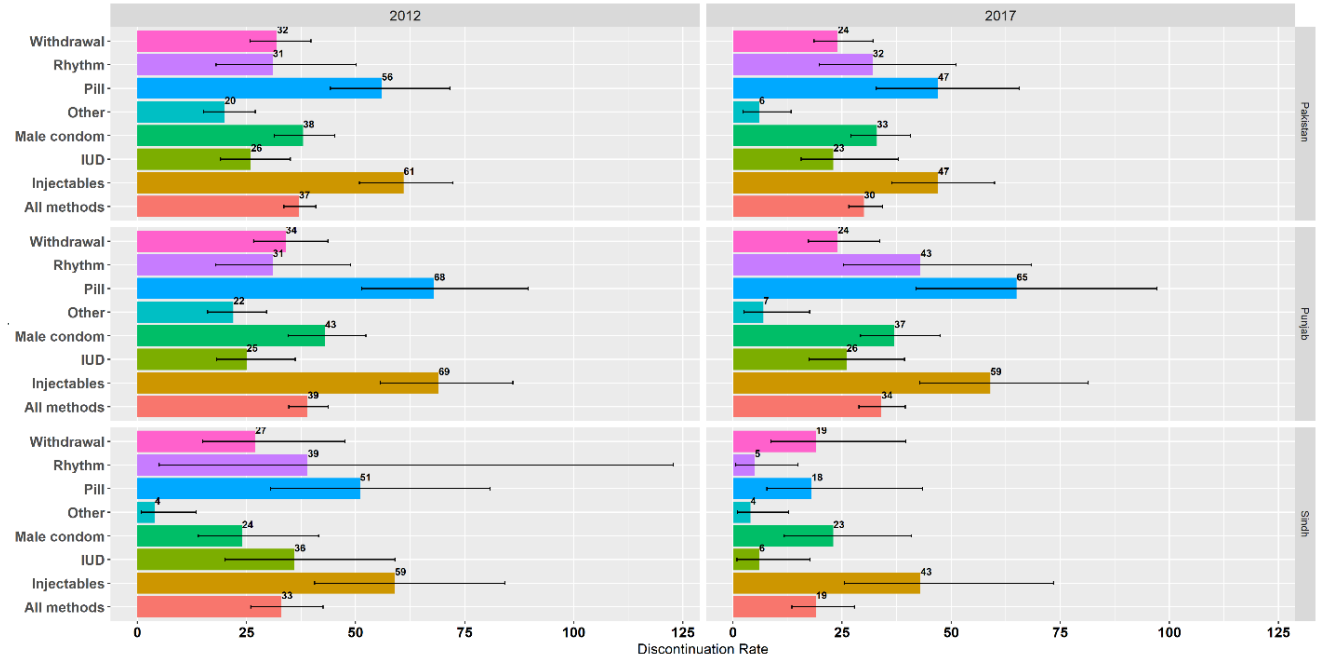
The discontinuation rate of Injectables has declined significantly from 60.7 percent (95% CI: 50.9 – 72.3) in 2012-13 to 46.8 percent (95% CI: 36.4 – 59.9) in 2017-18. Further, Pills and Condoms were the most discontinued methods during the same period at the national level: about 47.2 percent (95% CI: 32.9 – 65.7) of pills users discontinued in 2017-18 and considerably declined from 56.4 percent (95% CI: 44.2 – 71.6). Male condom discontinuation rate is about 33.2 percent (95% CI: 27 – 40.7) in 2017-18 and slightly declined from 37.2 percent (95% CI: 31.3 – 45.3) in

2012-13. Moreover, about 22.9 percent (95% CI: 15.6– 37.9) of IUD user were discontinued in Pakistan in 2017-18, which has slightly declined from 25.5 (95% CI: 19.1 – 35.1). It is important to note that the discontinuation of IUD in Pakistan is unexpectedly high compared to the other regional countries: Indonesia 9 percent in 2017, Turkey 10.8 percent in 2013, and Afghanistan 10.3 percent in 2015. As expected, the discontinuation of withdrawal and Rhythm remains highs and stagnated since 2012-13 (Figure 3).

Likewise, the discontinuation rate in Punjab for Pills remains highest at 65.4 percent (95% CI: 41.9 – 97.2) in 2017-18, this rate was slightly declined from 68 percent (95% CI: 51.4 – 89.6) in 2012-13. Followed by Pills, Injectables has the highest discontinuation rate of 59 percent (95% CI: 42.8 – 81.4) in 2017-18, declined from 69.3 percent (95% CI: 55.7 – 86.1) in 2012-13. Male condom ranked third with 37.4 percent (95% CI: 29.2 – 47.4) in 2017-18 decline from 42.8 percent (95% CI: 34.6 – 52.4) in 2012-13. The discontinuation rate for IUDs in Punjab remained stagnated during the two surveys at 26.1 percent (95% CI: 17.4 – 39.3) in 2017-18. It is important to note that the wider confidence interval for some of the methods in Punjab primarily because of the small sample size in both rounds of the survey.

Whereas, Injectable remained the highest discontinued methods in Sindh, 43 percent (95% CI: 25.6 – 73.5) in 2017-18, declined from 58.8 percent (95% CI: 40.6 – 84.1) in 2012-13. Discontinuation rate for male condom stood at 22.6 percent (95% CI: 11.7 – 41) in 2017-18 and remained stagnating since 2012-13. Even though Pills was the third highest discontinued method, the rate has dropped very significantly to 18 percent (95% CI: 7.7 – 43.5) in 2017-18 from 51.1 percent (95% CI: 30.5 – 80.8) in 2017-18. Since the number of implants users was very low, separate analysis was not performed for them.

