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"An Economic Analysis of Costs and Benefits of Pakistan's Investment in Population Control 1965-88"

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In

The Name of Allah

The Most Beneficent And Merciful

"Al-Quran"

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ABSTRACT

This thesis aims at presenting an economic analysis of Pakistan Government's investment in population control programme during the period 1965-88. Economic analysis in the context of this research implies an estimation of economic returns from public expenditure on the government's approved population control measures.

It may be asked as to what precisely economic returns mean and how they are assessed. To answer this question the present study has cast a look at the current demographic literature which reveals that quantitatively speaking, economic benefits of a population control program can be ascertained by measuring any one of the following:-

(i) Contribution of population control programme in the form of lower fertility rates to the achievement of a nation's overall economic goals as given in its fiveyear plans.

(ii) Changes in the knowledge, attitude and practice of family planning and its resultant economic impact in the form of better nutrition, more savings, higher consumption and similar type of benefits.

(iii) Saving in public expenditure on social overheads like schools, hospitals, housing and transport because of reduced rate of population growth.

(iv) Monetary benefits due to averted births made possible by population control measures. These monetary benefits can be viewed from a number of angles like higher per capita income, more capital formation or reduced unemployment.

This research shows that the last method of measuring economic returns is relatively more free of flaws from which other methods suffer. Take, for example, the first method. It requires the measurement of demographic impact of the family planning programme in the form of reduced birth rates. But decline in birth rate is dependent on many factors, family planning being only one of them. Even if birth rates do not show any significant downward trend, population control programme may still be exerting powerful influence in counteracting the effects of declining mortality rates. As against this, decline in birth rates may be due to changes in social and economic determinants of fertility or cultural factors influencing breast-feeding practices, age at marriage, gainful employment of women in economic fields and female literacy rates. As the type of data required for isolating these influences to assess the net contribution of population control programme was not available in Pakistan at the time this study was initiated, this approach was not attempted.

The second method of assessing economic returns cannot accurately depict the contribution of population control programme because change in attitudes and use of contraceptives cannot be ascribed merely to efforts of population control network in the country. Other intermediate variables, e.g. education, audio-visual aids, exposure to western ways of life and a multiplicity of other factors can also be responsible for a change in attitudes. So this type of assessment was also not considered.

The third method of assessment in terms of savings in public expenditure due to lesser demand for social overheads also lacks precision. Social overheads include schools, hospitals, means of transport and housing. An attempt to measure economic returns by this method can only partially depict the benefits from population control programme because of the difficulties of identifying and estimating all relevant variables. Hence this approach was also not found suitable for the purpose of this research.

The fourth method focusing on calculation of births averted because of the population control programme does not seem to suffer from any of the imperfections mentioned with reference to other methods. So this study focused on the calculation of the monetary benefits of averted births for an assessment of economic returns.

This disseration is divided into four parts, each having a different theme within the overall framework of the study in a logical sequence. Benefit/cost calculations as well as other mathematical derivations and application of multiple regression analysis are based on data tabulated in appendices A,B,C,D,E,F,G and H. Abbreviations and glossary of some relevant demographic terms are also appended.

PART I

This part consists of chapter 1 which focuses on the vitally crucial role of two interacting sets of variables i.e. economic development and population growth. Theory of demographic transition and vicious circle of poverty has also been discussed in this context. The objective of this disseration of developing an economic rationale for further investment in population control programme of Pakistan has been corroborated as well.

PART II

Conceptual framework of this study is discussed in this part consisting of chapters 2,3,4 and 5.

In chapter 2, an overview of a few evaluative techniques attempting economic evaluation of population control programmes is given.

In chapter 3, some models attempting economic analysis of population control programmes in other countries have been reviewed briefly. Coale and Hoover's model, has neglected cost of population control programme. George B. Simmons, in a refined version of Coale & Hoover's model, included the cost element but did not calculate the net survivors of averted births of the previous time periods which have been included in the present model. In Enke's model, cost was defined as the loss of productive services of the unborn child, whereas benefits were defined as difference between consumption and production of the unborn. Consumption would have strarted at zero age whereas production could start at age fifteen or above. Difference between the two magnitudes was the upper limit of the money bonus which could be given to contracepting parents. Zaidan's model was based on the framework constructed by Enke with some refinements. Both Enke's and Zaidan's models do not include the expenditure on population control programme as part of the cost, which has been included in the present model. Robinson's model does not contain any of the flaws mentioned above but requires data of the type not available in Pakistan. Models put forward by Simon, Bower and Demeny have also been briefly discussed in this chapter.

In chapter 4, a review of studies aimed at evaluation of population control programme of Pakistan has been done. The degree of over-estimation of output data generated by the population control network has been estimated by Farooqui and Soomro as 41%. Accordingly, in my estimation of averted births, such data have been reduced by 41% before converting these magnitudes into averted births. Khan, using Enke's coefficients calculated benefit/cost ratio for Pakistan within a range of 18:1 and 38:1 which forms a basis for comparison with the benefit/cost ratio calculated as 15.2:1 in this study.

In chapter 5, a brief introduction to the technique of benefit/cost analysis as well as economic models is given. The process of interlinking variables, constants and parameters in the form of definitional or behavioural equations in the appropriate mathematical structure has been explained. Prerequisites and salient features of economic models have also been briefly discussed. A new Averted Births Based (ABB) model has been developed for this study. This demographic/economic model is simple yet realistic. It has assumptions and limitations peculiar to this type of models. Interestingly, removal of some of the assumptions or limitations makes the benefits larger than depicted in the model. It may be mentioned here that in the case of models attempting to calculate economic benefits of population control programmes, precision of results and forecasting ability of the model depend not only on the degree of sophistication of the model but also on quality of data which is based on surveys, involving interviews and questionaires. Heterogeneity in the quality of interviewers & interviewees affects the quality of data which is generated by probing into a very private, subtle and delicate aspect of human behaviour. In Pakistan, in addition to the above mentioned limitations, there are inconsistencies in the data whether data is generated by more than one agency, or by the same agency overtime as discussed in details in Part III. Working with all such limitations, I have built the ABB model which interconnects the basic macro economic variables in a causal way. The mathematical form of the definitional and behavioural equations comprising the model is linear. As far as I know, the conceptual framework of the model is different from any of the models reviewed in this study or being developed by researchers world-wide.

PART III

This Part consists of chapters 6,7, and 8 which gives an analysis of Pakistan's investment in population control programme.

Chapter 6 depicts various contours of the uneven population policy adopted by Pakistan government. The rationale for wild fluctuations in costs has been traced and examined critically. Different drawbacks of Pakistan's population policy have been highlighted as well.

In chapter 7, an attempt has been made to compare targets, implementation and achievements of the population control programmes in various Five Year Plans of Pakistan. A number of discrepancies have been pointed out. A critical evaluation of Pakistan's population control programme in various Five-Year Plans has shown that greater success could have been achieved with a better organized, more imaginative, consistent and continuous programme.

In chapter 8, application of the ABB model to Pakistan's population control programme (1965-88) has been attempted. Great care has been taken to use only published and authenticated data. Data source of every variable used in the model has been given explaining the adjustments made and pointing out inadequacies if any. Number of averted births have been calculated each year from 1965 to 1988. The year 1965-66 has been taken as the starting year in this study because government run population control programme had gained momentum by that year. Total money benefits each year due to net averted births which could have been added to the population that year in the absence of any programme of population control, have been calculated. These yearly series of money benefits have been converted in terms of constant price level of 1980-81 which has been assumed to be the base year. Similarly, cost of population control programme has been calculated as sum of the yearly expenditure incurred on population control programme and converted into constant price level of 1980-81. Other types of costs e.g. opportunity costs or indirect costs have been ignored.

PART IV

This part consists of chapters 9,10 and 11 and deals with findings and recommendations.

Chapter 9 summarizes various economic aspects of the calculations done in chapter 8. Calculations of yearly benefit/cost ratios (ranging between 1.49 to 31.19) warrant further expansion of this programme of population control. Similarly, yearly benefit per averted birth (ranging between Rs. 1993 to Rs. 4098) has been compared with yearly cost per averted birth (ranging from Rs. 103 to Rs. 1339) to establish an economic rationale for more flow of funds in this direction till the point where benefit per averted birth is equalized to cost per averted birth. This economic rationale of allocation of funds to competing projects should be carefully considered by policy makers of Pakistan.It has also been concluded that the model built for this study can be applied to any other country with modifications in assumptions, if necessary. So in my view the model has universal applicability.

Chapter 10 explores the model further to find whether it can be used to forecast future benefits out of a given amount of cost. Multiple regression analysis was used after ensuring mathematically that the assumptions of linearity of costs and benefits functions was permissible. Different cases were considered such as the following:-

(i) Taking cost and time as explanatory variables and current benefits as explained variable.

(ii) Taking cost and time as explanatory variables and accumulated benefits as explained variable.

(iii) Taking cost only as explanatory variable and current benefits as explained variable.

(iv) Taking time only as explanatory variable and accumulated benefits as explained variable.

The structural parameters in all the above models were estimated using OLS (ordinary least squares) method of curve fitting. The calculated values of F-Statistics, T-Statistics and R^2 in all the above models revealed that both time and cost explained the variations in benefits to a fairly large extent and that the overall regression model was a good fit. However, forecasting was not possible because of wild and abrupt fluctuations in yearly costs.

Chapter 11 consists of conclusions of this study and recommendations. It suggests a policy-framework giving due importance to cultural, religious and political factors and stressing the multi-disciplinary nature of this study. It has been pointed out that the population problem is only a part of the overall problem of poverty and underdevelopment in this region. It has been concluded that the well being of the common man may not be improved by investing in population control programmes only. Other sectors like health, education, housing and manpower require effective and radical policies as well. Population policy can be effective only if it is an essential component of a well coordinated national economic plan. Also, in order to make this programme cost effective, organizational improvements within the population control network are inevitable. Similarly, political stability and administrative reforms are of vital importance to provide the basic infrastructure for the success of this programme in Pakistan.

PREFACE

My interest in the interrelationship between population dynamics and economic development has a long history. Back in 1963, when I started teaching a graduate level course at the Punjab University on this subject, I was extremely fascinated by it. Over the years my interest in this field continued to develop. Also, during my teching at Punjab University, I had ample opportunities of exchange of ideas with fellow economists and demographers whom I met at seminars, workshops and conferences in which we participated. My interest in this subject of economics of population continued to grow and I developed a firm conviction that many economic, social and cultural inhibitions faced by Pakistani people - women in particular could be overcome if our population growth assumed a reasonable rate. Nevertheless, it seemed that economic planners in Pakistan did not seek an economic justification for investment in family planning. It was surprising because research on benefit/cost analysis and related topics has been going on internationally including research in developing countries like Egypt and India.

I felt that it was essential for such a study to be undertaken in Pakistan. I discussed with Dr. Rafiq Ahmad, my senior colleague at the Department of Economics at that time, who encouraged me to undertake such a task. My initial attempts resulted in a few publications on population related issues. Eventually, I decided to go on for a doctoral thesis. Dr. Rafiq Ahmad encouraged and guided me to prepare a synopsis which was sent to Mr. M.L. Qureshi, Director, PIDE, and Dr. Gilbert Hardee, consultant at PIDE, and their comments resulted in many changes in conformity with the data available at that time. Finally, I got enrolled as a Ph.D. candidate in September, 1989 and thus began this Ph.D. thesis.

As a background to my research, I went through the existing literature. I found that one way to evaluate a family planning programme was to measure changes in the reproductive behaviour of the population before and after the programme. This could have been possible if there was a system of designing and maintaining data to estimate changes in the key variables which best represented reproductive behaviour, e.g. the crude birth rates, age-specific fertility rates, the pregnancy prevalence rates and potential fertility rates. But no such system existed in Pakistan. Alternatively, changes could be measured from what would have happened had there been no population control programme by the government of Pakistan. Even for this kind of analysis required type of data was not available in Pakistan e.g. a reliable national vital registration system as discussed by Mauldin (1967), Wishik (1973) and Pottor (1969). So I could not tread on any safe path of research devised elsewhere.

The present study is different from other attempts in the same direction. George B. Simmons (1969) calculated benefit/cost ratios for India as 75:1 which is much higher as compared to my very conservative calculation of benefit/cost ratio of 15:1 in the case of Pakistan. The wide difference is mainly due to variation of assumptions and horizon of benefits covered in the models. It may be interesting to note that I applied a modified form of Simmon's co-efficients for calculation of 'averted births' to Pakistani data (Chaudhary, Amatul R. 1974). The ratio was calculated as 25:1 which is closer to my present estimate of 15:1 than to Simmon's. Similarly G.C. Zaidan, Stephen Enke, W.C. Robinson and many other economists have undertaken economic analysis of population control programmes but covered different horizons.

Like many other countries, economists in Pakistan have different views on the issue of population control. On the one hand is the view that no economic development can be achieved with a high rate of population growth because whatever is achieved, is absorbed by the ever increasing population. On the other hand, another school of thought believes that population is the real resource and its proper utilization is possible only if we bring about appropriate changes in our economic and social structure. I have sympathy for their view point but when we look around in any urban centre of Pakistan, harsh realities of over population strike i.e. scattered huts, traffic jams which last for hours, buses and trains packed to the extent that travellers hang out of the doors and sit even over the roofs, hospital beds sprawled all over the corridors and court-yards of the premises and many such painful sights. This gloomy picture of Pakistan and the calculations done in my thesis clearly show that it is an absolute economic necessity to expand investment in population control activities to stop the high rate of population growth in Pakistan.

I may mention here an important limitation of my work. Ideally I should have crosschecked the published data on inputs and outputs by conducting surveys of some areas myself. But such a task was too unwieldy to be tackled by an individual researcher. Some properly funded research group having adequate staff, resources and time could have done it. Anyway, I have scanned and refined the published data on the basis of research studies conducted on relevant issues in Pakistan to compensate for the need of feedback filled surveys.

ACKNOWLEDGEMENTS

Although the present research relates to Pakistan, its substance has global dimensions. There is world-wide concern about the unhindered growth of population in many parts of the earth. Hence a vast amount of demographic literature has been produced in recent years. In my humble way, I have studied as much of this literature as permitted by the time and resources at my disposal.

Broadly speaking, my efforts concentrated on four major tasks, namely finding of relevant materials, holding of dialogues with experts, participation in seminars and workshops, and use of library facilities at home and abroad. The first task was to find relevant books, reports, articles and other materials with a view to becoming familiar with the existing concepts and findings about population control programmes.

I spent a year at Population Study Centre (PSC), University of Karachi where I worked as a visiting Professor. I attended a number of workshops and seminars held jointly by the PSC and University of London, U.K. There, I had chance to discuss issues relating to my research with such versatile intellectuals as Dr. John C.G. Blacker, Professor of Demography, Centre for Population Studies, London, UK, Professor W. Brass, London School of Hygiene & Tropical Medicine, University of London, UK, Dr. Y. Kim, Director/Professor, Population Research Centre, Utah State University, Utah, USA, Profs. S. Kinzett and Dave Atkins of Sir David Owen Population Centre, University of Wales UK.

I also made special trips to research organizations in Pakistan. I went to National Institute of Population Studies (NIPS) Islamabad, Pakistan Institute of

Development Economics (PIDE), Islamabad, State Bank of Pakistan (SBP), Karachi, Applied Economic Research Centre (AERC), University of Karachi, Federal Bureau of Statistics (FBS), Karachi, Population Study Centre (PSC), Faisalabad, Population Welfare Division (PWD), Islamabad. I held discussions with organizational heads e.g. Dr. Hafiz Pasha, Director AERC, Dr. Sultan S.Hashmi U.N.consultant at NIPS, Messrs. Mohammad Ahmad Turabi and M.D. Malik, Directors FBS, Syed Nawab Haider Naqvi, Director PIDE Mr. Ashraf Janjua, Deputy Governor State Bank of Pakistan, Dr. Talat Khan, Director National Institute of Fertility Control (NRIFC), Karachi and Mrs. Jameela Naeem, Director Ministry of Population Welfare (MPW), Islamabad. They were extremely helpful in sparing their time for me and allowing me to use their library sources. I am extremely grateful to all of them.

During the year I was at the PSC, (Karachi) Dr. M. Arif Ghayyur Director PSC and Miss Shakila Rahman Co-Director PSC were extremely helpful. We all worked together for building up the centre's library which already contained a vast number of volumes & research journals relevant to my topic of research.

A special gratitude is due to Dr. W.C. Robinson who has done quite a substantial amount of research on Population Control Programme of Pakistan. I read a number of his articles published in research journals of Pakistan and abroad but was unable to find some of his research reports relevant to my topic of doctoral research. I wrote to him at his available address in New Dehli, India but he had moved on to Nairobi by then. Eventually, I was able to contact him and he was extremely kind and helpful in sending me copies of the research reports requested for. I was extremely moved by his kind gesture.

I spent about four months in U.S.A in 1991 where I went to Population Studies Centres at Harvard and Brown and also used their library facilities. I am particularly indebted to Dr. David Bell and Dr. Lincoln Chen of PSC (Harvard) U.S.A. for their help. Professor Gustav Papanek, Director International Institute of Economic Development Boston University, U.S.A. has done a considerable amount of research on economic issues relating to Pakistan. He spared me some of his valuable time for discussion on my topic of research. He also extended all kind of help i.e. use of library facilities, attending graduate seminars and workshops. I am extremely grateful to him.

My junior colleagues at the Department of Economics, Punjab University have also been helpful in a number of ways. I discussed the techniques of model building with Dr. Abdul Rauf Butt, Chairman Department of Economics. Mr. Khalil Ahmad helped me in mathematical calculations and data collection. Mr. Amir got involved at a later stage in connection with statistical inferences and forecasting from the model I developed.

A special gratitude is due to my research supervisor. Dr. Rafiq Ahmad, Director General South Asian Studies Centre and Professor Emeritus, Economics Department, Punjab University. He possesses a very versatile and dynamic personality but is an extremely hard taskmaster. He spared for me hundreds of hours for discussion in spite of his various teaching, research and advisory assignments within Pakistan and abroad. I am deeply indebted to him for all the time and energy he used in unravelling the conweb of confusing issues which I had created around my topic of research. At times, I really felt guilty of bothering him too much over issues which proved to be trivial after discussing with him.

My daughter Hijab specializing in Pediatrics at Harvard University, son Irfan a graduate student at Massachusetts Institute of Technology and husband Mr. Inayat u Chaudhary, a chartered accountant from England & Wales have all been very useful in a number of ways. In addition to being helpful whenever they were around, they proved to be a source of strength and support during periods of stress. My sister Ms. Amatul Habib has always been supportive. I thank them all. The mistakes are my own.

I will be failing in my duty if I do not pay my tributes to late Mr. M.L. Qureshi and late Dr. Gilbert Hardee. They were a great source of guidance and encouragement for me in venturing on to this gigantic task of research. May their souls rest in peace (Amen).

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ABBREVIATIONS

ADP:	Annual Development Programme
CBR:	Crude Birth Rate
CMS:	Continuous Motivation Scheme
CPS:	Contraceptive Prevalence Survey
CRS:	Client Record System
CYP:	Couple Year of Protection
DPARC:	Demographic Policy Action Research Centre
FPAP:	Family Planning Association of Pakistan
FPO:	Family Planning Officer
FWC:	Family Welfare Centre
IEC:	Information, Education and Communication
IPPF:	International Planned Parenthood Federation
ISCM:	Information System on Contraceptive Movement
IUD:	Intra Uterine Device
KAP:	Knowledge, Attitude and Practice
LDC:	Less Developed Country
MCH:	Mother and Child Health
MESOREP:	Medical Social Research Project
MIS:	Management Information System
MSU:	Mobile Service Unit
NFPD:	National Family Planning Directorate
NGO:	Non-Governmental Organization
NIPS:	National Institute of Population Studies
NIS:	National Impact Survey
NRIFP:	National Research Institute of Family Planning

NRIFC:	National Research Institute of Fertility Control
NRIRP:	National Research Institute of Reproductive Physiology
PDR:	Pakistan Development Review
PESR:	Pakistan Economic and Social Review
PFS:	Pakistan Fertility Survey
PGE:	Population Growth Estimation
PGS:	Population Growth Survey
PIA:	Pakistan International Airlines
PLD:	Provincial Line Department
PLMS:	Population, Labour Force and Migration Survey
PSC:	Population Study Centre
PWD:	Population Welfare Division
PWP:	Population Welfare Programme
PWTI:	Population Welfare Training Institute
RHS:	Reproductive Health Services
RTI:	Regional Training Institute
SMC:	Social Marketing of Contraceptives
TBA:	Traditional Birth Attendant
TFR:	Total Fertility Rate
TGI:	Target Group Institution
TRI:	Training cum Research Institute
UNDP:	United Nations Development Programme
UNFPA:	United Nations Fund for Population Activities.
UNICEF:	United Nations Children Emergency Fund
USAID:	United States Agency for International Development
WAPDA:	Water and Power Development Authority
WFS:	World Fertility Survey

GLOSSARY

Age Specific Fertility Rate: It is the number of births per 1000 women of a given age group.

Age Specific Mortality Rate: It is the number of deaths per 1000 people of a given age group.

Crude Birth Rate: The number of live-births per 1000 population.

Crude Death Rate: The number of deaths per 1000 population
When the crude death rate is subtracted from the Crude Birth Rate, it gives the crude rate of natural increase.

Expectation of Life: The mean number of years that would be lived by a person experiencing the age specific death rates prevailing at a given time, measured from a particular year of life.

Fecundity: The physiological capacity of persons or couples to produce live-born children.

Fertility: A measure of the number of live children born to individuals, couples or populations. The most common measurements used are the following:-

> General Fertility Rate: The number of live-births per 1000 women of reproductive age, generally taken to be 15-44 or 15-49.

Gross Reproduction Rate (GRR): It is the mean number of female children born alive to women passing through the reproductive period and experiencing the age specific rate for female births at each age, assuming no mortality before the end of the reproductive period.

Net Reproduction Rate (NRR): It is calculated in the same way as the GRR with the important exception that women at risk are assumed subject to prevailing mortality within the reproductive period. So NRR measures the replacement rate of females in the population and thus its capacity for growth.

Marital Fertility Rate: The number of live-births per 1000 married women of reproductive age.

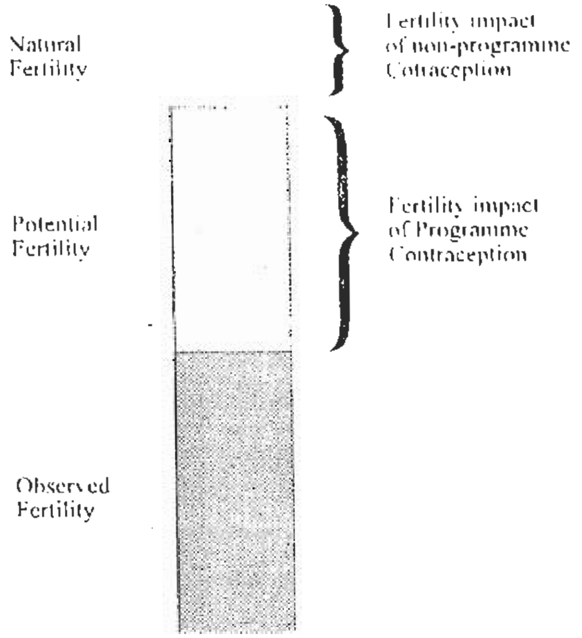
Total Fertility Rate: It is the total number of children born to women who live through the reproductive period. More precisely, the mean parity of women passing through the reproductive period and experiencing the given age specific fertility rates at each age assuming no mortality until the end of the reproductive period.

Natural Fertility: This the level of fertility in the absence of contraception whether programme induced or non-programme.

Potential Fertility: This is the level of fertility that would prevail in a population if all programme users stopped contracepting.

Observed Fertility: It is the rate of child bearing in a given year.

Relationship between observed, potential and natural fertility.



In the above diagram:-

1. Fertility impact of programme contraception is estimated as the difference between potential and observed fertility.

2. Fertility impact of non-programme contraception equals the difference between natural and potential fertility.

3. The total impact of all contraception - from both programme and non-programme sources - is given by the difference between natural and observed fertility.

<u>Vital Rates</u>: These refer to the variables which cause changes in the size and composition of population i.e. birth and death rates, migrations, marriages etc.

Vital Statistics: The collection, presentation and analysis of vital events constitute vital statistics. For purpose of comparison, relative numbers called Rates or ratios are commonly used in vital statistics.

Ratio of one number 'a' to another number 'c' is defined as a/c

Rate. In vital statistics, it is defined as a numerical proportion of the number of vital events to the population in which the events took place. e.g.

$$\text{Rate} = \frac{a}{a + b}$$

Where a stands for the number of times the given vital event occurs and b denotes the number of times the event does not occur.

Vital Rates are usually multiplied by 1000 and are generally of two kinds i.e. the crude rates and the specific rates.

A Crude Rate: It is defined as a ratio of vital events occurring during a year to mid year population during the same year.

A Specific Rate: It is defined as a ratio in terms of one or more characteristics of the population.

PART I
INTRODUCTION

"The world "stands before us as a great eternal riddle"

Einstein (1949)

"The marble index of a mind forever voyaging thorough strange seas of thought, alone."

Wordsworth

"I donot know what I may appear to the world; but to myself I seem to have been only like a boy, playing on the sea-shore, and diverting myself, in now and then finding a smoother pebble or a prettier shell than ordinary, whilst the great ocean of truth lay all undiscovered before me."

Newton

CHAPTER 1

ABOUT THE PRESENT RESEARCH

1.0 INTRODUCTION

This study aims at economic analysis of past investments in population control programme of Pakistan. In this chapter, an attempt has been made to highlight the need and importance of such a study. For this , importance of population studies in a world-wide perspective as well as with reference to Pakistan has been discussed. Scope and limitations of the study have been briefly specified as well.

1.1 IMPORTANCE OF POPULATION STUDIES IN THE GLOBAL CONTEXT

Economists, philosophers and political thinkers have always been concerned about the relationship between population growth and economic development. Views on population, its desirable size and relationship with economic development is found in the ancient writings of Chinese, Greek and Arab philosophers and social scientists e.g. Plato (c. 340 B.C.), Aristotle (c. 354 B.C.) and Ibn-i-Khaldoon (1392, 1976 ed.). Marcantilitists and Physiocrats gave considerable importance to the role of population in economic systems. Adam Smith in his book "The Nature and Causes of the Wealth of Nations"[1] (1776) also discussed population related issues. According to him as well as other classical economists like Ricardo (1821), Senior (1836) and Mill (1848), population was an endogenous variable affected by and in turn, affecting operation of the economic system. Malthus (1798) presented a consistent, forceful and comprehensive population theory relating population growth to economic conditions. Most of the classical economists as well as subsequent theorists based their theories on Malthusian Theory[2]. According to his theory, pressures of population brought down wages to subsistence level and there was a constant fear of positive checks (famines, wars and epidemics) if preventive checks (celibacy, abstinence and late marriage) were not applied. Marxian theory (1867) rested on the belief that it was inequality of bargaining power between the capitalist and the army of unemployed, which resulted in subsistence wage. Neo-classical economists regarded population essentially as part of the data of a given economic system neither controlling nor controlled by the routine operation of the system. Against the aforesaid theoretical background, it is interesting to observe how growth of world population has behaved during the past as depicted in Table 1.1.

TABLE 1.1
World Population Growth

Date	Population (millions)	Average annual increase (percent) since preceding date	Approximate number of years required for population to double at given rate
B.C.			
7000 - 6000	5 - 10		
A.D.			
1	200 - 400	0.0	
1650	470 - 545	0.0	
1750	629 - 961	0.4	173
1800	813 - 1,125	0.4	173
1850	1,128 - 1,402	0.5	139
1900	1,550 - 1,762	0.5	139
1950	2,486	0.8	86
1960	2,982	1.8	38
1965	3,289	2.0	35

Source: U. N. 1973

Table 1.1 shows that the average annual increase of the world as a whole since the year I. A.D. till 1650 A.D. had been negligible. The primary reason being high death and birth rates in the pre-industrial stage. From 1750 onwards; rate of growth of world population rose progressively in keeping with industrial development and higher incomes. But world is not a homogenous unit. It can be sub-divided into various economic sub-groups, as shown in Table 1.2 which reveals the causal connection between population growth and economic development.

Table 1.2
World Population Trends

	Population (millions)							Average annual growth (percent)				
...try group	1965	1973	1980	1990	1991	2000	2030	1965 -73	1973 -80	1980 -90	1990 2000	2000 2030
...income	1,776	2,168	2,501	3,058	3,117	3,670	5,430	2.5	2.0	2.0	1.8	1.3
...e income	627	755	883	1,088	1,109	1,311	2,011	2.3	2.3	2.0	1.9	1.4
...income	671	726	766	816	821	859	919	1.0	0.8	0.6	0.5	0.2
...economies	252	275	294	321	323	345	...	1.1	1.0	0.9	0.7	...
	3,326	3,924	4,444	5,283	5,370	6,185	8,869	2.1	1.8	1.7	1.6	1.2

Source: World Development Report 1992
Oxford University Press, New York, U.S.A

Viewing rows and columns of Table 1.2. It can be concluded that rate of population growth inverse correlation with economic status of countries. The underlying reasons have been explored ...ail in section 1.1.1. In Table 1.3, it is shown that percentage of world population in the more ...oped regions of the world has been decreasing overtime in sharp contrast to less developed regions ... it has been progressively increasing. Simlarly, rate of growth of population has been accelerating ... less developed regions overtime as contrasted with more developed regions where it has ...ated overtime.

TABLE 1.3
World Population
Growth And Distribution By Major Regions
1950-1980

Major region	Population (in millions)				Percentage of world population				Annual rates of population growth			
	1950	1960	1970	1980	1950	1960	1970	1980	1950-60	1960-70	1970-80	1950-80
...ore ...veloped ...gions*	832	945	1050	1131	33.1	31.2	28.6	25.6	1.3	1.0	0.7	1.0
...ess developed ...gions**	1681	2082	2628	3284	66.9	68.8	71.4	74.4	2.1	2.3	2.2	2.2
...orld total	2513	3027	3678	4415	100.0	100.0	100.0	100.0	1.9	1.9	1.8	1.8

Source: U.N. World Population Trends and Prospects by Country, 1950-200
Summary Report of the 1978 Assessment
ST/ESA/SER. R/33. Department of International
Economic and Social Affairs, New York, 1979

* More Developed Region include Japan, Europe, Northern America, Australia and New Zealand and U.S.S.R

** Less Developed Region include Africa, Asia except Japan, Latin America and Oceania except Australia and New Zealand.

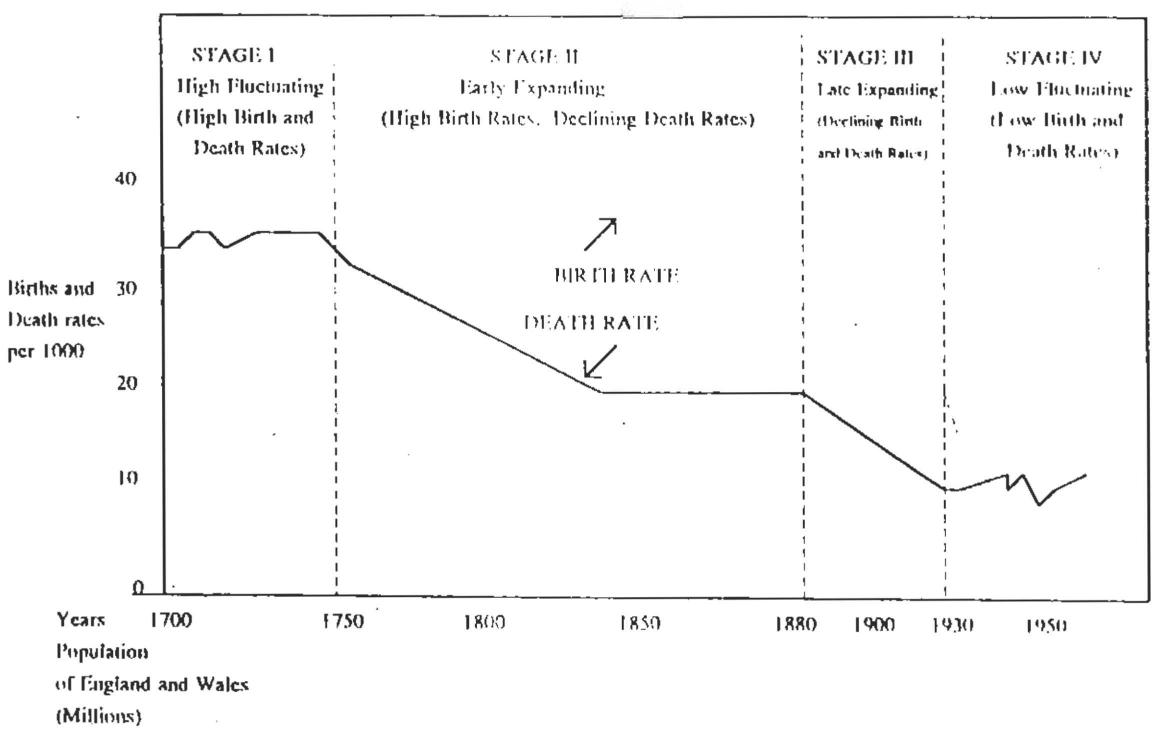
Viewing Tables 1.1, 1.2 and 1.3, it can be concluded that the two variables i.e. population growth and economic development are not mutually exclusive but are inter-dependent. However, each discipline has its own identity. Population has become a subject of study in itself and emirical research has started in this field since the 19th century. Nevertheless, economists have also been exploring the interrelationship between population growth and economic development during all these years e.g. the Dynamic Theory of Optimum Population was put forward by Sidgewick (1883) and later refined and improved by Cannon (1888), Wolfe (1926), Sauvy (1963) and others. Over the past few decades, there has been a lot of interest in tracing the consequences of simultaneous behaviour of fertility and mortality rates through time and their combined influence on economic development. In this context, a summary of the Theory of Demographic Transition is given below.

1.1.1 THEORY OF DEMOGRAPHIC TRANSITION

The theory was initially put forward by Landry (1909, 1934 ed.). It was later refined by Blacker (1947), Davis (1968) Notestein (1945, 1953, 1956), Coale and Hoover (1958). It continues to be refined to anticipate the future demographic trends of countries presently in the phase of transition. This theory was derived from actual historical experience as shown in figure 1.1 below.

Figure 1.1

Demographic Transition
A Historical Perspective
(England and Wales)



SOURCE: P.E.P. Report (1964)

Process of economic development in the Western countries, later spreading to U.S.A. and Japan followed a more or less rhythmic pattern of mortality and fertility rates. Growth of population followed well defined stages. The initial pre-industrial stage had high mortality and high fertility rates. When economies became industrialized and market oriented, mortality rates began to fall due to economic prosperity, better nutrition and improved medical knowledge. Fertility rates lagged behind. Economic development resulted in modernization of agriculture, employment opportunities for all including women and changing family patterns. All these factors precipitated a decline in birthrates. Finally, further reductions in birth rates or death rates became harder to obtain because mortality rates stabilized due to low risks of mortality and birth rates stabilized as smaller families became the norm. Both mortality and fertility rates converged around a low level of equilibrium.

This trend of mortality and fertility rates from a high level to an eventual low level as a consequence of economic development shown in figure 1.1 is of particular significance to less developed countries (LDCs). Technological progress in the late 19th and early 20th century had spill-over effects on LDCs in many fields including public health. Control over epidemics like plague, typhoid and cholera was achieved even in these countries, lowering the mortality rates. Whereas fertility rates could not follow the same trend because of lack of profound social changes which accompany industrialization i.e. wide spread education, gainful employment of women, a rise in the cost of having and bringing up children and an over all change into an industrial mentality. During this period, LDCs were undergoing other political and social changes as well, some of them were being colonized and became primary producers and raw material exporters. Political freedom achieved in many colonized countries in the mid-20th century set the stage for realization that in the long run, political freedom could not be maintained without first achieving economic independence. The strong desire to achieve economic independence forced the national governments to initiate economic planning to achieve maximum results in the shortest span of time. But governments soon became aware that economic planning had to be coupled with population planning. Newly formed native governments needed savings badly for capital formation, income and employment generation, and increasing the availability of social overheads which was not possible without curbing high rates of population growth.

1.2 IMPORTANCE OF POPULATION STUDIES WITH REFERENCE TO PAKISTAN

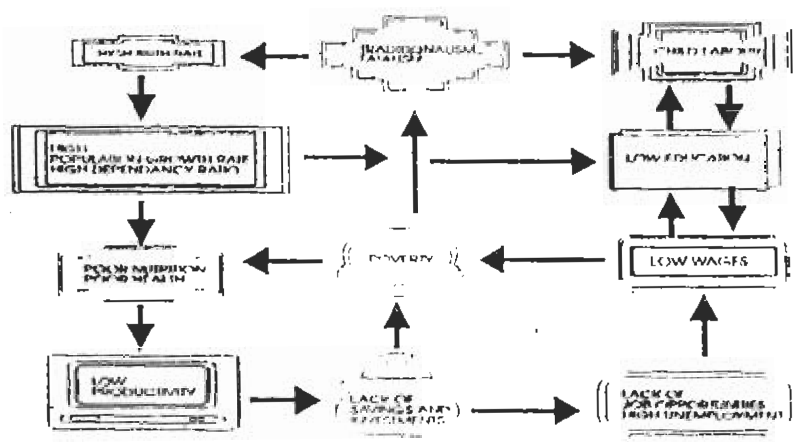
In the initial stages of Pakistan's economic planning, population appeared both as a denominator as well as a hurdle in the major components of planning i.e education, health, housing, transport etc. Improvements in any of the above mentioned indicators of economic growth got dissipated over an ever enlarging denominator (population) with the result that economic planning appeared as a self frustrating experience. Therefore, the population variable assumed a pivotal role in the process of economic growth. Since the Theory of Demographic Transition was no longer applicable in the sense of automatically switching the economy from a "high birth rate" equilibrium to a "low birth rate" equilibrium[3]. the government had to evolve policies to bring harmony between population and resources. For this, investment in population planning became an essential feature of public expenditure in Pakistan.

1.2.1 VICIOUS CIRCLE OF POVERTY

Economic forces affect the variables of population growth directly as well as indirectly. A model of economic development has to include population as endogenous variable. Economic planners cannot show the fruit of economic development if it does not get reflected in raising per capita income. Also in the poverty stricken third world countries like Pakistan, improving standard of living requires technological modernization, a reasonably adequate level of national savings, a healthy educated and skilled manpower. Productivity of manpower is of crucial importance . But qualitative improvements in manpower cannot be brought about unless there is a check on its quantity. Low wages perpetuate poverty and fatalistic attitudes which bring about high birth rates, high dependency ratios, poor nutrition and lack of education, all reinforcing one another to bring about low productivity which again leads to low wages. This wage - productivity spiral works backwards and generates a vicious circle of poverty as shown in figure 1.2 below:-

Figure. 1.2

Vicious Circle of Poverty



To get out of this circle in the shortest possible time, national governments resolve to economic planning and population control simultaneously. In Pakistan also, economic planning as well as investment in population control were initiated for getting out of the vicious circle of poverty[4].

