



# Positive Consequences of Declining Fertility: Socioeconomic Analysis of Punjab, Pakistan

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## Abstract

**Objectives:** The present paper attempted to discover the behaviour of fertility differentials across the districts of Punjab, Pakistan. More precisely, it aimed to investigate some salient determinants of fertility differential through fitted regression line and scatter plot including the confidence interval.

**Materials and Methods:** Data in this study were gathered from Multiple Indicator Cluster Survey 2013-2014. The regression analysis was employed to evaluate the relationship of fertility determinants, followed by plotting two-way scatter plots and confidence intervals. For the empirical analysis, the total fertility rate (TFR) was taken as an outcome variable while the employment rate, under-five mortality, and contraceptive use were considered as determinants.

**Results:** The results indicated that child mortality is a very significant variable in determining the level of fertility and it had the coefficient value of 0.0096. It was further found that child mortality has a positive relationship with fertility rates. Thus, child mortality must be reduced to overcome the issue of high fertility rates at the district level of Punjab. Contraceptive use was also a very effective variable regarding determining the level of fertility and had a negative coefficient value of -0.033. Finally, the employment rate was a very useful variable for the determination of fertility level.

**Conclusions:** The empirical results revealed that child mortality should be reduced in order to decrease the level of fertility in Punjab, Pakistan, and contraceptive use should develop through family planning programs.

**Keywords:** Fertility, Employment Rate, Under-five Mortality, Punjab

## Introduction

Numerous studies are organized for exploring the causes of fertility differentials. The subject is as old as the history of mankind. Different researchers have explored psychological, sociological, ethnic, geographical, and economic factors. The innumerable theories of the population exist in literature emphasizing the central theme of differential fertility.

The global apprehension about population growth is at the top of the universal agenda. In addition, population increase through high fertility is creating severe warning to the peace and prosperity of humanity. The increase in the world population was documented 142% during the last century. It increased from 2.52 billion in 1950 to 6.07 billion in 2000 and 6.47 billion in 2005 and reached 7.6 billion in October 2017. (1) The contribution of developed and developing worlds to the increase of the global population was recorded at 0.36 billion (43%) and 3.20 billion (190%) during the last century, respectively. Currently, the global population is increasing by 83 million people per year and requires a global action to retard and lower this pace of growth. The developed countries have achieved significant improvements on the demographic forefronts through well-organized planning in the socioeconomic dimensions and with political

commitment but the developing world is yet at the initial stages of demographic transition. The vicious cycle of high population growth is continuously accelerating poverty and is mainly responsible for the progressive degradation of natural resources. Fifty-three percent of the world population spends below US\$2 per day. According to the report of Food and Agriculture Organization, more than 842 million people are chronically hungry and 795 million are undernourished (2).

The most populated countries of the world are India, USA, Indonesia, Brazil, China, Russia, Pakistan, Bangladesh, Nigeria, and Japan. Japan is a 10<sup>th</sup> populated country but ranks top in terms of life expectancy. On the other hand, India is the second most populous country, but it occupies 9<sup>th</sup> position with regard to life expectancy, followed by Pakistan. It means higher population growth adversely affects both life and resources.

South Asia comprises countries like Nepal, Sri Lanka, Bhutan, Pakistan, Bangladesh, India, and the Maldives. This sub-region comprised of 37% of the Asian and 22.5% of the global population. (1) A conservative estimate revealed that 40 million women in the South Asian Association for Regional Cooperation (SAARC) countries, including seven million from Pakistan, intended to postpone birth to two or more than two years



or wanted to terminate childbearing while not using contraception. The fastest decline in fertility was found in East Asia whereas a gradual pattern was witnessed in South Asia (3). The dismal states of affairs speak of the worsening situation and underline the urgent need for redressing demographic issues.

#### Situation of Total Fertility in Pakistan

Since the inception of the family planning program in Pakistan in the 1950s, many governments have attempted to check population growth through the increased allocation of resources to family planning activities, the involvement of the non-government sector, and the adoption of multi-dimensional approaches. Furthermore, democratic governments extended the program to outreach areas by involving field workers for doorstep access to family planning services. Moreover, extensive mass media campaigns were launched to create awareness and motivation for contraceptive use. Efforts were also made to integrate health and family planning services. Despite all these efforts and extensive investment, the population continues to grow at a faster pace. According to the National Institute of Population Studies, huge public spending, as well as public and private partnerships were hardly able to bring down the total fertility rate to 4.8 births per woman in 2010.

The population increased from 32.5 million in 1947 to 143.17 million in 2002, 148.72 million in 2004 and 152.53 million in 2005, making Pakistan the 7th populous country in the world (4). In absolute terms, 120 million people were added to the population for 58 years. Pakistan experienced 6-7 births per woman in the early 1990s. Based on the reports of the United Nations International Children's Emergency Fund, this predicts future demographic momentum for population increase. Every passing minute adds eight new babies to the population and 70 children breathe their last every hour in Pakistan (5).

