

- (ii) Estimation of the total number of births during the period from 1975 to 1990 under the three assumptions of population growth rates to find out the number of births that can be averted by reducing the rate of population growth.
- (iii) Translation of the government's Education Policy into enrolment in the primary and middle schools.
- (iv) Estimation of social costs of primary and middle school education on the basis of school enrolment.
- (v) Estimation of the savings in the social costs of primary and middle school education per birth averted.
- (vi) Estimation of government outlays on the basis of school enrolment.
- (vii) Estimation of savings in government outlays per birth averted.

Population Projections

In order to estimate the number of children to be enrolled for primary and middle school education, population projections for the relevant age groups have been made up to 1990 on *three different assumptions* about the rate of population growth.

Under the *first assumption*, the projections have been prepared on the same basis as was used by the Planning Commission for the population projections for the Fifth Five-Year Plan [3]. The Planning Commission made its projections up to 1985 on the basis of an average growth rate of 3.0% during 1975-80 and of 2.9% for 1980-85. These projections have been extended to 1990 on the basis of an average growth rate of 2.8% during 1985-90. Under the *second assumption*, projections have been prepared on the basis of an average growth rate of 2.83% during 1975-80, of 2.67% during 1980-85 and of 2.50% during 1985-90. Under the *third assumption*, projections have been made on the basis of an average growth rate of 2.67% during 1975-80, of 2.33% during 1980-85 and of 2.20% during 1985-90. The assumptions used in the preparation of these projections have been briefly explained in Appendix I.

Population projections of the relevant age groups under the three assumptions are given in Appendix III, Table 1. The breakdown by sex of the two school-age groups is given in Appendix III, Table 2. Projected numbers of births as well as crude birth and death rates are given in Appendix III, Table 3.

The estimated total population as well as populations in the primary and middle school age groups in 1990, under the three assumptions of population growth, is shown in Table I alongwith the corresponding population in 1975, the base year.

Table I

Projected Population (in millions), 1975 and 1990, under Different Assumptions

Population Categories	1975 (Base year)	1990		
		Assumption I	Assumption II	Assumption III
Total Population	70.3	107.9	104.4	100.3
Primary School Age Group	10.1	15.4	14.4	12.8
Middle School Age Group	5.4	8.1	7.7	7.3

Source: Appendix III, Table 1.

It will be seen from the above figures that for the year 1990, the estimated primary school age population is 1.0 million less under Assumption II and 2.6 million less under Assumption III compared with that under Assumption I. Similarly, the middle school age population is 0.4 million less under Assumption II and 0.8 million less under Assumption II compared with the corresponding population under Assumption I.

The impact of changes in birth rate (which is reflected in changes in the rate of population growth) on the size of the primary school age population is felt after four years as the primary school age population for the first four years has already been born. Similarly, the impact of changes in birth rate of the size of middle school age population is felt after nine years, because the population for the first nine years of age has already been born. Thus over the period of fifteen years, for which projections have been made, the impact of changes in birth rate is greater on the size of the primary school age population than on the size of the middle school age population.

School Enrolment

The number of pupils to be on the rolls of primary and middle schools from 1975 to 1990 has been projected in line with the enrolment objectives of the Government Education Policy in respect of these two levels of education. These projections are given in Appendix III, Table 4. Projections for new enrolment for primary and middle schools from 1975 to 1990 are given in Appendix III, Table 5.

The estimated number of pupils to be on the rolls in primary and middle schools in 1990 compared with that in 1975 under the three assumptions of population growth is shown in Table II.

Table II

Projected Number of Pupils (in millions), 1975 and 1990, under Different Assumptions of Population Growth

Year	Assumption I		Assumption II		Assumption III	
	Primary	Middle	Primary	Middle	Primary	Middle
(A) 1990	15.4	8.1	14.4	7.7	12.8	7.3
(B) 1975	6.1	2.0	6.1	2.0	6.1	2.0
Increase (A) — (B)	9.3	6.1	8.3	5.7	6.7	5.3

Source: Appendix III, Table 4.

The increase in the numbers of primary and middle school pupils will be very large. However, the number of primary school pupils in 1990 will be 1.0 million smaller under Assumption II and 2.6 million smaller under Assumption III than that under Assumption I. Similarly the number of middle school pupils will be 0.4 million smaller under Assumption II and 0.8 million smaller

under Assumption III compared with the corresponding number under Assumption I.