1.3 WHY THIS RESEARCH?

Pakistan's investment in population planning is spread over almost forty years. In fact, it is one of the many programmes aimed at economic and social development of Pakistan. But financial resources allocated to this programme have been varying with availability of foreign aid as well as political changes in the country.

Ideally, investment in population control programme by the Government of Pakistan should have competed as one of the many alternatives for very scarce public resources. In an attempt to find out the basis of allocation of funds to population control by the Government of Pakistan, I searched through various Government publications and relevant official documents available in the libraries of national universities and institutions such as National Institute of Population Studies (NIPS), National Research Institute of Fertility Control (NRIFC), Population Study Centres (PSCs), Pakistan Institute of Development Economics (PIDE), Population Welfare Division (PWD) and Planning Commission, Government of Pakistan. I also personally visited Pakistan based offices of some international agencies e.g. The Population Council, United Nations Development Programme (UNDP), United Nations Fund for Population Activities (UNFPA), United Nations Children Emergency Fund (UNICEF) and United States Agency for International Development (USAID). I could get hold of some working papers and limited circulation drafts pertaining to population control programme of the Government of Pakistan from these institutions. A careful study of the available literature revealed that allocation of public funds to population control programme by the Government of Pakistan did not seem to follow any convincing economic criteria.

The fact that investment in the field of population control would give rise to a stream of benefits in future years seems to have been neglected. Even the usual criteria of financial feasibility, capital/output ratio or application of input/output analysis did not seem to have been applied for allocation of public funds to population control programme. Siumilarly, a review of available official documents pertaining to Pakistan's population control programme even at the provincial level do not contain justification for the continuity or expansion of this programme according to the principles of economic theory[5]. No model or exercise seems to have been developed to see that investment in population control activities in the form of 'averted births' had a higher rate of return than other public sector projects. No mention is found of the pay off period, income generation, employment generation or multiplier effect of investment in population control programme to quantify benefits. Other non-quantifiable gains in the form of cleaner air and lesser pollution also seems to have been ignored[6]. In short, investment in population control programme of Pakistan seems to lack scientific basis. So there is need for a study which seeks an economic basis for expenditure in population control programme of Pakistan.

1.3.1 OBJECTIVES

In this dissertation, I have tried to build a simple model to find benefits and costs of investment in population planning programme of Pakistan. The objectives are as follows:-

I. To find the number of averted births by government run-programme of population control. The aim of the study is not to find out the reduction in fertility. Fertility rate is affected by many other factors, for example, change in age at marriage, lactation period, contraceptive prevalence rate, literacy rate, age-specific maternal fertility and mortality rates, as well as increasing degree of economic development, urbanization, improvement in status of women, higher education especially among women, gainful employment of women and the change in family structure. This study is focused only on one aspect-finding the number of averted births.

2. To find benefit/cost ratio in order to put this programme in its proper place in the national priority order for the purpose of allocation of public funds in future. Economists in Pakistan cannot ignore a very important determinent of economic development i.e. population because a high rate of population growth has always been an obstacle in bringing about any improvement in per capita availabity of social overheads such as literacy rate, health, housing, transport and a number of other infrastructural parameters in Pakistan.

3. To find the limitations and assumptions of such an attempt. During the process of model building, I came across many unique type of problems inherent in this study. However, the need for such a basic yet pivotal study has led me to continue despite the fact that it was very difficult to define costs and benefits. A number of assumptions have to be made before defining these terms.

4. To give suggestions for improving the existing organizational structure of population control programme of Pakistan.

1.4 SCOPE AND LIMITATIONS

The estimates of costs and benefits arrived at in this study cannot be precise because of the nature of assumptions about human behaviour. A simple marco/demographic model of the 'basic Keynesian type' has been developed to furnish a reasonably adequate estimate of benefits and costs which can be useful not only for assessing past investments but can also be used for future comparison of benefits and costs of such programmes. It can also serve as a basis for comparison with other benefit/cost studies conducted in other parts of the world. Such estimates can also furnish a basis for expansion of investment in population control programme of Pakistan if marginal returns exceed marginal costs. Economic planners in Pakistan can use these estimates for purpose of comparison with other income yielding projects. This exercise can also be useful to economic planners to regulate the volume of investment among competing public sector projects equating their marginal returns with marginal costs for maximizing total returns to the economy.

So the scope of this study is to find benefit/cost ratio of investment in population control programme of Pakistan during 1965-88 and also to suggest measures for improving organizational efficiency because this study has shown that magnitude of benefits and costs can be improved by better internal checks and balances.

Limitations of this study stem from its nature. This analysis of costs and benefits of population control programme involves, first of all, the task of defining both these magnitudes. Final calculated values of both the variables will depend upon these definitions as well as the model built. In this study, both the variables, i.e. benefits as well as costs have been defined keeping in view all the difficulties and problems inherent in such an exercise. These definitions are by no means comprehensive or precise. Rather, one can call them 'working' or 'convenient' definitions for serving the purpose of making a rough estimate of costs and benefits. This is so because problems arise not only in defining these terms i.e. costs and benefits but also in calculating them. Costs consist of heterogeneous components i.e. number of vehicles and their continuous maintenance, the services of personnel of all types and capital costs incurred on buildings. Also costs have a large variety i.e. short or long term, direct or indirect, recurring or non-recurring, initial or time-dependent, average or marginal. In addition, costs might be incurred for research, evaluation or making bonus payments for contraceptive use. Finally, even if all these aspects can be taken care of, economists know that financial costs are not true costs because of the differences in market wages and economic wages. Similarly international differences in wages also make such financial costs incomparable to other studies.

Calculations of benefits also become difficult because heterogeneous elements are involved such as measurement of change in attitudes (revealed by KAP type of studies) or use of contraceptive materials distributed by the population control network. These magnitudes cannot be added up. Also, it is very difficult to combine or isolate qualitative aspects of the issue from the quantitative ones. Impact of a reduction in frequency of births is felt by the individual family as well as the community; just as cost of a birth falls not only on the family but also on the community. Quantifying well-being and happiness of a family or benefits of cleaner air and lesser noise to the community involve value judgements. So this task of finding benefits and costs of a national programme running over a large period of time is very complicated and unwieldy. Nevertheless, it is worth the effort considering its need and importance.

NOTES

1. This is the precise title of the book by Adam Smith (1776).

2. Literature in this field includes the following:-

   (i) Myrdal, G. (1968)

   (ii) Lewis, A. (1972)

   (iii) Leibenstein, H. (1967)

3. For details of the theory and its evaluation, see U.N., "The Determinants and Consequences of Population Trends" (1973).

4. Qureshi, M.L. (ed. 1960). In this book, the interrelationship between population growth and economic development in Pakistan has been lucidly supported by empirical evidence; especially in the article by Ranis, G.

5. It should be noted that even foreign experts e.g. the Harvard Advisory Group was involved in the formulation of the 2nd Five Year Plan of Pakistan. This makes such indifference all the more surprising.

6. Currently economists and scientists at the Netherlands Central Bureau of Statistics are devising a set of indicators for calculating "Green" G.N.P. According to them, environmental losses like cutting of forests should not be considered as an addition to G.N.P. but rather its depletion (Khaleej Times, March 8, 1992). Benefits from a programme of population control could also include quantified indices for cleaner air, lesser pollution, lesser overcrowding and lesser crimes.

PART II
CONCEPTUAL FRAMEWORK

"Traveler, there are no paths
Paths are made by walking."

Antonio Machado (1940)

"I often say that when you can measure what you are speaking about, and express it in numbers, you know something about it; but when you cannot measure it, when you cannot express it in numbers, your knowledge is of a meagre and unsatisfactory kind: it may be the beginning of knowledge, but you have scarcely, in your thoughts, advanced to the stage of science, whatever the matter may be."

William Thomson, Lord Kelvin (1889)

CHAPTER 2
POPULATION CONTROL EVALUATION CONCEPTS AN OVERVIEW

2.0 INTRODUCTION

Evaluation implies determination of the results achieved by a programme directed towards some preconceived objective. The process of evaluation is a continuous and necessary component of a programme in order to set realistic and internally consistent goals.

In evaluating population control programmes, there are direct and indirect methods[1] drawn from multifarious disciplines including Demography and Statistics. Over time, innumerable literature has become available on the evaluative techniques of measuring the success of family planning programmes. A combination or refinement of these techniques can, give a good estimate of fertility reduction by isolating the programme induced reduction from other socio-economic factors. These evaluative methods[2] use the tools of analysis in terms of CYP (Couple Years Protection), CYEC (Couple Years of Effective Contraception), and SCYP (Standard Couple years of Protection). Evaluative methods include Standardization Approach, Component Projections, Trend Analysis, Experimental Design and Matching Studies, Reproductive Process Analysis, Controlled Trials, Multivariate Areal Analysis, Life Table Approach, Prevalence Models and Computer based Simulation Models. With the passage of time there have been refinements in these techniques and micro/macro models such as POPSIM (Sarma, 1970) REPSIM (Ridley and Sheps, 1966) and FERMOD (Potter and Sakoda, 1966) have been developed. Different methodologies yield a wide range of estimates but the choice of a technique is generally dependent upon availability of the required type of data. Precision of results depends on the accuracy of data and choice of appropriate method.

These evaluative techniques can generally be grouped into three Catagories:-

1. First group involves evaluation of basic data i.e. service statistics generated within the programme. These help to find the number and characteristics of acceptors and rates of acceptance.

2. At an intermediate level of evaluation, in addition to service statistics, data generated through follow up studies and various types of KAP surveys is evaluated to measure the programme's success.

3. At the final level, evaluation techniques focus on the number of 'averted births'. These also include various methods of estimation given below.

These techniques try to isolate the programme induced reduction in fertility from the non-programme secular decline of fertility which may be due to other factors like higher age at marriage, urbanisation, higher female education and improvement in the status of women, biological factors, such as changes in lactation period and sterility ratio.

Some evaluative techniques have been described below which attempt to disaggregate the total reduction in fertility rates into their relevant components in an attempt to isolate the programme induced changes in fertility rates.

2.1 STANDARDIZATION APPROACH

It aims to decompose an observed change in CBR (Crude Birth Rates) or GFR (General Fertility Rates) between two time periods into their demographic components i.e. age structure of women of reproductive age, age-specific proportions married and marital fertility of women of reproductive ages as a proportion of the total population, assuming that these variables are independent[3]. Direct estimates of averted births from statistics may then be compared and if the figures for standardization and programme estimates of averted births are close, it shows that the programme has had a significant role in the decline of fertility. Because of data deficiencies, one can only say that the standardization estimate is an upper limit of the programme impact.

2.2 TREND ANALYSIS

It simply extrapolates (linear least square trend line) the pre-programme trend in CBR during the period between t_0 and t_1 to t_2. Then the difference between observed trend in t_2 and extra-polated trend during t_1 and t_2 is simply the Programme averted Births. This method has all the hazards of extrapolation i.e. being sensitive of choice of the initial year and the time interval for determining the trend and failing to recognize post-programme accelerating decline derived from social and economic parameters.

2.3 COMPONENT PROJECTIONS APPROACH

This method depends on programme service statistics, so the quality of data affects the reliability of its findings. One such technique CONVERSE[4] is a one sex age-component population projection model. An initial population is hypothetically survived annually over an interval of five to ten years according to a prescribed mortality schedule; modified from contraceptive practice. It is subtracted from the annual expected births under natural fertility schedule to obtain the programme averted births.

Methodological weaknesses in this model arise due to limitations of service statistics, transitional nature of societies rendering changing patterns of child care and breast feeding and failing to allow for contraceptive ineffectiveness.

2.4 MULTIVARIATE AREAL ANALYSIS

It compares the effect of socio-economic and other related variables on fertility vis-a-vis family planning programme inputs. The Multivariate Areal Models applied to evaluation of family planning programmes are essentially cross-sectional in nature, so dynamic inferences do not follow readily. These models investigate the extent to which differentials in fertility among different areas at a certain period are associated with other characteristics of the areas; some of which may be measured at the same time and some pertaining to preceding periods may be measured with the use of lagged variables.

There are many pitfalls found in the use of these models for evaluating the family planning programmes. Finding influence of one variable on fertility does not mean that changes in this variable within an area are associated with intra-area changes in fertility over the time period specified by the model. Similarly absence of association does not mean that the background variable is without influence on intra area fertility changes. Schultz (1973) and Duncan (1966) were skeptical of the precision of these models. Nevertheless, improved estimates of dynamic relationships are possible when we have cross-sectional data for several years.

So despite above mentioned limitations in the interpretation of areal analysis, it can be used for determining the demographic impact of a family planning programme on fertility provided confirmatory evidence for the inferences from an areal analysis come from other sources, e.g. KAP surveys and alternative statistical procedures This also requires a thorough knowledge of all the data producing operations in the country and their demographic, social and economic trends. Multivariate Areal Analysis can render more precise results with greater standardization in operational definitions, by reducing measurement errors and applying more efficient estimating techniques.

2.5 PRODUCTIVE PROCESS ANALYSIS

This technique primarily aims at disclosing the fertility impact on persons subjected to different biological and demographic stochastic processes. It yields insight into the influential parameters to be considered in adapting the other techniques into instruments that more directly measure programme impact on fertility. This technique is not very useful in measuring aggregate net or gross effects of the programme on fertility.

2.6 PREVALENCE METHOD

This method is derived from a fertility model which explains the quantitative relationship between fertility and its proximate determinants. Good estimates of gross potential fertility can be made with this method. The model developed by Bongaarts (1978) requires estimates of contraceptive prevalence both inside and outside the programme. Estimates of prevalence can be derived using CYP approach (Wishik and Chen, 1973). Recently such type of data has also become available even in the case of third world countries including Pakistan because of the World Fertility Survey (1975), Health and Demographic Surveys (1991) conducted internationally. Availability of data of such type has enhanced the usefulness of this method for evaluation purposes.

2.7 CONCLUSIONS

A large number of programme evaluation techniques have been developed[5]. Here I have mentioned a few of them very briefly as a prologue to economic analysis of Pakistan's investment in population control programme. It was not meant to be a technical orientation to these techniques. All evaluative techniques developed so far are handicapped due to a number of limitations which affect their precision. Socio-economic and demographic settings also exert their influence. Depending upon nature of the problem, more than one evaluation techniques may be applied for cross-checking the results. Understanding of the basic determinants of fertility would also contribute towards improving the techniques of evaluation. In most of these techniques, the crucial variable measuring the demographic impact has been 'Potential Fertility' - a concept which has been defined as "The fertility that a population (subject to a population control programme) would have experienced in the absence of a population control programme".

Choice of a technique can also be limited due to demand of a specific quantity and quality of data currently not available in the country. Also, precision of results depends not only on sophistication of the model or inclusion of relevant key parameters or choice of appropriate technique in the current setting and data system but also on the quality of data. Evaluation remains an approximate magnitude because data is generated through surveys based on interviews. Heterogeneity in the quality of interviewers and interviewees can affect the data because data generation involves investigations into human behaviour on a very personal and private aspect of life. In particular, illiteracy, low status of women and their social seclusion in some areas of Pakistan also create problems in collection of data.

NOTES

1. For details about these evaluative techniques see the following:-
   - (i) U.N. (1982)
   - (ii) U.N. (1985)
   - (iii) C. Chandrasekaran, and A.I. Hermalin (1975)

2. See U.N. Publication Manual IX, "The Methodology of Measuring the Impact of Family Planning Programme on Fertility". Sales No. E 78 XII.8, for more details.

3. For more details see Bongaarts, U.N. (1985)

4. See in this context
   - (i) D.L. Nortman, U.N. (1985)
   - (ii) C. Chandrasekaran, and A.I. Hermalin (1975).

5. Appendix A of this thesis gives a resume of different methodologies to measure the demographic impact of family planning programmes.

CHAPTER 3
SELECTED MODELS RELATING TO CONOMIC BENEFITS OF POPULATION CONTROL PROGRAMMES

3.0 INTRODUCTION

Economists have been aware of the influence that various variables of population, i.e. its size, rate of growth, age and sex composition could exert on potentialities and scope of degrees of economic development that a country could achieve[1]. The pioneering study by Coale and Hoover (1958) on India[2] proved to be the beginning of a modern quantitative economic analysis of the impact of population trends on economic development. Infact, it set a style and many subsequent models were built on more or less similar lines. Later, diverse types of models attempted to evaluate economic benefits of population control programmes.

3.1 A CRITICAL LOOK AT MODELS

Some models attempting to calculate economic benefits of population control programmes or benefit/cost analysis of such programmes have been reviewed below:

3.1.1 ANSLEY J. COALE AND EDGAR M. HOOVER

This well known study on India by Coale and Hoover (1958) proved to be a trend setter. They attempted to measure economic benefits from a slower rate of population growth. They constructed an econometric model of Indian economic growth. Assuming a given decline in fertility, they calculated its effects on aggregate and per capita incomes. Their model assumed that size and quality of the labour force was constant regardless of fertility. Only monetized investment was considered and a constant proportion of income was spent on welfare to meet the needs of the existing population. They later assumed that it took ten times as much to meet the initial needs of a new addition to the population than to maintain that person thereafter[3].

The model eventually contrasted the outcomes of alternative projections of population growth for five-year periods between 1956 and 1986. The results were presented in a time stream. No discounting was done in order to avoid bias. For the high rate of population growth, income per capita grew by 38%. For the low rate of population growth, income per capita grew by 95%. Also, growth of income per capita decelerated under the assumption of a low rate of population growth. Total income grew faster under the low fertility assumption. Since the marginal productivity of labour was assumed to be zero, the loss of population meant no loss of output. Their model used aggregate magnitudes, e.g. effects of a reduction of 'Z' percent in the birth rates rather than 'averted births'. Also they did not relate this reduction to any measures of population control.

The validity of Coale and Hoover's model can be questioned on a number of grounds[4].

1. The assumption of a constant capital/output ratio and a saving ratio which increased as a result of higher per capita income is weak. It is doubtful whether parents will avert births to accumulate savings. In the context of poor countries, it is more logical to assume that the per capita consumption will rise as a result of smaller families.

2. Cost of population control programmes have not entered the model. In fact, the cost side has been totally ignored. This is unrealistic as substantial public expenditure has to be incurred to acquaint the masses with the concept (even if we do not include the cost of various means of population control).

3. Marginal product of labour need not be zero as assumed by this model. Marginal productivity fifteen years later may be different due to capital accumulation and technological advancement.

4. A number of important variables have been omitted. It was possible to achieve a wider range of results by varying the assumed parameters in combination rather than one at a time.

5. The assumption of no non-monetized savings sector is also questionable in a LDC like India.

6. The assumption of growing personal and government savings varying directly with per capita income, casts doubt on the validity of this model.

Coale and Hoover's model set a style and many prominent economists e.g. Demeny (1961), Enke (1960, 1961, 1962, 1966), Ohlin (1967), Leibenstein (1969), Simon (1969) contributed significantly to the economic consequences of fertility reduction and related issues. Thus Coale and Hoover's analysis proved to be a stepping stone for further explorations in this field. Nevertheless, Gunnar Myrdal's (1968) comments appear to be relevant as well[5]. He said, "Models would have to contain many more parameters and account for many more inter-relationships. They would have to be very much more complex in order to be logically consistent and correspond with reality. With the present dearth of empirical data, indulging in this type of preparatory macro analysis does not seem to be a rewarding endeavor".

3.1.2 STEPHEN ENKE

Enke published an article (1957) which showed the necessity of population control for economic development of backward countries. He advocated for investment in birth control schemes (May 1960, July 1960). His analysis was based on an economic theory that a policy of maximizing per capita income would call for balancing the returns from all forms of investment at the margin. His study was a one sector model containing a demographic sub-model and attempting direct calculations of the benefits of a prevented birth. Applying a rate of discount of 10%, he showed that since an individual does not begin producing during at least the first fifteen years of his life, the discounted present value of his production is almost zero. But he would start consuming as soon as he is born. Enke estimated the value of a prevented birth as about Rs.690.00 which would become higher if lower discount rates were applied. Enke further refined his calculation by introducing the possibility that money saved from an averted birth may be re-invested which would enhance its value[6].

Enke also advocated economic justification of payment of bonus by the government to contracepting parents. According to him, size of bonus need not be calculated accurately since it was merely a transfer payment. The real criterion of whether a bonus was too high or too low, was its effectiveness as an inducement. This bonus was to be kept in a bank by the government till some appropriate time as explained in his model. Enke also maintained that governments might find bonuses ten times as productive as conventional investment for development[7].

Later, Enke stated that births were excessive if their present discounted value was negative. This could be due to many reasons i.e. many children do not survive to working age. Secondly, marginal product of an additional worker might be considerably lesser than the average product and thirdly, consumption was based on the average rather than the marginal product. Production was more heavily discounted than consumption since the latter began at birth whereas the former started many years later.

Enke's suggestion was to calculate a rate of discount which would equate the stream of production with the stream of consumption. This was much like the concept of marginal efficiency of capital. If it was lower than the rate of return on capital, then births were excessive. According to Enke, it was negative in many LDCs. If bonuses for contracepting parents were made by diverting public money from traditional development projects, then resource costs would equate money costs. Later, Enke (1966) gave a ratio called the Superior Effectiveness Ratio. Assuming the same amount was devoted to either investment in capital goods or birth control, the latter would be superior if it reduced population by a greater percentage than a corresponding investment in capital goods would raise output. The ratio of these percentages was the one defined above and would vary inversely with the rate of return on capital and directly with the fertility of contracepting mothers[8].

Enke's model regarding value of an averted birth and his bonus scheme received wide criticism.

1. Enke's contention that transfer was simply a 'monetary operation' has not been accepted[9]. If it were to be financed by taxation, it would not have a neutral effect. Bonus payments would also have an 'opportunity cost' (in the sense of traditional investment projects foregone) whether financed by taxation or borrowing.

2. Enke's model has also been attacked on the ground that per capita income should not be the sole welfare criterion[10]. If a family chose to pay the costs of having a child, nothing was gained from a social point of view by 'bribing' them not to do so. High discount rates of 10-15% in Enke's model have also been objected to, since in LDCs high interest rates depict marginal rates of time preference. So a better way would be to use the rate of return on alternative available uses of resources[11].

Enke's model has many other weaknesses as well e.g. his definition of consumption expenditure as gross national Product minus gross capital formation was arbitrary. Expenditure on education, health and other types of human capital was not consumption from the point of view of economic growth as inherent in his model. Similarly, government expenditures on law and order or defence were non-marginal in the sense that these were made independently of the rate of growth of population. These problems of measurement of consumption as well as distribution of consumption by age and choice of a discount rate need primary empirical studies for any developing country in order to make reasonably precise estimates of economic benefits of a prevented birth.

Finally, it was not MPL (Marginal Product of Labour) in the present (but MPL after fifteen years) which was relevant to his model. But then, it was not possible to foresee future as there were other interacting variables like technology, capital stock, and population itself. So Enke's model at best has served the purpose of providing guidelines for policy makers of LDCs which can only be considered as a tenuous guess work rather than a precise estimate. Enke's model has all the merits of being precise, predictable and consistent. However, advocacy on providing a specific amount of money bonus and his basis for such calculations can be questioned. To conclude, "Enke provided some wrong reasons in arriving at his right conclusion"[12].

3.1.3 RICHARD L. MEIER

Meier (1959) used a frame work developed earlier by Dublin and Lotka (1945) for calculating benefits and costs of family planning[13] programme. His conclusions were:

1. The net value of a prevented birth varied directly with per capita income.
2. The value of medical innovation which reduced infant mortality would be negative in underdeveloped countries.
3. The economic value of an effective programme of family limitation was much greater for more developed societies.

There are many similarities in Enke's and Meir's models, but Enke limited his analysis to a case study of India whereas Meir's model was more general but was not very relevant to LDC's, especially from the view point of formulating an effective programme of population control. His model had a general applicability to health programme of developed countries[14].

3.1.4 PAUL DEMENY

Demeny (1965) investigated another relevant and crucial question that if costs and effectiveness of a birth control programme were known, what price would be worth paying for it? He also discussed the dependence of that price on the structural parameters of the economy. In this model Demeny employed the Coale and Hoover saving function. He assumed that the sole effect of population change was on per capita savings and thus on per capita investment. According to him, demographic investment initially reduced the amount of resources available for investment in capital goods. But its secondary impact was to reduce population, thereby increasing per capita income and raising per capita savings.

Demeny calculated the maximum amount that could be transferred to demographic investment without reducing per capita income. When this sum was divided by the number of births, it showed the maximum permissible value per birth prevented. Demeny's model can be criticized due to the restrictive nature of its assumption i.e. he assumed a constant capital/output ratio and ignored the non-economic advantages of having children. Also, he has not discussed how increasing population could serve as a stimulus for investment[15].

3.1.5 JULIAN SIMON

Simon (1969), using Coale and Hoover's data, estimated the increase in family savings due to fewer children. He also calculated the resulting increase in capital / labour ratio and the final rise in per capita income.

Salient features of his model were as follows:-

1. The model showed the maximum level of transfer payment allowable to contracepting parents as incentive payment for not producing children.

2. He employed a discount rate of 15% and after a series of calculations, estimated that the benefit of an averted birth to economy would be U.S. $ 108 but at 5% it would go upto U.S. $ 248.

3. His model showed the range within which incentive bonus might be paid to contracepting people leaving every member of the society better off.

Simon's model did not answer questions like the maximum extent of resources that could be diverted to reduce births which otherwise would have gone to development projects in the absence of such a programme[16].

3.1.6 LEONAND G. BOWER

Bower (1967) presented a model which contained certain features of the models presented by Enke (discounting), Demeny (opportunity cost of investment in population control programme being the increase in output which would not have resulted from non-demographic investment) and Coale and Hoover (assumption of zero MPL). Bower found the value of preventing one birth per year as the difference in the per capita income which resulted due to exclusion of the unborn person from the population because of demographic investment. This argument has been explained in detail with the help of mathematical equations in his model. Bower, however, missed the fact that 'unborn person' would not only consume but also produce in later part of his life[17]. This has been the reason for his calculation of rate of return to demographic investment being very high (4500%) as compared to other models.

3.1.7 GEORGE B. SIMMONS

Simmons (1969) constructed a model on a number of assumptions pertaining to social, economic and demographic characteristics of acceptors of population control programme. He applied this model to India to calculate the number of averted births during the period 1956-67. He relied on various relevant coefficients calculated earlier by Agarwala (1966), Potter (1966, 1969), Mauldin (1967) and others. He arrived at benefits per averted birth from the following points of view:-

1. Measured by the criterion of national income, the value of averted birth was Rs. 3534.00 in the year 1968 in India.

2. Measured by the criterion of per capita consumption, value of an averted birth was Rs.3011.00 in the year 1968.

3. He also calculated economic benefits of an averted birth by assuming different future demographic patterns as in Coale and Hoover's model. The national income was made a function of investment and investment a function of per capita income Then the benefit of an averted birth was calculated to be Rs. 2263.00 by the aggregate income criterion and Rs. 5800.00 by the per capita income criterion. Comparative figures for per capita consumption criterion according to this calculation were Rs. 1164.00 and Rs. 4176.00 respectively. The discount rate eomployed was 10% and only the first twenty five years were considered[18].

These benefits appeared to be very large i.e. about fourteen times the per capita income of the base year. Had he employed a lower rate of discount or had he extended his period of analysis beyond twenty five years, the benefits per averted birth would have become even greater.

Simmon's model deserves the credit for utilizing and modifying earlier models especially that by Coale and Hoover. He made good use of abundant data and relevant feeding research studies available on India. He employed statistical coefficients derived in these studies for the solution of key parameters of his model.

Some weaknesses of his model have been discussed below:

1. He has not dealt with welfare considerations in his model. He has not tried to show increase in welfare due to investment in population control[19]. Also, he has not explained his reasons for totally omitting this aspect.

2. If family planning activities of the Government were benefitting higher socio-economic classes and if the public money would not have been spent on it but on alternative development projects where the poor sections of the economy might have benefitted, then there would be a reduction in social welfare regardless of the positive and large value of an 'averted birth'. He has not dealt with this problem in his study. Also he has not mentioned any reasons for not tackling this aspect.

3. He has totally ignored the impact of a great variety of contracepting devices and picked up only IUDS and sterilizations[20]. With improvement in education, greater degree of urbanization and more exposure to rest of the world, Indian economy would have had more 'averted' births through other conventional contraceptives as compared to the two mentioned above.

4. He has completely neglected abortions which contributed to averted births.

5. Simmon's model has not included the foregone production of the averted births considered earlier by Zaidan (1967) and Enke (1966). He has neither given any satisfactory explanation for this nor has supported this feature of his model by any statistical method.

Many other limitations of this model are applicable to all other above mentioned models, like the inability to trace and quantify the behavioural changes in the society due to investment in population control to estimate the true benefits of an averted birth in the long run.

3.8 GEORGE C. ZAIDAN

Zaidan (1967) attempted to refine Enke's model and applied this revised version to measure the economic returns of family planning programme of Egypt (then United Arab Republic). After narrating the assumptions and limitations of his model. benefits were shown to be 2.5 to 8.7 times the costs. Difference between benefits and costs ranged between 1.6 to 6 times the per capita income of Egypt at that time. Benefits of an averted birth were calculated as follows:

$$B = \alpha + \beta + \gamma$$

Where

$$\alpha = \sum_t \frac{y_t}{(1+r)^t}$$ = Discounted consumption stream of an unborn child

$$\beta = P\sum_i\sum_t \frac{x_t}{(1+r)^t} \quad = \quad$$ Government saving on educational expenses

$$\gamma = kh\sum_t f_t \frac{y_t}{(1+r)^t} \quad = \quad$$ Wage productivity effect

In the above equation showing benefits:

$\sum_i$ denotes summation over all years of the unborn child's age to the end of our time horizon.

y_i = $C_i(1-q_i)$, the anticipated consumption of an unborn child in year i, allowance being made for the possibilities of the child's death at various ages.

C_i = annual consumption of a child between ages i and (i+1),

q_i = probability that a newborn child having lived to age i will not live to age (i+1). $(1-q_i)$ is therefore, the probability of survival between ages i and (i+1),

f_i = marginal propensity of the labour force to consume food in year i, expressed as a proportion of total income, in periods of the year when there is no seasonal unemployment,

k = a constant that converts expenditures on food into an extra supply of effort via increased caloric intake.

h = the marginal product of effort,

x_i = the annual (current and capital) cost of education per child between ages i and (i+1),

r = social rate of discount,

P = average yield on investment.

Cost of an averted birth were calculated as follows:

$$C = A + B$$

Where

$A = \sum_{i} \frac{MP_i}{(1+r)^i}$	=	Actual governmental expenditure and real costs to the economy of averting a birth through population control programme
B= E	=	Reduced output due to 'averted births' measured by MP of labour that would have prevailed at the time when 'averted births' entered' the labour market

In the above equation showing costs:-

MP_i = the marginal product of labour of the unborn child between ages i and (i + 1). Assuming the child would enter the labour force at age Z, then

$$\sum_{0}^{Z} MP_i = 0$$

r = the rate of discount

E = the real resources required to avert a birth through the provision of family planning services

Benefits of an averted birth flowed from different channels:

The first being the difference between consumption stream and productivity stream of an unborn child called "Initial Effect" by Zaidan and "Enke effect" by Robinson (1968). To the extent that per capita income of the remaining population improved, there occurred improvement in consumption or savings or both which were themselves foundations for several additional rounds of improvements in per capita income.

The second path through wage-productivity effect was earlier mentioned by Liebenstein (1967). It referred to increased productivity of labour due to improved diet as generally in LDCs, per capita consumption is below the minimum caloric requirements but the marginal product of effort is not zero.

The third path operated through the 'saving effect'. Reducing births improved private savings (as earlier seen by Demeny (1961, 1965)) as well as public savings (a possibility earlier mentioned by Coale and Hoover (1958) and M.L. Qureshi (1974)).

The fourth channel was that the change in age distribution of population with 'averted births' further improved the initial increment of incomes.

His model assumed children as purely an investment and returns on this investment were calculated from macro point of view rather than micro. This assumption was very weak and unrealistic. It was also assumed that an averted birth was not a delayed birth.

Zaidan's model brought about a clear net advantage in reducing fertility of LDCs like Egypt (then UAR) but a major limitation of his model was the 'built in' bias which assured that benefits exceeded costs i.e. consumption starting immediately after birth whereas contribution to production starting fifteen years later. So even a moderate rate of discount will greatly exaggerate the difference between the present values of both the streams. Another limitation of Zaidan's model was his complete disregard of calculating private savings on the benefit's side. In benefit/cost analysis of any human resource development programme, it is generally not possible to present a comprehensive picture. Rather, some aspect of the model is emphasised which is stated in the beginning.

The results of application of this model to Egypt have been summarized as follows:-

1. At a discount rate of 10% the higher limit of initial effect of an averted birth was 4.5 and the lower limit was 2.5 of the per capita income of Egypt.

2. Wage-productivity (Liebenstein) effect varied between 4.5% to 18% of the initial effect.

3. Private saving (Demeny) effect was assumed to be zero.

4. The public saving (Coale and Hoover) effect was between 18.5% to 37% of the initial effect.

To conclude, Zaidan's model refined Enke's model and incorporated salient features of the models of Demeny (1965), Leibenstein (1957), Coale and Hoover (1958). Subsequent studies could start where he left. Its application to Egypt at that time was very relevant because of persistent population pressures and economic backwardness in that region[21].

3.9 WARREN C. ROBINSON

Robinson (1968) presented a dynamic macro model which disaggregated the economy into two sectors i.e. agriculture and non-agriculture. Robinson chose to reject the Harrod Domar framework since he wanted to allow changes in population to influence the level of output directly as in other neoclassical development models[22]. A sub-model of Cobb-Douglas production function was used for each sector. Governmental sector was also incorporated in the model. Since it was a benefit evaluation mode', it contained a demographic sub-model broken down by age classes indicating the determinants of population size, ratio of labour force to total population, labour force participation rates, birth rates, death rates and impact of government expenditure on births and deaths similar to that in the models of Coale and Hoover (1958) or Enke (1961). His reasons for disaggregating the economy into two sectors were as follows:

1. Land entered as a factor of production in agriculture and not in non-agricultural sector.

2. Wage rates and hence productivity as well as standards of living might be different in both the sectors.

3. Demographic characteristics of agricultural sector might be different than those of the non-agricultural sector.

His general model, made sectoral output a function of supply forces i.e. output was regarded as dependent variable and factor inputs land (J) , labour (L), capital (K) and technology (F) were considered as independent variables. He assumed that technological change was a function of rate of growth of output. Labour input was made a function of the number of persons above a specific (may be 15) age (Z), level of nutrition in previous time period, labour force participation rate in each sector (R), which itself depended upon the proportion of women who must remain at home to rear children in the LDCs. Equations in his model consisted of variables mentioned above and interlinked by economic relationships. Capital stock was defined as equal to stock in the previous time period plus net investment over the year. Savings were not assumed as a direct linear function of income and inverse linear function of population as in Coale and Hoover's model but only a possible relationship without specifying the direction. Similarly, stock of land (J) was assumed as equal to previous years stock plus annual increment. ΔJ was defined as a function of Governmental expenditure. Welfare expenditure made by the Government was assumed to be a constant amount per equivalent adult consumer.

The detailed framework of the model consisted of sectors (A, N), endogenous variables (Q, F, L, K, J, Z, ... etc.) and exogenous variable (T, G_1, G_2, G_3 (A, N), TR (A, N) ..... etc.), parameters (Φ, α, β ..... etc.). The structural relationships among them were as a result of a combined programme of expenditure on population control and transfer payments to induce its acceptance. A few possible consequences of a population control programme traced by this model were as follows:-

1. Lesser number of consumers and so higher average caloric intake.

2. Higher Labour participation rates as fewer women would sit at home to rear infants (a very doubtful implication especially in the socio-culture set up of a country like Pakistan).

3. Lesser Government expenditure on social welfare. Government expenditure on population control and inducement payments would be drawn from other sectors and so a series of interacting relationships would determine the ultimate magnitude of benefits.

This model is relevant to the situation prevailing in LDCs. It deserves the credit of combining the impact of birth prevention as well as inducement expenditures of the government on almost all the significant variables of economic development through a series of logically specified equational relationships. The parameters have been carefully and logically defined and it meets the consistency criterion of a model adequately. The model escapes short run - partial equilibrium emphasis as well as restrictiveness of a fixed capital / output ratio. It incorporates primary effect of raising per capita income as soon as births fall (Enke effect). It also includes secondary effects of rising nutritional levels and resulting improved labour productivity and savings to government arising from decreases in expenditure on social overheads. These factors had earlier been stressed by Leibenstein (1967), Zaidan (1967), Coale and Hoover (1958) and later by Qureshi (1974). This model is unique in allowing only a possible relationship between rise in per capita income and savings without specifying the direction or magnitude of change. This is an improvement over the previous models. Earlier models had failed to recognize and tackle this factor. Disaggregation of the economy into two sectors as explained above also increases the creditability and forecasting power of this model.

The model, has a few doubtful assumptions which are as follows:-

1. It transpires that the model is relevant to a 'closed' economy though it is not specifically assumed. This makes the model highly unrealistic. Interdependence among economies internationally is a common feature and has been increasing over the last many years. Its complete disregard makes the model unrealistic especially in the context of Pakistan where there has been (for the last few years) too much dependence on international loans.

2. The death rates have been expressed as decreasing function of many variables as well as 'time trend' but the process has not been detailed and the specific inter-relationship between time trend and death rates has not been explained. In Pakistan, mortality rates cannot be assumed to be falling over time unless other variables are at work.

3.10 A BACKWARD GLANCE

After scanning through the above models, it is concluded that it is very difficult to quantify the success of a country wide population control programme. The constraints, assumptions and limitations of such models cast doubts on their validity and applicability.

The assumptions of constant capital/output ratio and of zero marginal productivity of labour in Coale & Hoover's model were not realistic but presumably adopted for reasons of simplicity & convenience. Similarly, later versions of their model especially that by George B. Simmons had similar assumptions though he considered the cost of population control programme which had earlier been neglected by Coale & Hoover and Enke. Later Zaidan, following the foot steps of Enke considered the "loss of output" because of "prevented" births. Meier's model also had many similarities to Enke's model showing the net value of prevented births varying directly with per capita income. Meier's model was general though more applicable to developed economies; whereas Enke's model was a case study of India. Simmon's & Zaidan's models differred in many ways, though these models have some common features e.g. case studies of underdeveloped economies of India and Egypt. Both studies showed that under developed economies of the world having abundance of population, low level of literacy and shortage of capital could accelerate their rate of economic growth by slowing down their rate of growth of population. Both studies revealed that investment in population control programmes in LDCs could render many times larger returns as compared to any other type of conventional investment in physical capital.

George B. Simmon's model combining the salient features of coale & Hoover's model as well as Enke's model failed to answer such basic questions as the maximum extent of resources that could be diverted to population control programmes.

Other models put forward by Ruprecht (1970), Robinson (1968) & Jorgenson (1961) disaggregated the economy into two sectors on the ground that production functions of agricultural sector in many respects could not be generalized for the entire economy. This brought more precision into these models but operationally, these type of models required more data to estimate actual coefficients of relationships than other one sector models explained above. The benefit evaluation model by Robinson recognized the dual nature of the economies of under developed countries and was built in a two sector format. It included salient interactions between expenditure on population control and the economic/demographic time path of the economy. This flexibility enhanced its applicability especially for the LDCs.

