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Evolution of Population and Education in Pakistan:
Analysis and Projections by Provinces

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Muhammad Asif Wazir

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To

Ammi, Abu and Jindjaan

Abstract

Each province in Pakistan has witnessed a significant population growth rate since the 1970s—ranging between 2 to 4 percent per annum. Rapid population growth in Pakistan hindered socio-economic development in the past, and Pakistan will have to adopt a development model capable of absorbing the future increase in population. The population growth is mostly due to the extended time lag between the mortality decline and the fertility decline. Following the demographic transition theory, the birth rates were expected to fall in the 1970s as a response to the decline in death rates. However, due to political instability, low levels of socio-economic development and ineffective population policies, the targets for reducing fertility were not accomplished even until recently. The main objective of our research is to study the level and trends of population and education retrospectively and prospectively for each province in Pakistan. The projection results show that the population of Pakistan (at national and provinces level) will be growing significantly in the next five decades. The substantial growth of the population of Pakistan at national and provinces level in the future is due to the “population momentum”. In 2010, approximately half of population growth in Pakistan is due to population momentum. This would lead to further increase in the working-age population. As population growth is beginning to level off, as part of the demographic transition, Pakistan, including all provinces, will experience a demographic window of opportunities. For the next 30 to 40 years, the majority of its population will be of working age. Our Projections result reveals that Pakistan will not be able to attain the Millennium development goals (MDGs) regarding education in 2015 and not even in 2060, if it does not increase primary enrollment at a rate significantly higher than in the recent past.

Summary

Each province in Pakistan has witnessed a significant population growth rate since the 1970s—ranging between 2 to 4 percent per annum. Pakistan, at national and provinces level, is likely to experience further population growth in the near and distant future at least until 2050—more so than any other world countries except for some countries in sub-Saharan African. Rapid population growth in Pakistan hindered socio-economic development in the past, and Pakistan will have to adopt a development model capable of absorbing the future increase in population. If the country fails, it will be confronted with several major risks ranging from political instability to having large segments of the population trapped into poverty.

The population growth is mostly due to the extended time lag between the mortality decline and the fertility decline. Following the demographic transition theory, the birth rates were expected to fall in the 1970s as a response to the decline in death rates. However, due to political instability, low levels of socio-economic development and ineffective population policies, the targets for reducing fertility were not accomplished, even until recently. Thus, the fertility levels in the decades of 1970s and 1980s in Pakistan remained exceptionally high, fluctuating between six and seven children on average per women. It is only in the late 1980s that fertility started declining gaining momentum in the 1990s. The main objective of our research is to study the levels and trends of Population and Education retrospectively and prospectively for each province in Pakistan. To study the population and educational levels for each province in Pakistan in future, we used the probabilistic population projections and multistate population projection methodology.

As population growth is beginning to level off, as part of the demographic transition, Pakistan, including all provinces, will experience a demographic bonus—a period of time when the share of the working age population is prominent compared to the dependent groups, the youth and elderly population. For the next 30 to 40 years, the majority of its population will be of working age — in 2010, 35 percent of the population of Pakistan is below age 15 years and 60 percent of the population belongs to the working-age groups (15-64 years). The projection results show that the population of Pakistan (at national and provinces level) will be growing significantly in the

next five decades, as Pakistan will only manage to achieve replacement level fertility by 2035-40. The substantial growth of the population of Pakistan at national and provinces level in the future is due to the “population momentum”. Approximately half of population growth in Pakistan at sub-national level in 2010 is due to population momentum. This would lead to further increase in the working-age population—from 105 million in 2010 to 194 million in 2060. Thus, Pakistan will need to adopt a development strategy capable of absorbing the working age population. This large labor force, if well educated, skilled and sufficiently employed could be a key asset for the country to become socially and economically prosperous. In this context, human capital will be central to the transformation of the demographic bonus into a window of opportunity for rapid economic growth.

As fertility declines, the proportion of population aged 65+ will accelerate significantly. The proportion of the population aged 65+ is likely to increase six times between 2010 and 2060, from 4 percent to 15 percent. This rapid population aging poses many challenges for policy makers and for institutional adaption, including the financing of pension and health care system for elderly. The large uneducated and unskilled young population along with significant proportion of aged population in future would place extreme burden on Pakistan economy, if not invested in education and health. Furthermore, the school age (below 14 years) population will be stagnating during the next three decades (until 2030-35)—approximately at 61 million. This implies that until 2035, more children will need to be enrolled in the schools. More school will be needed and more teachers to be trained and hired, particularly in the rural areas. The share of young population would however decline after 2035—from 61 million in 2035-40 to 51 million in 2055-60.

Pakistani educational system has failed to provide the basic infrastructure, eliminate gender imbalances and the quality of education, which would be required to enjoy the full collateral benefits of demographic bonus such as high levels of economic growth and well-being. As expected, Pakistan will not be able to attain the Millennium development goals (MDGs) regarding education (goal 2 and 3), if it does not increase primary enrollment at a rate significantly higher than in the recent past. Our projections shows that the prolongation of present trends into the future would still leave 23 percent of boys and 18 percent of girls in the age group 5-9 not enrolled in school by 2015. The projections show that the MDGs would not be reached, even by 2060. This calls for effective educational policies and further investments in the education sector particularly in rural areas. Moreover, the gender gap would not be eliminated at all levels of education in the next two decades and even far from being eliminated in 2060, except at the level of tertiary education, that has highly benefited women in Pakistan in the last decade.

1.1 Background and Motivation

At the end of the first decade of the 21st century, Pakistan's prospect for development had not been very bright. The rising religious fundamentalism, political instability, governance, stagnating economic growth, low level of education particularly, for female and low social status of women are among the widely discussed problems facing Pakistan. The major demographic challenges lying ahead of Pakistan are rampant population growth—mainly due to population momentum—and low socio-economic development and the most essential one being the accumulation of human capital. The spatial distribution of Pakistan consists of four provinces (i.e. Punjab, Sindh, KPK and Balochistan) and four territories. A significant spatial heterogeneity exists in Pakistan in terms of demographic and socio-economic development—from Punjab to Balochistan. Pakistan comprises very small province in population size—such as Balochistan with 7 million inhabitants—and very large ones—such as Punjab, with more than 100 million inhabitants in 2010. Indeed, the spatial demographic heterogeneity in Pakistan is one of the main threads of this study. Rapid population growth rate has been virtually inevitable in Pakistan during the second half of the 20th century and will continue to do so in the near future. This can be explained by the conventional demographic transition theory—i.e. first mortality declined rapidly and later fertility declined gradually. Pakistan is one of the largest countries (In 2010, Pakistan ranks 6th as most populous country in the world and will stand at the 4th in 2050) in the world with very a young age structure (UN 2010). In 2010, nearly two-thirds of the Pakistani population is less than 30 years old with a median age of 21.7 years. The young age structure has been persistent in all provinces in Pakistan in 2010. The population of Balochistan is the youngest population in Pakistan, nearly 70 percent of the population is below 30 years of age in 2010. Each province in Pakistan will likely experience a significant population growth in the near and distant future at least until 2050—more so than any other world region except sub-Saharan Africa. Pakistan's population will still be young, and the median age is expected to be 31 years in 2040 (United-Nations, 2010). Currently, South Asian region along with Sub-Saharan Africa are the only regions in the world with young age structure and experienced rapid population growth. Within South Asian region, Pakistan stands out dominantly.

Pakistan is one of the world's fastest-growing countries—an annual growth rate of 1.8 percent from 2005 to 2010—compared to 2.1 percent in Arab world and 2.4 percent in sub-Saharan Africa (UN 2010). The rapid population growth rate has a universal phenomenon and each province in Pakistan experienced a significant growth in the Past. More than half of the population growth in each province of Pakistan has contributed by the momentum in 2005-10. Even though, we assume that Pakistan will attain replacement level fertility in next three decades, the population would be increasing until 2060 due to the large number of male and female in reproductive age. Each province in Pakistan will also experience significant population growth due to the momentum (See more details in Chapter 3). This phenomenon requires strong policy implications to curb population growth in Pakistan and not solely focus on the population policies on fertility decline, access and provision of family planning services.

Until the late 1980s, the fertility decline in Pakistan had hardly begun. The fertility level in the 1970s and 80s is considered exceptionally high (more than six children per women) in Pakistan. There is ample evidence found in the literature (Sathar, 2007) that the fertility decline in Pakistan had started since the late 1980s and strengthened further in the decades of 1990s. However, the fertility transition has stalled during the first decade of 21st century in Pakistan. Among the SAARC member states, Pakistan has the highest fertility rate—4.1 children per women in 2006-07. The spatial heterogeneity in fertility transition varies substantially in Pakistan (See more details in Chapter 2). Recent evidence shows that fertility transition has been now well underway in most provinces of Pakistan, some of which have caused a significantly rapid decline—i.e. Punjab (?). The number of socio-economic and cultural factors are responsible and have contributed substantially in the fertility decline in Pakistan, particularly female education. The overwhelming evidence found in the literature that education and fertility were negatively correlated, and the small family-size norms are more common in highly educated women (Bongaarts, 2008). The females have been most vulnerable in Pakistan in every sector of the society since the independence in 1947. In 2010, nearly 60 percent of women have never attended schools in Pakistan and the situation became worse in Balochistan—76 percent of women have no formal education in 2010. The data shows that, the ideal family size in Pakistan stagnated during the last two decades—at the level of 4.1 children per women. The important question raised in the debate is whether Pakistan would ever experience a sustained fertility decline toward replacement levels. In this context, female education plays a vital role and is a core theme of this study (See chapter 5 and 6).

The levels of mortality in Pakistan showed significant improvement during the second half of the 20th century. Life expectancy at birth has improved from 41 years for male and 41.5 years for female in 1950-55 to 63.8 for male and 65.4 for female in 2005-2010 respectively. The infant mortality rate (IMR) in Pakistan has been declining substantially over the last five decades—from 177 deaths per 1000 live birth in 1950-55 to 71 deaths per 1000 live birth in 2005-10. A tremendous spatial variation exists in Pakistan for infant mortality rate. IMR is very low in Balochistan—49 deaths per 1000 live birth in 2006-07—and very high in Punjab and Sindh—81 deaths per 1000 live births in both province. Child mortality declined in a similar way as the infant mortality in Pakistan. Maternal mortality has substantially high in Pakistan—276

maternal deaths per 100,000 live births in 2006-07. The enormous diversity in the maternal mortality ratio observed at the provincial level in Pakistan. For instance, in Balochistan, high level of maternal mortality persists—785 maternal deaths in 2006-07, whereas, maternal mortality ratio was low in Punjab—227 maternal deaths per 100,000 live births in 2006-07. The fact that explained the low maternal mortality in Punjab is that more and more women receive prenatal care and a large proportion of deliveries is attended by skilled birth attendants. The skilled birth attendance has now been more common in most provinces in Pakistan, however, Balochistan lagged behind in maternal care.

The story of the demographic development in Pakistan has not solely depended on rapid population growth and high fertility, but also considering the significant internal and international migration. As Burki, 2010 argues, the four waves of migration that happened in Pakistan had a profound impact on socio-economic and political development. The first massive migration occurred during the partition in 1947, nearly seven million Muslims migrants arrived in Pakistan from India (Visaria, 1969). It is worth mentioning to note that before the partition in 1947, the percentage of Muslims in Pakistan was 65 percent and due to the influx of large-scale Muslim's migration in Pakistan, the percentage rose to 95 percent (Burki, 2010). The second enormous migration occurred internally in Pakistan after the independence in 1947, when the significant number of Pashtuns from KPK (previously known as NWFP) migrated to the capital of Sindh (i.e. Karachi) in South of Pakistan, mainly for searching of better living condition, education and higher opportunities for jobs. This fickle ethnic mix, writes Burki, 2010, "transformed Karachi into one of the most violent cities in developing world", as we have seen recently in 2011, the ethnic conflict between Pashtuns and Muhajirs. The third large-scale movement occurred from Pakistan toward many regions of the world, such as North America, European Union, Persian Gulf and East Asia in 1970s and 80s. Thus, Pakistan's economy has benefited by generating the substantial amount of remittances from overseas Pakistanis. The last and fourth type of migration was the arrival of millions of Afghan refugees in Pakistan during 1980s and 2001s due to the wars in Afghanistan, which had a profound effect of ethnic mix in different parts of the country. In recent years, Pakistan experienced rapid urbanization. The urban population projection shows that about half of Pakistan's population will be living in cities by the year 2030. The population of Lahore (Capital of Punjab) will exceed 10 million and becoming Pakistan's second mega-city in 2030 after Karachi (UN 2010). Therefore, urbanization is one of the core problems facing Pakistan in near future and if the government is not well prepared then the economy will face a trouble and furthermore, ethnic conflicts will intensify.

The "demographic window of opportunities"¹ occurs when the ratio of the non-working-age population (typically the school-aged children aged 0-14, and the elderly population aged 65+) to the working-age population is low. The rising share of working-age population can translate into the subsequent rise of the rate of economic growth if the

¹Demographic bonus or demographic dividend are other terms used synonymously in the literature. According to United Nations, the demographic dividend define as "the period when the proportion of population aged (0-14) years old falls below 30 percent and the proportion of population aged 65+ years old is still below 15 percent."

economy can employ effectively and productively the growing labor force. The demographic window of opportunity has a beginning and an end, closely associated with the start and the pace of fertility decline, which influence the age structures. Currently, each province in Pakistan has undergone the process of the demographic window of opportunity. This period considered an important demographic potential for high economic growth, as we have seen into East Asian countries and to some extent, in India. However, the realization of this demographic window of opportunity is dependent on several factors. Levels of educational attainment are important as too low level, for instance, among women could limit participation in the labor force. Furthermore, the economy should be able to absorb using employment, the growing working-age population. The high level of unemployment may limit the impact of those favorable age structures. Therefore, if Pakistan manages to reap a demographic dividend, the effects could be long term on the economic growth. In this context, one important point to note here is that Pakistan is blessed with rich nature resources especially in Balochistan and Sindh. The large youth bulge would be essential to exploit these resources which would requires many highly educated professionals such as chemical analysts, engineers and other experts to exploit these resources. If proper policy implications are adopted, this could lead Pakistan to the track to development.

Indeed, human capital² will play a vital role for future development of Pakistan in the first half of 21st century, which will be influenced by the past and present educational policies. Virtually, by most measures, Pakistan has not achieved extraordinary progress in educational development during the past few decades. Females are particularly at a disadvantage for gaining literacy skills, and enrollment at primary and secondary school level in Pakistan. This is mainly because of two reasons: one is the momentum of education and second is due to under-investment in education. Significant spatial heterogeneity existed in the educational attainment level in Pakistan. Punjab achieved significant progress in educational attainment and enrollment in recent decades, particularly for females. Modest progress was observed in other provinces in Pakistan, based on the current educational enrollment and investment pattern, the targets of MDGs regarding education (goals 2 and 3) in Pakistan will not be attained in 2015. Consequently, the pace for achieving universal primary education and gender equity at provincial levels in Pakistan has never been sufficient, although the speed in some provinces is faster as compared to the others. This calls for a further investment in the education sector, particularly in basic education to enjoy the benefits of fostering economic growth and social change.

1.2 Objectives

This study aims at producing the population projections at the provincial level in Pakistan. So far, no population projections (neither deterministic nor probabilistic) in Pakistan has ever been produced at the sub-national level. In our knowledge, this is

²Crespo Cuaresma et al., 2009 define the human capital as “as the number of people who are participating in the work force, are in sufficiently good health and are differentiated by their skill levels which is conveniently approximated by level of educational attainment.” We are here only considering the educational dimension of the human capital.

the first attempt to produce the probabilistic and population projection by level of educational attainment for each province in Pakistan. The objectives of this work are threefold.

The first aim is to document the educational progress and demographic development in past and present in Pakistan for each province. In this regard, our focus is on the three main indicators of educational development in Pakistan at the provincial level; namely, educational attainment, literacy and enrollments rate (gross and net). We discussed the policies regarding education in the past and present and figure out the determinant of the failure of these policies. Currently, most of the studies that dealt with demography, have focus on the national level in Pakistan. Our objective is to analyze the current population dynamics at the provincial level in Pakistan, at least during the last four decades. Such documentation is very essential to understand the level, trends and determinant of the component of population change (fertility, mortality and migration) and assess the pace of demographic transition for each province in Pakistan. Each province in Pakistan has a different level of socio-economic development. Therefore, such analysis at the provincial levels are helpful in formulating the assumptions for future level of fertility and mortality for each province in population projection exercise. Using multiple data sources at provincial level in Pakistan, we assess the available data in Pakistan on fertility, mortality, internal and international migration. It ensues with an identification of data problem and an estimation of the input variables for each province, which later used in the probabilistic and human capital population projection.

The second objective is to produce probabilistic population projections for each province in Pakistan and improve the methodology used in the population projection by considering the internal migration component into the analysis. So far, little has been done on the probabilistic population projection at the sub-national level. The uncertainty of demographic variables at provincial levels, particularly, internal and international migration, make sub-national population projection more complex. Deterministic approach has employed to project the provincial population which fails to address the concern of demographic uncertainty into component of population change. Probabilistic population projection models have the potential to conquer these shortcomings, but these models have often been implemented at a national level. It is the first attempt to execute the probabilistic projection model at the provincial level in Pakistan .

The third objective of the study is to produce the new data set at provincial level of Pakistan by age, sex and level of educational attainment from 2010-2060 and assess the likely effect of future changes by education in the population. In this context, we used the method of multistate demographic modeling to project the population by age, sex and level of educational attainment at national and provincial level in Pakistan from 2010-2060. Education specific population projections are imperative, not because taking education into population projection improve the accuracy of the projection, but also information they produce is needed to economists, policy makers and other stakeholders that use the demographic and human capital data. We will also assess the potential for the achievement of the United Nations Millennium Development Goals (MDGs) regards education (goals 2 and 3) and education for all (EFA) goals-i.e.

universal primary education and gender equality at a provincial level in Pakistan. It will assess that how realistic the national goals of educational attainment are in view of the current speed of change observed in the education sector in Pakistan at national and provincial level. It is also necessary to assess the level of educational attainment of working-age population in the recent and distant future at the provincial level in Pakistan, which is important to formulate the economic and labor force policies. Thus present research is primarily oriented towards the methodological and evaluation in order to understand the current and the future patterns and directions of demographic and educational changes in Pakistan at the sub-national level.

In a nutshell, this research focuses on the development of techniques to make optimal use of the available data at provincial level in Pakistan and further utilize the different data sources for producing probabilistic population projection and population projection by age and sex and level of education from 2010 to 2060. Moreover, we have identified that the more than half of the population growth in the future contributes by the momentum of the population and estimates the time and magnitude of the demographic dividend for each province in Pakistan. We are also assessing the potential that whether Pakistan would achieve the MDGs goals based on the business-as-usual scenario and evaluate the likely effect of future changes in educational structure on the population.

1.3 Structure of the Report

This report is organized in seven chapters to answers the questions of what will be the future of education and population in each province in Pakistan. The first step involved in the analysis is an empirical assessment and construction of necessary inputs for the projections. Therefore, the book is segregated into two parts. The first part of the book focuses on the historical empirical assessment of the levels and trend of fertility, mortality and migration in Pakistan at national and provincial level. Furthermore, we describe the history of population and educational policies and its causes of failures in Pakistan. This chapter offer the basis for the arguments and assumptions for future level of fertility, mortality and migration at a provincial level in Pakistan. The second part constitutes the state of education and literacy in Pakistan. Moreover, we have also discussed multistate modeling techniques to describe the population projection by level of education at a provincial level in Pakistan.

The second chapter depict the description of population dynamics in Pakistan for each province in past and present. It elaborates the trends and patterns of population growth, fertility, mortality and migration for each province in Pakistan during the last four decades. It also represents the empirical analysis about the determinants and regional difference for these indicators in Pakistan. Chapter 2 also provides the fruitful overview of the population policies in Pakistan since independence. The chapter concludes with a brief discussion of the relationship between education, demographic indicators (fertility, mortality and migration) and socio-economic policies in Pakistan. Chapter two also provides the final input data, which is used in the later section for population projections. In Chapter 3, we illustrate the probabilistic population pro-

jection method at a sub-national level in Pakistan. The emphasis is particular on the methodological issues concerning with sub-national population projection and internal migration. After the brief introduction of the methodology and base year data, we discuss the results of the probabilistic population projections at the provincial level in Pakistan. It concludes with major outcome for each provinces derived from projection exercise.

Chapter 4 review the state of educational attainment and literacy in Pakistan since 1970s for individual regions. We describe the three indicators to assess the past development in the education sector in Pakistan; namely, educational attainment for broad age groups, literacy and enrollment rate for all levels of education. It also gave the brief overview of the past educational policies in Pakistan. The discussions focus on the provincial level. This chapter concludes with the causes and determinants of the failure of education in Pakistan.

In Chapter 5 and 6, we emphasis on the multistate population projection by level of education at national and provincial levels in Pakistan—with a view of how education has been and will be shaping the demographic future of each province in Pakistan. After the concise overview of the literature review and methodology, we discuss the different scenarios for education and fertility to analysis the concomitant effect of education on population size and age structure. In the following section, we have analysis the potential of achieving the MDGs and EFA goals for each province in Pakistan. The important findings and results of multistate population projections are discussed in the last section of this chapter.

Chapter 7 recapitulates the conclusion and discussion in the preceding chapters. This chapter summarized the proposed research objectives with important findings and recommendations, limitations and the implication for further research on provincial demographic research in Pakistan.

Part I

Evolution of Population

Population Dynamics of Pakistan at Sub-national Level: Past and Present

Summary

This chapter thoroughly documents the population dynamics for each province in Pakistan during the last four decades. First, we describe the trends and levels of the total population and population growth rate for each province in Pakistan. Second, we explain the sharp socio-economic inequalities between the provinces in Pakistan. For this purpose, we rely on the Human Development index for each province in Pakistan to access the socio-economic progress. Furthermore, it evaluates the state of demographic windows of opportunities and population momentum for each province in Pakistan, which has a profound effect on the future population growth. Pakistan experienced a rapid urbanization in recent decades. Therefore, we described the urban population growth at provincial levels and growth of major cities in Pakistan. Moreover, we assess the stage of demographic transition for Pakistan. It would help to formulate the future trends of fertility in Pakistan. Third, we evaluate the trends, levels and determinate of fertility, mortality and migration for each province in Pakistan. On one hand, it is useful to understand the historical development of demographic trends in Pakistan. On the other hand, it provides the basis for the scenarios development for each province in Pakistan in the subsequent chapters of this book. In the final section, we emphasize on the historical development of the population policies in Pakistan during past six decades and shed the light on the causes of the failure of population policies in Pakistan.

2.1 Introduction

Pakistan is often perceived as a “failure state” rather than for its development. With a population to some extent less than half of that the United States in 2010 and in an area, approximately half of that the Iran, Pakistan is the 6th largest country in the world—with total population of 174 million in 2010. The critical challenges faced in Pakistan are rapidly growing population and a number of social, political and economic problems. On one hand, the society has religious and traditional in terms of family structure. On the other hand, it has enormous ethnic and cultural difference from North to south. It is also worth mentioning that large diversity existed within provinces in Pakistan in terms of demographic and socioeconomic characteristics—for instance in Punjab—southern part of the Punjab dominates with Sariaki speaking people. The significant gap found in socio-economic and demographic indicators between Punjabi and Sariaki ethnic groups within Punjab.

Pakistan comprises of both very small and large regions – one with less than eight million populations, i.e. Balochistan – and highly populated province such as Punjab with a population of 101 million in 2010 (nearly 60 percent of the total population of Pakistan). In 1998, Islamabad capital territory and Punjab were most densely populated areas in Pakistan with 888 and 359 inhabitants per square kilometer respectively, whereas the Balochistan has the density less than 20 inhabitants per square kilometer. Our focus of this study is to address the level and trends of socio-demographic indicators in Pakistan at the provincial level and long-term future challenges inherent to the current demographic constellation. This chapter serves as the base line of our population projections exercise in the following chapters of this book. We will discuss here the level and trends of the demographic variables (fertility, mortality and migration) at provincial level in Pakistan which is necessary to formulate the assumptions for demographic variables in the future for each province in Pakistan.

2.1.1 Administrative division in Pakistan

The total land area of Pakistan is 796,100 sq km and consists of Himalayas in the north to the Arabian Sea in the south, from the mountains of the Himalayas and the Hindu Kush was forming the border with Afghanistan and Iran in the west to the politically demarcated line partitioning the Punjab province and delineating Sindh boundary with India in the east. In addition, about one-third of the disputed state of Jammu and Kashmir, forming Azad Kashmir and the Northern Areas, has also territorial and politically attached to Pakistan.(See Figure 2.1). Pakistan has a federation of four provinces, a capital territory and a group of federally administered tribal areas (See Table 2.1).

Balochistan is the largest province of Pakistan with an area of 347,190 sq km. Punjab stands at the second position in terms of the land area (205,344 sq km). However, it has the highest share of the population—60 percent of the total population of Pakistan. Due to its population size, agricultural land and culture, Punjab is considered the hub of Pakistani culture. With one mega metropolitan city Karachi and sea port with premier commercial and industrial center, Sindh has an area of 140,914 sq km. Historically, KPK and Balochistan are traditional, religious and tribal societies. The two provinces

Figure 2.1: *Geographical Map of Pakistan, Source: Table 2.1*

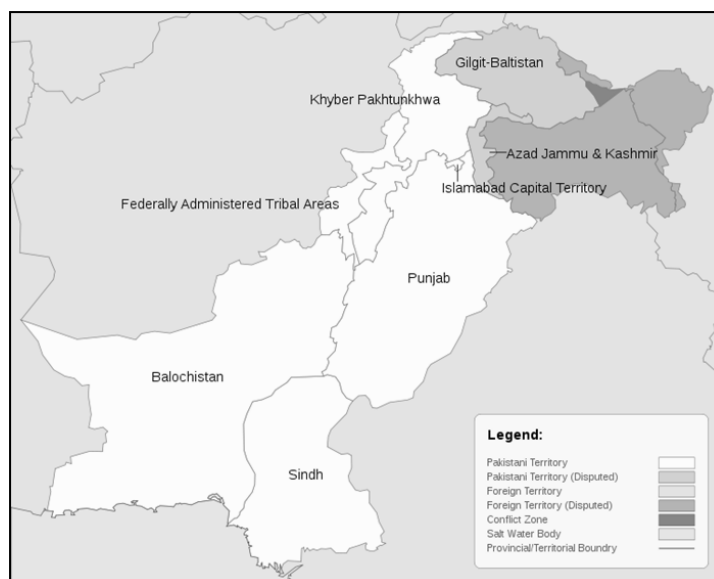


Table 2.1: *Administrative division in Pakistan*

Administrative Unit	Capital	Population (%)	Area (%)	Population Density
*Balochistan	Quetta	4.8	39.3	18.9
*Khyber Pakhtunkhwa (KPK)	Peshwar	12.9	8.5	238.1
*Punjab	Lahore	53.7	23.3	358.5
*Sindh	Karachi	22.2	16	216
Islamabad Capital Territory	Islamabad	0.6	0.1	888.8
FATA	-	2.3	3.1	116.7
Azad Kashmir	Muzaffarabad	2.2	1.5	223.6
Gilgit-Baltistan	Gilgit	1.3	8.2	24.8

FATA: Federally Adminstrate Tribal Area, Source: Wikipedia

*represent provinces

also includes the tribal territories which are self administrated, and bearers of distinct subcultures. Their strong family and marital traditions are the basis of their political and cultural role in Pakistan. Azad Kashmir and the Northern areas are nominally autonomous territories.

2.2 Pakistan Population–Past and Present

Historically, the population growth had been untamable in Pakistan during the second half of 20th century, albeit successive governments formulated various policies to cope with population explosion and promote family planning, particularly among females, but they had incapable of implemented these policies into action due to various political, social and cultural obstacles. The population growth rate of Pakistan incessantly increased in 1950s, approximately 27 percent gain had been observed in the population of Pakistan during 1951-61-from 33.7 million to 42.8 million and were attributed

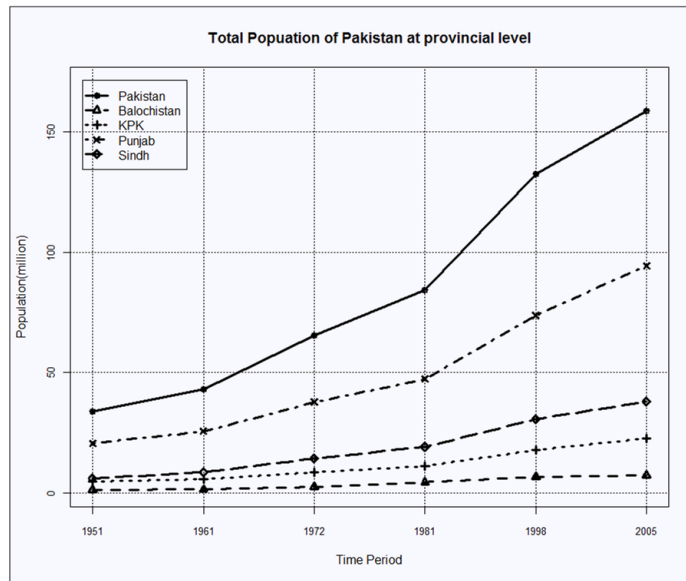
mainly by large scale migration after the partition of India and also due to mortality transition. During the next four decades (1970-2010), the population of Pakistan was growing rapidly, mainly due to high fertility. Consequently, the rapid population growth in Pakistan has unavoidable—increasing from 33 millions according to the first census taken in 1951 to 132 millions in 1998 and estimated at 173 millions in 2010. Thus rapid population growth has been a trait of Pakistani society in the 20th century in the post colonial period. The population growth rate is the key determinant of the progress in achieving the goals envisaged in every sector of society. With a soaring population growth rate of 2.16 percent in 2005-2010, the government of Pakistan faces the challenges of the provision of education, health care, housing and every other basic right while the economy remains under pressure.