Social Costs

The social costs comprise the government-borne costs and the pupil-borne costs. The former include the direct costs in the form of teacher salaries etc. and indirect costs on account of amortization of school buildings and other capital assets. The latter include the direct costs in the form of books etc. and the indirect costs on account of the earnings foregone by the pupils.

The social costs for the implementation of the Government Education Policy for enrolment in primary and middle schools have been projected on the basis of unit costs estimates prepared by the Bureau of Educational Planning, Ministry of Education, Government of Pakistan [2], with certain modifications as explained in Appendix II.

The projections of costs have been prepared on the basis of

- (i) school buildings used for a single shift, schools with boundary walls for girls, and schools without boundary walls for boys; and
- (ii) school buildings with boundary walls used for two shifts, one shift for boys and the other shift for girls.

Social cost projections on the basis of single-shift use of school buildings are given in Appendix III, Table 6 and on the basis of double-shift use of buildings in Table 7 of the same Appendix.

The total cost of primary and middle school education in terms of the estimated value of the Pak Rupee in 1975 for the entire fifteen-year period from 1975 to 1990 on single and double shift basis under the three assumptions about population growth is summarised in Table III.

Table III

Cost of Education on Projected Numbers of Pupils

(Million Rupees)

Shift/Assumption	Primary School	Middle School	Total
<i>Single Shift</i>			
Assumption I	60,005	41,751	102,556
Assumption II	58,047	41,229	100,076
Assumption III	56,336	40,712	97,088
<i>Double Shift</i>			
Assumption I	44,353	30,305	74,658
Assumption II	42,939	29,911	72,850
Assumption III	41,112	29,537	70,649

Source: Appendix III, Tables 6 and 7.

The cost estimates of primary and middle school education under the Government Education Policy are staggering. The costs increase from Rs. 2,172 million in 1975 to Rs. 5,674 million in 1990 under the lowest assumption of population growth rate and on the basis of double-shift use of school buildings (see Appendix III, Table 7). One may wonder if the Education Policy in respect of primary and middle school education is at all realistic. But a discussion of this question is beyond the scope of this paper. However, it will be seen from the above summary statement that with single-shift use of school buildings, there will be a saving of Rs. 2,480 million in the cost of primary and middle school education under Assumption II and of Rs. 5,508 million under Assumption III compared with the cost under Assumption I. But, if the school buildings are used for two shifts, the savings under Assumption II would amount to Rs. 1,808 million and those under Assumption III would be as high as Rs. 4,009 million.

There are 4.06 million fewer births under Assumption II and 9.07 million fewer births under Assumption III compared with those under Assumption I (Appendix III, Table 3).

The savings in the costs of primary and middle school education per birth averted are given below:

	<i>Assumption II</i>	<i>Assumption III</i>
<i>Single Shift</i>		
A. Saving in expenditure (Million Rupees)	2480	5508
B. Births averted (Millions)	4.6	9.07
C. Saving per birth averted ($A \div B$) (Rupees)	611	607
<i>Double Shift</i>		
A. Saving in expenditure (Million Rupees)	1808	4009
B. Births averted (Millions)	4.06	9.07
C. Saving per birth averted ($A \div B$) (Rupees)	445	442

Thus it would seem that minimum savings in primary and middle school education exceed Rs. 440 per birth averted.

Government Outlays

The impact of different rates of population growth on primary and middle school education can also be examined in terms of government outlays for the implementation of the enrolment objectives of the Education Policy. The government outlays in a particular year include the direct costs, such as teacher-salaries, and capital costs for the construction of new school buildings required for the additional pupils enrolled during the year. But they exclude amortization costs as no current outlays are required for meeting these costs. As the exercise is limited to the government outlays only, the pupil-borne costs are also excluded. Estimates of government outlays on the basis of single-shift use of school buildings are given in Appendix III, Table 8 and on the basis of double-shift use of buildings in Table 9 of the same Appendix. The estimates of the outlays are summarised in Table IV.