High fertility rate is the main determinant behind the differences among the population growth rates in Pakistan and some South Asian countries. The total fertility rate (TFR) was 2.3, 2.6, 1.5, 2.4, 2.6, 2.1, and 2.3% for Bangladesh, Bhutan, China, India, Nepal, Sri Lanka, and the Maldives, respectively. According to the latest issue of Pakistan Economic Survey, the TFR of Pakistan was 3.2%. Moreover, the paper examined the strong differentials in fertility levels of rural and urban residence. The TFR of the rural residents was 4.2% while it was 3.2% in the case of urban residents (6). Across different districts of Punjab (Pakistan), determinants are important for study because population growth in Punjab is high compared to the other provinces. Additionally, there are innumerable factors like socioeconomic and demographic determinants that are thought to be accountable for the differentials in the fertility of the regions. Accordingly, the present study sought to identify some socio-economic and demographic

determinants that cause infertility differentials. Under-five mortality, employment rate, and contraceptive use are well-thought-out as important determining factors of fertility differentials through the districts of Punjab.

Forty-six percent of the female population is in reproductive age and the under-twenty population comprises more than half of the total population. Similarly, significant proportions of girls in the Punjab province are married in their teens and start childbearing at that age as well. In addition, 40% of children are born within 24 months of the birth of an older sibling. Further, a large proportion of pregnancies is unintended and unplanned. This puts women's health at greater risk through early childbearing.

The country comprises of five provinces including Punjab, Sindh, KPK, Gilgit Baltistan, and Baluchistan. Punjab is the utmost populated region of Pakistan and accounts for almost 56% of the population, followed by Sindh. The KPK is the third with regard to population and Baluchistan comes in last.

The TFR of the districts of Punjab is displayed in Figure 1. As shown, Jhelum and Rajanpur are the districts with the lowest (2.3) and highest (6.2) fertility rates. In addition, the fertility level of Lahore, as the capital of Punjab province, is 3.1 according to MICS 2013-2014.

Figure 2 illustrates the comparison of the variations in the recent Multiple Indicator Cluster Survey 2014 with MICS 2011 Punjab and Pakistan Demographic and Health Survey 2012-2013. Throughout the previous four years, the MICS estimations demonstrate a decrease in infant and child mortality.

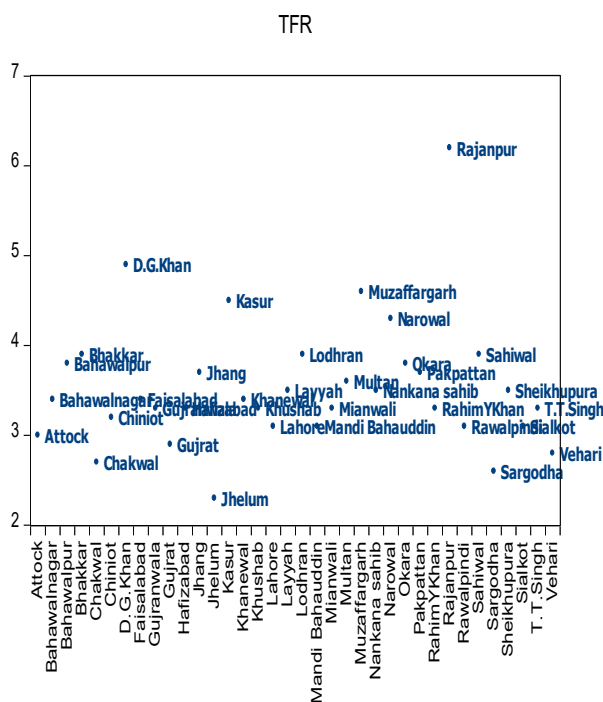
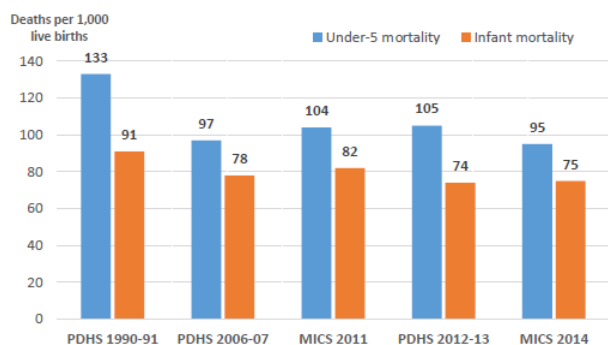


Figure 1. Distribution of Total Fertility Rate Among Districts of Punjab Province. Source: Author's Calculation.