Since Independence in 1947, the population growth has been rampant in each province in Pakistan. The population of Pakistan at provincial levels experiences rapid growth due to the mutual effect of declining mortality and slow decline in fertility. Figure 2.2 shows the population of Pakistan at the provincial level from 1951 to 2010. The population of Punjab increased rapidly from 20 million in the 1951 census to 102 million in 2010, while the share of the population of Punjab to the national level remains at one level - around 58 percent. The untamable population growth observed in Sindh is due to high levels of fertility and internal migration from the other parts of the country toward Sindh. The population of Sindh increased from 6 million in 1951 to 41 million in 2010 with a substantial gain in proportion to the national share from 18 percent in 1951 to 24 percent in 2010. The population of KPK and Balochistan was growing significantly over the last five decades. However, the share of the population of KPK and Balochistan to the total population of Pakistan has been stagnating during the last five decades. However, approximately four-times the growth of the population of KPK has been observed during the period of 1951 to 1998—from 5 million in 1951 to 18 million inhabitant in 1998 and 24 million in 2010. Interestingly, the population of Balochistan increased nearly six times during the inter-censal period from 1951 to 1998—from 1.2 million in 1951 to 6.6 million in 1998 and estimated total population of Balochistan in 2010 has 7.8 million inhabitants. Thus, rapid population growth has a universal phenomenon in Pakistan and each province experienced a significant growth during the last five decades.

2.2.1 Sustained Population growth since independence

During the second half of the 20th century, the population growth rate in Pakistan had been fluctuating between 2 to 4 percent per annum. Inter-censal annual growth rate is calculated for the period of 1951-61, 1961-1972, 1972-1981 and 1981-1998 from the census data provided by the Federal Bureau of Statistics Pakistan and shown in Figure 2.3. The annual population growth rate in Pakistan during the period 1951-61 was 2.4 percent. The significant population growth observed in the Sindh—the annual population growth during 1951-61 was 3.2 percent, due to the fact that the intensity of the migration after partition in 1947 toward Sindh is substantially high. Approximately, seven million people migrated from India after the partition in 1947 and most of them had settled in Karachi, Sindh (Visaria, 1969). The Punjab and KPK also witnessed a substantially high population growth rate during the period of 1951-61—more than

Figure 2.2: *Total Population Of Pakistan at provincial level from 1951-2005*



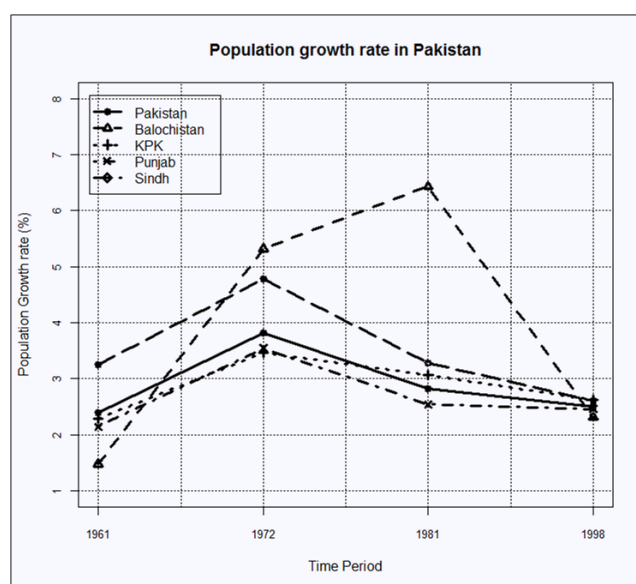
two percent in both provinces, whereas the Balochistan attained smallest population growth. The inter-censal period of 1961-72 in Pakistan regarded as a period of massive population growth. During this period, Pakistan experienced the rapid population growth rate, approximately four percent annually during the period 1961-72. Each province in Pakistan also bore significant population growth during 1960s. The population in Sindh and Balochistan increased nearly five percent annually during the period of 1961-72. However, nearly 3.5 percent rise in the population of KPK and Punjab had witnessed annually during the decades of 1960s.

The two major factors are responsible for rapid population growth in Pakistan at national and provincial level during the decade of 1960s. First, the objectives of the population policy were not clear enough and socio-economic development during the period had been scarcely improved particularly for less-developed provinces. Thus, the rapid population growth rampant everywhere in Pakistan in 1960s. Second, the two wars with India in 1965 and 1971 which accounts lot of casualties and prompted refugees in Pakistan. During the next two inter-censal period, the population growth rate had been declining systematically in all provinces in Pakistan except in Balochistan, where the population growth rate jumped during the period of 1972-81 and later had been level-off in next inter-censal period.

2.3 Diverse demographic transition

The demographic transition is a process where the societies make progress from traditional cultures-where birth and death rates are high - to the industrialized economic societies where birth and death rates are low (Lee, 2003). Before the onset of demographic transition, births were numerous, life span was short, economic growth was slow and population was young. In the beginning of demographic transition, first death rate and then birth rate declined, causing the population growth rate first to acceler-

Figure 2.3: Annual Population Growth rate

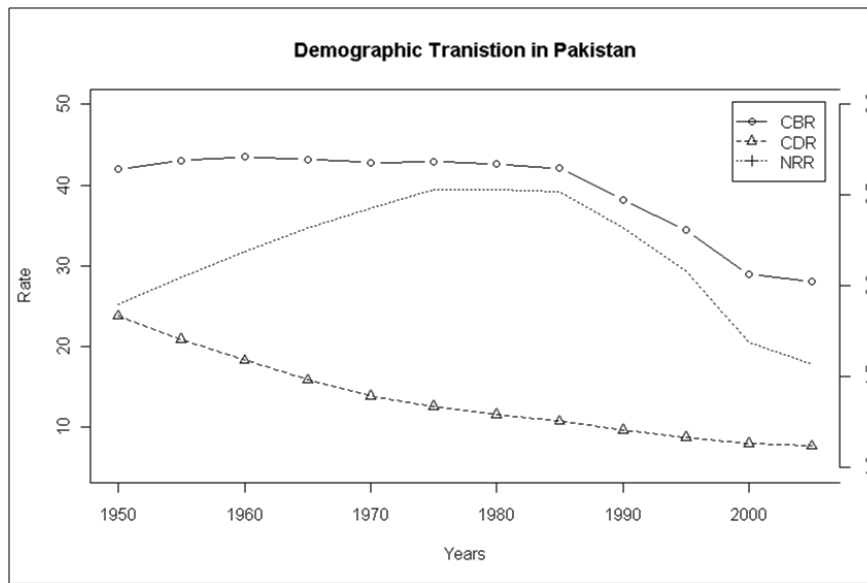


ate (creating young age structure of the population, this phenomenon being known as the demographic dividend) and then slow down. Furthermore, when the demographic transition well advances, this would cause lower birth rate, longer life expectancy and relatively older population. In the framework of demographic transition, education received a lot of importance because it proved that education (particularly female education) would increase the likelihood and the pace of the transition due to the relationship with fertility and mortality.

Based on several studies on the mortality in Pakistan after the independence, mortality had been declining since 1950s with an accelerated trend in the decades of 1960s (Yousuf, 1969; Davis, 1968). According to the figure 2.4, the demographic transition model during the second half of the 20th century in Pakistan indicates that the transition had not begun until the late 1980s. The mortality rate declined substantially during the last 50 years in Pakistan. For instance, in 1950s, the crude death rate (deaths per 1000 population) was 24 in Pakistan, which was very high among the other South Asian countries except Sri-Lanka at that time. On average, approximately 67 percent decline in the crude death rate occurred during the period of 1950 to 2005 in Pakistan. However, pace of the decline of crude birth rate in Pakistan until the late 1980s stagnated at or above 40 births per 1000 population. This high birth rate hindered the progress towards demographic transition in Pakistan. In the mid 1980s, the first evidence unveiled from Pakistan DHS that the fertility transition initiated in Pakistan and also confirmed from Figure 2.4. It is worth mentioning that approximately, 2 percent decline in crude birth rate in Pakistan had been observed from 1950 to 1980, and nearly 36 percent decline had attained from 1985 to 2005. Thus, it is evident that demographic transition in Pakistan had started in late 1980s and further quickened in the decade of 1990s.

The fact that the pace of demographic transition is also assessed by net reproduction

Figure 2.4: *The Demographic Transition in Pakistan, Source: UN 2010*



rate (NRR).¹ The NRR fluctuated around 2 to 2.5 in Pakistan until late 1980s due to the high fertility in the Past. NRR rose very rapidly from 1.82 percent in 1950-55 to 3.41 percent in 1980-85 and slowed down to the level of 1.8 in 2005-2010, due to the decline in a death rate while the birth rate remained high. Therefore, the demographic transition certainly has underway in Pakistan. The availability of the data on crude birth and death rates at the provincial level in Pakistan hindered the analysis to assess the demographic transition for each province. However, it is likely to assume that the demographic transition has initiated in each province in Pakistan with diverse pace.

2.3.1 Socio-economic Inequalities between Provinces

The geographical variation with demographic, economic and social heterogeneity at the provincial level in Pakistan goes simultaneously. Table 2.2 illustrates the socio-economic and demographic characteristics of Pakistan at the provincial level around the year 2005. The share of children aged 0-14 years was 38 percent in Pakistan in 2005. Punjab has the least share in Pakistan of children aged 0-14 years, due to the fact that Punjab has well advanced in fertility transition, whereas Balochistan has the highest share of children aged 0-14 years—43 percent in 2005. The majority of the provinces seen, on average, 58 percent of working-age population aged 15-64 in 2005 (see table 2.2). Balochistan considered less advance province in Pakistan in term of demographic transition and socio-economic development as compared to other provinces—the GDP per capita income was very low at US\$ 410 in 2005. The GDP per capita in Sindh is significantly higher in Pakistan—US\$ 760 in 2005—due to the fact that Capital of Sindh (Karachi) considered a larger hub of industries in Pakistan and only working seaport as well as known as financial capital in Pakistan. According to the Asian development bank (2005), the contribution of Karachi into the national

¹The NRR is defined as the average number of potential daughter would be born to a female during her reproductive life span conforming with the age-specific fertility and mortality rate in given years.

GDP of Pakistan was 20 percent in 2005 (ADB, 2005). Punjab is the second largest province in terms of GDP per capital income in Pakistan—580 US\$ in 2005.

Table 2.2: *Socio-demographic Characteristics of Pakistan, 2005*

Region	Pop. (%)		HDI	TFR	GDPpc	SRB	Population	Illiterate Pop (%)	
	0-14	15-64	2005	2006	US\$		Dent. 1998	Male	Female
Pakistan	38.1	57.8	0.48	4.1	600	108.5	166.3	30.3	51.6
Balochistan	42.9	54.2	0.56	4.1	410	114.6	18.9	45.7	69.5
KPK	41.1	55.1	0.61	4.3	480	105.0	238.1	28.9	61.9
Punjab	36.5	58.7	0.67	3.9	580	107.2	358.5	27.8	46.0
Sindh	39.3	57.3	0.63	4.3	760	112.2	216.0	34.1	56.4

Source: FBS , Govt. of Pakistan, PDHS 2006-07, UN 2010, UN HDI report (2008)

HDI = Human development Index, GDPpc = per capita GDP, SRB = Sex ratio at birth

The Human Development Index (HDI) is a summary indicator to access the social and economic progress in a given country. It consists of three dimension namely, education, health and standard of living to measure the socio-economic development². It is also used to address the policy questions that what is the level of human development beside the economic growth in a given country—because economic growth alone does not provide the guaranty that human development is also improved. For example during the decades of 1980s, economic growth in Pakistan had been very high in the history of Pakistan—nearly 6.6 percent GDP growth rate was observed during 1977-88 (Hussain, 2010). However, the human development was not impressive during the same period in Pakistan—i.e. the level of HDI was 0.38 in 1985³. Thus, it is evident that, economic growth is not solely responsible for the human development unless the other sectors also accelerated i.e. education and health. Pakistan is the least-developed region in the world after sub-Saharan Africa. In 2005, the human development index (HDI) was 0.48 in Pakistan—falling in the low human development category. Table 2.2 shows that the level of Human development Index at the provincial level in Pakistan in 2005. On average, each province in Pakistan has a medium HDI value ranging from 0.5-0.7. Balochistan is the least-developed region in the country with HDI value approaching 0.55 in 2005, whereas the Punjab is more advanced in terms of human development and standard of living with HDI value at 0.67. The data is also available at the district level in Pakistan for HDI. The Islamabad Capital Territory advanced in human development—the HDI value for Islamabad in 2005 was 0.80. The district of Karachi (Sindh) and Jhelum (Punjab) is well advanced in human development and socio-economic progress in Pakistan. These districts have been approaching a high HDI value (0.79 and 0.77 respectively) in 2005, whereas, the few districts in Balochistan and KPK at the bottom of the list (Jamal and Khan, 2005).

Pakistan is one of the highly densely populated countries in the world. Table 2.2 illustrates that the population density at provincial level in Pakistan from census 1998. In 1998, the population density was 166 per sq.km in Pakistan. The adjusted population density calculated (by Foubert and Murphy, 2009) consists of population density per sq.km of arable land. According to Foubert and Murphy (2009), the real population density in Pakistan was 834 per sq.km in 2005. Unfortunately, the recent data on population density at provincial level in Pakistan is not available. In 1998, a significant provincial heterogeneity existed for population density in Pakistan, which ranges from 358 inhabitants per sq.km in Punjab, to an average of just 19 inhabitants per sq.km in Balochistan. The fact that the low density in Balochistan the largest province, in respect to the land area and bears the lowest share of the population in Pakistan.

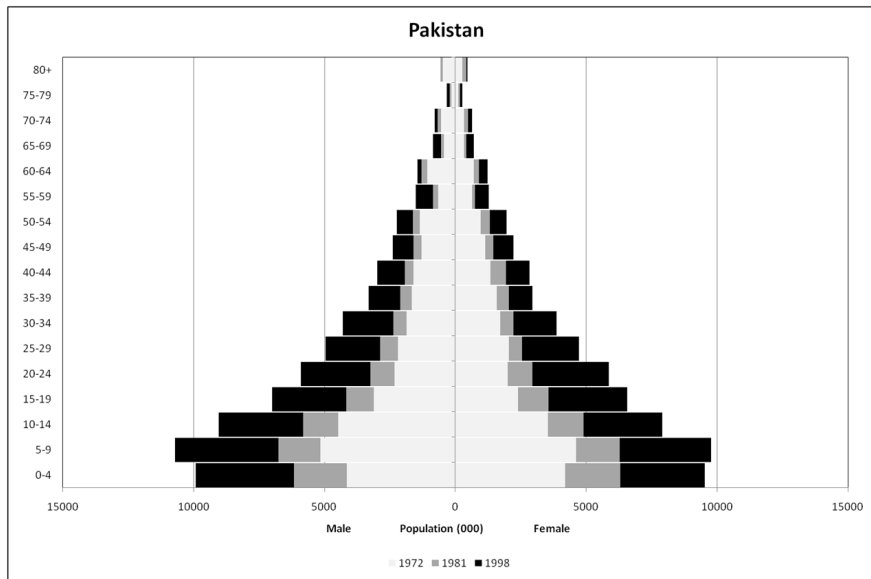
2.3.2 Evolution of Age and sex population composition

Age and sex population distribution is the most essential population characteristics, even more worthwhile than total population size. Age and sex composition of population provides the comprehensive picture of the population movement and characteristics of the population reproduction and consequently in terms of working-age

²<http://hdr.undp.org/en/statistics/hdi/>

³hdrstats.undp.org/en/countries/profiles/PAK.html

Figure 2.5: *Population of Pakistan by age and sex from 1972-1998*



population. Age and sex composition of the population consists of two factors; regular or evolutionary factor; which distinguish the smoothness of demographic processes and demographic transition, excluding any discontinuities. Second, the crisis factor which disturbs the normal demographic process such as war, famine and mass repression and massive migration; For example, migration after the partition of India and Pakistan in 1947. Keyfitz, 1987 has established the concept of demographic discontinuities to describe these interruptions. Demographic discontinuities caused by the sudden changes in fertility, as an illustration, (e.g. Baby boom in Europe) and mortality levels, for instance, (e.g. World War 1 & II, and Spanish influenza in 1920) of different cohorts that are affected by these distractions. In a long term, these demographic discontinuities generate the hump in age structures. In the following section, we will discuss the age and sex distribution of population in Pakistan at the provincial level.

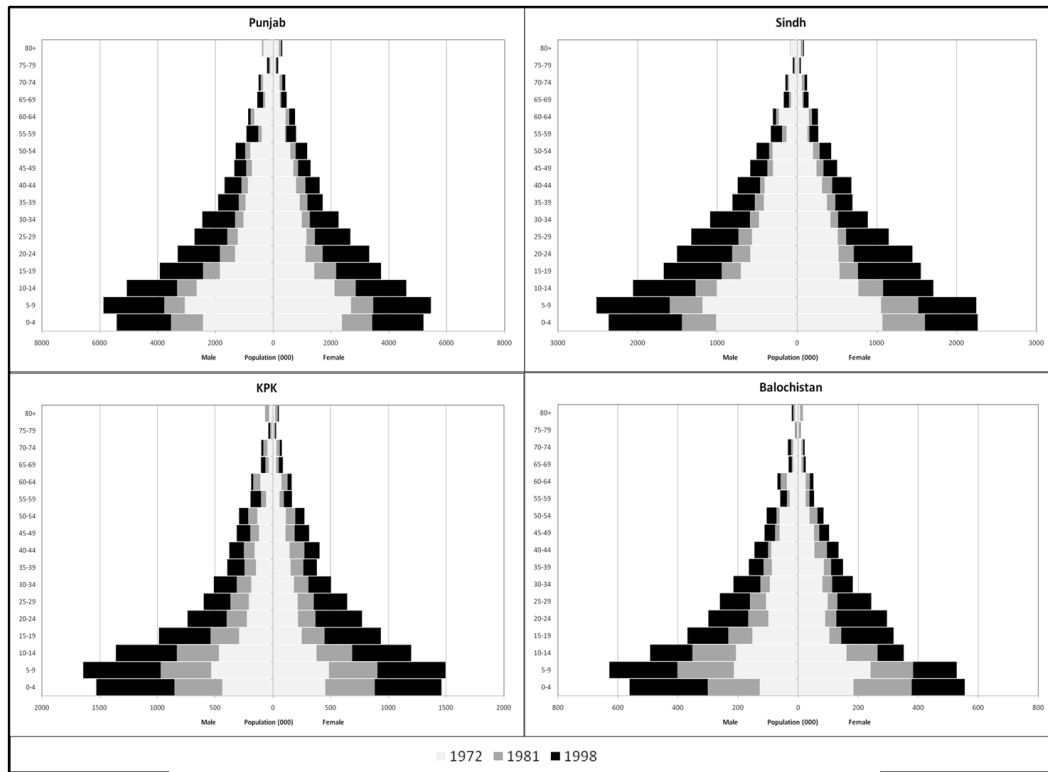
Pakistan is the youngest nation in the world after sub-Sahara African countries with a median age 21.2 years in 2010.⁴ We have calculated the Median age at provincial level in Pakistan for the year 2010 (United-Nations, 2010). Balochistan and KPK are the youngest provinces in Pakistan—the median age has 19.9 years in 2010 for both provinces. The median age is high in Punjab—22.3 years in 2010—because of the fact that Punjab has well advanced in fertility transition as compared to other provinces in Pakistan. Median age, a crude measure of young population reveals that three contrasting situations inherited from the process of demographic transition. The young population, contrasts observed in all provinces since 1972 where the fertility transition had hardly started until the 1990s, and the population was particularly young. In 1998, the Punjab and Balochistan were the youngest population (median age was 16.3 and 16.7 respectively), whereas in Sindh and KPK all of which engage in the fertility transition, median age was on average 18 years (See Table 2.3).

⁴http://en.wikipedia.org/wiki/List_of_countries_by_median_age

Since 1972, all provinces in Pakistan had the population with large proportion of young peoples aged 0-14 years. Table 2.3 illustrates the proportion of two broad age groups (0-14 and 15-64), median age and sex ratio at birth for each province in Pakistan during the last four decades. The highest share of the young population in last census 1998 observed in KPK—which increased from 45 percent in 1972 to 47.3 percent in 1998. The pace of growth for young population aged (0-14) is more rapid in Balochistan, 9 percent increase occurred in young population aged 0-14 year—from 42 percent in 1972 to 47 in 1998. The Punjab and Sindh had relatively a similar share of young aged children (0-14) in 1998—42.5 percent in Punjab and 42.8 percent in Sindh, respectively. Interestingly, the proportion of young population was stagnating during the last three decades in Punjab and Sindh (See Table 2.3). On aggregate level, the proportion of younger population under aged 15 years had more than 40 percent in all provinces in Pakistan during the last four decades. Furthermore, the proportion of working-age population people aged 15-64 increased during last four decades in all provinces except KPK where the proportion of working-age population actually declined. The further increase will be expected in all provinces due to the population momentum and slow pace of fertility decline that each province in Pakistan experienced in the recent past. The phase where dependency ratio (the proportion has above 60 percent for working aged and has less than 30 percent of young population aged 0-14) is very low regarded as “demographic window.” During this phase, countries have the opportunity for development, since the dependency ratio is low and expenditure of education and health of young children (aged 0-14) has negligible, health and pension costs of older people reduced the burden on the economic growth. Pakistan is now in a position to benefit from this opportunity, and this would be possible only as the working-age population must be employed and educated.

The population pyramid by age and sex for each province in Pakistan shows in figure 2.5 and 2.6 for the last three censuses of 1972, 1981, 1998. The base of the population pyramid of Pakistan prolonged since 1972 in response of high fertility. This pattern observed universally in Pakistan, and each province experienced a substantial rise in birth rate. Two main conclusions can be made here from population pyramid presented in figure 2.5 and 2.6. First, the young age structure is prominent in response of early phase of demographic transition. On one hand, the young population is an opportunity because if this large labor force is well educated, skilled and effectively employed, it could be a key asset for the country. On the other hand, the substantial concentration of people and working-age population (if not educated and unemployed) puts severe pressure on the government to provide basic needs for life, education, health and employment to their peoples. Second, each province in Pakistan has now well advanced in their fertility transition and enters into the phase of the demographic windows of opportunities. Due to the high fertility in the past, the large cohorts now enter into the childbearing age. This implies that two major conclusions here; one, Pakistan experienced a large youth bulge which is most favorable for socio-economic development. Second, due to the momentum of the population, rapid population growth would be unavoidable in near and distant future—at least 40 to 50 years—because the large youth cohorts would enter childbearing ages.

Figure 2.6: *Population by age and sex of Pakistan at provincial level from 1972-1998*



The population of Pakistan at the provincial level is also differentiated by sex ratio. The sex ratio is an important indicator to measure the sex imbalance. Sex ratio at birth is defined here as the number of females per 100 males. Table 2.3 presents the sex ratio at birth for each province in Pakistan for the period of 1998, 1981 and 1972. The sex imbalance at birth was affected in all provinces in Pakistan except Balochistan, where the female surplus was found during the last three census. The sex ratio at birth in Balochistan was in favor of female during last four decades, reflecting that infant mortality rate has been very low, particularly for girls. On the other hand, the sex imbalance prominent in other three provinces in Pakistan— the sex ratio at birth was 94 females per 100 male in KPK and Sindh in 1998, and slightly higher in Punjab in 1998. This indicates the stronger son's preference in these provinces. The large sex imbalance at birth was mainly due to the interplay of several factors, such as sex selective migration/abortion, and discrimination against girl children in these provinces.

Table 2.3: *Indicator of Age-sex composition of population in Pakistan at provincial level 1972-1998*

Region	Median Age			Population 0-14 (%)			Population 15-64 (%)			Sex ratio at birth		
	1972	1981	1998	1972	1981	1998	1972	1981	1998	1972	1981	1998
Pakistan	18.7	17.9	18.2	43.3	44.5	43.4	52.4	51.2	53.1	96.9	99.0	94.9
Balochistan	19.1	15.8	16.7	42.2	48.5	46.5	54.8	48.5	61.8	108.2	114.9	102.2
KPK	17.8	16.8	18.6	45.0	46.7	47.3	51.6	49.5	49.8	96.1	101.6	93.7
Punjab	18.7	18.4	16.3	43.2	43.4	42.5	51.7	51.7	53.4	96.0	92.9	95.2
Sindh	18.8	17.7	18.5	43.3	45.1	42.8	53.3	51.6	54.5	98.8	110.9	93.5

Source: Federal Bureau of Statistics, Govt. of Pakistan

2.3.3 Urbanization and urban population growth

Pakistan experienced rapid urban population growth and urbanization during the last four decades.⁵ Approximately, 18 percent of the total population in Pakistan had urbanized in 1951, and increased to 33 percent in 1998 and estimated the 35 percent in 2005 (United-Nations, 2010). The proportion of people living in urban dwelling increased sharply during the past fifty years in Pakistan. The urban population of Pakistan increased from 6 million in 1951 to 43 million in 1998, representing a nearly seven fold increase over five decades (see Table 2.4). Pakistan is a country in the South Asia region with the utmost percentage of urban population in 2005. Whereas, the lower level of urbanization observed in Sri-Lanka and Nepal, only 15 percent of the inhabitants has urban dwellers in 2005 (Veron et al., 2008). The major factors that are responsible for urban population growth in Pakistan were natural increase and internal migration. Recently, the urban population growth dominated by natural increase, and about one-fifth (1/5) of urban growth was attributed by internal migration (Arif and Hamid, 2009).

The profound heterogeneity in urban population existed at provincial level in Pakistan. Sindh is the most urbanized province of Pakistan mainly due to the share of the population of metropolitan city Karachi—which accounts for 33 percent of the total population of the province. In 1998, almost 50 percent of the population of Sindh lived in the urban areas⁶. Although, Punjab carries the highest number of urban population, it constitutes of only 32 percent of the entire population of Punjab. The share of urban population was 17 and 24 percent in KPK and Balochistan, respectively in 1998.

The pace of change in urban population in Pakistan differs greatly between the periods and provinces. For instance, particularly in Punjab, the pace of change very rapid during the inter-censal periods from 1951-1998. The urban population in Punjab was growing from 3.57 million to 5.47 million during the period 1951-61, and reached at 13 million and 23 million in 1981 and 1998, respectively. This represents 8 times increase in the urban population in Punjab from 1951 to 1998. The urban population grew rapidly in Balochistan from 1951 to 1998—approximately 10 times increase in urban population from 0.14 million in 1950 to 1.6 million in 1998. The growth of urban population in the remaining two provinces (KPK and Sindh) in Pakistan had moderate from 1951 to 1998—about 7 time increase. The urban population projection shows that about half of Pakistan's population will be living in cities by the year 2030. According to the United Nation forecast in 2009⁷, Pakistan will remain on the top of the list of most urbanized country in the South Asian region up to 2050, with nearly three in five inhabitants living in cities (60 percent of total population).

The huge diversity exists between the cities in Pakistan with respect to total population size. Karachi-capital of Sindh province—is the largest metropolitan city in Pakistan

⁵“The concept of ‘urban growth’ is different from ‘urbanization’, which refers to the rise in the proportion of total population living in urban areas due to rural-urban migration, whereas urban growth refers to the increasing population living in urban areas”.

⁶It is interesting to note that, by excluding the population of Karachi, the level of urbanization in Sindh declines to 28 percent.

