Original Article

Assessing the Determinants of the Usage of Contraceptive in Family Planning in Punjab, Pakistan

Usman Sarwar[1], Zuhair Mutaz Zuhair Murad[2], Muhammad Mohsin[3], Ayesha Saddiqua[2], Hasnain Ghulam Nabi[2], Muhammad Miandad[4]*, Abdur Rehman[5]

[1]Department of Statistics, The Islamia University of Bahawalpur, Bahawalpur, Pakistan.
[2]University Institute of Medical Lab Technology, Faculty of Allied Health Sciences, University of Lahore, Pakistan.
[3]Department of Geography, Govt. Sadiq Egerton Graduate College, Bahawalpur, Pakistan.
[4]Department of Geography, University of Gujrat, Pakistan.
[5]Department of Earth Sciences, University of Sargodha, Pakistan.
*Corresponding Author: Muhammad Miandad; Email: muhammad.miandad@uog.edu.pk
Conflict of Interest: None.

ABSTRACT

Background: Contraceptive use is pivotal for managing birth rates, particularly in regions with high fertility such as Pakistan. This study highlights the role of family planning in controlling population growth by assessing the determinants affecting contraceptive usage in Punjab, a province characterized by diverse demographic and socio-economic conditions.

Objective: The research aims to evaluate the impact of education, age, residential area, residential status, and media access on contraceptive use among ever-married women in Punjab, Pakistan.

Methods: Data from the 'Annual Contraceptive Performance Report 2019-20' by the Pakistan Bureau of Statistics were analyzed. A total of 78,563 ever-married women were sampled using random stratified techniques. Multiple statistical tests, including logistic regression, chi-square, and independent sample t-tests, were applied to identify key factors influencing contraceptive usage.

Results: Educational level, residential area, status, wealth index quintiles, and media access were significantly associated with contraceptive use across Punjab. Statistical analysis showed that women's age and the number of children significantly affected contraceptive use. Key predictors identified include media access, reproductive history, and residential characteristics, with media access and residential area being particularly impactful.

Conclusion: This study confirms that socioeconomic and demographic factors significantly influence contraceptive usage in Punjab. Enhanced focus on education and targeted media campaigns could improve family planning outcomes. Effective interventions should consider local cultural and social contexts to increase contraceptive uptake.

Keywords: Contraceptive Use, Family Planning, Logistic Regression, Punjab, Statistical Analysis

INTRODUCTION

Contraceptive use in family planning refers to the adoption of birth control methods and the planning of childbirth intervals, enabling individuals and couples to achieve their desired number of children and to space births appropriately (1). The prevalence of contraceptive use is typically measured as the percentage of women, or their partners, who are currently employing at least one form of contraception, irrespective of the method used (2). Traditionally, this measure applies to married women aged between fifteen and forty-nine (3). Globally, complications during pregnancy or childbirth lead to approximately fifty thousand deaths annually among young girls and women who are physiologically unprepared for childbirth; infants born to these young mothers face significantly higher risks compared to those born to older mothers (4).

In many developing nations, the uptake of contraceptive methods has become increasingly common, predominantly through modern forms of fertility control (5). Recent studies indicate that these modern methods are largely responsible for the rise in contraceptive prevalence (6). Despite being one of the first countries in South Asia to launch a national family planning program, Pakistan has shown relatively poor progress in increasing the rate of contraceptive use (7). The challenges include varying levels of satisfaction among clients, method selection, side effects, and the transition from more effective to less effective methods. Notably, the desired demand for contraception was estimated at 17% in 2019 (8).

Pakistan, the world's fifth most populous country with a population growth rate of 2.04%, has experienced significant demographic shifts. Since the 1950s, when Pakistan initiated family planning activities, its adoption rate has lagged compared to its South Asian neighbors (9). However, fertility rates in Pakistan have steadily declined, as evidenced by the Pakistan Demographic and Health Survey, which showed a reduction in the total fertility rate from 6.5 in 1979-80 to 3.6 in 2017-18 (10). Despite these efforts, the overall Contraceptive Performance measured in Couple Years of Protection (CYP), decreased by 24.5% from 2018 to 2019. Regionally, while Sindh saw an increase in CYP, significant declines were observed in Punjab, Khyber Pakhtunkhwa (KPK), and other areas (8).

The use of contraceptives in Pakistan is influenced by numerous factors, including access to family planning services, the availability of affordable modern methods, and the motivation of healthcare providers. Furthermore, the number of living children and educational attainment are positively correlated with the prevalence of contraceptive use (11). Urban women are more likely to adopt contraceptive methods than their rural counterparts, where the Contraceptive Prevalence Rate (CPR) remains low, contributing to rapid population growth and adverse health outcomes (13). As of 2020, the CPR declined to 33% from 34% in 2019, with an ambitious national goal to increase CPR to 50% by 2020, aligning with the Sustainable Development Goal (SDG) target 3.7 to ensure universal access to reproductive health services by 2030 (14, 8).