Table IV

Estimated Government Outlays under Different Assumptions
(in million rupees)

Shift/Assumption	Primary Schools	Middle Schools	Total
<i>Single Shift</i>			
Assumption I	29,092	23,285	52,377
Assumption II	27,306	22,592	49,898
Assumption III	24,794	21,747	46,541
<i>Double Shift</i>			
Assumption I	24,164	18,900	43,064
Assumption II	22,962	18,449	41,411
Assumption III	21,227	17,922	39,149

Source: Appendix III, Tables 8 and 9.

In the case of single-shift use of school buildings, there will be a saving of Rs. 2,479 million under Assumption II and of Rs. 5,836 million under Assumption III compared with the estimated outlays under Assumption I. The corresponding figures for savings in the case of double-shift use of buildings would be Rs. 1,653 million and Rs. 3,915 million respectively.

The savings in the government outlays on primary and middle school education per birth averted are given below:

	<i>Assumption II</i>	<i>Assumption III</i>
<i>Single Shift</i>		
A. Saving in government outlays (Million Rupees)	2,479	5,836
B. Births averted (Millions)	4.06	9.07
C. Saving per birth averted ($A \div B$) (Rupees)	611	643
<i>Double shift</i>		
A. Saving in government outlays (Million Rupees)	1,653	3,915
B. Births averted (Millions)	4.06	9.07
C. Saving per birth averted ($A \div B$) (Rupees)	407	432

Conclusion

The rate of population growth has a great impact on the costs of primary and middle school education. Both the financial costs and the government outlays are substantially less under Assumptions II and III of population growth than under Assumption I. The savings in costs under Assumptions II and III, when divided by the number of births averted, give the savings per birth averted. Such savings are very substantial and range from Rs. 442 to Rs. 661

in the case of social costs and from Rs. 407 to Rs. 643 in the case of the government outlays.

It should be pointed out that the primary and middle schools education costs are a very small part of the total costs which the country has to bear to sustain an increasing population. If, due to a reduction in the rate of population growth, the savings in this very small part of the total costs are so substantial, the savings in total costs must be truly impressive. This shows that the returns on a properly conceived and efficiently implemented family planning programme can be very high. With proper effort, it should certainly be possible to reduce the population growth rate to 2.2% or to an even lower level during the next fifteen years.

Appendix I**Population Projections**

The projections of total population and of primary and middle school age populations have been prepared by using, as base, the Planning Commission's projections prepared for the Fifth Five-Year Plan [3]. The present set of projections provides estimates of population under two additional assumptions of growth. The projections under Assumption I are the same as the Planning Commission's above-mentioned projections up to the year 1985 but have been extended here to 1990. The target growth rates for the period 1985-90 under Assumptions I, II and III have been taken as 2.8%, 2.5% and 2.2% respectively.

The base population and the age-specific mortality schedules used in the three projections are the same as used in the Fifth Plan projections. So the variations in the growth rate targets reflect different patterns of fertility declines, which are indicated by the crude birth rates in five-year periods, under the three assumptions.

Table III shows the growth rates, crude birth and death rates and the estimated births during five-year periods under the three assumptions. The table also gives estimates of births averted under Assumptions II and III compared with those averted under Assumption I.

Appendix II**Unit Cost Estimates**

Unit cost estimates of primary and middle school education have been prepared by the Bureau of Educational Planning, Ministry of Education [2]. The costs are expressed in terms of the estimated value of the Pak Rupee in 1975 and are based on two alternative assumptions about the use of school buildings, namely, (i) single-shift use of school buildings with boundary walls for girls and without boundary walls for boys, and (ii) double-shift use of buildings with boundary walls. The costs include the government-borne costs and the pupil-borne costs. The former include the direct costs which cover teacher salaries etc. and indirect costs which cover the amortization of school buildings and of other capital assets. The amortization has been calculated on the basis of an 18% discount rate which has been taken as the opportunity cost of capital. The pupil-borne costs include the direct costs of books etc. to be purchased by the pupil and the indirect costs in the form of earnings foregone by the pupil.

The cost estimates used in this paper are exclusive of the earnings foregone by the pupil because it is questionable whether there are any social costs involved in the form of earnings foregone in the case of pupils up to the age of twelve years in a labour surplus economy like that of Pakistan.