⁷<http://esa.un.org/unpd/wup/unup/index.asp?panel=1>

Table 2.4: *Urban Population and Percentage of Urban Population at Provincial level of Pakistan 1951-1998*

Region	1951	1961	1972	1981	1998
Pakistan	5,985,497 17.7	9,654,572 22.5	16,593,651 25.4	23,841,471 28.3	43,036,404 32.5
Balochistan	144,549 12	228,468 17	399,584 16	676,772 16	1,568,780 24
KPK	504,745 11	758,516 13	1,195,655 14	1,665,653 15	2,994,084 17
Punjab	3,568,076 17	5,475,922 22	9,182,695 24	13,051,646 28	23,019,025 31
Sindh	1,768,127 29.2	3,167,018 37.9	5,725,776 40.4	8,243,036 43.3	14,839,862 48.8

Source: Federal Bureau of Statistics, Govt. of Pakistan, UN urban prospects 2009

with an estimated population of 10 million in 2000 and is include in the world's thirteen largest cities. Lahore-capital of Punjab-is second-largest city in Pakistan with 5.44 million inhabitants in 2000 and forecast shows that the population of Lahore would be 10 million inhabitants in 2030. It is also noteworthy that ten largest cities in Pakistan have the population greater than one million except Quetta and Islamabad in 2000 and projection shows that the enormous growth will be observed for the cities in Pakistan in the next two decades. The most spectacular growth over the last fifty years was observed in Lahore, the population increased from 0.83 million in 1950 to 5.45 million in 2000 and should be approximately doubled during the next two decades. The Faisalabad, second largest city of Punjab is most populous city in Northern Punjab. Almost twenty-fold increase has observed in the population of Faisalabad from 0.16 million to 2.14 million during the period of 1950-2000. The pace of population growth of Quetta has faster than that of Islamabad where population increased nearly six fold. The population of Peshwar and Rawalpindi grew by a factor of 10-12 times over the period of 1950-2000 (See Table 2.5).

Table 2.5 presents the percentage of the urban population of big cities in Pakistan from 1950 to 2030. The comparison in the last fifty years in Pakistan shows that, Karachi and Lahore have the largest urban agglomeration in Pakistan with 20.4 percent and 11 percent urban population in 2000 respectively, which is higher than the largest urban agglomeration in India (Delhi and Mumbai). The weight of the capital cities in their respective provinces to the total population of the Pakistan also varies. Karachi has the home of 7 percent of the population of Pakistan, while almost 4 percent of inhabitants of Pakistan live in Lahore. The Population of Peshawar and Quetta, the capital of KPK and Balochistan respectively, represents less than 1 percent of the Pakistan's population. Islamabad—the capital of Pakistan—has recorded the highest annual urban growth rate of 4.28 in the period of 2000-2005 mainly due to internal migration from other parts of the country.

Table 2.5: *Population change in selected largest cities in Pakistan between 1950-2005*

City	Population (000)				Percentage of urban population				Change 2000-05
	1950	1975	2000	2030	1950	1975	2000	2030	
Faisalabad	168	907	2140	4200	2.3	4.8	4.4	4.1	3.08
Gujranwala	118	427	1224	2464	1.6	2.3	2.5	2.4	3.26
Hyderabad	232	667	1222	2373	3.2	3.6	2.5	2.3	2.64
Islamabad	36	107	595	1295	0.5	0.6	1.2	1.3	4.28
Karachi	1055	3989	10021	18725	14.6	21.3	20.4	18.5	2.96
Lahore	836	2399	5449	10308	11.6	12.8	11.1	10.1	2.88
Multan	186	599	1263	2474	2.6	3.2	2.6	2.4	2.8
Peshawar	153	347	1066	2128	2.1	1.9	2.2	2.1	3.05
Quetta	83	190	614	1272	1.1	1	1.3	1.2	3.45
Rawalpindi	233	670	1520	3008	3.2	3.6	3.1	2.9	3.07

Source: Federal Bureau of Statistics, Govt. of Pakistan

Change: Annual Rate of change

2.4 Ethnic and religious Population composition in Pakistan

Pakistan is a multi-lingual and multi-cultural society. In Pakistan, ethnicity is closely bound up with provincial societies, which are further desegregated internally into tribes, caste, regional and local communities of distinct dialects of languages and traditions. The ethnic composition presents here is roughly based on the linguistic distribution of population. Ethnically, Pakistan's society is divided into six major groups, with each group having a distinct cultural and linguistic mores, namely as Punjabi, Sindhi, Pushtu, Baluchi, Saraiki and Urdu. Table 2.6 shows the ethnic-linguistic population composition in Pakistan from 1998 census. In the 1998, the largest ethno-linguistic group was Punjabi, who comprised 44 percent of the total population of Pakistan. The Punjabi speaking population mostly dominated in Punjab (about 75 percent of the population in Punjab has Punjabi dialect) following with 7 percent in Sindh in 1998. The second most commonly spoken language in Pakistan is Pushtu, nearly 15 percent of the population has Pushtu dialect in 1998. The Pushton speaking population mainly lived in KPK and Balochistan, 74 percent and 30 percent respectively. The third largest ethnic group in Pakistan is Sindhi; nearly 14 percent of the total population of Pakistan has Sindhi dialect in 1998 and residing in Sindh province (60 percent of the Sindh population has Sindhi language in 1998). Although Urdu is the official national language of Pakistan, only 8 percent of the population has a native Urdu speaking in Pakistan in 1998. The Urdu speaking population generally identified as the Muhajirs (the people who migrated after the partition in 1947) in Pakistan. The second largest ethnic group in Punjab is Saraiki, mainly situated in Southern Punjab. They consist of 17 percent of the Population of Punjab and nearly 11 percent of the total population of Pakistan in 1998.

The relationship of ethnicity and population growth is very strong in Pakistani setting. The conflict between the different ethnic groups had started from the colonial

Table 2.6: *Ethnic Population composition at regional level in Pakistan 1998 (%)*

Region	Urdu	Punjabi	Sindhi	Pushtu	Baluchi	Saraiki	Others
Pakistan	7.57	44.15	14.1	15.42	3.57	10.53	4.66
Balochistan	0.97	2.52	5.58	29.64	54.76	2.42	4.11
KPK	0.78	0.97	0.04	73.9	0.01	3.86	20.43
Punjab	4.51	75.23	0.13	1.16	0.66	17.36	0.95
Sindh	21.05	6.99	59.73	4.19	2.11	1.00	4.93

Source: Census 1998, FBS Govt of Pakistan

Table 2.7: *Religion Population distribution of Pakistan at provincial level: 1998*

Region	Muslim	Christian	Hindu	Qadiani
Pakistan	96.3	1.6	1.6	0.2
Punjab	97.2	2.3	0.1	0.3
Sindh	91.3	1.0	6.5	0.1
KPK	99.4	0.2	0.0	0.2
Balochistan	98.8	0.4	0.5	0.1

Source: Census 1998, FBS Pakistan

era and was flourishing after independence in 1947. During the British colonial period, the inequities of access to jobs, political power, cultural and religious autonomy were vital factors in the struggle for the independence of Pakistan. Among other factors, struggling for a better economic development, maintaining cultural and linguistic identity and political power were the motives that agitated ethnic interests. To maintain their identity, each ethnic group in Pakistan has focus on the higher number of children. This phenomenon has confirmed in the recent PDHS 2006-07, where the Saraiki speaking women have higher number of children—on average 6 children per women—in Punjab. In recent years, the Saraiki speaking people now demand for a separate province because of their economic and political power.

Islam is the state religion of Pakistan. Table 2.7 shows that the religious population composition of Pakistan at regional levels from 1998 census. Historically, Pakistan is an Islamic state with nearly 97 percent of its population is Muslim. The Christian and Hindu comprise remaining 3 percent of the total population. The Muslim population in Sindh has been least as compared to other provinces. The proportion of Muslim's population in Sindh was 91 percent in 1998. The majority of the Hindu population has lived in Sindh province (7 percent of the Sindh population) while they were very much a minority in other parts of the country. The proportion of Christians has been exceeding just over 2 percent in Punjab and almost a negligible share in remaining provinces.

2.5 Fertility transition in Pakistan at regional level

2.5.1 Tantalizing Fertility decline

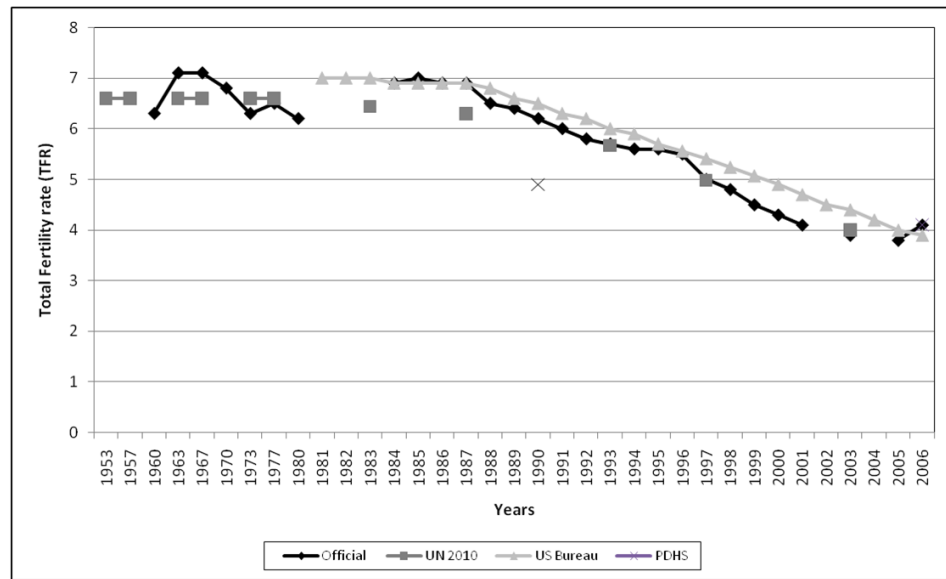
The measurement of the total fertility rates in Pakistan is relatively a complex task particularly at provinces level in past because information for the reproductive behavior of women has not been published in censuses. Virtually, there is no vital registration system existing in Pakistan. The only source about the reproductive behavior is from different surveys conducted at the national and international level. Figure 2.7 shows the total fertility rate in Pakistan from four different sources, namely Pakistan demographic and health survey (PDHS), UN 2010 World Population Prospects, US Census bureau and official estimates, published by the Federal bureau Statistics Pakistan based on different surveys conducted at the national level—such as Pakistan demographic survey (PDS). Total Fertility rate (TFR) in Pakistan had been very high during the decades of 1950s and 1960s ranging between six to seven children per women. According to a Population Growth experiment survey in 1962-65, indirect estimate of the TFR was 7.95 children per women in Pakistan. On average, TFR in Pakistan increased from 6.3 in the decade of 1960s to around 6.8 in the decade of 1970s (Sathar, 2007). In spite of the first family planning program implemented in Pakistan during the Ayub regime in 1965. Due to lack of funds, political instability, social and cultural obstacles, these programs were never successful during the 1960s and 1970s. There are several reasons of such high fertility in Pakistan during the decades of 1960s and 1970s. On the one hand, the religious parties and Zulfikar Ali Bhutto attached the family planning program as a part of the campaign against the Ayub Khan in 1970s, and giving the general public the idea that, family planning program had a western agenda against Pakistan. Thus, due to social-political changes during the decade of 1970s, family planning program became inactive during this regime.

The mean number of children per women fell sharply in late 1980s in Pakistan. The evidence of first fertility decline came out from the Pakistan demographic and health survey conducted in 1990-91, where the estimated TFR was 5.4 children per women.⁸ According to Figure 2.7, during the decade of 1980s, fertility declined sharply at a rate of roughly 20 percent based on the estimates from official sources in Pakistan. Whereas according to United Nations and the US census bureau, the decline was 18 percent during the decades of 1980s in Pakistan. Thus, there is an ample evidence that the fertility transition in Pakistan had begun in late 1980s and quickened further at a rate of one percent per annum during the decades of 1990s. It is worth mentioning that during the period of two Demographic and Health survey in Pakistan from 1990 to 2006, the total fertility rate declined one percent per year. It implies that with the same rate of decline, Pakistan will reach replacement level fertility in 20 years from 2005 (i.e TFR: 3.65 in 2005-2010 and with 0.07 children decline per year, TFR reaches 2.1 in 2025-30) which is far behind of the assumed year by United Nations 2010 World Population Prospects (UN assumed in 30 years; TFR: 2.1 in 2035-40).

Figure 2.8 illustrates the total fertility rate at provincial level in Pakistan from Pak-

⁸The estimates are based on six years preceding the survey

Figure 2.7: Total Fertility rate in Pakistan from 1950 to 2007



istan Demographic and Health Surveys (PDHS), which was carried out in 1990-91 and 2006-07. In 1990-91, total fertility rate in Pakistan at a national level was 5.4 children per woman. However, TFR had already slightly lowered—5.1 children per women—in the southern province of Pakistan (i.e Sindh). The spatial structure of Pakistan segregated into three groups based on their level of fertility transition and socio-economic development: a rapid fertility transition observed in Punjab and Balochistan during 1990-2006; to slow pace of decline experienced in Sindh during 1990-2006; and KPK stand in a middle position with moderating decline during the same period. The fertility transition in Punjab and Balochistan was significantly faster compared to other provinces in Pakistan. According to the PDHS, the total fertility rate fell sharply in Punjab and Balochistan at the rate of 28 percent and 29 percent, respectively during the period of 1991-2006—from 5.4 children to 3.9 children per women in Punjab and from 5.8 children to 4.1 children per women in Balochistan. The total fertility rate experienced a slow decline in Sindh during the period 1990-2006. Approximately, 16 percent decline in total fertility rate observed in Sindh—TFR from 5.1 children per women in 1990 to 4.3 in 2006. On the other hand, KPK accomplished a moderate fertility decline during the period 1990-2006. Roughly, 22 percent decline in total fertility rate notified in KPK—from 5.5 children per women to 4.3 during 1990-2006. The pace of the decline in Balochistan had rapid during the last two decades—29 percent from 1990 to 2006. Indeed, improved socio-economic development and educational level in Punjab assumed the vital factors that contribute in the fertility transition in Punjab. However, it is unclear yet in Balochistan and need further extensive research to explore the causes and determinants of fertility transition in Balochistan. The human development Index in Punjab is the highest value in Pakistan in recent years. The decline in fertility in Punjab was primarily achieved through contraceptive prevalence. However, age at marriage, infant mortality rate and female education also considerably improved in the recent past. Education reform program in Punjab has set up with the assistant of World Bank to promote literacy and universal primary enrollment particular for females in early 1990s. These programs

Table 2.8: *Total fertility rate in Pakistan at provincial level from 1990-2006*

Region	Total fertility rate		
	1990-91	2006-07	% decline
Pakistan	5.4	4.1	24
Punjab	5.4	3.9	28
Sindh	5.1	4.3	16
KPK	5.5	4.3	22
Balochistan	5.8	4.1	29

Source: PDHS

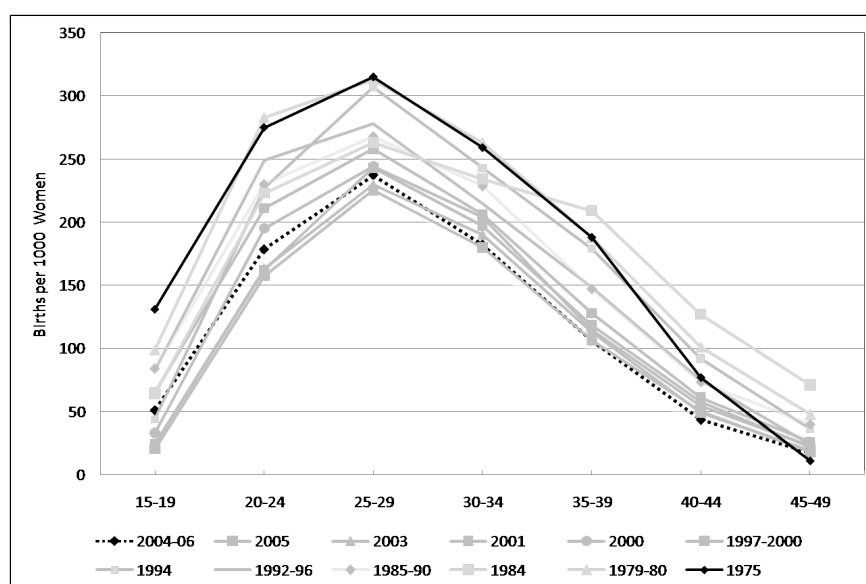
seem to have been more important as compared to specific family planning program initiative to convince the couples about the quantity-quality trade-off of children, a well-known factor in fertility reduction. The level of socio-economic development and urbanization has not a sole factor for accelerating the fertility transition in Punjab and Balochistan. This needs a further call for investigation about the determinant of the fertility transition at the provincial level, particularly in Punjab and Balochistan.

2.5.2 Age specific fertility rate

The Pakistan DHS reveals that the progress of fertility transition in Pakistan and suggested that the age pattern has remained in place. The pattern of age specific fertility rate in Pakistan during the period from 1975 to 2006 is based on the several sources at a national and international level and shown in figure 2.8. In 1975, teenage births in Pakistan had very common factors and was significantly at higher level. The fertility decline has observed at all ages during 1975 to 2006, however, the high fertility seen in the age group 25-29 (237 births per 1000 women). Figure 2.8 shows the timing of childbearing in earlier ages during the mid 1970s, and thus moved the fertility upward. Higher level of teenage births and substantially higher level of fertility from the age group 25-29 onwards were reflecting the lower level of contraceptive prevalence and an early age at marriage in respective age groups in Pakistan. In 1975, the highest age specific fertility rate observed for age group 25-29 in Pakistan (above 300 births per 1000 women) and explained by the fact that the contraception prevalence among married women was very low at that time. The relatively high fertility kept constant for age group 25-29 throughout the decades of 1970 and 1980 in Pakistan.

Although, the TFR declined steadily during the period from 1975 to 2006, age pattern did not shift toward the latter childbearing and explained by the fact that fertility preference has not changed and ideal family size still high in Pakistan. The fertility rate was very high in Pakistan in teenage, slightly over 100 births per 1000 women in 1975 and 50 births per 1000 women in 2006-07 for age group 15-19 (See figure 2.8). This explains the fact the early marriages are very common throughout the history of Pakistan. The age-specific fertility rate in Pakistan is a characteristic of population where later entry into childbearing, substantially low age at marriage and use of contraception in the early years of marriages has not been yet widespread particularly, in rural areas of Pakistan. It shows that at all ages the fertility of women in Pakistan and

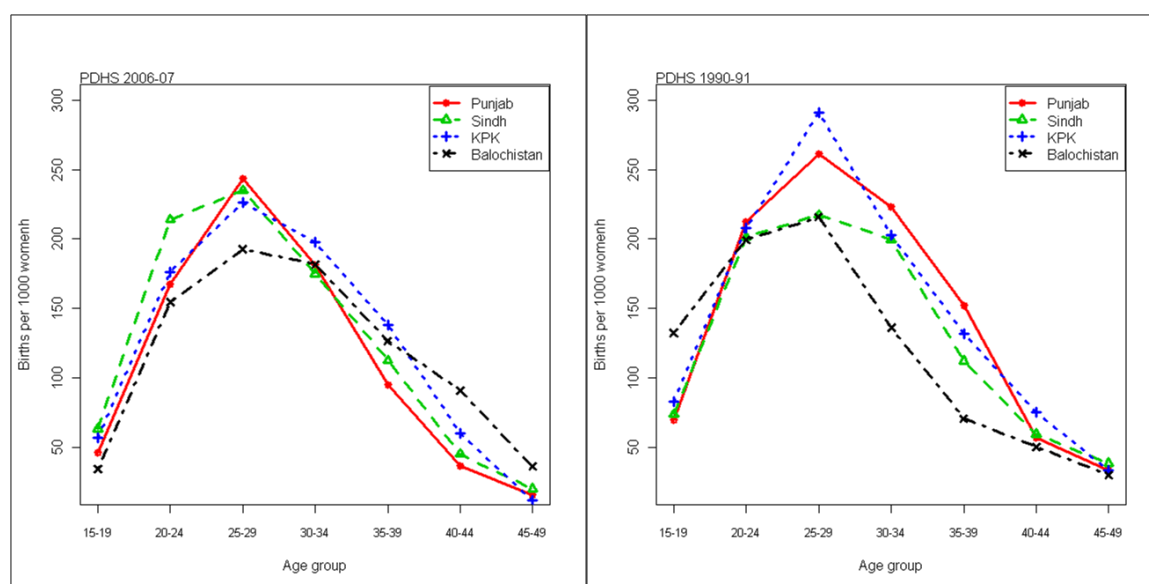
Figure 2.8: Age specific fertility rate in Pakistan from 1975-2006



likely for all provinces declined. However the pattern of the fertility curve is the same and only the level of fertility curve declined. This pattern of the fertility curve may bring down by rising age at marriage and relatively high prevalence of contraception practiced by older women. The vivid fertility decline in all age groups in Pakistan during 1975 to 2006 suggested that simultaneously, young couples were starting their childbearing later, married women were postponed their births afterward and older women were stopping their childbearing. Figure 2.8 shows this behavior that explains the moderate decline in total fertility rates that had occurred in Pakistan since the late 1980s.

Figure 2.9 shows the age-specific fertility rate at the provincial level in Pakistan during the last two decades. The trend of the age specific fertility rates at national and provincial level in Pakistan resembled during last two decades - concentrate in the early and middle ages of childbearing before the transition start in the late 1980s, a decline start in 1990s followed by a slow decline during 1990 to 2006. At provincial level, fertility declined at all ages during 1990 to 2006. In Punjab, fertility rate was at its peak at age 25-29 (261 births per 100 women) followed by age group 30-34 (223 births per 1000 women) in 1990. The shape of the age-specific fertility curve has similar characteristics in the 2006 curve, highest fertility rates recorded in the age group 25-29 (243 births per 1000 women). The teenage childbearing is common in every province in Pakistan, where the median age at first marriage of women age 25-49 in Pakistan has 19.1 years (PDHS 2006-07). The median age at first marriage is very high in Punjab (19.6 years) and lowest in Sindh (18.1 years). Interestingly, in Balochistan, the teenage births was high as compared to other provinces in 1990-91 (132 births per 1000 women), Whereas, in 2006 the fertility rate in Balochistan for age group 15-19 has lowest in Pakistan (34 births per 1000 women). Thus, Pakistani women had a relatively early childbearing pattern until 1990s although the pro-natalist policies adopted by the government of Pakistan since 1965. This pattern did not sustain longer. As the age at first marriage increased, fertility shifted to a relatively later childbearing pattern.

Figure 2.9: Age specific fertility rate at the provincial level in Pakistan from 1990-2006



2.5.3 Total fertility rate by background characteristics in Pakistan

Based on the experience of other contemporary less-developed countries, the substantial difference exists in urban-rural fertility. For instance, if a country is in early or middle stage of the transition, the difference is significant (for example, in Pakistan, the difference of urban to rural TFRs has 1.0 children per women in 2006-07), while on the other hand, if the country is well advanced in demographic transition, the difference is negligible (e.g. In Iran, the difference of urban-rural TFRs has 0.4 children per women in 2006-1.7 and 2.1 children per women in urban and rural areas respectively; Abbasi-Shavazi et al. (2009)). Table 2.9 sheds the light on the trend of TFR by woman's place of residence and educational level in Pakistan from 1990-2006. Here, we examine the urban-rural fertility differentials in Pakistan at the provincial level during the last two decades. The urban population growth has been very rapid in Pakistan during the last four decades. During the decade of 1970s, the urban fertility had slightly lower the rural fertility in Pakistan (Yusuf and Retherford, 1981). They had estimated that in 1975, the total fertility rate in rural and urban areas in Pakistan had 6.98 and 7.07 respectively. The table 2.9 shows that the substantial fertility differentials observed by place of residence in Pakistan at the provincial level. The total fertility rate in urban areas has less than rural areas by 1.2 children per women in Pakistan. As depicted, fertility rates were much higher in rural areas than in urban areas during 1990-2006. The difference of 1.0 child per women between urban and rural areas in Punjab, 1.7 in Sindh, 0.9 in KPK and 1.0 child per women in Balochistan has observed (See table 2.9). Table 2.9 shows that urban areas are at the forefront of fertility decline with fertility going down by more than a child in all provinces (except KPK where the decline is 0.9 child) from 1990 to 2006.

The survey data on fertility levels by women's educational attainment detailed in Table

Table 2.9: *Total fertility rate by background characteristics in Pakistan at provincial level: 1990-2006*

Region	Years	Place of Residence		Level of Education			
		Urban	Rural	E1	E2	E3	E4
Pakistan	2006-07	3.3	4.5	4.8	4.0	3.1	2.3
	1990-91	4.5	5.1	5.2	4.3	4.0	2.9
Punjab	2006-07	3.4	4.4	4.7	4.1	3.3	2.4
	1990-91	4.7	5.3	5.4	4.2	4.4	3.7
Sindh	2006-07	3.2	4.9	4.8	3.9	2.8	2.2
	1990-91	4.3	4.4	5.2	4.5	2.9	-
KPK	2006-07	3.7	4.6	4.9	3.6	3.3	2.4
	1990-91	4.5	5.4	5.5	3.7	3.4	-
Balochistan	2006-07	3.4	4.4	4.4	3.2	3.0	1.3
	1990-91	4.6	4.1	4.4	4.3	-	-

Source: Author's Calculation from PDHS, 1990-91 and 2006-07

E1= No education, E2= Primary, E3= Secondary, E4= Tertiary

2.10 show a consistent difference of 2-3 children between those women who did not receive any education, and those who received a secondary or post-secondary education. In 2006, the latest study available on fertility differentials by education showed that those are quite significant in Pakistan, with women with no education having more than twice the fertility of those who have a university education. This negative relationship between education and fertility recognized in all countries at all stages of development, particularly very strong in those countries that are in the middle of the demographic transition (Cleland, 2000; Martin and Juarez, 1995), as is currently Pakistan. Soomro and Mahmood (2004) argue that any family planning program in Pakistan would be weak in reaching illiterate women and therefore investment in female education should be prioritized. The educated couples will be more prone to use modern birth control techniques, towards which they will have a better perception and an easier access than less educated couples (Saleem and Bobak, 2005). Thus, if the woman's education was improved, significant decline in fertility and consequently in population growth would be achieved (see Abadian, 1996; Jejeebhoy, 1995; Martin and Juarez, 1995 on relationship between women's education and fertility).

The educational differentials in fertility were quite high in Pakistan at the provincial level during last two decades. Table 2.9 illustrates the differential by level of education at the provincial level in Pakistan from 1990 to 2006. The differentials by educational level have very wide in Pakistan in 2006-07; women with no education have on average 4.8 children versus only 2.3 children of women who had a university degree. During the period of 1990-2006 in Pakistan, 8 percent decline in TFR of women with no education has observed. Whereas, the intriguing decline of 21 percent happened in fertility of women with tertiary education in Pakistan. In Punjab, the difference of 2.3 children per women observed in TFR between the women with no education and tertiary education in 2006-07. However, in Sindh, the difference of 2.6 children between women with lowest and highest educational levels observed in 2006. Consequently, women with no education on average have more than twice the fertility of those with

Table 2.10: *Total fertility rate (TFR) by level of educational attainment from 1975-2006-07*

level	1975 ^a	1990-91 ^b	1997 ^c	2006-07 ^b
No Education	6.5	5.7	6.0	4.8
Primary	5.9	4.9	4.9	4.0
Middle		4.5	4.4	3.2
Secondary	3.4	3.6	3.1	3.1
Tertiary			3.5	2.3
Total	6.3	4.9	4.0	4.1

Note:(a) Pakistan Fertility survey, (b) PDHS

(c) Pakistan Fertility and family planning survey

a tertiary education in each province in Pakistan, who already have close to replacement level fertility in 2006-07. This low fertility level of tertiary educated women means that although few women have a tertiary education, the opportunities of the higher-education act as disincentives to “investing” in having many children. Thus, if the education of women was to increase, an important decline in fertility would potentially follow.

2.5.4 Proximate Determinants of fertility

There is an ample evidence found in the literature that changes in socio-economic factors often accounted for changes in reproductive behavior of the women. These factors cannot affect directly, but through intermediate variable which Bongaarts, 1978 named as “proximate determinants.” The most imperative are of which relate to marriage, contraception and breastfeeding. The national population policy of various countries has attempted to reduce population growth through these proximate determinants, such as fixing the minimum legal age of marriage of women, the availability of family planning and access to legal abortion. In the following sections, we will discuss the proximate determinants of Pakistan at provincial level.

