Population and Human Capital Development in Pakistan to 2050
Extended Abstract

1.Introduction

Although education has been emphasized by the government to play a central role for the successful development of Pakistan in the present and future, progress realized at all levels have been meager and this for two main reasons: the investments in education have been too low and the schooling age population has been growing too fast. This paper proposes itself to look at the future of levels of educational attainment through a scenario approach looking at four scenarios on future fertility and enrolment for the period 1998-2048.

A literature review and context section with aims of the analysis and its full policy value will go at the beginning of the paper.

2.Projections

2.1. Methodology

Projections are conducted using the PDE Population Projection Software[1]. *Short description*

Population by age and sex

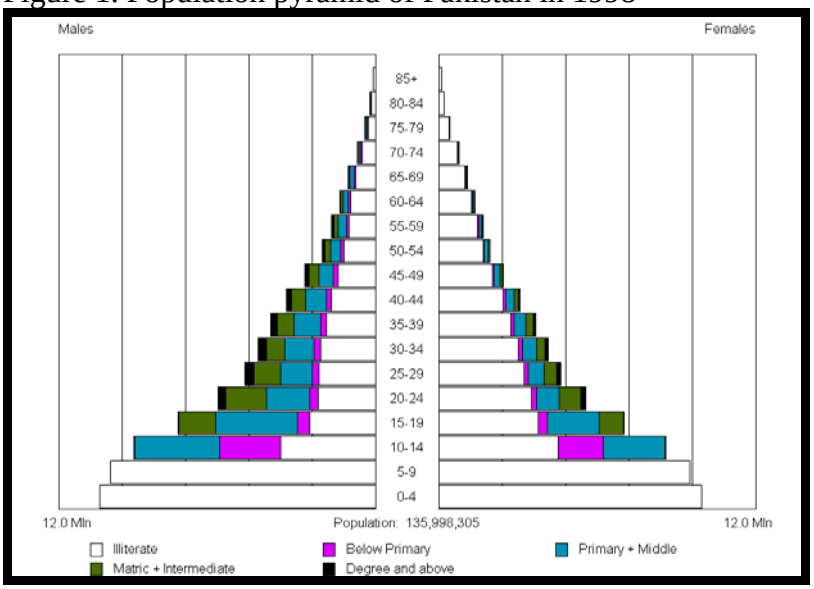
Pakistan is one of the few developing countries where detailed data on levels of education by age and sex is available from many surveys in the recent years. The latest population census was conducted in 1998. Another series of data collection was done through the labor force surveys in 2001-2002, 2003-2004-, and 2005-2006. After comparison of the different datasets and discussion with population experts, it was decided to use data from the population and housing census conducted in 1998. The census is aggregated into five main categories.

- Illiterate: Inability to read a newspaper and write a simple letter in any language.
- Below Primary: Literate but have not completed the five grades of primary education.
- Primary and Middle: Have completed grades one through five of primary education and/or grades six through eight of middle education.
- Matric and Intermediate: Have completed grades nine and ten, culminating in matriculation and/or grades eleven and twelve, leading to an F.A diploma in arts or F.S. in science
- Degree and above: Have at least completed an undergraduate degree (BA or BSc.)

Tables from the census only provide the information for the population 10 years and plus. Therefore we attributed all the population in the 0-4 and 5-9 age groups to the lowest education category i.e. illiterate. Figure 1 shows the population pyramid of Pakistan in the starting year, in 1998.

