FAMILY PLANNING AND FERTILITY REDUCTION IN PAKISTAN

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Abstract: The rising population is one of the major problems of developing countries like Pakistan. The higher fertility rate is considered a major factor for a growing population. This study tries to investigate the impact of family planning on the fertility rate employing OLS regression using micro-level data of Pakistan. We find a statistically significant inverted u-shape relationship between fertility rate and family planning. The education of women and living in urban areas affect fertility favorably.We also find an inverted u-shape relationship between the age of women and the fertility rate. The policy implication is that the govt. should chalk out such policies which encourage the use of family planning methods, and late marriage. Further, Govt. should give more emphasis on women's education especially in rural areas.
Keywords: Fertility, family planning, education,age, Pakistan.

I.   INTRODUCTION

Today, the world is facing problems of the high unemployment rate, deep poverty in many developing countries, resource scarcity, high population growth rate; environmental degradation, and climate change inter alia (Salvatore, 2013). Over 201 million (M) people are unemployed globally- with an increase of about 3.4M annually. The world unemployment rate has risen to 5.8 percent. Although, some progress has been made in recent years, yet almost every third person in emerging and developing economies is living in poverty. Over 2.1 billion workers worldwide are in vulnerable employment(ILO, 2017). This situation poses some threats to the workers, as they probably have less secure jobs with permanent income and access to improved social conditions. Hence, even today's world lacks decent job opportunities.

Asia is the most populous continent of the world with a population consisting of almost sixty percent of the global population (World meters, 2018) and is dependent only about thirty percent of arable land of the world (World Stat, 2018). It is home to the world's two highly populous countries, Viz., China and India. Up till 1979, Chinese growth was hindered by its huge and uncontrolled population since its inception in 1949. The Chinese government initially supported and encouraged large family sizes by giving incentives and prohibiting birth control. This was due to this support and encouragement that china saw an annual population increase of 26.69M between 1962 and 1972. As the population remained to uncheck, every effort of development went unanswered. The Chinese economy was marked by low exports, low per capita income, high unemployment, and high fertility rate inter aliahitherto (Wang, 2012).

India, being the second-most populous country on the planet, does not differ much from its neighbor China. Despite different measures taken by the government, including huge allocations of funds, the population could not be controlled following expectations. The result was that the population increased to 975.8M in 1978 from 350M in 1947. Consequently, poor families, lesser educational attainment, high unemployment rate, low contraceptive prevalence rate, and a high number of children were prevalent (Sen, 2001).

Pakistan's situation is not much different from its South Asian neighbors. With a population of 207.77M, it has become the sixth most populous country in the world and third within the South Asian region (PES, 2017-18).21.04 percent of our population is living below the poverty line of $1.90 per day and 60.19 percent of the

population is living below the poverty line of $2 per day. When we come to food security, the situation does not seem satisfactory because 58.1 percent of households are food insecure (SDGs, 2016).

This increasing population needs to be controlled. For this, it is important to reduce the fertility rate. One possible way out is Family planning. It is a way to come about intended pregnancies, and births by choice not by chance (UNFPA, 2018). Family planning (FP) operates through the reduction in fertility by averting unintended births and regulating the birth intervals. In America, FP has brought a two percent more decline in fertility rates as compared to those households who are not using FP services (Bailey, 2011). China's "One Child" policy adopted in 1979 brought a phenomenal decline in fertility over thirty-five years and an estimated 40M births have been averted. Per woman fertility decreased about ten percent between 1979 and 2015 (Huang, 2016). In the Indian case,the FP program has also shown some positive results. During 2010-11 about thirty-six percent of potential births have been averted through FP strategies (Chaurasia& Singh, 2104). Bangladesh's FP program has brought a spectacular decline in fertility rate (2.3 Births per woman) and an eminent increase in contraceptive prevalence rate (61 percent) since 1970 (Afroza, 2013).

As far as Pakistan is concerned, though Govt. of Pakistan has estimated the fertility rates, yet there is little evidence about estimating the factors responsible for high fertility rates. There might be possible that the major portion of women are having knowledge about family planning methods, but only small portion is using them. So, this study aims at finding the role of family planning along with other variables in Pakistan.

The organization of the rest of the paper is given as follows: the second section deals with data and methodology employed. The third section discusses and explains the results, whereas the final section concludes the paper.