2.5.4.1 Marriage

The marriages are the social and religious compulsions in Pakistan. The births outside marriage have very rare and unacceptable in Pakistani culture. The length of the period of women in childbearing influences the number of the children women can bear. Therefore, in this context, age at marriage plays a vital role in fertility transition in Pakistan. In Pakistan, marriages are virtually universal and considered as the onset of childbearing in the society. Thus, women who get married early will have longer years of exposure for pregnancy that often leads the higher fertility. Currently, the minimum legal age at marriage in Pakistan is 18 years for male and 16 years for female. Table 2.11 illustrates the median age at first marriage and first birth among ever married women aged 25-49 by background characteristics, at provincial level and at national level in Pakistan for the period of 1990-91 and 2006-07. It shows that median age at marriage in Pakistan very likely to rose over time—from 18.6 year in 1990-91 to 19.1 years in 2006-07. This tendency is likely to accelerate into the future because the level

Table 2.11: *Median age at marriage and birth at provincial level in Pakistan: 1990-2006*

	Median Age at 1st marriage		Median Age at 1st birth	
	2006-07	1990-91	2006-07	1990-91
Pakistan	19.1	18.6	21.8	21.3
Punjab	19.6	19.0	22.1	21.6
Sindh	18.1	17.1	21.1	20.6
KPK	18.7	19.3	21.2	21.4
Balochistan	19.3	17.7	22.3	20.3
Urban	19.7	19.1	22.2	21.3
Rural	18.8	18.4	21.5	21.3
No Education	18.7	18.3	21.0	21.0
Primary	19.8	18.7	21.8	21.1
Secondary	22.0	22.5	23.0	24.0

Source: PDHS: 2006-07 & 1990-91

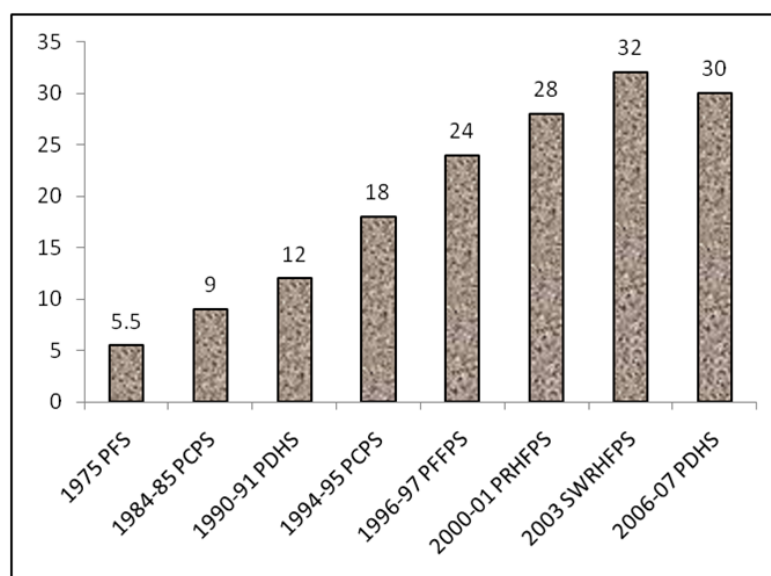
of education and empowerment of women increases. Age at marriage in urban areas is slightly higher than rural areas in Pakistan during the period of 1990-2006. The difference of a 0.9 year in age at marriage is observed between urban and rural areas in 2006-07, while a 0.7 year difference is notified in 1990-91. Education considered the strongest factor of heterogeneity in age at marriage in Pakistan. A woman with no education tends to marry earlier than women with higher education—3.3 years difference in age at marriages between women of no education and women with secondary education in 2006-07 (See table 2.11). At provincial level, women in Sindh tend to marry earlier as compared to other provinces in Pakistan (18.1 year in 2006-07). The age at marriage has been highest in Punjab in 2006-07 (19.6 years). The women in Punjab want to marry later because of the improvement in educational level in recent decades, particularly for females. The important factors that explain the rise of age at marriages at the provincial level in Pakistan are female education and labor-force participation.

Table 2.11 also shows the age at first birth in Pakistan was quite high as compared to age at marriage. In 2006-07, on average, the Pakistani women give their first birth 2.7 years after first marriage. This trend is common among women in urban and rural areas in Pakistan. At the provincial level in Pakistan, the duration varies between 2.5 to three years in 2006-07. Since the age at first marriage increased, the age at first birth also mounted over time. With continuing socio-economic development, particularly female education and integration of mass media with more advanced urban-values, there is a considerable increase in age at marriage and consequently further prolonging the age at first birth in Pakistan will have been inhibiting influence on the fertility transition.

2.5.4.2 Contraception

The success story of family planning program in Pakistan has not been stunning, although Pakistan became one of the first countries in South Asia to launch a family

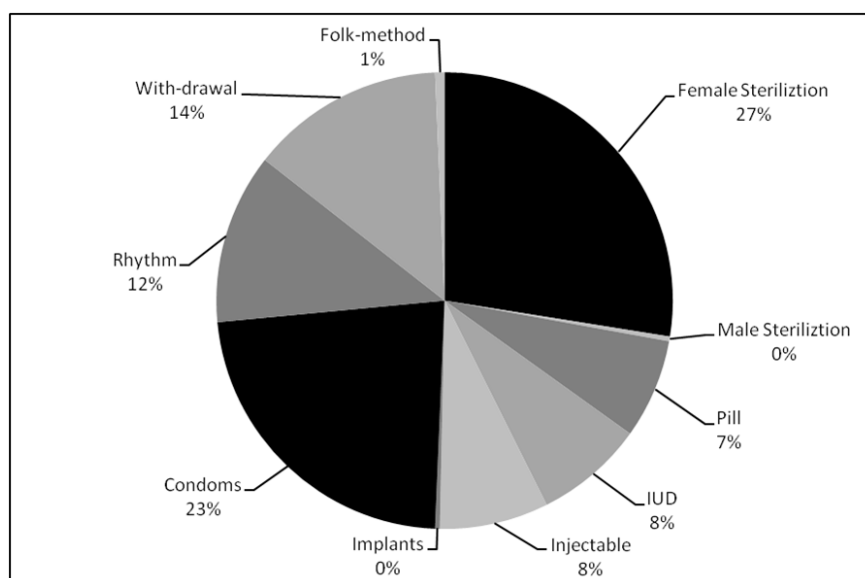
Figure 2.10: *Trend in Contraception Use (in percent) for both Modern and Traditional methods in Pakistan: 1975-2006; Source: PDHS 2006-07 & 1990-91*



planning program in 1965. During his tenure, President Ayub (1958-1969) referred to the consequence of rapid population growth in Pakistan and the need of the family planning program. Thus, in third five year plan of Pakistan (1965-70), the family planning program was installed. The program had not been successful during the decades of 1960s and 1970s due to many social, political and religious obstacles. As shown by figure 2.10, the CPR had 5.5 percent among currently married women in 1970s. During next two decades (1969-88), the inconsistency of political support and lack of access of family planning in Pakistan was widely noted (Rukanuddin and Hardee-Cleaveland, 1992; Mehmood and Ringheim, 1996). Soon after Ayub Khan in 1969, neither President Yahya Khan (1969-71) nor Prime Minister Zulfikar Ali Bhutto (1972-77) had shown fragile interest in promoting family planning in Pakistan. The President Zia-ul-Haq (1977-88) period considered the most fundamental and Islamization era with a little public and political support of family planning in Pakistan. However, during the next decade (1988-99), the family planning programs shown increasingly positive public and government support and CPR increased significantly.

Figure 2.10 shows the trend of the contraception use in Pakistan for currently married women using any method from 1975 to 2006. The percentage of currently married women who use any contraceptive method increased from 5.5 percent in 1975 (Pakistan Fertility survey) to 30 percent in 2006-07 in latest PDHS. The contraception prevalence rates had hardly changed during the period of 1975-1991 and consequently, the marital fertility transition did not start significantly until the late 1980s. A contraceptive prevalence rate (CPR) increased from 5.5 percent in 1975 to 12 percent in 1990-91 and was the evidence of beginning of fertility transition in Pakistan particular, for marital fertility. The decade of 1990s were the period of secular departure from this trend—the CPR increased significantly by more than twice during 1990s—from 12 percent in 1990-91 to 28 percent 2000-01 (PFFPS). The SWRHPS 2003 shows

Figure 2.11: *Distribution of the contraception method (Modern and Traditional) in Pakistan: 2006-07; Source: PDHS 2006-07*

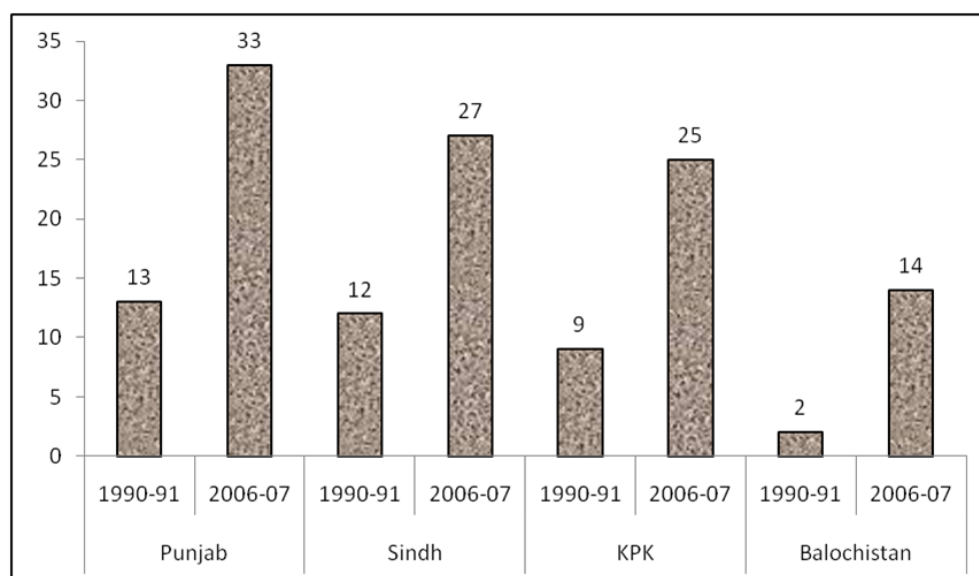


a contraceptive prevalence rate (CPR) rose to 32 percent (NIPS 2007). However, the Pakistan Demographic Health Survey (2006-07) shows the stagnation (even reversal) in overall CPR in Pakistan, and signifies that the CPR declined to 30 percent. The two percent increase per annum in CPR during the 1990s shows the strong political commitment to curb population growth in Pakistan and public support for family planning. However, in the recent years, the CPR slowdown because a significant proportion of women that had used contraception, and discontinued use.

Figure 2.11 breaksdown the contraceptive usage in Pakistan by the different method (Modern and Traditional) of the married women in reproductive age in 2006-07. The sterilization methods for birth control is very popular in Pakistan in recent years—about 27 percent of the married women use female sterilization method as a means of limiting their family size. On the other hand, though male sterilization has a less acceptable method for birth control because of the male dominance in society. The uses of condoms are second most accepted way for hindering births in Pakistan—23 percent of married women used condoms in 2006-07. Recently, the modern contraception methods among Pakistani women have been less common, except for female sterilization and condoms. The traditional ways are famous (14 percent and 12 percent of with-drawal and Rhythm respectively) with married women in Pakistan. The higher prevalence of natural methods have been observed in Pakistan, as compared to any other South Asian countries. In 2006-07, the natural methods (condoms, withdrawal and Rhythm) were accounted for 39 percent of the total contraception prevalence rate in Pakistan.

The CPR was not available at the provincial level in 1970s and 1980s. Thus, it is difficult to access the level and trends at provincial during the decades of 1970s and 1980s. Figure 2.12 shows that the trend of contraception prevalence (from Pakistan Demo-

Figure 2.12: *Trend in contraception prevalence rate (in percent) at provincial level in Pakistan: 1990-2006; Source: PDHS 1990-91 & 2006-07*

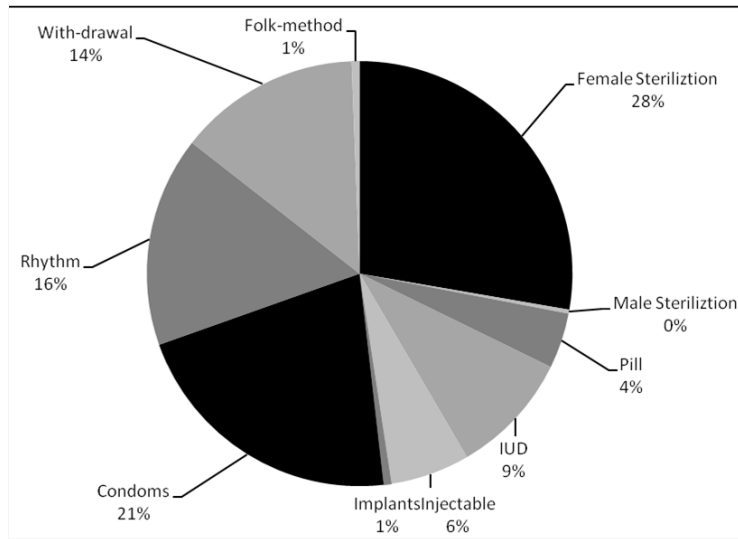


graphic and Health Survey) at the provincial level in Pakistan for currently married women using any method from 1990 to 2006. The figure 2.15 reveals that the contraception prevalence in every province in Pakistan increased over time as observed at the national level in Pakistan during the past two decades. The percentage of currently married women who used any contraceptive method increased from 13 percent in 1990-91 to 33 percent in 2006-07 in latest PDHS in Punjab—more than three times increase in CPR was observed. The percentage of contraception users for any methods has been higher in Punjab (33 percent) and lowers in Balochistan (14 percent) in 2006-07. A contraceptive prevalence rate (CPR) substantially increased during the last two decades, was the evidence of beginning of fertility transition in Pakistan at the provincial level as well. The raise of one percent per annum in CPR recorded in Punjab during 1990-2006. Whereas, less than one percent per annum was notified in the remaining provinces in Pakistan during the same period.

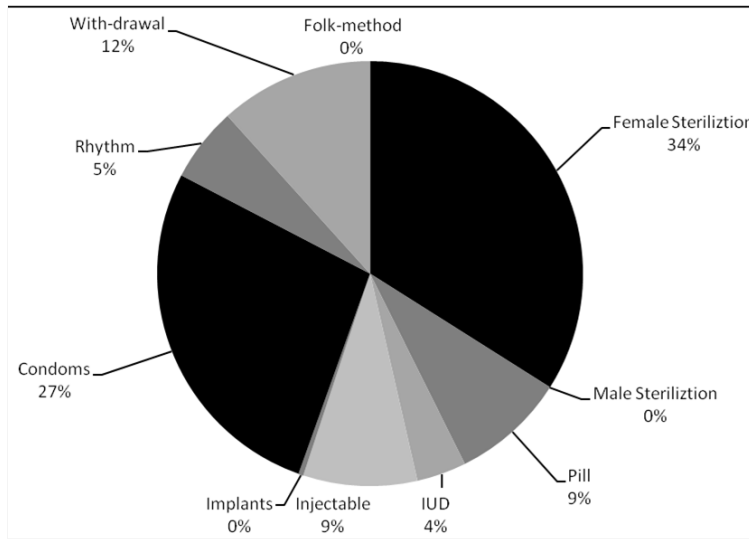
Figure 2.13 illustrates the contraceptive prevalence in Pakistan at provincial level by the different method (Modern and Traditional) for married women in reproductive age in 2006-07. The female sterilization has the dominant method of contraception in Punjab and Sindh—about 28 and 34 percent of the married women respectively. The condoms and with-drawal in the KPK and pills and female sterilization in Balochistan have the foremost way of controlling family size. It is worth mentioning that the modern contraception methods among women in KPK and Balochistan have been less common, except that being compared to Punjab and Sindh.

Figure 2.13: breakdown of methods of contraception at provincial level in Pakistan: 2006-07; Source: PDHS 2006-07

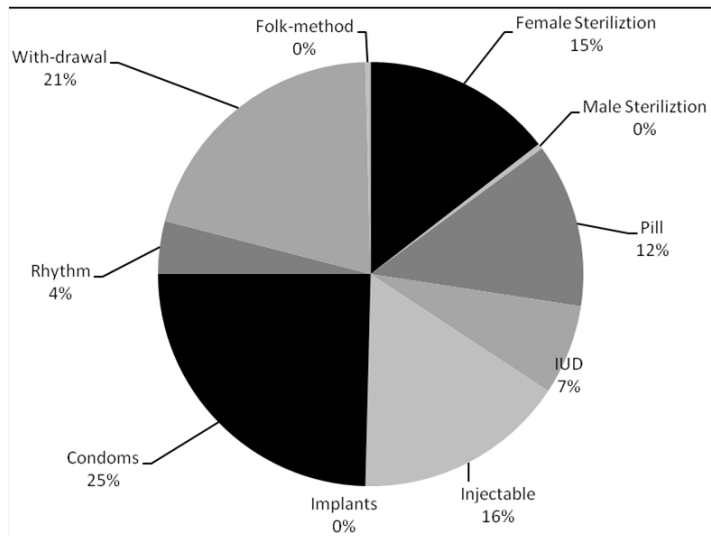
(a) Punjab



(b) Sindh



(c) KPK



(d) Balochistan

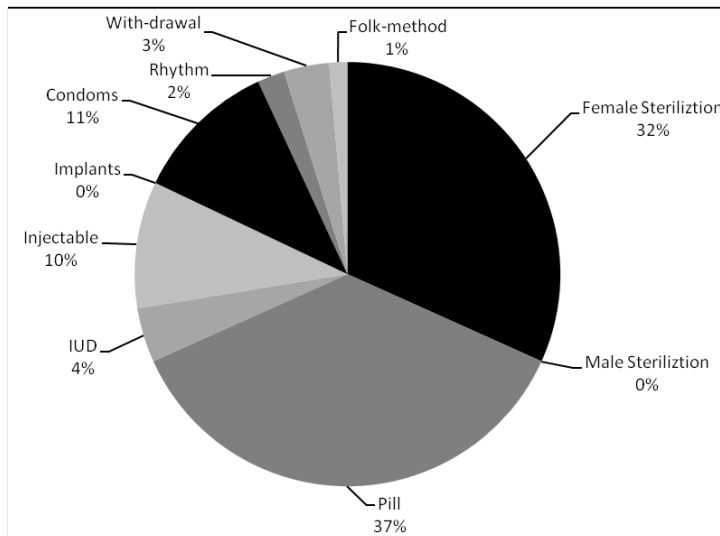


Table 2.12: *Percentage of currently married women aged 15-49, who want no more children*

No. of Living Child	2	3	4	Total
PDHS: 2006-07				
Pakistan	26.6	54.5	73.1	51.6
Punjab	29.0	57.8	78.6	54.4
Sindh	26.1	55.3	68.7	48.4
KPK	21.3	47.0	65.9	50.0
Balochistan	12.7	20.5	40.4	36.6
PDHS: 1990-91				
Pakistan	16.6	35.8	51.5	39.9
Punjab	17.6	40.8	60.4	44.4
Sindh	15.4	33.0	39.5	35.8
KPK	19.2	26.6	41.7	36.7
Balochistan	0.5	2.8	15.7	9.2

Source: PDHS

2.5.4.3 Fertility preference

The fertility preference of women is of fundamental importance in formulating the population policies and family planning program for future reproductive patterns and level. Furthermore, a detail study of the fertility preference of the population is crucial for determining the unmet need of family planning and predicting for future fertility level. Table 2.12 illustrates that the percentage of currently married women aged 15-49 years want no more children at the provincial level in Pakistan from 1990-2006. At the national level in Pakistan, the proportions of the women who want no more children significantly increased during last two decades. The increase of eleven percentage points of women who want no more children was observed from 1990 to 2006 (from 39.9 percent in 1990-91 to 51.4 percent in 2006-07). At the provincial level in 2006-07, the women in Punjab who most likely want no more children, while the women in Balochistan do (54.4 percent and 36.6 percent respectively). Moreover, the table 2.12 indicates that women in Punjab desire to limit childbearing at lower parities as compared to women in Balochistan. For instance, in 2006-07, 58 percent of women who have three children in Punjab want to stop childbearing whereas, the proportion of women in Balochistan has 20 percent—nearly three times less as compared to Punjab. The progress becomes significant in Balochistan. The rapid increase of the percentage of women who want no more children in Balochistan observed during 1990 to 2006 rose nearly four times from 9.2 percent in 1990-91 to 36.6 percent in 2006-07.

We focused here on the three indicators for fertility preference in Pakistan, namely, the mean ideal number of children, unmet needs of family planning and wanted total fertility Rate (WTFR). Table 2.13 shows three indicators of fertility preference for currently married women aged 15-49 in Pakistan at the provincial level from 1990 to 2006. The vital concern of the family planning and maternal health services is to identify the potential demand and need of contraception among married women who are not currently pregnant. The unmet needs defined in PDHS 2006-07 as “last birth of

child or the current pregnancy of the women was mistimed or unwanted or currently who are not using contraception but do not want the children soon". Table 2.13 shows the unmet needs (in percent of the total demand of contraception) in Pakistan at the provincial level during last two decades. In 2006-07, women in Punjab have the lowest unmet needs of the contraception, while the women in Balochistan have the highest unmet needs (41 percent and 68 percent respectively). As expected, the total demand of family planning was higher for limiting the childbearing rather of spacing the births in Pakistan. The unmet needs for spacing is higher in young women whereas, the unmet needs of limiting births was higher in older women in the latest PDHS 2006-07 in Pakistan. Nevertheless, more than half of the demand of family planning was met in 2006-07 for currently married women (54 percent). However, only 30 percent demand of family planning had accomplished in 1990-91 in Pakistan. A significant improvement was seeing for the services and availability of family planning in Punjab. A 30 percent of the demand has met during the period of 1990 to 2006 –70 percent in 1990 and 41 percent in 2006. On average, more than 20 percent of the demand has provided in remaining three provinces in Pakistan over the same period.

One of the major indicators to assess the fertility preference is the ideal number of children a woman had in her reproductive life. The question to capture the response of the women in PDHS is "how many children she would choose to have in her whole life regardless of the number (if any) that she had already born?" In this context, the sex of the woman's child had played a vital role in Pakistan. In a male-oriented society such as Pakistan, where the son preference is very high, if women have no sons, than her ideal number would be higher as compared to the women who have two or three sons. In Pakistan, PDHS 2006-07 reveals that about six in ten ever-married women consider the ideal family size would be at least four children, and only 13 percent of married women would prefer a two-child family (data not shown here). Table 2.13 shows that the mean ideal family size in Pakistan was 4.1 children in 2006-07 (Which is also the TFR level in Pakistan). It is worth mentioning that the mean ideal family size does not change during the last two decades (in 1990-91 the ideal family size was also 4.1 children) in Pakistan which reflect that the larger family size in Pakistan is favorable. A considerable differential is found at the provincial level, with a higher mean ideal number of children in Balochistan (5.9 children), compared to be lowest in Punjab (3.8 children). Substantial improvement observed over time for each province in Pakistan, ranging from 5.4 children in 1990-91 to 3.8 in 2006-07 in Punjab, and 5.5 to 4.3 from 1990 to 2006 in KPK. The family-size preference has almost stagnated in Balochistan during the 1990 to 2006. Based on the trend in ideal family size, heed policies are necessary to bring down the larger family size preference in Pakistan.

Another measure to capture the trend of fertility preference in recent years is a wanted total fertility rate. The wanted births are defined in PDHS as "whether a birth was planned (wanted) or mistimed (wanted later), or not wanted at all (unwanted)" shed the light on the extent of wanted childbearing. Wanted total fertility rate is calculated by subtracting all unwanted births. Table 2.13 also illustrate that the WTFR in Pakistan at provincial level during last two decades. It is evident that if the unwanted births curtail then the TFR of Pakistan would be one child less to the current level (from 4.1 to 3.1 children per women). However, there was a 13 percent difference observed

Table 2.13: *Wanted TFR, TFR and Unmet needs (in percent) in Pakistan at Provincial level: 1990-2006*

Region	PDHS 1990-91				PDHS 2006-07			
	WTFR	TFR	Ideal	Unmet Need	WTFR	TFR	Ideal	Unmet Need
Pakistan	4.7	5.4	4.1	70	3.1	4.1	4.1	46
Punjab	4.8	5.4	4.0	70	3.0	3.9	3.8	41
Sindh	4.4	5.1	4.0	66	3.2	4.3	4.3	49
KPK	4.9	5.5	4.3	78	3.2	4.3	4.4	55
Balochistan	5.7	5.8	6.3	86	3.5	4.1	5.9	68

Note: TFR=Total Fertility rate;WTFR= Wanted TFR;

Ideal= Mean Ideal No. of Children, Unmet Need=Unmet need of contraception

between WTFR and TFR in Pakistan in 1990-91, which reflects that lack of the access of family planning that hindered the unwanted births in Pakistan. These measures suggest the provision of family planning, information, services and induced abortion, are required to reduce unwanted pregnancies.

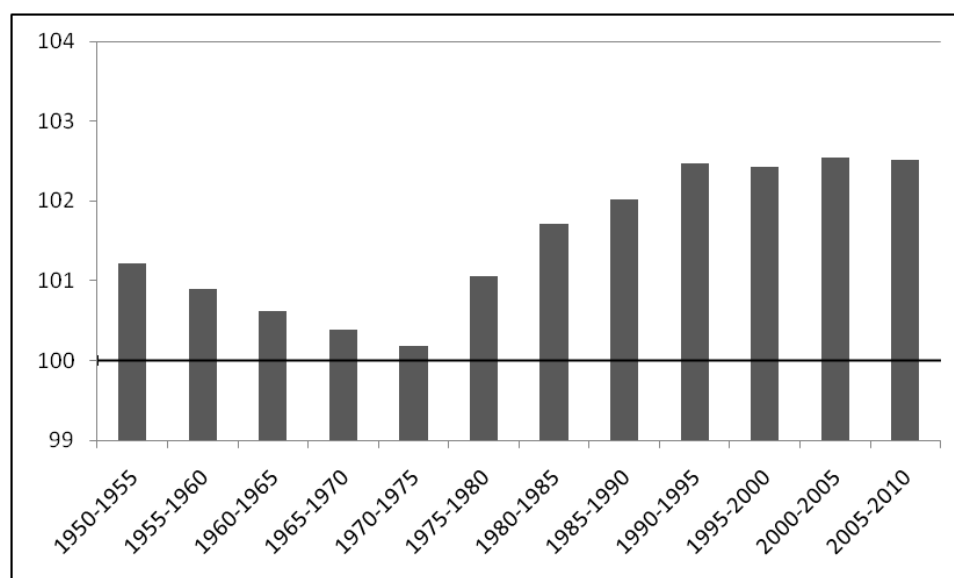
2.6 Mortality

2.6.1 Life expectancy at birth

The assessment of mortality in Pakistan is a difficult task due to lack of vital registration system. The birth and death registrations system officially exists in Pakistan, however, the coverage and accuracy is far from being satisfactory. In the post-independence period, Pakistan experienced a relatively linear improvement in mortality pattern for both genders. Life expectancy at birth increased from 41 in 1950-55 to 48.2 in 1960-65 for male and from 41.5 to 48.5 for female during the same period. The rising tendency in life expectancy at birth in Pakistan had observed in the next two decades of 1970s and 1980s for male and female, where on average, 5.4 years for female and 5.0 years for male life expectancy at birth has improved. These developments contributed by the improvement in better health facilities, improving hygiene conditions and reducing the infant and maternal deaths in Pakistan. During the next two decades of 1990s and 2000s, the improvement came to a moderate level, life expectancy at birth increased by 2.4 years for female and 2.2 years for male.

Gender differences in life expectancy at birth in Pakistan have also evolved significantly over the past six decades. In the early 1950s, life expectancy at birth for women was slightly higher than male in Pakistan, as shown in Figure 2.14. The index shown in figure 2.14 is based on the female/male ratio of the life expectancy at birth in Pakistan from 1950-55 to 2005-10. As expected, female life expectancy at birth had higher than male in 1950s. Interestingly the differentials vanished over time and in early the 1970s and the life expectancy at birth for male and female leveled off. These results divert from the finding that the biological and environmental norms that are liable for men having higher mortality than women at all ages, which led to a shorter

Figure 2.14: *Gender differential mortality index in Pakistan from 1950-2010; Source: UN 2010*



life expectancy for males than for females.⁹ This implies that the infant mortality rates for girls and maternal deaths was substantially higher in early 1970s in Pakistan. Although, the maternal and infant deaths are not the sole factors to determine the higher mortality among females in the past, low level of education, low status of the women in society and in family are also responsible. From the late 1970s and onward, the differentials of male and female life expectancy at birth had been significantly stronger.

