The Impact of Education on Total Fertility Rate in Pakistan (1981-2008)

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ABSTRACT

Most of the developing countries are facing the problem of high population growth, which is causing numerous social and economic problems. The Total Fertility Rate (TFR) in most of developing countries stands higher than the developed countries (UNPD, 2000). The TFR in Pakistan was 7.0 in 1989.The continuous efforts on part of government of Pakistan bought it to 3.0 in 2008. The present study aimed at finding out the impact of education on Total Fertility Rate (TFR) in Pakistan during the period 1981-2008. Econometric techniques, Multiple Regression Model and Johansen Cointegration have been used to derive results. The results show that mean age at marriage (male), the education of both sexes and the age of women are the most important factors affecting TFR. Women education can be more useful weapon to control TFR, if it is at secondary level. Female age at marriage also negatively affects TFR. In order to achieve the desired level of population growth, the government of Pakistan should focus on Primary as well as secondary education for male as well as female.

Key Words: Education, Cointegration , Total Fertility Rate

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INTRODUCTION

One of the major challenges in most of the developing countries today is the rapid increase in population, which is responsible for a large number of social and economic problems. The fertility rates in developing countries are very high vis-à-vis developed countries. The Total Fertility Rate (TFR) in developing countries is 3.0, which is the double of TFR in industrialized countries (UNPD, 2000). A large number of factors are responsible for high fertility rates in developing countries of the world. The age at marriage is one of the key determinants of fertility rate. The lower the age at marriage time, the longer the reproductive span,which results in higher fertility rate. There are many reasons for early marriages in developing countries, which include both the social and economic factors. Female education is the strongest determinant of variation in the age at marriage (Kabir *et al*, 2001)). The second factor affecting TFR, is the universality of marriages in most of the countries. Almost every body in these highly populated regions, enters into wedlock due to social and religious factors. Urbanization is another factor, which can also affect fertility of women. Urban life provides powerful incentives that can serve to change the fertility regime (White *et al*, 2002). Similarly, the use of contraceptives is considered as an instrument to control the rapid growth of population. The use of contraceptives depends upon the education level of both male and female partners, the availability of contraceptives and the awareness about its use. Woman's age, number of sons, religion and area of residence affect the decisions regarding use of contraceptives (Chacko, 2001).

Education is considered as one of the most important factors affecting women decision regarding the number of children. Educated women exercise higher command over their reproduction, as even after controlling husband's education, advanced women education is positively associated with the use of modern contraceptives (Omariba, 2005). Female education has a greater impact on determining the age at marriage and number of children (Breierva and Duflo, 2002). The greatest impact of education on fertility occurs when levels of education are at secondary level (Akmam, 2002). It indicates that higher the level of education, the lower the fertility. Income and education

both have significant impact on women fertility but the impact of education is comparatively greater (Handa, 2000). However, Cheng and Nwachukwu (1997) rejected the claim that education causes decline in fertility. Basu (2002) and Yadava (1999) found association in women autonomy and fertility. Other factors like marital structure and stress have effects on women fertility as found by Yip and Lee (2002), and Boivin et al (2006).

Pakistan, being a developing country, also faces the serious problem of over population. The population growth rate was 1.87% per annum in 2005, which was amongst the highest population growth rates of the world (Economic survey, 2008-9). It has created serious problems of unemployment, inflation, infrastructure and environment. So far, the growth of population is concerned; high fertility rate serves as the key factor accelerating the pace of population growth. The total fertility rate in Pakistan is very high as compared to developed countries. It was 7.0 per woman in 1980 and fell to 4.3 in 2004 (WDI, 2005). The continuous efforts of the government of Pakistan with the help of NGO's brought it to 3.0 in 2008 (Economic survey, 2008-9).

Keeping all these factors in mind, the major purpose of the present study is to find whether education has any impact on fertility rate in Pakistan. Furthermore, other factors like mean age at marriage, literacy rate and women average age that can affect total fertility rate, have also been taken in to consideration.