II.   LITERATURE REVIEW

Since the start of family planning policies in the early 1950s in Pakistan, there is much empirical evidence available on the fact that fertility decline has not been achieved as expected. Despite the reasonable allocation of funds and employment of manpower, the fertility rate dropped slightly to 4.8 children per woman in 2000 from 6.8 children per woman in 1980 (Punjab Population Department). Demographic statistics of a country havea vital role in its development and policymaking (PES, 2016-17). On one hand, a vastly populated country may face pressure on resources, and a sparsely populated country may become home to poverty, deficiency of human capital, and low infrastructure inter alia, on the other.

In this scenario, population programs become necessary to affect demographic patterns and trends in a country. It may Consist of legislating, regulating, and the programmatic mechanism that might changes the size, composition, and growth of the population. A Population policy is mainly associated with addressing mortality, fertility rate, and migration among other things. Decreasing mortality and fertility had been a justification for policy intervention fora long (Tsui, 2001).

Since 1994, after the International conference on population and development (ICPD) in Cairo, most countries have increased their funding in respect of population policies focusing on fertility and mortality reduction and improving primary education and infrastructure. The debate over the role of family planning in fertility reduction has got the attention of international researchers. A study by (Molyneaux & Gertler, 2000) for example, revealed that contraceptive subsidy in Indonesia causes lower fertility ranging from three to six percent while spreading the distribution network by one standard deviation causes to bring fertility down by approximately twelve percent.

In many countries timing of fertility, reduction coincides with an increase in FP services. It seems that family planning has positive effects on fertility decline. For instance (Angeles, Guilkey & Mroz, 2005) investigated, by random effects maximum likelihood method that in Peru, pharmacies and dispensaries established within five kilometers of randomly selected rural areas have substantial positive effects (decreases) on fertility. Both these outlets remained the main channels for a hike in contraception usage. Besides, simulation techniques revealed that women having ten years of education got married 3.08 years later than a woman having no education. In the same way, a woman having five to six years of education has 1.24 less conception than an uneducated woman. In Ethiopia, the fertility rate plunged to 3.9 children per woman in 2000 from 5.7 in 1990. Sibanda, Woubalem, Hogan, and Lindstrom (2003) attributed this decline to an increase in contraception rate, late marriages, and low employment opportunities. The unemployment rate, for instance, soared to 20.3 percent in 2000 from 8.8 percent in 1984, and the contraception rate was hiked by almost a hundred percent in the same period playing an important part in fertility decline. In the Middle East, the case of Iran is worth mentioning. In the early years, after the 1979 Islamic revolution, Religious leaders remained a

major hurdle in adopting FP policies. Ministry of health's persistence struggle concluded in success and a first-ever FP policy was launched in 1985. By the end of 2000, Iran's fertility rate was dropped to 2 children per woman from 5.2 in 1985. The success tale did not come to an end here. Infant and mother mortality rates dropped dramatically by fifty and seventy-five percent respectively along with the surge in HDI abreast of developed countries in the same period (Vahidnia, 2007).

Portner *et al.* (2011) investigated the impact of family planning on fertility by using Instrumental variation (IV) and OLS techniques. Results of OLS showed that family planning reduced the fertility level to 0.7 children per woman, while the IV method's results showed a decline of 0.9 children per woman. Family planning programs started under "Title X" reduced childbearing among poor women by 19 to 30 percent in America and averted 1.8 million births between 1959 and 1973 (bailey, 2011).

III. DATA AND METHODOLOGY

Data

This study has used cross-sectional data- Pakistan Social and Living Standard Measurement (PSLM) Survey 2013-14, consisting of 17,989 households all over Pakistan. PSLM Survey was first conducted in 2004-05 by the Pakistan Bureau of Statistics (PBS). It is conducted atthe district and provincial level every alternate year. District level surveys collect data on social indicators while provincial surveys gather information on social indicators along with information on income, consumption, HH size, employment status, sources of income, poverty status and FP.`

Estimation Strategy
Estimation of Fertility

Various relevant studies on FP and fertility used different measures for fertility. Foriet, Koh, and Suh (1980) for instance used total fertility rate estimated through age-specific fertility rates by using different age years with five years gap. Angeles, Guilkey, and Mroz (1998); Gurmu and Mace (2008) used dummy variable as a measure of birth with takes value of one if live birth occurs and 0 otherwise. Miller (2010) used the number of births to a woman as a measure of fertility.The study calculates the fertility rate as given below:

Fertility rate at HH level=$\frac{\text{Number of children in a HH}}{\text{Number of women in a HH}}$