The annual unit costs in terms of rupees per pupil, as estimated by the Bureau of Educational Planning, are given below:

	(Rupees per pupil)	
	<i>Primary</i>	<i>Middle</i>
I. Government-Borne Costs		
A. Single Shift Schools*		
(i) Direct Costs (Teacher salaries etc.)	100	160
(ii) Indirect Costs (amortization of buildings etc.)		
(a) Schools without boundary walls	183	274
(b) Schools with boundary walls	219	310
B. Double Shift Schools**		
(i) Direct Costs (Teacher salaries etc.)	100	160
(ii) Indirect Costs (amortization of buildings etc.)	110	155
II. Pupil-Borne Costs		
Direct Costs (books etc.)	30	40
Indirect Costs (earnings foregone)	456	1,064
III. Capital Costs (per pupil)		
School without boundary walls	1,030	1,520
School with boundary walls	1,230	1,720

*Schools without boundary walls for boys and schools with boundary walls for girls.

**Schools with boundary walls for boys and girls, one shift for boys and the other shift for girls.

Table 1
Population Projections, 1975 through 1990: Total, Primary School-Age and Middle School-Age (in millions)

Years	Assumption I			Assumption II			Assumption III		
	Total Population	Primary School-Age (5-9 years) Population	Middle School-Age (10-12 years) Population	Total Population	Primary School-Age (5-9 years) Population	Middle School-Age (10-12 years) Population	Total Population	Primary School-Age (5-9 years) Population	Middle School-Age (10-12 years) Population
1975	70.3	10.1	5.4	70.3	10.1	5.4	70.3	10.1	5.4
1976	72.4	10.2	5.5	72.2	10.4	5.5	72.1	10.4	5.5
1977	74.5	10.7	5.6	74.3	10.7	5.6	74.1	10.7	5.6
1978	76.8	11.1	5.7	76.4	11.1	5.7	76.0	11.1	5.7
1979	79.1	11.4	5.8	78.6	11.4	5.8	78.1	11.4	5.8
1980	81.5	11.8	6.0	80.8	11.8	6.0	80.2	11.8	6.0
1981	83.8	12.1	6.2	83.0	12.0	6.2	82.0	11.9	6.2
1982	86.2	12.5	6.4	85.2	12.2	6.4	83.9	12.0	6.4
1983	88.7	12.8	6.6	87.5	12.5	6.6	85.9	12.1	6.6
1984	91.3	13.2	6.8	89.9	12.7	6.8	87.9	12.2	6.8
1985	94.0	13.6	7.0	92.3	12.9	7.0	89.9	12.3	7.0
1986	96.6	13.9	7.2	94.6	13.2	7.1	91.9	12.4	7.1
1987	99.3	14.3	7.4	97.0	13.5	7.3	93.3	12.5	7.1
1988	102.1	14.6	7.6	99.4	13.8	7.4	96.0	12.6	7.3
1989	105.0	15.0	7.9	101.9	14.1	7.6	98.1	12.7	7.3
1990	107.9	15.4	8.1	104.4	14.4	7.7	100.3	12.8	7.3

Appendix III

Table 2

Projected Primary and Middle School-Age Populations (by Sex): 1975 through 1990

(in thousands)