Pakistan has not achieved significant progress in mortality decline during the past 50 years, as its neighboring countries do have. Regarding the provincial differences in life expectancy, there is not much wealth of the data available except few studies in Pakistan. Irfan, 1986 estimated the life expectancy at birth for male and female for four provinces of Pakistan for the period of 1976-1979 from Population Growth Survey II. Punjab and KPK seemed to have a somewhat higher life expectancy at birth for male in Pakistan—56.4 and 56.5 years for Punjab and Sindh respectively. Furthermore, females in Punjab and Sindh lived longer as compared to other provinces in Pakistan during 1976-79—the life expectancy at birth for female was 57.5 and 57.3 years for Punjab and Sindh respectively. The lowest life expectancy at births for male and female found in Balochistan—52.5 and 52.0 years for male and female respectively in 1976-79. Punjab and Sindh considered socioeconomically better developed provinces in Pakistan and experienced lower overall mortality, while Balochistan, being least-developed province in Pakistan, has the highest overall mortality.

For developing countries, the mortality levels are often estimated from infant and child mortality rate that is measured from surveys such as DHS (and adjusted the adult mortality levels by model life table, for instance, United Nations Population division did

⁹<http://www.prb.org/Articles/2007/genderdisparities.aspx>

this for developing countries where the data on deaths has limited). There is the variety of methods that exist for the estimation of adult mortality in the literature; such as census survival methods, growth balance method, the extinct generation methods. Estimates are derived on survival of parents and siblings and model life tables (Division, 2002). There are various data limitation that exists for mortality at provincial levels in Pakistan. For example, in census survival methods, the period between two successive censuses often considered a multiplier of five years and the period should not exceed 15 years (in case of Pakistan, the last two successive censuses have not multiplier of five years; 1998 and 1981 census also exceed 15 years). Moreover, Census survival ratios are appropriate only to population that experience negligible migration. It is also susceptible to age heaping, and in some cases, it gives poor results. Age reporting errors, in particular, can result in large variations in calculated survival ratios and inconsistent estimates of mortality. Census survival methods can also be seriously biased by relative difference in completeness of censuses. Historically, Pakistan has experienced a significant migration either internally or internationally. The significant amount of age heaping has been observed in the censuses of Pakistan (Zakaria, 2009). Thus, it is not viable to use the above mentioned methods in the case of Pakistan particularly at provincial level in Pakistan. Therefore, we used the infant and child mortality rate by sex from Pakistan Demographic and Health survey for each province and using the age and sex pattern of mortality at national level and developed the life table at provincial levels. The procedure is as follows.

1. Life table for Pakistan in 2005-2010 from UN 2010 World Population Prospects.
2. Estimate the Infant and Child mortality rate for male and female by level of education of mothers from PDHS 2006-07¹⁰.
3. Due to under-reporting and small sample size in some regions (i.e. KPK and Balochistan), we estimate the Infant and child mortality as the weighted average of education specific infant and child mortality at national level to the education specific distribution of women of reproductive age (15-49) for each province in Pakistan.
4. The model pattern (age specific probability q_x at national level) has been utilized with an iterative procedure to find the model corresponding to a given level of mortality. The iterative procedure is described in United-Nations, 1982. The level of mortality has been specified by the probability of death (q_x at national level) and designating the value of (1q0, 1q4) for each province to estimate the life table for each province in Pakistan.¹¹
5. Age and sex specific number of deaths at provincial level were estimated from the life table estimated at step 3. These numbers were then aggregated over and compared with the national level. The remaining residual discrepancies were proportionally adjusted.
6. The adjusted age and sex specific life table at provincial level were drawn.

¹⁰Rates are based on ten years preceding the survey

¹¹Mortpak software has been utilized for this purpose.

Table 2.14: *Estimated life expectancy at birth by sex, at provincial level of Pakistan: 2000-05*

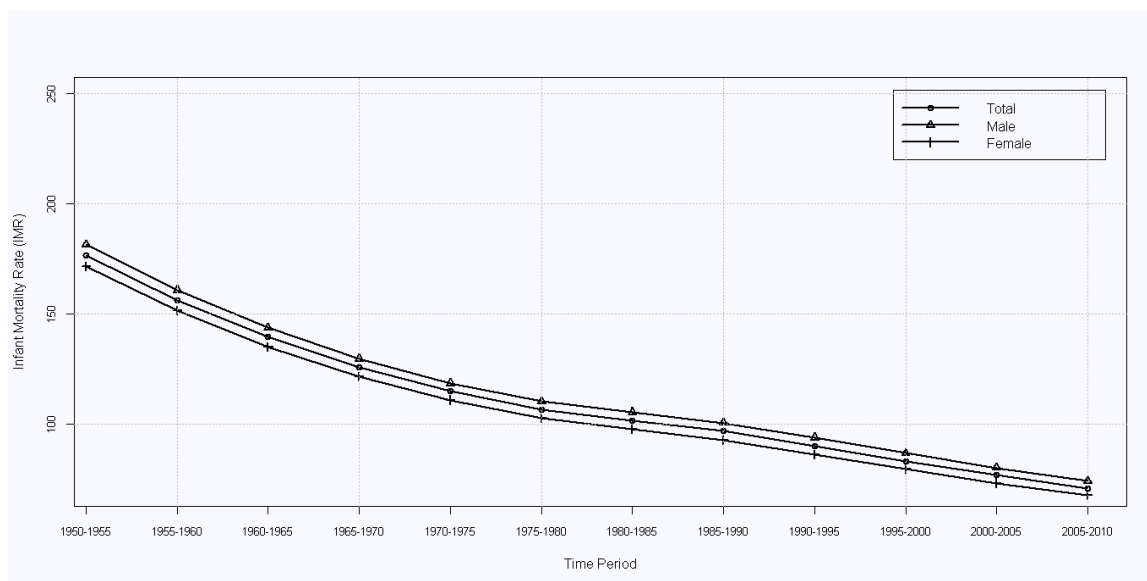
Region	Male	Female
Pakistan	62.9	64.5
Punjab	62.9	64.5
Sindh	62.7	64.3
KPK	62.3	63.8
Balochistan	62.2	63.7
Source: Own Calculation		

2.6.2 Infant Mortality Rate

The child mortality and infant mortality rate (IMR) have a profound effect on the population growth and is an indicator of the health status of the population. The infants are highly susceptible to the new diseases, environment and social status of the parents. Figure 2.15 shows the infant mortality rate in Pakistan for male, female and both sexes from 1950 to 2010. Literature on the trend in infant mortality in Pakistan shows that the IMR declined since 1950s. A significant decline in IMR for male, female and both gender occurred in 1950s and 1960s. In the decades of 1950s, the level of IMR for both sexes in Pakistan declined by 21 percent (from 176.6 in 1950-55 to 139.5 in 1960-65). During the next decade of 1960s, IMR declined significantly from 139.5 in 1960-65 to 114.8 in 1970-75 (18 percent decline). This implies that large-scale public health programs were implemented by the government of Pakistan during the decades of 1960s and 1970s. The pace of decline of IMR for both sexes slow in 1970s and 1980s—12 and 11 percent decline respectively had observed (see Figure 2.15). These trends confirmed the earlier conclusion that the pace of decline in IMR in Pakistan in early 1960s and late 1970s had slowed down (Agha, 2000; Sathar, 1987). Figure 2.15 also illustrates that during the late 1980s and early 1990s the decline in IMR in Pakistan appears to stagnated. It is worth mentioning that the sex differential in IMR in Pakistan have always been in favor of female with lower IMR for females observed as compared to males over the past five decades.

The substantially high infant mortality has been prevalent in Pakistan at the provincial level in the recent past. Table 2.15 reveals the differentials of the IMR at province level in Pakistan from DHS. The IMR declined in each province significantly with a different pace during the last two decades. For instance, in Punjab and KPK, 22 and 21 percent decline has been occurred during the period of 1990-2006. The IMR decreased from 104 to 81 deaths per 1000 live births during 1990 to 2006 in Punjab, whereas in KPK, IMR declined from 80 to 63 deaths per 1000 live births during 1990 to 2006. Meanwhile, a noteworthy decline occurred in Balochistan in last two decades. The IMR declined by 32 percent from 1990 to 2006—from 72 in 1990-91 to 49 in 2006-07 deaths per 1000 lives birth. Interestingly, the IMR is least in Balochistan. However, the Balochistan considered to be least-developed province in Pakistan. This needs a further investigation to unveil the determinant of IMR in Balochistan. It is also important to note that the neonatal mortality rate plays a vital role in IMR decline in Pakistan. The neonatal mortality in Balochistan has 30 deaths per 1000 lives births in 2006-07, whereas in Punjab, the neonatal mortality accounts for 58 deaths

Figure 2.15: *Infant Mortality Rate in Pakistan from 1950-2010; Source: UN 2010*



per 1000 live birth.

The maternal mortality ratio (MMR) defines as the ratio of the number of maternal deaths per 100,000 live births. The least MMR indicates the quality of the health care system in a country. Due to the sensitivity and importance of the maternal deaths in recent years, United Nations adopted MMR as an indicator and set the goals as “reducing maternal mortality from the 1990 level by 75 percent before 2015”.¹² Table 2.15 shows the MMR at the provincial level in Pakistan for 2006-07. The data reveals that maternal mortality ratio was very high in early 1990s in Pakistan (nearly 530 maternal deaths per 100,000 live births in 1990-91). Approximately, 50 percent improvement occurred in MMR in Pakistan during the last two decades—MMR reduced to 276 deaths per 100,000 live births in 2006-07. The PDHS 2006-07 data imply that 1 in 89 women in Pakistan will die due to maternal reason during her lifetime. The progress of maternal mortality remained slow as compared to other development sector indications. For example, 40 percent of pregnant women did not receive any prenatal care. Furthermore, nearly two in three births in Pakistan delivered at home with 60 percent of these births are attended by unskilled medical practitioners (PDHS 2006-07). The targets of MDG-5 goals in Pakistan are to reduce to MMR less than 140 and to increase skilled birth’s attendance to 90 percent by the year 2015 (Ministry of Health 2005). The availability of the data of MMR at the provincial level in Pakistan has scarce in the past. The latest PDHS reveals that maternal mortality ratio has been very high in Balochistan and Sindh in 2006-07—785 and 314 maternal deaths per 100,000 live births in 2006-07 respectively. Moreover, the MMR is least in Punjab with 227 deaths in 2006-07. The goals needed to heed health policies should achieve the targets particular, in rural areas and least-developed provinces in Pakistan.

¹²<http://www.un.org/millenniumgoals/maternal.shtml>

Table 2.15: *Infant Mortality and Maternal Mortality ratio in Pakistan at provincial level;*
Source: PDHS

Region	1990-91				2006-07			
	IMR	NN	PNN	MMR	IMR	NN	PNN	MMR
Pakistan	91	51	39	533	78	54	24	276
Punjab	104	58	46	-	81	58	23	227
Sindh	81	44	36	-	81	53	28	314
KPK	80	48	31	-	63	41	22	275
Balochistan	72	46	26	-	49	30	18	785

Note: IMR=Infant Mortality Rate, NN=Neo-natal mortality rate,
PNN=Post-neonatal mortality, MMR=Maternal mortality ratio

2.7 Migration

2.7.1 International migration

Pakistan is considered an emigration country in the South Asian region. Migration flows tend to be the most volatile in Pakistan. The flow of international migration is observed from Pakistan towards many regions of the world, such as North America, the European Union, Persian Gulf and East Asia. Although international migration taken place in Pakistan since independence in 1947, in recent past, this phenomenon has become more important. In 1990, there were roughly 6.5 million Pakistani living and working abroad (approximately 5.7 percent of the total population of Pakistan). The recent estimate of the international migration from Pakistan has 0.4 million in 2010 (United-Nations 2010)¹³. In another study, Jan (2008) argued that, “Pakistan was also among those countries that supplied labor force to European economic boom in the 1950s. Later in 1970s, these trends resulted in sharp decline due to geopolitical changes and economic recession. The most significant pattern of international migration from Pakistan was to East Asia, specifically to Persian Gulf states.” Table 2.16 illustrates that the distribution of international migration stock of Pakistani origin (Country of birth) to the different parts of the world (Country of enumeration). The statistics in the table is evident that the largest emigration to the Middle Eastern countries, mainly to Saudi Arabia—in 1995 nearly 0.8 million migrants—mostly labor migrants. In the recent year, the range of destination countries for Pakistani migrants has widened. The second most popular destination country for Pakistani is the United Kingdom—nearly 0.32 million migrants stocks were in 2001. The economic importance of international migration in Pakistan has been measured from the remittance send by the Pakistani migrants. In 2002, remittances transfer by the Pakistani aboard was 8.9 percent of the GDP income of Pakistan (OECD 2006).

2.7.2 Internal migration

The census in Pakistan includes the question on the person place of last residence, place of birth and period of stay at the current residence at the time of enumeration.

¹³<http://esa.un.org/migration/p2k0data.asp>

Table 2.16: *International migration stock of Pakistani around the world*

Country	Year	Total	% Female
Australia	2006	16990	42.7
Austria	2001	3753	-
Canada	1991	25185	-
China, Hong Kong	2006	7253	40.5
Denmark	2008	10475	46.6
France	1999	10854	40.9
Germany	2008	28540	41.3
Greece	2006	15830	1.2
Iran	1996	8836	41.4
Ireland	2002	3391	35.9
Italy	2007	49334	30.0
Japan	2006	9086	-
Netherlands	2008	11101	39.4
Norway	2007	15850	48.1
Saudi Arabia	1995	778668	-
Spain	2008	47715	12.4
Switzerland	2000	2301	29.5
Sweden	2008	7687	31.0
USA	2005	262442	44.7
UK	2001	321167	49.0

Source: UN International migrant stock, The 2008 revision

Table 2.17: *Percentage distribution of the internal migration in Pakistan*

Region	2008-09	1998
Punjab	7.75	3.2
Sindh	2.99	6.7
KPK	1.52	1.1
Balochistan	0.06	2.1
Source: LFS 2008-09, Census 1998		

Table 2.17 illustrates the percentage distribution of internal migration from the last census 1998 and Labor Force Survey (LFS) 2008-09. The LFS also includes the same question that was asked in the census. In 1998, 6.7 percent of the Sindh population had migrant status in Pakistan with major inflows toward the Karachi city. However, in the recent past, the proportion declined to 3 percent in 2008-09. The Punjab is the second biggest place to attract people from other provinces—3.2 percent population had migrant status in 1998, whereas the proportion has more than twice in 2008-09 (See table 2.17).

The searching for a better living condition, higher wages and declining land productivity and higher opportunities for job and education are often considered significant factor for migration either internal or international from less-developed region or more advanced region. In case of internal migration, this process also accelerates the process of urbanization. The process of internal migration between provinces is not a new phenomenon in Pakistan. Several studies shed the light on the in-and-out flows and determinant of internal migration in Pakistan. These include are Farooqui and Rukanuddin, 1987; Irfan, 1979; Shah, 1986; Afzal, 1974; and Perveen, 1993.

The table 2.18 shows the net internal migration in Pakistan between provinces from the last three inter-census period of 1951-61, 1971-81 and 1981-1998. The statistics are based on the question asked in the census about the place of birth data in the census. During the inter-censal period of 1951-1961, the migratory movements show the Sindh becoming a very popular place, particularly Karachi for internal migration—a net gain of 0.26 million during 1951-61. This inter-censal period reflects the migration account after the independence of Pakistan which may also include the migration from India as well. The share of the migrants from Punjab to Sindh during 1951-61 was two-third while, the remaining was from KPK. The Balochistan also gains the migrants from other provinces—a net gain of 15441 during 1951-61. This may occur due to the immigrants from India to main big cities in Balochistan, e.g. Quetta. The Punjab and KPK lost their population during the inter-censal period of 1951-61—0.14 and 0.13 million respectively. The peoples from Punjab mostly settled in Sindh and from KPK, the flows towards both Sindh and Punjab (Afzal, 1974).

The inter-censal internal migration during the period of 1971-81 was estimated by censal survival ratio method at the provincial level in Pakistan (Perveen 1993). The results show that considerable variation in the migration where nearly 1.4 million migrants leave Punjab to the other provinces and the remaining three provinces gains the migrants. Balochistan was the most attractive place for the migrants—nearly 0.96

Table 2.18: *Net Internal migration in Pakistan*

Region	1951-61	1971-81	1981-98
Punjab	-141,844	-1,428,037	-141,159
Sindh	259,752	123,661	369,847
KPK	-133,349	301,211	-337,083
Balochistan	15,441	961,341	-1074

Source: Census 1971 report (Afzal 1974)

Perveen A, 1993, Pop Assessment report 2003

million migrants to Balochistan from Punjab. The KPK and Sindh were second and third most favorable place to attractive peoples from Punjab. Table 2.18 also illustrates that the internal migrations flow in the last census in 1998. The total number of persons internally migrated between provinces during last ten years preceding the 1998 census was estimated 1.3 million (UNFPA, 2003). In 1998, Sindh was the only provinces that attracted people from other provinces—0.37 million internal migrants. Nearly 0.48 million people left in 1998 from Punjab and KPK respectively. The inter province migrations (in-and-out internal migration) statistics signify that “over 60 percent of those migrants who had left Punjab were settled in Sindh and 25 percent in Islamabad. Meanwhile, 16 percent of those migrants who settled in Punjab had originated from KHP and 33 percent from Sindh. Approximately, 50 percent settled in Punjab and 40 percent in Sindh of those who originated from KHP. On the other hand, 75 percent migrated to Punjab and less than 5 percent to KHP of those who had originated from Sindh” (UNFPA, 2003). Therefore, internal migration is liable for a substantial amount of relocation of population between provinces. This evidence may contribute largely to the rapid pace of urbanization in the country.

2.8 History of Population Policies in Pakistan

Pakistan was one of the first countries in the South Asian region who had begun the family planning program in 1965 and developed the population policies to curb the rapid population growth rate. However, Pakistan has not been able to hinder the population growth since independence and currently Pakistan has one of the largest countries in the world. This needed a deeper look into the history of population policies in Pakistan and try to figure out what is the cause of the failure of the population program in a broader context. In this context, the important question in formulating the contemporary population policies that: what should be the goals of population policies. What is the range of concern envisioned? Should the object is only to curtail fertility and provide the family planning services? Do they also consider the mortality, migration and urbanization? What is the main rational of the population policy—to improve socioeconomic development, individual well-being and better health? In this regard, Lutz (2008) argued that;

“People are the wealth of nations. But it is not only the number of people that counts; it is also the skills, abilities and health status of the people that matter. All these aspects viewed together can be called the human resources base or human cap-

ital in more economic language. This broadened view of population also implies that political goals should not be defined in terms of population size but rather in terms of human resources available for producing the best possible quality of life for all citizens.”

The effective population policies required the strong political commitment together with the development of other sectors such the economy, education and health. Sometime, the failures of the policies are inefficient bureaucratic structure, weak implementation strategies, insufficient funds allocated for the implementation, poor quality and not enough availability of services and in some situation formulating unrealistic policy goals in the future. According to Jain 1998, two questions are needed to address in formulating the population policies;

1. What is the role of a government in creating a desire to control fertility?
2. What is the role of a government in providing means of fertility regulations?

Jain, 1998 also argues that, the family planning services only effective for those who have experienced an unwanted fertility. The program does not work where the large segment of society has a strong desire of large family size (as in case of Pakistan). Therefore, promoting the trend of small family size is essentials for limit their child-bearing by postpone the marriages. Female education, age at marriage, employment opportunities for women, women autonomy and social security and better health services to curb the infant mortality are more likely to be associated with the aspiration of small families and postponing childbearing. These factors are contributed as significantly as the family planning services to the fertility decline at different stages of demographic transition.

Since 1965, Pakistan had an anti-natalist population policy to restrain the population growth and fertility. Although the Family planning Association of Pakistan (FPAP) was found in 1952 to provide the availability of contraception service voluntarily on a limited scale. The population growth had put on the agenda of the government of Pakistan under President Ayub regime in 1959, when he addressed publicly and spoke about the threat of overpopulation. He established a National Board of family planning with the help of Planning commission and FPAP to address the population issue. The board addresses the policy to the government while the ministry of health was responsible to implement the campaign. In lieu of these developments, the third five-year plan (1965-70) had mentioned the importance of population growth and advises the direction to limit the population growth. Figure 2.19 illustrates that the overview of the population policies in Pakistan from 1965 to 2010. The targets of the third five year plan (1965-70) were to reduce the annual birth rate from 50 to 40 per 1000 by 1970 and provide the access of family planning services to 20 million fertility couple. In the onset of the five-year plan, it had interrupted due to the war with India in 1965 but resumed shortly after the war.

The third five-year plan had not achieved its goals due to many political and administrative reasons. Due to agitation movement against President Ayub Khan Government in 1969, he was removed from power. The major relational against his constituent

who, he was a military dictator and in power since 11 years. He had a little concern for the religious support on family planning, and did not seek a religious mandate for his government. The religious parties, who joined the protest, used the population program and particularly family planning program against him and chanted "Family planning for those who want free sex." The second major reason for the failure of the program was that President Ayub wants to accelerate industrialization and rapid economic growth in the country, and during the second five-year plan (1960-65), government realized that the 1.4 percent of population growth hinders the economic progress. The major setback of this program was the centralized administration of the program with the single-minded provision of the services, setting unrealistic goals and extreme supply side shortage of the services of family planning. To access the effectiveness of the program and national targets, the National Impact survey (1968-69) had conducted and it reveals that after the three year of the program begun, shows that only 6 percent of the married women were using any contraceptive method (Khan, 1996).

In 1969, President Ayub had left the office and replace by another military dictator General Yahya Khan (1969-1971). During the Yahya regime, a pilot experiment (called "sialkot experiment") had set up with improved execution and re-oriented the program from a supply to the client based approach. This program was designed to prove or disprove the debate that demography could or could not be changed through family planning in international community. Initial results of the experiment show that the contraceptive prevalence rate improved at Sialkot, which attracts international community and serves at the basis for next population and family planning policies through Continuous Motivation System (CMS) and Contraceptive Inundation Scheme (1970-77). Figure 2.19 reveals that the particular objectives of the Scheme, which stated that reduce the birth rate from 45 to 40 per 1000 and 34 percent of the married women will practice contraception by 1975. The civil war in 1971 intruded on the scheme. Due to the partition of the country, that hindered the implementation of the program. In 1971, Zulfikar Ali Bhutto took charge of the government, and initially he was suspended the scheme because Bhutto also chanted the family planning program against military regimes. Furthermore, Bhutto was also reluctant to develop the family planning program because he had not been giving any opportunities to the religious right-wing parties to use the same slogans against him. This situation did not last long because USAID consistently delivered the message to the government that population growth was the major issue of the coming decades in Pakistan. This was confirmed when the results of 1972 censuses were made public, which reveals that the population of Pakistan had grown from 43 million in 1961 to 65 million in 1972 and fertility level were stagnated over the decade. Thus, Bhutto had accepted the assistance of USAID and formed a committee to review the population program. The committee had proposed the recommendation that; federalization of the program under health ministry, liberalization of abortion laws, and increasing the age at marriage for women (Khan, 1996). Moreover, the committee approved the CMS as the national program for family planning with contraceptive Inundation Scheme (1974-77). The programs were never successful, mainly because USAID funding was frozen due to the political and Islamic bomb crisis.

The population policies during the period of 1977-88 were very complex in Pakistan's

history. Another military rule was put into action by Muhammad Zia-ul-Haq Martial law in 1977. The population program was suspended and froze any field activity during the period of 1977-80. Zia had adopted the religious right wing ideology as his political ideologies to protect his military overtake. He had also dissolved the population welfare division and brought it under Ministry of Health. He considered fundamental Islamic thought and banned the publicity of family planning services and opposed the birth control program, that he was considered serious about Islamization. CMS had also disbanded, and half of family planning staff removed to other departments. The international support to population program was frozen during the period of 1977-81 due to political reasons. A report was promulgated and published by Council of Islamic Ideology (CII), which stated that the population program in Pakistan should be abandoned. Because of the family planning, Pakistan will undergo with scarcity of manpower, which is needed for national defense and economic development (Khan, 1996). Due to the invasion of Russian into Afghanistan, Pakistan has an important ally to USA due to geo-strategic position. USAID mission had been re-assumed, and the financial resources were allocated by other donors as well for the population program. Therefore, Zia ignored the recommendation of CII and never made it to parliament. A Sixth five-year plan (1983-87) was set up with new population and family planning goals as illustrated in Figure 2.19. The ban has lifted on the publicity for family planning. The Non-Government Organization Co-coordinating Council (NGOCC) had begun its function to allocating the funds to local NGOs for providing family planning services.

After the death of Zia in 1988, Benazir Bhutto (daughter of Zulfikar Bhutto) came into power, and her focus was to start family planning in urban center of Pakistan. She had created the Ministry of Population Welfare in 1989-90. Qisas and Diyat Ordinance had passed in which abortion is included as an act of murder and prescribe the punishment of murder. The content of the population policies during the next two decades had taken many turns into this period. The program had lacked firm political commitment and suffered with the financial crisis. The government officials addressed the issue of population growth as a national priority and addressed publicly and more importantly the funding for the program had been increased significantly over the decades of 1990s. An important development in the eight five-year plan (1993-1998) was that the family planning program was based in the village-based family planning worker scheme where the workers were recruited, trained and put into the field to provide the family planning services at the village level. The post-ICPD period even makes the greatest interest of the government of Pakistan in population policies. While rapid population growth was on the priority agenda of the government of Pakistan in recent years and greater emphasis on the providing the service, access and availability of better quality services at the individual level.

In a nutshell, the population policies in Pakistan since 1965 had so far failed to accomplish the target due to various social, political and religious reasons. The content of the policies, which is the most sole organ through which population policy is addressed and executed, have solely focused on the provision of the family planning program. It has been lacking of other development goals such as the health, urbanization, human capital development, and, particularly the MDGs. Therefore, promoting

the desire of small family size, socio-economic development, female education and more importantly balanced human capital (as cited by Lutz, 2008) are the core factors in population policies, which have neglected so far in Pakistan. That is as significant as the family planning services to curb population growth.

2.9 Conclusion and Discussion

The picture of population growth and human development in Pakistan was grim in the past. Albeit successive governments in the past announced various policies to cope with the population explosion, they were incapable of implement these policy actions due to various political, social and cultural obstacles. The population growth rate in Pakistan had been incessantly increasing during the second half of the 20th century. Due to rapid decline in mortality and slow decline in fertility during past four decades, Pakistan is currently experiencing the window of opportunities—a phase where the country has a young age structure in next 30 to 40 years—as the majority of the population is young with fewer dependents (Children and elderly population). In 2010, 35.4 percent (61.4 million) of the population of Pakistan under age 15 and 60.3 percent (104.7 million) population in working age (15-64) group. The low dependency ratio which led to increased in saving and long-term investment trends has been encouraged during this phase. This outcome has a direct effect on economic growth. However, the population has such a large momentum, the window of action is actually not very wide. In this context, human capital will play a significant role in the realization of this opportunity for rapid economic growth and further investment in education and infrastructure. Any delay in investment in education now will have a repercussion in the future.

A similar story of the difference between intention and action of the successive governments of Pakistan as was reported for population policy can be told regarding public policy towards population growth and fertility reductions. The first anti-natalist population policy in Pakistan was written in 1965 and pursued under the population program with, in fact, very little success due to a lack of commitment and financial constraints. If the government of Pakistan recognized the need for fertility to pull down, especially by reducing unwanted pregnancies and investing consequently in the provision and utilization of adequate services for reproductive health and family planning, surely the lack of social and economic progress – in education, health, poverty – has been hindering the fertility decline and the efficiency of population policies. The education of females shown would be the key to the impact of the fertility of women by levels of education that are much responding to these since women in Pakistan have been experiencing lower levels of fertility for a long period of time. Already in 1993, Sathar, 1993 were inkling at the fact that women's education is a "potentially powerful force for fertility change in urban Pakistan" not only as a unintended consequence of women's schooling which mechanically delays entry at marriage, but also changed the behavior of parents who had the need and the will to limit the number of children they would have.

Fertility transition is under way at the different pace within the provinces in Pakistan.