Summing up, one can say that over the years, models have been improved, revised and enlarged. New models have been built up based on previous models benefitting from them and enriching them. However, all point out to the same conclusion that such type of models at their best can be 'good guess work' in order to provide guidelines to policy makers. To be precise, such models require a vast set of input data which is presently unavailable in LDCs. Precise forecasting is not possible in such type of models even in the developed countries (where data machinery has become very accurate and efficient) because variables involve unpredictable human interactions and reactions.

NOTES

1. A. Lewis, (1972), H. Leibenstein, (1967) and G. Myrdal, (1968). All of them alongwith many more have dealt with this issue.

2. In India, research on benefit/cost analysis of population control programme began in the early sixties. A study on cost-effectiveness of sterilization and contraceptives was done by Agarwala

(1968). Expenditure per prevented birth was calculated by S.N. Agarwala, (1968). Need and data requirements of benefit/cost analysis were highlighted by S.N. Agarwala, (1968-1969). Similarly, many other studies on different aspects of costs and benefits of population control programmes were conducted in India during the seventies and eighties, see K. Sumati, (1987) as well as K.B Suri, and S.P. Mohanty (N.D.).

3. W.C. Robinson, (1968). The author has discussed all these issues comprehensively

4. See G. Myrdal, (1968), S. Kuznets, (1967) and G C Zaidan, (1967) in this context.

5. G. Myrdal, (1968).

6. S. Enke, (May 1960).

7. See J.L. Simon, (1969). The author has analysed Enke's model in depth, specially on value of a prevented birth being the yard stick for making decisions for bonuses and propaganda compaigns. He also found internal inconsistencies in Enke's model.

8. To understand fully and appreciate the finer points of Enke's work, see his original texts published in 1957, May 1960, July 1960, July 1961, July 1962 and March 1966.

9. See P. Demeny (July 1961). The author disagreed with Enke on this issue.

10. See A.O. Krueger, and L.A. Sjaastad (1962) on this point.

11. For more details, see Goran Ohlin, (1967)

12. This is taken from G.B. Simmons, (1969).

13. For details, see R.L. Meier, (1959).

14. For details of related issues and ensuing discussion, see Paul Demeny, (1965).

15 A very good resume and criticism of Demeny's model is contained in W.C. Robinson, (1968)

16 For details see the following:-

Julian L. Simon, (1969). "The Value of Avoided Births to Under-developed Countries"

17. W.C. Robinson, (1968). The author has given a good summary of Bower's model. He has also compared the models of Enke, Demeny and Bower, bringing out their similarities and dissimilarities.

18. G.B. Simmons, (1969). See the original work for details of calculations.

19. G.C. Zaidan, (1971). The author has dealt this topic adequately.

20. Many subsequent studies have shown that because of age and parity factors, sterilization has negligible effect on reducing fertility e.g. A.R. Rukanuddin, G.Y. Soomro and N.I. Farooqui (1985).

21. G.C. Zaidan, (1971). See this working paper for finer points of his model and mathematical exposition.

22. W.C. Robinson, (1968) The author has reviewed most of the relevant models comprehensively before putting forward his own benefit evaluation model.

CHAPTER 4

A REVIEW OF SELECTED EVALUATION AND BENEFIT/COST RELATED STUDIES OF PAKISTAN'S POPULATION CONTROL PROGRAMME

4.0 INTRODUCTION

A few attempts have been made to evaluate Pakistan's population control programme. This evaluation has been from different angles ranging from estimating the value of preventing a birth to finding the cost effectiveness of population control programme or analysing changes in fertility behaviour. In this chapter, a few such studies are briefly reviewed.

4.1 M.AMIN-UR-RAHMAN KHAN'S ANALYSIS

In this study, Khan (1969) attempted to estimate the value of preventing a birth based on the models previously put forward by Coale and Hoover (1958), Enke (1960), Demeny (1960) and Repetto (1968). He did not formally construct any model for Pakistan himself.

Khan using Enke's coefficients of calculations, arrived at the following benefit/cost ratios:-

1. In case of the vasectomy programme, benefit/cost ratio ranged between 24:1 to 52:1.

2. In case of births averted due to the IUD programme, the benefit/cost ratio ranged between 13.4:1 to 27.4:1.

3. Combining (1) and (2), Khan gave a minimum of 18:1 and a maximum of 38:1 as the benefit/cost ratio.

These benefits were calculated in the form of saved consumption within the first fifteen years of the programme. He made good use of the scanty data available to him in 1968 pertaining to Bangladesh (then East Pakistan). He also stressed the need for organizational reforms as total cost of the programme was proportional to the organizational setup. He deserves the credit for trying to attract the attention of the policy makers and economic planners on this crucial aspect that investment in population control could pay off manifold. His study also stressed the need for organizational reforms by showing that optimal utilization of manpower within the programme would further improve the benefit/cost ratio.

4.2 ANALYSIS BY PAKISTAN INSTITUTE OF DEVELOPMENT ECONOMICS (PIDE)

This study was prepared for Planning Division, Government of Pakistan by PIDE (1977). The period of analysis was the fiscal year 1973-74. Detailed data on expenditure incurred by various programme districts were used as a measure of programme inputs. Output of the programme was measured by computing an index of CYP (Couple Years of Protection) based on the number and effectiveness rates of different contraceptives provided by the programme. This study was based on the data made available through the GPE (1963), PGS (1965) and NIS (1968). The following were its findings:-

1. The total expenditure of the programme amounted to Rs.104 million for the fiscal year 1973-74.

2. The programme prevented 0.25 million births, resulting in an overall cost of Rs.416.00 per prevented birth.

3. There was lack of correlation between expenditure and the volume of births prevented in various districts, implying no direct correspondence between inputs and outputs at the district level.

This study leaves much to be desired. The following are some of its major weaknesses:-

1. Total reliance on service statistics to provide the basis of calculations of outputs is not justified. Some strategy should have been devised to refine, scan and sift the data, bringing it closer to reality e.g. micro level independent surveys could have been conducted to find out the extent and degree of inconsistency in service statistics.

2. The assumption that all distributed contraceptives were used appears to be unrealistic. Since a research organization was conducting the study, some feed back filled surveys could have shown the extent of discrepancy between distributed and actually used volume of contraceptives.

3. This study should have probed more deeply into the discrepancy found in the amount of expenditure on population control programme and the magnitude of births prevented so that the underlying causes could have been remedied. Such

findings could have been useful in making future policy recommendations.

4. No direct correspondence was found between inputs and outputs at the district level. This line of investigation should have been probed more deeply for policy recommendations and remedial measures.

5. The assumption that three CYPs saved one birth was based on a similar attempt by Potter (1969) in spite of a number of analytical weaknesses pointed out in this study. If the estimates of prevented births were to be based on coefficients and assumptions used in previous studies done in other countries, at least some attempt could have been made to refine them in the light of previous studies done on Pakistan's Population Control Programme. If it was all to be a 'guess work', some attempt should have been made to bring it closer to reality. This becomes all the more important because resources available to research organizations far exceed those available to a lone researcher.

6. No statistical inferences for prediction or forecasting were found in this study. The ultimate objective of an evaluative study is generally its practical usefulness for future policy making which seems to be lacking in this study.

4.3 ANALYSIS BY M.N.I. FAROOQUI AND G.Y. SOOMRO

Farooqui & Soomro (1984) based their study on data generated by GPE (1963-65) for the pre-programme year and that of PGS Phase-II (1976, 1977, 1978) for the post-programme years. Various techniques developed initially by E.M. Kitagaw (1955), B.M. Lee and John Isbister (1966), and S.M. Wishik (1973) were used and coefficients derived by them were applied in case data of the required type for Pakistan was not available.

They attempted to decompose changes in fertility rates in order to isolate the programme from the non-programme effects. The total number of births averted by decomposition analysis was arrived at by using constant fertility assumption throughout the reference period. The births averted by the programme methods were arrived at by applying the Lee and Isbister (1966) and Mauldin (1968) techniques to programme statistics.

The following were its salient findings:-

1. Change in marital status contributed around 48% of change in fertility whereas marital fertility contributed about 39% of such a change.

2. The contribution of age structure and proportion of females in fertility change was 10 and 18 percent respectively.

3. Programme statistics showed an over-estimation of 41 percent of births averted[1] (even if all observed number of births averted[1] by changes in marital fertility were attributed to the programme).

This study can be criticised on the following grounds:-

1. Some micro level surveys could have been conducted to refine the data sets obtained from GPE and PGS Both surveys suffered from sampling and non-sampling errors and there was high incidence of age misreporting as mentioned by W.C. Robinson (1978), K.R. Javaid, (1971) and J.G.C. Blacker (1987).

2. The technique for calculation of averted births due to IUDs should have taken into account all relevant information about the acceptors, i.e. the length of use

of the IUD, the age distribution of the users, the possibility of death or secondary sterility interrupting a marriage during the period when the IUD was being used, overlap between amenorrhea and the use of IUD, accidental pregnancies during the period when the IUD was being used and the alternative assumptions concerning the fertility that would have been experienced by the adopters had they never used the IUD. Neglect of above mentioned factors is a serious limitation of this analysis.

3. In this study, the service statistics relating to conventional contraceptives were found to be over-estimated but no attempt was made to refine them. However, there are many factors which cast doubts on reliability of these statistics in the context of Pakistan e.g. lack of education, inadequate housing facilities, rural character of economy, sexual taboos, social, cultural and religious biases which inhibit the use of conventional contraceptives in a typical rural setting in Pakistan.

Inspite of the above mentioned limitations, this study was a good attempt at decomposing the factors influencing fertility in Pakistan. The attempt to isolate programme induced averted births from the non-programme averted births, deserves all the credit being the first one of its kind in Pakistan. They did not attempt any benefit/cost calculations but subsequent studies could base such calculations on their analysis as has been done in the present study.

4.4 ANALYSIS BY RUKANUDDIN AND OTHERS

This study on family planning evaluation was done by Rukanuddin, Soomro and Farooqi (1985). It was based on the data sets generated by the PGE (1962-65) and PFS

(1975). PGE was conducted prior to official establishment of Population Control Programme in the country, and thus could provide a basis for the measurement of pre-programme or 'potential' fertility. It comprised of a cross sectional enumeration and a longitudinal registration system of measuring various population related vital events. The data gathered from these methods of enumeration was matched and adjusted for missing events by the application of the Chandre-Deming formula. The PFS (1975), was conducted in collaboration with the World Fertility Survey. It provided a great deal of information on demographic characteristics including information on the ever-use of programme as well as non-programme methods of contraception. So data generated by PGE.(1962-65) as the pre-programme period and that by PFS (1975) as post-programme era seemed reasonable for decomposing changes in fertility into 'programme induced' and 'non programme' changes.

This study had a much wider objective i.e. to decompose changes in fertility in order to isolate the contribution of socio-economic variables as compared to population control programme and thus assess the 'real' extent of the success of the population control programme of the Government of Pakistan. The authors used the following four techniques of evaluation:

1. Standardization approach
2. Component projections
3. Prevalence model
4. Multivariate Areal Analysis, including Path Analysis technique which was applied to areal data for measuring the programme impact only on fertility by controlling other socio-economic and demographic factors.

Effects of changes in age structure, marital status distribution, proportion of female population, marital fertility and the joint effect of the above mentioned factors were studied in order to sift the births averted due to population control programme from the total number of births averted.

Application of all the above mentioned four techniques gave varying results for the year 1975. With the standardization approach, the number of births averted by both programme and non-programme methods of contraception were estimated as 234,695. By component projection approach, births averted only by the population control programme were 299,976. The estimate of prevented births derived through the prevalence model was 221,179. It appeared that the estimate of prevented births arrived at by standardization approach, component projection method and the prevalence model were fairly close to each other. The overall effect of the assumptions inherent in the different methodologies might have played a role in the differences observed. Compared with the standardization results, the two other methods i.e. component projections and prevalence model seem to yield somewhat over-estimated results.

Multivariate areal analysis in combination with path analysis was used to isolate the effects of programme induced decline in fertility rates from the non-programme factors. Based on various assumptions, the technique of path analysis was applied by the use of areal data. But data on various socio-economic variables i.e. urbanization, education, proportion married, family planning acceptance, proportion in agriculture, enrolment ratio and such other variables was not available from the same source consistently during the reference period June 1967 to June 1971. However, it was concluded that the pace of socio-economic development during the above mentioned period was not enough to exert any significant effect on fertility. The existence of multicolinearity among the socio-economic variables mentioned above also affected the path coefficients. The net effect of the programme could not be estimated because of the non-availability of relevant data in Pakistan.

The study concluded that the number of births averted in 1975 ranged between 2,20,000 to 3,00,000 and 80% of this could be attributed to programme impact. The results from areal analysis showed that the population control programme exerted a very small impact on fertility, but education appeared to be a significant non-programme factor in this areal analysis.

The study obviously sufferred from data-deficiency problems. For example component projections required detailed characteristics of acceptors like new users or continuous users, drop out rate of users etc. which were not available in both the surveys used in the study. The use of prevalence data appeared to yield better results than the standardization and component projections. The technique of areal analysis and path analysis also could not be applied precisely because of lack of availability of data consistently from the same source which is perhaps also responsible for some conflicting conclusions of this study. For example, this study estimated that population control programme contributed 80% to births averted in 1975. Nevertheless, results from areal analysis revealed a very small impact of the population control programme. One wonders as to how a high figure of 80% can be called as a 'very small impact'.

To conclude, this research can be called a pioneer study leading the way for the new entrants to the fascinating field of the application of demography and statistics to population control evaluative techniques. It is hoped that more attempts in the same direction would render better results because data of the required type has become available after the CPS (1984) and PDHS (1991).

4.5 CONCLUSION

Very few attempts have been made to evaluate population control programme of Pakistan during the period under analysis 1965-88. In fact, the studies by Khan[2] (1969), PIDE[3] (1977) Farooqui & Soomro[4] (1984) and Rukanuddin[5] (1985) differ widely in coverage and scope and so strictly speaking, are not comparable. In all the above mentioned studies, data deficiency has been a basic deterrant although the time gap between Khan's study and Rukanuddin's study is about fifteen years. It is deplorable that data deficiency and inconsistency still persists. It is high time that economic planners and policy makers in Pakistan should try to find solution of this chronic problem from the grass root level.

NOTES

1. The degree of over estimation of service statistics was estimated to be around 50% in the Research Report No. 142 A Multivariate Areal Analysis of Programme and Non-Programme Effect on Fertility in Pakistan by Soomro et al.

2. For details, see Khan, M.A.R. (1969) "Economics of Family Planning Programme" Pakistan Journal of Family Planning 3:2

3. This study on Cost Effectiveness of Pakistan's Family Planning Perogrammes (1977) was done by Pakistan Institute of Development Economics for the government of Pakistan.

4. For details, see Farooqui & Soomro (1984) "Analysis of Fertility Change in Pakistan" Paper Presented at Annual General Meeting, Institute of Development Economics, Islamabad.

5. For details, see Rukanuddin, A. Razzaque et al. (1985) "Evaluation of The Impact of Family Planning Programmes on Fertility: The Case of Pakistan" Population Studies No 87 U.N.

CHAPTER 5

AVERTED BIRTHS BASED (ABB) BENEFIT/COST MODEL DEVELOPED FOR THE PRESENT STUDY

5.0 INTRODUCTION

Benefit/cost analysis is a technique based on the proposition that efficient allocation of resources is essential for maximization of economic welfare of a country.

Benefit/cost[1] framework of economic analysis as applied to population control programmes is an adoption of partial equilibrium analysis. Investment in this programme involves a flow of returns over a period of time. Problems such as scarcity of resources, conflicting priorities, alternative choices and objective of maximisation of benefits make traditional tools of economic analysis relevant to population control programme as well[2]. Therefore, estimation of the relationship between input (cost of the population control programme) and output (benefits generated by the population control programme) is within the framework of economics.

An economic analysis of costs and benefits is useful for efficient public decisions. Such an analysis can help policy makers in making rational decisions regarding the volume of the nation's resources that should be diverted to population control programme. So benefit/cost analysis of public investment in various fields is useful for efficient policy planning. It also helps to assess the relative economic effeciency of various public sector projects. In order to justify on economic grounds, a population control programme should yield economic returns higher or at least equal to other competing public sector projects. Within a project, if benefits exceed the cost i.e.

benefit/cost ratio exceeds one, the project is considered to be efficient and worth undertaking.

In applying benefit/cost technique to public investments of manpower and human capital development, a number of additional assumptions and limitations have to be encountered as compared with public sector projects involving development of physical capital. In the context of this study, a new Averted Births Based (ABB) model has been developed for economic analysis of benefits and costs of population control programme of the government of Pakistan.

5.1 WHY A NEW MODEL?

In this study aiming at economic analysis of Pakistan's investment in population control, a new demographic/economic model has been developed for calculating benefits and costs. Review of existing literature in chapters 2 and 3 showed that economic returns from investment in population control programmes far exceeds the costs in the case of over populated third world countries where the level of unemployment is already quite high. A few studies of similar type conducted on Pakistan's population control programme reviewed in chapter 4 also reinforced the same argument. Nevertheless, no macro level attempt to analyse and establish an economic rationale for investment in population control programme of Pakistan seems to have been made. Warren C. Robinson (1968,1978) and M. L. Qureshi (1974) stand out as some of the few economists who attempted to quantify public savings arising from Pakistan's population control programme. So in this study, a new `Averted Births Based' (ABB) model has been developed by the researcher to calculate benefits and costs of investment in population control programme of Pakistan at the macro level because such a model was lacking at the time this study was initiated.

5.2 GENERAL CHARACTERISTICS OF AN ECONOMIC MODEL

An economic model is a theoretical framework consisting of a carefully chosen set of pertinent variables linked and connected in a causal way, forming a number of equations describing the structure of the model and aiming at the solution values of the predetermined objectives. Market clearing level of prices or profit maximizing level of output are some examples of economic models. Generally speaking, an economic model possesses the following characteristics[3]:-

5.2.1 SPECIFICATION

Specification implies detailed description of the ingredients constituting the model. Variables included in the model may be endogenous or exogenous. Constants and parameters also constitute essential ingredients of the model. All these set of dependent or independent variables, constants and parameters are inter-linked with definitional and behavioural equations in a structure according to the principles of economic theory. Signs and magnitudes of parameters are also based on economic theory, applied research and information sources. Precise formulation of the model may or may not be indicated by economic theory. For example, the theory of demand does not determine whether the demand for a particular commodity should be studied with a single equation model or with a system of simultaneous equations, whether the demand function will be of linear or non-linear form though demand theory does render some information regarding the mathematical form of a demand function.

For solving an analytical problem, appropriate set of exogenous and endogenous variables are selected. Then a set of assumptions and limitations regarding the human, institutional, legal, technological or even psychological aspects of the environments affecting the chosen set of variables are formulated. The chosen set of variables are connected in a causal way and translated into appropriate equational forms. Solution values of endogeous variables are arrived at through appropriate mathematical or statistical methods.

Some of the problems faced at this stage are:-

1. Limitations of knowledge about all the operative factors.
2. Non-availability of data of requisite type
3. Omission of some important variables or equations or mistaken mathematical form of some function.

5.2.2 ESTIMATION

Estimation involves obtaining estimates of parameters of the model by appropriate methods. This implies gathering of data or observations of the variables included in the model, tackling problems of identification and aggregation, examining the degree of correlation between the explanatory variables and finally choice of appropriate techniques for estimating coefficients. Data may consist of cross-section, time series, panel or engineering data. These may be obtained from institutions or government organizations or constructed through dummy variables. Identification of the coefficients of the function is vitally important because it determines whether a relationship which is theoretically plausible can be statistically estimated or not. Coefficients of economic relationship may be estimated by single equation techniques (least squares) or simultaneous equations under carefully chosen and stated assumptions.

5.2.3 EVALUATION

Evaluation is performed on the basis of certain pre-conceived and appropriate criteria to find out the authenticity and reliability of estimates. It consists of deciding whether the estimates of the parameters aretheoretically meaningful and statistically significant. For this, different criteria are used.

Firstly, economic (a priori) criterion which implies that economic theory defines the signs and magnitudes of coefficients of economic models. For example, negative relationship between quantity demanded and price of a commodity. So economic theory imposes restrictions on the signs and values of the parameters of economic models. If the estimates of parameters turn up with signs or sizes not conforming to economic theory, these may be rejected or considered unsatisfactory unless there are strong reasons to their exception.

Secondly, statistical criteria are applied. Correlation coefficient shows the extent to which the explanatory (independent) variables are responsible for changes in the explained (dependent) variable of the relationship. Standard deviation tells the dispersion of the estimates around the true parameter and so, the larger the standard error of a parameter, the less reliable it is and vice versa. Sampling theory may also prescribe some tests to find out the accuracy of the estimates. Statistical criteria remain secondary to 'a priori' theoretical criteria.

Thirdly, econometric criteria or the second-order tests are applied to determine the reliability of the estimates. These help to establish whether the estimates have the desirable properties of unbiasedness and consistency.

So it can be concluded that evaluation of the results obtained from estimation of the model is a very complex procedure and all criteria i.e. economic, statistical and econometric may be used for accepting or rejecting estimates of the model.

5.2.4 FORECASTING

A model can also be used for forecasting the values of economic variables included in the model. One way to test the forecasting power of the model is to use the estimates of the model for a period not included in the sample. The estimated value may be compared with the actual (realized) magnitude of the relevant dependent variable. The difference should not be satistically significant otherwise the forecasting power of the model becomes weak. Another way can be to enlarge the sample and then re-estimate the function. The variation of the revised estimates as compared to the previous estimates should not be statistically significant otherwise the model has poor forecasting performance[4].

To summarize, an economic model should possess the following few features:-

1. Theoretical plausibility i.e. conforming to basic postulates of economic theory.

2. Explanatory ability i.e. it should be consistent with the observed behaviour of the economic variables whose relationships it determines.

3. Accuracy of the estimates of its parameters, meaning that estimates should be as unbiased and efficient as possible.

4. Forecasting ability i.e. the model should produce satisfactory predictions of the future values of the dependent (endogenous) variables.

5. Simplicity i.e. the model should be extremely simple to handle from the start till the end. However, this should not be at the cost of other desirable features explained above.

5.3 INGREDIENTS OF THE ABB MODEL

The model formulated for the present study has been developed keeping in view the general principles of model building discussed in section 5.2 as well as availability of authenticated data generated through reliable channels. Nevertheless, data deficiency and inconsistency remained a chronic problem. This has been discussed in detail in the Abstract as well as in Chapter 2 and 4 of this study. In fact, inability to isolate programme induced factors from the non-programme socio-economic variables has been one of the primary reasons and driving force for the formulation of the ABB model which side tracks and by passes all such tricky issues and relies on the data officially published by the government of Pakistan as the output of government run population control programme.

This model has also escaped the necessity of measuring the influence of such socio-economic variables as female education, adult literacy, exposure to audio visual external influence and a host of other such variables bringing about decline in birth rates. This is important because data on such variables require surveys and controlled experiments which necessitate a vast amount of time, resources and manpower which has not been available to the present researcher. The ABB model has the following ingredients:-

1. Assumptions
2. Specification and definition of variables.
3. Rationale of the equations used in the ABB model.
4. Formulation of the ABB model and Estimation

5.3.1 ASSUMPTIONS

Generally speaking, models are based on assumptions. These become necessary because of the innumerable number of variables which may afffect the dependent variable but whose estimation is not possible because of a variety of reasons. It may even be beyond the scope of the model. So, in the ABB model, a set of assumptions has also been made mostly for the sake of simplicity of calculations. However, in my opinion, lifting of these assumptions would enhance the benefits of an averted birth in the case of a labour-abundant and poor country like Pakistan.

The assumptions of the ABB model are as follows:-

1. Actual national income in any given year remain unaffected with or without averted births. This assumption is necessary in order to proceed with the calculations without considering the likely effects of a smaller size of population on national income via improved savings and larger investment made possible due to higher per capita income.

2. Level of savings and investment remain unchanged with or without averted births. In fact, this assumption is a corollary of the first assumption.

3. Per capita consumption and as a consequence, productivity per capita remain constant with or without averted births. This assumption is necessary for calculation of per capita benefit of an averted birth without taking into account the likely benefits of improved productivity due to smaller size of population resulting in higher per capita income and better nutrition.

4. Money costs of averted births as shown by actual investment on population control reveal the true scarcity of the resources i.e. opportunity costs of factors of production have been reflected truly in their wages. This assumption is necessary because of the estimation problems involved in calculation of shadow prices.

5. Welfare considerations including satisfaction which the parents derive from their children have been ignored[5]. This has been done due to the difficulties of translating psychological factors into money terms.

6. Abortions have been totally ignored though abortions have been permissible under medical advice in Pakistan. Officially published data on abortions is not available. Also, abortions occur outside the programme and thus do not enter the cost side of this model[6].

7. All averted births consist of 'unwanted babies'[7]. This is a necessary assumption and is, infact, implied in the entire study.

8. All averted births are due to the population control programme of the government of Pakistan. This seems logical because averted births are calculated on the basis of contraceptive materials used and distributed through government run population control programme channels[8].

9. The time lag between averted birth and actual birth has been ignored[9]. This has been done for the sake of simplicity because accuracy of results may be affected otherwise.

10. Previous expenditures incurred during 1955-65 have not yielded any significant spill-overs and substitution of private population control devices by the government run population control programme has not occurred[10]. This assumption is necessary for accurate calculation of costs and benefits.

11. All distributed contraceptive materials have been used without any time lag. Although acquiring contraceptive is a necessary but not a sufficient condition for averting birth, yet this assumption is necessary in order to proceed with calculations[11]. Lack of relevant research studies on the extent of difference between the use and distribution of contraceptives has been the major reason for this assumption.

12. Costs of the programme are the actual yearly expenditure by the government on population control programme as given in various volumes of Pakistan Economic Surveys.

13. Benefits have been considered only from the point of view of improvement in per capita income due to smaller size of the population as a result of investment in population control programme.

5.3.2 SPECIFICATION & DEFINITION OF VARIABLES

A comprehensive difinition of costs and benefits is not possible because diverse components such as personal, psychological, ecological and spill-overs cannot be quantified. So in the ABB model, definition of costs and benefits is by no means precise or comprehensive but conforms to convenience and availability of data as explained below:-

I Costs

Costs can be of many types such as the following:-

(i) Economic costs

These are very difficult to define and quantify. The list of inputs into population control programme appear to be infinite, ranging from highly skilled medical and professional personnel, semi-skilled people, production costs of contraceptive materials and use of vehicles and building. International and private agencies have also been supporting this programme financially as well as administratively.

(ii) Joint inputs

Costs sometimes are incurred as joint inputs and data does not exist separately in official records. In the case of cost of population control programme, some inputs have been joint for a few years Population control programme has been a part of a larger maternal health and child care programme as discussed in detail in Chapters 6 and 7.

(iii) Indirect costs and spill overs

It is difficult to quantify such type of costs because of arbitrary and heterogeneous elements involved in such an exercise.

(iv) Opportunity costs

Accuracy requires calculation of opportunity costs and shadow prices of certain inputs. This has not been possible because of resource constraints in terms of personnel and time.

(v) Cost as loss of labour services of the averted births

This has also not entered the cost side of this model because this is long run analysis spreading over twenty three years. Reduced births are not supposed to be affecting the size of the labour force in the initial 13-14 years. In later years, earnings of the marginal net additions to the labour force have been assumed to be just enough to keep the existing per capita income constant. This model has not assumed zero marginal productivity of marginal net additions to the labour force as suggested by many researchers in the case of over populated labour abundant countrties like Pakistan e.g. Coale and Hoover (1958).

So an accurate estimate of all types of costs has not been possible. Only financial costs have been calculated. The yearly expenditure of the government on population control programme during 1965-88 in constant price level of 1980-81 has been assumed to be the total yearly costs.

2 Benefits

Averted births bring about benefits of many types to the family as well as the country. Some of them are as follows:

(A) Benefits to the Family

With given family income, each child receives better package of goods and services in a small sized family as compared to a large one. But many definitional and conceptual problems make calculation of such benefits very difficult. So no such attempt has been made in this model.

(B) Benefits to the Country

These benefits arise due to many factors such as the following:

(a) Denominator Effects

(i) A smaller population results in improvement in per capita income due to pure denominator effect i.e. the same magnitude of national income would be divided over a smaller population due to averted births resulting in higher per capita income

(ii) A smaller population due to averted births implies public savings on social overheads i.e. education, health, transport and housing. Assuming a constant ratio of these services to the size of the population, the existing expenditure on provision of such services per person multiplied by the number of averted births would be the money value of such savings to the government. Again this is a pure denominator type of effect. This type of savings have been discussed by H.Leibenstein (1967), G.C. Zaidan (1971) and M.L. Qureshi (1974).

(b). Mixed Effects

A stream of benefits may arise due to mixed numerator and denominator effects. This implies that change in national income may take place due to averted births via various interactions among diverse set of economic variables e.g. changed magnitudes of savings and investment, changes in the quality and quantity of labour force due to changing patterns of age structure, changed magnitude of technology coefficient and the combined effect of all of these could safely be assumed to be a higher national income. These interactions have been discussed by G.B. Simmons, U. Rob and S. Bernstein (1986) as well as G.B. Simmons (1969).

In the ABB model, a(i) type of benefits in terms of improved per capita income have been calculated which have made this estimate of the calculation of benefits very conservative. A large majority of factors operating in Pakistan of the types (a) and (b) would enhance the magnitude of benefits but due to practical problems in quantification, such benefits have not been included.

Variables and parameters used in ABB model are given below:-

TC	=	Total cost of the programme in constant price level of 1980-81.
TB	=	Total benefits of the programme in constant price level of 1980-81.
C_t	=	Cost of the programme in year t.
G_0	=	General Price index of the base year (1980-81 = 100).
G_t	=	General price index of year t
t	=	Time period starting t = 1 = 1965-66
Y_t	=	National income of year t in price level of year t

LP_t = Actual population in year t.

HP_t = Hypothetical population in the absence on any expenditure on population control by the government in year t.

s_{ti} = Hypothetical Survivors of age i out of averted births in the year t.

a_{ti} = Averted births of age i in year t.

d_{ti} = Death rate of age i in year t or age specific death rate.

TB, HP_t, s_{ti} are endogenous variables whereas TC, LP_t, Y_t, C_t, G_0, G_t, a_{ti}, d_{ti} are exogenous variables as discussed in Sections 5.3.2 and 5.3.3 of this chapter.

The ABB model seeks to estimate benefit/cost ratio of investments in population control during a specific time period by calculation of TC and TB.

5.3.3 RATIONALE OF THE EQUATIONS USED IN THE ABB MODEL

Equations 1 and 2 of Section 5.3.4 are definitional, Costs being the sum of yearly government expenditure on population control in constant price level of 1980-81. Benefits are the number of net averted births (Hypothetical survivors) each year multiplied by the difference between actual per capita income and hypothetical per capita income (calculated by dividing that year's national income by the enlarged hypothetical population). Equation 3, 4, 5 and 6 of Section 5.3:4 are based on the following economic rationale.

1. In the first year i.e. 1965-66, hypothetical survivors have been calculated by multiplying the averted births of that year with the survival rate of age group 0-1.

2. For the second year i.e. 1966-67, hypothetical survivors have been calculated by adding the previous year's survivors multiplied by survival rate of age group 1-2 to the averted births of 1966-67 multiplied by survival rate of age group 0-1.

3. For the third year i.e. 1967-68, hypoothetical survivors have been calculated as a sum of three terms. First term is 1965-66's survivors multiplied by survival rate of age group 2-3. Second term is equal to second year's (1966-67) averted births multiplied by the survival rate of age groups 1-2. The third term is the third year's (1967-68) averted births multiplied by survival rate of age group 0-1.

4. Similarly, every year, one additional term has been added upto the fourteenth year i.e. the year 1978-79. Hypothetical survivors of 1978-79 are the sum of fourteen terms consisting of successive hypothetical survivors of the previous thirteen years and the current year's hypothetical survivors which have been as before, calculated by multiplying the averted births of current year with the survival rate of age group 0-1.

5. In later years starting from the year 1979-80, hypothetical syrvivors of 1965-66 attained the age fourteen or above. In the ABB model, it is assumed that the marginal productivity of persons above fourteen who entered the labour market is just enough to keep per capita income quotient unaffected. From the year 1979-80 onwards till 1987-88, every year hypothetical survivors have been calculated by adding current year's hypothetical survivors (calculated by multiplying current year's averted births with the survival rate of 0-1 age group) and excluding the first term consisting of that group of hypothetical survivors who reached fourteen years of age or above and entered the labour market, with

the assumption that they left the per capita income quotient unaffected. So after 1978-79, each year, the first term of hypothetical survivors has been left out and the last term consisting of current year's hypothetical survivors has been included. Therefore, the total number of terms starting from the year 1979-80 till 1987-88 remains fourteen and hypothetical survivors are the sum of fourteen terms every year.

5.3.4 FORMULATION OF THE MODEL AND ESTIMATION

The following set of equations interlinking the variables explained above constitute the ABB model.

Input data is represented by the following equation:-

$$TC = \sum_{t=1}^{23} \frac{C_t}{G_t} G_o \qquad (1)$$

Output data is represented by the following set of equations:-

$$TB = \sum_{t=1}^{23} \left(\frac{Y_t}{LP_t} - \frac{Y_t}{HP_t}\right) HP_t \times \frac{G_o}{G_t} \qquad (2)$$

$$HP_t = LP_t + \sum_{i=1}^{t} s_{t_i} \qquad 1 \leq t \leq 14 \qquad (3)$$

$$HP_t = LP_t + \sum_{i=1}^{t} s_{t_i} - \sum_{i=1}^{t-14} s_{t_i} \qquad 15 \leq t \leq 23 \qquad (4a)$$

OR

$$HP_t = LP_t + \sum_{i=t-13}^{t} s_{t_i} \qquad 15 \leq t \leq 23 \qquad (4b)$$

Generalizing equation (3) and (4a)

$$HP_t = LP_t + \sum_{t=1}^{t} s_{t_i} - \sum_{t=1}^{t-14} s_{t_i} u[t-15] \tag{5}$$

$$S_{it} = A_{it} - d_{it} \times A_{it}$$

OR

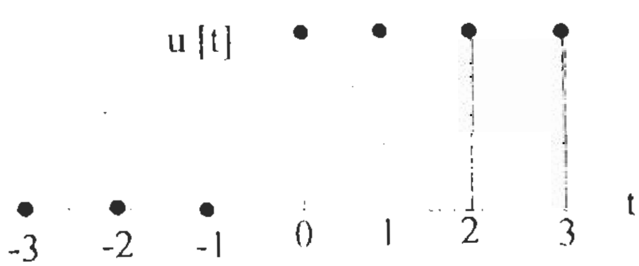
$$s_{t_i} = a_{t_i}(1 - d_{t_i}) \tag{6}$$

Where u[t] is discrete-time unit step function[12] defined as under:-

u[t] = 1 if $t \geq 0$

u[t] = 0 if $t < 0$

Geometrically the above restrictions imply the following:



$1 \leq t \leq 23$...........($t \in \mathbb{Z}$)

Equation (5) allows tracing the time path through successive hypothetical survivors of averted births of each year. In any given year, hypothetical survivors of averted births can be calculated provided the exogenous variables and relevant coefficients e.g. survival rates, initial population and data concerning averted births are known.

Thus, the ABB model can be applied to calculate the benefit/cost ratio of any family planning programme. The age at which people enter the labour market and its effects on per capita income may Vary from country to country thus necessitating minor adjustments but equations (1) to (6) can still be used for calculations by replacing the changed magnitudes of t or i or age at which people enter labour market and other such minor changes. Fertility surveys, health and demographic surveys are conducted internationally after regular intervals and so projected data on most of the exogenous variables required in the model can be available for future years. So future benefits out of anticipated costs or extrapolated costs can be estimated and used for policy making or target setting.

5.5 CONCLUSION

Presently, models are becoming highly sophisticated and computer oriented, involving a large number of variables and assuming non-linear form. The magical charm and beauty of such models cannot be denied. But if forecasting ability of the model or precision of results does not increase very much by this exercise, then it is better that a few basic variables are chosen, interconnected logically and handled with simple mathematical operations. Keeping in view all these factors as well as constraints of data and resources, an effort has been made to keep the ABB model simple and realistic.

The decline in birth rate is dependent on many factors and program output is only one of them. So even if birth rates do not show any significant downward trend; population control programme may still be exerting powerful influence in counteracting the influence of declining infant mortality rates and decline in overall mortality rates. On the other hand, decline in birth rates may be due to social and economic determinants of fertility or cultural factors influencing breast-feeding practices, age at marriage, gainful employment of women in the economic field and higher female literacy rates. Decline in birth rate due to these factors can not be attributed to population control network in a direct way. The ABB model has avoided all these complications.

So, it is concluded that ABB model is appropriate for a developing country like Pakistan. This model is an attempt at finding an approximate figure of averted births as an output of population control programme and resolves many controversial and tricky issues which are present in other models measuring the success of population control programmes. This model has been used for calculation of benefits and costs of Pakistan's population control programme in part III of this study.

NOTES

1. Discussion on fundamental concepts and problems of Benefit/Cost analysis are contained in the following:-

   (i) W.C. Robinson (1974). "The Population Debate: Dimensions & Perspective". Vol.ii.

   (ii) East-West Centre Hawaii. "Costs and Benefits of Children: Implications for Population Policy", No.8, March 1989.

   (iii). R.H.C. Haveman, (1976).

   (iv). S.B.S. Raju, (1976)

   (v). C. Chandrasekaran and A.I.Hermalin, (1975)

   In this study, I have chosen to use the term benefit/cost analysis instead of the usual CBA (Cost Benefit Analysis) to emphasise that benefits exceed costs in benefit/cost analysis of population control programmes. Other economists have also used the term this way.

See R.H.C. Haveman (1976) in this context.

2. Most of the literature cited against (i) above also deal with such issues and related problems.

3. See for details:-

   (i) A.C. Chiang (1985)

   (ii) A. Koutsoyiannis (1987)

4. See A. Koutsoyiannis (1987)

5. In the formulation of a population policy, welfare considerations are varied and quite difficult to quantify e.g.

   (i) There can be a case where consumption of an additional child is met by a redistribution of family income and no one outside this household is affected. The household itself might prefer to have this additional child by foregoing some of their consumption needs. Nevertheless, government expenditure in terms of provision of social services for the additional birth can never be over looked.

   (ii) There is no yard stick or criterion to judge the social desirability off an additional child in a one-child family as compared to a large sized family. So 'marginal birth' cannot be defined in the 'economic' sense as in the case of other consumer durables.

   (iii) The welfare debate in the calculation of costs and benefits of population control programmes is only one aspect of the larger debate going on globally over the specification and quantification of a meaningful social and economic welfare function. All programmes of public expenditure of social welfare e.g. education or health etc. contain arbitrary elements. So population control programme is no exception. There is a good discussion of these issues in Leibenstein (1969) and Asia-Pacific (March, 1989).

6. Micro level studies conducted in Pakistan as well as various interviews with medical personnel of data generating agencies suggest that investment in polpulation planning has, in fact, attracted many potential aborters. Previously, a fair magnitude of unauthorized induced abortions were done by midwives as a family planning device. With the introduction of family planning centres, such people became users of contraceptive services.