**Figure 2.** Overtime Variations in Under-five Mortality and Mortality Rates During 1990-2014. Source. Multiple Indicator Cluster Survey (2014).

### Aim of the Study

Conferring the 6th Population and Housing Census, Pakistan's population ballooned to 207.8 million. It was counted as a huge increase of 57% since the 1998 census. An average growth rate of the population on an annual basis is 2.4% over a period of 1998-2017. This population increase is a heavy burden on Pakistan's economy. It was unable to sustain this burden thus there is a dire need for handling this issue. Birth rates are decreasing but the pace of decline is slow. In Punjab province, this issue becomes more severe as compared to the other provinces because it is a densely populated province. Punjab's population reached 110.1 million according to the census of 2017. There is a need to figure out the reasons and determinants for high population and high fertility rates and to examine the nature of the relationship between fertility and other socio-economic and demographic determinants. Accordingly, studying the factors behind this persistent high fertility and factoring out the most important determinant are of great importance. Therefore, the present study evaluated the fertility trends at household and district levels in Punjab, Pakistan given limited data about fertility differentials at the sub-national level in this city.

### Objectives of the Study

1. To rank the districts based on TFR, under-five mortality rate, contraceptive use, and employment rate;
2. To examine the relationship and spread among variables through fitted regression line scatter plot including confidence interval;
3. To investigate some salient socio-economic and demographic factors for fertility differential for the districts of Punjab.

### Review of Literature

Various socioeconomic and demographic researchers examined the significance of fertility differentials through time and across the regions. Further, previous research explored the influence of various channels of female status

as the female educational level and analyzed the role of labour force participation in fertility. In this research, labour force participation, under-five mortality rate, and contraceptive usage were analyzed to find out the differentials in fertility across different districts of Punjab, Pakistan.

Becker explored an economic framework to present fertility determinants (7). According to him, children are considered as a durable good that give some sources of income to parents. Several factors such as income, child costs, knowledge, uncertainty, and tastes could determine fertility. The demand for children is determined by income and price. In other words, the desire for children would increase by an increase in income and a decline in price. Furthermore, the quality of children was directly associated with the amount spent on them. The quantity of children in a family not only relies on its demand but also on its ability to produce or supply them.

Becker and Lewis explained that the relationship between fertility and other economic variables relied on numerous socioeconomic determinants such as the incentive for having children, the quality of children, the efficiency of private capital markets, and intergenerational transfers within a family (8). Moreover, Ellis explored that female employment is negatively linked to fertility. Kid rearing and home-based tasks are time- and energy-consuming for mothers while opportunity cost for the educated mothers might be high and they might have a preference for fewer kids. (9) Thus, education, the effect of urbanization, and development would halt fertility levels. Likewise, Bettio and Villa examined the association between the unemployment rate and fertility rate in Italy. Moreover, the unemployment rate and TFR were used to observe the association between the observed determinants. The results of econometric analysis established a negative relationship between the observed variables (10).

Wong and Levine investigated the associations among female employment and total fertility by taking the data taken from the National Demographic Survey of Mexico, 1982. The observed analysis was established on the investigation of reduced form equations for recent female labour force participation and current fertility. This study differed from earlier research by including a proxy measure of having child-care as an indicator of both fertility and labour force participation. They found that the availability of other household members decreased the risk level of abandoning employment while increasing the rate of having a child in employed women. (11)

Similarly, Murthi et al explored the determinants of fertility in India using district-level data of 1981 from the Census of India. Independent variables included male and female literacy, poverty level, urbanization, female employment, health-care facilities, and other socio-economic variables. Reduced form equations were used and fertility, child mortality, and gender preferences

in mortality were determined accordingly. The study highlighted some variables that were directly related to women's literacy and female employment, especially women's literacy, meaningfully reduced child mortality, fertility rates, and the female shortcoming in child death. However, female employment had not any empirically major impact on child mortality, but reduced gender bias in child survival and fertility levels. (12)

Gandotra et al also explored the behaviour of fertility through socio-economic and demographic determinants of the whole India and for the individual states. Data were based on India's National Family Health Survey 1992-1993. These socioeconomic and demographic indicators were analysed through multivariate analysis technique, which included child mortality, surviving sons, urban and rural households, caste/tribe, and exposure to electronic mass media, female education, along with husband's education and religion. The results indicated an extensive variety in TFR in the case of Indian states, that is, from approximately two children per woman in Goa and Kerala to five children per woman in Uttar Pradesh (13).