MATERIALS AND METHODS

Data

The data used in this study is secondary in nature, which is based upon the period 1981-2008 and has been taken from the following sources:

1. Pakistan Population Data Sheet 2001, National Institute of Population Studies
2. World Development Indicators (2006)
3. Economic Survey of Pakistan (various issues),
4. Academy of Educational Planning and Management (AEPAM),
5. Social Indicators of Pakistan (2007)
6. Labour Force Survey of Pakistan (various issues),
7. Pakistan Integrated Household Survey (various Issues)

8. Pakistan Social & Living Standards Measurement Survey (various issues)
9. Human Development Reports, UNDP
10. World Health Organization

Statistical Analysis

The Total Fertility rate, education, mean age at marriage (for male& female) and women age have been taken as major variables in the present study. The results are displayed in terms of counts, percentages and figures. A technique of least squares is employed to check the impact of various factors on the total fertility rate. The model used in the study is given in equation (1)

$TFR = = \beta_0 + \beta_1 PEF + \beta_2 PEM + \beta_3 HEF + \beta_4 HEM + \beta_5 MAMM + \beta_6 MAMF + \beta_7 FA + Ui$ (1)

Where TFR = Total fertility rate; PEF = Primary School Enrollment Female; PEM = Primary School Enrollment Male; HEF = High School Enrollment Female; HEM = High School Enrollment Male; MAMM = Mean age at marriage (male) MAMF =Mean age at marriage (female); FA = Female age; β_0 = intercept of the model; $\beta_i (i = 1, 2, ..., 7)$ are the coefficients of variables; and U_i is the random error and assumed to follow a normal distribution with zero mean and constant variance. Other econometric techniques used in this study are Augmented Dickey Fuller (ADF) and Johansen Cointegration test.

Education and fertility profile of Pakistan

According to Economic Survey of Pakistan (2008-9), total population of Pakistan stands at 163.76 million. The literacy rate is 56%, 69% and 44% for both, male and female respectively. The NIPS data sheet (2001) shows that literacy rate differs in different provinces of Pakistan. The highest literacy rate is of Punjab province, followed by Sind . NWFP is third one and lowest literacy is in Baluchistan province, which is 24.8 % only. Comparing the literacy rate to fertility rates in all provinces; it can be observed that the highest fertility rate 5.4 is of Baluchistan, wherein the literacy rate is the lowest in Pakistan. The lowest TFR 4.7 is of Punjab and Sind where the literacy rates are higher than Baluchistan. Similarly, the Fertility rate in NWFP is higher than Punjab and Sind while the literacy rate is lower than both the provinces, which shows the existence of

some kind of relationship of education and TFR. The data in Table. I, shows the contraceptive prevalence, literacy and fertility rates in Pakistan. Comparing the use of contraceptives with the literacy rates, we find the highest contraceptive prevalence of 30% is in Punjab which has highest literacy rate while in NWFP contraceptive prevalence is 2 3 .5%.The lowest contraceptive use is in Baluchistan where contraceptive prevalence is 15.9%..

Table I: Province wise Literacy rate, Contraceptive use and Total fertility rates in Pakistan

Province	Literacy rate of both sexes (%)	Literacy rate of male (%)	Literacy rate of female (%)	Contraceptive use (%)	Total Fertility Rate	Urban Population
Pakistan	43.9	54.8	32	27.6	4.8	32.5
Punjab	46.6	57.2	35.1	30	4.7	31.3
Sind	45.3	54.3	34.5	26.8	4.7	48.8
NWFP	35.5	51.4	18.8	23.5	5.1	16.9
Baluchistan	24.8	34	14.1	15.9	5.4	23.9

(Source Population Data Sheet, 2001)

Pakistan Social & Living Standards Measurement Survey (2005-6) shows that 32% of Pakistanis do not use family planning methods because they wanted more children,6% due to religious reasons and 4 % due to fear of bad side effects.