[1] Available online at: http://www.iiasa.ac.at/Research/POP/pub/software.html

Figure 1. Population pyramid of Pakistan in 1998



Fertility

Data was collected in the Pakistan Reproductive health and Family Planning Survey in 2000-01 on fertility for the period 1997-2000. The differentials by education are shown in the table below as well as the resulting fertility rates assumed for the starting period of the projections 1998-2003 for the five education categories. The three main adjustments are made to the differentials in the Survey. The first one is to compensate for a different starting period and this was done by adjusting all TFRs by levels of education to the overall TFR estimated by the UN for the year 2000 (as the mean of the TFR for periods 1995-2000 and 2000-2005). As well, because the education categories are not exactly the same, some adjustments were also needed. A third and more substantive adjustment was implemented to change the TFR of women with higher education (up to secondary and above secondary) who seemed to be having a fertility higher than the up to middle group). Comparing with the results of the 1990-91 and 2006-07 DHSs, as well as the total marital fertility rate and children ever born, the TFR were adjusted as follow.

Table 1. Fertility differentials by levels of education for 1997-2001 (Source: National Institute of Population Studies 2001)

Education categories	TFR 1990-1991 (a)	Education categories	TFR 1997-2000 (b)	TFR 2006-2007 (c)	Education categories	TFR 1998-2003 (d)
No education	5.7	None	5.1	4.8	Illiterate	4.82
Attended Primary	4.9	Up to primary	4.2	4.0	Below Primary	3.97
Attended Middle	4.5	Up to Middle	3.2	3.2	Primary + Middle	3.59
Secondary and +	3.6	Up to Secondary	3.6	3.1	Matric + intermediate	3.40
		Above Secondary	3.8	2.3	Degree + above	3.02
Total	5.4	Total	4.8	4.1	Total	4.42

Sources: (a) DHS Pakistan 1990-1991, (b) National Institute of Population Studies 2001, (c) DHS Pakistan 2006-2007, and (d) Own calculations.

Mortality

Mortality was not considered by education in this application. We chose to use life expectancies as derived from the UN (2004) and fit mortality rates based on estimation calculated with the help of Mortpak. Life expectancy in the starting year is 63.1 for both males and females.

Migration

Like mortality, net number of migrants was derived from the UN 2004 estimates. They were shared between education levels according to some basic assumptions according to which the migrants are less likely to belong from the lowest educated (too little financial means to migrate) or highest educated segment of the population (good opportunities already in the country): hence 10 percent of the migrants were attributed to the illiterate category, 10 percent to the below primary category, and 10 percent to the Degree category. The rest (70 percent) was shared between the primary and matric categories. The age schedules originates from Rogers (1981)

Transition

Transitions were calculated based on the starting year population. The census information on levels of educational attainment only starts after age 10 hence the first transitions occur to from the illiterate category at the age 10-14.

Scenarios

Four scenarios are considered in the projections at the moment. They all follow the same pattern of mortality and migration as shown in table 2 below. They differ only by fertility and the transition rates that are implemented according to four main story lines.

- Scenario Constant enrollment rates (CONSTRATE): Transitions calculated as mentioned above are kept constant during the projection period. This replicates the present situation in terms of enrolment and shows the progress or lack of progress that are already embedded in the country. The overall fertility declines according to the United Nations (2004) medium scenario and relative fertility differentials are kept constant.
- Scenario Constant enrollment numbers (CONSTNUMB): it is similar to the scenario above mentioned however one important difference is that it keeps only the numbers of students enrolled in each levels constant and therefore shows what would happened if Pakistan did not have the capacity to increase its educational capacity to enroll the growing number of children as a result of high population growth. The overall fertility declines according to the United Nations (2004) medium scenario and relative fertility differentials are kept constant.
- Scenario Constant enrollment numbers and rapid fertility decline (CONSTNUMBFERT) in terms of education it is similar to the scenario above mentioned however the fertility declines more rapidly than in the previous scenarios so that each category reaches their 2043-2048 value already in 2023-28. Therefore the number of in-school children to be enrolled is reduced.
- Scenario trend (TREND): This scenario looks at the trend in the proportion in all categories and allows the transition to follow this trend up to 2048. The overall fertility declines according to the United Nations (2004) and relative fertility differentials are kept constant.

Some further scenarios will be implemented to evaluate the feasibility of some yardsticks such the education objectives of the MDGs.