Likewise, Drèze and Murthi investigated the factors of fertility differentials by using the panel data of 1981 and 1991 on Indian districts. They observed that female education was a significant determinant that controlled fertility behaviour along time and across the country. A reduction in child mortality and son preferences also contributed to fertility decline. Contrarily, urbanization, poverty eradication, and male education level had no substantial relationship with total fertility. Attitudes to contraceptive use varied across and within regions as well (14). In Asia, contraception is mainly applied to prevent married women, with a certain number of children, from having more children. However, in sub-Saharan Africa, contraception is mostly used for child spacing purposes and as prevention against sexually transmitted infections/sexually transmitted diseases and human immunodeficiency virus infections. As a result, contraception is found to replace postpartum infecundability (15)

In another study, Gupta et al evaluated the relationships between female and male use of modern contraceptive methods and their intention to use those methods and multimedia behaviour change communication (BCC) campaigns in the target areas of Uganda. Logistic regressions were used to investigate the relationships between BCC exposure and family planning attitudes and practices by controlling for individuals' background characteristics. The empirical analyses discovered that exposure to BCC messages was related to greater use of contraceptives and intention for its use compared to previous experiences (16).

Bloom et al estimated the influence of fertility on women employment in a panel dataset and found a large negative effect of the fertility rate on female labour force participation. They examined a simulation model to

explore the effect of a decline in fertility on income per capita (17).

In addition, Adhikari studied the reproductive health outcomes of Nepal where infant and child mortality was high. Using data from the Nepal Demographic and Health Survey (18), fertility differentials among women aged 15-49 were examined in Nepal. Bivariate and multivariate analyses were employed to analyse the patterns of fertility. It was found that household headship was one of the strong predictors after controlling for the other variables. The study was limited to only those women who gave birth within the past 5 years preceding the survey, therefore, the obtained prevalence of child-death experience should not be generalized to entire women in Nepal (19).

Angeles analysed the outcome of child mortality on fertility differentials as it was the central and major instrument to describe the demographic changes. The results showed that child mortality played a great part in fertility decline. Variation in fertility behaviour came by a lag of about 10 years and net and gross fertility were both affected as well (20).

Further, Khan assumed fertility differentials among the population of urban and rural residents of Bahawalpur district. He investigated the reasons for fertility variations among urban and rural areas of the district. Salient transformations in the fertility level of urban and rural residents were established and a substantial reverse association was found among the percentage of urban residents and fertility level. Khan suggested that rural parts must be the centre of considerations during policymaking (21).

Furthermore, Nadeem-ud-din et al found the effect of female education and their employment status on fertility. They reported that the fertility differentials occurred due to different determinants from which education was a very important determinant (22).

Moreover, Bhatti studied the social processes underpinning the fertility decline in Punjab, Pakistan. The study employed a two-phased explanatory sequential mixed-method approach. The results of the study showed that young women were expected to be obedient to their husbands and mothers-in-law with regard to fertility decisions. More precisely, they could influence the power dynamics between themselves and their mothers-in-law by building stronger marital relationships and being submissive to their husbands' desires (3).

Additionally, Yasmeen intended to obtain coherent forecasts for the age-specific fertility rates of Pakistan for the two broader urban and rural areas by using the secondary data of age-specific fertility rates (1984-2007) from Pakistan Demographic Surveys. Based on the results, there was a negative relationship between the proportion of urban population and fertility rate. The findings of the study further revealed that reproductive behaviour of the women residing in rural or urban areas is heavily based on some differentials of their socio-

economic conditions, especially from differentials in the literacy rates, educational level, and age at marriage. Finally, the forecasts of future fertility rates showed that these differences were expected to maintain over the next 20 years (23).

## Materials and Methods

### Study Area

As shown in the following graph, Pakistan mainly consists of Punjab, Sindh, Khyber Pakhtun Khaw, Baluchistan, Azad Jammu and Kashmir, and Gilgit Baltistan. Nevertheless, Punjab is considered as the major province. According to its population size, Punjab establishes 29% reported area, forms 55% population, and finally, constitutes 57% of cultivated area and 69% of the cropped area for agricultural production of the country (24).

### Description and Data Source

TFR is the dependent variable whereas under-five mortality, contraceptive use, and employment rate are considered as independent variables. Similarly, under-five mortality describes per thousand number of children died under the age of five years while the total employment rate includes employed people (15 years and above) at the district level of Punjab province in Pakistan. Data for selected variables were gathered from Multiple Indicator Cluster Survey (25) and Stata 12 was used for data analysis.

### Conceptual Framework

Numerous contributing factors affect the level of fertility. The most important sources of variations in fertility are social, economic, cultural, or geographical factors which affect the level of births and the size of a family in a particular society. There are various theories which connect socioeconomic transitions with fertility variations and describe variations in the level of fertility.

Figure 3 displays the conceptual framework of the paper. Contraceptive use, under-five mortality rate, and employment rate are considered as independent variables and TFR is the dependent variable that relies on three independent variables in this framework.