Table 2.19: Overview of the Population Policies in Pakistan: 1965-2010; Source: Khan 1996 and Ministry of Population Welfare Pakistan

Objectives	Target	Years
• Maintain present and planned level of increase in per capita income. • Obtain itself sufficiency in food, avoid imbalance in population age structure.	• Prevent 5-6 million births in next 5 years • Reduced annual birth rate from 50 to 40 per 1000 by 1970 • Cover all 20 million fertile couple with services by 1970	3 rd Five year plan 1965-1970
• Maintain a growth rate in GNP higher than population growth. • Rapidly reduce Fertility	• Reduce birth rate from 45 to 40 per 1000, 4th year plan, 1970-75 • 34% married women will practice effective contraception by 1975 • 9.6 millions birth prevented	Continuous motivation system scheme 1970-77
• Create a holistic approach; integrate family planning with development planning. • Demand creation through using target groups institutions, mass media and social-legal measures to indirectly reduce fertility.	• Reduce birth rate from 40.3 to 37.3 per 1000 by 1987 • Increase CPR from 9.5% to 18.6 % by 1988 • Reduce population growth rate from 2.87 to 2.69 by 1987 • If above achieved, then 0.5 million births will be prevented per year by 1987-88	6 th Five year plan 1983-1987
• Increased in Child survival will help reduce fertility • Reduce infant and child mortality	• Lower CBR from 42.3 to 38 per 1000 • Increase CPR from 12.9% to 23.5% • Prevent 3.17 million births	7 th Five year plan 1987-1993
• Total program outreach to expand from 20% to 80% of population • Increase rural coverage from 5% to 70% and urban coverage from 50% to 100% • Demand creation for services through communication	• Raise CPR from 14% to 29% • Reduce TFR from 5.9 to 5.4 children per women. • Reduce crude birth rate from 39 to 35 per 1000 • Prevent 4.66 millions births • Reduce population growth rate from 2.9% to 2.6%	8 th Five year plan 1993-1998
• Attain a reduction in fertility through improvement in access and quality of reproductive health services. • Reduce population momentum through a delay in the first birth, changing spacing patterns and reduction in family size desires.	• Reduce population growth rate to 1.9% per annum by 2004 and 1.3 % per annum by the year 2020. • Reduce fertility through enhanced voluntary contraception to 4 births per women by the year 2004 and attained replacement level, 2.1 births per women by 2020 • Universal access to safe family planning methods by 2010.	Pakistan population policy 2002
• Accelerate completion of fertility transition to achieve population stabilization. • Increase birth spacing for improved health of women and children.	• Reduce fertility level to 3 by 2015 • Universal access to family planning • Replacement level by 2025 • CPR to 60 percent by 2030 • Unmet need reduce to 5 % by 2030	Pakistan population policy 2010

In terms of development, each province broadly faced the same challenges, unemployment for large working-age population, reducing poverty, pushing economic growth and creating better health facilities and social protection for the poor particularly in the rural area. Women were at a predominant disadvantage and this had affected various forms of discrimination in every sector, from education to autonomy, and from employment to health facilities. Another contemporary challenge facing each province that rapid urbanization and urban growth which build the pressure on economies of big cities and creating a social problem among the different ethnic groups in main urban agglomerations. Population policies have mostly failed so far in terms of the provision and quality because of the poor involvement of the state in improving the socioeconomic status and human capital accumulation of the peoples. Pakistan's development is highly dependent on the capacity of the county to educate its population and advance the socio-economic status of an inhabitant so that 284 million Pakistanis in 2060 can live prosperous, lives in a nation economically, socially and politically successful.

Probabilistic Population Projections for the Provinces of Pakistan

Summary

This chapter presets the first attempt to implement the probabilistic projection model at the provincial level for Pakistan. The uncertainty of demographic variables at provincial levels in Pakistan particularly, internal and international migration renders sub-national population projection more difficult. Deterministic approach is utilized to project the sub-national population which fails to address the issue of demographic uncertainty. Probabilistic population projection models have the potential to overcome these shortcomings, but these models have often been implemented at the national level. The paper sets out the projection framework at the regional level, outlines the methodology, and presents the probabilistic forecasts for 2010-2060 for Pakistan at the sub-national level. The projection shows that there are 31% chances that population of Pakistan will start to decline in 2060. The 80% prediction interval shows that Pakistan's population in 2060 will be between 241.5 and 326.2 million. The greater uncertainty exists about the demographic future of provincial level compared to the national level.

3.1 Introduction

The uncertainty of demographic variables at sub national level, particularly internal and international migration, renders provincial level population projections more complexly. The uncertainty of the demographic variables, particularly for the internal migration in future, is therefore, a vital element in any sub-national population projections. Currently, the deterministic approach is utilized to project the sub-national population which fails to address the issue of demographic uncertainty for internal migration. Probabilistic population projection models have the potential to prevail these shortcomings. However, in contemporary research, these models have often been executed at a national level. This paper applies the probabilistic population projection technique at the provincial level in Pakistan to present the first comprehensive set of projections and associated uncertainties for all demographic variables including internal migration in Pakistan. It is a first attempt to implement the probabilistic population projection model at provincial level for Pakistan. The paper sets out the projection framework at a provincial level in Pakistan, outlines the approach adopted for each demographic parameter (fertility, mortality, internal and international migration) and their assumptions, and presents the probabilistic population projections for 2010-2060 for national and provincial level of Pakistan. A particular feature of our projections is an age breakdown into the five-year age groups with open-ended age group of 100+ for male and female at each province in Pakistan. Our model desegregates the internal in-and-out internal migration flows between provinces in Pakistan separately. Our model also considers the strong correlation between demographic variables within and between provinces in Pakistan. The details of the model will be discussed in next section.

Indeed, we have been familiar with one thing with a high degree of certainty about the deterministic population projections: that they are uncertain. Contemporary deterministic population projections turn out to be rather imprecise, particularly for longer time periods (i.e. 40 or 50 years) due to the number of factors, such as an imperfect understanding of the drivers of demographic component, inherent randomness in demographic processes, and errors in jump-off population (Wilson and Bell, 2004b; De Beer, 2000). Undoubtedly, there is an uncertainty existed in all three components of the demographic change (fertility, mortality and migration) in population projections. In current research, the vital concern of the demographers is that how to deal with this uncertainty in a statistically reliable manner which is both revealing and acceptable to the users, national and international agencies. A contemporary way to deal with uncertainty in deterministic population projections is produced “high” and “low” variants to accommodate uncertainty around the medium trajectory of fertility, mortality and migration. Many national and international agencies had followed the variant approach to produce the future path of the component of demographic changes. Closer assessment reveals that variant approach undergoes from several drawbacks. The most significant are: 1) lack of the probability interval attached to the variable, the probability interval covered by the low and high variant has not specified (Lutz and Scherbov, 1998); 2) In many circumstances, high-low variant only assumed for fertility, ignoring mortality and migration (e.g. the population projections produced by United Nations); 3) The variant approach does not allow the sudden demographic

discontinuities in the projection that change the age structure substantially (Lee and Tuljapurkar, 1994); 4) Variant approach also probabilistically incompatible between variables and over time (De Beer and Alders, 1999). The probabilistic population projection's techniques overcome these shortcomings in a statistically consistent manner.

During the last two decades, techniques of probabilistic population projections have been developed and applied extensively to many countries in the world and global regions including, Austria (Lutz and Scherbov, 1998), Norway (Keilman et al., 2002), the Netherlands (De Beer and Alders, 1999), Sweden (Cohen, 1986), Finland (Alho, 2002), United States (Lee and Tuljapurkar, 1994), Australia (Wilson and Bell, 2004b), China (Li et al., 2009), Germany (Hardle and Mysickova, 2009), New Zealand (Wilson, 2005), Japan (Okita et al., 2009) and Poland (Matysiak and Nowok, 2007). In fact, (Lutz et al., 2001; Lutz et al., 2003a) have taken the lead to produce the first comprehensive set of probabilistic population projections for the world as whole and 13 regions of the world, in particular. In another study, the authors have produced the 95% confidence interval by utilizing United Nations past projection errors and applied these confidence intervals to the deterministic population projections of the United Nations World Population Prospects (Bongaarts and Bulatao, 2000a). In addition, the Uncertain Population of Europe (UPE) project has applied the consistent method of probabilistic population projection and produced the comprehensive set of projections for European countries (EEA+ countries). The important feature of the UPE was that they considered the correlation in the demographic processes between the countries in Europe (Alders et al., 2005).

However, the application of probabilistic population projection at the sub-national level has been meager. Notwithstanding, the sub-national projection has been applied in some cases including, Wilson and Bell, 2007; Miller, 2002; Gullickson and Moen, 2001; Gullickson, 2001; Frees, 1992; and Cameron and Poot, 2010. Gullickson and Moen, 2001 extended the probabilistic population projection at the sub-national level in a multi-regional framework and suggesting log-linear models to forecast the internal migration. In other papers, Miller, 2002 had presented the probabilistic projection of California, which is somewhat based on single state model and accounts for the net interstate and net international migration. Considering the total population size of the selected US states, Smith and Tayman, 2004 have applied the ARIMA model to forecast the total population in the future. In the recent work, Wilson and Bell, 2007, have extended the probabilistic population projections at the sub-national level in Australia. They have extensively developed the bi-regional framework to forecast the population of Queensland and rest of Australia and internal migration from and to Queensland to rest of Australia has forecasted by using the GMRs. At one point, this lack of attention for using sub-national probabilistic population projection is not astonishing because sub-national projection requires additional components of internal migration to be considered in the model which brings further challenges in the modeling practice. This is mainly because of two reasons; first, there is an additional variable consider in the existing complex model, and internal migration is also a more volatile component of population change to be modeled in the future. Second, the availability of time series data at sub-national level particularly for internal migration between different regions in a country has considered scarcer. In the case of

Pakistan, virtually, the data on internal migration between provinces has been limited. Therefore, projecting the population of Pakistan at the provincial level has been more difficult than that of the country as a whole.

3.2 Methodology

The standard cohort component model was utilized to obtain the probabilistic population projection at provincial level in Pakistan. The difference, however, is that instead of formulating low and high variant; the probabilistic population projection required the prediction intervals for future vital rates (fertility, mortality, migration) which is incorporated by running the cohort component model several thousand times by specifying the distribution of each vital rate. Traditionally, three principal approaches have been used for producing these distributions of fertility, mortality and migration. The three methods are: 1) model-based approach (Lee and Tuljapurkar, 1994); 2) expert arguments and judgment (Lutz and Scherbov, 1998); 3) based on past forecast errors (Keilman, 2001; Stoto, 1983). In practice, a combination of at least two of these methods have extensively used for probabilistic population projection. The method of probabilistic population projection that has been applied here is based on the time-series model and formulates the assumptions for future course of fertility, mortality and international migration and on the range of their uncertainty (see details in Lutz et al., 2001). In order to produce the probabilistic population projections for Pakistan at the provincial level, we proceed as follows:

1. Six summary indicators were chosen for fertility, mortality and migration at a national and provincial level in Pakistan for the reference year 2010; TFR, male and female life expectancy at birth (e_0), net international migration and in-out internal migration probabilities between provinces.
2. In order to generate the probability distribution for all summary indicators in future for each province in Pakistan, a moving average model with annual fluctuations has been chosen based on the Lutz et al., 2001. The model described as, Let “ f ” be the one of the summary indicators of the base year and to be projected for the period 1 through t and “ f_t ” would be its forecasted value at a time “ t ”. i.e. $f_t = \tilde{f}_t + \varepsilon_t$. The $\tilde{f}_t$ be the future value of any summary indicator at a time “ t ” and are chosen based on the assumptions. The error term ε_t is assumed to be normally distributed with mean zero and standard deviation $\sigma(\varepsilon_t)$. we have assumed that the error term ε_t would be auto-correlated over time. To capture the auto-correlation over time of ε_t , we used the moving average model of order “ q ”, where “ q ” is the number of lagged term in moving average. The following moving average model specification has been utilized $\varepsilon_t = \sum_{i=0}^q \lambda_i \mu_{t-i}$, where μ_{t-i} is independently distributed standard normal random variables. We set that $\lambda_i = \frac{\sigma(\varepsilon_t)}{\sqrt{q+1}}$, to make sure that the standard deviation of ε_t is equal to its pre-specified value. The auto-correlation chosen for all components is based on 31-years moving average process value (See more details in Lutz et al. (2001)).
3. The future path of each summary indicator (TFR, Life expectancy at birth for male and female, net international migration, and in-and-out internal migration)

and their uncertainty rang were formulated. The details of these assumptions covered in the next section.

4. The future level of TFR between provinces assumes to be correlated. Life expectancy at births between provinces and life expectancy at birth for male and female within each province are highly correlated. Therefore, in our simulation, correlated random numbers for male and female life expectancy at birth within each province and TFR between provinces were produced via Cholesky decomposition of the variance-covariance matrix. Furthermore, we have assumed no correlation between fertility and mortality.
5. The medians and other selected confidence intervals of the predictive distribution for each summary indicator were computed.
6. For each indicators 10,000 simulations were generated covering the projection period 2010-2060 by using model explain in step 2. Fixed age specific rates (for fertility, net international migration and in-and-out migration) were used during each sample path to obtain the age-sex specific rates. For age specific mortality rate, we used the UN model life table (2010). The male and female life expectancy at birth of each sample path was linked to the corresponding set of UN model life table and extracts the survivor function (L_x).
7. Using a cohort component method of projection, 10,000 simulations over the period of 2010-60 at national and provincial level were computed. Compare the results for provincial level to the national level; the remaining difference was adjusted proportionally. The final results of the probabilistic projection were generated in term of pyramid and other indicators.

In the following sections, we proceed as follows, turing to the baseline data and assumptions used to construct model inputs, and how the predictive distributions for fertility, mortality, international and internal migration were created. Moreover, we discuss the results and draw the conclusion from the projection results. We have implemented the probabilistic population projection for each province of Pakistan in R-Statistical Programming Language.¹

3.2.1 Jump-off Population

In Pakistan, five censuses had conducted since 1950, and last census was carried out in 1998. The census in Pakistan administratively done in four provinces, Federally Adminstrated Tribal Areas (FATA) and Islamabad Capital Tertiary .The official census methodology in Pakistan consists of two rounds, in the first round the housing units enumerated with detail's characteristics of household and in a second step the individual counting carried out. The canvasser methodology was used in which information about household and individuals are recorded by enumerator through door to door visit. A De-Jour methodology was utilized to count the population in which individuals count at their usual place of residence and foreign nationals also counted. We carried out the probabilistic population projections for four provinces in Pakistan

¹<http://cran.r-project.org/>

and excluded the FATA and Islamabad which respectively make up 2.4 and 0.6 percent of the total population of Pakistan.

The reliable estimate of age and sex distribution at a provincial level in Pakistan is a challenging task. The jump-of population of Pakistan at the national and provincial level by five years of the age interval and sex (0-4,5-9,.....100+) based on the results of the latest Pakistan Demographic and Health Survey (PDHS) 2006-07 and United Nations (UN) World Population Prospects 2010. There are several reasons for choosing the estimate from these resources. The Pakistan population census 1998 suffered from serious age heaping (Kemal et al., 2003; Zakaria, 2009) and out-dated because the last census was carried out 14 years ago. Virtually, in the recent years no consistent estimate of total population by age and sex at the provincial level in Pakistan was found except UN. Thus, we relied on above international resources. There are several reasons to adopt the age and sex distribution for each province from PDHS. First, the PDHS 2006-07 has the largest household and national representative survey conducted in Pakistan. The sample size of the PDHS (95,441 household sample size and 727,493 individual sample size) had designed to provide reliable estimates for a variety of demographic and health indicators in Pakistan. Second, we have compared the age and sex distribution from PDHS and UN 2010 Population Prospects for Pakistan. Practically, the difference between the two age-sex distributions has been negligible. Therefore, we computed the proportion of age and sex distribution of each province from PDHS (2006-07) and acquire final age and sex distribution for each province in Pakistan proportionally.

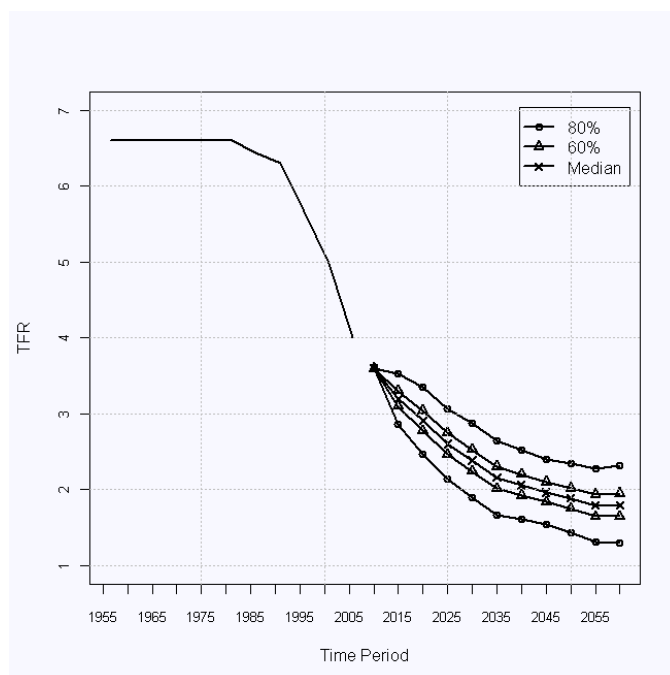
3.2.2 Fertility

The fertility transition in Pakistan passed through different stages over the last four decades. The government of Pakistan recognized the need that fertility was pulled down, especially by reducing unwanted pregnancies and consequently, investing in the provision and utilization of adequate services for reproductive health and family planning. However, the lack of social and economic progress – in education, health, poverty – has been hindering the fertility decline and the efficiency of population policies in Pakistan (see details in Chapter 2 for determinants of fertility and history of population policies in Pakistan).

Currently, Pakistan is undergoing the middle phase of the fertility transition and will certainly continue to fall in coming decades. The important question arises here: what is the pace of future decline in fertility? In this context, the main argument considered here is, according to Bongaarts and Bulatao, 2000a; “the pace of decline slows after mid-transition is reached and this deceleration progresses as fertility falls further”. Our fertility assumption is consistent with this view.

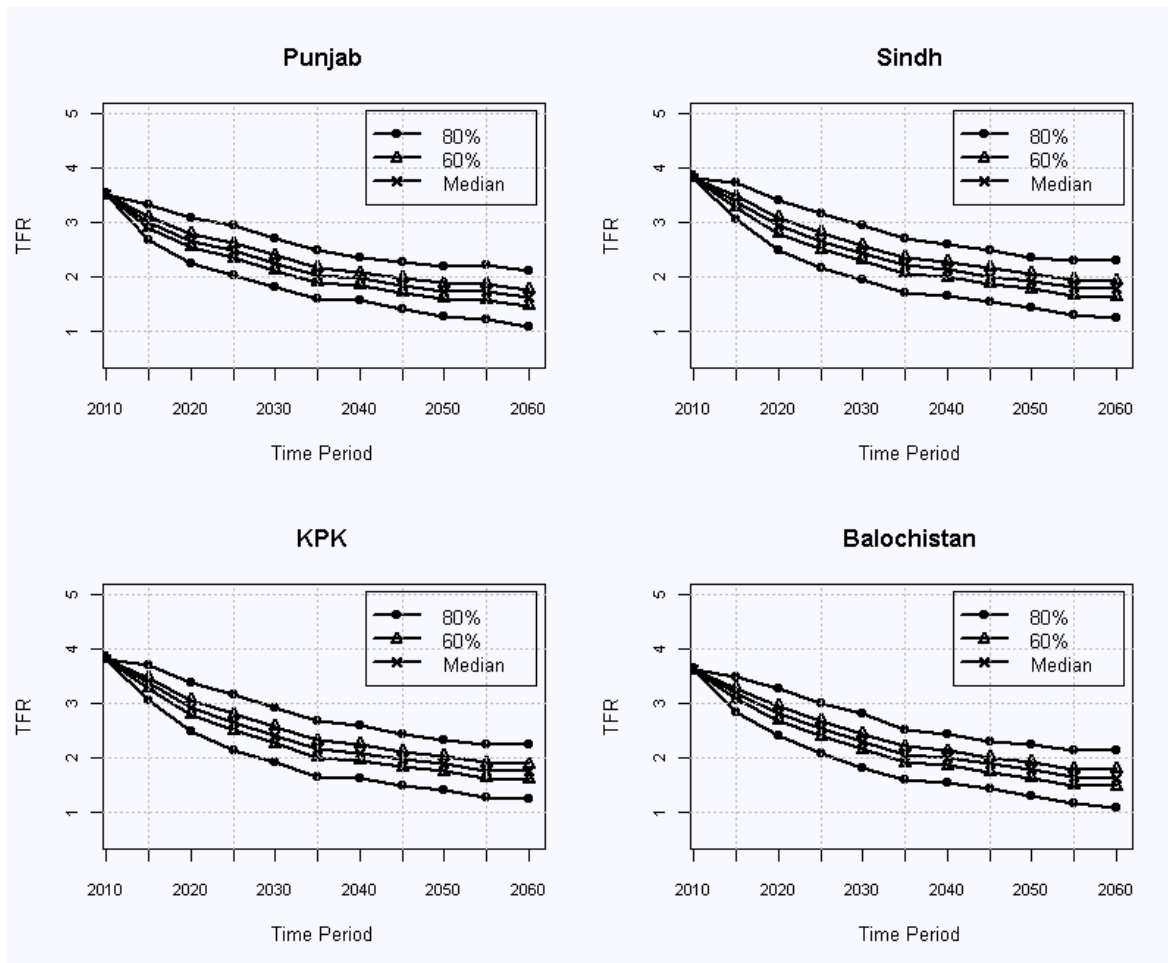
The levels and trend of fertility in past implies that Pakistan’s TFR at a national and provincial level will continue to fall in coming decades. The important question in the projection exercise that how we specify the level and pace of the fertility decline in particular situation. To specify the level of total fertility rate in Pakistan, we assumed that the pace of decline in fertility for Pakistan will be slow in future. This is due to the

Figure 3.1: Total fertility rate in Pakistan from 1950-2060 with selected predication interval:
Source: Own Calculation



past experience of fertility decline in Pakistan and consistent with the Bongaarts and Bulatao (2000b) view that after the mid-transition stage the pace of decline in fertility slows. Thus, future trend in mean level of fertility in Pakistan is defined for the period 2010-2060 similar to those chosen by United Nations 2010. According to the UN 2010, TFR in Pakistan will steadily decline from 3.65 in 2005-2010 to 2.1 in 2035-40 and 1.79 in 2055-60 which is consistent with above arguments. For instance, based on the pace of decline of fertility during last two decades (1990-2010), Pakistan will attain replacement level in 20 years from 2005 onward. Whereas, the UN assumed the replacement level in Pakistan will attain in 30 years (in 2040). The most recently empirical estimates of TFR at the provincial level observed from Pakistan Demographic and health survey are: Punjab-3.9, Sindh-4.3, KPK-4.3, and Balochistan-4.1 in 2006-07 and at the national level: 4.1 in 2006-07. We assume that the TFR of each province will decline in future with same pace as observed at the national level in Pakistan. Thus, the scaling factor of TFR for each province to the national level TFR in Pakistan is calculated from PDHS 2006-07 and is held constant. These are the factors needed throughout the projection period in order to obtain the provincial level TFR. i.e. $TFR_i^{provn}(t) = TFR^{national}(t) * scaling.factor_i(t)$. The key parameter in our projection is the uncertainty range of our summary indicator (TFR, e0 etc.) and specification of the standard deviation. The uncertainty of our assumption on fertility rates is described by a probability distribution of our point forecast. We do not have a long time series on fertility and other demographic indicators and official forecast of population dating far back into the past for Pakistan that would allow us for its computation. The availability of such information's at provincial level in Pakistan is even scarcer. Therefore, we use the assumption of the uncertainty distribution calculated by Lutz et al., 2001. There are two reasons to support this view. First, there is substantive

Figure 3.2: Total fertility rate and Selected predictive distribution of Pakistan at Provincial level: 2010-2060; Source: Own Calculation



evidence that can be found in the literature based on argument-based expert judgment (Lutz and Scherbov, 1998) to support this view. Second, in the recent United Nations World Population Prospects 2010, the probabilistic projection of fertility that has been carried out for all the countries in the world was based on the long time series by using Bayesian hierarchical models. Given the long forecast period and the change in fertility pattern over the last 50 years in Pakistan, the 80 percent prediction interval for fertility in Pakistan in UN 2010 Population Prospects is likely consistent with our assumptions about uncertainty range in the projection considered here.

As Lutz et al., 2001 illustrated that, “the variances in the total fertility rates are assumed to depend on the level of fertility. If the total fertility rate is above 3.0 there is an 80 per cent chance that fertility would be within one child of the mean. When it is below 2.0, the same probability is attached to a range within one half a child of the mean. Between the two total fertility rate levels, the variance is interpolated.” These assumptions applied on each province and national level in Pakistan. Within provinces in Pakistan, the increasing role of media (exchanging the norms and fashion with respect to fertility and family life) as well as transmission of the reproductive technologies in the Pakistan from the developed region to under-developed areas is shown (i.e. from Punjab to Balochistan). Therefore, we expect that the deviation

from assuming trends of fertility between provinces has correlated. We assumed the inter-provincial correlation of 0.7 for fertility deviations in Pakistan. The 80 percent prediction interval for Pakistan yields the TFR [1.89, 2.88] in 2025-30 and [1.29, 2.31] in 2055-60 (See 3.1 and 3.2).

3.2.3 Mortality

Based on mortality levels and trends for each province in Pakistan described in previous chapter, we assume that the progress in mortality observed in Pakistan at the national and provincial level will continue in the future. We assume that life expectancy at birth will rise in all provinces with same pace as assumed at the national level in Pakistan. Specifically, the life expectancy at birth (e_0) for male and female increases by two years per decades (Lutz et al., 1996) at the national and for each province in Pakistan and uncertainty range of life expectancy at birth for each province in Pakistan will be; 80 percent probability that the increase in life expectancy is between zero to four years. We also considered that the inter-provincial correlation of 0.9 for the mortality deviation between provinces in Pakistan and prefect correlation between male and female mortality deviation within each provinces in Pakistan (adopted from Lutz et al., 2001). The main motivation behind our choice of correlation between life expectancy between provinces and gender in Pakistan is that faster communication of medical technologies and the spread of new health exposure. No correlation between fertility and mortality will be assumed in our projection. The age-sex specific mortality schedules at the provincial and national level in Pakistan have been derived from UN model life table 2010 based on the life expectancy at birth.

3.2.4 Migration

3.2.4.1 International migration

In Pakistan, roughly no estimates are available for international immigration and emigration. The situation is even worst at the provincial level. The procedure to produce the future path of net international migration is analogous to fertility and mortality. The net international migration flow at base year and in the future has chosen from UN 2010 Population Prospects. Furthermore, these flows are distributed proportionally among the provinces. The uncertainty range at the national and provincial level is assumed as; 80 percent probability that the increase is between the twice (up and below) of the mean trend of net international migration. The age and sex distribution of international migration was estimated through residual analysis. Furthermore, the age and sex specific net international migration numbers are distributed proportionally between provinces.

3.2.4.2 Internal migration

The forecasting of internal in-and-out migration is more challenging than any other demographic components because internal migration is vulnerable by unpredictable factors. During the last two decades, forecasting of internal migration has been made in several studies such as Segal, 1985, Frees, 1992 and Gullickson and Moen, 2001.