The objective of this research is to elucidate the determinants influencing contraceptive use among divisions in Punjab, Pakistan, focusing on factors such as education, age, area of residence, residential status, and access to media. By identifying these determinants, the study aims to provide insights that could enhance the effectiveness of family planning initiatives, thereby supporting the national goal of increasing contraceptive prevalence and improving reproductive health outcomes.

MATERIAL AND METHODS

Study Area
The study was conducted in Punjab, the most populous and geographically the second-largest province of Pakistan, encompassing approximately 25.8% of the country's total land area (205,344 square kilometers) and supporting a population of 110,012,442. This region is marked by its high population density, calculated at 544 individuals per square kilometer, and comprises nine divisions and 36 districts, sharing borders with Sindh, Baluchistan, Khyber Pakhtunkhwa, and Kashmir (Figure 1).

Data Collection and Sampling
The research employed an explanatory design, utilizing secondary data on contraceptive usage and selected variables such as level of education, residential area, residential status, wealth index quintiles, and media access. Data for these variables were obtained from the Pakistan Bureau of Statistics' 'Annual Contraceptive Performance Report 2019-20'. The sample comprised data from 78,563 married women who had ever been married, selected through a stratified random sampling technique to ensure a representative distribution of the population across various socioeconomic segments.

Domain of the Study
This study focuses on social and economic factors affecting contraceptive usage in various areas of all divisions of Punjab. The cultural values, socio-economic status and mode of living all over the area are almost same.

Data Analysis
The gathered data analyzed by applying various statistical techniques to determine the significant factors affecting usage of contraceptive and find out the relationship of certain variables.

Wealth Index
In terms of data analysis, the wealth index was calculated by assessing the cumulative value of all physical, natural, and financial assets owned by a household, adjusted for liabilities. This index serves as a proxy for the household's wealth level.

Chi-Square Test
To explore the associations between contraceptive use and the selected socioeconomic variables, a chi-square test was performed, providing insights into the dependency and relationships among these variables. The test statistic used followed the chi-square distribution formula $\chi^2 = \sum \frac{(o_i - e_i)^2}{e_i}$, where o_i and e_i represent the observed and expected frequencies, respectively (15). A study employed chi square test in their research to check the relationship between social and economic variables affecting contraceptive usage (16).

T-Test
Furthermore, the t-test was employed to examine the effects of the age of women and the number of children ever born on contraceptive use. This test helps identify the differences between two sets of data concerning the same continuous, dependent variable. The t-test formula used was $t = \frac{\bar{X} - \mu}{s/\sqrt{n}}$, where 'μ' is the population mean, '$\bar{X}$' is the sample mean, 's' is the standard deviation, and 'n' is the sample size (17).

Binary Logistic Regression

Binary logistic regression was utilized to estimate the probability of contraceptive use as a binary outcome based on several predictor variables such as media access, childbirth history, and residential area. The logistic model employed was $\ln(p/1-p)=a+bX$ where 'ln' is the natural logarithm, 'p' is the probability that Y for cases equals 1, p(y=1), '1-p' is the probability that for Y cases equals 0, 1-p (Y=1), "p/(1-p)" is the odds and ln [p/1-p] is the log odds, 'a' is Y intercept, 'b' is regression coefficient (18). Binary logistic regression analysis taking contraceptive usage as outcome variable and media, ever given birth, ever had child who later died, currently pregnant and area were taken as input variables. To discover the influence of the above explained and explanatory variables the following model was used;

$\ln(p/(1-p))=a+b_1 X_1+b_2 X_2+b_3 X_3+b_4 X_4+b_5 X_5$ (Equation 1)

Model

$\ln(p/(1-p))=a+b_1 X_1+b_2 X_2+b_3 X_3+b_4 X_4+b_5 X_5$

$Pi=e^Z/(1+ e^Z)$

$Pi=1/(1+ e^{(-Z)})$

$Z =a+b_1 X_1+b_2 X_2+b_3 X_3+b_4 X_4+b_5 X_5$ (Equation 2)

Where a is y intercept which represents the average value of explained variable, when X is zero and b's are the slope of regression line.

$Y =Ln[p/1-p]$ = The log odds of contraceptive usage, X1 = Media Access (TV, internet, Radio, Newspaper), X2 = Ever given birth, X3 = Ever had child who later died, X4 = Pregnancy Status (either currently pregnant or not) and X5 = Residential Area

The Log-linear Model

Additionally, a log-linear model was used to analyze contingency tables by fitting a model that assumed all possible one-way and two-way interactions. This model, considered saturated due to its comprehensive inclusion of effects, ensured that expected cell frequencies perfectly matched observed frequencies, providing a robust analysis of the interactions between variables such as media access and residential area. Through these methodologies, the study aimed to rigorously evaluate the determinants affecting contraceptive use in Punjab, facilitating a deeper understanding of the factors influencing family planning decisions within this context (19).