7. Investment in population planning in Pakistan is done largely by the state and international agencies. But the beneficiaries are free to resort to available facilities or not. The economic/political system is not authoritarian. There are no monetary or fiscal disincentives for exceeding one's family size beyond any limit. So the very fact that people avail themselves of these facilities mean that the 'averted births' are really 'unwanted births'. On the other hand, many births do take place inspite of parents' desire of not exceeding family size because of a number of reasons, i.e. social pressure for a male child or lack of knowledge, lack of proper environments to practice population control or non-acceptance of induced abortions on social and religious reasons. Many indicators point out that inspite of investment in family planning, a number of births taken place since 1965 have really been unwanted (might be having 'disutility' in the economic sense.)

8. Socio-economic changes bring about variations in birth rates. Also people practice family planning even without any formal governmental policy or persuasion. So this assumption is valid.

9. This is for convenience of analysis because if this time lag is introduced, then the births averted in 1964-65 will have to be included and those averted in 1987-88 will have to be excluded. So it is assumed that there is no time lag. This, in any case, does not affect the final calculations to any significant extent.

10. This seems logical because it takes a long time to build infrastructure for any innovative programme of social reforms and ten years is not a very long period for that. Ideally,

expenditure incurred during this period should have been included in the costs as price for changing attitudes. But then the expenditure incurred during the period under analysis (1965-66 to 1987-88) would generate benefits extending into more remote future. So all such spill overs have been neglected.

11. Except for sterilization, no method has been foolproof. We have bureaucratic set up in the administrative machinery of the population control network where specific targets are given. So it is unrealistic to assume that figures on IUDs or conventional contraceptive can be accurate. Some researchers have statistically estimated the degree and extent of inaccuracy of service statistics. In this study, calculations of averted births have been adjusted accordingly.

12. For details, see oppenheim et al. (1983)

PART III

ANALYSIS OF PAKISTAN'S INVESTMENT IN POPULATION CONTROL

"We should consider it as one of the most astonishing errors of the present age that so many people listen to the words of pseudoprophets who, in place of the dogmas of religion, offer scientific dogmas with medieval impatience but without historical justification."

Eotvos, 1977. As quoted In Fejer and Mikola (1918)

"Famines are not the result of land's incapacity to cope with increasing demand, but of the political chaos and physical oppression which invade the state in its decline."

Ibn-I-Khuldoon, As quoted in Cassen, R.H. (1987)

CHAPTER 6

EVOLUTION OF PAKISTAN'S POPULATION POLICY 1947-1993

6.0 INTRODUCTION

Pakistan achieved political independence in 1947 after a very long struggle for independence by the masses. Immediately after its inception, Pakistan had very peculiar and formidable problems including settlement of displaced families who migrated from India, political chaos and economic instability. The government felt the need to break the vicious circle of poverty so that the feel of economic independence could be permeated to the masses. This precipitated the process of economic planning i.e. to telescope the experience of centuries of the West into a few decades without wastes inherent in haphazard growth[1]. In the initial stages of economic planning the imperative requirements of survival and nation building alongwith limited availability of demographic data did not bring the issue and problems of over population to the lime light[2]. So the policy makers did not make any serious efforts for evolving a national population policy. Before proceeding any further, a little diagression on meaning and scope of a population policy seems imperative.

6.1 MEANING AND SCOPE OF POPULATION POLICY

The term population policy can be defined in a number of ways depending upon whether one chooses to define it in a narrow sense or in a broad sense. In a narrow sense, it can be defined as all governmental measures aiming directly to manipulate rate of growth, age structure and size of population. In a broad sense, all governmental social and economic measures which effect directly or indirectly the size, composition or spatial distribution of population are included in the population policy. Another definition put forward by Kingsley Davis (1968) is that a population policy includes deliberate measures taken by the state to eliminate the demographic causes of the socio economic problems. This definition does not draw any line of demarcation between narrow or broad sense and is therefore, widely accepted. In this way, formulation of a consistent and coherent population policy pre-requires conceptual and empirical knowledge about the dynamic nature of the socio-economic-demographic system. Population dynamics itself constitute complex processes which includes interrelated dimensions of behaviour operating on various levels of decision making units from the family to the state. Thus it can be concluded that the scope of population policy is very wide. A complete modelling of such a system which can demarcate its scope is very difficult. However, a simple demographic-socio-economic system may be depicted as follows:-

$$P = B\ D + NM$$

Where	P	=	size of the population
	ΔP	=	change in the size of the population during a given time period
	B	=	Total number of births
	D	=	Total number of deaths
	NM	=	Net migration

P and ΔP are affected by and affect the following variables of economic development through various channels such as:

(a) Production and output

(b) Utilization of output

(c) Per capita income and output

(d) Savings

(e) Investment

(f) Consumption

(g) Governmental expenditure

(h) Productivity of labour

(i) Participation rates of labour

Under non-stationary conditions, all the above mentioned variables act and react upon one another. In Section 1.1.1 and 1.1.4, the consequence of a series of changes which the above mentioned variables bring about on P and ΔP and vice versa have already been discussed. Production and output, per capita income, level of savings and investment are all affected by and in their turn, affect P and ΔP. Similarly, productivity and government expenditure are causally related the P and P. All the above mentioned set of variables are jointly responsible for bringing about changes in another set of variables given below:-

(a) Human capital including health, education, skills and motivation.

(b) Technology information, and management

(c) Social structure, socio economic roles and organization

(d) Income distribution

(e) Spatial distribution of population

(f) Environmental quality

(g) Resource depletion and pollution

So, one can see the complexity of the problem involved in defining a population policy and demarcating the boundaries of its scope. If any of the component mentioned above moves in the desired direction as a consequence of population policy, some other component may move in the opposite direction resulting in neutralization of the net impact e.g. a high usage of contraceptives may be accompanied by a shortening of the lactation period. Total Fertility Rate (TFR) is affected by many components e.g. age at marriage, lactation period, infant and maternal mortality and many other demographic, social and economic variables. The time path of these components of TFR is a function of the pattern of development and its institutional framework[3].

6.1.1 NEED FOR A POPULATION POLICY IN PAKISTAN

The need for population policy is felt when the demographic acts of some individuals affect the welfare of other individuals or state, producing a sizeable divergence between private and social welfare. This need is felt when the movement from a higher equilibrium level of vital rates to a lower level, in accordance with changing technology and accompanying social or economic changes (called the process of demographic transition) does not happen automatically. This may be due to a number of reasons as explained in Chapter I.

Fertility and mortality rates in Pakistan have followed a totally different pattern as compared to those experienced by the industrialized countries. These rates have a very wide gap warranting dramatic and drastic social and economic adjustments which cannot be brought about without a population policy. The need for a comprehensive population policy for Pakistan is too compelling to be ignored. For this, many variables have to be tackled e.g. contraceptive use, indices of marriage, abortions, lactation and fecundity. Even if population policy is taken in the narrow sense, all these components of TFR have to 'march together' in the desired direction in order that high contraception use reflects itself in reduced TFR. In a broad context, appropriate fiscal and social measures must be fabricated into demographic-economic matrix in order to constitute a comprehensive population policy. The 'demographic riddle' has no easy and straight cut answers. Pakistan cannot and should not continue its past secular trends of high births and death rates. To engineer a very sharp and precipitate fall in fertility, an effective population policy is needed.

6.2 EVOLUTION OF PAKISTAN'S POPULATION POLICY

The evolution of a population policy in Pakistan has been slow. Soon after Independence in 1947, mortality rates started falling as a result of international health measures to eradicate epidemics like small pox, plague and malaria. Nevertheless, no profound changes were taking place in the social and economic module to usher in a decline in birth rates. Consequently, rates of population growth started accelerating due to fall in mortality rates and other public health measures. This was the period when international agencies had started looking into this crucial issue of population control. Family Planning Association of Pakistan (FPAP) was formed to initiate efforts to subdue the accelerating rate of population growth[4]. The first step in this direction or the beginning of a population policy in Pakistan took place when government of Pakistan allocated Rs.5,00,000 for this purpose in 1957-58. From then onwards, there were periodic ups and downs in financial allocation as well as moral and ethical support to this programme depending upon changes in economic and political scenarios in the country but the foundations of a policy of population control had been laid.

Looking back, this policy seems to have distinct stages[5] which can be termed as follows:

6.2.1 THE INFANCY STAGE[6] (1948-59)

This period was marked with a few notable features e.g. death of Mr. Mohammad Ali Jinnah, the founder of Pakistan was a tragic event of grave political and economic consequences[7]. During this period the country was ruled by a parliamentary form of government. Initial attempts at economic coordination and planning had started but the country was facing multifarious problems of a newly created state e.g. lack of capital, shortage of technical know how, no industrial base of any sort and absence of a reliable data system pertaining to vital rates and other pertinent demographic variables. The previous British rulers had not felt the necessity or urgency to explore the inter-linkages among variables of population growth and economic development. So the newly formed government of Pakistan did not inherit any population policy to start with. The First Five year Plan (1955-60) recognized the need for population planning in consideration of health and family welfare. It stated that, "Population Planning is needed so that evils of under feeding and over_crowding may not undo the efforts for the provision of better life to the nation". Thus, the need for a population policy was beginning to be felt during this period.

6.2.2 THE "EXPANDING ACTIVITIES" STAGE 1959-69

This may be called as the 'true beginning' of a population policy in Pakistan. This phase was marked by an all-pronged attack on the problem of overpopulation and evolution of a very aggressive population policy.

The government felt the need for a forceful and effective population policy and its effective implementation. It consisted of measures to make people aware of the necessity of population planning for improving the quality of life. Lower mortality rates, increased span of life, improvements in health and nutrition could not be maintained in the long run without accompanying decline in fertility rates which was not coming through. Salient features of this policy were as follows:-

(a) Building Institutional Framework

During this period, serious efforts were made by the government for building institutional framework for an effective policy of population regulation in Pakistan.

A National Family Planning Directorate was established at the Centre alongwith Directorates at the Provincial levels. A National Research Institute of Family Planning (NRIF) was set up at Karachi and two Training-cum-Research Institutes (TRI) were set up at Lahore and Hyderabad. National Research Institute of Reproductive Physiology(NRIRP)acted as a data bank on contraceptive technology. So tempo had started building up for training of personnel, extension in services, educational work and contraceptive research. A training-cum-research project MESOREP (Medical Social Research Project) was also established in Lahore with the cooperation of the Population Council (U.S.A) and Johns Hopkins University (U.S.A) which continued to work for the next ten years.

(b) Organizational Reforms at the Federal Level

At the federal level, a very effective Pakistan Family Planning Council was established as an autonomous body under the Family Planning Division with the federal Minister for Family Planning as its chairman. It consisted of Provincial ministers and Central Secretaries as its members. Its functions were as follows:

1. Policy, planning and overall implementation of the programme
2. Research, evaluation and training
3. Co-ordination
4. Procurement and management of foreign exchange requirements.
5. Advice to the federal government on family planning.

(c) Organizational Reforms at the provincial level

These included formation of two provincial family planning boards, one for West Pakistan and other for East Pakistan. These boards were made responsible for implementation of the programme in their respective provinces. These boards were also responsible for administering Training-cum-Research Institutes (three in each province) to cater for in-service and pre-service training needs of the personnel engaged in the programme.

(d) Organizational Setup at the District Level

Each district had its own Family Planning Board which was headed by the Deputy Commissioner and drew its membership from various departments and amongst the prominent citizens of the district. A Publicity-cum-Executive Officer served as Secretary of the Board and was Chief Executive of the programme. The District Officer was assisted by a District Technical Officer(Medical doctor), Family Planning Officers, Family Planning Doctors (full time and part-time), Family Planning Counsellors, Lady Family Planning Visitors, Lady Health Visitors, Family Planning Organizers and Distribution Agents. The District Family Planning Organization, which was the basic unit for field implementation had three major functions:-

1. Publicity and education
2. Distribution and sale of contraceptives
3. Provision of clinical services.

(e) Adequacy Of Personnel

Shortage of required personnel was met by imparting training to paramedical and medical people. Group of Lady Family Planning Visitors started joining the programme after completion of their training. These were reinforced by involvement of all doctors including private practitioners under the special directive of the President of Pakistan. The field staff consisted of wide range of personnel i.e. Publicity-cum-Executive Officers, Family Planning Officers, medical and paramedical personnel, Dais (local midwives) and agents for distribution of conventional contraceptives.

In this whole intricate system, only the secretariat of the Family Planning Council, the research and evaluation unit at the centre and Family Planning Supervisors at the provincial level were full time staff. The remaining staff were all part time down to village mid-wives receiving small payments or referral fees and bonuses. A nation wide survey, The National Impact Survey was undertaken by the Population Planning Council in 1968-69. This was essentially a KAP (Knowledge, Attitude and Practice) type survey which revealed that ever and current use levels of contraceptives were 12% and 6% respectively.

(f) Motivation, Dissemination of Knowledge and Promotion of Distribution

During the period 1965-69, greater stress was laid on dissemination of knowledge for promotion of distribution and use of contracepting materials. All types of contraceptives were introduced through a cafeteria approach including tubeligation and vasectomy[8]. A review of official records showed a very high level of achievement in this field[9] .

(g) Exposure Through All Types Of Audio-Visual Aids

During this period all efforts were undertaken by the field functionaries and the staff pertaining to all tiers within this organization to make population control an open topic for public discussion.

(h) Research and Evaluation

In addition to the institutional framework established as mentioned against (a) above, many other international agencies like UNICEF, U.S. AID and U.N. started backing up the research and evaluation side of this programme financially as well as administratively.

A review of U. N. evaluation report(1968) and U.S. AID report(1969) indicated that during this period, social taboos & psychological barriers were beginning to break, this subject was being discussed not only among the press, the urban elites, educationists and administrators but also amongst rural masses. This programme was considered an extensive, multi-disciplinary technical programme and an educational movement aimed at producing social change. The U.N. and U.S. AID Evaluation Teams recognized population control programme of the government of Pakistan as a model programme holding lessons for other developing countries facing similar problems.The well-known Couple Years of Protection (CYP) concept was developed initially for use in Pakistan[10]. Research studies published during this period showed the level of achievement higher in Pakistan than in India, a pioneer country in the field of population policy[11].

6.2.3 THE CHAOTIC STAGE 1969-71

The top administration of population control programme underwent changes in 1969 and there was a subsequent change in population policy. The new administration called for a smaller, full time literate staff who could maintain the records needed for supervision and evaluation. The Continuous Motivation Scheme (C.M.S.) was introduced in Sialkot District (Punjab) in July, 1969 as a 'test' before it could be extended to the entire country. The C.M.S. aimed at contacting all eligible couples on a continuing basis, using full time and educated local male-female team of workers who could maintain a record of their activities. They were given incentives but were to be constantly checked by functionaries from above. But political disturbances erupted in the entire country before this system could be fully operational. Large scale disturbances in East Pakistan hampered regular governmental activities. War with India in 1971 culminated in a crisis separating East Pakistan into an individual entity known as Bangladesh. In short, March 1969-December 1971 was a period notorious in the history of Pakistan for political upheavals and total absence of any serious economic planning. Population control activities were also hampered.

6.2.4 THE RECOVERY STAGE 1971-77

This stage can be split into two phases.

1) The Revival Phase (1971-72)

2) The Expanded Activities Phase (1973-77)

1) The country had been in a state of shock after the civil war which resulted in the creation of Bangladesh. Population Planning activities were also affected. Attempts were made to curtail the size of the organisation with increase in recruitment of whole time staff who replaced the part time staff. It was also envisaged that there should be a gradual replacement of local mid-wives (Dais) by a new category of full-time Family Planning workers; one for each Union Council. These were to be literate enough to keep the records needed for supervision and evaluation, oriented towards providing advice and supplies as a regular and continuous service rather than as a single exposure. This phase is also marked for a subdued population policy.

2) By 1973 onwards, governmental activities for population control were resumed. Salient features of population policy adopted during this phase were as follows:

A. Resumption of CMS Approach

This approach was resumed with added new dimensions e.g.

i) CMS areas were redefined to include all areas with population density of 300 per square mile.

ii) Mobile clinics were set up in the non-CMS areas.

iii) Clinic-based lady family planning visitors were converted into family welfare visitors operating from clinics in the CMS areas.

B. Introduction of Contraceptive Inundation Scheme

This controversial scheme was an effort to distribute conventional contraceptives chiefly condoms and orals throughout the country through a net work of 50,000 shopkeepers and local agents, hospitals, clinics and full time motivators. This inundation aimed at making contraceptive devices available to the entire population by putting supplies in every village and the quarter of the urban area. It was viewed as supplementing the CMS and clinical systems.

C. Beyond Family Planning Approaches[12].

Experimental efforts were made to explore diverse methods like providing monetary and non-monetary incentive of all types to increase contraceptive acceptance rate. Demographic Policy Action Research Centre (DPARC) was set up to explore all possibilities in this context.

D. Management Reforms

These included the Client Record System (CRS) meant for more rapid analysis of performance data and feed back of the results to the field and Information System on Contraceptive Movement (ISCM) meant for greater control over contraceptive supplies as they moved through the pipe line. Both these computer based internal control systems were long overdue because evaluation and logistic control over supplies had been the chronic problems of this programme since its inception[13].

All the above mentioned steps remained functional till 1976. Then the top administration of this programme changed causing abrupt cessation of the policy measures. Instead, a new policy called the, Integrated Approach was evolved. Even this new policy could not be implemented fully because of political factors. Communication activities were totally suspended and the entire working of this programme went under a very low profile as a deliberate policy measure in 1977[14].

6.2.5 THE TAKE OFF STAGE AND DRIVE TOWARDS MATURITY (1978-TODATE)

The population policy of Pakistan during the period has been broad based and multi-sectoral. It can be sub-divided into two distinct phases which are as follows:-

A) Integrated Approach (1978-81)

B) A New Beginning (1981-todate) or The Take off Stage.

A. In the Integrated Approach, personnel of the delivery system of the population control net work were merged with the staff of the existing health system which extended the outreach of each. It was expected that the research, monitoring, evaluation and training components would also be strengthened as a result of this merger. But it only resulted in confusion and mismanagement due to complex problems of combining two large programmes. So population control programme could not make any significant progress.

B. In the take off stage, it was felt by the policy makers that this programme required a clossal effort to put life into it. An effective population policy was needed to help the situation as the World Fertility Survey results (1975-76) had shown that the total fertility rate in Pakistan was 7 births per female. An annual growth rate of about 3.0 per cent showed that there had been no reduction in it over the past twenty years. A report of Needs Assessment Mission sponsored by United Nations Fund For Population Activities (UNFPA) became public in early 1980 which was also instrumental in making the government aware of the dire necessity of reviving and revitalizing the programme[15]. So in 1980 a new beginning[16] was made through a three year (1980-83) development plan which resulted in major reorganization. Salient features of this plan included appointment of an advisor on population to the President of Pakistan and shifting of population programme to the Ministry of Planning and Development where it was renamed as Population Welfare Division (PWD). The recommendations of Population Sector Working Group were as follows:-

1. To explore and research linkages among population, resources, environment and development.

2. To improve the diffusion of contraceptive methods, the availability of contraceptive surgery and outpatient procedures.

3. To strengthen the public and private sector supply outlets to ensure accessibility and availability of services.

4. To convey knowledge and promote new set of attitudes to reverse the existing cultural values favouring large sized families.

5. To develop an acceptable socio-cultural, ideological framework for population planning.

6. To integrate development planning and population welfare planning.

In the light of above mentioned recommendations, population policy during 1983-88 was revised to include the following new features:-

i) Primary administrative responsibilities were provincialized. Provincial Councils for Population Welfare Planning were created, chaired by Chief Ministers consisting of ministers, secretaries, representatives from private sector and non-governmental organizations (NGOs)[17]. A similar council was formed at district level which was the principal implementing agency and had the District Welfare Officer as its secretary; it was responsible for day to day operations.

ii) A National Council for Population Welfare Planning at the federal level was formed having secretary of the Population Welfare Division, Ministry of Planning and Development as its secretary and the President of Pakistan as its Chairman. Its functions included formulation of a national population policy and a periodical review of the actual performance of the programme machinery. The entire programme was funded by the Federal Government.

iii) Training, research, evaluation and communications continued to be Federal Government's responsibility under the Population Welfare Division.

iv) A Population and Development Centre enjoying semi-autonomous status was created under the Population Welfare Division for development and operation of systematic procedures as well as for monitoring the population impact of all major development projects and programmes in Pakistan. This appeared to be a highly innovative and useful experiment. Training of both clinical and in service government officers and NGOS were centered in the Directorate of Population Welfare Training in Islamabad, the Directorate of Clinical Training in Karachi and the provincial Population Welfare Training Institutes. National Institute of Population Studies (NIPS) was established in 1986. Two population studies centers (PSCs) were set up at Karachi and Faisalabad.

v) The Population Welfare Programme was implemented under a three tier structure, federal, provincial and local level, i.e. districts and below. At the federal level, the Population Welfare Division and its allied units under the Ministry of Planning and Development were mainly responsible for the national policy, planning and coordination, information, training supplies, statistics, monitoring and evaluation, research, foreign assistance, NGOs infrastructural projects and target groups training and few other functions more suited to be performed at the federal level.

From September 1983, field activities directly related to providing services and some of the support activities including Family Welfare Centre's Project, Reproductive Health Service Project, Population Welfare Programme through other Departments Project and training of Traditional Birth Attendants (TBAs) Project became the Provincial responsibility with the transfer of field activities to them. In financial terms, they accounted for two-third of the total expenditure. These activities were carried out by the Directors General in each province through the District Offices as well as the Projects' Staff. The offices of the Directors-General, Districts officers, Family Welfare Centers and individual projects previously under the Federal Government were transferred to the provinces thereby ensuring continuity. It was anticipated that transfer of field activities to the Provinces would draw better community participation and support through local government institutions and ensure effective integration at the field level. It could also meet the requirements of a multi-sectoral approach more readily as the related departments i.e. health, labour, local Government, social welfare and education with which coordination was essential, could be under the same government at the provincial level alongwith the population welfare department.

The population policy pursued during 1983-88 was allowed to continue during the Seventh Plan (1988-93). Better and wider birth control and delivery services with more intensive and varied motivational programme was emphasized. A multi-sectoral approach involving all ministries and departments having population-related components was pursued in continuation of the previous policy adopted during the Sixth Plan (1983-88). The provision of mother and child health (MCH) services through the programme's own service outlets and through semi-governmental and autonomous organizations such as Pakistan International Airlines (PIA), Railways, Armed Forces, Water & Power Development Authority(WAPDA) etc. was initiated. The financial assistance to N.G.Os started during the Sixth Five Year Plan was continued in this period. The involvement of Hakims and Homeopaths in this programme during the Sixth Plan continued and their adequate training was stressed to enable them to make a significant contribution. Traditional Birth Attendants (TBAs) incorporated during the Sixth Plan were trained and their numbers increased to expand out-reach services. Their specific role was to motivate couples, provide conventional contraceptives and service as referrers of cases of IUD & contraceptive surgery. The participation of medical practitioners was also increased for delivery of family planning services.

6.2.6 PRESENT POSITION

The Population policy being pursued since 1988 has been a continuation of the coordinated approach developed during the Fifth, Sixth and Seventh Five Year Plans. A major policy change has been the transfer of responsibility of the field implementation to the provinces. Other changes include the introduction of a multi-sectoral, multipurpose and community based approach and restructuring of the staffing pattern. A strong and open political support has been given by the government for achieving demographic objectives of the Seventh Plan. A written directive has been issued to all the federal and provincial ministries to extend full support for implementing an effective, well-coordinated and integrated population policy. A number of international agencies like the World Bank, United Nations Fund for Population Activities (UNFPA). The Path Finder Fund and The Agha Khan Foundation have been actively instrumental in financing some components of the population policy. It remains to be seen how the policy makers of Pakistan make use of the meagre resources diverted into the population control programme under its various projects including the much publicised Social Action Programme.

6.3 A BACKWARD GLANCE

Looking back at the history of population control programme. A few observations on its first phase (1959-69) are as follows:-

1. The elaborate system developed for population control proved very unwieldy. In this system, local midwife who had accessibility and communication with rural households developed through generations assumed the pivotal role. But it was unimaginative and oversimplistic. The middle aged, illiterate, ill trained and part time mid-wives could not do justice to the key role assigned to them in such a delicate task of national interest.

2. The family planning officer of the area worked with fifty to seventy mid-wives who could be replaced if they failed to achieve the desired number of clients. The replacement rate often went as high as 40% which created further problems of insecurity of the employed and training problems for the replaced mid-wives[18].

3. The mid-wives being illiterate could not keep any record, creating further problems in formulation of a reliable and adequate data base to judge performance and for future policy formulation. Sample surveys conducted during this period were not good substitutes for a complete record system of field work for identifying problems of local importance or to serve as indices of effectiveness of the programme in specific areas.

4. The achievements of population control functionaries could not be assessed, with the result that highly exaggerated performance was shown during this

'decade of progress'. Persons inside this organisation put up a very rosy picture of achievements and the foreign consultants and visitors were really impressed by the level and extent of performance.

5. A built-in mechanism of evaluation at all stages of administration was lacking.

6. Greater stress on female staff was tried during this phase on the assumption that they would be more effective in carrying the message due to lesser social inhibitions and accessibility to the females of the households. It was presumed that population control would interest the females more than males. This is exactly so if females enjoy social and economic status, are educated and have a say in the determination of family size. Profile of Pakistani women generally lack these characteristics[19]. Better results could have been achieved by motivating the male population through male field staff as well.

7. The initial emphasis on local involvement through mid-wives was highly imaginative and could have disarmed the local hostile groups. They could have served the dual purpose of removing the local hurdles in the way of government sponsored population control activities and also receiving basic education and training in contraceptive use. But this purpose could not be achieved due to their illiteracy and job insecurity. Beauracratic practices e.g. over-emphasis on performance, measurement of performance in terms of units of contraceptives rather than ensuring their continuous use with regularity ,was also another weakness. The initial emphasis should have been on 'clients' rather than devices. So the efforts in this phase were 'chaotic' rather than 'crash'. It aimed at recruiting, training and involving too many people at too low a rate in too short a time[20].

However, in view of above observations as well as the progress made during this stage, one feels that level of performance could have had an ever ascending trend if the successors had carried further the policies adopted during the sixties. Assured perpetuity of the programme managed by efficient and innovative managers, following consistent policies irrespective of changes in political power could have produced better results. But this phase came to a rather abrupt end when Ayub Khan's regime collapsed in 1969.

During 1969-71, population control activities of the government remained subdued and chaotic, neutralizing the speed and tempo gained during the previous decade. The growth strategy of the sixtees with high growth rates of industrial and manufacturing sectors were looked down upon for a number of political and economic reasons e.g. large scale foreign borrowings, increase in inequalities in inter-regional and intra personal incomes which had worsened the credibility of the economic policies of Ayub regime including its population control policy[21]. So investment in population control was adversely affected.

During the recovery stage of 1971-77, revival of population control activities continued till the top administration under went a change in 1976, followed by political changes in the country which resulted in complete cessation of the field activities of the programme in 1977. A few observations relating to the period (1974-77) are as follows:-

1. Erratic and conflicting components contained in the population policy during this phase, were due to lack of effective planning machinery. The role of Planning Commission was distrusted and professional economists no longer remained associated with it.

2. Democratically elected government wanted to win mass popularity. The population control organization became an easy target for squeezing in inefficient people with strong political push. Patches of efficient people within this organization here and there could not redeem the deteriorating conditions.

3. The revised CMS required suitable female-male team preferably husband and wife to work as motivators. Unfortunately, such a team was hard to find. Young urban female workers were forced to work in alien rural areas where they proved to be highly ineffective. So the CMS never really worked in the spirit in which it was envisaged.

4. The Inundation Scheme launched jointly with U.S. AID was strongly supply-oriented and never met its objectives. It was not even managed properly as continuous supplies could not be assured. Even the computerized ISCM. system failed to stream line the working of inundation.

Political developments during and after the general elections of 1976 led to a change in the government and stress on reshaping the entire economy according to the dictates of Islamic Jurisprudence. In this state of confusion, population policy could not be pursued effectively. Also merger of this programme with health sector could not be tackled efficiently. Population control programme mainly emphasized reduced births without considering reduction in mortality. Similarly the health sector continued stressing preventive and curative health services without any regard to the role of population limitation in this context. Since 1978, population policy has been consistently vigourous through a number of innovating measures though some of them proved futile. A few observations are as follows:-

1. Targets in term of contraceptive performance could not be achieved due to the problems created by local resistence and bureaucracy inspite of many policy changes since 1978 like the projectization of the population control programme and transfer of field activities to the provinces for improving the managerial efficiency.

2. Demographic objectives could not be achieved due to unsatisfactory performance of collaborating departments even after adopting a number of innovative measures e.g. the adoption of multi-sectoral approach, stress on education and active participation of private sectors i.e. Non-Government Organizations (NGOs), Target Groups Institutions (TGIs), Provincial line Departments (PLDs) and private medical practitioners.

3. The development of organizational skills, training of the personnel in new management techniques and monitoring of operations remained unsatisfactory.

4. There has been wastage of funds and duplicacy of services where clinics run by NIRFC, MCH and FWC were all located in the same vicinity.

5. There was dissatisfaction among the employees of this network when their services were transferred from the federal to the provincial departments. Sometimes, it led to litigation and delay by the provincial departments in owning the transferred staff. It also bore badly on supervision of field activities and coordination with other organizations etc.

6. There were other handicaps of diverse nature e.g. non-existence of out-reach activities; paucity of funds, restrictions on the use of mass-media and lack of

open political support. Another lacunae has been that these services did not reach the targets e.g. only 5 percent of rural population was covered. Planned coverage during 1983-88 was one-third of the total population of the country but the services hardly reached 15-20 percent of the population.

Slow progress has been made during 1978-93 for achieving the laid down objectives of the population policy due to the above mentioned factors. However, by 1990-91, family planning services were provided to 55.7% of the total users by the government outlets and only 4.4% by others. Contraceptive use rate has increased from 7.6% in 1984-85 to 11.8 in 1990-91. Age at marriage has also shown an upward trend over time from being 25.3 years for males and 20.7 years for females to 26.5 year for males and 21.7 years for females[22].

6.4 CONCLUSION

An overall view of the population policy of Pakistan during (1955-93) reveals a cyclically fluctuating pattern with administrative, social and political support for the programme playing a pivotal and catalytic role in the momentum of the cycle.

One should not be disillusioned by the fact that even after pursuing a population policy for the last thirty five years, no tangible reductions in the vital rates i.e. birth rates, total fertility rates and rate of growth of population have been achieved. Infact, population policy has to be strengthened with more vigour, better organization and insight. There should not be an abrupt turning point. Population policy should constitute an integral part of the package designed to promote social infrastructure, health and educational facilities. An effective population policy has to be a necessary component of a wider human capital development policy. Pre-requisites for a successful population policy are a consistent political backing, adequate funds, expansion of population welfare services to the maximum, community involvement and integration of other human capital formation policies.

NOTES

1. For further details, see M.L. Qureshi. "Economic Development and Population growth in Pakistan" (1960)

2 See M.L. Qureshi opcit. It was later investigated that the rate of population growth itself was largely under-stated due to lack of reliable data at that time.

3. Ismail, Sirageldin (1984) Prof. Sirageldin has given a comprehensive picture of the need for a population policy in developing countries like Pakistan. various other aspects related to this issue have also been discussed.

4. Family Planning Association of Pakistan (FPAP) was formed in 1952 by some public-minded philanthropists. It got affiliation with the International Planned Parenthood Federation (IPPF) in 1954. The Government of Pakistan started backing the Ist five year plan and has been doing so on an ever enlarging scale so far. FPAP is very active in all aspects of population control activities in collaboration with Government of Pakistan as well as other donor agencies like the Path Finder Fund etc. It has, in fact, done pioneering work in this direction attracting the attention of the economic planners and policy makers towards this crucial issue and facing hostile attitudes.

5. This term is synonymous as that used by W.W. Rostow (1963)

6. It is convenient to identify stages of Investment in Population control with political changes in the country because each political change was accompanied with marked changes in economic policies which distinctly affected the amount and direction of investment in various public sectors including population control activities of the Government.

7. The founder of the newly born Muslim country which emerged on the map of the world on 14th August, 1947 because of cultural, religious and ideological basis died on 11th September, 1948 leaving the gigantic task of laying a strong foundation for economic and political structure of the country incomplete.

8. For details see W.C. Robinson (1978)

9. See for example:-

   (i) Second Five Year Plan of Pakistan (1960-65)

   (ii) Third Five Year Plan of Pakistan (1965-70).

10. or more details about this concept, see the following

   (i) S.M. Wishik, and K.A. Chen (1973).

   (ii)L.L. Bean, & W. Seltzer(1968).

11. See W.C. Robinson, (1978,1987), and G.B. Simmons (1969), in this context.

12. These approaches include all policy measures, proposals or methods which may help in reducing birth rate directly or indirectly. A very good article by the same title i.e. 'Beyond Family Planning' by Bernard Berelson is contained in, 'Proceedings of the Pakistan International Family Planning Conference at Dacca (1969)

13 See W.C. Robinson (1978) for more details

14. There were large scale protests in the country which were initiated due to alleged massive 'rigging' in the national elections of 1976. The government had failed to 'deliver' the 'goods'

according to the expectations of the common man on the economic as well as political front. Its policy of indiscreet nationalization coupled with devaluation of the rupee, had skyrocketed the general price level. The masses were fed up with various types of political bribery, coupled with favourtism and nepotism etc. Social unrest led to imposition of Martial Law in July 1977. The popular and long overdue demand regarding reshaping the entire economic system and constitution of the country in accordance with 'Islamic Shariah' was promised to be fulfilled. During this period there was subduing of the population control programme.

15. Another underlying factor could have been a reaction of the government being abused internationally of discriminating against 'Women' in particular and 'Human Rights' in general at that time. Population control is believed to be 'favouring' women in the sense that it protects their physical well being and mental health. Any service delivery system can save them from unwanted pregnancies and agonies of induced abortions.

16 This was title of an article by W.C. Robinson, (1987).

17. In Pakistan, Non-Governmental Organisations (NGOS) are the pioneers in the field of population planning programme for stimulating awareness of the population problems and highlighting the consequences of rapid population growth. To institutionalise the involvement of the NGOs, the government introduced a national level population welfare project through them in 1984 which provided motivational services, treatment of minor ailments, ante-natal and post-natal care and family planning services. A number of international NGOs and bilateral donors came forward to provide financial assistance to the NGOs projects. In view of the greater autonomy, flexibility, dynamism and involvement of the local community at the grass-root level, acceptance of family planning by the masses would increase substantially through NGOs. Joint and periodic evaluations and continuous monitoring is being also devised.

18. See W.D. Ahmad, (1971) for details.

19. See the following:-

    (i) M.Shah Nasira, (1986)

    (ii) Amatul R. Chaudhary, (1975,1976).

20. See W.C. Robinson, (1978 & 1987) for greater details.

21. Planning machinery was condemned because of its close proximity with the previous regime which was rightly or wrongly held responsible for massacre of democratic system, unfair elections based on limited franchise and wrong economic policies giving way to mal-distribution of income and concentration of wealth among the notorious twenty two families, paving the way for separation of East Pakistan. For greater details see R. Amjad, and V. Ahmad (1986).

22. The data for 1984-85 has been taken from Pakistan Contraceptive Prevalence Survey (PCPS), and for 1990-91 from Pakistan Demographic and Health Survey (PDHS).

CHAPTER 7

PAKISTAN'S FIVE YEAR PLANS AND POPULATION CONTROL MEASURES

7.0 INTRODUCTION

Economic planning started in 1950 with the introduction of the Colombo Plan[1] in Pakistan. A Development Board was formulated which brought forth a Six Year Development Plan (1951-57). The creation of a Planning Board[2] in 1953 was the beginning of economic planning in Pakistan. During the same period, investment in population control programme was initiated by the government as discussed in detail in chapter 6. In this chapter, salient features of population control programme of the government of Pakistan as envisaged and implemented in its various Five Year Plans have been highlighted[3].

7.1 THE FIRST FIVE YEAR PLAN (1955-60)

The plan document did not have any specific reference to population control programmes as in the later plans. However, the following few facts were collected after careful scrunity of the Ist Five Year Plan as well as other relevant literature:-

7.1.1 STRATEGY

1. This plan stressed the advantages of a reliable data bank on all aspects of population and manpower. The need for data generation was felt because the

country was lacking reliable information on all aspects of population. It was suggested that surveys should be conducted at regular intervals in order to generate data on all aspects of population and vital events

2. The importance of scholarly research in the universities of Pakistan was also emphasized. Skilled mathematicians, statisticians, and social scientists were required to probe into the intricate issues of development and its interconnection with different aspects of population growth and age structure.

3. It was recommended that in the initial stages of planning, foreign experts might be hired till the time Pakistani people acquire the requisite technical know-how.

7.1.2 TARGETS

No specific financial or physical targets were laid down regarding population control activities in the Ist Five Year Plan.

7.1.3 ALLOCATED VERSUS ACTUAL EXPENDITURE

Initially, an allocation of Rs. 500,000/- was made. However, about a million rupees were actually disbursed by the end of the Plan Period as grants to private associations[4].

7.1.4 IMPLEMENTATION

As seen above, no targets were laid down in the Plan document. Also, no policy measures for controlling population were taken during this plan by the government. So implementation can not be analysed in the light of laid down targets.

7.1.5 ACHIEVEMENTS

The programme was meagre in scope and no specific targets in financial or physical terms were laid down. So achievements cannot be quantified. However, philosophy of family limitation was endorsed in the Plan. The voluntary organizations, partly funded by the Govenment of Pakistan, did propagate the concept of small family among the masses and offered clinical help to the clients in this context.

7.2 THE SECOND FIVE YEAR PLAN 1960-65

The beginning of governmental financial support to population control programme had already started in the first five year plan. This support was expanded and strengthened in the second plan. The broad outlines of the population control programme were as folows:

7.2.1 STRATEGY

1. It stressed development of human resources through provision of education, health and social services including population control measures.

2. The need of a population policy was emphasised which should include meaures to increase expectation of life as well as improve health and nutrition alongwith population control measures.

3. Female education was strongly emphasized as the single important factor which might bring about smaller families.

4. Need for research and demographic analysis was stressed. It called for effective steps to overcome limitations of vital statistics.

7.2.2 TARGETS

Targets laid down for population control programme in this plan were as follows:-

1. To cover 1.2 million families during the plan period or about 10 per cent of women of child bearing age.

2. To establish 3,000 Family Planning centres in existing health facilities and to develop a distribution system for conventional contraceptive supplies.

3. To train the required motivational and technical personnel including 1,200 health personnel (doctors, nurses, midwives and health visitors) each year.

4. To promote research and administrative projects in the field of population control.

7.2.3 ALLOCATED VERSUS ACTUAL EXPENDITURE

Rs. 30.50 million were allocated for population control programme during the plan period. This amount was fully utilized[5].

7.2.4 IMPLEMENTATION

Many problems emerged during implementation because population control programme was made a part of the health network[6]. Arrangement for the distribution of contraceptives were not satisfactory[7]. There was shortage of administrative personnel. Three groups from abroad established units for research and demonstration during this plan period. These were as follows:

1. The Medical Social Research Project by Johns Hopkins University, USA, in Lahore.

2. The University of California, USA Health Education Research Project in Dacca and

3. The Sweden-Pakistan Family Welfare Project with branches in Karachi, Hyderabad, Lahore, Dacca and Chittagong[8].

7.2.5 ACHIEVEMENTS

The programme did not fully achieve the targets because of a number of reasons. A few were as follows:-

1. The motivational barriers could not be tackled efficiently.

2. The programme was administered as a normal function of the existing health services. Doctors and other health personnel became overburdened with additional clinical work associated with family planning. So they could not handle it properly.