Figure 3.3: Projected life expectancy at birth for Punjab with prediction interval; Source: Own Calculation

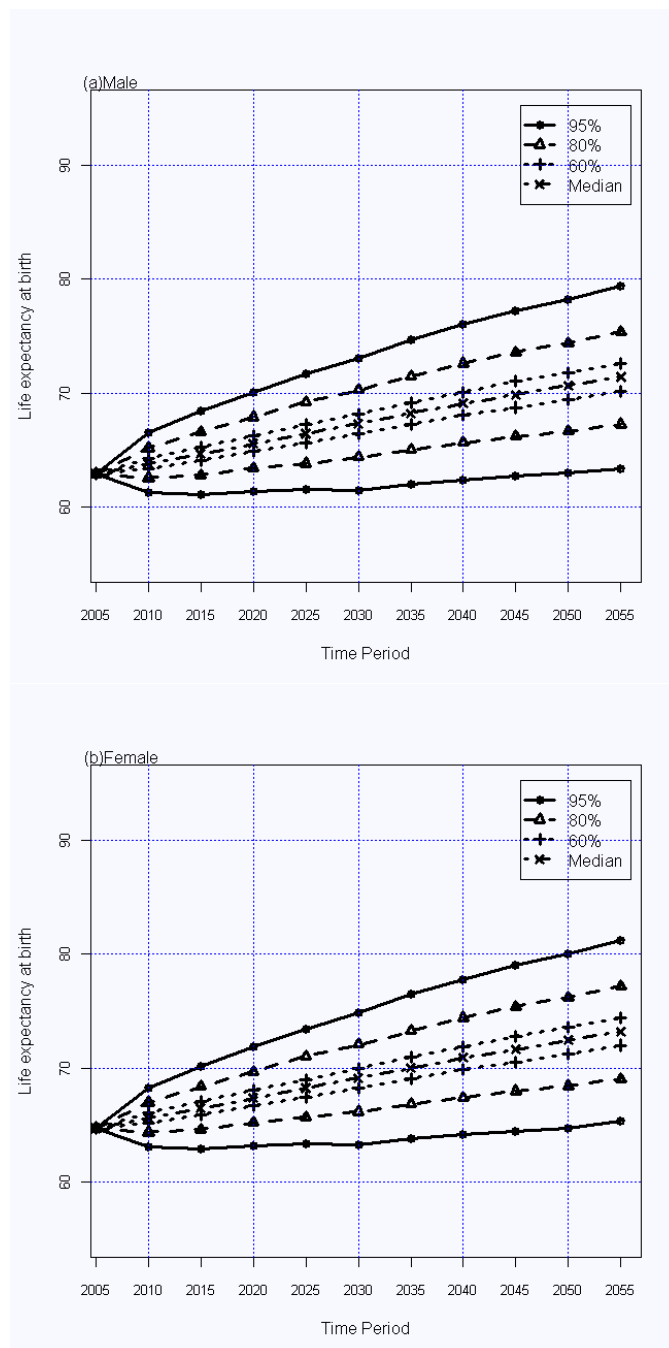


Table 3.1: *Distribution of inter-provincial migrants of Pakistan-1998*

Region	In migration		Out migration		Net migration	
	Number	percent	Number	percent	Number	Rate
Punjab	326,671	28.9	467830	41.4	-141159	-1.917
Sindh	500,223	44.2	130376	11.5	369847	12.150
KHP	81,736	7.2	464233	37.0	-382497	-18.284
Balochistan	55,894	4.9	56968	5.0	-1074	-0.164
Total	1,130,858		1,130,858			

Source: Population Census 1998, UNFPA, 2003

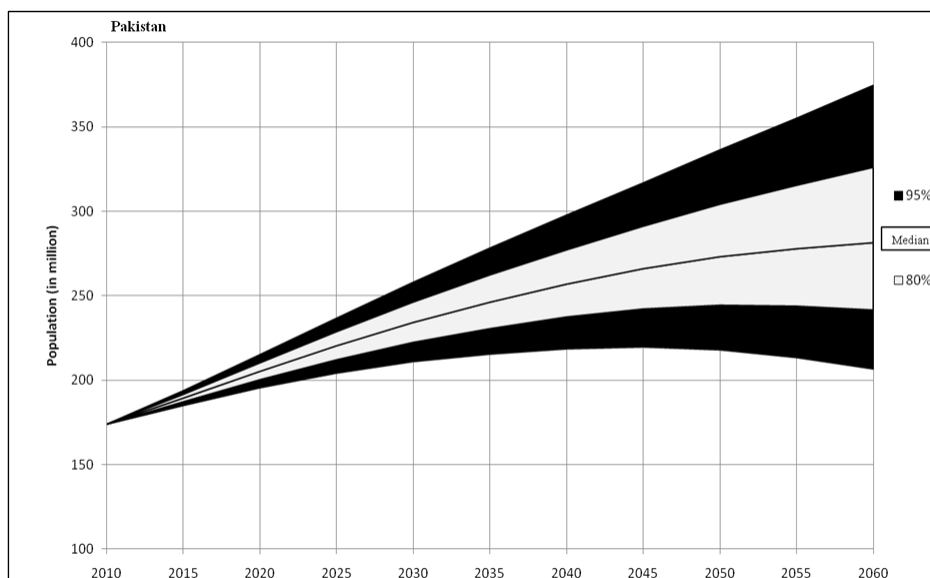
All these models are requiring the reasonable time series data for internal migration, which is not the case in Pakistan. Therefore, we rather used the simplest model for projection of internal migration between provinces and named it as “Pooled Migration Method”. To describe the method, we proceed as follows, from census 1998, origin-destination internal migration matrix for four provinces in Pakistan was obtained. For each province, out internal migration proportion is calculated for each province and for each projection step used these proportions to calculate out number of internal migrants for each province. Moreover, in the second step, out migrants from one province is distributed among the remaining three provinces proportionally through origin destination matrix in each projection period. This procedure will be repeated for each province from 2010 to 2060. For example, in Punjab, out-migrants have computed by applying the corresponding destination proportion and distribute these migrants in the remaining three provinces proportionally via origin-destination matrix. This procedure applied for all provinces in Pakistan, for each projection step and for each simulation. In this study, migration (internal and international) treated as independent of the other two components and between provinces.

3.3 Results and Discussion

3.3.1 Total Population

Rapid population growth is practically unavoidable in Pakistan, at least in the near future. Even though we assume that Pakistan will manage to achieve replacement level fertility by 2035-40, the population would grow 174 million in 2005-10 to 288 millions in 2055-60 according to the median of the predictive distribution. Figure 3.4 shows that the projected total population and selected prediction interval of Pakistan at the national and provincial level from 2005-10 to 2055-10. The median of the distribution shows that the population of Pakistan reaches 249 million in 2035-40 with an 80 percent prediction interval between 234 and 266, and in 2055-60, the size of the total population of Pakistan would reach 288 million with 80 percent prediction interval between [246.9, 334.9]. The Punjab and Balochistan province, which has a diverse and heterogeneous characteristics, are likely to follow the similar trends. Owing to an earlier fertility transition, both provinces will have an identical speed

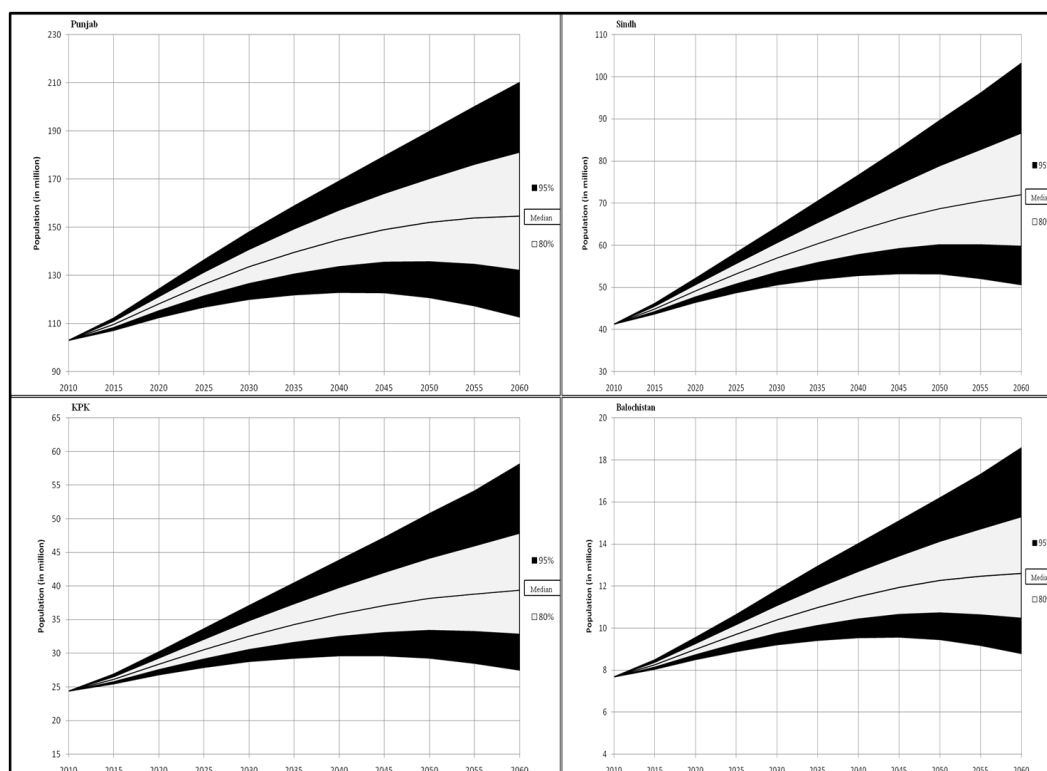
Figure 3.4: *Total Population of Pakistan with selected prediction Intervals:2010-2060;*
Source: Own Calculation



of convergence and a higher probability that the population will start to decline in 2055-60 as compared to other provinces. The population of Punjab would grow by fifty percent during 2005-10 to 2055-60—from 101 million in 2005-10 to 160 million in 2055-60. The median of the predictive distribution pointed out that population of Balochistan will be at 12.3 million in 2055-60 with an 80 percent prediction interval between [10.1, 14.9]. The Sindh province which is the second largest province (in population size) in Pakistan with a large business hub and active seaport (Karachi). The population of Sindh estimated at 40.6 million in 2005-2010, and median of the distribution demonstrates that population would increased to 74.1 million in 2055-60 with an 80 percent prediction interval between [61.4, 89.0].

Figure 3.5 also shows the total population of KPK and Balochistan from 2010 to 2060. If KPK population follows the median of the predictive distribution, this will accounts for a 38 percent increase in the total population over the period of fifty years from 2010-2060—from 24 million in 2005-10 to 40 million in 2055-60 with an 80 percent prediction interval between [32.8, 48.1]. A significant proportion of population growth during this period will be due to population momentum. The trend of the total population over time in Balochistan is quite surprising. The Balochistan, the largest province in Pakistan (44 percent of the total land area in Pakistan), consists of 5 percent of the total population of Pakistan (estimated total population of Balochistan was 7.6 million in 2005-2010). Figure 3.5 also shows the population change in Balochistan from 2005-10 to 2055-60. According to the median of the predictive distribution, the total population of Balochistan will be 12.3 million in 2055-60 and falls between [10.1, 14.9] with 80 percent confidence interval. Although, Balochistan has considered developing province in Pakistan. Human development index for Balochistan (HDI: 0.555) was low in 2005 in Pakistan. Low level of literacy and educational attainment, particularly for women and fundamental tribal systems, are the major issues concerning the development framework. The PDHS 2006-07 reveals the stunning results that fertility transition in Balochistan was well advanced as compered

Figure 3.5: *Total Population of Pakistan at Provincial level and selected prediction Intervals:2010-2060; Source: Own Calculation*

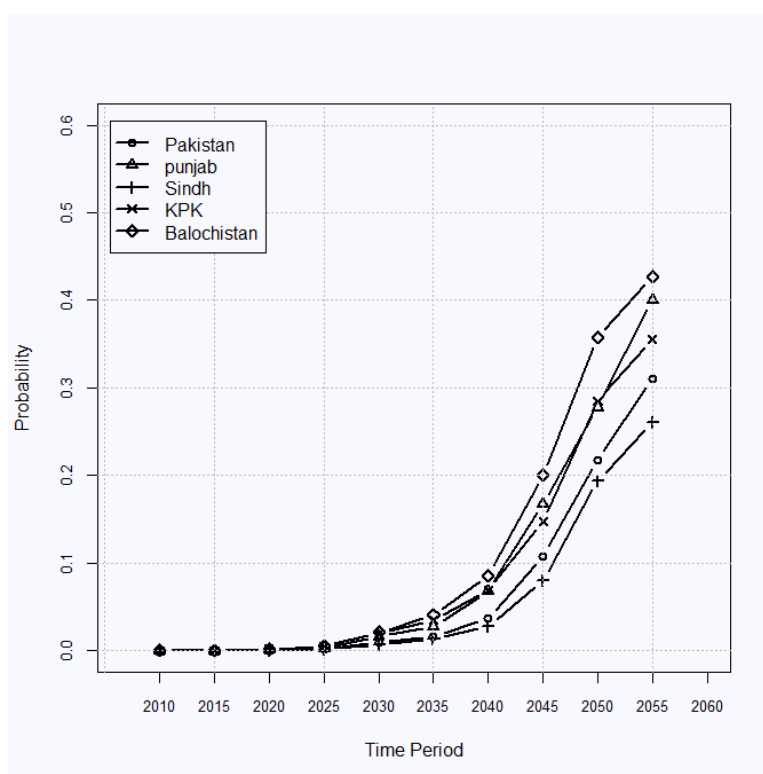


to other province in Pakistan, except for Punjab and our projections also point out that the probability that the population will start to decline will be highest in Balochistan. Until recently, the causes of fertility transition has not veiled in Balochistan. However, it is possibly correlated with a level of women education and socio-economic development.

Although Pakistan was one of the first countries in South Asia to have initiated a family planning program in 1965, unprecedented population growth has been observed in Pakistan in the past and will likely be experienced in the future. Our projections show a 31 percent probability that Pakistan's population will start to decline in 2055-60. For different provinces, the probability of start to decline will vary substantially.

Figure 3.6 shows the probability that the Pakistan population size at the national and provincial level would start to decline at or before the indicated year. It sheds the light to the fact that there is around 2 percent chance that the peak of the Pakistan population would be reached by 2035-40, and around 31 percent chance that it would reach by 2055-60. In other words, until 2035, the population size of Pakistan will not turn down due to population momentum. The highest probability that the population will start to decline is observed in Balochistan. For instance, 43 percent chance that the population of Balochistan will start to decline in 2055-60. It implies that internal migration and high mortality are the main drivers responsible for the higher probability of decline in Balochistan. There is around 3 percent chance that the peak of the population of Punjab will be reached by 2035-40 and 40 percent chance by 2055-60. For Sindh, the probability of reaching the peak of the population in the next two decades will be very low and even lower in 2060 as compared to other provinces. In 2055-60, there is a 26

Figure 3.6: *Forecasted Probability that population will start to decline at or before the indicated date; Source: Own Calculation*



percent probability that the population size of Sindh will start to decline. There is a significant improvement of health and education level in KPK in the past two decades which shown that the probability of decline in 2055-60 reaches 36 percent as high as from Sindh and lower from Punjab.

3.3.2 Population Momentum's

During the demographic transition—particularly in the early and middle stage of the transition—country shift from high death and birth rate to low death and low birth rate—is a period of rapid population growth. During this phase, population growth rate typically does not stop growing even the fertility has fallen to or below the replacement level. This phenomenon refers typically to “Population Momentum.” The reason behind the non-stop population growth is that the age structure of the population was very young before the fertility transition; the huge bulk of youth will sooner enter the childbearing year. Therefore, even if these generations only have two children, they will produce more than enough births to maintain significant high population growth over the next few decades.

For countries that have undergone the middle phase of the demographic transition, population momentum contributed significantly to the future population growth. Bon-gaarts, 1994 had estimated that population momentum will account for nearly half of the population growth of the developing countries in twenty-first century. The level

Table 3.2: *Population Momentum in Pakistan*

Region	2005-10	2030-35	2055-60
Pakistan	1.52	1.22	0.96
Punjab	1.50	1.20	0.94
Sindh	1.52	1.23	0.99
KPK	1.61	1.26	0.98
Balochistan	1.55	1.21	0.93

Source: Own Calculation

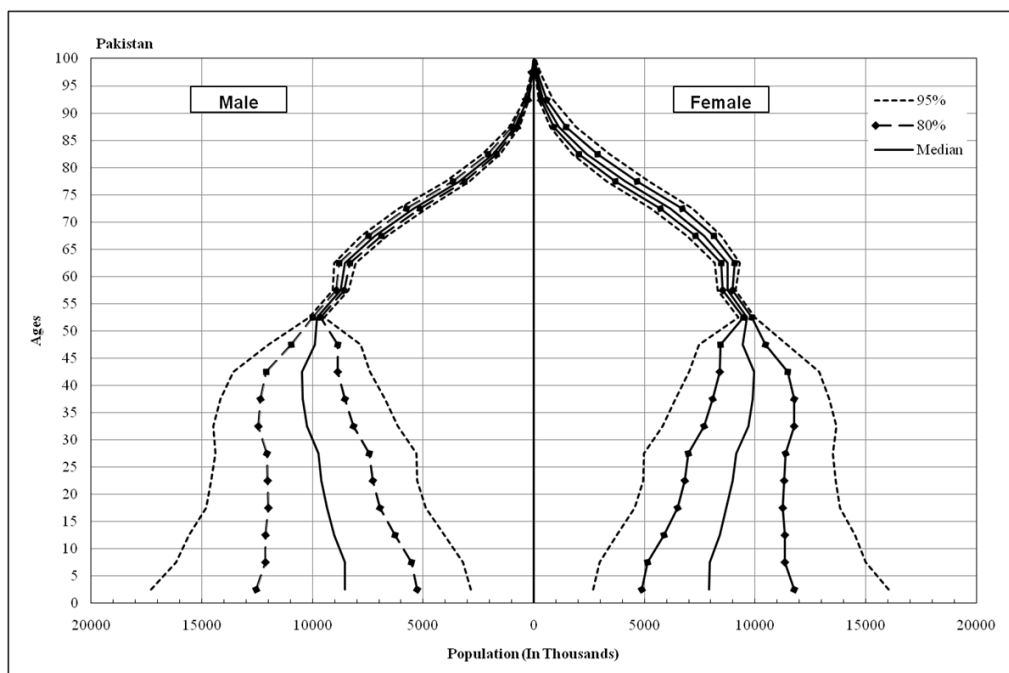
of population momentum² in Pakistan at the provincial level during the period 2010-2060 has shown in table 3.2. In 2005-10, nearly half of the population growth at a national level in Pakistan accounts due to momentum (1.52). Momentum generally peaks between 1.5 to 1.6 for all provinces in Pakistan during 2005-10. Punjab and KPK has represented two extremes on the momentum scale in Pakistan. The highest momentum was achieved in KPK and Balochistan in 2005-10–1.61 and 1.55 respectively, whereas the lowest momentum was in Punjab (1.50) due to the fact that the fertility transition has started earlier in Punjab as compared to other provinces in Pakistan. During the next five decades, the momentum would be a vital factor in future population growth in Pakistan and each province. Our projection results show that, median of the total population of Pakistan would grow by an additional 22 percent in 2030-35 and momentum will be vanished in 2050-55 if the fertility rates decline immediately to replacement level. The largest momentum in KPK and lowest in Punjab will be observed in 2035-30. Over the next 50 years, momentum would play a significant role in Pakistan, which need a immediate policy implications.

3.3.3 Age and Sex Population distribution

Figure 3.7 and 3.8 illustrate the age and sex distribution of the population of Pakistan at national and provincial levels for 2055-60. For most of the users, the population projection by age and sex is as important as the total population size. The population by age and sex in Pakistan shows that the significant amount of uncertainty across age groups over time. In the early year of the projection, the high uncertainty exists in the childhood ages because wide ambiguity for the birth rate whilst fairly narrow prediction interval reflects for working and older ages (Figures not shown here). The mortality uncertainty takes longer time horizon to become evident in the pyramid in Pakistan, by 2040 it will start to become apparent in the older ages and continues to widen. The migration virtually will not be the greatest contributor in the change of age structure in Pakistan, although high uncertainty in migration has assumed in the projection period. This is partly because the population growth has very high and natural increase in the population is dominant over the migration. Table 3.3 enlightens the total population size of broad age groups (0-14, 15-64 and 65+) at national and provincial level in Pakistan with 80 percent prediction interval in the parenthesis. It is interesting to note the population of working age (15-64) in Pakistan will likely increase during the next 50 years from 104.7 million (60.3% of total population) in

²Momentum is calculated according to the formula describes in Samuel et al., 2001 pp-165

Figure 3.7: *Population Pyramid of Pakistan with selected prediction interval in 2060; Source: Own Calculation*



2005-10 to 193.6 million (67.5% of total population) in 2055-60 with an 80 percent prediction interval between [165.0, 223.3]. The number of children aged (0-14) will be declining with a medium pace in next five decades in Pakistan. It is important to point out that during the next three decades, the population in the childhood age group (0-14) will significantly decline due to high fertility in the past and possibly with population momentum. The population of the age group (0-14) will likely decrease from 61.5 million (35.4%) in 2005-10, to 51.6 million (17.9%) in 2055-60, with an 80 percent prediction interval between [33.7, 72.8].

By most indicators, Punjab is the more advanced province in Pakistan. In 2010, the estimated population of Punjab was 101.3 million inhabitants, comprising 58 percent of the total population of Pakistan. The population pyramid of Punjab with selected prediction interval has been illustrated in Figure 3.8. The fairly high uncertainty seen over the birth rate translates into the ample prediction interval in the youngest childhood ages in 2055-60, while the uncertainty over the death rate becomes more prominent in the older ages of Punjab. On the contrary, the changes in age structure in Sindh and those in Punjab are particularly interesting in view of the fact that, the wide prediction interval for younger ages in Sindh are observed, as compared to Punjab. In 2005-10, the younger population aged (0-14) in Punjab has 34.3 million (34 percent of total population of Punjab) and projection shows that the population aged (0-14) in Punjab will likely to decline to 27.1 million (17 percent of total population of Punjab) in 2055-60 with an 80 percent prediction interval between 17.3 and 39.9 million. In case of Sindh, the population aged (0-14) will be declining from 14.8 million (37 percent of total population of Sindh) to 13.6 million (19 percent) during the next 50 years. It is worth mentioning that in absolute term, the decline is not significant in Sindh as

compared to Punjab in younger ages. However, if we look in terms of percentage, almost 50 percent decline is observed in both provinces. In KPK and Balochistan, the situation does not vary significantly. Both provinces have smaller population size in Pakistan. The younger age population (0-14) will declining in KPK from 9.2 million, to 7.1 million in 2055-60 with an 80 percent prediction interval between [4.3, 11.0]. Contrary, the decline of one million inhabitants in younger age (0-14) population in Balochistan will be observed in 50 year time horizon.

In Punjab and Sindh, 62.1 (61 percent of the total population of Punjab) and 24.5 (60 percent of the total population of Sindh) million population were in the working ages (15-64) in 2005-2010 respectively. By 2055-60, the median of the prediction interval for the working age population will be 107.2 million (67%) and 49.6 million (68%) for Punjab and Sindh respectively, with an 80 percent confidence interval between [90.7, 124.9] for Punjab and [41.2, 59.1] for Sindh. In KPK, working age population will be double in 50 years. The median of predictive distribution reveals that the working age population in KPK would increase from 13.8 million in 2005-10 to 26.9 million 2055-60. Thus, the rising share of the working age population for each province in Pakistan can translate into a subsequent rise in the rate of economic growth if the economy employs them effectively and productively. Pakistan has experienced a phase of the demographic window of opportunities, which is closely linked the onset and pace of the fertility transition, which influences the age structure. However, the recognition of this demographic window is dependent on numerous factors. Levels of educational attainment are substantial in this regards as too low level of education particularly, for women could limit economic growth. Furthermore, the unemployment rate is crucial in this regard because it may limit the impact of those favorable age structures.

Population aging is one of the prominent themes in the western world and now has become more dominant in South Asian countries in recent times. The traditional indicator to assess the impact of aging in a country is the percentage of population 65 and older and elderly dependency ratio. Table 3.3 illustrates the proportion of elderly population aged 65 and older at provincial level in Pakistan from 2010 to 2060. In 2010, the population pyramid of Pakistan was very young. The proportion of the population aged 65 and older was 4 percent (7.5 million) in Pakistan in 2010. Approximately, similar proportion has been found in 2010 for all provinces for elderly population, except Balochistan where the proportion of 65 and older people was 2.9 percent (0.22 million). The median of predictive distribution reveals that, the substantial rise in the population aged 65 and older will be notified in Pakistan, approximately six times in 50 years, from 7.5 million (4%) in 2005-10 to 42.5 million (15%) in 2055-60 with 80 percent confidence interval between [38.4, 47.5]. A substantial rise will be observed in elderly population for all provinces in Pakistan (See Table 3.3).

Figure 3.8: Population Pyramid of Pakistan at provincial level with selected prediction interval in 2060; Source: Own Calculation

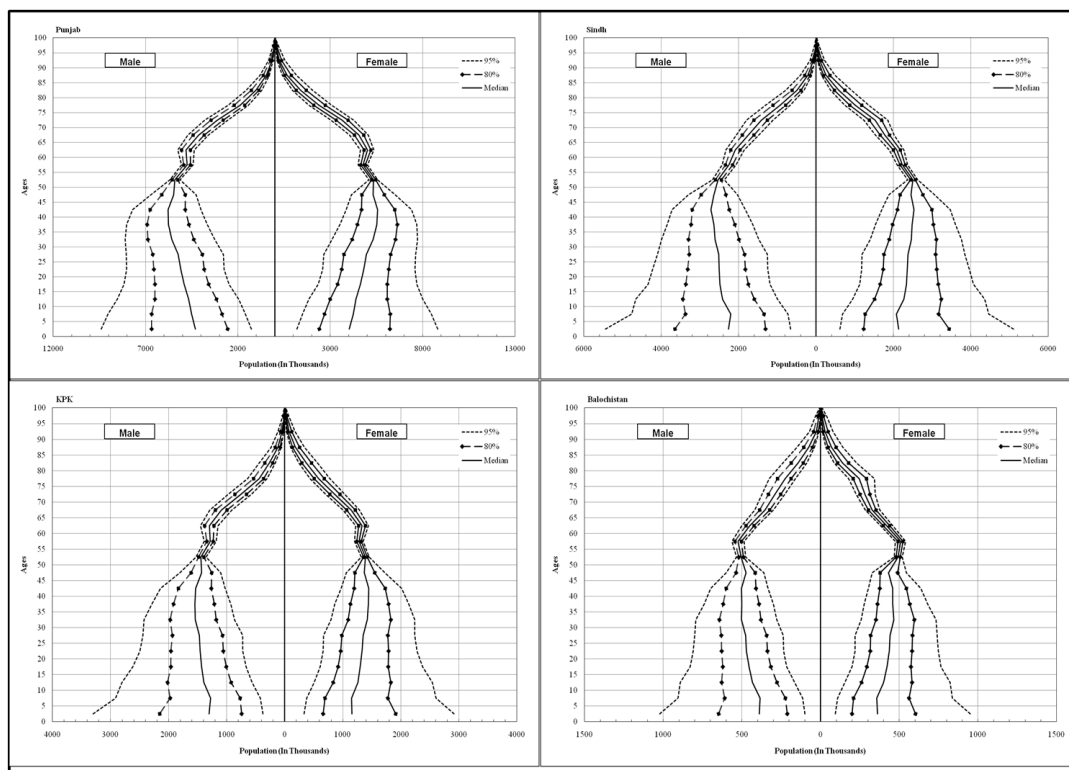


Table 3.3: *Population (in million) in Pakistan at provincial level for broad age group with 80% prediction interval; Source: Own Calculation*

Region	2005-10			2030-35			2055-60		
	0-14	15-64	65+	0-14	15-64	65+	0-14	15-64	65+
Pakistan	61.4	104.7	7.5	61.5 (48.8,74.3)	171.1 (164.5,177.8)	16.9 (15.8,17.2)	51.6 (33.7,72.8)	193.6 (165.0,223.3)	42.5 (38.4,47.5)
Punjab	34.3	62.1	4.9	33.9 (26.7,41.6)	97.7 (93.7,101.7)	10.4 (9.8,10.9)	27.1 (17.3,39.9)	107.2 (90.7,124.9)	24.9 (22.3,28.2)
Sindh	14.8	24.5	1.4	15.4 (11.8,19.4)	42.2 (40.2,44.2)	3.8 (3.6,4.1)	13.6 (8.4,20.7)	49.6 (41.2,59.1)	10.4 (9.0,12.0)
KPK	9.2	13.8	0.95	8.8 (6.8,11.2)	23.5 (22.4,24.7)	2.1 (1.9,2.3)	7.1 (4.3,11.0)	26.9 (22.2,32.4)	5.4 (4.6,6.2)
Balochistan	3.1	4.4	0.22	2.7 (2.0,3.4)	7.6 (7.2,7.8)	0.64 (0.59,0.69)	2.1 (1.2,3.2)	8.4 (6.9,10.2)	1.7 (1.4,2.0)

3.4 Conclusion

Untamable population growth has led to growing pressure on land, high unemployment, poverty and overall grave economic scenarios. In this study, we described the initial attempt at producing the sub-national probabilistic population projections of Pakistan. The model incorporates in and out internal migration at the provincial level in Pakistan to avoid the conceptual and practical problem of net internal migration. It also deals with the correlation of vital rates between sexes and between regions. Our key projection results are summarized as follows:

- Approximately, 31 percent probability that the population of Pakistan will start to decline in 2055-60. The highest probability of the decline will attach to Punjab and Balochistan (40 and 43 percent respectively in 2055-60) and lowest probability of decline for Sindh (26 percent in 2055-60). [Figure 3.6]
- The median of the predictive distributions reveals that the total population of Pakistan will be 288 million in 2055-60 and an 80 percent prediction interval gives that population of Pakistan's will lie between 246.9 and 334.9 million by 2055-60. According to median of predictive distribution, the population of Punjab would be 159.6 million in 2055-60 with and 80 percent prediction interval between [136.2, 187.1]. (Figure 3.4)
- During the next 50 years, population momentum would contribute significantly in population growth in Pakistan at provincial level and consequently at national level (Table 3.2).
- A very young age structure, according to the median of the prediction interval, the working age population of Pakistan would increase to 194 million inhabitants (68 percent of total population of Pakistan) in 2055-60. Therefore, heed policies in Pakistan should be addressed for the utilization of this demographic window of opportunities, by inducing them into the job market. (See Figure 3.7 and Table 3.3)

Faced with the unprecedented population growth rate and a rapid increase in its labor force in the future, Pakistan will have to adopt a development model that is capable of absorbing the increase. The age structure will become very young and more favorable in next 50 years, the large working age population, if the well-educated and employees could be a major asset for the country, and Pakistan will be prosperous socially and economically. If a country fails, it will be confronted with many problems. This study pinpoints two major concerns; demographic dividend and the population momentum, where policies will be highly needed.