Figure 3. 12-months contraceptive discontinuation rates by contraceptive methods at national and for two provinces with 95% CI: Pakistan DHS 2012-13 and 2017-18

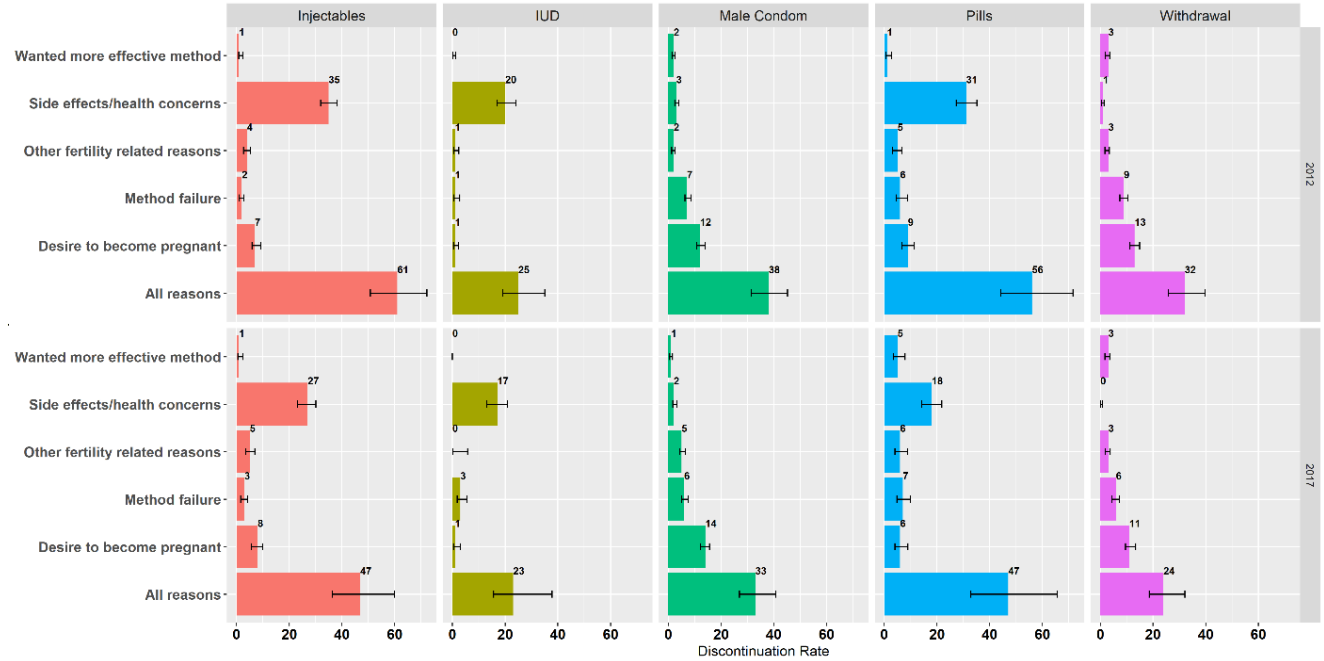


Source: Author's computation from contraceptive calendar from PDHS: 2017-18 and 2012-13

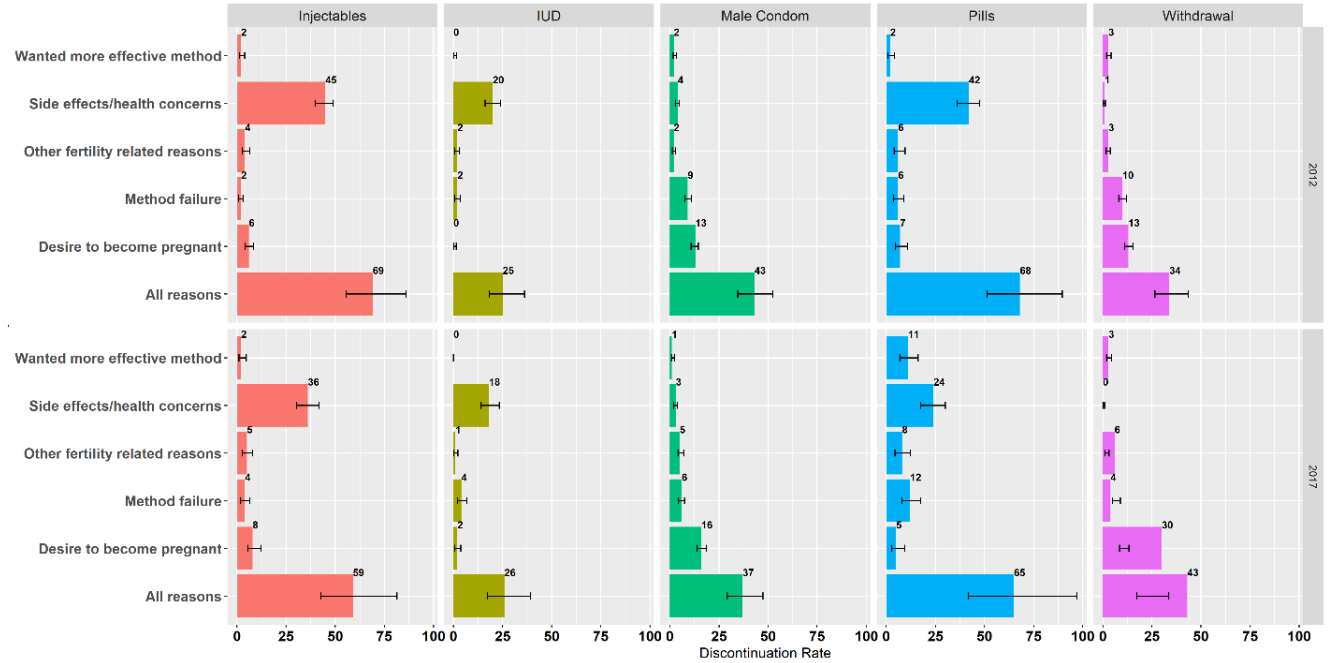
Our analysis revealed the quality-of-care is one of the major issues for contraceptive discontinuation in Pakistan. Figure 4 shows 12-months contraceptive discontinuation rates in Pakistan, and two provinces (Punjab, Sindh) disaggregated by reasons at national and for two provinces with 95% CI from Pakistan DHS 2012-13 and 2017-18. By far, side effect and health concerns are the largest contributors to the overall discontinuation in Pakistan among all methods in both round of the surveys (Figure 5). Injectable has the highest discontinuation rate of 26.6 percent (95% CI: 23.1 – 30.0) respondents siting side effect, though declined from 35.1 percent (95% CI: 32 – 38.2) in 2012-13. Pills discontinuation rate was second highest at 17.8 percent (95% CI: 14.2 – 21.8) which declined from 31.2 percent (95% CI: 27.3 – 35.2). Moreover, about 16.7 percent (95% CI: 13.0 – 20.9) user of IUD discontinued due to side effects and marginally declined from 20.5 percent (95% CI: 17.1 – 24.1) in 2012-13. The most striking finding is that the injectables, pills and IUD have lower discontinuation attributable to method failure in both surveys. The discontinuation due to method failure for IUD is lower 3.3 percent (95% CI: 1.8 – 5.5) probably due to its greater contraceptive efficacy and the need for removal by a health care professional. The users of traditional family planning methods (periodic abstinence and withdrawal) have higher rates of discontinuing because of desire for pregnancy and other fertility reasons.