Estimation of Determinants of Fertility

The major objective of this study is to find the role of Family Planning on fertility reduction in Pakistan. Many studies on the relationship between FP and fertility have estimated the fertility equation by using different estimation strategies. Foriet*et al.* (1980) used the OLS technique to find out the relationship between FP, socio-economic characteristics, demographic characteristics, and fertility in South Korea. Tsui (2001) found by OLS regression technique that if FP was not used in 75 selected countries their fertility rate would have been 0.5 children more than in presence of the FP. Sinha (2005) estimated the impact of FP on Child Work, Fertility, and Schooling Consequences in rural Bangladesh by using OLS and the maximum likelihood method of Tobit. Portner (2011) used OLS and two stages model to measure the effect of FP on fertility reduction by using cross-sectional data in Ethiopia. Bailey (2012) estimated by the difference in difference technique the impact of FP on US fertility.

This study has estimated the following fertility model.

$l\text{Fertility} = \beta_0+\beta_1 \text{ FP} +\beta_2(\text{FP})^2_1+\beta_3 \text{ Age} +\beta_4(\text{Age})^2 + \beta_5 \text{ Edu}_0+\beta_6 \text{ Edu}_1+\beta_7 \text{ Edu}_2+\beta_8 \text{ Edu}_3+\beta_9 \text{ Edu}_4$
$\qquad\qquad +\beta_{10}\text{Urban} +u_i$

$l\text{Fertility}$= Log of fertility rate
FP =Total number of women adopting Family Planning (FP)
$(\text{FP})^2$=Square of FP
Age=Age of women in a complete year
$(\text{Age})^2$ = Square of age
Reference category= Woman having education of more than 10 years
Edu_0 = Woman who never attended school
Edu1 = Woman's education is <5 years but greater than 0 years
Edu_2= Woman's education equal to 5 years
Edu_3= 5years<Woman's education< = 8 years
Edu_4=Woman's education equal to 10 years

Urban = Area of residence of women equal to 1 if urban 0 otherwise

u_i= Error term

The dependent variable is fertility rate per HH, which is measured as the total number of children born to ever-married women in a HH having age 15-49 years. FP is the indicator of family planning which is the number of women adopting family planning. $(FP)^2$ is square of FP which indicates that to affect the dependent variable there must be a large increase in the number of women who are adopting family planning. The variable of age represents the age of women in complete years and it is assumed that to affect fertility there must be a large increase in age of the woman. To incorporate this effect, we have taken the square of women's age. The independent variable education is in categorical form. The education of women has six sub-categories. A woman whose schooling is more than 10 years is taken as the reference category. Edu_0 shows a woman who never attended school i.e., her years of school are zero. It takes the value of 1 if the education of a woman is 0 and 0 otherwise. Edu_1 is showing that woman has less than five years of schooling. It takes the value of 1 if the education of a woman is between one and five years and 0 otherwise. Edu_2 indicates woman's education is equal to five years. It takes the value of 1 if the education of a woman is equal to five years and 0 otherwise. Edu_3 shows that the education of women is middle. It takes the value of 1 if the education of a woman is greater than five years and equal to eight years and 0 otherwise. Edu_4 is indicating that woman has education equal to matriculation and it has the value of 1 if education is equal to ten years and 0 otherwise. The region of residence of the women has a visual impact on fertility. To evaluate this factor dummy variable of urban is included as the independent variable which takes the value of 1 if the area of a woman is urban and 0 otherwise.

IV.   RESULTS AND DISCUSSIONS

Since its inception, Pakistan's population growth rate has remained high. A high population growth rate always has some impacts on the structure of the population. On one hand, a high growth rate increases the youth population that can be converted into productive human capital. But on the other hand, the higher growth rate of the population also tends to increase women in reproductive age and enhance the already high growth rate. In this situation, there arises a need to decrease the fertility rate. Both, in Pakistan and internationally, planning of births by using different contraceptive methods has been recognized as a cost-effective technique to manage fertility (Government of KPK, 2015). So, first of all, there is a need to estimate the fertility rate across the country which will helpful for formulating policy regarding population. This study has estimated fertility rates at the national, rural, and urban levels.

Estimation of fertility

Results of fertility rates at the national, rural, and urban levels are given in table 1.

Table 1 *Fertility Rates in Pakistan*

Region	Fertility Rate (Number of Children per Woman)
Pakistan	3.9
Urban	3.6
Rural	4.1

The results reveal that the fertility rate at the national level is 3.9 children per woman. Our estimated rate is equal to the fertility rate (3.9) estimated by the Pakistan Bureau of Statistics for the same year. The results depict that rural women have higher (4.1) fertility rates than urban ones (3.6). Fertility results at the rural and urban levels are also consistent with the results estimated by the Pakistan Bureau of Pakistan.