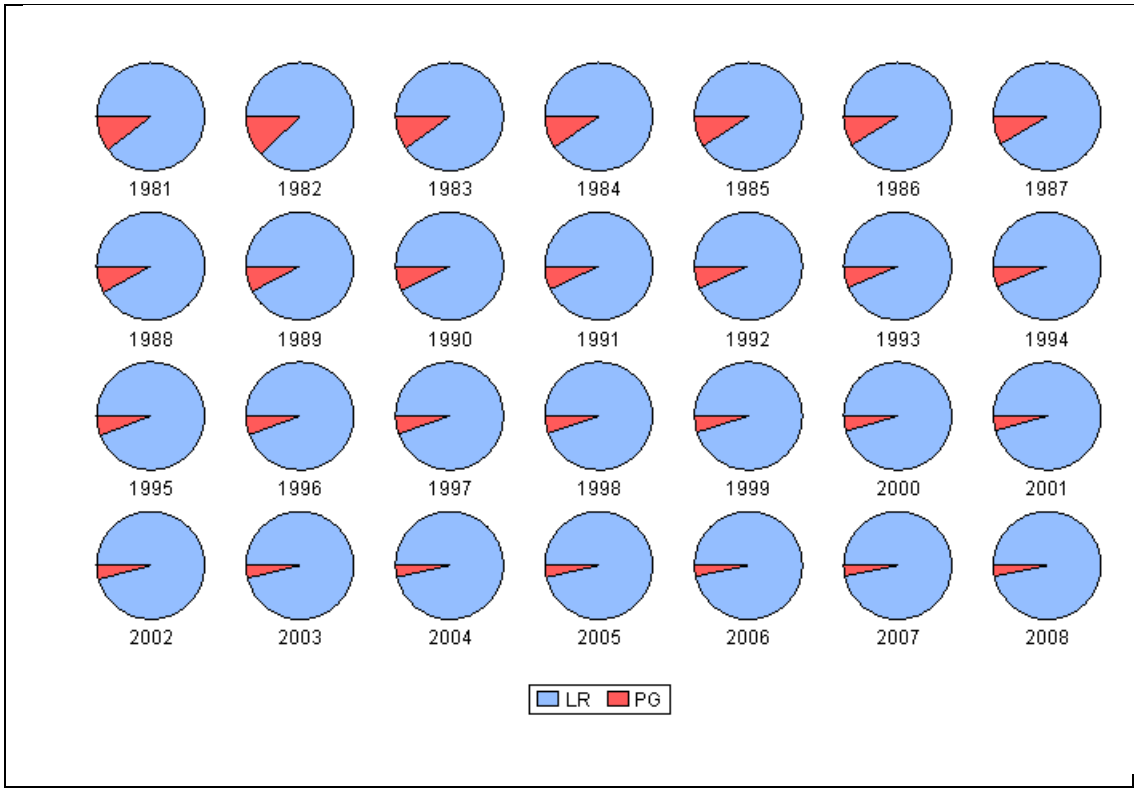
Table II: TFR in Urban and Rural Areas of Pakistan

Region / Year	Over all TFR	TFR (Urban)	TFR (Rural)
1993-95	5.4	5.8	4.5
1994-96	4.5	4.7	4.0
1998-00	4.5	4.9	3.5
2002-4	3.8	3.9	3.6

Source: Pakistan Integrated Household Survey (various issues)

Table II shows the TFR in urban and rural areas of Pakistan during the period 1993-2004. It shows that TFR in urban areas is comparatively lower than the rural areas which indicates the effect of urbanization on TFR. It further shows a decline in TFR which fell down from 5.4 in 1993 to 3.8 in period 2002-4. The literacy rate and Population growth rate trend in Pakistan during the period 1981-2008 is shown in fig 1.

Figure.1: Literacy rate and Population Growth Rate (1981-2008)



Source: Economic survey of Pakistan (2001-2, 2008-9),Social indicators of Pakistan 2007, ,PSLM (2004-5),Pakistan school education statistics (AEPAM)

Fig.1 shows that since 1981, literacy rate in Pakistan is increasing and the population growth rate is decreasing which shows some kind of association of literacy rate and population growth rate. Pakistan is one of countries of the region having a tendency of growing population.