Figure 4. 12-months contraceptive discontinuation rates disaggregated by reasons at national and for two provinces with 95% CI: Pakistan DHS 2012-13 and 2017-18

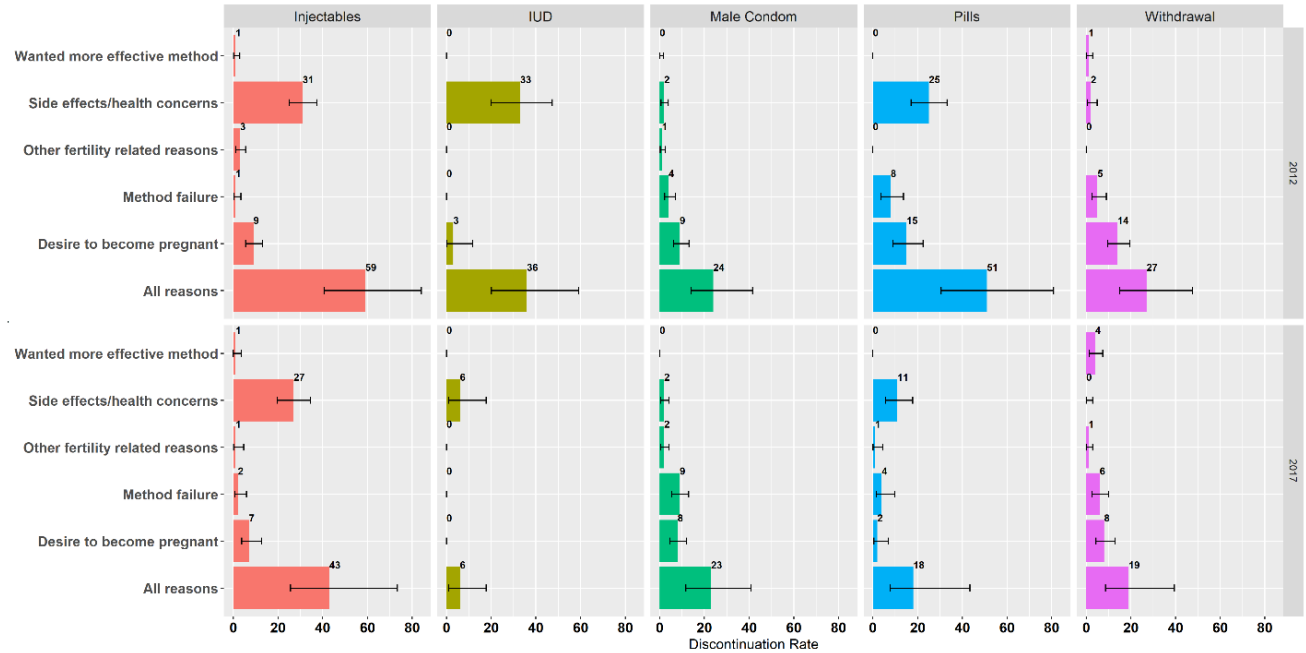
a) Pakistan



b) Punjab



c) Sindh



Source: Author's computation from contraceptive calendar from PDHS: 2017-18 and 2012-13

Similarly, Injectables discontinuation rates in Punjab is highest at 36 percent (95% CI: 30.2 – 41.8) due to side effect, though it has declined from 44.6 percent (95% CI: 40 – 49.1) from 2012-13. Followed by Injectables, pills discontinuation rate in Punjab was 26.5 percent (95% CI: 17.5 – 30) which has declined from 41.8 percent (95% CI: 36.2 – 47.4). Moreover, about 18.5 percent (95% CI: 14.2 – 23.3) user of IUD were discontinued in Punjab due to the side effect and marginally declined from 19.9 percent (95% CI: 16.1 – 23.9) in 2012-13 (see Figure 4).