Fig 1. Study Area-Divisions of Punjab Province
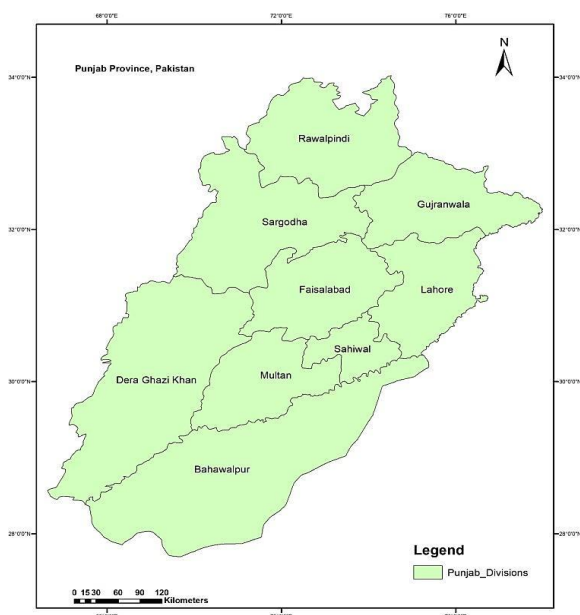
Source: Authors (2023)

RESULTS

Status of contraceptive usage

The status of contraceptive usage across various divisions in Punjab reveals significant educational disparities influencing contraceptive use.

Status of contraceptive usage in Bahawalpur Division

Table 1 shows that the education level of women who are not using contraceptives is 43.5% preschool, 10.6% primary, 4.6% middle, 5.1% secondary and 4.5% higher whereas the education level of women using contraceptives is 18.4% preschool, 5.8% primary, 2.2% middle, 3.1% secondary and 2.3% higher. The p-value is also highly significant at 99% level of significance (0.001)

indicating that education plays a pivot role in the usage of contraceptive.

Status of contraceptive usage in D.G. Khan Division

Table 1 shows that the education level of women who are not using contraceptives is 51.5% preschool, 8.4% primary, 3.6% middle, 4.3% secondary and 3.8% higher whereas the education level of women using contraceptives is 17.9% preschool, 3.9% primary, 2% middle, 2.5% secondary and 2.2% higher. The corresponding p-value is also highly significant (< 0.001) showing that education is an important variable in the contraceptive use.

Status of contraceptive usage in Faisalabad Division

The education level of women who are not using contraceptives is 31.5% preschool, 12.8% primary, 6.2% middle, 7.4% secondary and 5.5% higher whereas the education level of women using contraceptives is 17% pre-school, 7.3% primary, 3.8% middle, 4.9% secondary and 3.5% higher. The p-value is significant at 95% level of significance (0.013).

Status of contraceptive usage in Gujranwala Division

The education level of women who are not using contraceptives is 23% preschool, 14.5% primary, 8.9% middle, 11.1% secondary and 7.8% higher whereas the education level of women using contraceptives is 12.6% preschool, 8.2% primary, 4.6% middle, 5.4% secondary and 3.9% higher. The p-value (0.048) is significant at 95% level of confidence and shown a relationship between the education and the level of the contraceptive use.

Status of contraceptive usage in Lahore Division

The education level of women who are not using contraceptives is 29.4% preschool, 10% primary, 6.7% middle, 8.5% secondary and 7.4% higher whereas the education level of women using contraceptives is 17 preschool, 6% primary, 4.2% middle, 5.7% secondary and 5.2% higher. The p-value (0.024) is significant at 95% level of confidence and emphasizing the importance of education.

Status of contraceptive usage in Multan Division

The education level of women who are not using contraceptives is 33.8% preschool, 9.5% primary, 4.7% middle, 5.3% secondary and 5.3% higher whereas the education level of women using contraceptives is 24.5% preschool, 6.8% primary, 3.3% middle, 3.7% secondary and 3.1% higher. The p-value (0.128) is not significant and showing no strong relationship between the education and the level of the contraceptive use.

Status of contraceptive usage in Rawalpindi Division

The education level of women who are not using contraceptives is 20.7% preschool, 14.7% primary, 8.1% middle, 11.2% secondary and 9.1% higher whereas the education level of women using contraceptives is 12.3% preschool, 9.1% primary, 4.2% middle, 5.8% secondary and 4.9% higher. Likewise the p-value of Lahore Division (0.024) 95% level of confidence, similar for Rawalpindi Division and witnessing that there is a relationship between the education and contraceptive use among women.