Table 2. Demographic assumptions for 1998-2048

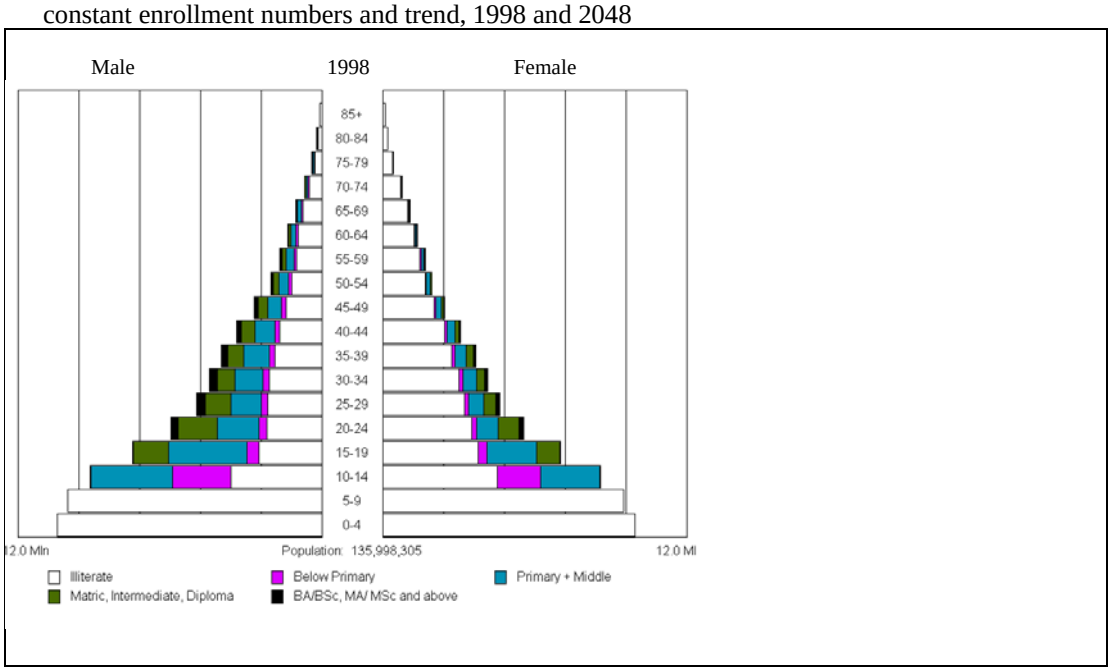
Scenario			Illiterate	Below Primary	Primary & Middle	Matric & Intermediate	Degree & Above	Total
TFR		1998-2003	4.82	3.97	3.59	3.40	3.02	4.42
		2023-28[a] 2043-48[b]	2.27	1.87	1.69	1.61	1.61	1.88-2.03[c]
Life expectancy at birth	Male	1998-2003	63.1					
		2043-2048	73.8					
	Female	1998-2003	63.1					
		2043-2048	76.3					
Net-Number of migrants	Both sexes	1998-2003	-255	-94	-329	-329	-94	-102
		2003-2008	-297	-109	-383	-383	-109	-282
		2008-2013	-190	-70	-246	-246	-70	-822
		2013-2048	-173	-64	-224	-224	-64	-750

[a] TFR values reached in 2023-28 for scenario CONSTNUMBFERT
[b] TFR values reached in 2043-48 for scenarios CONSTNUMB, CONSTRATE, TREND
[c] Depending on scenario (see table 4)

2.2 Results

First results are shown as population pyramids in figure 2 and table 3.