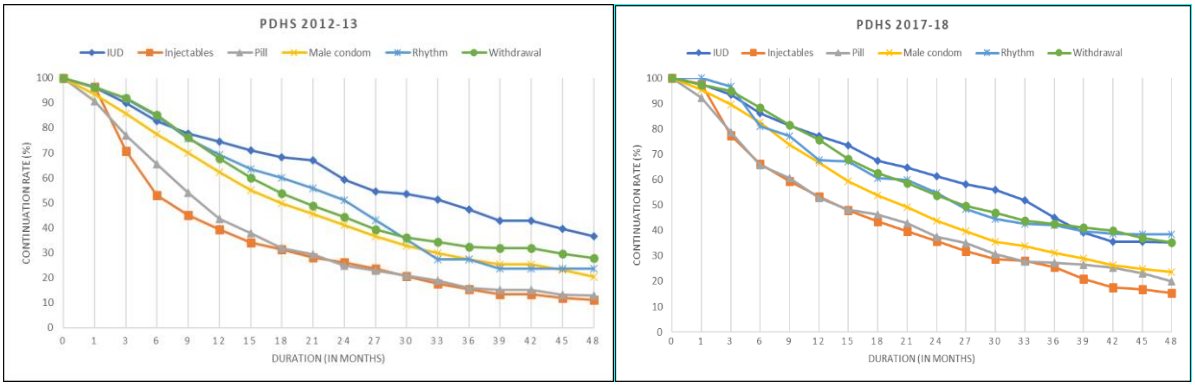
The injectables discontinuation rate in Sindh has also highest at 26.9 percent (95% CI: 19.7 – 34.6), which declined a little bit from 31.1 percent (95% CI: 25.2 – 37.3) in 2012-13. Interestingly, the discontinuation of pills due to side effect in Sindh is very low compared to Punjab and national level, it has declined substantially from 24.8 percent (95% CI: 17.1 – 33.2) in 2012-13 to 10.8 percent (95% CI: 5.7 – 17.8) in 2017-18. The findings reinforced at the provinces level that the injectables, pills and IUD have lower discontinuation attributable to method failure in both surveys (see Figure 4).

3.2.Retrospective analysis of contraceptive discontinuation rate: Life table approach

Life tables approach for continuation rates represents the probability that a woman accepting a method at specific month 'x' and will stop using that method at time '$x + n$'. Figure 5 shows that Table 3.2 life-table continuation rates by selected contraceptive methods at selected months (duration) of use.

The results also confirmed that discontinuation rates are highest for the two hormonal methods: pill and injectable along the duration. Approximately, one-third of both injectable and pill and users discontinued within the first six month, only 18 percent of male condom and 12 percent of withdrawal were discontinued. The analysis revealed that the continuation rate for injectables has increased from 53 percent to 66 percent within the first six months between two surveys. Whereas the continuation rate for pills remains stagnated during the same period. The discontinuation rates were lowest among IUD users; 77 percent of users continued use after one year in 2017-18 which is slightly increased from 75 percent in 2012-13, and only 14 percent removed the IUD within 6 months of use in the latest survey. Male condom and withdrawal had higher continuation rates for the whole period of use (Figure 4). First six months of using these methods, 82 and 88 percent of women continued them, and at 24 months, 44 and 54 percent continued their use.

Figure 5: 48-month life-table continuation rates, by method in Pakistan, PDHS: 2012-13 and 2017-18



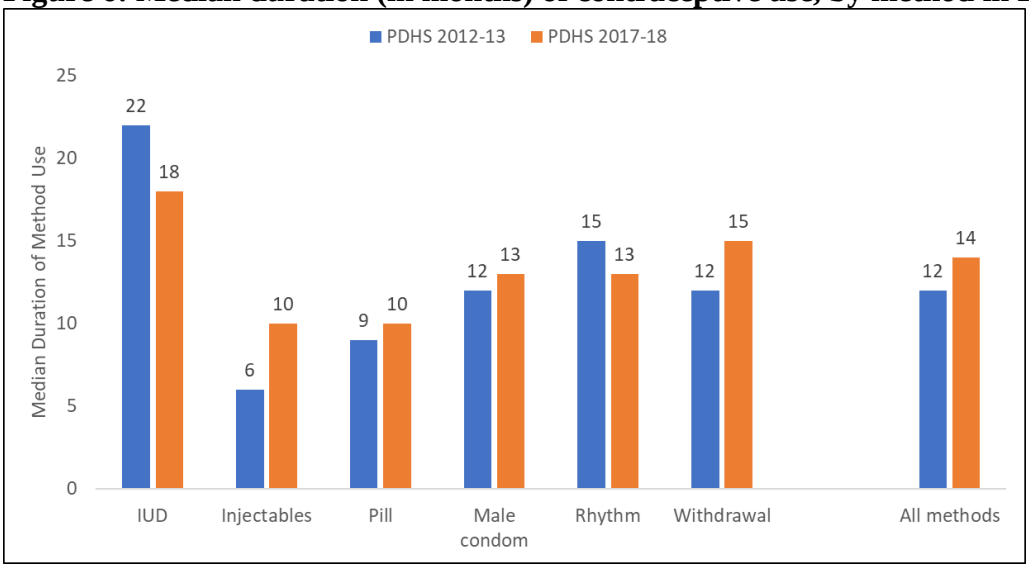
Source: Author's computation from contraceptive calendar from PDHS: 2017-18 and 2012-13

3.3.Median duration of contraceptive use

Figure 6 illustrate the median duration of contraceptive use in the two surveys. The life tables Median computed as the duration by which half the users have discontinued use. Overall, the median duration of contraceptive use increased by 2 months, with a 4 month increase for Injectables and one month increases for both pills and male condom. The median duration for

IUDs has declined 4 months during 2012-13 - 2017-18. The use of withdrawal is unexpectedly increase by 3 months during the same period.

Figure 6: Median duration (in months) of contraceptive use, by method in Pakistan



Source: Author's computation from contraceptive calendar from PDHS: 2017-18 and 2012-13

The most striking findings are the method specific discontinuation rates disaggregated by the public and private sector. The analysis revealed that the discontinuation rates of all methods have declined obtained from public sector during 2012-2017, the IUD experienced a substantial decline from 25 percent to 9 percent. Whereas the other methods (injectables, pills and male condom) obtained from public sector have also experienced a significant decline (Figure 7). Comparably, the pills and injectables obtained from private sector have highest discontinuation rates in 2012, which declined considerably in 2017. Surprisingly, the discontinuation rates for IUD obtained from private sectors have increased from 15 percent to 24 percent during the two surveys.