Status of contraceptive usage in Sahiwal Division

The education level of women who are not using contraceptives is 37.7% preschool, 11.9% primary, 4.8% middle, 6% secondary and 5.2% higher whereas the education level of women using contraceptives is 19% preschool, 6.4% primary, 2.6% middle, 3.4% secondary and 2.9% higher.

Status of contraceptive usage in Sargodha Division

The education level of women who are not using contraceptives is 43% preschool, 11.9% primary, 4.8% middle, 5.5% secondary and 5.1% higher whereas the education level of women using contraceptives is 17.7% preschool, 5.2% primary, 2.1% middle, 2.3% secondary and 2.3% higher. Table 1 shows that p-value is significant at 99% and 95% levels of significance, on basis of result, we conclude that contraceptive usage is significantly associated with level of education in all divisions of the Punjab except in Multan, Sahiwal and Sargodha. Likewise a study conducted in Gujrat (Pakistan) illustrate that most of the couples used traditional contraceptive methods i.e. Condoms, rhythm and withdrawal (5). Chaurasia (20) used data mining approach to analyze patterns of contraceptive use in India by comparing contraceptive use among groups of women with distinct economic, demographic, social and cultural characteristics. Badar et al. (21) performed a cross sectional to find out the relationship between educational level and fertility behavior. The data from Multiple Indicator Cluster Survey (MICS) Punjab (2011) had been used for the study. The total sample

size of 78,563 for ever married women is used to assess the socioeconomic characteristics of women and contraceptive use in Punjab under the logistic regression analysis and shows a key relation between the education and level of contraception use. Moreover, a cross sectional study conducted in Peshawar (Pakistan) concluded that more than 90% women had knowing about the methods of contraception (22). Another study also demonstrates that educational level, number of alive child children, spouse' wish for more children were important variables for the contraception use (11).

Table 1. Contraceptives usage and education in divisions of Punjab

Division	Usage of Contraceptive	Education					Total	P-value
		None/ Pre-school	Primary	Middle	Secondary	Higher		
Bahawalpur	No	3,753	910	396	438	391	5,888	0.001*
		43.5%	10.6%	4.6%	5.1%	4.5%	68.3%	
	Yes	1,586	496	193	265	194	2,734	
		18.4%	5.8%	2.2%	3.1%	2.3%	31.7%	
	Total	5,339	1,406	589	703	585	8,622	
D.G. Khan	No	3,895	635	271	322	285	5,408	0.001*
		51.5%	8.4%	3.6%	4.3%	3.8%	71.6%	
	Yes	1,349	291	152	187	170	2,149	
		17.9%	3.9%	2.0%	2.5%	2.2%	28.4%	
	Total	5,244	926	423	509	455	7,557	
Faisalabad	No	3,181	1,293	629	748	560	6,411	0.013**
		31.5%	12.8%	6.2%	7.4%	5.5%	63.5%	
	Yes	1,721	738	384	492	357	3,692	
		17.0%	7.3%	3.8%	4.9%	3.5%	36.5%	
	Total	4,902	2,031	1,013	1,240	917	10,103	
Gujranwala		3,020	1,905	1,176	1,458	1,021	8,580	0.048**
	No	23.0%	14.5%	8.9%	11.1%	7.8%	65.3%	
	Yes	1,658	1,080	608	706	512	4,564	
		12.6%	8.2%	4.6%	5.4%	3.9%	34.7%	
	Total	4,678	2,985	1,784	2,164	1,533	13,144	
Lahore	No	2,924	993	664	850	733	6,164	0.024**
		29.4%	10.0%	6.7%	8.5%	7.4%	61.9%	
	Yes	1,695	597	416	566	513	3,787	
		17.0%	6.0%	4.2%	5.7%	5.2%	38.1%	
	Total	4,619	1,590	1,080	1,416	1,246	9,951	
Multan	No	3,043	853	426	476	478	5,276	0.128
		33.8%	9.5%	4.7%	5.3%	5.3%	58.6%	
	Yes	2,206	611	298	334	280	3,729	
		24.5%	6.8%	3.3%	3.7%	3.1%	41.4%	
	Total	5,249	1,464	724	810	758	9,005	
Rawalpindi		1,770	1,256	691	961	776	5,454	0.024**
	No	20.7%	14.7%	8.1%	11.2%	9.1%	63.7%	
	Yes	1,056	783	364	493	417	3,113	
		12.3%	9.1%	4.2%	5.8%	4.9%	36.3%	
	Total	2,826	2,039	1,055	1,454	1,193	8,567	
Sahiwal	No	1,728	547	219	276	237	3007	0.706
		37.7%	11.9%	4.8%	6.0%	5.2%	65.6%	
	Yes	872	294	117	158	133	1574	
		19.0%	6.4%	2.6%	3.4%	2.9%	34.4%	