Figure 2. Population pyramids of Pakistan according to scenario constant enrollment rates, constant enrollment numbers and trend, 1998 and 2048



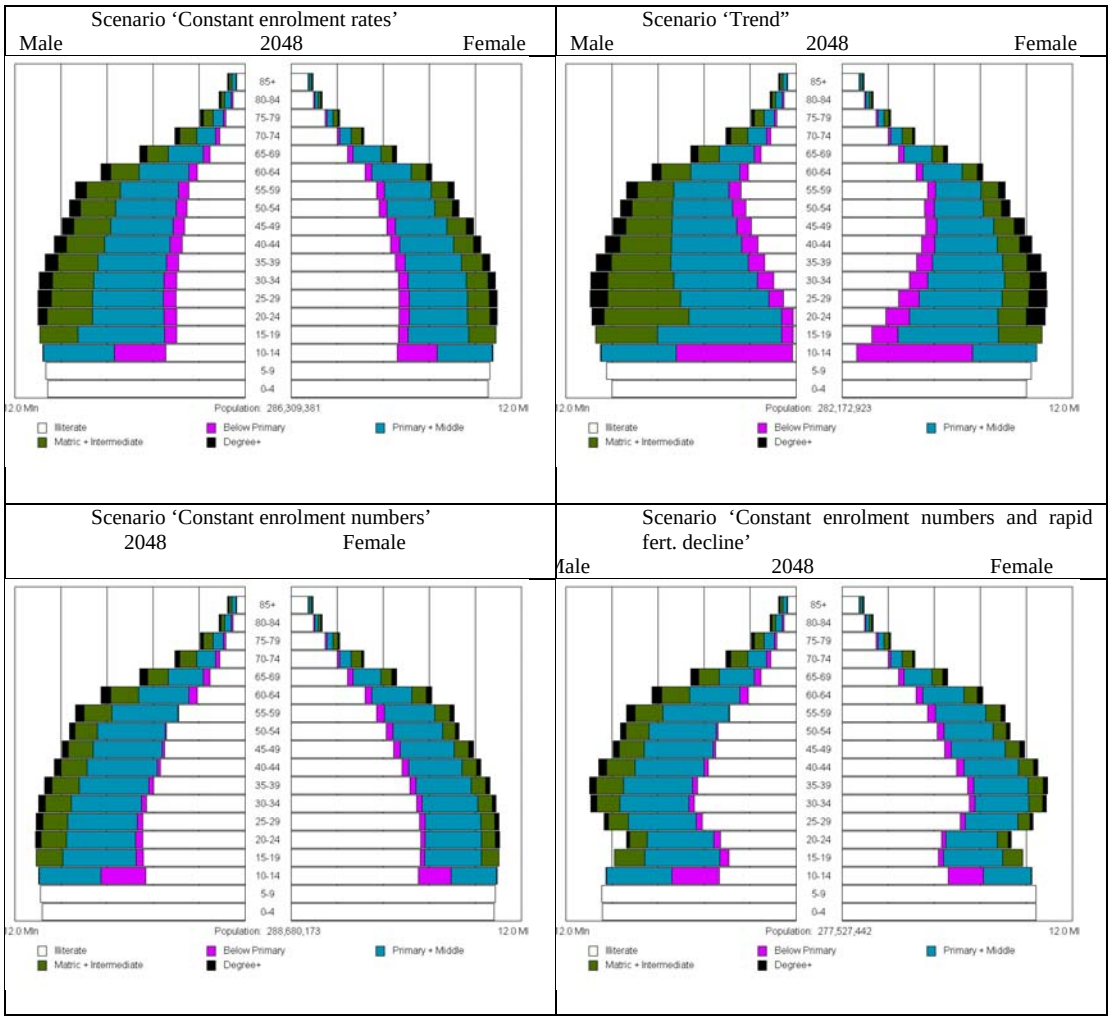
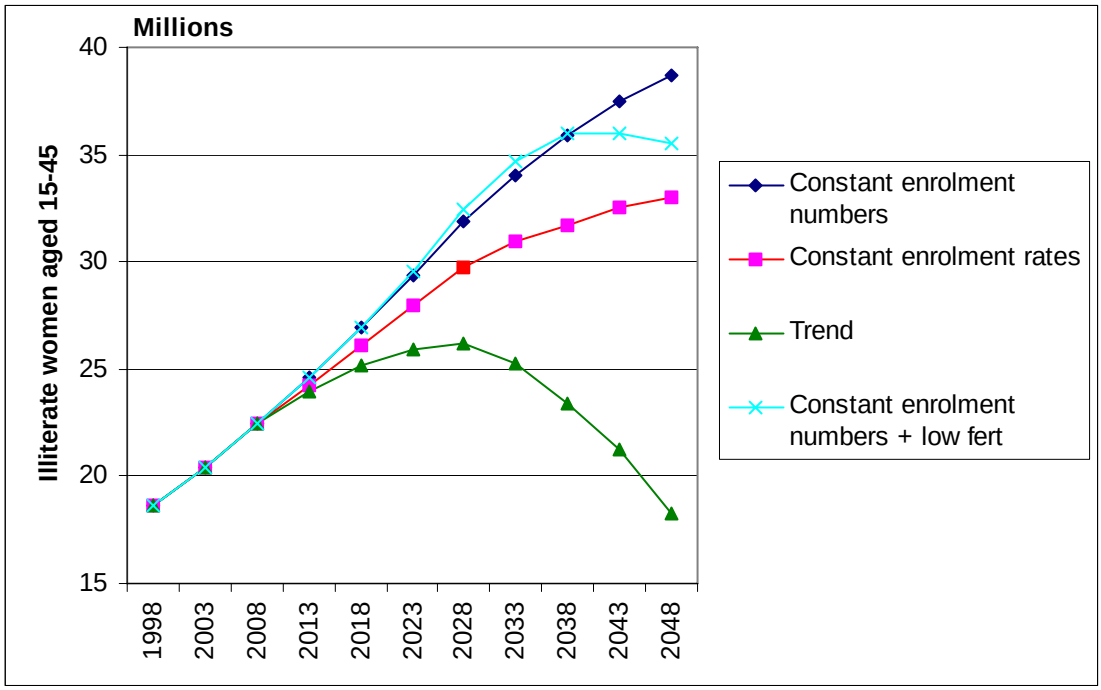