Figure 7: 12-months contraceptive discontinuation rates disaggregated by source of method - public and private sector: Pakistan DHS 2012-13 and 2017-

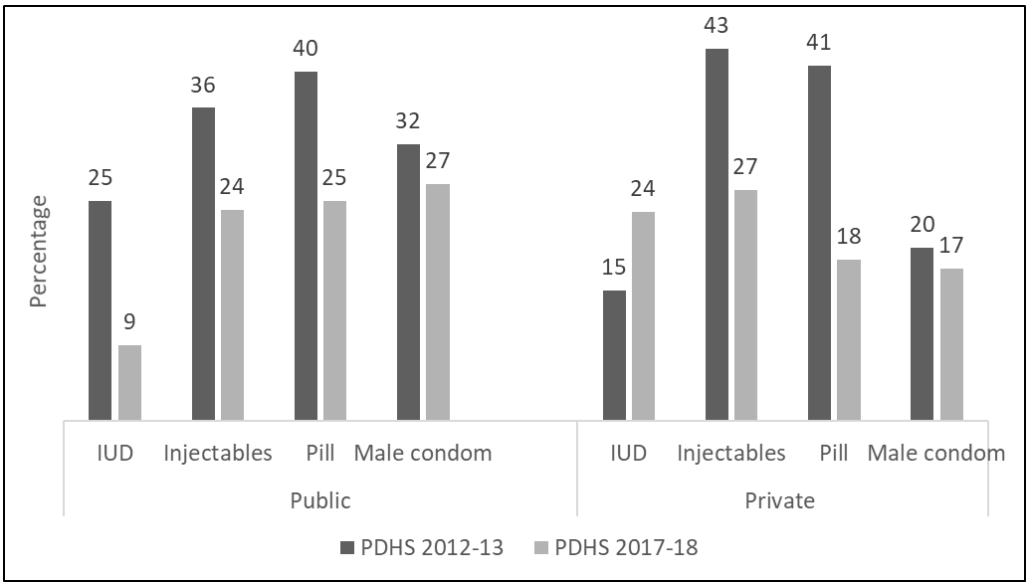

Percentage
25
9
36
24
40
25
32
27
15
24
43
27
41
18
20
17
IUD
Injectables
Pill
Male condom
IUD
Injectables
Pill
Male condom
Public
Private
PDHS 2012-13
PDHS 2017-18

Table 2: 12-month discontinuation rates by women's background characteristics, PDHS 2017-18

Characteristics	IUD	Injectables	Pill	Male condom	Rhythm	Withdrawal	Other	Any Method
Contraceptive Intention								
Spacing	15.0	47.3	38.9	32.6	39.4	33.5	9.4	32.6
Limiting	27.2	45.2	52.8	34.3	28.8	19.6	4.4	29.7
Non-numeric response	15.9	57.8	35.8	24.3	10.7	11.4	7.0	23.6
Place of residence								
Urban	24.5	42.4	35.8	30.0	34.9	20.2	7.6	26.0
Rural	22.0	48.1	52.2	36.1	29.9	28.2	4.4	33.1
Number of living children								
1-2	27.4	52.7	57.2	31.6	38.9	32.9	24.0	35.9
3-4	23.5	47.4	46.2	36.9	28.7	22.3	4.4	30.3
5+	19.7	42.8	39.9	27.0	24.5	15.9	3.1	23.9
Age group								
<25	35.2	53.2	54.6	39.9	59.7	38.3	8.3	42.1
25-34	23.1	45.6	49.1	35.5	34.3	27.9	8.4	32.4
35+	18.5	46.3	39.0	24.3	17.7	10.6	2.0	21.1
Education								
No Education	18.1	40.4	40.3	35.3	20.2	23.3	1.5	27.7
Primary	29.4	62.9	57.9	26.7	29.7	28.8	9.7	33.2
Middle	14.3	54.8	50.7	44.4	47.6	16.9	8.7	34.6
Secondary	25.0	51.1	62.1	30.9	41.0	21.2	12.0	30.1
Higher	26.2	38.6	40.7	30.1	34.7	28.6	8.5	29.3
Wealth quintile								
Lowest	24.0	43.4	37.7	21.6	21.9	30.1	4.7	28.1
Middle	21.0	50.8	54.8	40.0	32.8	26.1	6.1	33.7
Highest	25.1	45.4	47.3	30.5	36.2	20.6	5.9	27.8
Sex of last child								
Boys	25.9	46.1	48.8	31.9	28.2	24.8	5.6	30.1
Girls	19.7	47.5	45.4	33.8	37.0	23.7	5.7	30.0
Total	22.9	46.8	47.2	33.2	32.4	24.2	5.6	30.2

Source: Author's computation from contraceptive calendar from PDHS: 2017-18

Table 2 illustrate the 12-month contraceptive discontinuation rate by demographic and socioeconomic characteristics of women in Pakistan from PDHS 2017-18. The discontinuation rate is lower for women aged 35+ compared to the younger women (aged < 25) for all methods. The injectables and Pills discontinuation in younger women is much higher among other methods, even it remains higher for women aged 35+ (46.3 percent and 39 percent respectively). The higher the number of livings children, the lower the discontinuation rate. More than one-third (35.9 percent) Of contraceptive use episodes among women who have 1-2 children discontinued use within 12 months of starting, compared with more one-fourth (23.6%) among women with five children or more at the end of the episode. The contraceptive discontinuation rate is slightly higher among women who space births than among women who limit births (32.6% versus 29.7%). Unexpectedly, the discontinuation of IUDs among women who limit childbearing (27.2 percent) remains high. While discontinuation of Injectables and pills for women who want spacing and limit were remarkably high (47.3 percent and 45.2 percent respectively).