3. Imparting information to the masses in family planning and population education was a very delicate and intricate subject. It was not handled imaginatively and efficiently.

4. Inspite of all these factors, literature emerging during that period contained claims of great success of the programme. However, no significant statistics are available to support that claim except that more than 1000 health centres were provided with family planning services. Also, several thousand health visitors and village level workers were trained in this field. Similarly, a sizeable cadre of professional workers was trained for field work and research activities. Also a number of well staffed institutions were established for research and training[9].

7.3 THE THIRD FIVE YEAR PLAN (1965-70)

This Plan was distinct from the earlier Plans because population control programme was implemented with full political support. Also there was a manifold increase in financial allocation and an overhauling of the population control network.

7.3.1 STRATEGY

1. The programme of population control was to be based on strong, continuous and well conceived schemes to motivate families to resort to population control. High level personnel and field workers were to be well-trained for the purpose.

2. Ample supplies of contraceptives were to be ensured.

3. For continuous motivation and usage,constant availability of medical personnel was a pre-requisite. So all health centres in the rural areas were to be adequately staffed for the ongoing family planning campaign.

4. An innovative feature of the programme was provision of monetary incentives for contracepting parents and free of cost facility for contraceptive surgery and insertions of IUDs by properly trained and qualified staff with the assurance of follow up visits by the qualified personnel.

7.3.2 TARGETS:

The following targets[10] were set for the programme:

1. To reduce birth rate from an estimated 50 to 40 per 1000 by reaching all the estimated 20 million fertile couples by 1970[11]. Assuming a further moderate decline in death rates from 20 to 15 per thousand, this implied a net decline in growth rate from 3% to 2.5%.

2. To make family planning services and knowledge available to the entire population by 1970.

3. To bring down the population growth rate to 1.5 per cent by 1985 as laid down in the Perspective Plan 1965-85.

4. To prevent 5 million births during this plan.

5. To Involve all doctors available in the country, in the Family Planning Programme.

7.3.3 ALLOCATED VERSUS ACTUAL EXPENDITURE

A total sum of Rs. 274 million was allocated to implement a very ambitious programme involving an elaborate administrative set up and employing one of the largest number of workers in the public sector. The actual expenditure amounted to Rs. 356 million.

7.3.4 IMPLEMENTATION

In the elaborate apparatus set for reaching the entire population, only the secretariat of the Family Planning Council and the Research and Evaluation Units had full time staff at the centre. Similarly, at provincial and district levels, full time staff was minimal.

The key people were the following:

1. Publicity-cum-Executive officer at the district level was provided with a jeep and was regarded as 'key figure' for this programme in his district.

2. Family Planning Officer at the local level was responsible for three union councils[12].

3. The village Dai (midwife) was at the bottom of this heirarchy. She was responsible for motivation and distribution of contraceptives.

The plan aimed at wider coverage and participation. The size and speed of the programme was impressive and foreign observers called it "A Model of Administrative Success". But lack of built-in checks within this network and undue stress on local midwives led to a chaotic state. In a nutshell, implementation did not take place in the spirit in which the programme was envisaged.

7.3.5 ACHIEVEMENTS

1. The system of monetary incentives did not work properly. It was misused by the local midwives and proved to be an incentive for mis-reporting. No effort was made to rectify the system. On the other hand, the system of monetary incentives was discontinued.

2. The target of decline in birth rates could not be achieved. Even a fall in the crude birth rates (CBR) to 45 per 1000 could not be called an achievement of this programme because at the start of the plan, the estimated figure of CBR as 50 per thousand was later found to be an exaggerated one[13].

3. In this plan, emphasis was put on IUDs which were considered to be the cheapest and simplest according to the programme personnel. But it required intensive follow ups which could not be done.

4. The vasectomy programme was shown to be more successful than envisaged especially in East Pakitan. On the whole, 90,000 contraceptive surgeries were planned but 1.3 million were carried out during the Third Plan. The following table shows the targets and approximate figures of achievements[14].

Table 7.1

Targets and Achievments (1965 - 70)

	Targets (Millions)	Achievements (Millions)
Number of births to be averted	5.00	3.3
IUDs	3.00	3.3
Sterilization	0.09	1.3
Units of Conventional Contraceptives	1,152.50	664.4

Source: Fourth Five Year Plan of Pakistan (1970-75)

The achievement figure on IUDs seems extremely exaggerated because of high drop-out rates. In fact, these only show the possible range of wastage of IUDs but not their effective use by clients.

Similarly, regarding sterilization, achievement figures tend to be highly inflated because of the small bonus payment on it. Even if the exact magnitude of surgeries performed could be known, calculations of averted births on that basis would tend to be erroneous because the age and parity of contracepting parents of this category was not known[15]. In later years, it was found that during the Third Five Year Plan, only 50% of the targets in physical terms were achieved[16]. A few of the reasons for not achieving the targets are as follows:

1. The key role assigned to the poorly trained part time Dais (mid-wives) could not be accomplished properly.

2. The focus of programme functionaries was on distribution of contracepting material rather than maintainance of their clients.

3. These was a lack of reliable data base.

4. The stress on recruitment of female workers was uncalled for. In fact, male motivators could have been more mobile and equally (if not more) effective.

5. Inadequate wage structure for part time workers was also responsible for their lack of interest and low results.

7.4 THE FOURTH FIVE YEAR PLAN (1970-75)

This plan was implemented during a period noted in the history of Pakistan as very unfortunate because of political upheavals, seperation of East Pakistan and mistrust of planning machinery[17]. The following were the salient features of the Population Control Programme during this period 1970-75.

7.4.1 STRATEGY

The plan noted that the weakest aspect of this programme in the Third Plan had been the use of Dais. So in the Fourth Plan, it was envisaged that gradual replacement of Dais by a new category of full time family planning workers should take place. Rural clinics with residential accomodation for the staff should be set up for close and continued contact with the local population.

7.4.2 TARGETS

1. To distribute 1,000 million conventional contraceptives.
2. To perform 4.5 million Contraceptive Surgeries (C.S.)
3. To make arrangements for insertion of 3.6 million IUDs.
4. To introduce oral pills as a contraceptive device and distribute 39 million cycles of oral pills.
5. To train a total of 17298 Family Planning workers.
6. To increase the number of Family Planning visitors from 1200 to 2883.

With all the above mentioned measures, 9.6 million births were to be prevented and the birth rate was to fall down from 45 per 1000 in 1970 to atleast 40 per thousand by the end of plan period.

7.4.3 ALLOCATED VERSUS ACTUAL EXPENDITURE

An allocation of Rs. 695 million was made for both the provinces constituting Pakistan at that time. This was about double the expenditure incurred during the Third Plan. But considering the increase in the cost of living, Rs. 520 million were required to merely maintain the programme at the 1969-70 level. So this allocation was not a substantial increase. The yearly actual expenditure figures are available on a yearly basis because the government was operating on annual budgets. The details are as follows:-

Table 7.2

Actual Expenditure during the Fourth Five Year Plan

Year	Actual Expenditure (Rs. Millions)
1970-71	42.47
1971-72	25.70
1972-73	41.901
1973-74	103.34
1974-75	145.00
Total	358.411

(SOURCE Pakistan Economic Survey 1990-91)

7.4.4 IMPLEMENTATION

The population control programme of this plan could not proceed according to schedule because of political uncertainty and economic instability. So Fourth Five Year Plan was not implemented at all. However, expenditure on Population control activities continued on annual basis. Efforts were continued through the Continuous Motivation System (CMS). In 1974, Contraceptive Inundation Scheme was introduced to bring down the birth rates to reasonable level. Both these measures could not be successful and the later, in particular, proved futile.

7.4.5 ACHIEVEMENTS

A review of the plan document as well as other relevant literature revealed that most of the targets could not be achieved though some objectives were fulfilled such as the following:

1. Crude birth rate fell from 45 per thousand in 1970 to 44 per thousand by 1975.

2. Various administrative reforms were introduced e.g. renewal of C.M.S. approach with new added features, mobile clinics, Inundation Scheme and the Client Record System (CRS).

3. All other targets in terms of averted births or various programmes of training could not be achieved as annual expenditure went very low in 1971-72, though in later years, it kept a rising trend.

7.5 THE FIFTH FIVE YEAR PLAN (978-83)

As mentioned in Section 7.4, five-year planning was abandoned in favour of annual plans during the period (1970-78). However, the process of five-year planning was revived in 1978 with Fifth Five Year Plan. The population control programme contained the following features:-

7.5.1 STRATEGY

The Fifth Plan embodied a socio-economic strategy aimed at inducing a desire to limit family size, e.g. emphasis on poorer sections of the society, uplift of backward and rural areas, greater provision of social services, extension of educational facilities at the primary level especially for females and emphasis on creating environments conducive to greater female participation in economic activities. The strategy of the plan was to generate desire among the masses for small size family norm and to expedite the transformation of this desire into practice. The entire population was intended to be contacted and given a wider choice of contraceptives than ever before. So the entire programme was reshaped in 1980. The three year Development Plan (1980-83) adopted a multi-dimensional approach. The previous single purpose, vertical approach was discarded. For the first time, this plan was processed to conform to the procedures of governments' planning requirements.

7.5.2 TARGETS

1. The Fifth Plan projected a decline in the crude birth rate from 43.6 per 1000 in 1977-78 to 35.5 per 1000 in 1982-83.

2. The plan proposed to reduce the total fertility rate from 6.75 to 5.00 per women.

3. The above mentioned targets, though ambitious were considered to be feasible. The Pakistan Fertility Survey of 1975 revealed that 6% of the exposed couples were practising family planning while 64% of the total remaining couples were intending to use it. The target was to bridge this gulf between attitude and behaviour.

7.5.3 ALLOCATED VERSUS ACTUAL EXPENDITURE

The following table shows year wise allocation and utilization.

Table 7.3

Financial Allocations and Utilization during the Fifth Five-Year Plan (1978-83)

(Million Rs.)

Year	Total Allocation	Foreign Assistance	Utilization	Percentage Utilization
1978-79	174.180	9.560	114.273	66
1979-80	169.000	23.810	126.638	75
1980-81	159.500	42.583	130.697	82
1981-82	143.369	4.810	108.274	76
1982-83	190.000	34.705	137.218	72
Total	836.049	115.468	617.100	74

[Source: Sixth Five Year Plan (1983-88)]

7.5.4 IMPLEMENTATION

The entire plan consisted of thirty six projects which as a whole constituted the population welfare programme. These projects were classified into three groups.

1. First group consisted of "The Core Projects" These core projects had the following components.

   Family Welfare Centres

   i. Reproductive Health Services (RHS).

   ii. Family Health and Manpower Development(FHMD)

2. Second group consisted of 'Complementary Projects', which had the following components:

   i. Provincial Line Departments(PLDs)

   ii. Hakims

   iii. Target Group Institutions (TGIs)

3. Third group consisted of 'Support Components' which included the following:-

   i. National Research Institute of Fertility Control(NRIFC)

   ii. National Research Institute of Reproductive Physiology (NRIRP)

   iii. Training (non-clinical)

4. Logistics of Supply and Distribution

The above mentioned strategy of projectizing the entire plan resulted in large scale retrenchment of staff, i.e. from 16,000 to 8500. This gave rise to litigation, legal and administrative problems. Termination of the services of experienced field staff to implement new concepts of community involvement had adverse repurcussions on effective implementation of the plan.

7.5.5 ACHIEVEMENTS

As mentioned above, this plan had adopted a strategy focusing on reducing birth rates through bringing about a change in socio-economic variables. This was a long run process and the plan could not yield results in the form of impressive statistics. However, review of this plan contained in the sixth Five Year Plan document revealed the following achievements:

1. A fall in the total fertility rate from 6.75 to 5.9 during this period against a target of 5.0.

2. The crude birth rate fell from 43.6 per 1000 in 1977-78 to 40.3 per 1000 in 1983 against a target of 35.5 per 1000.

3. In physical terms, the following table shows achievements of the plan.

Table 7.4

Contraceptive Performance for the Fifth Plan

(in Millions)

Year	Contraceptive Surgery (Cases)	IUD (Cases)	Oral Pill (Cycles)	Conventional Contraceptive (Units)	Injectable (Vials)
1978-79	0.013	0.078	1.882	66.960	0.001
1979-80	0.025	0.099	1.485	85.180	0.014
1980-81	0.025	0.092	1.211	26.210	0.024
1981-82	0.026	0.078	0.233	7.890	0.025
1982-83	0.044	0.096	0.571	43.200	0.061

Source: Sixth Five Year Plan (1983-88)

7.6 THE SIXTH FIVE YEAR PLAN (1983-88)

The primary focus was to integrate development planning and population welfare planning. Role of private sector in the field of population control was also emphasized. Salient features of the population control programme were as follows:-

7.6.1 STRATEGY

The strategy was to continue and strengthen the previous strategy adopted during the fifth Five Year Plan. It was recognized that programme structure should be based on local needs and family planning would be purely voluntary. It was also emphasized that family planning was closely linked to female literacy, improvement of the health of child and mother, status of women, better job opportunities for women etc. So stress was laid on combining public sector with private sector to diffuse not only family planning information and services but also to strengthen each other in all the above national problem areas.

7.6.2 TARGETS

Targets of the plan were as follows:

1. To reduce the CBR from 40.3 per 1000 population to 36.2 per 1000 population by the end of the Plan period.

2. To prevent 2 million births during 1983-88 so as to attain the above-mentioned decline in fertility.

3. Consequentially, to reduce the rate of population growth from an estimated 2.87 per cent to 2.6 per cent by the end of the Plan period.

4. To reduce total fertility rate from 5.9 to 5.4 per woman by the end of the Plan period.

7.6.3 ALLOCATED VERSUS ACTUAL EXPENDITURE

A sum of Rs. 2,300 million was provided as plan allocation for this sector. The following table shows year wise break-up showing the actual expenditure as Rs.1758.9 million against the allocated sum of Rs. 2300 million.

Table 7.5

Financial Allocation and Utilization during Sixth Five Year Plan (1983-88).

Year	Allocation (Million Rs)		Utilization	
	Plan	Actual	Million Rs.	%
1983-84	273	273.1	202.2	74.0
1984-85	320	300.0	321.3	107.1
1985-86	475	456.3	388.4	85.1
1986-87	530	555.9	333.8	60.1
1987-88	702	571.0	513.2	89.9
Total	2300	2156.3	1758.9	81.6

[Source: Seventh Five Year Plan]

7.6.4 IMPLEMENTATION

During this plan, implementation suffered because of the following problems:

1. The programme was divided into projects and for each project, a separate PC-I had to be prepared, some projects were disapproved or deferred causing disruption in the smooth running of the entire programme.

2. The performance of provincial line departments (PLDs) remained unsatisfactory because there was no stated policy from their parent departments for the involvement of their outlets to deliver family planning services.

3. The IEC programme was adversely affected due to lack of professional expertise and delay in publicity.

7.6.5 ACHIEVEMENTS

Some progress was made for achieving the demographic objectives of the plan. The following table shows performance in physical terms.

Table 7.6

Targets and Achievements of Population Control Programme (1983-88)

	1983-84			1984-85			1985-86			1986-87			1987-88		
aceptive	Target (000)	Achievement (000)	Percentage	Target (000)	Achievement (000)	Percentage	Target (000)	Achievement (000)	Percentage	Target (000)	Achievement (000)	Percentage	Target (000)	Achievement (000)	Percentage
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
* Inits)	128700	59523	46.3	136100	82691	60.8	150000	86307	57.5	165000	94938	57.5	180000	104432	58.0
Cycles)	4225	741	17.5	3908	927	23.7	3865	1274	33.0	3946	1402	35.5	3865	1542	39.9
Cases)	188	152	80.9	232	197	84.9	260	242	93.1	290	266	91.7	320	293	91.6
es Vials)	95	96	101.1	550	110	20.0	661	225	34.0	716	248	34.6	890	273	30.7
ptive Surgery Cases)	76	41	53.9	117	59	50.4	130	70	53.8	150	77	51.3	175	85	48.6

Source: Seventh Five Year Plan and Perspective Plan
Report of the working group on Population Welfare
Planning Commission, Islamabad Government of Pakistan

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Due to above mentioned problems in implementation, 1.2 million births were estimated to have been averted against the target of 2 million during the 6th Plan period.

7.7 THE 7TH FIVE YEAR PLAN (1988 - 93)

The population control programme adopted during the Seventh Plan was a continuation of the coordinated approach adopted during the Fifth and Sixth Five Year Plans. Another noteworthy feature was strong and open political support and introduction of a process of decentralization. The following were its salient features:-

7.7.1 STRATEGY

1. Solicit greater political support.
2. More active participation of relevant governmental departments, public institutions and private sector to provide services or augment promotional programmes.
3. Additional measures should be adopted for improving coverage of population.
4. Shift to more effective contraceptive methods such as contraceptive surgery, IUDs and injectables.
5. Strengthen field supervision from the federal to the grass-root level.
6. Introduce special incentives to accelerate acceptance of small family norm.

7.7.2 TARGETS

The plan included the following primary and demographic objectives:

1. Raising the level of current practice of family planning from an estimated 12.9 per

cent in 1987-88 to 23.4 per cent by 1992-93.

2. Providing reproductive care services to mothers and child health care services for children under 5 years.

3. Reducing the CBR from 42.3 to 38.0 per 1,000

4. Preventing 3.1 million births

The physical targets are shown below:

Table 7.7

Selected Demographic Indicators for The Seventh Five-Year Plan

	1987-88 (Bench mark)	1988-89	1989-90	1990-91	1991-92	1992-93
Mid-year Population (million)	105.7	109.0	112.4	115.9	119.4	123.0
Birth rate (per 1,000 population)	42.3	42.0	41.4	40.8	40.2	39.6
Death rate (per 1,000 population)	11.1	10.8	10.4	10.0	9.6	9.2
Rate of growth (%)	3.1	3.1	3.1	3.1	3.1	3.0
Number of women age group: 15-49 (million)	22.5	23.3	24.1	24.9	25.7	26.5
Number of married women age group: 15-49 (million)	16.9	17.5	18.1	18.7	19.3	19.9
Number of births to be averted (million)	0.3	0.4	0.5	0.6	0.8	0.9
Birth aversions as % of married women	2.0	2.4	2.7	3.3	3.9	4.6
Number of acceptors including carry over (million)	2.1	2.1	2.3	2.8	3.2	3.7
Acceptors as % of married women age group 15-49	12.5	11.8	12.8	15.1	16.8	18.4

Source: Seventh Five Year Plan

7.7.3 ALLOCATED VERSUS ACTUAL EXPENDITURE

There were problems of inadequate funding in the ADP allocations. However, the allocation of funds to the programme was exempted from the budgetary cuts during 1991-

92 and ADP for 1992-93 was further increased. The expenditure on population welfare is indicated by the following table.

Table 7.8

Financial Outlay of the Population Welfare Programme in the Seventh Five Year Plan, 1988-1993

Year	Plan Allocation (Million Rs.)	ADP (Million Rs.)	Expenditure (Million Rs.)	Utilization (%)
1988-89	514	433.828	450.056	104
1989-90	675	465.500	477.699	103
1990-91	760	597.120	653.069	109
1991-92	785	702.015	702.015	100
1992-93	801	1000.000	1000.000	100
Total	3535	3198.463	2382.839	103

Source: Report of the Working Committee, Eighth Five Year Plan (1993-98)

7.7.4 IMPLEMENTATION

The focus in this plan shifted to more effective contraception such as surgery, IUDs and injectables. Also provision for maternal and child health services through programme outlets was continued and field operations were strengthened. Efforts were made to involve NGOS and Hakims more effectively. Social marketing of contraceptives was also pushed up. Involvement of TGIS was encouraged and their health staff was trained. TBAs were encouraged to play their role and registered medical practitioners were also actively involved in the programme.

7.7.5 ACHIEVEMENTS

In the Seventh Plan, contraceptive prevalence rate was targeted to increase from 11.0% in 1987-88 to 23.5% in 1992-93. This target was based on the assumption that services would become available to at least on third of the total population. But due to problems of funding and restrictions on recruitment of staff the services remained limited to only 20 per cent of the population. Other factors like lack of sustained political and administrative support, inadequate supervision, weak monitoring and ineffetive contribution from other development sectors also accentuated the problems.

The targets for clinical performance were also not fully achieved. The following table illustrate year wise performance.

Table 7.9

Yearly Targets and Achievements During The Seventh Five Year Plan ((88-93)

1988-89			1989-90			1990-91			1991-92			1992-93		
Targets	Achievment	% Achievement	Targets	Achievment	% Achievement	Targets	Achievment	% Achievement	Targets	Achievement	% Achievement	Targets	Achievement	% Achievement
2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
127.19	139.88	110	120.88	132.78	110	120.26	131.25	109	115.71	126.73	110	123.62	122.70	99
1.99	1.56	78	1.53	1.64	107	1.59	1.62	102	1.63	1.19	73	1.61	3.27	203
0.59	0.38	64	0.68	0.60	88	0.99	0.66	66	1.24	0.79	64	1.50	1.12	75
0.68	0.57	84	0.81	0.67	83	1.39	0.74	53	1.70	0.84	49	2.03	1.00	49
0.11	0.08	73	0.13	0.08	63	0.12	0.07	58	0.21	0.08	38	2.27	0.09	33
0.16	0.12	77	0.17	0.14	80	0.20	0.11	52	0.23	0.08	34	0.24	0.10	42

Source: Report of the Working Committee, Eighth Five Year Plan (1993-98)

7.8 THE EIGHTH FIVE YEAR PLAN (1993-98)

This plan is expected to be operative during 1993-1998. Salient proposed features are as follows:-

7.8.1 STRATEGY

Most of the innovative measures introduced during Sixth and Seventh Plan are to be continued with some modifications and amendments. A few such measures are as follows:-

1. The efficiency of existing family welfare centres is to be improved for optimal use of staff.

2. Family welfare centres are to be opened in the urban slum areas of Karachi.

3. The network of reproductive health centres should also undertake extension work.

4. Facilities for vasectomy should be provided to private surgeons and efforts for training to perform contraceptive surgery (C.S.) should be intensified.

5. The involvement of NGOS for performing contraceptive surgeries (C.S) may be increased in a cost effective manner. NGOS should also be encouraged to cover specific urban, semi-urban or rural areas not already covered by governmental network.

6. The staffing pattern of Mobile Service units (MSUs) should be amended according to needs.

7. Innovative schemes for establishing a network of private paramedics in villages should be established to involve local literate people.

8. The social marketing of contraceptives (SMC) should be increased.

9. Target Group Institutions (TIGs) should be decentralized to maximize their involvement and improve the logistics

10. Performance of TBAs should be made more effective.

11. Seminars, orientation courses and distribution of relevant literature should be

undertaken to intensify the involvement of private medical sector. Moreover, all types of equipment and facilities of the poulation control network should be optimally and commercially used to generate additional resources and private medical practioners should also be involved in this regard.

12. Training, publicity, monitoring, evaluation and research areas should be strengthened and modified according to needs.

In a nutshell, the strategy should be to build up a favourable environment for achieving demographic goals. For this, acceleration of efforts to develop all social sectors, especially education and health is required in the Eighth Plan.

7.8.2 TARGETS

According to the recommendations of the working group on Population Welfare, the targets of moderate fertility reduction may be chosen out of a diverse set of ambitious targets. This implies raising the contraceptive prevalence rate from 14% in 1992-93 to 29.0% by 1997-98. This shall bring down the CBR from 41.54 per 1000 to 34.75 per 1000. It will imply preventing 4.8 million births and reduction of TFR from 5.9 in 1992-93 to 4.72 by the end of the Eighth Plan. The coverage is to be extended from 20% in 1992-93 to 80% by the year 2000.

The following table shows physical targets during the plan period:-

Table 7.10

Targets of Contraceptive Use During the Eighth Five Year Plan (1993-98)

(in Millions)

Year	Comdoms	Oral Pills	IUDs	Ijectables	Contraceptive Surgery	Foam
1993 - 94	141.150	4.290	1.150	2.334	248	170
1994 - 95	156.750	5.460	1.270	3.244	336	205
1995 - 96	169.950	6.810	1.470	4.362	394	245
1996 - 97	179.250	8.340	1.575	5.694	466	285
1997 - 98	184.050	10.050	1.670	7.241	558	330
Total	831.150	34.950	7.135	22.875	2.002	1.23 5

Source: Report of the Working Committee, Eighth Five Year Plan (1993-98)

7.8.3 ALLOCATED EXPENDITURE

It has been recommended by the working group mentioned above that resources of the programme may be increased from the existing level of 0.33% to 1% of the total development budget. Funding procedures may be streamlined and simplified. These may be used by the provinces for approved activities. The following table shows the proposed yearly allocations.

Table 7.11

Yearly Allocations During The Eighth Five Year Plan (1993-98)

Year	Amount (Million Rs.)
1993 - 94	1621.705
1994 - 95	2100.045
1995 - 96	2538.396
1996 - 97	2667.353
1997 - 98	2796.212
Total	11723.711

Source: Report of the Working Committee, Eighth Five Year Plan (1993-98)

MPARATIVE LOOK AT PAKISTAN'S POPULATION CONTROL GRAMMES (1955 - 98)

FIRST FIVE YEAR PLAN (1955-60)	SECOND FIVE YEAR PLAN (1960-65)	THIRD FIVE YEAR PLAN (1965-70)	FOURTH FIVE YEAR PLAN (1970-75)*
Generation of reliable data Training of skilled personnel	Development of human resources Stress on female education Overcome limitations of vital statistics	Training of high quality personnel and field workers Promotion of family Planning concept & services Introduction of monetary incentives and CMS Ensure adequate supply of contraceptives, qualified and trained administrative & medical staff	Gradual replacement of local midwives by full time family planning workers Rural Clinics with residential accommodation for the staff to keep close and constant contact with rural population
No specific financial or physical targets were laid down	To establish 3000 family planning centres. To train 1200 personnel. To cover about 10% women of child bearing age. To promote research and administrative reforms in family planning.	To make family planning services available to the entire population by 1970. To reduce birth rates from 5% to 4% and prevention of 5 million births. To arrange for insertion of 3.00 million IUDs To perform 0.09 million contraceptive surgeries To distribute 1,152.50 million condoms.	To avert 9.6 million births and bring down the birth rate from 4.5% to 4% per annum To distribute 1000.00 million conventional contraceptives To perform 4.5 million contraceptives surgeries To arrange for insertion of 3.6 million IUDs. To introduce oral pills as a contraceptives device, & distribute 39.00 million cycles of oral pills. To train 17298 family planning workers To increase the number of family planning visitors from 1200 to 2881
Rs. 0.5 million VS Rs. 1 million	Rs. 30.5 million VS Rs. 30.5 million	Rs. 274 million VS Rs. 136 million	Rs. 695 million VS Rs. 358.41 million
Cannot be analysed due to lack of specific targets and policies.	Unsatisfactory distribution of contraceptives. Shortage of administrative personnel. Three research units were set-up in collaboration with international agencies.	Lack of built in checks within the network Undue stress on local midwives. Inefficiency of the administrative staff.	Not properly implemented due to political and economic instability in the country. Various schemes i.e. CMS, CRS did not prove effective.
Efforts for creating awareness of the need for family planning among the masses. Availability of clinical help was initiated.	Targets could not be fully achieved.	Targets could not be fully achieved though 3.3 million births were estimated to have been averted. Contraceptive performance was as follows: IUDs 3.3 million Contraceptive Surgeries 1.3 million Units of conventional Contraceptives 664.4 million.	Crude birth rate fell from 4.5% to 4.4%. Introduction of CRS and CMS. Oral contraceptives were introduced for the first time. Other physical targets could not be achieved fully.

Contd.

	FIFTH FIVE YEAR PLAN (1978-83)	SIXTH FIVE YEAR PLAN (1983-88)	SEVENTH FIVE YEAR PLAN (1988-93)	EIGTH FIVE YEARPLAN (1993-98)
STRATEGY	Multi dimensional approach for controlling excessive population. Entire population to be covered but emphasis on poorer sections of the community. Wider choice of contracepting materials & devices. Socio-economic approach to limit family size.	Strategy adopted in the fifth five year plan was strengthened. Improvement in educational and health facilities for females, creating more job opportunities for them to raise their status. Emphasis was laid for active participation of private sector and non-governmental efforts in the direction of population control.	Acquiring greater political support for family planning. Stressing greater participation of private sector to promote family planning. Introduction of more effective contraceptives. Incentives to be given to popularize small sized family norms.	Continuity of the innovative measures taken in the Sixth and Seventh Five Year Plans with necessary modifications and amendments. Stress on promotion of health and education to build up favourable attitude for small sized families.
TARGETS	To decrease crude birth rate from 4.36% to 3.55%. To reduce total fertility rate from 6.75 to 5 per woman. To distribute 655.1 million units of condoms. To distribute 198.018 million cycles of oral pills. To arrange for 1.31 million insertions of IUDs. To arrange for use of 0.406 million injectables. To perform 0.161 million contraceptives surgeries.	To reduce CBR from 4.03 to 3.62%. To prevent 2 million births. To reduce population growth rate from 2.87% to 2.6%. To reduce total fertility rate from 5.9 to 5.4 per woman. To distribute 759.8 million units of condoms. To distribute 19.809 million cycles of oral pills. To arrange for 1.290 million insertions of IUDs. To arrange for the use of 2.912 million injectables. To perform 0.618 million contraceptive surgeries.	To raise the level of contraceptive prevalence from an estimated figure of 12.9% to 23.4%. To provide better health facilities to mothers and children. To reduce Crude Birth Rate (CBR) from 4.03% to 3.80%. To prevent 3.1 million births. To distribute 607.66 million units of condoms. To distribute 8.35 million cycles of oral pills. To arrange for 5.00 million insertions of IUDs. To arrange for use of 6.61 million injectables. To perform 2.81 million contraceptives surgeries.	To raise contraceptive prevalence rate from 14% to 29%. To bring down CBR from 4.15% to 3.475%. To prevent 4.6 million births. To reduce TFR from 5.9 to 4.72. To increase CPR (Contraceptive Prevalence Rate) from 20% to 80% by the year 2000). To distribute 831.15 million units of condoms. To distribute 34.95 million cycles of oral pills. To arrange for 7.135 million insertions of IUDs. To arrange for use of 22.875 million injectables. To perform 2.002 million contraceptives surgeries. To distribute 1.235 bottles of foam.
ALLOCATED VS ACTUAL EXPENDITURE	Rs. 836.049 million VS Rs. 617.100 million	Rs. 1758.9 million VS Rs. 2156.3 million	Rs. 3535 million VS Rs. 3282.839 million	N/A
IMPLEMENTATION	Projects were implemented in the form of three groups of projects: a) care projects b) complementary projects c) support projects Plan resulted in retrenchment of a large number of staff, which adversely affected the plan.	Some projects were disapproved or deferred. Unsatisfactory functioning of PLDs. Lack of professional expertise.	More effective contraceptive techniques were adopted. Health and medical facilities were strengthened. Involvement of TGIs and TBAs were encouraged.	The plan has not been initiated so far.
ACHIEVEMENTS	Total fertility rate fell from 6.75 to 5.90. Crude birth rate fell from 4.36% to 4.03%. -Contraceptive performance was as follows: a) Contraceptive surgeries = 0.133 million b) IUDs = 0.443 million c) Oral Pills = 5.382 million d) Conventional contraceptives (units) = 229.44 million e) Injectables = 0.125 million	Targets could not be achieved fully. An estimated figure of 1.2 million births were averted. Contraceptive performance was as follows: (Million / Achievements as Percentage of Targets) a) Conventional contraceptives 427.893 56.32 b) Oral Pills 5.886 29.71 c) IUDs 1.150 89.15 d) Injectables 0.952 32.69 e) Contraceptive surgeries 0.332 51.23	Contraceptive prevalence rate increased to 20%. Targets for clinical performance were not fully achieved. Contraceptive performance was as follows: (Million / Achievements as Percentage of Targets) a) Conventional contraceptives 653.34 107.51 b) Oral Pills 8.86 103.71 c) IUDs 3.55 71.00 d) Injectables 3.82 57.79 e) Contraceptive surgeries 0.40 0.14	N/A

* Although Fourth Five Year Plan was prepared for the period 1970 - 75, it never took off the ground due to various political and economic reasons. Actually five year planning was abandoned in favour of annual plans during the period 1970 - 78. The process of five year planning was revived with the Fifth Five Year Plan covering the period 1978 - 83.

7.10 CONCLUSION

1. A review of the Five-Year Plans vis-a-vis Population Control has revealed that Pakistan has been experimenting with all sorts of imported modules for controlling population. Most of the time, this experimentation has followed political ups and downs in the country. There has not been a consistent, committed and rational population policy.

2. Population Control network should be only one instrument of a wider policy for creation of demand for population planning. Other and more effective instruments are a wide spread campaign of adult literacy, programmes for imparting of skills to urban and rural females etc. In other words, all social welfare policies aiming at raising the cost of bearing and rearing children are important instruments of such a policy.

3. Once the demand for family planning services is there, the supply side can easily be dealt by the existing governmental network coupled with other outlets being operated quite effectively by NGOS.

4. Professionals and policy makers in this network have always been thrown from one policy to another depending upon the whims of the beaurucrats at the top. They might be highly competent but would obviously lag behind the professionals in this network; not only in terms of competence and technical knowhow but also in terms of committment and devotion to the profession which only comes with long experience and involvement with population control network. This policy should be reversed and top management ould always go to the best within this organization.

5. Such a delicate task of population control should not be put in the routine rut of governmental machinery. This aspect should be further probed into; to formulate a system where the best and most suitable persons can be injected into the network without the usual seniority criterion which is rusting the entire governmental machinery in Pakistan. Suitable measures for 'pruning' and 'weeding out' should be built in the system. Due weightage to professional experience and committment to the cause should also be given. One cannot expect speedy results from people within this network who are not convinced themselves of the 'cause' of this programme.

NOTES

1. This was a Six-Year Development Plan (1947-53) which eventually failed to achieve its targets and objectives.

2. It was renamed as Planning Commission later on.

3. Some discussion on planning machinery, its administrative set-up and the series of reforms have already been dealt with in Chapter 6 inconnection with population policy of Pakistan.

4. W.C. Robinson, (1978). The author has dealt with this issue as well as other aspects of funding in various plans.

5. See W.C. Robinson, (1978).

6. For details see 2nd Five Year Plan of Pakistan (1960-65)

7. Enver Adil (1969)

   The author has provided many minute details about the physical tartgets and progress of the population programme during the 2nd five year plan.

8. For details see Enver Adil (1969)

9. This aspect has already been discussed in detail in the context of population policy in Pakistan in Chapter 6.

Most of the figures given in this chapter have been taken from the Plans. In case of ommissions or discrepancies efforts have been made to scan through the relevant Annual Plans and Pakistan Economic Surveys.

10. Enver Adil (1969).The author has given a detailed account of the administrative system of population control network during 1965-68 as well as targets and achievements of this programme in the Third Plan.

11. This estimate of 50 was not accurate to start with. In fact, it was based on early results from the Population Growth Estimation Study (1963). It was later found out that this figure was exaggerated due to a methodological error. See W.C. Robinson, (1978) in this context

12. At that time, the country consisted of two provinces only, West and East Pakistan. Each province was further spilt up into Union Councils, districts, tehsils and villages.

13. See note (10) above.

14. See Fourth Five Year Plan of Pakistan (1970-75) for further details on the achievements of Third Five Year Plan.

15. Ideally speaking, the parents undergoing Contraceptive Surgery (C.S.) should be in the most fertile age group 20-35 and their family size should not be complete but should be closer to the minimum i.e. 2 or 3 (according to Pakistani family size norms).

16. These figures have been taken from Pakistan Economic Survey 1990-91.

17. Some details about this period 1971-72 are given in Chapter 7 as well.

CHAPTER 8

APPLICATION OF ABB MODEL TO PAKISTAN'S INVESTMENT IN POPULATION CONTROL

8.0 INTRODUCTION

In this chapter, benefits and costs have been calculated according to the ABB model developed in part II of this study. Before proceeding with the calculations, the data source of each variable used in the model has been explained, giving reasons for the adjustments made and pointing out the inadequacies of data wherever they existed.

During this period of research, it has been discovered that there was a chronic dearth of data on the relevant variables of population dynamics and economic development in Pakistan. Some literature which was available in the form of research reports and departmental working papers was hard to find because there was no centralised system in Pakistan to locate the required information. International agencies like Population Council, Path Finder Fund, UNDP, UNFPA and USAID operating in Pakistan did not have any system either in which they could help an individual researcher by providing access to international data bases. However, some macro level surveys i.e. Population Growth Estimation (1963-64), National Impact Survey (1968), Pakistan Fertility Survey (1975), Contraceptive Prevalence Survey (1984), Pakistan Demographic and Health Survey (1991) do provide some vital linkages in this complicated set of variables.

8.1 BENEFIT/COST CALCULATIONS ACCORDING TO THE ABB MODEL

Before applying the ABB model to find out benefits and costs of the Government of Pakistan's investment in population control during 1965-88, it is essential to explain data sources and justification of choice of the base year.

8.1.1 SOURCES AND USE OF DATA

Data on variables used in this model have been collected through a variety of sources. Some items have been taken directly from officially published sources without any attempt at adjustment. In a few cases, adjustments have been made to bring about greater precision. These adjustments, too, are based on authenticated sources. Some of the variables used in this model did not exist in the present form in any standard publication but have been calculated or derived by manipulation of the data available with authenticated data generating agencies. Variables and parameters used in application of the ABB model to Pakistan consist of the following:-

TC	=	Total cost of the programme in constant price level of 1980-81.
TB	=	Total benefits of the programme in constant price level of 1980-81.
C_t	=	Cost of the programme in year t.
G_0	=	General Price index of the base year (1980-81 = 100).
G_t	=	General price index of year t
t	=	Time period starting t = 1 = 1965 66
Y_t	=	National income of year t in price level of year t
LP_t	=	Actual population in year t.

HP_t = Hypothetical population in the absence of any expenditure on population control by the government in year t.

s_{ti} = Hypothetical Survivors of age i out of averted births in the year t.

a_{ti} = Averted births of age i in year t.

d_{ti} = Death rate of age i in year t or age specific death rate.

$$1 \leq t \leq 23 \ldots\ldots\ldots\ldots (t \in \mathbb{Z})$$

Data for C_t, G_o, Y_t, LP_t were taken from various yearly Economic Surveys of Pakistan and crosschecked with Statistical Yearbooks as well as Five Year Plans of Pakistan. In some cases where discrepancies have been found, data published in Pakistan Economic Surveys has been considered as final. Data on d_{ti}, G_t, HP_t has been generated as explained in Tables 8.1, 8.2 and Appendices B, C, D, E, F, G, H.