Estimation of Determinants of Fertility

First of all, we analyze the situation of family planning estimated from the PSLM survey 2013-14.

Status of family planning

This study has used PSLM survey 2013-14 data to estimate different descriptive statistics e.g., Contraceptive knowledge, ever used contraceptive rate, currently used contraceptive rate, contraceptive rate by quintiles.

Contraceptive Knowledge at National and Province level

Results of this study show that contraceptive knowledge in Pakistan is about 98.28 percent. The analysis at the provincial level reveals that knowledge about contraceptives is the highest in Punjab (99.94%) while it is the lowest in Baluchistan (87.99%). These results are consistent with the official results (99%) estimated by the Pakistan Bureau of statistics in the same period. Figure 2.1is showing province-wise contraceptive knowledge across the country. Further, at the regional level results depict that its knowledge is more in urban areas as compared to rural ones see appendix 1.

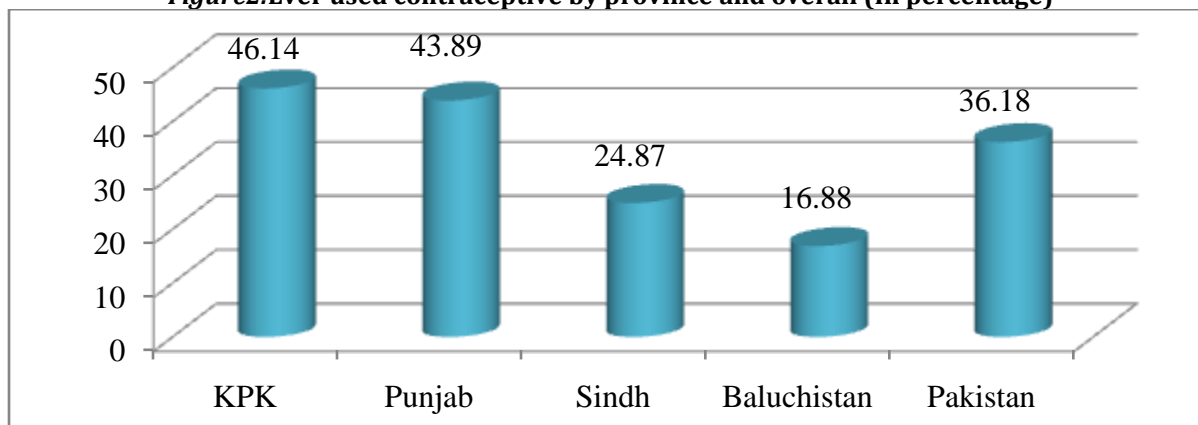*Figure1.* **Contraceptive Knowledge (In percentage) by province and overall**
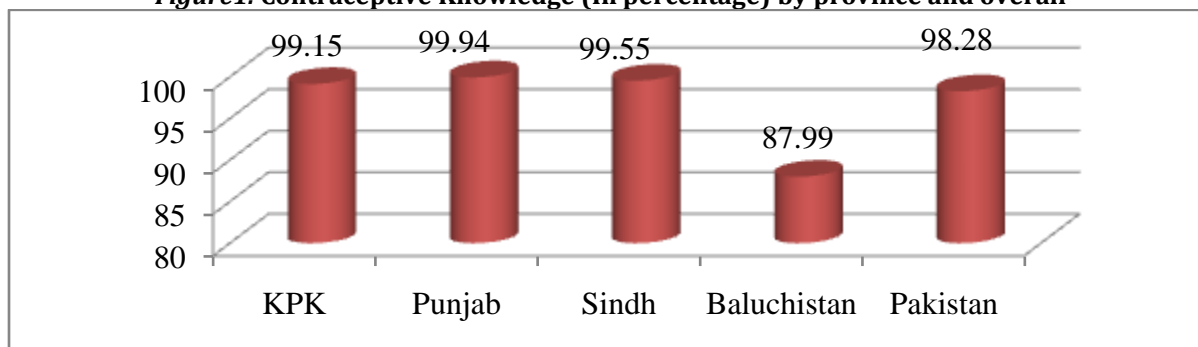
Source: Author's estimations

Ever used contraceptive at the National and provincial level

Ever used contraceptive is about 36 percent in Pakistan. It is highest (46.14%) in KPK and lowest (16.88).Ever used contraceptive rates across the provinces are given in figure 2. At the regional level, it is more prevalent in urban areas as compared to rural ones see appendix 2.