Schultz supported the fact and concluded that child

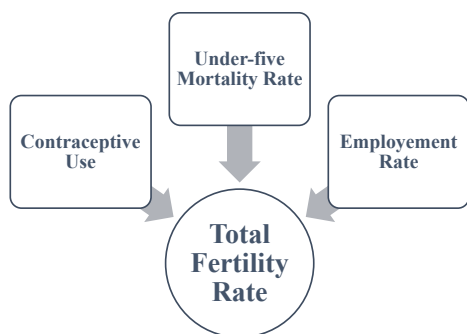


Figure 3. Conceptual Framework. Source. Author's Calculation.

mortality is responsible for the fertility decline. Low risk of child mortality forced the couples to produce few children as insurance in case of child death. Moreover, women's participation in labour market decreased fertility in the presence of economic growth. Additionally, awareness about birth control methods pushed away the idea of utility or the psychic pleasure of child and reduced fertility in economically advanced countries (26).

### Econometric Modeling

By definition, linear regression deals with the linear relationships among dependent and independent variables. Thus, it assumes that there is a straight-line relationship between these variables. In addition, the least-square regression is undoubtedly a useful and important technique and ordinary least square method is used to estimate the model which is expressed as follows:

$$TFR_d = f(U5M_d, LFP_d, CPT_d)$$

$$TFR_d = \alpha_d + \beta_0 U5M_d + \beta_1 LFP_d + \beta_2 CPT_d + \epsilon_d$$

where,

TFR = Total Fertility Rate of  $d^{\text{th}}$  district

U5M = Under-five Mortality of  $d^{\text{th}}$  district

CPT = Contraceptive use of  $d^{\text{th}}$  district

EMR = Employment Rate of  $d^{\text{th}}$  district

$d = 1, 2, 3, \dots, 36$ .

## Results and Discussion

This section clarifies the achieved outcomes as reported by the objectives of the present study.

### District Ranking on the Basis of Resources Availability

Table 1 demonstrates the rank and position of TFR for the districts of Punjab according to TFR. As shown, Rajanpur, D. G. Khan, and Muzaffargarh are the most populated districts with the highest fertility rate. However, Bahawalnagar, Faisalabad, Khanewal, and Rahim Yar Khan have moderate TFRs. Eventually, Chakwal, Sargodha, and Jehlum are the least populated districts with the lowest fertility rate in Punjab.

Table 2 presents the rank and position of contraceptive use for the districts of Punjab according to contraceptive use. Based on the data, Narowal, Hafizabad, and Attock are the top-ranked districts regarding contraceptive use while Khanewal, Lodhran, Multan, and Pakpattan lie in the middle category. Finally, Bahawalpur, D. G. Khan, and Rajanpur are the lowest-ranked districts in terms of contraceptive use.

The rank and the position of the under-five mortality rate for the districts of Punjab according to the under-five mortality rate are provided in Table 3. According to the data, Kasur is highly graded in terms of the under-five mortality rate while Bhakar, Jhang, Layyah, and Sahiwal have moderate under-five mortality rates. In addition, Mianwali, Gujrat, and Chakwal are the lowest-ranked districts regarding the under-five mortality rate in Punjab.

**Table 1.** District Ranking of Total Fertility Rate

Rank	District	TFR	Rank	District	TFR	Rank	District	TFR
1	Rajanpur	6.2	13	Multan	3.6	25	Mianwali	3.3
2	D.G. Khan	4.9	14	Layyah	3.5	26	Chiniot	3.2
3	Muzaffargarh	4.6	15	Nankana sahib	3.5	27	Mandi Bahauddin	3.1
4	Kasur	4.5	16	Sheikhupura	3.5	28	Sialkot	3.1
5	Narowal	4.3	17	Bahawalnagar	3.4	29	Lahore	3.1
6	Lodhran	3.9	18	Faisalabad	3.4	30	Rawalpindi	3.1
7	Sahiwal	3.9	19	Khanewal	3.4	31	Attock	3
8	Bhakkar	3.9	20	RahimYKhan	3.3	32	Gujrat	2.9
9	Bahawalpur	3.8	21	T.T.Singh	3.3	33	Vehari	2.8
10	Okara	3.8	22	Gujranwala	3.3	34	Chakwal	2.7
11	Jhang	3.7	23	Hafizabad	3.3	35	Sargodha	2.6
12	Pakpattan	3.7	24	Khushab	3.3	36	Jhelum	2.3

TFR, total fertility rate.