In Pakistan rural women have a higher discontinuation rate than urban women (31.1 percent versus 26 percent) for all methods except IUDs. The rate for urban areas is higher than the rural areas (24.5 percent and 22 percent respectively). By educational attainment, the rate is highest among women with secondary education (30.1%) and lowest among women with no education (27.7 percent). Particularly, the rate is highest for Injectables and Pills among women with secondary education (51.1 percent and 61.1 percent, respectively) and lowest among women with no education (40 percent each). Among the wealth quintiles, discontinuation rates are not significantly among women in the highest wealth quintile (27.8 percent) compared with the lowest quintile (28.1%). Furthermore, the son preferences are insignificantly, the discontinuation rate among women with boys and girls are approximately 30 percent each.

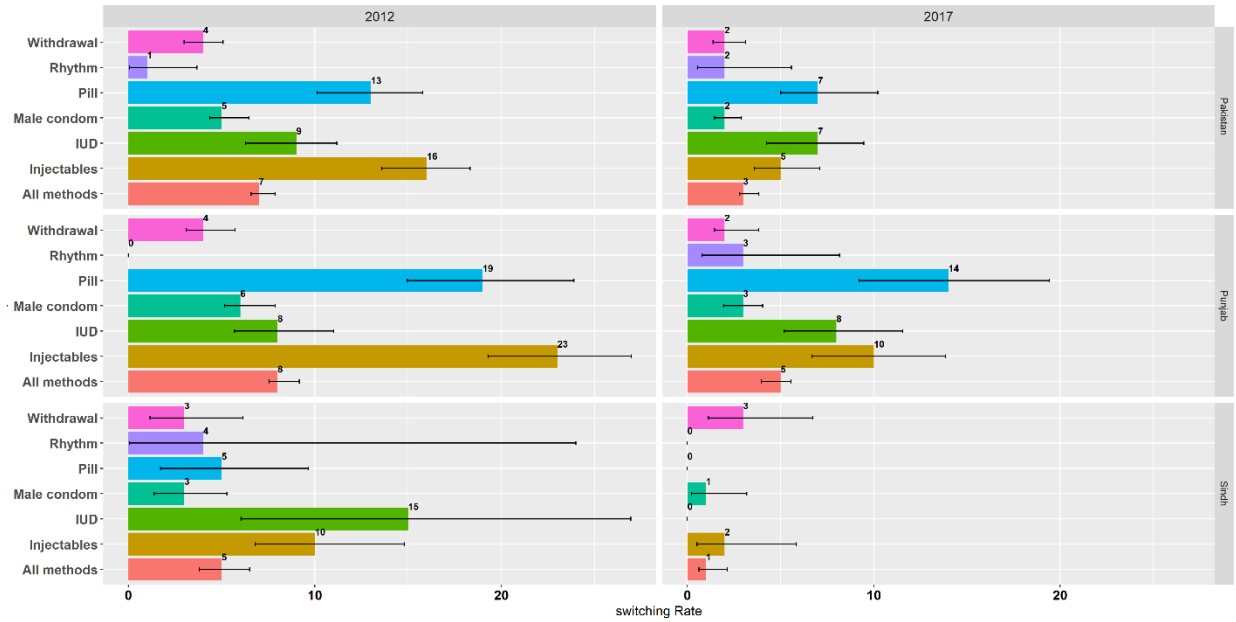
3.4.Contraceptive Switching Rate

Figure 8 shows the 12-month contraceptive switching rates with 95% confidence intervals (overall and by specific methods) in Pakistan and two provinces (Punjab and Sindh) for two rounds of PDHS 2017-18 and 2012-13. For all methods combined at the national level, 3.3 percent (95% CI: 2.8 – 3.9) of users switched their method within 12 months of use in 2017-18, the rate has declined from 7.2 percent (95% CI: 6.6 – 7.9) in 2012-13. The highest switching rates were found among users of Pills, and injectables, whereas the lowest rates were for male condom. The switching rate of Injectables and pills has declined between the two rounds of surveys from 2017-18 to 2012-13: Injectables declined from 15.9 percent (95% CI: 13.6 – 18.3) to 5.1 percent (95% CI: 3.6 – 7.1), and Pills declined from 12.8 percent (95% CI: 10.1 – 15.8) to 7.3 percent (95% CI: 5 – 10.2).

Switching rate in Punjab, for all methods combined, remained lowest at 4.7 percent (95% CI: 4 – 5.6) in 2017-18, this rate was slightly declined from 8.3 percent (95% CI: 7.5 – 9.2) in 2012-13. Again, the highest switching rates were found among users of Pills, and injectables, whereas the lowest rates were for male condom. The switching rate of Injectables declined from 23 percent (95% CI: 19.3 – 27) to 9.9 percent (95% CI: 6.7 – 13.8), and Pills declined from to 13.8 percent (95% CI: 9.2 – 19.4) from 2012-13 to 2017-18. Comparably, the overall switching rate in Sindh has also declined from 5 percent (95% CI: 3.8 – 6.5) in 2012-13 to 1.2 percent (95% CI: 0.6 – 2.1)