*Figure2.***Ever used contraceptive by province and overall (In percentage)**
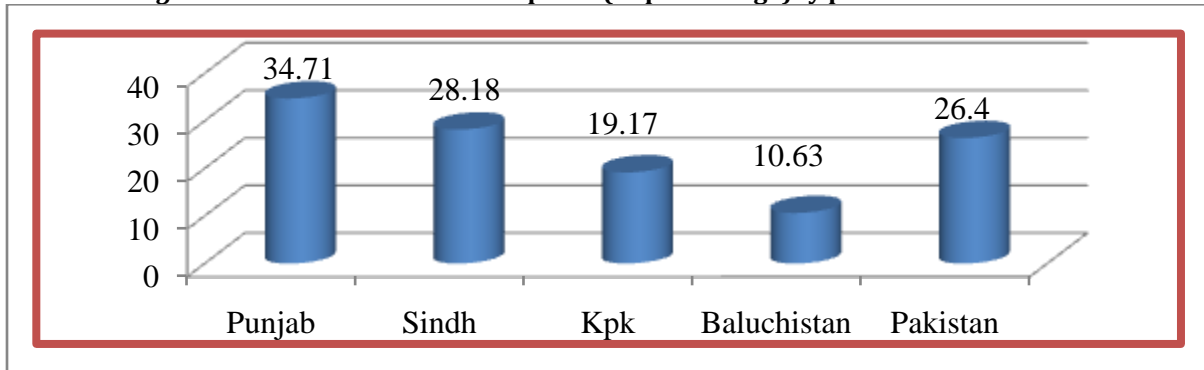

Source: Author's estimations

Current use of contraceptives at the National and province level

The use of contraceptiveswas only 26.40 percent in Pakistan. Contraceptive use was highest (34.71%) in the Punjab and lowest (10.63%) in Baluchistan. Figure 3 is showing contraceptive rates in the whole country by province and across the country. The results at the regional level reveal that its current use is also more in urban areas as compared to rural areas see appendix-3.

Figure3. Current use of contraceptives(In percentage)by province and overall
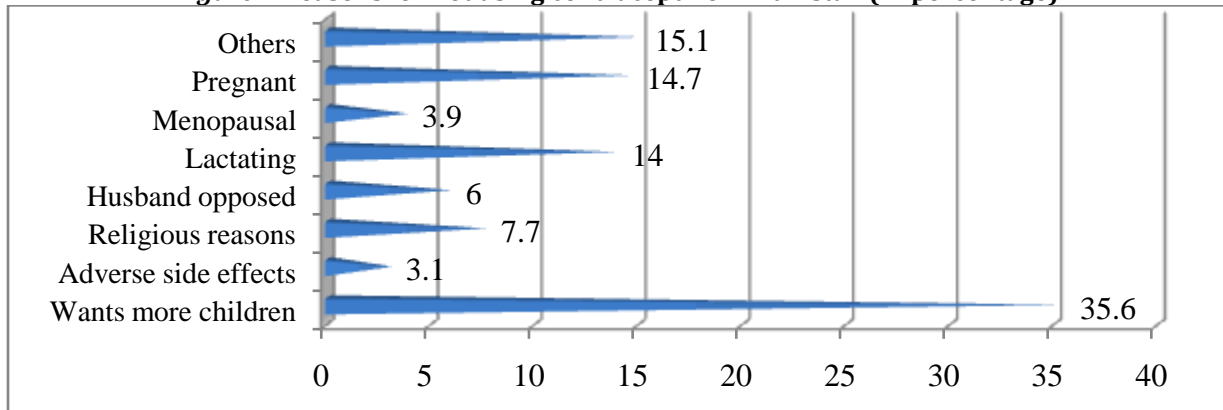

Source: Author's estimations

Reasons for not using contraceptive

It is evident by this study that contraceptive knowledge across the country is very high (98.28%) but the current (26.40%) and ever (36.18%) use of contraceptives is very low. There are various reasons for such a low level of the current use of contraceptives. These reasons are depicted in the graph. It can be seen that want for more children, religion, adverse side effects, and lactating are some of the reasons for not using contraceptives.