**Table 2.** District Ranking of Contraceptive Use

Rank	District	CNT	Rank	District	CNT	Rank	District	CNT
1	Narowal	51	13	Kasur	42.3	25	Sargodha	34.6
2	Hafizabad	50.3	14	Mandi Bahauddin	40.6	26	Mianwali	32.9
3	Attock	48.2	15	Vehari	40.4	27	Khushab	32.2
4	Sialkot	47.6	16	T.T. Singh	40	28	Bhakkar	31.9
5	Lahore	47.3	17	Khanewal	39.5	29	Jhang	31.7
6	Gujranwala	46.9	18	Lodhran	39.2	30	Layyah	30.6
7	Gujrat	46.1	19	Multan	39	31	Chiniot	28.3
8	Nankana sahib	45.7	20	Pakpattan	38.6	32	Rahim YKhan	27.9
9	Chakwal	44.9	21	Faisalabad	37.8	33	Muzaffargarh	27.1
10	Sheikhupura	43.4	22	Sahiwal	37.6	34	Bahawalpur	25.7
11	Rawalpindi	43.2	23	Okara	37.4	35	D.G. Khan	22.1
12	Jhelum	42.7	24	Bahawalnagar	35.2	36	Rajanpur	21.8

CNT: Contraceptive use.

Source. Author's calculation.

**Table 3.** District Ranking of Under-five Mortality Rate

Rank	District	U-5	Rank	District	U-5	Rank	District	U-5
1	Kasur	143	13	Rajanpur	109	25	Faisalabad	86
2	Pakpattan	126	14	Nankana sahib	108	26	Sargodha	83
3	Okara	125	15	Sheikhupura	102	27	Gujranwala	82
4	T.T. Singh	123	16	Rahim Y Khan	100	28	Sialkot	82
5	Mandi Bahauddin	123	17	Bhakkar	100	29	Narowal	78
6	Bahawalnagar	122	18	Jhang	98	30	Jhelum	77
7	Hafizabad	122	19	Layyah	97	31	Attock	73
8	Bahawalpur	119	20	Sahiwal	96	32	Lahore	64
9	D.G. Khan	116	21	Chiniot	92	33	Rawalpindi	64
10	Lodhran	114	22	Vehari	90	34	Mianwali	63
11	Muzaffargarh	113	23	Multan	88	35	Gujrat	61
12	Khanewal	113	24	Khushab	88	36	Chakwal	48

U-5: Under-five mortality rate.

Source. Author's calculation.

The same scenario is represented in Figure 4.

Table 4 summarizes the rank and position for the districts of Punjab according to the employment rate. The obtained data indicate that Pakpattan, Sahiwal, and Jhang are the most populated districts with the highest unemployment whereas Kasur, D.G. Khan, Rahim Yar Khan, and Faisalabad have a moderate employment rate. Further, Bahawalpur, Jehlum, and Chakwal are the least ranked districts with the lowest unemployment rate in Punjab. The same scenario is depicted in Figure 5.

### Two-way Scatter Plot With Confidence Interval

Scatter plots are very valuable for understanding the trends in statistical data. There are two coordinates for every single observation in a scatter plot, representing that observation is placed at the intersection of two coordinates.

The CI contributes the facts around a series that contains a real value with a particular amount of probability, along

with the way and strength of the demonstrated effect. The reports ensure the way of the effects, as well as its strength and the presence of a statistically significant result. Furthermore, the CI indicates the trend of the calculated result. A two-way scatter plot for the two coordinates (i.e., TFR and contraceptive use) and the CI about TFR and contraceptive use are illustrated in Figure 4. The negative association shows that a rise in contraceptive use leads to a reduction in the fertility rate among the districts of Punjab. Figure 6 displays the positive relationship through the two-way scatter plot and CI between TFR and under-five mortality rates of the districts of Punjab. In Figure 6, the CIs demonstrate the positive trend of the effect between TFR and employment rate.

Table 5 explains the association between TFR, employment rate, and contraceptive use and the under-five mortality rate. As far as the relationships of these independent variables with TFR is concerned, the under-five mortality rate and employment rate are positively