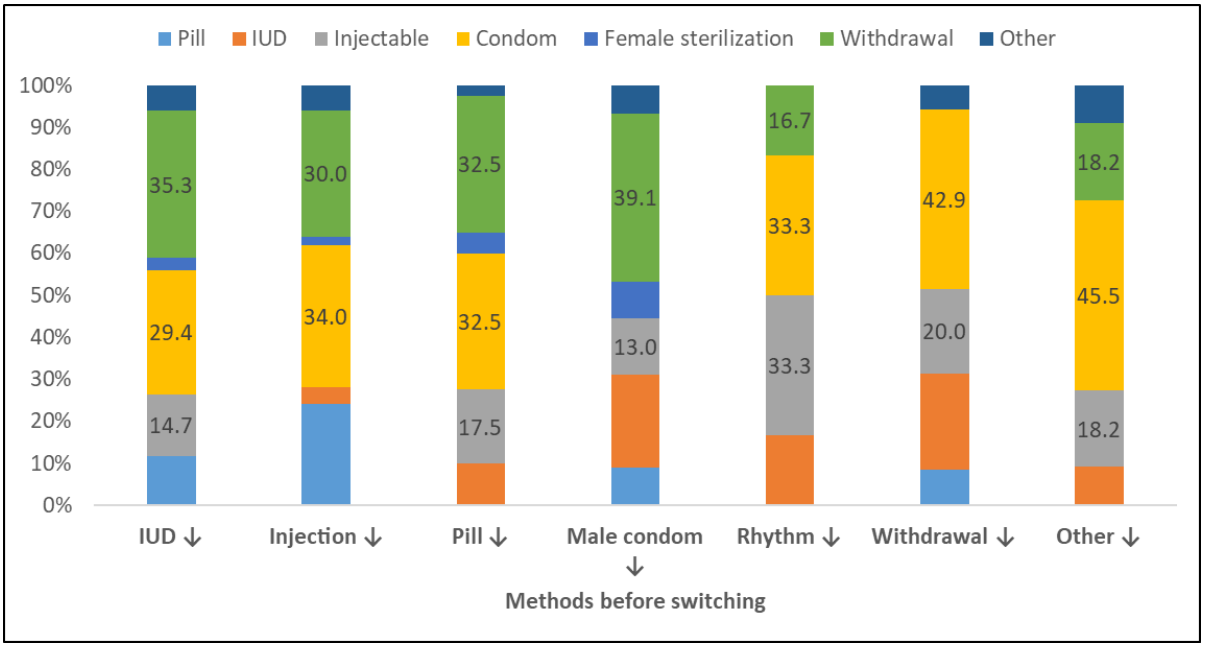
in 2017-18. The switching rates for Injectables in Sindh has declined from 10.4 percent (95% CI: 6.8 – 14.8) in 2012-13 to 2.1 percent (95% CI: 0.5 – 5.9) in 2017-18.

Figure 8. 12-month contraceptive switching rates by method in Pakistan and two provinces with 95% confidence interval, PDHS: 2017-18 and 2012-13



Source: Author's computation from contraceptive calendar from PDHS: 2017-18 and 2012-13

Figure 9. 12-month contraceptive switching rates by method (before and after) in Pakistan, PDHS 2017-18



Source: Arrow reflects that the methods used before switching

A Multivariate Statistical Analysis

We apply Gompertz proportional hazards model to the dichotomous variable, in which the outcomes are modelled as a linear combination of the predictor variables. The selected dependent variable is those women who were discontinued specific contraceptive method.

The Gompertz distribution implemented is the two-parameter function as described in (Lee and Wang 2013), with the following hazard and survivor functions:

$$h(t) = \lambda \exp(\gamma t)$$

$$S(t) = \exp\{-\lambda\gamma^{-1}(e^{\gamma t} - 1)\}$$

Methods (ref. Male Condom)	Model A	Model B	Model C	Model D	Model E
IUD	0.63 *** (0.53-0.74)	0.66 *** (0.56-0.78)	0.13 *** (0.08-0.19)	0.13 *** (0.08-0.19)	0.13 *** (0.08-0.20)
Injection	1.48 *** (1.32-1.67)	1.52 *** (1.35-1.72)	0.37 *** (0.26-0.51)	0.37 *** (0.26-0.51)	0.40 *** (0.28-0.57)
Pill	1.39*** (1.22-1.60)	1.40*** (1.22-1.61)	0.38*** (0.26-0.55)	0.37*** (0.26-0.55)	0.39*** (0.26-0.57)
Rhythm	0.70 *** (0.55-0.89)	0.74 *** (0.58-0.94)	1.07 + (0.50-2.29)	1.10 + (0.52-2.36)	0.83 + (0.38-1.81)
Withdrawal	0.73 *** (0.65-0.81)	0.74 *** (0.66-0.83)	0.98 + (0.70-1.4)	0.98 + (0.69-1.36)	1.21+ (0.85-1.75)
Region (ref. Punjab)					
Sindh	0.65 *** (0.58-0.73)	0.59 *** (0.53-0.67)	0.55 *** (0.39-0.76)	0.55 *** (0.39-0.76)	0.65* (0.45-0.93)
KP	0.79*** (0.71-0.88)	0.73*** (0.65-0.82)	0.67** (0.49-0.92)	0.66** (0.48-0.91)	0.57** (0.40-0.81)
Balochistan	0.44 *** (0.34-0.58)	0.43 *** (0.33-0.58)	0.26 *** (0.10-0.66)	0.25 *** (0.10-0.65)	0.27** (0.10-0.70)
Demographic Factor					
Age at the start of Episode (ref. 15-24)					

25-34	0.59 *** (0.54-0.65)	0.42 *** (0.33-0.56)	0.43 *** (0.33-0.57)	0.39*** (0.29-0.52)
35+	0.33 *** (0.28-0.39)	0.29 *** (0.20-0.45)	0.29 *** (0.19-0.44)	0.29*** (0.18-0.45)
Parity at the end of episode (ref. 1)				
2-3	0.98^{+} (0.84-1.16)	9.33+ (0.4-216.2)	9.33^{+} (0.40-216.2)	12.2^{+} (0.52-285)
4-5	1.13^{+} (0.93-1.36)	14.6~ (0.63-342)	14.6$^{\tilde{}}$ (0.62-343)	23.9* (1-568)
6+	1.24^{+} (0.99-1.56)	16.5~ (0.69-392.8)	16.8$^{\tilde{}}$ (0.71-398.1)	26.3* (1.0-637)
Contraceptive intent (reference=Spacing)				
Limiting	0.80 *** (0.73-0.84)	0.92+ (0.68-1.26)	0.93^{+} (0.68-1.26)	0.85^{+} (0.61-1.17)
Informed choice (reference = No)				
Yes		1.36* (1.03-1.79)	1.36* (1.03-1.79)	1.3* (1.0-1.76)
Source of Methods (Ref. Public)				
Private		1.24* (1.0-1.55)	1.23* (0.99-1.53)	1.07^{+} (0.85-1.36)