Figure4. Reasons for not using contraceptive in Pakistan (In percentage)
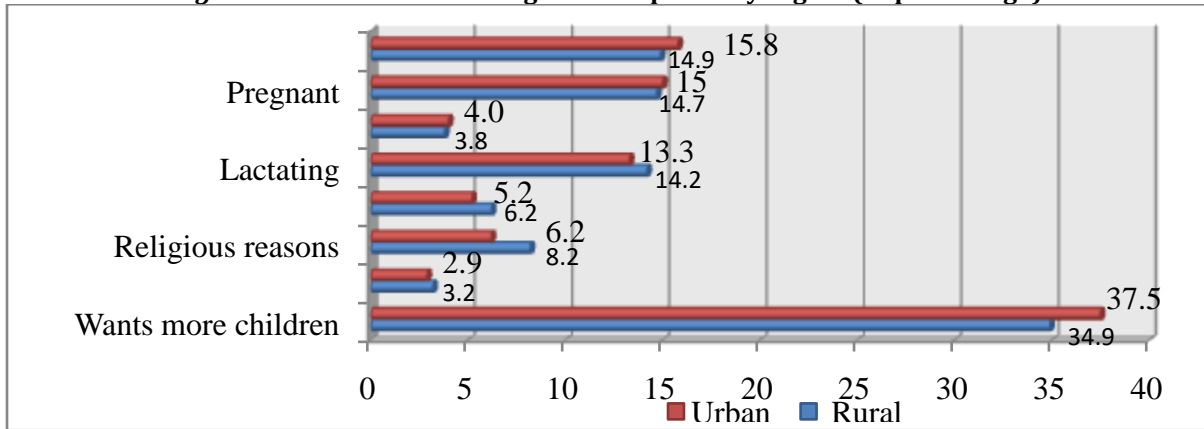

Source: Author's estimations

Reasons for not using contraceptives by region

It has been found that the magnitude of reasons that HHs do not use contraceptives differs in urban and rural areas. In rural areas, 34.90 percent of households are not currently using contraceptives because they want more children while in urban regions 37.50 percent of people describe the same reason. Want for more children in urban regions is more as the fertility rate in urban areas is already low as compared to rural regions. Reasons for not using contraceptives by region are presented in figure 5.

*Figure5.*Reasons for not using contraceptives by region (In percentage)

Source: Author's estimations

Sources of contraceptives

There are about ten types of sources all over the country from where households are obtaining FP services. These sources are friends/relatives, governmental FP centers, NGOs, private hospitals, BHU/RHC, Lady Health workers, Dai, private stores, and others. The major source of contraceptives is friends/relatives (26.1%) followed by private (18.6%) and public (18.2%) hospitals. The role of RHC/BHU (1.5%) and NGOs (1.4%) is negligible in the provision of FP services.

Figure6. Sources of Contraceptives (in percentage)
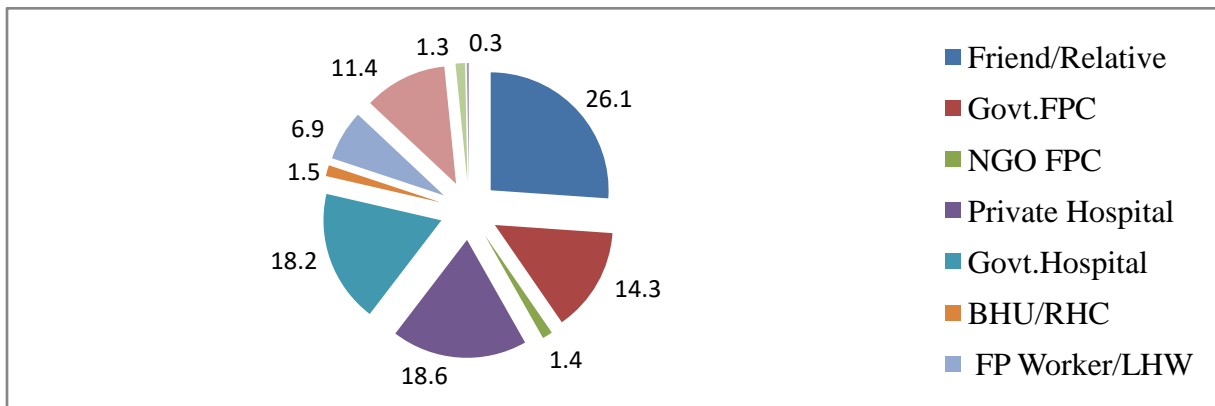
Source: Author's estimations

Sources of contraceptive by region

The provision of contraceptives in rural and urban areas by the source is different across the country. Estimates of this study have shown that 33.1 percentof households in urban areas and 20.4 percent HHs in rural areas are obtaining FP services from relatives/friends. In rural areas second (20.6) major source of contraceptives is governmental hospitals. While in urban areas second (17.8) major source is private hospitals. Main sources in urban and rural areas are depicted in figure 2.9.