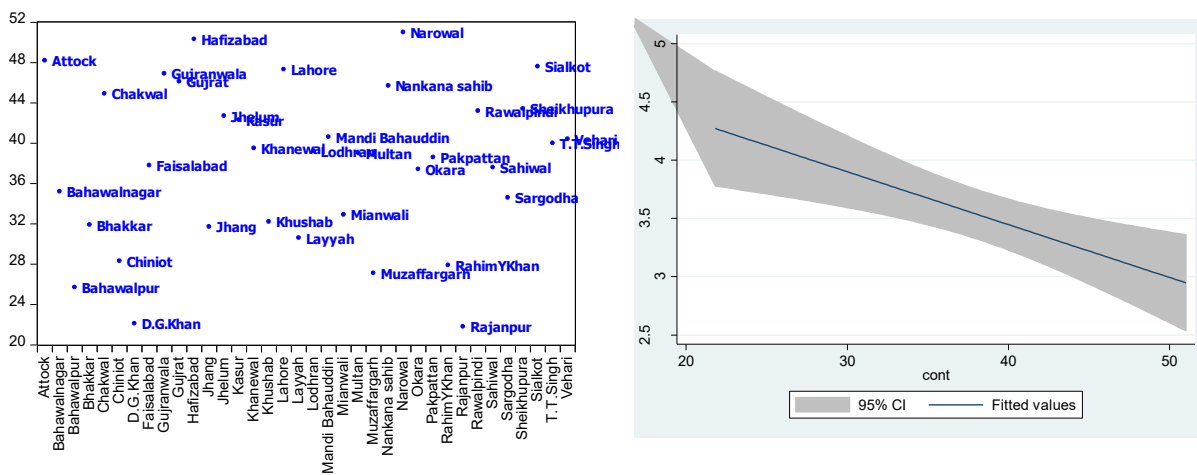
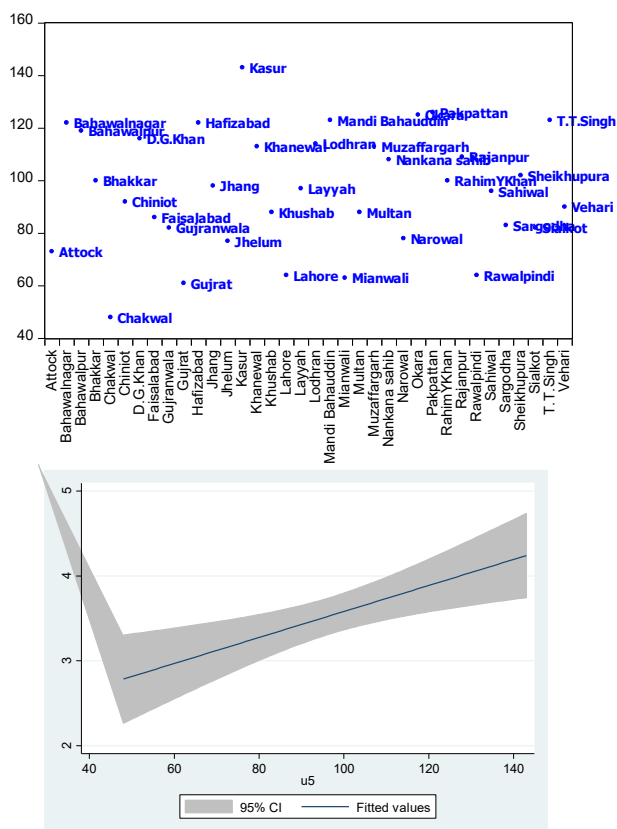


Figure 4. Total Fertility Rate and Contraceptive Use.

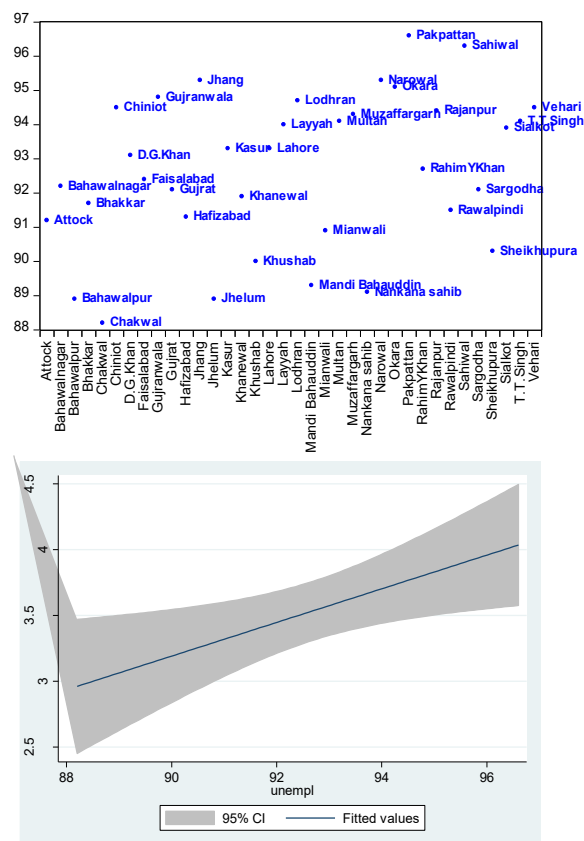
Table 4. District Ranking of Employment Rate (10 years and above)