Years	Primary School-Age (5-9)						Middle School-Age (10-12)					
	Assumption I		Assumption II		Assumption III		Assumption I		Assumption II		Assumption III	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
1975	5,280	4,788	5,280	4,788	5,280	4,788	2,811	2,536	2,811	2,536	2,811	2,536
1976	5,448	4,944	5,488	4,944	5,488	4,944	2,573	2,594	2,573	2,594	2,573	2,594
1977	5,622	5,103	5,622	5,103	5,622	5,103	2,938	2,653	2,938	2,653	2,938	2,653
1978	5,801	5,268	5,801	5,268	5,801	5,268	3,004	2,713	3,004	2,713	3,004	2,713
1979	5,985	5,439	5,985	5,439	5,985	5,439	3,071	2,775	3,071	2,775	3,071	2,775
1980	6,176	5,615	6,176	5,615	6,176	5,615	3,140	2,839	3,140	2,839	3,140	2,839
1981	6,346	5,783	6,292	5,720	6,233	5,666	3,240	2,931	3,240	2,931	3,240	2,931
1982	6,520	5,957	6,401	5,328	6,290	5,718	3,344	3,027	3,344	3,027	3,344	3,027
1983	6,700	6,135	6,530	5,937	6,347	5,778	3,452	3,125	3,452	3,125	3,452	3,125
1984	6,844	6,319	6,653	6,049	6,406	5,824	3,562	3,227	3,562	3,227	3,562	3,227
1985	7,073	6,509	6,778	6,162	6,465	5,877	3,677	3,332	3,677	3,332	3,677	3,332
1986	7,243	6,677	6,921	6,293	6,510	5,919	3,783	3,428	3,746	3,395	3,711	3,363
1987	7,418	6,848	7,068	6,425	6,557	5,960	3,892	3,528	3,818	3,460	3,746	3,395
1988	7,596	7,025	7,217	6,562	6,603	6,003	4,005	3,629	3,890	3,526	3,781	3,426
1989	7,779	7,206	7,370	6,700	6,645	6,045	4,120	3,734	3,964	3,592	3,817	3,458
1990	7,966	7,392	7,526	6,842	6,697	6,088	4,239	3,842	4,039	3,661	3,852	3,491

Appendix III

Table 3

*Projected Enrolments (by Sex) in Primary and Middle School:
1975 through 1990*

Period	1975—80	1980—85	1985—90
<i>Assumption I</i>			
Number of births (in five years)	16,817,229	18,558,580	20,459,887
Population growth rate (%)	(3.0)	(2.9)	(2.8)
Crude birth rate (per thousand)	44.4	42.4	40.6
Crude death rate (per thousand)	14.4	13.4	12.6
<i>Assumption II</i>			
Number of births (in five years)	16,092,238	17,362,482	18,321,805
Population growth rate (%)	(2.83)	(2.67)	(2.5)
Crude birth rate (per thousand)	42.7	40.2	37.3
Crude death rate (per thousand)	14.4	13.5	12.3
<i>Assumption III</i>			
Number of births	15,282,022	15,449,882	16,033,885
Population Growth rate (%)	(2.67)	(2.33)	(2.2)
Crude birth rate (per thousand)	40.7	36.4	33.8
Crude death rate (per thousand)	14.0	13.1	11.8

Total births in 15 years

(a) Under Assumption I	=	55,835,696
(b) Under Assumption II	=	51,776,525
(c) Under Assumption III	=	46,765,789
Difference (a) — (b)	=	4,059,171 births
Difference (a) — (c)	=	9,069,907 births

Appendix III

Table 4

Projected Enrolments (by Sex) in Primary and Middle Schools: 1975 through 1990

Years	Primary School Enrolments						Middle School Enrolments					
	Assumption I		Assumption II		Assumption III		Assumption I		Assumption II		Assumption III	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
	(in thousands)	(in thousands)	(in thousands)	(in thousands)	(in thousands)	(in thousands)	(in thousands)	(in thousands)	(in thousands)	(in thousands)	(in thousands)	(in thousands)
1975	4,013	2,107	4,013	2,107	4,013	2,107	1,335	644	1,335	644	1,335	644
1976	4,478	2,472	4,478	2,472	4,478	2,472	1,581	820	1,581	820	1,581	820
1977	4,947	2,883	4,947	2,883	4,947	2,883	1,836	1,003	1,836	1,003	1,836	1,003
1978	5,453	3,308	5,453	3,308	5,453	3,308	2,103	1,194	2,103	1,194	2,103	1,194
1979	5,985	3,753	5,985	3,753	5,985	3,753	2,380	1,393	2,380	1,393	2,380	1,393
1980	6,176	4,222	6,176	4,222	6,176	4,222	2,669	1,601	2,669	1,601	2,669	1,601
1981	6,346	4,626	6,292	4,656	6,233	4,612	2,997	1,835	2,997	1,835	2,997	1,835
1982	6,520	5,218	6,401	5,105	6,290	5,009	3,344	2,082	3,344	2,082	3,344	2,082
1983	6,700	5,706	6,530	5,569	6,347	5,413	3,452	2,344	3,452	2,344	3,452	2,344
1984	6,844	6,319	6,653	6,049	6,406	5,824	3,562	2,620	3,562	2,620	3,562	2,620
1985	7,073	6,509	6,778	6,162	6,465	5,877	3,677	2,912	3,677	2,912	3,677	2,912
1986	7,243	6,677	6,921	6,293	6,510	5,919	3,783	3,209	3,746	3,178	3,711	3,147
1987	7,418	6,848	7,068	6,425	6,557	5,960	3,892	3,528	3,918	3,460	3,746	3,395
1988	7,596	7,025	7,217	6,562	6,603	6,003	4,005	3,629	3,890	3,526	3,781	3,426
1989	7,779	7,206	7,370	6,700	6,645	6,045	4,120	3,734	3,964	3,592	3,111	3,458
1990	7,966	7,392	7,526	6,842	6,697	6,088	4,239	3,842	4,039	3,661	3,852	3,491