	Total	2,600	841	336	434	370	4581	
Sargodha	No	3,027	840	341	390	356	4954	0.757
		43.0%	11.9%	4.8%	5.5%	5.1%	70.4%	
	Yes	1,242	367	145	161	164	2,079	
		17.7%	5.2%	2.1%	2.3%	2.3%	29.6%	
	Total	4,269	1,207	486	551	520	7,033	

Note: *significant at 99% level of confidence and **significant at 95% level of confidence

Table 2. Area, contraceptives usage and wealth index quintile

Area	Usage of Contraceptive	Wealth index quintiles					Total	P-value
		Lowest	Second	Middle	Fourth	Highest		
Urban	No	441	1,361	2,896	5,990	8,066	18,754	0.001*
		1.4%	4.3%	9.2%	19.1%	25.7%	59.8%	
	Yes	192	687	1,727	4,062	5,938	12,606	
		.6%	2.2%	5.5%	13.0%	18.9%	40.2%	
	Total	633	2,048	4,623	10,052	14,004	31,360	
Rural	No	8,597	8,356	7,970	5,634	1,831	32,388	0.001*
		18.2%	17.7%	16.9%	11.9%	3.9%	68.6%	
	Yes	3,012	3,933	3,980	2,880	1,010	14,815	
		6.4%	8.3%	8.4%	6.1%	2.1%	31.4%	
	Total	11,609	12,289	11,950	8,514	2,841	47,203	

Note: *significant at 99% level of confidence

Status of contraceptive usage and status of residence in urban area

Table 3 shows that the status of residence of urban women which are not using contraceptives is 46% compound, 0.3% apartment/ flat, 12.8% part of house, 0.3% part of compound and 0.5% other whereas status of residence of Urban women using contraceptives is 30.7% compound, 0.4% apartment/ flat, 8.8% part of house, 0.1% part of compound and 0.3% other.

Status of contraceptive usage and status of residence in rural area

The status of residence of rural women which are not using contraceptives is 51.9% compound, 0.1% apartment/ flat, 15.4% part of house, 0.7% part of compound and 0.6% other whereas status of residence of rural women using contraceptives is 24.1% compound, 0.1% apartment/ flat, 6.7% part of house, 0.3% part of compound and 0.2% other. Table 3 depicts that p-value is significant at 5% level of significance, on basis of results; we conclude that contraceptive usage is significantly associated with status of residence in rural and urban area.

Table 3. Area, contraceptives usage and status of residence

Area	Usage of contraceptive	Status of residence					Total	P-value
		Separate house	Flat	Part of house	Part of compound	Other		
Urban	No	14,427	87	4,008	83	149	18,754	0.001*
		46.0%	.3%	12.8%	.3%	.5%	59.8%	
	Yes	9,615	112	2,745	45	89	12,606	
		30.7%	.4%	8.8%	.1%	.3%	40.2%	
	Total	24,042	199	6,753	128	238	31,360	
Rural	No	24,485	32	7,263	336	272	32,388	0.001*
		51.9%	.1%	15.4%	.7%	.6%	68.6%	
	Yes	11,395	24	3,163	143	90	14,815	
		24.1%	.1%	6.7%	.3%	.2%	31.4%	
	Total	35,880	56	10,426	479	362	47,203	

Note: *significant at 99% level of confidence

Status of contraceptive usage and desire for another child in urban area

Table 4 shows that desiring for another child of women whom are not using contraceptives in urban area, 21.5% wanted another child, 19% do not want another child, 4.2% said they can't pregnant and 15.1% were undecided on the other hand women using contraceptives in urban area, 7.5% wanted another child, 17.4% do not want another child, 0.1% said they can't pregnant and 15.1% are undecided.

Table 4. Area, contraceptives usage and desire for another child

Area	Usage of Contraceptive	Would like to have another child				Total	P-value
		Have another child	No more / None	Cannot get pregnant	Undecided/ Don't know		
Urban	No	6,742	5,968	1,309	4,735	18,754	0.001*
		21.5%	19.0%	4.2%	15.1%	59.8%	
	Yes	2,360	5,470	38	4,738	12,606	
		7.5%	17.4%	.1%	15.1%	40.2%	
	Total	9,102	11,438	1,347	9,473	31,360	
Rural	No	11,932	9,610	2,522	8,324	32,388	0.001*
		25.3%	20.4%	5.3%	17.6%	68.6%	
	Yes	2,598	5,454	37	6,726	14,815	
		5.5%	11.6%	.1%	14.2%	31.4%	
	Total	14,530	15,064	2,559	15,050	47,203	

Note: *significant at 99% level of confidence

Status of contraceptive usage and status of residence in rural area

Desiring for another child of women whom are not using contraceptives in rural area, 25.3% wanted another child, 20.4% do not want another child, 5.3% said they can't pregnant and 17.6% are undecided on the other hand women using contraceptives in rural area, 5.5% wanted another child, 11.6% do not want another child, 0.1% said they can't pregnant and 14.2% are undecided. Table 4 shows that p-value is significant at 99% level of significance, on basis of result, we conclude that contraceptive usage is significantly associated with desire of another child in rural and urban area.