8.1.2 CHOICE OF BASE YEAR

This study relates to the period 1965-88. Choice of a representative base year involved many factors. War with India and resulting separation of East Pakistan in 1972 had destablized the economy. Indiscrete nationalization of the mid-seventies and later attempts at reversing it, aggravated the economic, social and political chaos. 1980-81 as the base year has been chosen because the economy had somewhat stabilized by that time. Recently, Federal Bureau of Statistics has also chosen the same year as the base year. So the choice of 1980-81 as the base year seems reasonable.

8.1.3 CALCULATION OF BENEFITS (OUTPUTS)

Before proceeding with calculation of benefits, it is considered necessary to discuss some technical aspects of each method of averting births selected for this study.

(a) Methods For Averting Births

Out of various methods, three major methods have been selected for calculation of benefits in this study. These are as follows:

(i) Intrauterine Device (IUD)

(ii) Contraceptive Surgery (CS)

(iii) Conventional Contraceptives (CC)

Details about these methods are as follows:-

(i) The IUD (Intra Uterine Device) or as it sometimes also called IUDC (Intra Uterine Contraceptive Device) or simply `Loop' or `Coil' has been one of the early methods[1] approved and widely publicised by the Pakistan Population Control Programme. It gained momentum[2] in 1963 when the programme was launched with vigour and enthusiasm[3]. Potter (1969) developed a technique[4] for estimation of number of births averted through the use of IUDs. This method took into account the length of use of IUDs, the age distribution of the users, the possibility of death or secondary sterility interrupting a marriage during the period when IUDs were being employed, the overlap between amenorrhea and the use of the IUD, accidental pregnancies during the period when IUDs were being employed and the alternative assumptions concerning the fertility that would have been experienced by the adopters had they never used the IUDs. Mauldin (1967, 1968) and Tietze (1972) have also made significant contribution towards developing indices of conversion of IUDs into averted births.

In the case of India, Simmons (1969) computed the mean number of births averted through the use of an IUD equal to 0.55. This ratio was based on the studies mentioned above as well as other relevant research studies on India. In the ABB model, one birth averted has been calculated as equal to 5.76 new insertions of IUDs according to the conversion index explained in Table 8.1.

(ii) Contraceptive Surgery (CS) Or Sterilization

The effect of sterilization among males or females is permanent[5]. Birth avertion coefficient of this method should be larger than any other method if it has been performed on people who are potentially fertile. But it will not be true if contraceptive surgery has been performed on potentially or tending to be sterile persons[6]. Another factor is that couples resorting to sterilization could have resorted to other methods of conception control in the absence of this facility by the government. But this limitation is valid for all methods of conception control and is not peculiar to sterilization only.

In the case of India, Simmons (1969) computed the mean number of births averted per sterilization equal to 2.75. This ratio was based on previous studies done on India by different researchers, e.g. Agarwala (1966). In the ABB model, one birth averted is calculated as equal to 3.4 new cases of contraceptive surgeries performed according to the rationale developed in Section 8.1.3(b).

(iii) Conventional Contraceptives

These include condoms, oral pills and other similar materials of conception control[7]. These are popular in many ways not only in developed countries but also in LDCs including Pakistan. Condoms are harmless to use, do not evoke any fear or mistrust among users and are fairly effective if used with care and caution[8]. These are more effective if applied in conjunction with foam tablets or jelly.

Oral pills have a long history wrought with mistrust and side effects in Pakistan. Its only relative advantage in contrast to condom is that women are considered more concerned about avoiding unwanted pregnancies because they have to undergo all the inconveniences of child bearing[9]. On the contrary, oral pills require regularity of use which becomes difficult in socio-cultural environments of an average Pakistani rural or semi-urban uneducated woman. Interestingly, since level of illiteracy is very high even among the males, one cannot be very optimistic even regarding the use of condoms among the male population of Pakistan.

In the case of India, calculations of averted births through this method were not done by Simmons (1969) because according to him, number and characteristics of users of this method were not recorded in the officially published documents as in the case of IUDs and sterilization. In the ABB model, one averted births is calculated as equal to use of 833.33 condoms or 9.738 cycles of oral pills.

b. A Note on Conversion Index

According to the ABB model, calculations of averted births have been done by [illegible] using the following index.

One birth averted = Sales and use of 833.33 condoms
OR
Sale and use of 97.38 cycles of oral pills
OR
5.76 new insertions of I.U.D s
OR
3.4 new cases of contraceptive surgeries performed

The above index has been developed by the Population Welfare Division, government of Pakistan. Before adopting this conersion index, literature reviewed in Chapters 2,3 and 4 has again been scrutinized. Personal visits have also been made to government departments as well as autonomous bodies concerned with this field directly or indirectly i.e. Federal Bureau of Statistics (FBS) Karachi, Path Finder Fund (Karachi), Population Study Centres (Karachi and Faisalabad), Pakistan Institute of Development Economics (Islamabad), Population Welfare Training Institutes (Karachi, Lahore), Applied Economic Research Centre (Karachi) and a number of offices of population welfare network (Lahore, Karachi and Islamabad). All these efforts were directed towards bringing about some improvement in the existing formula or evolveing a new formula for converting various conception control methods into averted births. Similarly, a considerable amount of time was spent in search of some studies which could be used as a feed back in the form of primary data on various aspects of conception control in order to refine the existing conversion index or at least to find its rationale. Unfortunately, no significant success was achieved in all these efforts. Eventually, it has been considered safe to adopt the above index unconditionally. Viqar H. Zaidi (1987) gave some technical information as to how this formula was evolved which is summarized below:

The basic data used for developing this index has been the crude birth rates, the percentage of married women of the reproductive age group (15-44) and the marital fertility ratio. These have been taken from the PGE project (1963). Application of

Chandre-Deming (CD) formula[10] gave marital fertility ratio as 0.311 and application of Logitudinal Registration[11] (LR) gave this ratio as 0.240 and so 0.275 as the average of the two was taken for use in the above index. This index has taken into account all the intermediate factors like dropouts, failures, partial use, etc. It has also considered other related factors such as the fact that births do not take place every year (even in the absence of contraceptive devices) to women of varying ages within the reproductive age groups (15-44 years). It transpires that the basis of calculation of the above index has been the following table given by Viqar H. Zaidi (1987).

Table 8.1

Details of Index of Averting Birth

	I	II*	III**	IV****
Contraceptive method	Units	Effective CYP	Units of Averted Birth	Units of Contraceptive methods required for single birth aversion
Condoms	100	0.45	0.1200	833.33
Cycles	13	0.50	0.1335	97.38
IUD	1	0.65	0.1735	5.76
Contraceptive Surgery	1	1.00	0.2670	3.74

Source: Viqar H.Zaidi, 1987

* It was calculated by making allowances for dropouts, failures and partial use of contraceptives as stated by Zaidi (1987).

** $(\text{Col. III})_i = (\text{Col. II})_i \times 0.267^{***}$

$$^{***}0.267 = \frac{\text{Percentage of crude birth rate}}{\text{Percentage of married women of age 15-44 in the total population}}$$

$$= \frac{4\%}{15\%}$$

$$= 4/15$$

$$= 0.267$$

$$\text{****}(\text{Col. IV})_i = \frac{(\text{Col. I})_i}{(\text{Col. III})_i}$$

c. **Conversion into Net Averted Births**

For calculation of averted births, data on IUDs, contraceptive surgeries and conventional contraceptives has been obtained and tabulated as explained in Section 5.3.4 and contained in appendices D,E,F, and G. These data sets have been brought down by 41% in accordance with a study by Farooqui and Soomro (1984) on the extent of over-estimation of service statistics generated by the Pakistan governments population control network[12].

For further refinement of these data sets, figures of yearly averted births were converted into net averted births by applying relevant survival rates obtained from a study by J.G.C. Blacker (1990). The following table shows relevant survival rates.

Table 8.2

Survival Rates of Averted Births During 1965 - 88

0	I	II	III	IV
Age	Mortality Rate*	Age	Mortality Rate ** (d_i)	Survival Rate *** (s_i)
0	0.11040	0 — 1	0.059725	0.940275
1	0.00905	1 — 2	0.008125	0.991875
2	0.00720	2 — 3	0.006275	0.993725
3	0.00535	3 — 4	0.004425	0.995575
4	0.00350	4 — 5	0.002575	0.997425
5	0.00165	5 — 6	0.001610	0.998390
6	0.00157	6 — 7	0.001530	0.998470
7	0.00149	7 — 8	0.001450	0.998550
8	0.00141	8 — 9	0.001370	0.998630
9	0.00133	9 — 10	0.001290	0.998710
10	0.00125	10 — 11	0.001335	0.998665
11	0.00142	11 — 12	0.001505	0.998495
12	0.00159	12 — 13	0.001675	0.998325
13	0.00176	13 — 14	0.001845	0.998155
14	0.00193	14 — 15	0.002015	0.997985
15	0.00210	15 — 16	0.002175	0.997825
16	0.00225	16 — 17	0.002325	0.997675
17	0.00240	17 — 18	0.002475	0.997525
18	0.00255	18 — 19	0.002625	0.997375
19	0.00270	19 — 20	0.002775	0.997225
20	0.00285	20 — 21	0.002870	0.997130
21	0.00289	21 — 22	0.002910	0.997090
22	0.00293	22 — 23	0.002950	0.997050
23	0.00297	23 — 24	0.002990	0.997010
24	0.00301	24 — 25	0.003030	0.996970
25	0.00305			

[Source: Author's calculations based on appendix B]

*. $(\text{col I})_i$ is obtained from Appendix B

$$** \ (\text{col III})_i = \frac{(\text{col I})_i + (\text{col I})_{i+1}}{2}$$

$$*** \ (\text{col IV})_i = 1 - (\text{col III})_i$$

Table 8.2 shows the mechanism of converting Blacker's survival coefficients for Pakistan into a form which was in line with the overall format of the model. To be more specific, Blacker's survival rates were grouped within an interval of five years i.e. 0-5, 5-10, 10-15 and so forth. The data available from official sources was in running years i.e. 1965-66, 1966-67. To overcome this problem, survival rates were first calculated in calender years as explained in appendix B. conversion of these calender year rates into running year rates has been done as explained in Table 8.2 and Appendix B.

The data generated in Table 8.2 has been used for calculation of yearly net births averted by the population control programme after giving due allowance to the fact that even if there had been no programme of population control during 1965-66 to 1987-88, all births taking place during this phase would not have survived because of the influence of mortality rate of the relevant age groups.

The overall picture with respect to Net Averted Births becomes vivid by the table below:-

Table 8.3

Yearly Net Births (A_{ti}) Averted By The Population Control Programme.

0	I	II	III	IV	V	VI
Year	Birth averted by IUD's	Birth averted by sterilization	Births averted by oral pills	Birth averted by condoms	Total births averted *	Survivors ** (S_t)
1965 - 66	23024.52	311.75	—	23489.45	46826	44029
66 - 67	41603.13	345.89	326.69	53361.91	95638	89926
67 - 68	52446.80	2760.27	146.30	81702.45	137056	128870
68 - 69	53973.10	10513.14	39.16	86808.84	151334	142296
69 - 70	42228.13	1952.44	35.30	86808.84	131025	123200
70 - 71	29249.41	902.45	79.15	58565.09	88796	83493
71 - 72	15314.84	628.25	433.69	21447.87	37825	35566
72 - 73	13158.12	599.99	1186.92	25324.61	40270	37865
73 - 74	11313.41	783.37	9210.45	41865.44	63173	59400
74 - 75	16929.42	1466.80	8880.52	70668.86	97946	92096
75 - 76	27974.78	2795.73	37371.06	126688.25	194830	183194
76 - 77	19678.51	2783.02	30022.20	86485.75	138964	130669
77 - 78	8713.67	1335.38	10280.33	42164.71	62494	58762
78 - 79	9516.84	2537.64	13685.95	56860.00	82600	77667
79 - 80	12255.59	4719.16	25382.27	27248.78	114606	107761
80 - 81	11340.50	4696.02	8819.38	22306.12	47162	44345
81 - 82	9628.03	4830.85	1700.11	23070.36	39229	36886
82 - 83	11899.01	5372.25	2912.60	35364.21	55548	52230
83 - 84	18113.06	7155.91	5941.43	49107.13	80318	75521
84 - 85	24070.99	9939.13	6711.21	69331.91	110053	103480
85 - 86	31685.87	13033.15	9237.84	71674.53	125631	118128
86 - 87	38731.03	13093.07	10517.10	85021.85	147363	138562
87 - 88	62534.97	14674.78	14195.39	20967.58	112373	105662

Source: Appendices D, E, F, G.

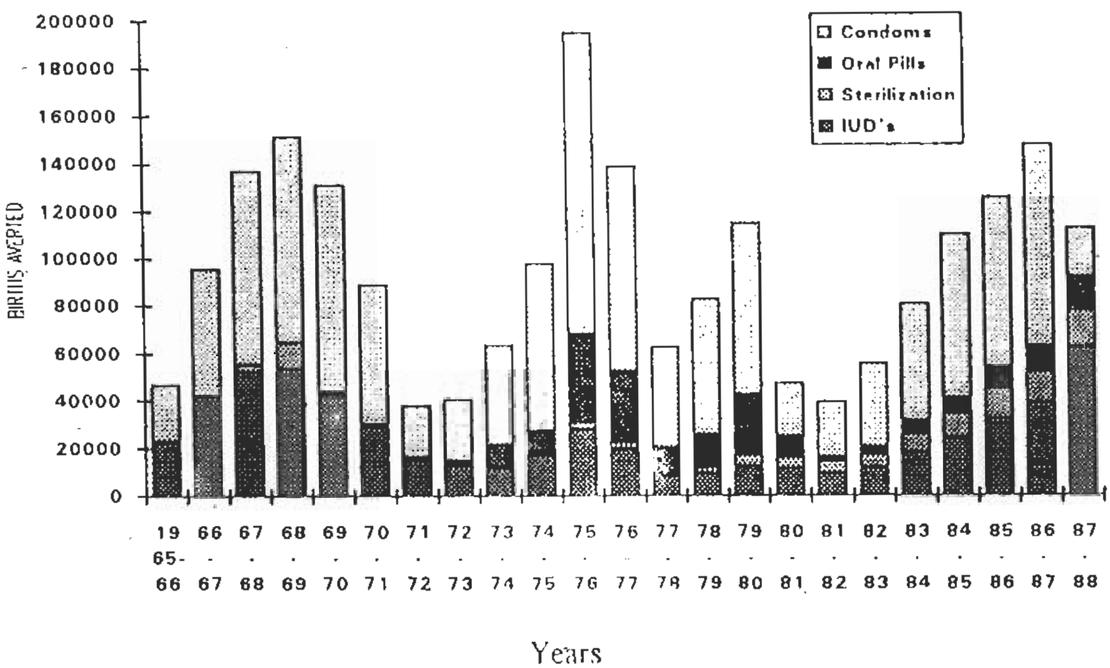
* $(\text{col V})_i = (\text{col I})_i + (\text{col II})_i + (\text{col III})_i + (\text{col IV})_i$

** $(\text{col VI})_i = (\text{col V})_i \times s_{t_i}$ where s_t is col IV of table 8.2

Table 8.3 presents a summary statement of the findings of Appendices B,D,E,F and G. Many interesting inferences can be drawn by scrutinizing its various columns e.g. the high extent of success of conventional contraceptives as against surgical methods of conception control i.e. IUDs and contraceptive surgeries Figure 8.1 gives a graphic picture of the magnitude of success of each method.

Figure 8.1

Births Averted By Various Methods



The high level of achievement of condoms is a very conspicuous feature as compared with all other methods put together. Surgical methods like IUDs and Contraceptive Surgeries (CS) are more reliable as use and distribution are synonymous. On the contrary, distribution of condoms is only a necessary but not a sufficient condition for use of condoms. Similarly, regularity of their use is another precondition for their success in averting births. All these factors make the number of averted births through the use of condoms given in figure 8.1 very doubtful inspite of all the refinements of data as done in this study. However, in the absence of any study which could reveal the extent and regularity of use of condoms, nothing more could be done in this respect.

d. **Calculations of HP_t (Hypothetical Population)**

Figures of actual population (LP_t) for the years 1965-66 to 1987-88 were taken from Pakistan Statistical Year Books. Total hypothetical suvivors (TS_t) and Hypothetical population (HP_t) have been calculated according to the rationale of equations 5 and 6 of the ABB model in Section 5.3.4. Details of calculations are available in appendix H. Table 8.4 gives a summary of the results of Appendix H as follows:-

Table 8.4

Survivors of Averted Births and Hypothetical Population

0	I	II	III
Time Period	Actual Population (LP_t) (Millions)	Total Hypothetical Survivors (TS_t)*	Hypothetical Population (HP_t)** (Millions)
1965 - 66	53.26	44029	53.30
1966 - 67	54.79	133598	54.92
1967 - 68	56.37	261463	56.63
1968 - 69	58.00	401961	58.40
1969 - 70	59.70	522697	60.22
1970 - 71	61.49	603446	62.09
1971 - 72	63.34	636411	63.98
1972 - 73	65.89	672172	66.58
1973 - 74	67.90	729764	68.63
1974 - 75	69.98	820011	70.80
1975 - 76	72.12	1000973	73.12
1976 - 77	74.33	1128338	75.46
1977 - 78	76.60	1183401	77.78
1978 - 79	78.94	1257680	80.20
1979 - 80	81.36	1319724	82.68
1980 - 81	83.84	1273944	85.11
1981 - 82	86.44	1183528	87.62
1982 - 83	89.12	1095924	90.22
1983 - 84	91.88	1050281	92.93
1984 - 85	94.37	1070829	95.44
1985 - 86	97.67	1151867	98.82
1986 - 87	100.70	1250657	101.95
1987 - 88	103.82	1295294	105.13

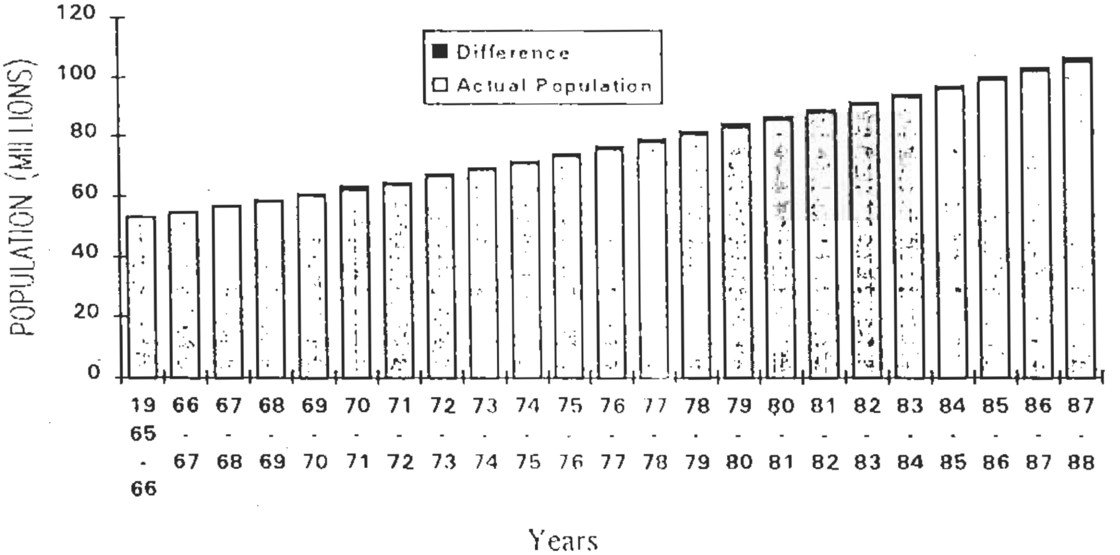
Source: Pakistan Economic Surveys and Statistical Year Books

* $(\text{col II})_t = (\text{col XXIV})_t$ of Appendix H

** $(\text{col III})_t = (\text{col I})_t + (\text{col II})_t$

Hypothetical population versus actual population of Pakistan in the period (1965-66 to 1987-88) is shown in the following Figure for comparison purposes.

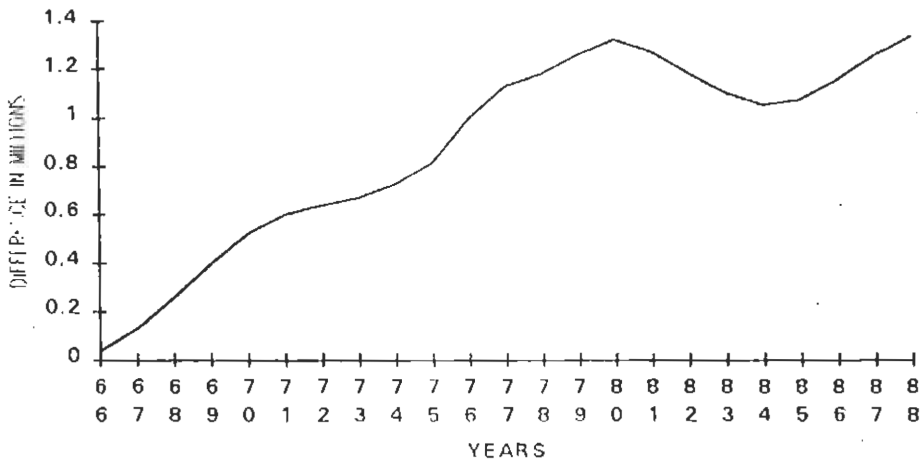
Figure 8.2
Hypothetical Versus Actual Population of Pakistan



Difference in hypothetical and actual population does not appear to be large because Figure 8.2 is in terms of millions. To make the picture clearer these differences in LP_t and HP_t shown in the following Figure:-

Figure 8.3

Difference Between Hypothetical and Actual Population



The bumps and humps of the curve in figure 8.3 is a picture of the woeful state of affairs regarding ups and downs in the yearly allocation of funds to population control programme by the government. Ideally speaking, the curve in figure 8.3 should have been without such ups and downs and more steep, getting steeper with the passage of time. This type of curve showing dampened and erratic behaviour is a corollary of what has already been discussed in Chapters 6 and 7 of this thesis.

(e) Summary of Benefits (Output)

Equation (2) of the ABB model in Section 5.3.4 was formulated on the rationale that per capita income of Pakistan during the years 1965-66 till 1987-88 was higher due to averted births than in the absence of the programme. Hypothetical per capita income in constant price level YC_t/Hp_t is subtracted from actual per capita income YC_t/LP_t (where YC_t is defined as $Y_t \times G_0/G_t$ as explained in Section 5.3.4) to find money benefit per capita of government's investment in population control programme. This benefit per capita is converted into total benefits by multiplying with hypothetical population (Hp_t) i.e. the population which would have been there had there been no investment in population control programme in Pakistan. Tables 8.5 gives a summary of yearly benefits in constant price level.

Table 8.5

Benefits in Constant Price Level of 1980-81

0	I	II	III	IV
Year	Actual Population (LP_t) (Million)	Hypothetical Population (HP_t) (Million)	National Income in Constant price level of 1980-81* (YCt) (Million Rs.)	Benefits in constant price level of 1980-81** (BCt) (Million Rs.)
1965-66	53.26	53.30	116891.67	87.79
1966-67	54.79	54.92	120510.54	285.93
1967-68	56.37	56.63	128832.06	617.08
1968-69	58.00	58.40	137170.22	969.65
1969-70	59.70	60.22	150730.18	1338.14
1970-71	61.49	62.09	152267.90	1510.55
1971-72	63.34	63.98	156471.14	1581.02
1972-73	65.89	66.58	167597.51	1704.21
1973-74	67.90	68.63	180024.06	1935.46
1974-75	69.98	70.80	187339.42	2195.17
1975-76	72.12	73.12	195489.09	2710.61
1976-77	74.33	75.46	203688.98	3096.56
1977-78	76.60	77.78	225398.43	3472.20
1978-79	78.94	80.20	238978.64	3814.44
1979-80	81.36	82.68	255863.18	4151.17
1980-81	83.84	85.11	269721.00	4085.71
1981-82	86.44	87.62	288322.96	3935.92
1982-83	89.12	90.22	312625.76	3858.81
1983-84	91.88	92.93	325793.73	3723.15
1984-85	94.37	95.44	352334.38	3994.89
1985-86	97.67	98.82	377129.97	4440.46
1986-87	100.70	101.95	394968.46	4902.79
1987-88	103.82	105.15	414330.76	5307.84

Source: Table 8.4

* $(\text{Col III})_i = (\text{Col V})_i$ of Appedix C

$$** \; (\text{Col IV})_i = \left| \frac{(\text{Col III})_i}{(\text{Col I})_i} - \frac{(\text{Col III})_i}{(\text{Col II})_i} \right| \times (\text{Col II})_i$$

These total benefits are the output of population control programme as defined in this study.

8.1.4 CALCULATIONS OF COSTS (INPUTS)

Costs have been calculated according to equation of the ABB model in Section 5.3.4. Yearly actual expenditure on population control during 1965-66 to 1987-88 has been converted into constant price level of 1980-81 to bring homogeneity between inputs and outputs. This is shown in table 8.6.

Table 8.6

Calculation of Programme Costs

0	1	II
Year	Yearly Costs in current price level (C_i) (Million Rs.)	Yearly Costs in constant price level of 1980-81 (CC_i)* (Million Rs.)
1965-66	14.72	58.95
1966-67	15.23	56.34
1967-68	28.83	104.57
1968-69	41.27	149.15
1969-70	44.71	155.46
1970-71	42.47	140.82
1971-72	25.70	80.61
1972-73	41.91	113.52
1973-74	103.34	226.03
1974-75	145.00	260.84
1975-76	187.81	299.16
1976-77	202.00	290.86
1977-78	105.00	137.61
1978-79	114.00	141.61
1979-80	127.00	142.19
1980-81	131.00	131.00
1981-82	174.00	159.19
1982-83	178.00	151.50
1983-84	202.00	158.43
1984-85	346.00	257.56
1985-86	456.00	324.02
1986-87	483.00	327.57
1987-88	513.00	327.44

Source: Pakistan Economic Survey 1990-91

$$* \ (\text{col II})_i = \frac{(\text{col I})_i}{(\text{col IV})_i \text{ of Appendix C}} \times 100$$

These total yearly costs (in constant price level of 1980-81) are the inputs into the programme. This completes the calculation of benefits and costs.

8.2 CONCLUSION

In this chapter, total costs and total benefits of the family planning programme of Pakistan have been calculated according to the ABB model formulated in Chapter 5. It has already been discussed that this model is simple, realistic and conforms to data availability in Pakistan. The estimates of total costs and total benefits are by no means precise and no such big claim is being made. The purpose of calculation of total benefits and total costs has been to find an approximate figure of benefit/cost ratio in order to see the economic rationale of government of Pakistan's investment in population control. But this is not the primary objective. During the course of this study, it has been discovered that investment in this field has not been consistent. Similarly, organizational lapses have been responsible for wastage of funds and high costs of this programme. So, both aspects of this investment i.e. benefits generated as well as costs incurred should be analysed from as many angles as possible.

The validity of the assumptions of the ABB model may be questioned if it applied to some other country with different socio-economic backgrounds. But in most cases, assumptions can be modified. Similarly, benefits and costs can be defined in different ways to suit availability of data or peculiar set of circumstances. In a labour abundant country with widespread illiteracy, having cultural & social inhibitions like Pakistan, India and Bangladesh, the application of the ABB model can depict reasonably accurate estimate of benefits and costs. Common features like low productivity of labour, abundant supply of unskilled workers, low level of capital formation, widespread illiteracy and fatalist attitudes are found in the low income countries of the world. In such countries, the ABB model can be put to use with slight adjustments, if necessary, regarding assumptions or definitions of benefits and costs.

Another problem area has been the availability of reliable data base in Pakistan. Even the policy makers within the population control network are themselves not satisfied with the quality of the data generated within the programme. It is shocking to observe that publications originating from the same source give inconsistent data. Administrators and policy makers might be facing genuine problems but it is very essential to overcome these bottlenecks. Lack of consistency and authenticity of published data can cast doubts on the reliability of estimates.

The results formed on the basis of various tables constructed in this chapter shall be analysed in the next chapters.

NOTES

1. For history and technical details about IUD's see Pakistan Journal of Family Planning Vol. I, No.1, 1967.

2. IUD clinics started functioning in 1958 and substantial size of IUD acceptors was reported as early as 1963. See the following in this context:-
   - (i) Samad, S. (1967)
   - (ii) Yousuf, F. and S.S. Hashmi (1969)
   - (iii) IUD Retention Study (1967). Preliminary analysis is found in a number of articles appearing in proceedings of the Fifth Biannual Seminar on Research in Family Planning, Lahore No. 7-8, 1968.

3 Physical targets in case of IUD insertions were almost fully achieved in initial phases of this programme. If this was true, it seemed a remarkable feature of the programme considering social, economic and religious inhibitions prevalent among Pakistani masses. See "Proceeding of Third

Bi-Annual Seminar on Research in Family Planning" March 26-28, 1967. Also "Proceedings of the Pakistan International Family Planning Conference" at Dacca Jan. 28-Feb 4, 1969. All these publications show the remarkable achievements during the decade 1958-68.

4. The background, history and achievements of this technique are available in many books and journals. A good treatment for economists is contained in Cassen, R.H.(1987). Application to Indian data is available in Simmons, G.B. (1969).

5. There have never been any failures in the case of tubeligations. However, Simmons (1969) has cited some rare cases of partial failure of vasectomy cases

6. A pioneering study on secondary sterility has been done by Agarwala, S.N. (1966). A good discussion on this subject is also contained in Simmons, G.B. (1969). In Pakistan this subject has been under discussion since 1969 as found in research findings of National Research Institute of Fertility Control (N.R.I.F.C.) and National Research Institute of Reproductive Physiology (N.R.I.R.P.).

Considering the social and economic inhibitions in Pakistan, sterilization particularly female sterilization can be a good solution. Our women folk are illiterate, marry very early, needing a permanent method and minimal visits to clinics or hospitals. Unrealistic as this may seem, popularity of vasectomy among the low income groups was found to be significant in a study by Qudus, Ratcliffe and Croley (1969).

This topic of sterilization, it awareness, educational, economic and cultural factors, age and parity of acceptors, role of agents, attitudes and practices etc. is also found in various publications of N.R.I.F.C. and N.R.I.R.P. e.g :-

(i) "Proceedings of the 8th Seminar on Research in Population Planning", Peshawar, April 18-20 1974, N.R.F.P.

(ii) "Proceeding of the 5th Seminar on Research in Population Planning", Lahore, Nov 7-8, 1968, N.R.F.P.

(iii) "Proceedings of the 13th Seminar on Research in Population Planning", Karachi, July 7-9, 1987 and N.R.I.F.C. (Its old title was N.R.F.P.)

7. Khan, T. "Proceedings of the 13th Seminar on Research in Population Planning" (1987); the author has dealt with this issue in details

8. Various research studies on different approaches on this subject corroborate this view. See regular publications of N.R.I.F.C. i.e. Proceedings of the Seminars as well as the monthly News letters mentioned in the Bibliography.

9. In a country like Pakistan, male population being more literate, aware and effective could use condoms regularly if convinced of the need. The number of users of condoms have been increasing ever since the inception of the programme, with ups and downs associated with inadequate supplies, flaws in the legistics of distribution, flow of foreign aid and change in the governmental policies. However, the acceptance of oral pills has generally been low in our population.

Oral pills included in the programme have been of many types. Periodically, efforts have been re-activated by Population Welfare Division and N.R.I.F.C. to popularize the use of oral pills by various innovative techniques but the results achieved have not been encouraging. Other developing countries have been using oral pills alongwith I.U.D.s as an alternative and supplement. In Pakistan some improvement can be brought about in the consumption of oral pills as a contraceptive device if it is used in conjunction with I.U.D.s, in particular for those clients who find I.U.D.s incompatible or are medically unable to use them. It can also act as a supplement to condoms and sterilization. good discussion on this subject is contained in "Proceedings of 5th Biannual seminar on Research in Family Planning" (1968).

10 C. Chandrasekaran and Deming were the originators of this technique called Chandra-Deming formula which combine the LR (Longitudinal Registration) and CS (Cross-Sectional) or multi-round survey. For details see J G.C Blacker (1987)

11. Longitudinal Registration (LR) System was based on registration data kept by a registrar resident in the sample area.

12. In another study by G.Y. Soomro et al (1984), the degree of over-estimation of service statistics was found to be 50% giving due allowance to non-programme reduction of fertility rates.

PART IV

"The way that can be walked is not the perfect way. The word that can be said is not the perfect word."

Lao-Tzu (~ 3rd Century B.C.)

"Now, here, you see, it takes all the running you can do, to keep in the same place. If you want to get somewhere else, you must run twice as fast as that."

The Red Queen, in Through The Looking Glass
Lewis Carroll (1871)

CHAPTER 9

FINDINGS OF THE ABB MODEL

9.0 INTRODUCTION

In this chapter, an attempt has been made to discuss the findings of ABB model with reference to economics of population control. For this, use has been made of the data generated in Chapter 8 regarding benefits and costs of the population control programme of Pakistan. Benefit/cost ratios, average of such ratios, benefit per averted birth and cost per averted birth have been tabulated and graphically depicted for further exposition, exploration and drawing economic as well as demographic implications.

9.1 ECONOMICS OF POPULATION CONTROL

In a developing country like Pakistan, resources diverted to population control programme have to be taken away from another competing investment channel like education and health. Therefore, it is necessary to seek its economic justification. To discuss the economics of population control, yearly costs and benefits of population control programme in Pakistan have been tabulated below:-

Table 9.1
Yearly Benefit/Cost Ratios

0	I	II	III
Year	Benefits in costant price level (BCt) (million Rs.)	Cost in constant price level (CCt) (million Rs.)	Benefit/Cost Ratio (Rt)
1965 - 66	87.79	58.95	1.49
1966 - 67	285.93	56.34	5.07
1967 - 68	617.08	104.57	5.90
1968 - 69	969.65	149.15	6.50
1969 - 70	1338.14	155.46	8.61
1970 - 71	1510.55	140.82	10.73
1971 - 72	1581.02	80.61	19.61
1972 - 73	1704.21	113.52	15.01
1973 - 74	1935.46	226.03	8.56
1974 - 75	2195.17	260.84	8.42
1975 - 76	2710.61	299.16	9.06
1976 - 77	3096.56	290.86	10.65
1977 - 78	3472.20	137.61	25.27
1978 - 79	3814.44	141.62	26.94
1979 - 80	4151.17	142.19	29.19
1980 - 81	4085.71	131.00	31.19
1981 - 82	3935.92	159.20	24.72
1982 - 83	3858.81	151.50	25.47
1983 - 84	3723.15	158.43	23.50
1984 - 85	3994.89	257.56	15.51
1985 - 86	4440.46	324.02	13.70
1986 - 87	4902.79	327.57	14.97
1987 - 88	5307.84	327.44	16.21
Total	63,719.45	4194.45	

Source:-
Column I derived from Table 8.5
Column II derived from Table 8.6
Column III author's Calculations

$$\frac{\text{Total Benefits during 1965-66 to 1987-88}}{\text{Total Costs during 1965-66 to 1987-88}} = \frac{63719.45}{4194.45} = 15.19$$

$$\text{A.M. of Yearly Cost/Benefit Ratios} = \frac{R1+R2+\ldots\ldots\ldots\ldots+R23}{23}$$

$$= 15.49$$

Arithmetic Mean of yearly benefit/cost ratios depicted in Table 9.1 is calculated as 15.49 which again reconfirms the fact that benefits exceed costs by about fifteen times over the entire period under analysis i.e. 1965-66 to 1987-88. Such a high return implies a very wide gap between marginal benefits and marginal costs which has also been explored in Section 9.3.

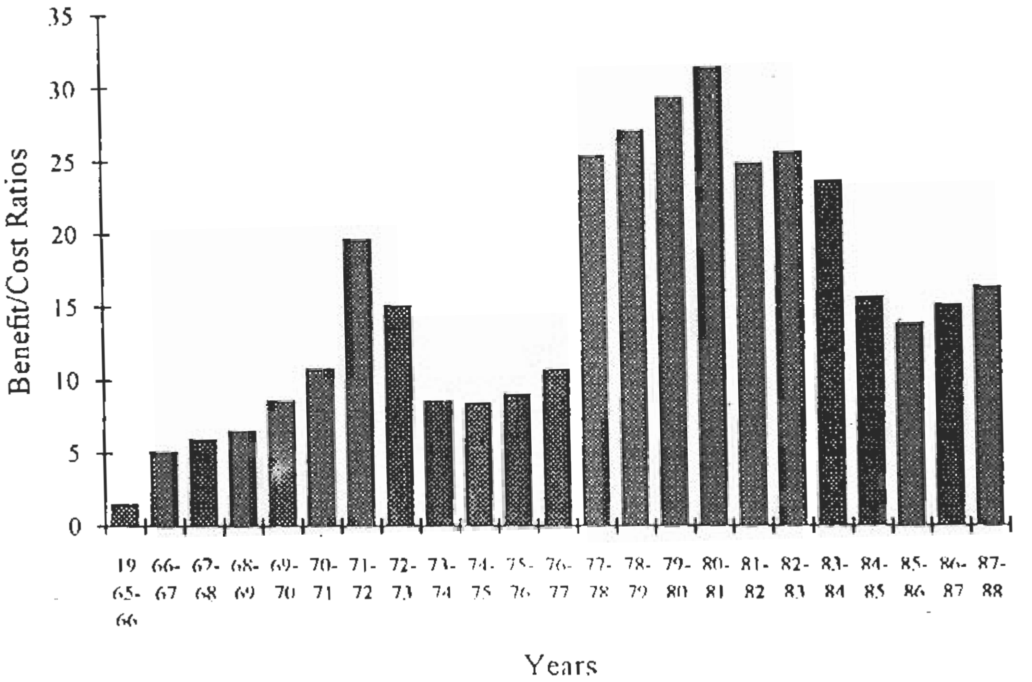
Table 9.1 shows inconsistency in benefit/cost ratios overtime which increases continously with time. In the year 1965-66, benefit/cost ratio is low being 1.49, following an irregular rising trend till this ratio reached a maxima point at 19.61 in the year 1971-72. The chaotic stage of 1969-71 could be responsible for the down ward trend of this ratio from the year 1972-73 which continued its decline till 1974-75 when it reached a minima point at 8.42. From 1975-76, it started improving again though the rate of increase has not been uniform. It reached a maxima point again in 1980-81 after which a pattern of yearly dampened flucutations around a rising norm starts which can again be related to change in governmental policies and a series of other economic events narrated briefly in Chapter 6.

Another noticeable feature is that benefit/cost ratio is highest in 1980-81 at 31.19 which happens to be the base year for conversion of current costs and benefits into constant price level. This implies that though the size of the allocations to this programme has had a rising trend even after 1981-82, most of this rise was not in real terms because of the fall in the value of money both domestically as well as internationally. Another implication is that higher allocations to this programme could not be diverted to increased supplies or distribution of all types of contraceptive devices effectively. Detailed cost analysis of this programme might reveal the proportionate increase in expenditure on actual disbursement of contraceptive materials in order to provide guidelines for future policy making.