Appendix III

Table 7

Projected Social Costs of Double-Shift Primary and Middle School Education (by Sex): 1975 through 1990
(million rupees)

Years	Primary						Middle					
	Assumption I		Assumption II		Assumption III		Assumption I		Assumption II		Assumption III	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
1975	963	506	963	506	963	506	474	229	474	229	474	229
1976	1075	593	1075	593	1075	593	561	291	561	291	561	291
1977	1187	692	1187	692	1187	692	652	356	652	356	652	356
1978	1309	794	1309	794	1309	794	747	424	747	424	747	424
1979	1436	901	1436	901	1436	901	845	495	845	495	845	495
1980	1482	1013	1482	1013	1482	1013	947	568	947	568	947	568
1981	1523	1110	1510	1117	1496	1107	1064	651	1064	651	1064	651
1982	1565	1252	1536	1225	1510	1202	1187	739	1187	739	1187	739
1983	1608	1369	1567	1337	1523	1299	1225	832	1225	832	1225	832
1984	1643	1517	1597	1452	1537	1398	1265	930	1265	930	1265	930
1985	1698	1562	1627	1479	1552	1410	1305	1034	1305	1034	1305	1034
1986	1738	1602	1661	1510	1562	1421	1343	1139	1330	1120	1317	1117
1987	1780	1644	1696	1542	1574	1430	1382	1252	1355	1228	1330	1205
1988	1823	1686	1732	1575	1585	1441	1422	1288	1381	1252	1342	1216
1989	1867	1729	1769	1608	1595	1451	1463	1326	1407	1275	1355	1228
1990	1912	1774	1806	1642	1607	1461	1505	1364	1434	1300	1367	1239
Total:	24609	19744	23953	18986	22993	18119	17387	12918	17179	12732	16983	12554

Appendix III

Table 9

Projected Government Outlays in Double-Shift Primary, Middle and Total (Primary and Middle) School Education
(Both Sexes): 1975 through 1990

(million rupees)

Years	Primary Education			Middle Education			Total (Primary and Middle)		
	Assumption I	Assumption II	Assumption III	Assumption I	Assumption II	Assumption III	Assumption I	Assumption II	Assumption III
1975	612	612	612	317	317	317	929	929	929
1976	1205	1205	1205	747	747	747	1952	1952	1952
1977	1324	1324	1324	830	830	830	2154	2154	2154
1978	1448	1448	1448	919	919	919	2367	2367	2367
1979	1575	1575	1575	1013	1013	1013	2588	2588	2588
1980	1445	1445	1445	1111	1111	1111	2556	2556	2556
1981	1451	1433	1359	1257	1257	1257	2708	2690	2616
1982	1645	1494	1409	1378	1378	1378	3023	2872	2787
1983	1652	1574	1459	1245	1245	1245	2897	2819	2704
1984	1782	1641	1512	1321	1321	1321	3103	2962	2833
1985	1616	1440	1304	1404	1404	1404	3020	2844	2708
1986	1600	1490	1297	1464	1395	1329	3064	2885	2626
1987	1640	1521	1306	1555	1470	1385	3195	2991	2691
1988	1681	1554	1314	1406	1356	1210	3087	2910	2524
1989	1723	1586	1321	1445	1330	1223	3168	2916	2544
1990	1765	1620	1337	1488	1356	1233	3253	2976	2570
Total:	24164	22962	21227	18900	18449	17922	43064	41411	39149

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