*Figure7.* **Sources of contraceptive by region (In percentage)**
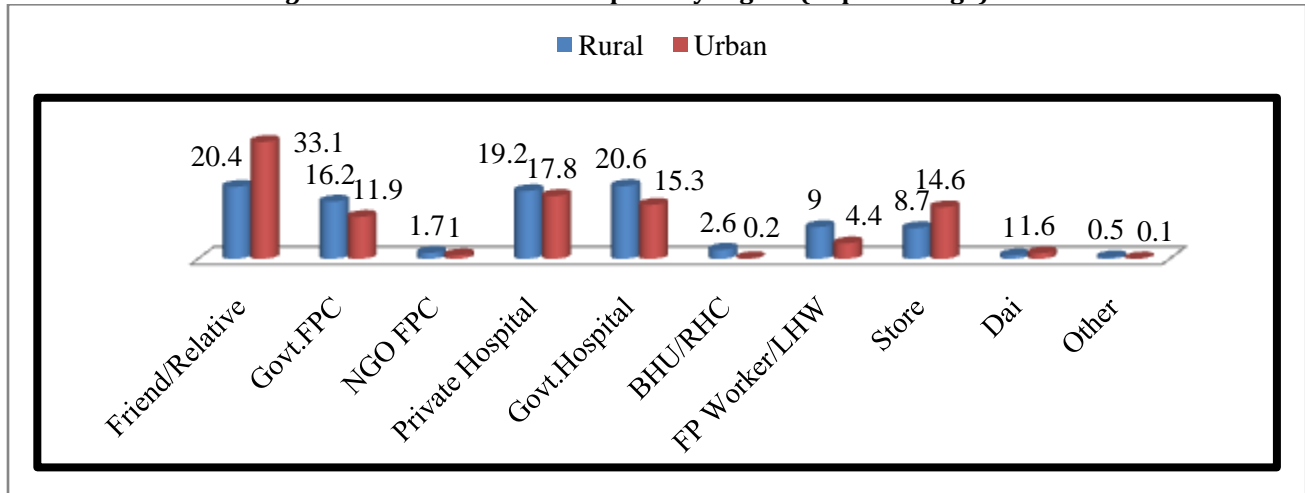
Source: Author's estimations

Contraceptive usage by Quintile
The apparent relationship between contraceptive usage and quintiles is negative. The use of contraceptives decreases as the poverty of HHs increases. In other words, contraceptive usage in the poorest quintile across the country is the lowest among all quintiles. The figure below is depicting the contraceptive usage by quintiles in the whole of Pakistan. Contraceptive usage in the poorest quintile was about 21.30 percent while it was 32.61 percent in the richest quintile during 2013-14.

Figure7. **Contraceptive usage by Quintile (in percentage)**
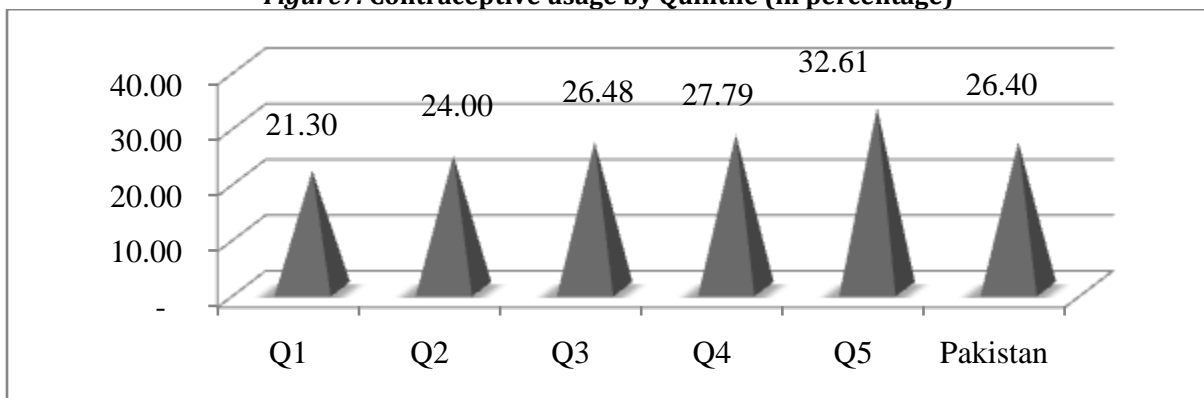
*Source:*Author's estimations