The yearly benefit/cost ratios has been graphically depicted as follows:

Figure 9.1

Yearly Benefit/Cost Ratios



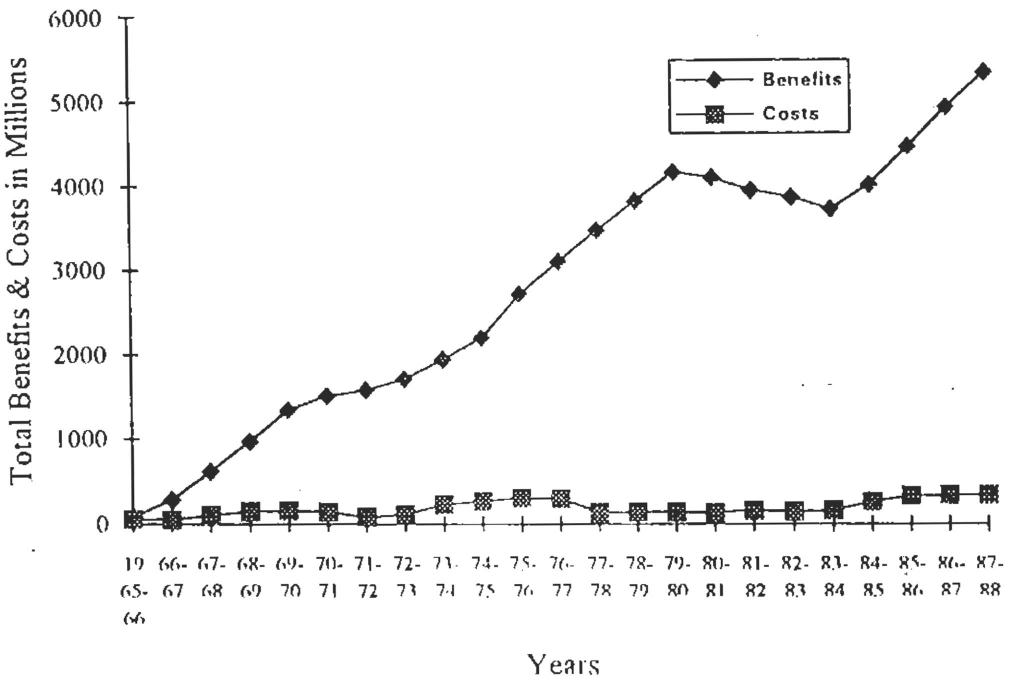
Source: Author's Calculations based on Tables 8.5 and 8.6.

The yearly benefit/cost ratios oscillate due to wide fluctuations in the yearly expenditure of the population control programme. The reasons for these oscillations have been discussed in chapters 6 and 7. Instead of these oscillations, an effective and realistic population policy should have produced a secularly rising trend.

The folowing figure shows a comparison of benefits and costs per year which can also provide guidelines to economic planners responsible for allocations of scarce resources to competing investment channels.

Figure 9.2

Total Benefits & Total Costs of Population Control Programme



Source: Tables 8.5 & 8.6.

In figure 9.2, wide fluctuations in costs appear to be dampened as compared to those in benefits. This phenomenon has occured because of two factors.

(i) The scale of measurement is in milions. Yearly fluctuations in costs appear to be dampened because yearly expenditure in terms of millions was not substantial anyway. Had the scale of measurement been in thousands, the fluctuations could become more vivid but it was not possible to do so because of constraint of the size of space on which the figure has been graphed.

(ii) The built-in mechanism in the formula evolved in the ABB model for the measurement of benefits produced an ever-enlarging size of benefits till the year that the 'missing' hypothetical net averted births could have started adding to production. Then benefits due to the absence of hypothetical net averted births were just enough to offset the loss of their possible contribution to production.

9.2 BENEFITS PER AVERTED BIRTH

Calculation of benefits per averted birth has been an area of significant interest in research on benefit/cost or cost effectiveness studies of population control programme internationally as discussed in detail in chapter 5. Benefit per averted birth (BB_t) depends upon the criterian applied. In this model, benefits have been calculated from the point of view of higher per capita income because of averted births. symbolically,

$$BB_t = \frac{\text{Yearly Total Benefits in current price level}}{\text{Yearly Total Hypothetical Survivors or Net Averted Births}}$$

$$= \frac{BC_t}{TS_t}$$

Yearly benefit per averted birth is shown in the table below:

Table 9.2

Yearly Benefits Per Averted Birth

(in constant price level of 1980-81)

0	I	II	III
Years	Benefits in constant price level (BCt) (million Rs.)	Total survivors of Averted Births (TSt)	Benefits per Averted Birth (BBt)* Rs.
1965-66	87.79	44029	1993.39
1966-67	285.93	133598	2140.23
1967-68	617.08	261463	2360.10
1968-69	969.65	401961	2412.30
1969-70	1338.14	522697	2560.07
1970-71	1510.55	603446	2503.21
1971-72	1581.02	636411	2484.28
1972-73	1704.21	672172	2535.38
1973-74	1935.46	729764	2652.17
1974-75	2195.17	820011	2677.00
1975-76	2710.61	1000973	2707.98
1976-77	3096.56	1128338	2744.35
1977-78	3472.20	1183401	2934.09
1978-79	3814.44	1257680	3032.92
1979-80	4151.17	1319724	3145.48
1980-81	4085.71	1273944	3207.13
1981-82	3935.92	1183528	3325.82
1982-83	3858.81	1095924	3521.06
1983-84	3723.15	1050281	3544.91
1984-85	3994.89	1070829	3730.65
1985-86	4440.46	1151867	3855.01
1986-87	4902.79	1250657	3920.17
1987-88	5307.84	1295294	4097.79
Total	63719.45	20087992	

Source: Table 8.5 and Appendix H

$$*(\text{col III})_i = \frac{(\text{col I})_i}{(\text{col II})_i}$$

The A.M. (Arithmatic Mean) of yearly BBt is as follows:-

$$= \frac{BB_1 + BB_2 + \dots\dots\dots + BB_{23}}{23}$$

$$= \frac{\text{Rs. } 68085.49}{23} = \text{Rs.} 2960.24$$

Since this is a long run analysis, it is more meaningful if benefit per averted birth is calculated over the entire period of study as follows:-

$$\frac{\text{Total Benefits (1965-66 to 87-88) in constant price level}}{\text{Total hypothetical Survivors of averted births (1965-66 to 87-88) in constant price level}}$$

$$= \frac{\sum_{t=1}^{23} BC_t}{\sum_{t=1}^{23} TS_t}$$

$$= \frac{\text{Rs. } 63719.45 \text{ million}}{20{,}087{,}992} = \text{Rs. } 3172.02$$

The A.M. of yearly (BBt) = Rs. 2960.24 or around Rs. 2960 where as (BBt) over the enire period under analysis is Rs. 3172.02 in constant price level of 1980-81. Both magnitudes are in close proximity to each other because of the same reasons as explained in Section 9.1.

9.3 COST PER AVERTED BIRTH

Calculation of cost per averted birth is needed for analysing cost effectiveness of population control programme and for comparing benefits with costs of such programmes. Cost per averted birth is also used for making international comparison of the cost-effectiveness of population control programmes. In the ABB model, cost per averted birth has been derived by dividing the yearly costs in constant price level of 1980-81 [(CC_t) of table 9.1] by the number of total survivors of averted births [(TS_t)of appendix H]. This is shown below:-

Table 9.3
Yearly Cost Per Averted Birth

0	I	II	III
Time Period	Cost in constant price level. (CCt) (Million Rs)	Survivors of averted births (TSt)	Cost per averted birth.* (CBt) (Rs)
1965-66	58.95	44029	1338.89
1966-67	56.34	133598	421.71
1967-68	104.57	261463	399.94
1968-69	149.15	401961	371.06
1969-70	155.46	522697	297.42
1970-71	140.82	603446	233.36
1971-72	80.61	636411	126.66
1972-73	113.52	672172	168.89
1973-74	226.03	729764	309.73
1974-75	260.84	820011	318.09
1975-76	299.16	1000973	298.87
1976-77	290.86	1128338	257.78
1977-78	137.61	1183401	116.28
1978-79	141.62	1257680	112.60
1979-80	142.19	1319724	107.74
1980-81	131.00	1273944	102.83
1981-82	159.20	1183528	134.51
1982-83	151.50	1095924	138.24
1983-84	158.43	1050281	150.85
1984-85	257.56	1070829	240.52
1985-86	324.02	1151867	281.30
1986-87	327.57	1250657	261.92
1987-88	327.44	1295294	252.79
Total	4194.45	20087992	6441.98

Source: Tables 8.4 and 8.6

$$* (\text{col III})i = \frac{(\text{col I})i}{(\text{col II})i}$$

From the table above:-

$$\frac{\text{Total Costs over the period 1965-66 to 87-88}}{\text{Total hypothetical Survivors of Averted Births during the period 1965-66 to 87-88}}$$

$$= \frac{\text{Rs. 4194.45 million}}{20087992} = \text{Rs.208.80}$$

A.M. of yearly cost per averted birth is as follows:-

$$= \frac{CB_1+CB_2+CB_3+\ldots\ldots\ldots\ldots+CB_{23}}{23}$$

$$= \frac{6441.98}{23}$$

$= \text{Rs. } 280.09$

It is significant to note that cost per averted birth in constant price level of 1980-81 has had a fluctuating trend. This could partly be due to economies of scale and frequent changes in the organizational structure of this programme. Some reasons for this discrepancy have also been discussed in chapter 6 and 7.

Cost per averted birth is compared to benefit per averted birth as shown in Table 9.4 below:-

Table 9.4

Benefit Versus Cost Per Averted Birth

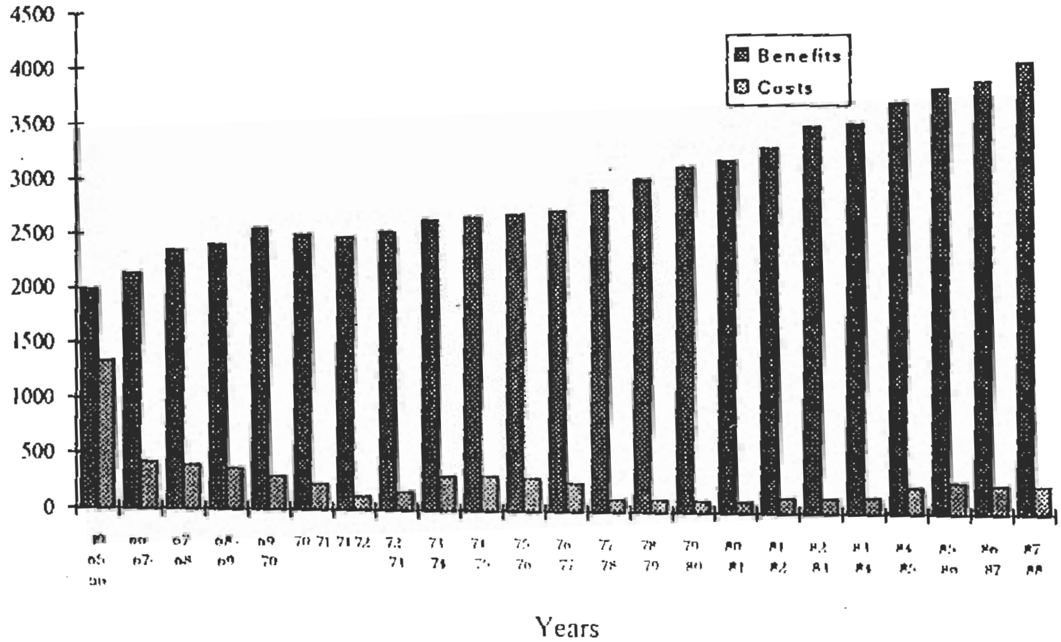
0	I	II	III
Time Period	Benefit per Averted Birth (BB_t)	Cost per averted birth.(CB_t)	BB_t - CB_t
1965-66	1993.39	1338.89	1654.50
1966-67	2140.23	421.71	1718.52
1967-68	2360.10	399.94	1960.70
1968-69	2412.30	371.06	2041.24
1969-70	2560.07	297.42	2262.65
1970-71	2503.21	233.36	2269.85
1971-72	2484.28	126.66	2357.62
1972-73	2535.38	168.89	2366.49
1973-74	2652.17	309.73	2342.44
1974-75	2677.00	318.09	2358.91
1975-76	2707.98	298.87	2409.11
1976-77	2744.35	257.78	2486.57
1977-78	2934.09	116.28	2817.81
1978-79	3032.92	112.60	2920.32
1979-80	3145.48	107.74	3037.74
1980-81	3207.13	102.83	3104.30
1981-82	3325.82	134.51	3191.31
1982-83	3521.06	138.24	3382.82
1983-84	3544.91	150.85	3394.06
1984-85	3730.65	240.52	3490.13
1985-86	3855.01	281.30	3573.71
1986-87	3920.17	261.92	3658.25
1987-88	4097.79	252.79	3845.00
Total	64485.49	6441.98	

Source: Col I from Table 9.2
Col II from Table 9.3

These are shown in the figure 9.3 for comparison purpose:

Figure 9.3

Comparison of Yearly Benefits and Cost Per Averted Birth



Source: Table 9.4

Figure 9.3 shows fluctuating trends of both the variables i.e. BBt and CBt. CBt has been fluctuating because of vagaries of international financial assistance, political and economic ups and downs in the country briefly discussed in Chapter 6 and 7 as well. The fluctuating values of BBt are because of the built in mechanism of the model. Benefits arise because of averted births, which are again a function of the cost of the programme. In other words, if the cost of the programme goes lower in any year, the sale and distribution of contraceptive materials as well as other promotional activities of the programme are adversely affected which brings down the magnitude of averted births as well as the resulting monetary benefits. So generally speaking, fluctuating trend of costs is responsible for fluctuations in the benefits per averted birth. This factor also highlights the need for consistency in allocation of funds to this programme in keeping with its rising yearly targets.

On the whole, it can be concluded that there has been economic justification for investment in population control. The wide difference between benefit per averted birth and cost per averted birth indicates that marginal returns are very high as compared with marginal cost of the programme. This justifies further expansion of the programme on economic grounds. So there is economic justification for investment in population control.

9.4 BENEFITS OUTWEIGH COSTS

The tables and figures depicted in this chapter reveal the fact that in the case of investment in population control, benefits outweigh costs by a very large margin. In fact, the margin of return per rupee invested in this programme is very high as discussed in Section 9.3. However, it may be stressed that the ultimate objective of economic planning in Pakistan cannot and should not be just the maximization of returns on its various investments. More important consideration are the maximization of total welfare of the population and optimal use of resources. Such issues will be discussed in more details in chapter 11.

9.5 CONCLUSION

It has been shown in this chapter that benefits outweigh costs by a wide margin. However, this may not be the end in itself. More important issue is its cost-effectiveness. A number of other problem areas also need further investigations e.g. ways to improve the organization and efficiency of population control network in the country. Whether population control projects should be assigned to NGOs, and if so, what type of projects can be better tackled by them. Another aspect which needs further investigation is the cost-effectiveness of government run projects versus projects run by NGOs. Among competing projects, cost effectiveness and optimal returns should be the criterion of selection. So far, it appears that projects being undertaken by the government are not following such principles.

Similarly, further exploration is necessary in connection with wide fluctuations in allocation of funds to population control. Why have public funds to this sector been so erratically allocated? No clues are available in the Five-year Plans of Pakistan except fluctuations in assistance from international agencies. Cost figures go up and down rythmically making the entire effort of using this model as a basis for prediction and forecasting highly difficult. Meaningful statistical inferences can be drawn if there is some consistency in public investment on population control. However, in Chapter 10 a multiple regression model is built to draw some meaningful inferences.

CHAPTER 10

PREDICTION PROPERTIES OF ABB MODEL: APPLICATION OF MULTIPLE REGRESSION ANALYSIS

10.0 INTRODUCTION

In this chapter, an effort has been made to find out prediction properties of the ABB model. For this, multiple regression analysis has been applied to data of costs and benefits generated through the ABB model in chapter 9. Before such an attempt, it has been mathematically ensured that benefits and costs functions can be represented linearly. A new series of data on current yearly benefits have also been generated and its possible relationship with cost and time variables have been explored. F-statistic and T-statistic values as well as R^2 values of structural parameters in a few multiple regression models involving different combinations of key parameters i.e. costs, accumulated benefits, current benefits and time have also been estimated.

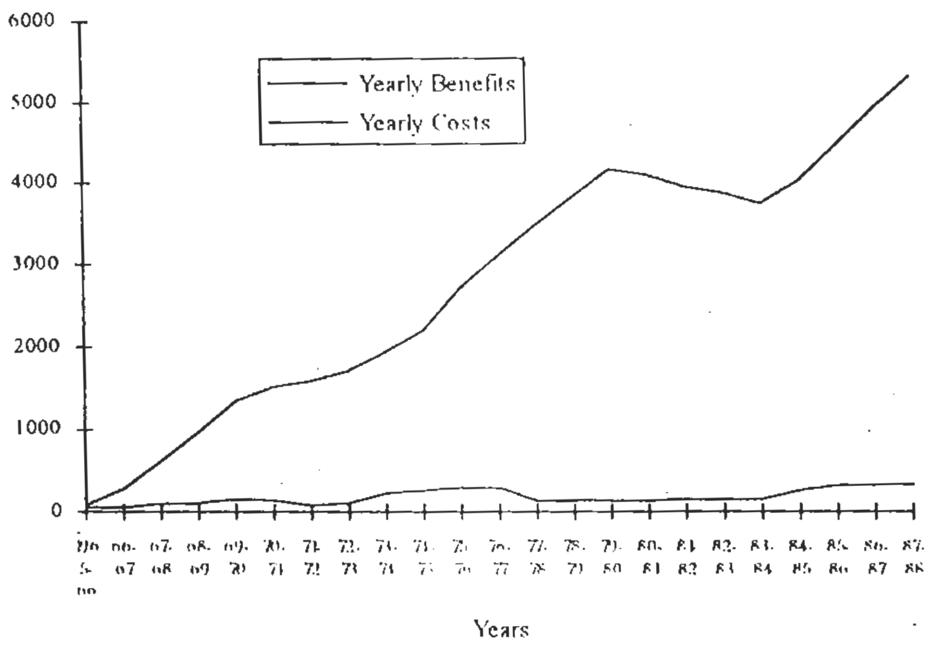
Nevertheless, fitting regression to data of costs and benefits is not a matter of purely statistical or algebraic nature. In order to be meaningful, all these statistical inferences have to be justified on economic grounds. The purpose of this chapter is to find out whether the ABB model presented in chapter 5 and applied to Pakistani data in chapter 8 is good enough for prediction and forecasting in order to be useful for future policy making.

10.1 LINEAR RELATIONSHIP AMONG INTERACTING VARIABLES

Before proceeding with the regression analysis, an attempt was made to find out whether linear equations could best represent the cost and benefit functions on yearly cost and benefits from Tables 8.5 and 8.6. The data is graphed as follows:-

Fig 10.1

Yearly Benefits versus Yearly Costs

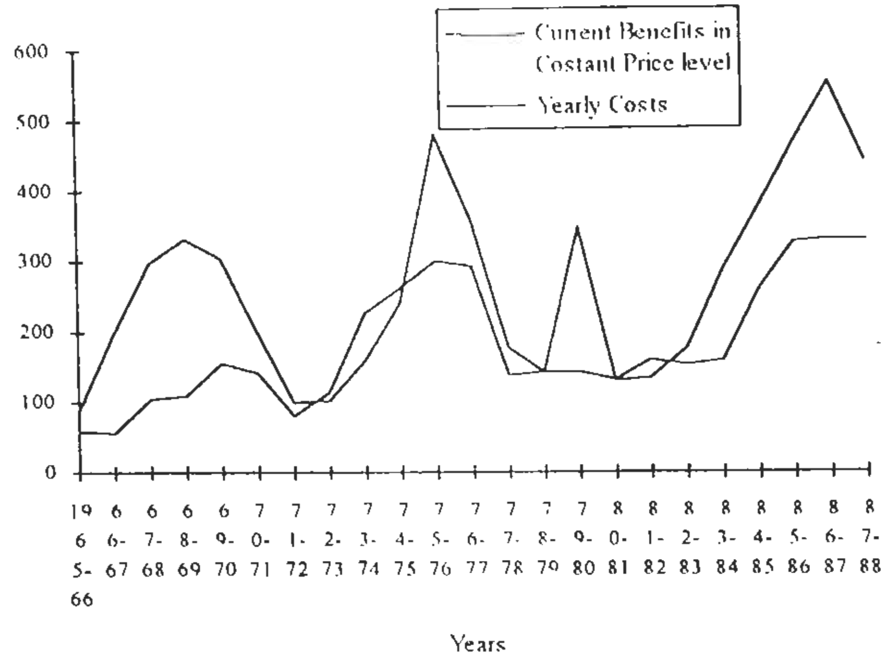


Source. Tables 8.5 and 8.6

In figure 10.1 though the cost function is very low as compared to corresponding benefit function, yet the correspondence between abrupt changes in cost and benefit functions is vivid. This implies that a sudden precipitous fall in investment is generally followed by a fall in benefits because benefits depend upon the use of various types of contraceptives. This in itself, is dependent upon purchase of contraceptive materials and their proper disbursement, both of which need investment in the population control programme.

Fig 10.2

Current Yearly Benefits versus Yearly Costs



Source:Tables 8.6 and 10.1

In Figure 10.1 and 10.2[1]. it is observed that even though benefits and cost functions are subject to violent and abrupt fluctuations, yet a secular rising trend is traceable. This applies that assumption of linearity in all such types of functions i.e. yearly costs and current yarly benefits is permissible[2]. So multiple regression analysis can be applied.

10.2 PREDICTION PROPERTIES OF ABB MODEL

To explore prediction properties of the ABB model, efforts were made to either smooth out the abrupt fluctuations in the cost functions by statistical methods or to eliminate abnormal years on economic grounds.

10.2.1. STATISTICAL ASPECTS

An effort was made to smooth out violent fluctuations in yearly costs in constant price level by converting data of yearly costs in constant price level as a series of moving averages i.e. taking three, four, ... till nine years moving average: no success was achieved until nine years moving average was calculated. But in this process, the observations got reduced from 23 to 15: casting doubts on the reliability of the analysis and making this entire exercise futile. So this has not been attempted though when the cost series were converted into nine years moving average, yearly fluctuations got smoothed out and forecasting could have been possible.

10.2.2 ECONOMIC ASPECTS

Another way to curb the violent fluctuations in costs could be to eliminate the abnormal years largely responsible for the fluctuations e.g. 1971-72 (political chaos) 1972-73 (devaluation) 1976-77 and 1977-78 (subdued population control activities), 1981-82 (devaluation again) so on and so forth. When this exercise was done, number of observations got reduced to twelve but with remaining observations, a significant relationship emerged between costs and time as explained variables and benefits as explanatory variable. Nevertheless, this exercise also becomes futile because number of observations become too small to ensure reliability of prediction or forecasting being only twelve.

So it can be concluded that considering both statistical as well as economic aspects, prediction has not been possible with ABB model. The primary reason has been the abrupt variations in costs. Observations have to be reduced to fifteen which casts doubts on the reliability of the estimate. However, this case study of Pakistan can be an eyeopener for policy makers of this country as well as other countries with similar problems. Investment in population control programme should have been consistent so that the ABB model could have been able to predict the future benefits and be more useful for future policy making.

10.3 APPLICATION OF MULTIPLE REGRESSION ANALYSIS

Multiple regression analysis has been applied to study the relationship between a dependent variable and several independent variables. The general form of the multiple regression model is:-

$$Yi = b_1 x_{i1} + b_2 x_{i2} + \ldots\ldots\ldots\ldots\ldots + b_k x_{ik} + e_i$$

In order to find the relationship between accumulated benefits (BC_t) or current benefits (CBC_t) as explained variables and cost of the programme (CC_t) as well as time (T) as explanatory variables, multiple regression analysis has been applied to data of costs and benefits generated through the ABB model. The target equation to be estimated appears as follows:-

$$\text{Benefits} = \text{Constant term} + \beta_2 \text{ Cost} + \beta_3 \text{ Time}$$

In abbreviated form,

$$BC_t = \beta_1 + \beta_2 CC_t + \beta_3 T \qquad \text{(I)}$$

The following variables/parameters have been defined as follows:-

BC_t = Series of yearly Benefits in constant price level of 1980-81.

CC_t = Series of annual costs on population planning in constant price level of 1980-81.

T = Time variable; using year as a basic unit and taking the year 1976-77, being mid-point, as the origin. (It starts from -11 and goes on to +11)

β_1 = The constant term.
Speaking strictly in statistical terms β_1 is the value of benefits when both C and T are zero.

β_2 = The slope coefficient associated with cost variable.
It signifies that by how much benefits will increase as a result of one unit change in cost (keeping effect of time as constant). In other words, it measures rate of change of benefits caused by cost alone. It can also be written mathematically as:

$$\beta_2 = \frac{\partial BC_t}{\partial CC_t}$$

β_3 = The slope coefficient associated with time variable.
It measures rate of change of benefits per unit change in time (keeping effect of cost as constant) mathematically, it is:-

$$\beta_3 = \frac{\partial BC_t}{\partial T}$$

10.3.1 THE ESTIMATION

To estimate the structural parameters of equation (I), Ordinary Least Square (OLS) method of curve fitting has been used[3].

ase I

The Table (critical) values in the case of one independent variable are as ollows:-

F-Statistic = 4.32 with 1 (k-1) and 21 (n-k) degrees of freedom.

T-Statistic = 2.08 with 21 (n-k) degree of freedom.

ase II

In the case of two independent variables, the Table (critical) values are as ollows:-

F-Statistic = 3.49 with 2 (k-1) and 20 (n-k) degrees of freedom.

T-Statistic = 2.086 with 20 (n-k) degrees of freedom.

k = number of unknowns i.e., β_1, β_2, β_3

n = number of observations i.e. 23 in this case

The critical values have been found with 0.05 level of significance.

A) MODEL I

Data on yearly total benefits (BC_t) and yearly total Costs (CC_t) has been taken om Tables 8.5 and 8.6. The structural parameters of the multiple regression equation) have been computed in a number of ways:

) $BC_t = f(T, CC_t)$

By regressing BC_t as function of CC_t and T the equation has been estimated as llows:-

$$BC_t = 2842.29 + 225.54\,(T) - 0.394\,(CC_t) \qquad (II)$$

The ca ulated values appear as follows:-

(i) T-Statistic associated with time (T) is = 15.455

T-Statistic associated with (CC_t) is 0.347

(ii) F-Statistic = 199.24

Whereas table value of T-Statistic at 0.05 level of significance and (n-k) i.e. 20 degrees of freedom is 2.086.

The table value of F-Statistics at 0.05 level of significance with 2 (k-1) and 20 (n-k) degrees of freedom is 3.49 as seen above in Case II. Calculated value of F-Statistic being 199.24 is very much above its table value. observing equations (I) and (II), the hypothesis that $\beta_1 = \beta_2 = 0$ has been rejected and it has been concluded that this model is a very good fit (implying that variables of cost and time explain variations in benefits to a large extent). However, the coefficient of CC_t is insignificant and negative; which needs further exploration as discussed in Section 10.4.

(iii) $R^2 = 0.95$

This very high value of R^2 shows that 95% of the variations in BC_t are due to variations in T and CC_t and the model is a very good fit.

b) $BC_t = F(CC_t)$

By regressing BC_t as function of CC_t above, (keeping time constant), equation I is estimated as follows:-

$$BC_t = 773.87 + 10.95\ CC_t$$

(i) The estimated value of T-Statistic is 3.60 against its table value of 2.08 which shows that costs are significant in explaining the variations in benefits.

(ii) The estimated value of F-Statistic is 12.95 against its table value of 4.32 which shows that the equation is a good fit.

(iii) $R^2 = 0.38$

Which is low because time (T) is a very important variable in the benefit-cost model i.e. benefits go on accumulating over time. So exclusion of time has made the value of R^2 very low in this case.

c) $BC_t = F(T)$

By regressing BC_t against (T) above, the following equation is estimated.

$BC_t = 2770.42 + 222.27\, T$

$R^2 = 0.95$

(i) The very high calculated value of T-Statistic = 20.39 as compared to its table value of 2.08 shows that the variable T is a very good fit.

(ii) The estimated value of F-Statistics = 415.77 against its table value of F-Statistics = 4.32 is very high implying that the estimated equation is a very good fit.

(iii) The very high value of $R^2=0.95$ reconfirms that benefits increases over time because of the accumulated benefits of averted births over the years.

(B) MODEL II

Another multiple regression analysis with yearly current benefits (BCC_t) as the dependent variable and yearly costs (CC_t) and time (T) as the independent variables has been done. For this, a new series of data has been generated as follows:-

Table 10.1

Current Benefits in Constant Price Level of 1980-81

0	I	II	III	IV	V
Year	Actual Population (LP_t) * (million)	Current Survivors (CS_i)	Hypothetical Population current (HPC_i) ** (million)	National Income in Constant price level of 1980-81 (YC_i) * (million Rs.)	Current Benefits in constant price level (CBC_i) *** (million Rs.)
1965-66	53.26	44029	53.30	116891.67	87.79
1966-67	54.79	89926	54.80	120510.54	197.96
1967-68	56.37	128870	56.50	128832.06	297.11
1968-69	58.00	142296	58.14	137170.22	331.10
1969-70	59.70	123200	59.82	150730.18	302.97
1970-71	61.49	83493	61.56	152267.90	198.10
1971-72	63.34	35566	63.38	156471.14	98.81
1972-73	65.89	37865	65.93	167597.51	101.74
1973-74	67.90	59400	67.96	180024.06	159.08
1974-75	69.98	92096	70.07	187339.42	240.93
1975-76	72.12	183194	72.30	195489.09	478.91
1976-77	74.33	130669	74.46	203688.98	356.24
1977-78	76.60	58762	56.66	225398.43	176.55
1978-79	78.94	77667	79.02	238978.64	242.19
1979-80	81.36	107761	81.47	255863.18	345.93
1980-81	83.84	44345	83.88	269721.00	128.68
1981-82	86.44	36886	86.48	288322.96	133.42
1982-83	89.12	52230	89.17	312625.76	175.43
1983-84	91.88	75521	91.96	325793.73	283.67
1984-85	94.37	103480	94.47	352334.38	373.35
1985-86	97.67	118128	97.79	377129.97	463.35
1986-87	100.70	138562	100.84	394968.46	549.11
1987-88	103.82	105662	103.93	414330.76	438.99

Source: Tables 8.3 and 8.5

* (col I) is taken from Table 9.3, (col II) is taken from Table 9.1 and (col IV) is taken from table 9.4.

** $(\text{col III})_i = (\text{col I})_i + (\text{col II})_i$

** $(\text{col V})_i = \left[\dfrac{(\text{col IV})_i}{(\text{col I})_i} - \dfrac{(\text{col IV})_i}{(\text{col III})_i}\right] \times (\text{col III})_i$

The parameters CC_t (cost in constant price level) and T (time) have been regressed as independent variables against CBC_t (current benefits in constant price level) in a variety of ways.

d) $CBC_t = f(T, CC_t)$

By regressing CBC_t as a function of CC_t and T, equation I of Section 10.3 is computed as follows:-

$CBC_t = 339.43 - 1.04\ \text{Time} + 1.25\ CC_t$

(i) T-Statistics associated with Time is = 0.2937

T-Statistic associated with CC_t = 4.5604

Whereas the table value of T-Statistics is 2.086. T-Statistics associated with Time is obviously insignificant as compared to CC_t because only current benefits are being estimated.

(ii) F-Statistics is 16.44 against its table value of 3.49 with 2 and 20 degrees of freedom. Since the estimated value of F-Statistics is very high as compared to its table value.

It can be concluded that the model is a good fit. This implies that current benefits are largely explained by variables of cost and time.

(iii) R^2=0.062 which indicate that 62% of the variations in CBC_t are due to the combined variations in T and CC_t. This high value of R^2 reconfirms that model is a good fit.

e) $CBC_t = f(CC_t)$

Benefits of currently averted births in constant price level have been regressed as a function of costs alone. The target equation has been estimated as follows:-

$$CBC_t = 48.9398 + 1.2\, CC_t$$

(i) Calculated value of T-Statistic is 5.86 against its table value of 2.08. So the variable of cost is a very good fit, implying that benefits accrue much more than the costs incurred even if benefits of only currently averted births are being considered.

(ii) The value of F-Statistics 34.29, much higher than its table value of 4.32 implying that the model is an overall good fit.

This implies that costs incurred on population control do result in manifold monetary benefits even if only averted births in the current year are being considered. This is a very positive result and this regression should give an indication to the policy makers to expand costs in this programme.

(iii) $R^2 = 0.62$

This is a fairly high value implying that 62% of the current benefits arise because of the costs.

f) $CBC_t = f(T)$

When CBC_t is regressed as a function of T (time) above, the target equation is estimated as follows:

$$CBC_t = 267.98 + 9.367\, T$$

(i) The calculated value of T-Statistics is 2.49 against its table value of 2.08

implying that the variable of time (T) a good fit though not very significant.

(ii) F-Statistics is calculated as 6.22 which is still higher than its table value of 4.32 but much lower than the previous values of F-Statistics obtained in different cases considered above implying that time alone does not explain the variations in CBC^t which is obviously true.

(iii) $R^2 = 0.23$

Implying that only 23% variations in CBC_t are due to Time. So this exercise of regressing CBC_t against Time is only of academic interest and it is not significant.

10.4 CONCLUSION

This attempt at multiple regression analysis has been aimed at finding out the prediction properties of the ABB model. The foregoing analysis and statistical estimation has shown some interesting results.

The ABB model has assumed that benefits go on accumulating because of the absence of net hypothetical survivors of the averted births of previous years. This has subdued the strong impact of violent fluctuations in cost over benefits. Nevertheless, after the estimation of various regression equations in Section 10.3, it can be concluded that this regression model can not be used for forecasting though the overall model is a good fit. The primary reason has been abrupt and wide fluctuations in costs. A close scrunity of Section 10.3 has revealed that the overall model has been a very good fit in both the cases i.e. whether accumulated benefits or yearly current benefits have been taken as dependent variables.

Among the independent variables, cost variable has been more important in case B and Time variable more important in case A. Broadly speaking, both time (T) and costs(CCt) largely explain the variation in benefits (BCt, CBCt). Analysis in Chapter 9 has already shown the wide divergence between benefits and costs. Benefits per averted birth have been much higher than cost per averted birth. All this warrants further expansion of the programme and more flow of funds in this direction till a point is reached where benefits per averted birth are equalized to cost per averted birth. But whether this economic rationale of allocation of funds to competing projects can be used as a basis by policy makers or not needs further research because it involves value judgments. Some such aspects have been highlighted in Chapter 11.

NOTES

1. (i) In Figure 10.1, the data of yearly benefits (CB_t) has been taken from Table 8.5 and data on yearly costs (CC_t) has been taken from Table 8.6.

   (ii) In Figure 10.2, the data of current yearly benefits (CBC_t) has been taken from Table 10.1 and data of (CC_t) from Table 8.6.

2. To find the possibility of assumption of linearity of CBC_t (current benefits in constant price level) and BC_t (accumulated benefits in constant price level); a simple mathematical excerise is done as follows:-

   Let

   $YL_t = M$

   $LP_t = A$

   $HP_t = A + \varepsilon$

   where $\varepsilon << A$ (as shown in Table 8.4)

   Then

$$BC_t = \left[\frac{M}{A} - \frac{M}{A+\varepsilon}\right] \times (A+\varepsilon)$$ (as calculated in Table 8.5)

Using binomial expansion (to first order)

$$= \left[\frac{M}{A} - \frac{M}{A}(1 - \frac{\varepsilon}{A})\right] \times (A+\varepsilon)$$

$$= \frac{M\varepsilon}{A^2}(A+\varepsilon) \cong \frac{M\varepsilon}{A}$$ (ignoring ε^2 and higher terms)

∴ This simple calculation shows that to first order,

$$BC_t = \frac{M}{A} \times \varepsilon$$

So BC_t function has been represented linearly. Hence BC_t function has been assumed to be linear. Similarly it can also be shown mathematically that CBC_t can be assumed as a linear function as well. So these variables have been assumed to be linear in this study.

3. The data on benefits and costs are in the form of a time series, so the computation of R^2, β_1, β_2 and β_3 coefficients as well as values of F-Statistic and T-Statistic and other relevant coefficients have all been computed in the Micro Time Series Processer (TSP) Version 5.0 soft-ware package. For details about the procedures of calculations, relevant formulae for calculating table values of T-Statistic, F-Statistic etc. see the following:-

(i) D.N. Gujrati, (1988)

(ii) W.H. Green (1991)

(iii) Dictionary of Statistics (1993)

CHAPTER 11

CONCLUSIONS AND RECOMMENDATIONS

11.0 INTRODUCTION

This chapter is divided into two parts. Part I gives a summary of major conclusions of the present study. Part II contains somewhat detailed suggestions about the population policy which Pakistan should adopt in its future development programmes.

The summary of conclusions given in Part I is essentially based on the discussions of Chapters 6, 7, 8, 9, and 10. Other chapters are equally important but they mostly consist of background analysis which has helped me in developing my own benefit/cost model for examining Pakistan's population control programme.

As for Part II dealing with recommendations for future population policy, I firmly believe that this policy should be evolved in the light of past experiences as well as current national economic goals. In this connection, there is need to analyse religious, cultural and political factors which play a vital role in achieving national demographic objectives. This is precisely what I have attempted in Part II, apart from identifying some vital areas for further research.

PART I

11.1 CONCLUSIONS

Major conclusions which stem from the present study are as follows:

1. The importance of demographic variables in economic development of Pakistan is generally accepted by economists though contrary views also exist. The present study reaffirms that the variable of population is far more crucial than recognized by Pakistan's general public as well as policy makers.

2. There have been many types of experiments for bringing about a fall in birth rates, viz. Continous Motivation Scheme (CMS), Integrated Approach, project-based Approach and Social Action Programme. Recently there has been stress on greater participation of Non-Governmental Organizations (NGOs) but their work strategies are mostly determined by foreign donor agencies. Ideally, policies should be made by experienced and dedicated Pakistani field workers and professionals who are well acquainted with the country's socio-cultural framework. The absence of this condition explains why population control programmes have not yielded satisfactory results so far.

3. There has been no consistency and continuity in the methods used to evaluate population control programmes of the government of Pakistan. For example, a National Impact Survey was conducted in 1968 to find out the Knowledge, Attitude and Practice (KAP) of family planning in Pakistan. Another method of programme evaluation adopted during the early seventies was Couple Year of Protection (CYP). Later, Pakistan Fertility Survey (1975) and Contraceptive

Prevalence Survey (1984) adopted different methods of programme evaluation. This inconsistency has largely been due to changing emphasis of foreign donor agencies. The disadvantage of shifting from one evaluative approach to another is that evaluation of performance in terms of economic benefits of population control programme over the years becomes impossible.

4. The present study concentrates on the Averted Birth Based approach for economic analysis of Pakistan Government's investment in population control programme This in my view is the best method for calculating benefits and costs of population control programme. Of course, is it based on certain assumptions which are necessary in order to simplify the calculations. However, the assumptions are realistic and their detailed account is given in Chapter 8.

5. The Averted Birth Based approach avoids many data inadequacy problems and is relatively free from the sort of conceptual issues which have to be tackled in other methods of evaluation. Take, for example, those methods which attempt to estimate decline in birth rates, assess changes in contraceptive prevalence rates or measure changes in Knowledge, Attitudes and Practice (KAP) of population control measures. In all such cases, in order to decompose decline in fertility rates into programme induced decline, there is need for reliable statistics on relevant intermediate variables such as age at marriage, breast-feeding practices, ideal family size norms and a reliable system of registration of vital events. No such statistics are available.