Table 5. Media access, contraceptives usage and residential area

	Usage of Contraceptive	Area		Total	P-value
		Urban	Rural		
Media Access	No	No	3,054	13,676	16,730	0.001*
			12.9%	57.8%	70.7%	
		Yes	1,594	5,326	6,920	
			6.7%	22.5%	29.3%	
		Total	4,648	19,002	23,650	
	Yes	No	15,700	18,712	34,412	0.001*
			28.6%	34.1%	62.7%	
		Yes	11,012	9,489	20,501	
			20.1%	17.3%	37.3%	
		Total	26,712	28,201	54,913	

Note: *significant at 99% level of confidence

Status of contraceptive usage and residential area without media access

Table 5 shows that there were 12.9% urban women without media access were not using contraceptives and there were 57.8% rural women without media access were not using contraceptives while 6.7% urban and 22.5% rural women were using contraceptives but don't have media access.

Status of contraceptive usage and residential area with media access

Determinants of Contraceptive Use in Punjab: A Family Planning Study
Sarwar U., et al. (2024). 4(2): DOI: https://doi.org/10.61919/jhrr.v4i2.692

Journal of Health
and Rehabilitation
Research 2791-156X
JHRR

There were 28.6% urban women with media access were not using contraceptives and there were 34.1% rural women with media access were not using contraceptives while 20.1% urban and 17.3% rural women were using contraceptives having media access. Table 5 also shows that p-value is significant at 99% level of significance, on basis of results; we conclude that contraceptive usage is significantly associated with residential area in absence or presence of media. Access to media to family planning and spousal relation are preventive aspects that inspired the women to adopt contraception, including recent contraception methods, to stop unneeded pregnancy (23).

Statistical Analysis Results

Independent samples t-Test

The independent t-test compares the means between two isolated groups on the similar continuous, dependent variable. The normal reproductive age of women is 15-49 years. It is evident from table 6 that out of 78,563 women, 51,142 were not using contraceptive with mean age of 32.10 years and 27,421 were using contraceptive having mean age of 35.10 years. As Imran et al. (24) performed a study to find the different trends of contraceptive methods of ever married women at varying reproductive age groups. They also highlighted the demographic and socioeconomic characteristics that highly influencing in the selection of contraception. The data sets of three consecutive Pakistan demographic health surveys (PDHS) viz. 1990-91, 2006-07 and 2012-13 have been used for descriptive and multinomial logistic regression analysis and find a key relationship among between the age and contraception use. A study conducted at Peshawar (Pakistan) found that about 70.4 % of married women using contraceptive methods were of age 25-40 years (22).

Table 6. Age of women and contraceptive usage

	Usage of Contraceptive	N	Mean	%
Age of woman	No	51,142	32.10	65.097
	Yes	27,421	35.10	34.903

Table 7. Group Statistics of contraceptive usage for children ever born

	Usage of Contraceptive	N	Mean	%
Children ever born	No	51,142	3.09	65.097
	Yes	27,421	4.52	34.903

Table 7 shows that out of 78,563 women, 51,142 were not using contraceptive with mean of 3.09 children and 27,421 were using contraceptive having mean of 4.52 children.

Binary logistic regression

To use binary logistic regression, the response variable should only have two outcomes i.e. 1 or 0. Here response variable is usage of contraceptives where media access, ever given birth, ever had child who later died, currently pregnant and residential area are predictors. The overall share is the percentage of time predicted categories from the model is correct. It shows how goodness of the model as larger values gives good results. In table 8 the overall percentage is 65.1, which is quite larger.

Table 8. Classification table

	Observed	Predicted		
		Usage of Contraceptive		Percentage Correct
		No	Yes	
Step 0	No	51,142	0	100.0
	Yes	27,421	0	.0
	Overall Percentage			65.1

Table 9 shows that Omnibus test of model coefficients means that the model with these explanatory variables performs better predicting the outcome or not. The model's p-value is statistically significant at 99% level of confidence. So the variables included in the model are having a strong influence on the contraceptive usage.

Estimation terminated at iteration number 12 because parameter estimates changed by less than .001. Table 10 shows that R square value is 0.257, it can be said that 0.257 of variance in the data set is explained by the model which is approximately 26%. Model is fairly describing the fair amount of variation in the data.