Table. III shows a comparison of literacy rate and TFR in Economic Cooperation Organization (ECO) countries in 1990 and 2004.The figures show that Afghanistan had the highest TFR of 7.96 in 1990. Pakistan was second with TFR of 5.84. Similarly

Kazakhstan was the ECO country with, the lowest TFR of 2.72. Azerbaijan and Turkey were also among the ECO countries with comparatively low TFRs.

Table III: Fertility situation in ECO countries

Country	Total fertility rate		Literacy rate	
	1990	2004	1990	2004
Afghanistan	7.96	NA	NA	12.59
Azerbaijan	2.74	2.01	NA	98.17
Iran	4.84	2.09	53.94	70.4
Kazakhstan	2.72	1.81	98.2	99.28
Kyrgyzistan	3.69	2.49	NA	98.13
Pakistan	5.84	4.3	20.1	35.98
Tajikistan	5.08	3.6	97.2	99.22
Turkey	3	2.2	66.4	97.68
Turkmenistan	4.23	2.65	NA	98.2
Uzbekistan	4.0	2.38	97.8	NA

Source: World Development Indicators 2006

By 2004, most of the countries were able to curtail TFR. Pakistan brought it from 5.8 in 1990 to 4.3 in 2004.Kazakistan with a literacy rate of 99% reduced TFR from 2.72 to 1.81 and Uzbekistan got the TFR of 2.38 in 2008.

Results and Discussion

The major objective of the present study was to find out the direct and indirect impacts of education on total fertility rate in Pakistan. Total fertility rate was treated as dependent variable. Education, an important explanatory variable has been limited to school level. Primary and high school enrollment of sexes, male and female have been taken as proxies for education. The other explanatory variables were mean age at marriage of man, mean age at marriage of women, and age of women. The estimates

were derived by using Multiple Regression Model. Software "Eviews 6" has been used for this purpose. The results were very interesting. These results are shown in Table: III

Table IV: Regression Results, Total fertility rate as Dependent Variable

Independent Variables	Coefficient	Std. Error	t-Statistic	P
MAMM	-0.56555**	0.250796	-2.255019	0.035
MAMF	-0.09668	0.102942	-0.939215	0.359
PEM	-7.02E-05**	3.37E-05	-2.083481	0.050
PEF	-4.54E-05	5.06E-05	-0.897709	0.380
HEM	-0.00029	0.000586	-0.485469	0.633
HEF	-0.00214**	0.000856	-2.498798	0.021
FA	0.04731**	0.021505	2.199960	0.040
C	21.14084*	6.945038	3.044021	0.006

R-squared = 0.978226; Adjd R-squared = 0.970605; No of Observations = 28; F-statistic = 128.3586Prob(F-statistic) 0.000000; * and ** indicates significant at 1% and 5% levels of probability respectively.

According to the regression results, mean age at marriage (male) negatively affects TFR in Pakistan. The affect is significant at 10% level of Significance. The women mean age at marriage though affects TFR negatively but not significantly. Interestingly, Primary education of Male showed significant impact on TFR rate than Primary education of women.

The results further show that High School Enrollment of women (HEF) negatively affects TFR and the result is significant at 5 % level of probability. It suggests that higher the HEF, lower will be the fertility. Similarly, there is a statistically significant relationship between female age and TFR. High school enrollment of man (HEM) is negatively associated with TFR in Pakistan but the result is statistically not significant.

The value of R^2 and R^2-Adjusted seem to be very high and the regression can be Spurious which necessitates the use of other tests. In order to achieve more reliable

results, it is pre-requisite to check the stationarity of data. The Augmented Dickey Fuller (ADF) test was conducted for this purpose. The results are given in Table-V.