Table 3. Proportion by level of educational attainment of population aged 20-64 according to scenario constant enrollment rates, constant enrollment numbers and trend, 1998 and 2048

Scenario	Sex	Illiterate	Below Primary	Primary & Middle	Matric & Intermediate	Degree & Above
2000	Male	47.5	5.8	23.6	17.6	5.5
	Female	74.8	3.3	11.5	7.9	2.6
	Total	60.7	4.6	17.7	12.9	4.1
'Constant enrolment rates'	Male	33.2	6.1	34.3	20.2	6.2
	Female	52.4	4.9	28.3	10.7	3.7
	Total	42.7	5.5	31.3	15.5	5.0
'Constant enrolment numbers'	Male	44.6	2.3	35.6	13.8	3.7
	Female	58.3	3.3	28.3	7.8	2.3
	Total	51.4	2.8	32.0	10.8	3.0
'Trend'	Male	18.2	7.4	38.2	29.0	7.2
	Female	39.1	7.7	34.5	12.1	6.6
	Total	28.6	7.5	36.4	20.6	6.9
'Constant enrolment numbers and rapid fertility decline'	Male	44.4	2.5	36.2	13.3	3.6
	Female	58.1	3.5	28.6	7.6	2.2
	Total	51.2	3.0	32.4	10.5	2.9

Figure 3. Absolute number of illiterate women aged 15-45 according to four scenarios, 1998-2048



Source: Own calculations

Table 4. Overall total fertility rate according to the three scenarios

Scenario	1998	2048
Constant enrolment numbers	4.42	2.03
Constant enrolment rates		1.98
Constant enrolment numbers + rapid fertility decline		1.98
Trend		1.88

3. Main Conclusions

To be written