Similarly, reliable data are needed to measure interaction of variables of population growth and economic development which exert influence in a subtle and peculiar way. For example, economic development implies higher education and more job opportunities for women. Ideal family size norms change with employment and education of women and with their wider exposure to alien cultures. An example of this sort of influence is the wide spread use of television and the resulting familiarity with global perspectives. People residing in remote rural areas of Pakistan can see how life is organized in an European or Australian village. Thus people's concepts about ideal family size, preference for sons, status of women and stereotyped values of male dominance due to their being the prime bread earners for female dependents, all undergo changes. The question arises as to which is influencing people's demographic concepts more, government's population control programme or outside influences as enumerated above. No easy statistical answer is possible.

Another interesting phenomenon is that with economic development, periods of breast-feeding and lactation get reduced causing fertility rates to rise. Better medical facilities at child birth and better nutrition also raise fertility rates. Thus, one can say that some variables of economic development and population growth lead to a fall in fertility rates whereas others raise them. In other words, intermediate socio-economic variables do affect contraceptive prevalence rates and fertility rates. Only a part of changes in these rates can be attributed to the motivational campaigns of government-run population control programmes.

6. Therefore, it is clear that the abovementioned methods of estimating economic benefits of Pakistan's population control programme pose difficult conceptual problems. Similarly, they suffer from the non-availability of reliable data on intermediate variables. Hence none of the above methods is satisfactory.

7. Accordingly, a new Averted Births Based (ABB) model has been developed by the researcher. This model establishes an easily calculable economic rationale for Pakistan Government's past investments on population control. It has a built-in mechanism which makes it applicable to any other country or programme for the analysis of benefits and costs of past investments as well as likely future investments.

The major findings of this model as applied to Pakistan are as follows:-

i) Benefits per net averted birth ranged from Rs 1993 in the year 1965-66 to Rs 4098 in the year 1987-88. The benefit per net averted birth went on increasing throughout except a minor downfall in the year 1970-71 which was because of the disruption in the normal working of the population control network due to massive political upheaval in the year 1969-70 discussed in detail in Chapter 6 of this study. The benefit per net averted birth over the entire period from 1965-66 to 1987-88 was Rs 3172.02 per net averted birth and the relevant Arithmetic Mean was Rs 2960.24.

ii) A detailed analysis of cost per net averted birth has an altogether different story. It stood at Rs 1339 in the year 1965-66, but declined to Rs 422 in the next year and then kept a fluctuating trend as the years passed by. It stood at Rs 253 in the year 1987-88. The decline in cost per net averted birth over the years was partly due to diffusion of fixed costs over an everincreasing amount of net averted births over time. However, main reason of yearly fluctuations was lack of perpetuity and consistency in yearly allocations to the population control programme by the government. Cost per net averted birth over the entire period (1965-66 to 1987-88) was Rs 208.80 and Arithmetic Mean was Rs 280.09.

iii) Accordingly, yearly benefit/cost ratio varied from 1.49 in the year 1965-66 to 31.19 in the year 1980-81. The benefit/cost ratio during the entire period i.e. 1965-66 to 87-88 stood at 15.19 and the Arithmetic Mean of the yearly ratios stood at 15.49. Both the magnitudes show a very high margin of returns i.e. benefits being fifteen times the costs.

iv) Prediction properties of the ABB model were tested by applying multiple regression analysis in chapter 10 which revealed that inspite of the model being an overall goodfit, future forecasting cannot be meaningful because of the wide fluctuations in the cost function over the period 1965-66 to 1987-88.

8. In both conceptual and statistical terms, ABB Model convincingly demonstrates that economic returns of population control investments are exceedingly high and need to be fully recognised by the nation as well as its rulers.

PART II

11.2 RECOMMENDATIONS

The foregoing analysis has prompted me to make somewhat detailed recommendations for evolving a forward looking and aggressive population policy, in view of high economic returns which can be reaped by lowering the current rate of population growth in Pakistan.

11.2.1 FORMULATION OF AN EFFECTIVE, INTEGRATED AND GOAL-ORIENTED POPULATION POLICY

Looking back at the history of Pakistan's population control programme, the beginning was reasonably good which gained momentum during the sixtees. In the year 1965, Pakistan was one of the pioneer countries of the world to initiate and pursue a government-run population control programme. In the subsequent years, decision makers made noteworthy and sincere efforts to promote this programme by making appropriate population policies which have been discussed in detail in Chapters 6 and 7 of this thesis. Then came the era of staganation during the seventees. Suspicions were cast on the usefulness of the programme which slackened the speed and tempo of the population control measures.

This trend however, changed during the period of Sixth Five-Year Plan (1983-88) and once again relatively greater allocations were made for the success of population control programmes. Seventh Five-Year Plan (1988-93) also continued to place considerable emphasis on lowering rate of growth of population, though it did not achieve much success. The result is that population continues to grow at a high rate of

3 per cent per annum. I feel that what is actually required is an integrated and goal-orianted population policy package.

Policy makers should envisage, visualize and formulate population policies with clear minds. A look at various Five-Year Plans shows that economic planners in Pakistan have assumed nil functional relationship between aggregate national income and population growth. Models of economic planning do not depict demographic variables, playing a role in aggregate savings, investment or consumption functions. Similarly in books dealing with Pakistan's economic development and planning, no mention is found of this very important aspect of demographic variables[1].

There should be an effective and comprehensive population policy in Pakistan. All the variables affecting total fertility rates i.e. rate of contraceptive use, frequency of marriages, incidence of abortions, breast feeding practices and such other intermediate variables should be geared towards achieving the demographic goals. In fact, all fiscal and monetary measures should be incorporated into the population policy to achieve the demographic objectives.

11.2.2 HUMAN RESOURCE DEVELOPMENT

The future population policy of Pakistan should incorporate the component of human resource development i.e. a wide spread adult literacy programme aimed at imparting professional skills to rural and urban population including specially designed projects for females to suit their peculiar needs.

In short, all measures which increase the cost of bearing and rearing children should constitute an integral part of the future population policy. Cost of bearing children becomes higher when females have to disengage themselves from economic activities in order to bear children. Withdrawal of leave facility with full pay for three months (extendable to six months on medical advice) for bearing a child can be one such step. Such a facility may exist for the first or the second child but then it should be stopped once for all. This is only one example of raising the cost of bearing children. Other fiscal, monetary and legislative measures can be scrutinized and modified to raise the cost of bearing children.

Cost of rearing children can be raised by introducing legislative measures ensuring abolition of child labour and provision of a minimum packet of education, medical facilities and food. Strict compliance of laws prohibiting child labour in hotels, gas stations, brickkilns and factories is necessary. These laws do exist at present but concerned people along with willing parents easily get away with such laws by illegal methods. Compliance of such laws will serve the dual purpose of raising cost of children and acting as a disincentive for large sized families. The other and more important purpose is its positive effect on physical and mental well-being of the child who is forced to work in unhealthy environments and is deprived of the chance to acquire education and other professionals skills at school and college level.

11.2.3 DOMESTIC RESOURCE MOBILIZATION

In order to make a rational and consistent population policy, 'imported modules' should be dispensed with. The policy should be to involve local intelligentia and domestic resources.

In fact, every effort should be made to mobilize domestic resources for an effective population policy. The funds for population planning should not be dependent on foreign aid or loans. If public funds are inadequate, these should be supplemented by soliciting support from private organizations and institutions. Dependence on foreign loans and donations should be minimized because of the following major reasons:-

(i) A bulk of international assistance is in kind, i.e., in the form of contraceptives, equipment and experts. This, however, does not suit Pakistan because Pakistani culture is a mix of religious practices of urban and rural people, of the variety of languages spoken in various areas, of the ancient civilization inherited by the people and a host of other factors, interwoven in an inexperssable subtle way. No expert from abroad can appreciate or even understand our problems as seen by Pakistani people. Foreign experts cannot accurately identify Pakistani problems. They cannot peep through those subtle areas of languages or culture which only the indegenous people know.

(ii) Contraceptives and related equipment should be manufactured in Pakistan. After a long period of industrialization spreading over more than forty years, Pakistan should try to become self-sufficient in the production of population control materials and equipment. Pakistan is a labour-abundant country and can produce required equipment and mechanical devices with a low capital/output ratio. As far as I know, no worth while research, discovery or innovation has been done in developing modern contraceptive technology in Pakistan so far.

(iii) Foreign experts, who generally form a part of the deal of any programme of technical assistance, receive wages according to international standards which are very high as compared with Pakistani level of wages. So procurement of aid or loans becomes self-frustrating.

In view of the above mentioned factors, import of contraceptives, experts and technology cannot serve any useful purpose.

11.2.4 IMPROVEMENT IN THE QUALITY OF DATA PERTAINING TO ALL ASPECTS OF POPULATION

Problems of data inadequacy and inconsistency are acute in Pakistan. Unsatisfactory data is the root cause of many analytical problems[2]. These have to be tackled on a war footing for evolving an effective population policy in future. Policies have to be based on facts and not fiction. There should be an independent national organization with vast resources and powers to work independently for generation of authentic and reliable data. It is very essential because data generating agencies should not be under any political influence to generate data of the required type. The personnel of the population control network should not be left alone for such a difficult and important task.

Supply of reasonably adequate and authenticated vital statistics is a basic requirement without which no tangible programme can be made in the field of population control. Lack of adequate information is an obstacle to progress at all levels. It makes it difficult to assess the relative priority which should be given to population control programme among many conflicting demands on scarce resources. It also enhances the difficulties of decision makers within the demographic network. In fact, this problem of inadequate data persists in the entire economy and affects every aspect of economic planning.

11.2.5 CONSISTENCY IN ALLOCATION OF FUNDS TO THE POPULATION CONTROL NETWORK.

A review of financial allocations to population control programme shows violent fluctuations with the result that no meaningful statistical inferences can be drawn for forecasting and policy making. Ideally speaking, expenditure in this sector should have had a rising trend, in line with the rise in cost of living as well as higher financial size of each plan. This is a pre-requisite for the success of population control programme.

My research has clearly shown that fluctuations in yearly allocations to this programme in the past have rendered it impossible to make meaningful forecasting of benefits. There should be guarantee of perpetuity and consistency in financial allocations for population control. This is essential to initiate long run prjects. But unfortunately, this has not been so. With massive fluctuations in foreign aid, the expenditure has varied accordingly. This should be avoided.

11.2.6. ADMINISTRATIVE AND ORGANIZATIONAL REFORMS

The organizations entrusted with population control programme have been stagnating. There is need for horizontal and vertical mobility at each stage within the population control network in Pakistan in order to optimize the use of scarce resources and maximize returns from investment in population control programme.

Calculations of benefits and costs of population control programmes show that benefits have been very high as compared to costs. However, this is not enough. Review of population control network shows that there is lethargy, wastage of funds and insincerity to the cause and so, there is considerable scope for improvement. Though this sort of attitude is peculiar to many other governmental organisations, it needs to be changed. Expenditure incurred on population control measures should be made cost-effective by bringing about necessary administrative reforms within this network.

A task force of dedicated workers with a very high level of efficiency and integrity should be developed. Such people should be rotated among social sector projects of national importance e.g. education, health and population control to propagate and popularize the importance of health, education and judicious family planning decisions. This can be one such method to overcome administrative lethargy generally prevalent in government departments. However, the role of local leadership has to be pivotal in this connection. In the rural areas, population control programmes and campaigns must necessarily include local professionals i.e. teachers, doctors and religious leaders based in the same village.

In Bangladesh, the astonishing success of 'Matlab' project is one such example. The birth rate in those villages of Bangladesh which were covered by the 'Metlab' project (S. Fazil, 1989), fell drastically with joint efforts of the functionaries of population control network, local teachers, doctors and religious leaders even without the necessary pre-requisite of changes in the intermediate variables like higher female education, higher age at marriage or higher level of employment of females. Community leaders like the pioneers of Korangi Project at Karachi can be instrumental in bringing about significant economic and social uplift with local manpower and funds. The need is to convince the local leadership i.e. doctors, teachers and religious leaders of the usefulness of population control for the family welfare as well as for the local community. Eventually it would have 'spill over' effects on the entire country.

The population control network needs community in financial allocations, strong political support and community involvement at all levels. Organizational reforms are vital for ensuring that every rupee spent on this programme of population control is cost effective.

11.2.7 INITIATION OF POLITICAL, SOCIAL AND ECONOMIC REFORMS

Massive reforms are required at the grass root level for the eradication of corruption, administrative chaos and political confusion. The achievement of demographic objectives should be an inseparable part of national economic objectives. The success of any programme of national economic and social reform requires sincerity, efficiency, honesty and hardwork with dedication. People with these qualities may be available but to locate and pool them together is a formidable task.

A major portion of annual budget is eaten away in debt servicing and defence. A large portion of that whatever is left is spent on administration rather than improvement of social infra-structure including education and health. Similarly, a meagre percentage of the A.D.P. is devoted to education and health. This situation needs to be remedied.

Liberation of planning machinery from political influences is inevitable. Review of various economic plans of Pakistan has shown that population policy of Pakistan has generally been subjected to political influences. Whatever little is done in one year is reversed in the next year. Alleviation of poverty which has been proclaimed as the ultimate objective of all governmental policies has never been sincerely pursued. To please the larger sections of the community in order to elicit their votes has been the real concern of political parties rather than the solution of demographic and economic problems. This has to be stopped by liberation of planning machinery from political influences.

11.2.8..IMPROVEMENT IN THE QUALITY OF LIFE AS A WHOLE.

The concept of quality of life is difficult to be defined because it is a normative concept. Nevertheless, in the context of Pakistan, it includes the provision of basic necessities of life like availability of clean and drinkable water, unadulterated food stuffs, electricity, basic medical and educational facilities and minimum environmental pollution.

It also includes a system which ensures maximum personal liberty in matters of religion, protection of life and property and assurance of social mobility without any barriers of language, religion, class or caste. In the context of the present research, it implies that the future population policy of Pakistan should be based on the principles of improving the quality of life and alleviation of poverty primarily through wide-ranging population control measures.

In Pakistan, many factors, like gainful employment of children and male population as a manifestation of power in rural and family fights and political power, make reduction in family size unattractive. Similarly, illiteracy, low status of women, lack of old age insurance, all these factors significantly thwart the programme of population control. So, massive reforms are required on social, political and religious scenes to improve quality of life.

11.2.9 INTEGRATION OF DEMOGRAPHIC GOALS WITH EDUCATIONAL AND HEALTH GOALS.

It has been proved internationally that formation of human capital is even more important than formation of physical capital for economic growth. Quality of labour force is improved with education, health and acquisition of skills. So these could reinforce one another rather than being rivals for the purpose of procurement of public funds. The negligence of this aspect is causing frustration among professionals like doctors and engineers who are leaving their professions and joining civil service where they get better opportunities of promotion. Such tendencies should be curbed by appropriate remedial measures.

The will to modernize has to be developed. The determination to be liberated from darkness of illiteracy, to acquire knowledge, to change, to shatter old outdated feudalistic values and to replace them with contemporary thinking has to be developed among the masses.

A true understanding of Islam can also go a long way in inculcating a zest for knowledge, science and technology among Pakistani people. Population planning was advocated even under administration of the Holy Prophet (peace be upon him). It has been stated (Rafiullah Shehab, 1973), that when Medina became overcrowded, the Holy Prophet asked the local affluent people to move out and settle somewhere else. The less affluent were advised to control their family size according to the methods known at that time. It has also been discussed that population control was advised even in the times of the Holy Prophet for fear of crimes and environmental pollution (Rafiullah Shehab, 1993). So, investment is needed in both the sectors of education and population control to strengthen each other and to make a large sized family unattractive economically, socially and politically.

11.2.10 SOCIO-CULTURAL FACTORS

Socio-cultural factors play a dominant role in affecting fertility rates via ideal family size norms, son preference and status of women. In Pakistan, profound changes in the economic, social and cultural scene have not taken place which could ensure self-sustained economic growth in the economy.

Such changes include high level of literacy, equal opportunities for men and women in all fields and other factors which bring about a fall in fertility rates themselves. On the contrary, traces and patches of economic development found in Pakistan combined with exposure to foreign culture has given rise to a strange sort of situation. Instead of falling, fertility rates are rising due to reduction in the period of breast-feeding which has shortened the lactation period of females. While in the primitive era, it used to act as a natural contraceptive. Similarly, disengagement from traditional social and sexual taboos of the past which favoured abstinence have given rise to higher birth rates. These, coupled with a fall in mortality rates because of greater awareness of medical facilities, better personal and envionmental hygiene, have accentuated the phenomenon of population explosion in Pakistan.

On the whole, in the context of Pakistan, cultural and social factors appear to me to be more of an obstacle to population control measures of the government. There appears to be no signs of any lesser intensity for son preference and large sized families. Political factors coupled with deteriorating law and order situation in the country all favour that there should be a reasonable number of male members in a family.

Religion is also generally seen to favour large sized families in Pakistan. These issues are extremely important and need to be sorted out and remedied for the success of population control programme in Pakistan.

11.3 AREAS FOR FURTHER RESEARCH

1. An important area of research is to explore all fiscal and monetary measures which promote human welfare. Research is needed to explore such human welfare measures which raise economic costs of children, e.g incentives to be given to people for having small sized families e.g. priority may be given to parents of small sized families in matters of jobs, housing and others facilities as compared to those with large sized families. Such measures can go a long way in inducing parents to make judious decisions regarding the size of their familities.

2. Another area of research is to explore the interdependence of scientists, policy makers and psychiarists in strengthening one another in evolving an effective population policy.

   In my view, if the will to change or modernize is not there, nothing can be done. There is need to change the mentality of the masses to enable them to enter 21st century with confidence and self reliance.

3. Research is needed for improvement in education and health facilities. These can go a long way augmenting population control policies of the government. There is need for further research in this field.

4. Research is needed in the area of human capital formation.

This study has shown that physical capital formation no longer constitute the key parameter in the process of economic development in Pakistan. Human capital formation through education, health and other 'mix' of cultural and religious factors has assumed a key position[3]. These factors, in turn, are affected by and also affect the demographic variables.

It may be added that human capital formation in an Islamic state should proceed under Islamic set of assumptions as compared to capitalistic or socialistic systems. Capitalistic set of assumptions are based on profit maximization, cost minimization, cut-throat competition, policies of retaliation and such other concepts. On the other hand, socialistic economic system accepts the sumpreme authority of the State which governs the entire working of the economic system and no allowance is given to individual enterprise and freedom of thought.

In complete contrast to both the above mentioned systems, the Islamic economic system draws its set of assumptions from the Holy Quran and the Sunnah under complete and unconditional submission to the All-embracing, All powerful authority of Allah. Its set of assumptions do not include profit maximization or cost minimization at the expense of exploiting other members of the community. Further research is required in this area.

5. Fundamental research on how modernization, Islam and population control are interwoven, should be undertaken.

It may not be the religion of Islam which serves as a barrier. It may be the under-privileged, semi-educated and socially deprived rural religious leaders who oppose this programme because of misguided sincerity, narrowness of vision or lack of education. Confusion surrounds contemporary Pakistani people on issues of family planning, employment of women and such related topics. If these can be resolved according to Islamic injunctions, they will go a long way in helping control population growth rate in Pakistan.

Scholarly research in this direction has to be promoted as an instrument of policy. This is of vital importance because propegation of the concept of a judicious family size is handicapped because of confusion on this issues[4]. Research on this subject should be promoted at local as well as national level. Over the years, a number of educational institutions imparting knowledge on Islamic Jurisprudence and Fiqqah have emerged. These institutions should be involved for resolving such issues.

6. Research should be conducted on the intricate relationship between modern sciences in particular Demography, Economics and Islam. Demographic models in Islamic framework may have different sets of assumptions and different objectives. So research is needed on the crucial issue of role of demographic/economic models in an Islamic economic system. The model presented in this thesis is silent as to the the question of 'Islamic sanctions' without which no act or knowledge can be allowed to proceed in an Islamic framework.

7. There is need to develop national and religious consensus on basic demographic issues.

Using investment framework makes it comparatively easier to compare cost of a population control programme with cost of any alternative public sector programme. But this comparison does not solve the basic problem because operating within the investment framework debars one from many relevant and crucial issues. Whether operating within the 'money oriented' models is permissible or not, raises many ethical issues which need to be tackled and research is needed in this field as well. Underlying this model of benefit-cost framework is the assumption that it is good to be rational in a money oriented way which may not necessarily be an Islamic way.

Islam defines rationality in a different way as compared to its definitions in the Western World[5]. Population theories and policies are generally based on western thinking not necessarily in comformity with the doctrines of Islam. This crucial issue has to be tackled and serious research on this aspect should be undertaken. To quote Allama Iqbal

اپنی ملت پر قیاس اقوام مغرب سے نہ کر
خاص ہے ترکیب میں قوم رسول ہاشمی

In the West, the contemporary thinking and family norms which have resulted in a very low level of equilibrium of fertility and mortality rates have also shattered the family values. The concept of family as a basic unit is disappearing. Co-habitation is becoming permissible without the obligations of marriage or family which might imply annihilation of the race itself. Thus, the speed and tempo with which the Western World has experienced increase in national income and the so-called 'high level of quality of life' indices may, in fact, become the basis for its eventual precipitous fall. To quote Allama Iqbal again.

تمہاری تہذیب اپنے خنجر سے آپ ہی خود کشی کرے گی
جو شاخِ نازک پہ آشیانہ بنے گا ناپائیدار ہو گا

To conclude, the harsh reality remains that there are no easy solutions of this problem of imbalance between growth of population and resources in Pakistan and half hearted attempts will not lead us anywhere. However, this study has shown a very high margin of returns from investment in population control. So, further investment in this sector will go a long way for solving the overall problem of poverty and low quality of life in Pakistan.

NOTES

1. Many authenticated and well-read books on Pakistan by Pakistani economists can be cited e.g., Viqar Ahmad, and Rashid Amjad (1986)

2. Regarding inconsistencies in data, the following is quoted from 6th Five Year Plan.

   "In the Third Five Year Plan (1965-70); the family planning programme was allocated an amount of Rs. 285 million; it however utilized Rs. 148.2 million only".

   This may be contrasted to another quotation from the Fourth Five Year Plan Document which says,

   "The Family Planning started on a large scale in 1965. It is the only sector of the Third Plan in which the financial target was exceeded. Against the allocation of Rs. 274 million, the actual expenditure amounted to Rs. 356 million".

Both the quotations refer to the same period i.e. 1965-70. Also both the documents were published by Planning Commission itself. There is generally no explanation of any sort pertaining to such discrepancies. Similarly, figure of annual actual expenditure on family planning given in various yearly issues of Pakistan Economic Surveys do not generally tally with one another.

3. See for example:-

(i) I Adleman, (1963)
(ii) M. Blaug, (1972)
(iii) G. Myrdal, (1968)

4. There are a number of scholars who quote 'Fatawahs' and refer to various leaders of diverse schools of thought within Islamic jurisprudence in support of population control. They advocate that population control is permissible in Islam on economic, social, political and health grounds. e.g.,

(i) M.A. Mannan, (1983)
(ii) Rafiullah Shehab, (1973, 1993)

5. For the last many years, a vast amount of literature has emerged on economic doctrines of Islam. Many economists and scholars have made noteworthy contribution towards it. A few among them are as follows:-

(i) A. Maudoodi (1986)
(ii) N. Siddiqui (1979)
(iii) Umar Chapra (1992)
(iv) Rafiq Ahmad (1953)
(v) N.H. Naqvi (1981)
(vi) Khurshid Ahmad (1980)
(vii) N.H. Naqvi, H.U. Beg, Rafiq Ahmad and M. Nazeer (1984)

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ENDIX A*

Selected Criteria for Comparison of Methodologies to Measure the Demographic Impact of Family Planning Programmes

Criterion	Standardization	Trend Analysis	Experimental design	Standard Couple-years of protection	Component projection I (CONVERSE)	Component Projection II	Reproductive Process analysis	Prevalence	Regression analysis
Sector: public; private;....	Both	Public	Public	Public	Public	Public	(Individuals)	Public; private both	Public
Input data....	Selected factors affecting CBR/TFR/GFR	Limited: preprogramme, post-programme trends	Heavy to ensure comparability of subjects with controls	Programme acceptors by age continuation rates	Heavy: demographic and programme service statistics	Heavy	Heavy	Light	Heavy: socio-economic by area programme input data
Ease of application....	Straightforward: can be computerized	Simple	Difficult	Moderately difficult	Fair computerized	Laborious	Laborious	Simple	Fair (Computer packages available)
Potential fertility: gross or net....	Gross	Net	Net	Net	Gross	Gross	Gross	Gross	Net
Robustness of findings....	Sensitive to initial date	Poor: sensitive to time interval	Fair: diffusion, contamination between subjects and control	Fair: depends on quality of programme data	Fair: depends on quality of programme data	Fair: depends on quality of programme data	Fair	Good	Fair
Confounding factors considered	Implicit: not adaptable for explicit factors	Implicit	Implicit	Pregnancy penalty, sterility, post-partum overlap	Sterility, post-partum overlap, trend in natural fertility and nuptiality	Implicit	Pregnancy penalty, sterility, post-partum overl...	Pregnancy penalty sterility	Implicit
Subjects treated	Population groups	Population groups	Population groups	Programme acceptors	Programme acceptors	Programme acceptors	Individuals	Population groups	Population groups
Direct output measure	Contribution of marital fertility to observed change in CBR holding other factors constant	CBR/fertility in absence of programme	Contraceptive prevalence in subject/control groups (areas); sometimes fertility differentials	Lifetime births averted by programme acceptors	Age-specific annual CYPs, births averted by programme acceptors with annual impact on all manner of demographic variables	Annual births averted by programme acceptors	Method-specific annual births averted by individuals, to end of reproductive age	Annual births averted in corresponding sector	Percentage of observed fertility differentials explained by programme input

Source: For nature of assumptions, see John Bongaarts, "The concept of potential fertility in evaluation of the fertility impact of family planning programmes" (U.N. 1985)

It serves the purpose of being a corollary to Chapter 2 in which some of the above mentioned techniques of evaluation have been described briefly.

APPENDIX B*

Model Life Tables for Pakistan MALES and FEMALES 1984 - 1988

0	I	II	III	IV	V	VI	VII
	MALES			FEMALES			
Age	Life Table Survivors	Expectation of Life	Age-Specific Mortality Rate	Life Table Survivors	Expectation of Life	Age-Specific Mortality Rate	(III + VI) / 2
0	10,000	59.4	0.1165[1]	10,000	60.9	0.1043[1]	0.11040
1	8,835	66.2	0.0089	8,957	67.0	0.0092	0.00905
5	8,526	64.5	0.0016	8,632	65.4	0.0017	0.00165
10	8,458	60.0	0.0012	8,559	61.0	0.0013	0.00125
15	8.407	55.4	0.0021	8,505	56.3	0.0021	0.00211
20	8.320	50.9	0.0029	8,416	51.9	0.0028	0.00285
25	8,201	46.6	0.0031	8,297	47.6	0.0030	0.00305
30	8.076	42.3	0.0034	8,175	43.3	0.0031	
35	7,937	38.0	0.0040	8,018	38.9	0.0036	
40	7,780	33.7	0.0051	7,901	34.6	0.0044	
45	7,584	29.5	0.0068	7,732	30.3	0.0057	
50	7,329	25.4	0.0096	7,514	26.1	0.0080	
55	6,986	21.6	0.0140	7,221	22.3	0.0115	
60	6,515	18.0	0.0205	6,817	18.2	0.0175	
65	5,881	14.6	0.0299	6,246	14.7	0.0275	
70	5,062	11.6	0.0435	5,442	11.5	0.0442	
75	4,070	8.8	0.0672	4,359	8.7	0.0723	
80	2,899	6.3	0.1150	3,025	6.4	0.1178	
85	1,604	4.4	0.2247[2]	1,649	4.7	0.2123[2]	

Source, John, G.C. Blacker et al (1987)

* Column VII of this appendix has been used for calculation of various of column I of Table 8.2 in the following manner:-

To obtain mortality rate for any age group of g_1-g_2, subtract mortality rate of g_2+1 from mortality rate of age g_1-1, given that mortality rate of g_2+1 is lesser than that of g_1-1 and divided by $(g_2+1)-(g_1-1)$. Assuming that mortality rate (between g_2+1 and g_1-1) is uniformly distributed, each successive term is obtained by subtracting the resulting quotient

$$\frac{\text{Mortality rate of } (g_1-1) - \text{Mortality rate of } (g_2+1)}{(g_2+1)-(g_1-1)}$$ from the preceding term.

In case mortality rate of (g_2+1) is greater than mortality rate of (g_1-1) the procedure will be reversed. And for each successive term the quotient

$$\frac{\text{Mortality rate of } (g_2+1) - \text{Mortality rate of } (g_1-1)}{(g_2+1)-(g_1-1)}$$ will be added to each preceding

term. So the year wise mortality rates have been calculated from column VII of Appendix B according to the above rationale. The year wise mortality rates constitute column I of Table 8.2.

APPENDIX D

Births Averted Through Use of the IUD

0	I	II	III
Year	IUDs	Averted Births by IUDs *	Births Averted adjusted for over estimation **
1965 - 66	186996	32464.58	23024.52
66 - 67	387884	58660.42	41603.13
67 - 68	425952	73950.00	52446.80
68 - 69	438348	76102.08	53973.10
69 - 70	342960	59541.67	42228.13
70 - 71	237552	41241.67	29249.41
71 - 72	124381	21593.92	15314.84
72 - 73	106865	18552.95	13158.12
73 - 74	91883	15951.91	11313.41
74 - 75	137494	23870.49	16929.42
75 - 76	227200	39444.44	27974.78
76 - 77	159821	27746.70	19678.51
77 - 78	70769	12286.28	8713.67
78 - 79	77292	13418.75	9516.84
79 - 80	99535	17280.38	12255.59
80 - 81	92103	15990.10	11340.50
81 - 82	78195	53158.85	9628.03
82 - 83	96639	16777.60	11899.01
83 - 84	147107	25539.41	18113.06
84 - 85	195495	33940.10	24070.99
85 - 86	257340	44677.08	31685.87
86 - 87	314558	54610.76	38731.03
87 - 88	507884	88174.31	62534.97

Source: (i) Pakistan Economic Surveys, Government of Pakistan.
(ii) Statistical Year Books of Pakistan, F.B.S. Government of Pakistan.

* $$(\text{col II})_i = \frac{(\text{col I})_i}{5.76}$$

** $$(\text{col III})_i = \frac{(\text{col II})_i}{141} \times 100$$

The above data has been used in Table 8.3.

APPENDIX E

Births Averted Through Sterilization

0	I	II	III
Year	Sterilization (number of cases)	Birth averted by sterilization *	B.A. adjusted for over estimation **
1965 - 66	1644	439.57	311.75
66 - 67	1824	487.70	345.89
67 - 68	14556	3891.98	2760.27
68 - 69	55440	14823.53	10513.14
69 - 70	10296	2752.94	1952.44
70 - 71	4759	1272.46	902.45
71 - 72	3313	885.83	628.25
72 - 73	3164	845.99	599.99
73 - 74	4131	1104.55	783.37
74 - 75	7735	2068.18	1466.80
75 - 76	14743	3941.93	2795.73
76 - 77	14676	3924.06	2783.02
77 - 78	7042	1862.89	1335.38
78 - 79	13382	3578.07	2537.64
79 - 80	24886	6654.01	4719.16
80 - 81	24764	6621.39	4696.02
81 - 82	25475	6811.50	4830.85
82 - 83	28330	7574.87	5372.25
83 - 84	37736	10089.84	7155.91
84 - 85	52413	14014.17	9939.13
85 - 86	68729	18376.74	13033.15
86 - 87	69045	18461.23	13093.07
87 - 88	77386	20691.44	14674.78

Source: (i) Pakistan Economic Surveys, Government of Pakistan.
(ii) Statistical Year Books of Pakistan, F.B.S. Government of Pakistan.

$$(\text{col II})_i = \frac{(\text{col I})_i}{3.74}$$

$$(\text{col III})_i = \frac{(\text{col II})_i}{141} \times 100$$

The above data has been used in Table 8.3

APPENDIX F

Births Averted Through Use of the Oral Pills

0 Year	I Oral Pills (number of cycles)	II Births averted by Oral Pills *	III B.A. adjusted for over estimation **
1965 - 66	----	----	----
66 - 67	44856	460.63	326.69
67 - 68	20088	206.28	146.30
68 - 69	5376	55.12	39.16
69 - 70	4848	49.78	35.30
70 - 71	10368	111.60	79.15
71 - 72	59548	611.50	433.69
72 - 73	162971	1673.56	1186.92
73 - 74	1264648	12986.73	9210.45
74 - 75	1219347	12521.53	8880.52
75 - 76	5131264	52693.20	37371.06
76 - 77	4122222	42331.30	30022.20
77 - 78	1411577	14495.55	10280.53
78 - 79	1879160	19297.19	13685.95
79 - 80	3485133	35789.00	25382.27
80 - 81	1210951	12435.32	8819.38
81 - 82	233434	2397.15	1700.11
82 - 83	399916	4106.75	2912.60
83 - 84	815793	8377.42	5941.43
84 - 85	921488	9462.81	6711.21
85 - 86	1268409	13025.35	9237.84
86 - 87	1444059	14829.11	10517.10
87 - 88	1949109	20015.50	14195.39

Source: (i) Pakistan Economic Surveys, Government of Pakistan.
(ii) Statistical Year Books of Pakistan, F.B.S. Government of Pakistan.

$$(\text{col II})_i = \frac{(\text{col I})_i}{97.38}$$

* $$(\text{col III})_i = \frac{(\text{col II})_i}{141} \times 100$$

The above data has been used in Table 8.3.

APPENDIX G

Births Averted Through Use of the Condoms

0 Year	I Condoms	II Birth averted by condoms *	III B.A. adjusted for over estimation **
1965 - 66	27600000	33120.13	23489.42
66 - 67	62700000	75240.30	53361.91
67 - 68	96000000	115200.46	81702.45
68 - 69	102000000	122400.48	86808.84
69 - 70	102000000	122400.48	86808.84
70 - 71	68813712	82576.78	58565.09
71 - 72	25201152	30241.50	21449.87
72 - 73	29756304	35707.71	25324.61
73 - 74	49191696	59030.27	41865.44
74 - 75	83035584	99643.10	70668.86
75 - 76	148358128	178630.46	126688.25
76 - 77	101620368	121944.92	86485.75
77 - 78	19543344	59452.25	42164.71
78 - 79	66810240	80172.61	56860.00
79 - 80	84891388	101870.67	72248.70
80 - 81	26209584	31451.63	22306.12
81 - 82	27107568	32529.21	23070.36
82 - 83	41552784	49863.54	35364.21
83 - 84	57700656	69241.06	49107.13
84 - 85	81464832	97758.19	69331.91
85 - 86	84217248	101061.10	71674.53
86 - 87	99900288	119880.82	85021.85
87 - 88	142136352	170564.29	120967.58

Source: (i) Pakistan Economic Surveys. Government of Pakistan.
(ii) Statistical Year Books of Pakistan. F.B.S. Government of Pakistan.

* $$(\text{col II})_i = \frac{(\text{col I})_i}{833.33}$$

** $$(\text{col III})_i = \frac{(\text{col II})_i}{141} \times 100$$

The above data has been used in Table 8.3.

APPENDIX H

Net Hypothetical Survivors of Yearly Averted Births

0	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI	XVII	XVIII	XIX	XX	XXI	XXII	XXIII	XXIV Total Hypothetical Survivors (TS_i) *	XXV Actual Population (LP_i) (millions)	XXVI Hypothetical Population (HP_i) ** (millions)
	44029																							44029	53.26	53.30
	43673	89926																						133598	54.79	54.93
	43398	89195	128870																					261463	56.37	56.64
	43206	88636	127823	142296																				401961	58.00	58.41
	43094	88243	127021	141139	123200																			522697	59.70	60.23
	43025	88016	126459	140254	122199	83493																		603446	61.49	62.10
	42959	87874	126133	139633	121432	82814	35566																	636411	63.34	63.98
	42897	87740	125930	139274	120894	82295	35277	37865																672172	65.89	66.57
	42838	87613	125738	139049	120583	81930	35056	37557	59400															729764	67.90	68.63
	42783	87493	125555	138837	120389	81719	34900	37322	58917	92096														820011	69.98	70.80
	42726	87380	125383	138635	120205	81588	34811	37156	58548	91348	183194													1000973	72.12	73.13
	42661	87263	125232	138445	120030	81463	34755	37061	58289	90775	181705	130669												1128338	74.33	75.46
	42590	87132	125054	138267	119866	81345	34701	37001	58138	90373	180565	129607	58762											1183401	76.60	77.79
	42511	86986	124866	138082	119711	81233	34651	36944	58045	90140	179366	128794	58284	77667										1292680	78.94	80.20
		86625		137874	119552	81129	34604	36891	57956	89995	179302	128224	57918	77036	107767									1319724	81.36	82.68
			[illegible]	137645	119372	81030	34559	36840	57872	89857	179015	127894	57662	76552	106886	44345								1370044	83.84	85.11
				137589	119172	80896	34513	36793	57793	89725	178741	127688	57512	76214	106215	43985	36886							1383525	86.44	87.62
					118952	80763	34461	36744	57716	[illegible]	[illegible]	127493	57421	76017	105745	43709	36586	52230						1395932	89.12	90.22
						80614	34403	36668	57641	[illegible]	[illegible]	127308	57333	75895	105473	43516	36357	51806	75521					1450281	91.58	92.93
							34340	36627	57554	89369	178007	127133	57250	75779	105305	43403	36196	51481	74907	103480				1070829	94.37	95.40
								36559	57458	89235	177769	126969	57172	75669	105142	43334	36103	51253	74437	102639	138125			1151867	97.67	98.82
									57352	89085	177502	126800	57098	75565	104989	43267	36045	51127	74168	101995	137268	138562		1250657	100.70	101.95
										88921	177204	126609	57022	75468	104845	43205	35989	51039	73917	101544	116433	137436	105662	1295294	103.82	105.11

$$TS_i = \sum_{j=1}^{23} s_{ij}$$

$(\text{col XXVI})_i = (\text{col XXIV})_i + (\text{col XXV})_i$

$s_{ij} = s_{i-1,j} \times sr_{i-j+1}$ for $i > j$ and $s_{ii} = CS_i$ where CS_i is taken from Table 8.3

This appendix is a matrix of rows and columns. It shows the details of calculations of hypothetical survivors of yearly net averted births who would have shared the national income of Pakistan in the absence of a population control programme by the government of Pakistan.

BIOGRAPHY

The author was born on December 31, 1941 at Faisalabad. She attended Government High School, Baghbanpura, Lahore and stood first amongst female candidates in the Middle School as well as Matriculation Examination. She joined Lahore College For Women in 1956, and got her B.A. Honours degree from Punjab University and stood first in B.A. Honours in Economics Examination of the Punjab University in 1960. She joined department of Economics, Punjab University as a graduate student in 1960 and stood first in M.A. in Economics Examination of the Punjab University in 1962. She became a faculty member of department of Economics in 1962. During her studies as well as in the capacity of a teacher, she won various awards and scholarships.

At the time of submission of this thesis, she is working as Professor of Economics at Punjab University, Lahore.