Table.V: Augmented Dickey Fuller Test Results

Variable	Difference order	ADF Statistic	Critical Value			Prob (p)
			1%	5%	10%	
TFR	I(0)	0.4927	-3.7695	-3.0048	-2.6422	0.9824
	I(1)	-3.5748	-3.7695	-3.0048	-2.6422	0.0153**
MAMM	I(0)	-0.0905	-3.7529	-2.9981	-2.6388	0.9395
	I(1)	-3.9379	-3.7529	-2.9981	-2.6388	0.0066*
MAMF	I(0)	-1.0623	-3.7240	-2.9862	-2.6326	0.7141
	I(1)	-8.0633	-3.7114	-2.9810	-2.6299	0.0000*
MEPS	I(0)	-1.9966	-3.7696	-3.0048	-2.6422	0.2860
	I(1)	-6.4837	-4.3743	-3.6032	-3.2380	0.0001*
FEPS	I(0)	0.3269	-3.7241	-2.9862	-2.6326	0.9750
	I(1)	-4.1137	-3.7379	-2.9919	-2.6355	0.0042*
MEHS	I(0)	-0.0402	-3.6999	-2.9763	-2.6274	0.9465
	I(1)	-4.8886	-3.7115	-2.9810	-2.6299	0.0006*
FEHS	I(0)	0.8680	-3.6999	-2.9763	-2.6274	0.9934
	I(1)	-5.6798	-3.7115	-2.9810	-2.6299	0.0001*
LEF	I(0)	-2.3354	-3.6998	-2.9762	-2.6274	0.1688
	I(1)	-5.9139	-3.7115	-2.9811	-2.6299	0.0000*

- and ** stands for 1 % and 5 % level of significance

In Table. V. the term I (0) shows ADF test results at level and I(1) shows results at 1st difference. The table shows that almost all variables of the study are non-stationary at level but are stationary at first difference.

After making the data stationary, Cointegration test was conducted to know about the longrun relationship. The results are displayed in Table-VI.

Table. VI. Cointegration test results with lag interval 1 to 1

Hypothesized No. of CE(s)	Eigen Value	Trace Statistic	Critical Value(5%)	Probabilty
None*	.9741	290.91	159.52	0.0000
At most 1*	.9558	199.53	125.61	0.0000
At most 2*	.8684	121.54	95.75	0.0003
At most 3*	.5705	70.84	6982	0.0414
At most 4*	.5616	49.71	47.85	0.0331
At most 5*	0.4977	29.100	29.79	0.0600
At most 6	0.2581	11.88	15.49	.1626

At most 7*	0.1620	4.41	3.84	0.0355

*denotes rejection of null hypothesis at 5% level of significance.
Trace statistics indicates 5 cointegrating euations at 5 % leve of significane

The Cointegration test results show the existence of 5 Cointegrating equations at 5 % level of significance, which shows that there the regression is not spurious and there exists long run relationship in the variables of the study as discussed in the regression results.

CONCLUSION

The present study analyzed the role of various factors in determining TFR in Pakistan. Based on the results obtained from regression analysis, it can be concluded that mean age at marriage of male, education of both sexes and women age are the most important factors affecting TFR in the study area. Female mean age at marriage is negatively associated with TFR but the result is not statistically significant. Women education can be more effective if it is at secondary level. An inverse relation between the TFR and education suggests that higher the women education, the lower will be TFR. In addition, in case of male, primary education has significant impact on the TFR. It has also been observed that those provinces of Pakistan, where the literacy rate is high, the TFR is comparatively low. Similarly, in these provinces the contraceptive use is high indicating the impact of education on contraceptive use. The Cointegration test results also support existence of long run relationship of the explanatory variables with the TFR as the results show 5 cointegrating equation neglecting the assumption of spurious regression.

In order to achieve the desired level of population growth rate, it is suggested on the basis of the findings of the present study that government of Pakistan should focus on primary as well as secondary education. High rate of female education will empower them as a part decision making regarding the number of children. Moreover, early marriages should be discouraged as in rural areas of Pakistan as the marriages take place at very early stage of the life. The contraceptive use needs to be encouraged and awareness compagn regarding the hazards of huge population can help Pakistan to overcome the problem of rapidly rising population.

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