Women participation in decision-making (Ref. Do not participate)		
Fully participate	1.00 + (0.68-1.48)	0.90+ (0.6-1.35)
Partially participate	0.90 + (0.71-1.13)	0.80~ (0.62-1.01)
Socioeconomic factors		
Internet use (reference=Never)		
Ever		0.88+ (0.58-1.3)
Mobile phone ownership (reference=Do not have)		
Have		1.3* (0.98-1.65)
Education (ref. No Education)		
Primary		0.86 + (0.62-1.21)
Secondary		0.63** (0.42-0.92)
Higher		1.76** (1.1-2.80)

Work status (reference=Currently not employed)					
Currently employed					0.97+ (0.73-1.3)
Place of residence (reference=Rural)					
Urban					0.76* (0.57-0.99)
Household wealth index quintile (reference=Lowest)					
Second					1.75*** (1.14-2.67)
Middle					1.99*** (1.27-3.11)
Fourth					2.08*** (1.26-3.44)
Highest					1.86* (1.05-3.3)
Constant	0.04 *** (0.03-0.04)	0.06 *** (0.05-0.07)	0.008 *** (0.0004-0.19)	0.008 *** (0.003-0.20)	0.004** (0.0001-0.09)

Gamma	-0.008*** (-0.01-0.005)	-0.004 *** (-0.007 - -0.001)	0.013*** (0.003 -0.021)	0.012*** (0.003 -0.021)	0.016 *** (0.006 -0.025)

*** p > 0.000, ** p > 0.01, * p>0.05, ~ p>0.1, + refers to statistically insignificant

4. Limitations of the study

The study had some limitations. Health system factors (service availability, accessibility, and quality of services) and spouse/family/community factors were not analyzed in the study due to unavailability of the information. Because of the cross-sectional data, understanding of some association factors were limited, which decreased our understanding of the experience of women that contributes to the discontinuation and switching of contraception.

5. Conclusions and recommendations

The reproductive calendar from the last two rounds of Pakistan Demographic & Health Survey (2017-18 and 2012-13) provides an opportunity to study the dynamics of contraceptive use in Pakistan and selected subnational level (Punjab and Sindh). We studied the length of time women uses specific contraceptive methods, how often they discontinue the method or change to a different one, and associated reasons for doing so. At the national level, about 30 percent contraceptive users discontinued their method, while 34 percent in Punjab and 20 percent in Sindh discontinued within the first 12 months. The 12month discontinuation rates are comparable to those in some other recently surveyed countries in the region—Indonesia (27 percent), Afghanistan (26 percent in 2015), Bangladesh (37 percent in 2017).

The first-year discontinuation rate for all methods was high, primarily because of discontinuation of short-term methods. The contraceptive discontinuation rate while in need was also considerably high, with health concerns/fear of side effects cited as the most common reason for discontinuation. The further insights would be very essential to know whether, and when women discontinue because of health concerns, side effects, and/or method-related problems. Are they do so on their own or on the advice of a healthcare provider? The discontinuation rate for IUD was among the lowest of any method. This may reflect those women are well informed about these methods before adopting them and thus have confidence in their suitability.

This study's findings highly recommends that the inclusion of Pakistan FP Program's goal to reduce contraceptive discontinuation while women are in need. Women who have discontinued contraception need timely and accurate information on method switching. The country must improve the availability and accessibility of long-term contraceptive methods and encourage counselling that promotes informed choice and voluntary FP services. In addition, qualitative research could explore the other potential family/community and health service factors that might influence contraceptive discontinuation.

While discontinuation for becoming pregnant is a choice of individual woman and couples, discontinuation for other reasons contribute to increased unmet need, unwanted fertility, and potentially unsafe abortion. In the framework of rights-based quality family planning programme, health system should be able to address the needs of both groups of women. Those who want to become pregnant should be assisted to have proper counselling and care throughout pregnancy and childbirth. The interventions for those who discontinue for other reasons are complex and require pre and post discontinuation actions.

As indicated in the limitation section, the analysis could have provided more in depth and comprehensive understanding especially at individual and couple level if it was supplemented by qualitative research to get deeper understanding of individual and couple decision-making process.

Major contributors to discontinuations such as concerns related to side effects or myths can be reduced through interventions such as: detailed and candid discussion during counselling on potential side effects and solutions and options that would be available if they occur; improved male engagement; evidence based SBCC programmes for dispelling misconceptions about contraceptives; and most importantly expanding method choices by ensuring availability through addressing commodity stock-outs, implementing task sharing/shifting and improving referral networks. The goal should be enabling women and couples to be able to make informed decisions and switch to effective and acceptable methods of their choice immediately to ensure continuity of protection.

References

Bongaarts, John, and Robert Potter. n.d. *Fertility, Biology, and Behavior An Analysis of the Proximate Determinants*. Vol. 1. Elsevier Science. https://www.sciencedirect.com/book/9780080916989/fertility-biology-and-behavior#book-description.

Bradley, Sarah E.K., Hilary M. Schwandt, and Shane Khan. 2009. 'Levels, Trends, and Reasons for Contraceptive Discontinuation'. DHS Analytical Reports 6. Calverton, Maryland, USA: ICF Macro.

Lee, E.T., and J.W. Wang. 2013. *Statistical Methods for Survival Data Analysis*. 4th ed. New York: Wiley.

NIPS, and ICF. 2014. 'Pakistan Demographic and Health Survey 2012-13'. Islamabad, Pakistan, and Rockville, Maryland, USA.

———. 2019. 'Pakistan Demographic and Health Survey 2017-18'. Islamabad, Pakistan, and Rockville, Maryland, USA.