Determinants of Fertility
To find the factors affecting fertility, the fertility model has been estimated by using OLS regression whose results are presented in Table 2. The results reveal that Family planning is an important variable to affect the fertility rate of women.The coefficient of the number of women adopting FP is positive, representing that as the number of women adopting FP increases, the fertility rate of women increases. But, the square of indicator of the FP is negative. The coefficient of the square of FP is -0.127. It indicates that as the number of women adopting FP increases by one unit, the overall fertility rate of women decreases by 12 percent. Variable of FP is highly significant at one percent level of significance. The estimates obtained by this study are comparable with other empirical studies. Sinha (2005) estimated that family planning (FP) in Bangladesh reduced the fertility rate by fourteen percent. This study proved that in Ethiopia FP has a significant effect on fertility and reduced it to 3.9 children per woman in 2000 from 5.7 in 1990.
The results also show that the age of a woman plays a vital role in determining her fertility. Fertility increases at an increasing rate up to the age of thirty-four years and after that, it increases at decreasing rate and finally it tends to decline after the age of forty-four years (PSLM, 2013-14). Due to this reason, the sign of age's

coefficient is positive, but the square of the age of the woman is negative. It shows that adult woman has more chances of conception relative to the older one. The coefficient of age square -0.001 means that as the age of a woman increases by one year, the fertility of a woman decreases by one percent. Coefficients of age (0.07) and the square of age (-0.001) are significant at a one percent level of significance. These results are consistent with those of Sibanda (2005).

The fertility of a woman is also affected by her educational level, age, area of residence, and FP. As expected, the signs of coefficients of different levels of education are positive. If we talk about each level of education, we come to know that, a woman with no schooling has more children than a woman who has less than five years of schooling. In the same way, a woman having less than five years of schooling has more children than her counterpart who has primary education. Furthermore, a woman who has done matriculation has a lower number of children than a woman having middle education. It shows that fertility decreases as the education level of women increases (Jain & Ross, 2012). The t-statisticsfor each level of coefficients of education are highly significant at a one percent level of significance. We can easily reject the null hypothesis that there is no difference in fertility between a woman with no years of schooling and a woman with higher education. So, we accept the alternative hypothesis H_1 i.e., women of both categories have different fertility.

Other characteristics of women also play a significant role in determining their fertility. One such characteristic is the area of residence of the women. Urban women have low fertility as compared to women residing in rural areas (PSLM, 2013-14). This can be attributed to several factors namely, the higher education level of urban women, late marriages, availability of modern contraceptives (Daniels, Martinez & Nugent, 2018). Our coefficient of the urban dummy variable is also negative, showing that urban women have a lower fertility rate than rural ones. Women inhabiting urban areas have about seven percent fewer children than the women of rural areas. The coefficient of urban is also statistically significant at a one percent level of significance.

Table2: Determinants of Fertility in Pakistan

Variables	Coefficients	t-value	p-value
Constant	-0.819	-23.54	.000
edu0	0.397	23.51	.000
edu1	0.307	10.16	.000
edu2	0.262	12.76	.000
edu3	0.163	6.56	.000
edu4	0.122	5.57	.000
Total No. of women adopting FP	0.188	19.93	.000
Fplaningsq	-0.127	-5.14	.000
Urban	-0.070	-7.14	.000
Age in complete year	0.070	48.12	.000
Agesq	-0.001	-44.69	.000

Source: Authors' calculations

V.   CONCLUSION AND POLICY RECOMMENDATIONS

Pakistan is facing a problem of an increasing population just like the other developing countries. Its population has increased up to 207.77 million having an average annual growth rate of 2.4. Among other reasons,the high fertility rate is the major cause. Therefore, it is necessary to find the factors responsible for it. So, the present study identifies the factors to affect fertility by employing the multiple OLS regression technique using the Pakistan Social and Living Standard Measurement (PSLM) survey data for the years 2013-14 in Pakistan. The results reveal that there is a 3.90 % fertility rate in Pakistan. Rural areas are facing a

higher fertility rate (4.1) as compared to the urban ones (3.5). The results of OLS regression depict that the family planning, education of women, and living in urban areas are the major factors to affect fertility in Pakistan. At a policy level, it is suggested that govt. should emphasize more on promoting family planning and give special attentiontoeducating the women especially in rural areas. Awareness about late marriage should be promoted.

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