Table 9. Omnibus tests of model coefficients

		Chi-square	D F	Sig.
Step 1	Step	16202.059	5	0.0001*
	Block	16202.059	5	0.0001*
	Model	16202.059	5	0.0001*

Note: *significant at 99% level of confidence

Table 10. Model summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	85433.162	.186	.257

Table 11. Computation of Equation 1

		B	SE	D F	Sig.	Exp (B)
Step 1	Media Access	0.274	0.019	1	.000*	1.315
	Ever given birth	4.860	0.153	1	.000*	129.072
	Ever had child who later died	-.046	0.018	1	.013**	0.955
	Pregnancy Status	-8.527	1.000	1	.000	0.000
	Residential Area	-.312	0.017	1	.000	0.732
	Constant	-4.796	0.156	1	.000	0.008

Note: *significant at 99% and ** significant at 95 level of confidence

Putting the values of coefficients in equation 2 from table 11, we get:

$$Z = -4.796 + 0.274\,X_1 + 4.860\,X_2 - 0.046\,X_3 - 8.527\,X_4 - 0.312\,X_5$$

In table 11 the values given in the column named 'B', they are for the logistic regression equation for predicting the dependent variable from the independent variable. They are in log-odds units. If the coefficient is significantly different it can be assumed that the predictor is making a significant contribution to the prediction of the outcome. Exp (B) is an indicator of change in odd resulting unit change in the predictor. They are the odd ratios for the predictor.

Media access: The value of Media intended to increase about 0.274 units. Explaining in terms of odd ratios exponential of 0.274 will be 1.315. P-value (<0.0001) shows that there is a significant relationship between contraceptive usage and media. The table value show that 1 unit change in the media access leads to 0.274 changes in contraceptives usage. Value of B showed positive relationship between media access and contraceptives usage.

Ever given birth: The value of ever given birth is intends to increase to 4.860 units. Explaining in terms of odd ratios exponential of 4.860 will be 129.072. P-value (0.0001) is highly significant and shows that there is a relationship between ever given birth and contraceptives usage, as it is statistically significant. Value of B showed positive relationship between ever given birth and contraceptives usage.

Ever had child who later died: The value of ever had child who later died intended to decrease to -0.046 units. Explaining in terms of odd ratios exponential of -0.046 will be 0.955. P-value (0.013) shows that there is negative relationship between ever had child who later died and contraceptives usage, as it is statistically significant. Value of B showed negative relationship between ever had child who later died and contraceptives usage.

Currently pregnant: The value of currently pregnant intended to decrease to -8.527 units. Explaining in terms of odd ratios exponential of -8.527 will be 0.000. P-value (0.0001) is highly significant and shows that there is relationship between currently pregnant and contraceptives usage, as it is statistically significant. Value of B showed negative relationship between currently pregnant and contraceptives usage.

Area: The value of area intended to increase to -0.312 units. Explaining in terms of odd ratios exponential of -0.312 will be 0.732. P-value (0.0001) is also highly significant and shows that there is relationship between area and contraceptives usage, as it is statistically significant. Value of B showed negative relationship between currently pregnant and contraceptives usage.

Table 12. Goodness-of-Fit test

	Value	D F	Sig.
Likelihood Ratio	0.651	1	0.420
Pearson Chi-Square	0.650	1	0.420

Table 12 shows that given model adequately fit the data as p-value is not significant (p <0.001).

Table 13. Parameter estimates

Parameter	Estimate	S E	Z	Sig.
[main = 0]	.676	.012	56.682	.000*
[main = 1]	0	.	.	.
[main = 0] * [Media = 0]	.273	.017	15.633	.000*
[main = 0] * [HH6 = 1]	-.318	.016	-20.152	.000*

Note: *significant at 99% level of confidence

Table 13 summarizes the effect of predictors like media and residential area. Significance level of the Z statistic for all variables was small (less than 0.05) so it can be considered that all the parameters are different from 0. Contraceptive usage and media access significantly increase the likelihood of response category because these have positive coefficients (0.676 and 0.273) and also have p-value < 0.001, while residential area significantly decrease the likelihood of response category because it have negative coefficients (-0.318) and also have p-value < 0.005.

CONCLUSION

Contraceptive usage is essential for the effective and targeted family planning (FP) particularly in rapidly populating countries like Pakistan. The findings of the study shows that level of education, residential area, residential status, wealth index quintiles and media access is significantly associated with the usage of contraceptives in all the division of Punjab. But level of education is not significantly associated with contraceptive usage in Multan, Sahiwal and Sargodha which indicates that there is lack of awareness about contraceptive usage in Multan, Sahiwal and Sargodha. Similarly, residential area is not significantly associated with contraceptive usage in Multan. Status of residence, wealth index quintiles and desire of another child is significantly associated with contraceptive usage in rural and urban area. By using independent sample t-test, we come to know that age difference of women and number of children ever born has significant effect on contraceptives usage. The results from the binary logistic regression model showed that media access, ever given birth, ever had child who later died, currently pregnant and residential area are the statistically significant factors that are affecting the contraceptive usage in various areas of Punjab. The results from the log-linear model revealed that media access and residential area significantly affect the contraceptive usage.