Rank	District	Employment Rate	Rank	District	Employment Rate	Rank	District	Employment Rate
1	Pakpattan	96.6	13	Multan	94.1	25	Bhakkar	91.7
2	Sahiwal	96.3	14	Layyah	94	26	Rawalpindi	91.5
3	Jhang	95.3	15	Sialkot	93.9	27	Hafizabad	91.3
4	Narowal	95.3	16	Lahore	93.3	28	Attock	91.2
5	Okara	95.1	17	Kasur	93.3	29	Mianwali	90.9
6	Gujranwala	94.8	18	D.G. Khan	93.1	30	Sheikhupura	90.3
7	Lodhran	94.7	19	Rahim Y Khan	92.7	31	Khushab	90
8	Chiniot	94.5	20	Faisalabad	92.4	32	M. Bahauddin	89.3
9	Vehari	94.5	21	Bahawalnagar	92.2	33	Nankana sahib	89.1
10	Rajanpur	94.4	22	Gujrat	92.1	34	Bahawalpur	88.9
11	Muzaffargarh	94.3	23	Sargodha	92.1	35	Jhelum	88.9
12	T.T. Singh	94.1	24	Khanewal	91.9	36	Chakwal	88.2

Source. Author's calculation.



**Figure 5.** Total Fertility Rate and Under-five Mortality. Source. Author's Calculation.



**Figure 6.** Total Fertility Rate and Total Employment Rate. Source. Author's Calculation.

associated with TFR with the values of 0.482 and 0.399, respectively. Moreover, the strength of the correlation between TFR and contraceptive use is negatively associated with the value of -0.500.

The regression results of the econometric model indicate that the employment rate and under-five mortality have a significant and positive relationship with total fertility

**Table 5.** Correlation Matrix

	TFR	U5MR	EMPL	CNT
TFR	1.0000	0.4829	0.3998	-0.5004
U5MR	0.4829	1.0000	0.2178	-0.3164
LFP	0.3998	0.2178	1.0000	-0.1209
CNT	-0.5004	-0.3164	-0.1209	1.0000

TFR: Total fertility rate; U5MR: Under-five mortality rate; EMPL: Employment; CNT: Contraceptive use. Source. Author's Calculation.

**Table 6.** Empirical Results

Dependent Variable: Total Fertility Rate				
Variable	Coefficient	Standard Error	T Statistic	P Value
Contraceptive Use	-.0335064	0.0125859	-2.66	0.012
Employment Rate	.0924786	0.0431553	2.14	0.040
Under-five Mortality Rate	.0096171	0.0044812	2.15	0.040
Constant	-4.692232	4.01253	-1.17	0.251

R-square = 0.4469, F-statistic = 7.954, P value = 0.0002

Source. Author's calculation.

among the districts of Punjab. More precisely, the mortality rate increases by 0.0096% by an increase of 1% in TFR. All variables with significant probability values have a significant relationship with total fertility (Table 6).

### Conclusions

In general, a cross-sectional empirical analysis was incorporated to explore the effect of various socioeconomic determinants on fertility for the districts of Punjab. In the empirical analysis, the TFR was considered as the outcome variable whereas the employment rate, under-five mortality, and contraceptive use were considered as determinants. The main findings of the paper are as follows:

First, the empirical results of this study indicated that contraceptive use has an inverse and significant association with fertility. Thus, the results are associated



with empirical indication on the association between contraceptive usage and fertility in the study by Gupta et al (16) and Bongaarts (27). Based on the results, 450 contraceptive use in societies like Pakistan is mainly for the gap purpose instead of ending family size. In addition, 451 couples used contraceptives after completing their ideal number of children thus the fertility plans of these Pakistani couples are very high. According to Bhatti (3), religion may also be a reason in this regard. Contraceptive use has a strong impact on fertility rates as well.

Further, Hakim indicated that the employment rate has a statistically significant and positive influence on fertility (28).

According to the results of this study, a reduction in under-five mortality might be supportive to decrease fertility for the districts of Punjab. It was found that under-five mortality has a substantial relationship with fertility. Based on the results, less under-five mortality leads to lower fertility rates. Therefore, the policy recommendation confirms development in human capital, particularly females' welfare through child health and contraceptive knowledge might be the greatest policy choice for decreasing fertility levels among various districts of Punjab. It is recommended that the governmental setting up of social services regarding child healthiness and contraceptive knowledge may enhance social welfare and child life expectancy that may be beneficial for decreasing fertility levels.

The Ministry of Population Welfare is a long time advertising ideal family comprised of one boy and one girl. People who have two girls feel that their family is incomplete and they increase the family size until the birth of a boy. Women's fertility intentions are still more than two children. Counselling through mass communication should be encouraged so that people will not increase the family size in the expectation of male child births. Furthermore, messages should be inspiring and effective and awareness campaigns for men should be launched to control fertility control.

### Conflict of Interests

Authors declare that they have no conflict of interests.

### Ethical Issues

Not applicable.

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