REFERENCES

1. Sedekia Y, Jones C, Nathan R, Schellenberg J, Marchant T. Using contraceptives to delay first birth: A qualitative study of individual, community and health provider perceptions in southern Tanzania. BMC Public Health 2017;17(1):768.

2. Jain R, Muralidhar S. Contraceptive methods: needs, options and utilization. J Obstet Gynaecol India 2011;61(6):626-634.

3. WHO. Married or in-union women of reproductive age who have their need for family planning satisfied with modern methods. 2022. Available from: https://www.who.int/data/gho/indicator-metadata-registry/imr-details/4668 (Accessed on: November 24, 2022).

4. UNICEF. The State of the World's Children 2006: Excluded and invisible. 2006. Available from: http://www.unicef.org/sowc06/profiles/marriage.php (Accessed on: May 24, 2021).

5. Shafiq S, Nosheen N. People's perceptions about family planning and contraceptive methods in Gujrat, Pakistan. Rawal Med J. 2020;45(1):179-183.

6. Darroch JE, Singh S. Trends in contraceptive need and use in developing countries in 2003, 2008, and 2012: An analysis of national surveys. The Lancet 2013;381(9879):1756-1762.

7. Khan MH, Shah H, Saba N. Study of contraceptive user women in DI Khan, Pakistan. Biomedica 2007;23:24-26.

8. PBS. Annual Contraceptive Performance Report (2018-19). 2019. Pakistan Bureau of Statistics (PBS), Government of Pakistan, Islamabad, Pakistan.

9. Ali S, Rozi S, Mahmood MA. Prevalence and factors associated with practice of modern contraceptive methods among currently married women in District Naushahro Feroze. J Pak Med Assoc. 2004;54(9):461-465.

10. PDHS. Pakistan Demographic and Health Survey (PDHS). 2017. National Institute of Population Studies (NIPS) and ICF International, Calverton, Maryland, USA.

11.   Saleem A. Modeling the Behaviour of Pakistani Married Women towards Contraceptive Use. 2013. Ph.D. Thesis, Department of Statistics, Bahauddin Zakariya University Multan, Pakistan.

12.   Fikree FF, Khan A, Kadir MM, Sajan F, Rahbar MH. What influences contraceptive use among young women in urban squatter settlements of Karachi, Pakistan? Int Family Planning Per. 2001;130-136.

13.   Nishtar NA, Sami N, Alim S, Pradhan N. Determinants of contraceptives use amongst youth: An exploratory study with family planning service providers in Karachi Pakistan. Global J Health Sci. 2013;5(3):1-8.

14.   PES. Pakistan Economic Survey 2021-22. 2021. Government of Pakistan, Islamabad, Pakistan.

15.   Pearson K. Chi-square test. 1900. Available from: https://en.wikipedia.org/wiki/Chi-squared_test (Accessed on: May 21, 2023).

16.   Nonvignon J, Novignon J. Trend and determinants of contraceptive use among women of reproductive age in Ghana. Etude de la Pop Afri. 2014;28(2):956.

17.   Gosset WS. T-test. 1908. Available from: https://en.wikipedia.org/wiki/Student%27s_t-test (Accessed on: May 21, 2023).

18.   Douthwaite M, Ward P. Increasing contraceptive use in rural Pakistan: An evaluation of the Lady Health Worker Programme. Health Policy and Planning 2005;20(2):117-123 (2005).

19.   Knoke D, Burke PJ. Log-Linear Models. Sage Publications, Inc. Newberry Park, California, USA; 1980.

20.   Chaurasia AR. Contraceptive use in India: a data mining approach. Int J Pop Res. 2014: 11.

21.   Badar S, Gull S, Saeed MA, Hussain W. Female Educational Empowerment and Fertility Behaviour. J Rawalpindi Med Col. 2013;17(2):291-293.

22.   Ayub A, Kibria Z, Khan F. Assessment of Knowledge, Attitude and Contraceptive use in Married Women of Peshawar. J Dow Uni Health Sci. 2015;9(1):89-93.

23.   Nguyen TT, Neal S. Contraceptive prevalence and factors influencing utilization among women in Pakistan: a focus on gender-based violence. Fulbright Rev Eco Pol. 2021;1(1):119-134.

24.   Imran M, Nasir JA, Zaidi SAA. Demographic socio-economic characteristics of women and contraceptive use in Pakistan. J Uni Med Dent College 2015;6(2):47-54.