Part II

Evolution of Education

Educational Attainment and Literacy in Pakistan

Summary

This chapter provides a comprehensive overview of the state of education in Pakistan. It offers a broad overview of the educational attainment and literacy during last four decades at the provincial level in Pakistan. In the introduction, it is pointed out how education influences the different socio-economic indicators in Pakistan. The chapter pays attention to show the historical perspective and development over the last four decades in the education sector at the provincial level in Pakistan. It also reviews the educational policies in Pakistan since 1950s. We rely on three main indicators to assess the education development in Pakistan: Educational attainment, literacy and enrollment rates. We show the failure of the education, particularly toward females in Pakistan, shedding light on the expenditures spent on education in Pakistan.

4.1 Introduction

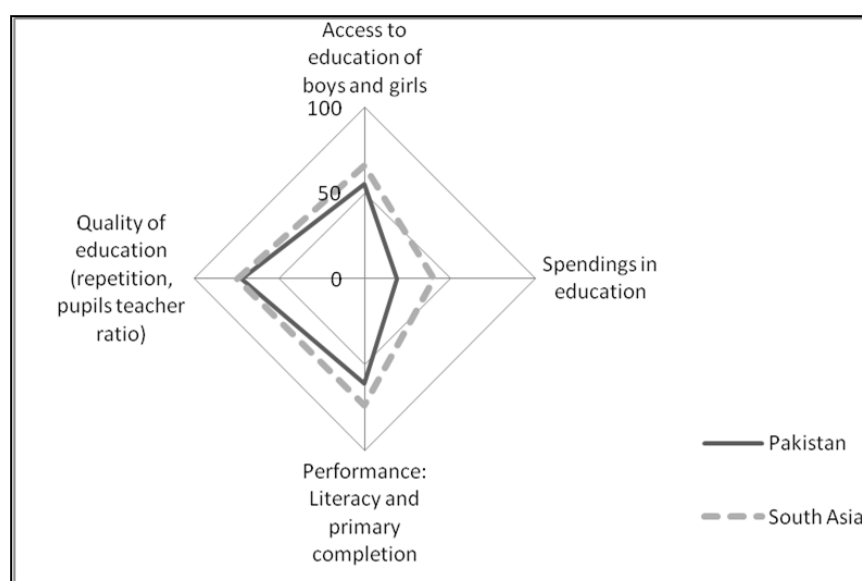
Any assessment of the education sector in Pakistan today is submerged by the abundance of negative aspects ranging from inadequate physical infrastructure, shortage of school facilities and qualified staff and poorer student performances than any other Asian developing country. In 1947, when Pakistan received independence from Great Britain after 100 years of colonial rule, one of the first aims of the government, following the recommendations of the 1947 education conference, was to provide free and compulsory elementary education. Again in 1973, under the leadership of Zulfikar Ali Bhutto, the newly adopted constitution included an article stipulating that “the State shall remove illiteracy and provide free and compulsory secondary education within a minimum possible period.” Indeed, human capital formation, the result of education, is essential in raising the efficiency and productivity of the labor force. This obvious link which should result in the prioritization of education in the development policy of a country is not always taken into account mostly because of the short and medium term time span in which politicians are thinking, whereas returns to investment in education will happen in the long term. Similar to many developing countries, the low levels of educational attainment in Pakistan are, firstly, attributable to extremely low levels of public investment in the education sector.

Pakistan considered the most illiterate country in the world after sub-Saharan Africa. In 2011, 58 percent of the total population of Pakistan was literate. Furthermore, Pakistan ranks 160th out of the 183 countries in the world by literacy rate in 2011.¹ The literacy rate of the total population in Pakistan during last three decades has been rising significantly—from 26 percent in 1981 to 43 percent in 1998. A significant variation in literacy rate exists between the provinces in Pakistan. During the period of 1981 and 1998, the literacy rate of the total population in Punjab increased significantly as compared to other provinces in Pakistan. Even in the socioeconomically and educationally backward provinces of Pakistan—Balochistan and KPK—the literacy rate accelerated substantially in recent years. Current school attendance also rose rapidly in every province in Pakistan. For instance, the Net attendance ratio in primary level for the age group 5-9 in Punjab was 75 percent for total population in 2006. The corresponding figures for other provinces in Pakistan was 54, 62 and 42 percent in Sindh, KPK and Balochistan respectively (PDHS 2006-07).

At the beginning of the 1990s, Pakistan achieved a reasonable level of economic growth, but failed to raise human development, particularly in the education sector. For this reason, the government launched the Social Action Program (SAP) in 1992, with the support mainly of the World Bank and other international donors. This was an open-ended action plan, carried in several phases, which was aimed at increasing the quality and quantity of social services such as the education sector, wherein the objectives were to increase enrollment and school quality as well as eliminate gender and regional disparities. The SAP yielded unsatisfactory education outcomes, with almost no increase in primary enrollment rates, and little reduction of the gender and regional gap. As it can be seen from Figure 4.2, education expenditures have been

¹http://en.wikipedia.org/wiki/List_of_countries_by_literacy_rate

Figure 4.1: *Generation of Human Capacity in Pakistan compared to countries in Southern Asia, Source: Goujon and Wazir, 2011*



increasing since 2002, mainly as part of the National Plan of Action (NAP 2001 to 2015), whose basis for planning was the UNESCO Education for All, aiming mostly at achieving universal primary education by 2015 for both girls and boys. Other governmental objectives are set in terms of increasing participation at lower secondary level and are producing more higher education graduates. Until the end of the 1990s, Pakistan was doing worse than the average of least developing countries across the indicators of enrollment and budget allocation (e.g. the primary school enrollment rates in Pakistan were 62 per cent compared to 76 percent for the average for low income countries (UNDP 2003)). In 2010, as shown in Figure 4.1, Pakistan scores less than its regional neighbors in terms of indicators related to the generation of human capacity, such as access (enrollment of both girls and boys at primary and secondary levels), investment, performance (measured by literacy and primary completion rates), and quality of education—dependent for instance upon grade repetition and pupil to the teacher ratio.

The “problem” with education is that it takes time to influence society. Levels of educational attainment are acquired mostly during childhood. Hence, any improvements in enrollment and completion rates will not have diffused through the entire working population until some 50 years later², meaning that any lack of improvement in educational policies in Pakistan will plague the human capital characteristics of the labor force for many decades. Educational momentum is visible in the evolution of three types of indicators: (1) literacy rates, and the share of the population distributed between levels of educational attainment; (2) the translation of past investments (or lack thereof); (3) enrollment ratios that reflect present education flows and, which later

²Education occurs mostly in schools, adult education being marginal. Any change, for instance in the intake level of primary education, will take a few decades before it has reached the whole working age population by the process of generation replacement, the old and less educated generations being replaced by the new generations who have benefited from increased education.

translate into human capital stocks. In the following sections, we will emphasis on these three indicators.

4.2 Educational development in Pakistan: Past and Present

4.2.1 Policy Development Regarding Education in Pakistan

The illiteracy and neglect of education sector in Pakistan were inherited from the British legacy. The first post-independence census in 1951 indicates that only 16 percent of the total populations were literate, and female literacy was low as compared to the male—12 percent and 19 percent respectively. Since the independence in 1947, numbers of attempts have been made to identify the problems in the education system in Pakistan and propose several policy recommendations. The first All-Pakistan Education Conference was held in 1947, in the will of the founder of Pakistan. Quaid-e-Azam, who had provided the fundamental guidelines for the future development of education in Pakistan. The conference therefore recommended three basic guidelines; 1) education should be inspired from Islam; 2) free and compulsory elementary education; 3) emphasis of technical education (Khan, 1997). In 1951, the first educational policy was formulated in the Six-year National education plan for Education and translates the policy recommendation purposed in 1947 into physical targets. The lack of firm political commitment and financial constraint were the main factors explaining the failure of the first educational policy (Khan, 1997). In addition, migration from India after the partition into Pakistan significantly affected the educational structure and policy because of the sheer number of enrollment at all levels of education. Furthermore, the segmentation of the education sector has also played a substantial role in the development of education. Contemporary education system in Pakistan fragmented into many different systems, such as English and Urdu medium and public and private sector. The major factor of this fragmentation of the education system in Pakistan is considered primarily the British rule made some changes into the education system in pre-independence of India and was paid attention mainly to educate the elite which would help to administer the country. Perhaps, this has the major step for the segmentation of the education system currently prevail in Pakistan. It has therefore, create intractable problems in the optimal use of the resources in the country. The pre-independence educational system had not changed in Pakistan and even further strengthens.

The first ambitious goals of education were set in the Second Five-year plan (1960-65). The National Educational commission were reviewing thoroughly the education system in Pakistan and emphasized three basic recommendation that; 1) compulsory primary schooling for age group 6-11 within next 10 years and for age group 11-14 within next 15 years; 2) introduce the technical/vocational subjects in secondary stage; and 3) Bachelor level degree extended from two to three years (Khan, 1997). The educational goals in Second Five-years plan was seen as an reasonable progress. Approximately 96 percent of intended investment for the education allocated in the plan was utilized, although the targets set for primary and technical education were still lagging behind for implementation and goals for basic primary education have not

been accomplished. It is worth mentioning that the growth of school aged children was one of the causes for the failure of educational goals during 1960s in Pakistan—the proportion of the children aged 5-14 in Pakistan were increasing from 24 percent in 1960 to 26 percent in 1970.

Aly (2007), in his white paper for a national education policy, summarizes with elegant severity educational policy developments in the past since independence of the country in 1947: “Periodically, the State of Pakistan addressed the educational needs of the people and the aspirations of the State in this regard, in 1947, 1951, 1959, 1966, 1969, 1970, 1972, 1979, 1992 and lastly in 1998. Apart from the common denominator of Islam and national cohesion, the statements of vision and purpose for the national education system in Pakistan have tended to reflect the dominant political paradigm and compulsions of the day. Impliedly, most of these noble assertions remained rhetoric, now confined to the dustbins of history.” It is noteworthy that several educational policies have been formulated in Pakistan from 1970s to 2010. However, in every five year plan, Govt. of Pakistan has set the goals for basic education. However, the goals for education have not been met in the history of Pakistan. The education goals in Pakistan have been reiterated and absurd targets have been set repeatedly since 1970s. For example, the attainment of universal primary education goal in Pakistan has been still far behind in 2010 although, it was formulated in early 1960s and Pakistan has also signatory of Education for All (EFA) and MDGs goals.

4.2.2 Historical development in Literacy

Literacy in Pakistan has been expanding since the beginning of the 1970s. In 1972, only 22 percent of the population aged 15+ was literate compared to the 54 percent in 2008. Table 4.1 shows in 2006 that the population became majority literate. The overall literacy rate for age group 15+ in 2008 was estimated at 54 percent, 67 percent for males and 40 percent for females. These rates are among the 10 lowest in the world for the countries with data available in 2008 – data was not available for Afghanistan, where rates of illiteracy are presumably higher than in Pakistan – , and Pakistan is the only Asian country as all the others are sub-Saharan African countries. The difference in literacy levels of the 15+ population and the 15-24 population is striking, and show that literacy is gaining ground in the population. Still Pakistan is among the 10 countries with the lowest scores in terms of literacy of the 15-24 population, meaning that the pace of change for the youngest age group is not any faster than in the other least-literate countries. Since the overall population of Pakistan is large, the absolute number of illiterate men and women is very large as well, 51 million in 2008—about the whole population of South Africa for the same year. Table 4.1 also shows that the increase in literacy rates is not keeping up with the population growth rates as the total illiterate population is more or less staying in constant at about 50 million.

Literacy rate has been gaining ground in every provinces in Pakistan since the beginning of the decade of 1970s. Figure 4.2 shows the literacy rate of the population aged 15 years and older and 15-24 year older at the provincial level from 1972 to 2006. The literacy rates for the population aged 15-24 years is a reflection of recent educational

Table 4.1: *Literacy rate in Pakistan from 1972-2008*

Age group	Year	Literacy Rate (percent)			illiterate Population (million)			illiterate Population
		Total	Male	Female	Total	Male	Female	Percent Female
15+	1972	22	30	12	31	14	17	54
	1981	26	35	15	36	17	19	54
	1998	43	55	29	47	19	28	60
	2005	50	64	35	51	19	32	63
	2008	54	67	40	51	19	32	63
15-24	1972	36	49	20	7	3	4	56
	1981	35	45	24	10	4	6	56
	1998	55	67	43	12	5	7	62
	2005	65	77	53	12	4	8	65
	2008	69	79	59	12	4	7	64

Source: Goujon & Wazir (2011)

achievement in a country. The literacy rate for the population aged 15+ in Punjab increased more than double from 23 percent to 55 percent, from 1972 to 2010. More than four times improvements in the literacy rate for female (aged 15+) were observed during the past four decades in Punjab—from 10 percent in 1972 to 42 percent in 2010. It is interesting to note that during the decade of 1970s and 1980s the progress in Punjab was not impressive in female enrollments. However, over the past two decades, attractive progress has seen in Punjab, which is the reflection of the investment and commitment in education sector, particularly adult literacy for female by the government of Punjab. Several projects for improving adult literacy and female enrollment in Punjab has launched in 1990s and earlier of the first decade of 21st century—for example, Social Action Program funded by World Bank in early 1990s. It is worth mentioning that the illiterate population in Punjab has been almost double from 1972 to 2010—from 15.5 million to 30.2 million—about the whole population of Nepal in 2010. Moreover, more than 60 percent of illiterate population in Punjab was female in 2010. The literacy rate for the population aged 15-24 in Punjab was rapidly growing from 37 percent in 1972 to 74 percent in 2006. However, more than three times the female population (aged 15-24) in Punjab has been gaining literacy during the period from 1972-2006—from 20 percent in 1972 to 68 percent in 2006. Not surprisingly, persistent high levels of illiteracy is visible in KPK and Balochistan in the recent and distant past for the population aged 15+ and 15-24. The literacy rate for total population aged 15+ increased 26 percentage points in KPK (from 19 percent in 1972 to 46 percent in 2010) and 27 percentage points in Balochistan (from 10 percent in 1972 to 37 percent in 2010) over the period of 1972-2010. Approximately, 8 million inhabitants in KPK are illiterate in 2010—about the whole population of Austria in 2010. Furthermore, in Balochistan, the literacy has also been gaining—from 10 percent to 37 percent from 1972-2010 for total population aged 15+. Approximately, 65 percent in population aged 15-24 in KPK and 55 percent in Balochistan has been literate in 2006, which reflect the fact that pace of change for the youngest age group (15-24) in

those province has slow as compared to other provinces in Pakistan.

As expected, gender disparities were extremely high in Pakistan in literacy rate (for population aged 15-24 as well as for population 15+), particularly in KPK and Balochistan in the recent and distant past. The Gender Parity's Index (GPI) is used here to access the gender inequality in the literacy. A value of less than one of GPI indicates the difference in favor of boys, whereas values close to one show that the equal opportunities was provided for girls and boys alike. The GPI extremely low in KPK during the last four decades—0.19 for population aged 15+ in 1972, and was significantly high in Sindh 1972 (GPI: 0.41). The pace of change in GPI for Punjab was astonishing during the last four decades, particularly in recent years for population aged 15 years and older—from 0.29 in 1972 to 0.63 in 2010. Table 4.2 shows by all criteria, the KPK and Balochistan were at the bottom of the ladder for literacy rates, like the GPI in Pakistan during last four decades (for population aged 15+ and 15-24).

4.2.3 Educational Attainment

Not surprisingly, the persistent high levels of illiteracy are visible in the levels of educational attainment of the working age population in Pakistan—the age group 20-64—which is dominated by a large proportion with no education³ (Table 4.3). Still the share of men who have completed primary education increased from 13 percent in 1972 to 16 percent in 2010, pointing at imbalances in the development of the education sector with a barrier restricting access to primary education; however, once this level has been accessed, there are fewer obstacles to higher levels. The higher educated are very few in the working-age population in Pakistan and as of 2010 only 15 percent of men have a university equivalent education in Pakistan. The situation is far worse for women, where the barrier to primary education has been impervious in many settings, especially in rural areas. Only 12 percent of the working age female population has completed a primary education in 2010—increasing from 4 percent in 1972—and only 8 percent had a tertiary education, as compare to 1 percent in 1972. Table 4.3 shows the progress and most of the time, the lack of progress in levels of educational attainment as can be seen from the population across censuses with a majority of that population being uneducated until the 21st century, and it was still the case of two-third of women in 2010. For those who had access to education, the path often stopped at the level of secondary education and a small share of the male and female population gained an upper education i.e., university education.

Table 4.4 shows the educational attainment of working age population (WAP) aged 20-64 at provincial level in Pakistan from 1972 to 2010. The persistent low levels of educational attainment has been visible in the WAP at the provincial level in Pakistan during last four decades. For instance, in Punjab, 92 percent of the female and 68 percent of male of WAP received no education in 1972. However, this declined to 59 percent for female and 32 percent for male in 2010. On the other hand, the share

³The category “No Education” underestimates the number of illiterates on one hand because some children who enter the school for a short period may not acquire all literacy skills. On the other hand, is concurrently overestimates since some children and adults can learn to read and write while not being in school.

Table 4.2: *Literacy rate in Pakistan at provincial levels: 1972-2010*

Province		Literacy Rate (percent)				illiterate Population (million)		
Age group	Year	Total	Male	Female	GPI	Total	Male	Female
Punjab								
15+	1972	23	34	10	0.29	15.5	7.2	8.3
	1981	26	36	14	0.39	19.7	9.0	10.7
	1998	44	56	31	0.55	24.0	9.8	14.2
	2010	55	67	42	0.63	30.2	11.1	19.3
15-24	1972	37	50	20	0.40	3.6	1.6	2.0
	1981	36	47	24	0.51	5.2	2.3	2.9
	1998	59	69	48	0.70	5.9	2.2	3.7
	2006	74	81	68	0.83	-	-	-
Sindh								
15+	1972	27	37	15	0.41	5.8	2.8	3.1
	1981	29	38	19	0.50	7.4	3.5	3.9
	1998	43	54	32	0.59	9.9	4.3	5.6
	2010	58	71	43	0.61	10.9	3.9	7.0
15-24	1972	38	49	24	0.49	1.4	0.6	0.8
	1981	37	44	29	0.66	2.0	0.9	1.1
	1998	51	61	41	0.67	3.0	1.2	1.8
	2006	64	74	53	0.72	-	-	-
KPK								
15+	1972	19	31	6	0.19	2.7	1.2	1.5
	1981	16	26	5	0.19	4.9	2.3	2.6
	1998	32	48	15	0.31	6.6	2.5	4.1
	2010	46	65	28	0.43	7.9	2.5	5.4
15-24	1972	30	48	11	0.23	0.7	0.3	0.4
	1981	22	34	9	0.26	1.4	0.6	0.8
	1998	45	65	25	0.38	1.9	0.6	1.3
	2006	65	84	48	0.57	-	-	-
Balochistan								
15+	1972	10	15	4	0.27	1.4	0.7	0.7
	1981	10	15	3	0.20	2.0	1.0	1.0
	1998	23	33	12	0.36	2.8	1.3	1.5
	2010	37	56	15	0.27	3.0	1.1	1.9
15-24	1972	16	23	7	0.30	0.4	0.2	0.2
	1981	12	17	6	0.35	0.6	0.3	0.3
	1998	31	42	18	0.43	0.9	0.4	0.5
	2006	55	69	41	0.60	-	-	-

Source: IPUMS, PDHS 2006-07, PSLM 2010-11, GPI=Gender Parity Index

Table 4.3: *Educational attainment of the working age population (20-64) in Pakistan, in percent*

Census	Gender	No Education	Primary	Secondary	Tertiary
1972	Male	68	13	17	2
	Female	92	4	3	1
1981	Male	66	12	19	3
	Female	88	5	6	1
1998	Male	48	18	28	6
	Female	74	11	12	3
2010	Male	35	16	34	15
	Female	65	12	15	8

Source: IPUMS, PDHS 2006-07

of male and female of WAP who have at least completed primary education in Punjab increased from 19 percent and 5 percent in 1972 to 33 percent and 17 percent in 1998 respectively. However, the proportion of males and females who have completed primary education in Punjab in fact declined in 2010—16 percent, and 15 percent for male and female, respectively. The declining share of primary education for male and female for WAP alike in Punjab during the last decades is pointing the fact that, majority of the population who attained the primary education, enroll to higher levels. The share of the secondary education of the WAP in Punjab was very low in 1972—only 11 percent of male and 3 percent of female have attained secondary education. Moreover, the percentage of secondary educated peoples in Punjab increased to 37 percent for male and 17 percent for female in 2010. The percentage of tertiary educated persons of the WAP of Punjab was disappointing in the past. In 1972, only 2 percent of males had a university degree in Punjab. The situation is far worse for women where the barriers to tertiary education have been impervious in many settings, especially in rural areas—zero percentage of the female in Punjab had a university degree in 1972 and approximately 10 percent in 2010 (See Table 4.4).

In the early 1970s, the situation of the educational attainment of the WAP in Sindh was not inspiring. Roughly 89 percent of female and 65 percent of male in Sindh had never attended school in 1972. Furthermore, the share of of uneducated population of WAP in Sindh declined to 65 percent for female and 35 percent for male in 2010. Whereas the share of primary education of WAP in Sindh had 22 percent, and 6 percent for male and female respectively in 1972 and improved to 10 percent for female in 2010 and is declining for male—i.e., 17 percent. On one hand, it shows that access of primary education to girls increased in Sindh, whereas the dropout rates for boys were substantially higher in rural areas. Consequently, only 9 percent of male and 3 percent of female had been secondary educated in Sindh during early 1970s, whereas the progress in producing university graduates had very slow in Sindh—4 percent of male and 1 percent of female had tertiary education in 1972. The picture of the higher education has not look pretty in Sindh. The share of secondary and tertiary educated females in Sindh increased to 13 percent and 11 percent, respectively in 2010. On the other hand, the male is in a relatively better position in Sindh. The share of sec-

Table 4.4: Educational attainment (in percent) of the working age population (20-64) of Pakistan at provincial level from 1972-2010

Category	1972		1981		1998		2010	
	Male	Female	Male	Female	Male	Female	Male	Female
Balochistan								
No Education	87	97	84	97	69	91	49	84
Primary	7	2	9	2	15	5	8	5
Secondary	5	2	5	1	12	3	26	7
Tertiary	1	0	1	0	4	1	17	4
KPK								
No Education	72	95	74	96	54	88	35	79
Primary	16	2	14	3	23	7	11	7
Secondary	10	2	10	1	18	4	37	9
Tertiary	2	0	2	0	5	1	17	5
Punjab								
No Education	68	92	64	87	45	72	32	59
Primary	19	5	21	8	33	17	16	15
Secondary	11	3	12	4	18	8	37	17
Tertiary	2	0	2	1	4	2	15	10
Sindh								
No Education	65	89	62	83	47	71	35	65
Primary	22	6	21	10	26	15	17	10
Secondary	9	3	11	5	18	10	25	13
Tertiary	4	1	5	2	9	5	23	11

Source: Own Calculation from Census 1972,1981,1998 (IPUMS), PDHS 2006-07

ondary and tertiary educated males improved to 25 percent and 23 percent in 2010 respectively (See Table 4.4).

In 1972, 72 percent of the male and 95 percent of the female of WAP in KPK, and 87 percent of the male and 97 percent of the female of WAP in Balochistan received no education. This has declined to 84 percent for female and 49 percent for male in Balochistan, and 79 percent of female and 35 percent of male of WAP in KPK in 2010. The share of at least primary education for males in KPK increased to 23 percent in 1998 from 16 percent in 1972, and further declined to 11 percent in 2010. It is evident from Table 4.4 that, during the early 1970s, the transition from primary to secondary education for male was not significant in Sindh, whereas in 2010, this transition was sustainability high in reflecting the fact that the probability to move into secondary level was high in Sindh and dropout rates were low. Also, the proportion of primary education of female WAP increased from 2 percent to 7 percent from 1972 to 2010 in KPK respectively. Furthermore, the picture of primary education in Balochistan has been gloomy during the last four decades—only 7 percent of male and 2 percent of female in 1972 had primary education and as of 2010, only 8 percent of male and 5 percent of female have acquired to primary education—reflecting the access to primary education which hinder the development of education in Balochistan. The situation disgruntled for secondary and particularly for tertiary education in KPK and Balochistan. Approximately, 37 percent of the male and 9 percent of female of WAP

in KPK completed at least secondary education in 2010—increasing from 10 percent and 2 percent in 1972, for male and female respectively. Only 1 percent of males in Balochistan completed a university degree in 1972 and females never attended the university in the same year. However, significant improvement in tertiary education in Balochistan has been seen during last four decades. The share of tertiary educated increased to 17 percent for male and 4 percent for female of WAP in 2010. As expected, the situation has become even worse in 1972 for tertiary education for male and female alike in KPK (See Table 4.4). The share of tertiary educated person of WAP in KPK had been substantially low during the last four decades—only 17 percent of male had tertiary education in 2010, as compared to 2 percent in 1972. The females of WAP had never attend the university in early 1970s in KPK and this has to confirm in 1998 that the proportion of female university graduate was one percent. Recently, the female enrollment in universities in KPK increased considerably—the share of tertiary educated female rose to 5 percent in 2010.

Table 4.5 shows that the percentage distribution for four broad age groups, sex and by level of educational attainment in Pakistan at the provincial level for the period of 2005-2010. The table shows a very gloomy picture. It shows that the inheritance of past education policies and outcomes into the current educational distribution. It is quite reasonable that before making any policy paradigm for the future, to identify the trend in educational distribution of population and examine some of the obstacles that hindered to reaching a highly educated society, which ultimately affects the economic growth of the country. In Pakistan, 81 percent of females aged 35 and older have no formal education in 2010. Whereas, their males counterpart have better educated (47 percent in 2010). The situation has been inferior in KPK and Balochistan in 2010, where 92 and 94 percent of females aged 35 and over have never been to school in KPK and Balochistan respectively. The gender equity is quite higher in the older cohort rather than in the younger cohort in primary and secondary level in Pakistan. Approximately more than 80 percent of females aged 35 years and older have never attended school in all four provinces in Pakistan.

Table 4.5 gives comparable information of educational level for Pakistan at provincial level in 2010. On average, the males in Punjab and KPK have been better educated at all levels of education (particularly at the primary and secondary level) for older cohorts (i.e. 25-34 and 35+) as compared to Balochistan and Sindh. Whereas, the situation for females of similar cohorts deteriorates in all provinces except Punjab. The large proportion of younger cohorts (age group 15-19) of males in Balochistan and Sindh had never attended the school—30 percent and 27 percent in 2010 respectively and significant proportion (approximately 50 percent) of females aged 15-19 had no formal education in remaining three provinces except Punjab in 2010. Female enrollments in primary education for older cohorts (25-34 and 35+) as well as younger cohorts (15-19) in Punjab and Sindh improved as compared to other provinces in Pakistan. For instance, 22 percent and 21 percent of females aged 15-19 have at least a primary education in Punjab and Sindh in 2010. The proportion with at least primary education never reached even 25 percent for older cohorts (age groups 35+) for all provinces in Pakistan, even though the national and provincial governments had higher priorities for providing primary education and adult literacy in recent years. The pro-

portion of females (age group 15-19) with at least secondary education in Punjab and Sindh has much higher as compared to other provinces—39 percent and 28 percent respectively. This development over time has been pervasive in Pakistan, with only 4 percent for women and 12 percent of men in Pakistan, having a tertiary education in the age group 35+. It is interesting to note that the proportion of tertiary education for males are higher than females for older cohorts (25-34, 35+). However, in recent decades, the higher proportion of females observed in age group 15-19 which reflect that the access to university for girls and the priority of government was high in recent years. The gender parity has wide in secondary and tertiary education in all provinces but the situation was alarming in Balochistan and KPK, where 10 percent of females in KPK and 8 percent in Balochistan in the age group 20-24 have completed tertiary education whereas, the proportions of males are almost doubled in these provinces as compared to females. During the last two decades, the improvement in education particularly for female in Punjab has seen which is reflected by the fact that the fraction of women with a tertiary education is higher than males in the age group 20-24.

4.2.4 Enrollment and Educational Expenditures

Enrollment ratios inform the present situation in school and represent the engine of future human capital. Table 4.6 is showing the data for gross enrollment ratio for the last 10 years, and those demonstrates quite strong progress at the level of primary and lower secondary education. However net enrollment ratios⁴ show that all children are far from entering primary schools at the official school age – 72 per cent for boys and 60 per cent for girls in 2009 – and even more so in secondary schools – 36 per cent for boys and 29 per cent for girls in 2009. Also only 6 per cent of the children who have entered primary complete the level and only 72 per cent of those move onto secondary level studies.

Level of enrollment indicates that an increase in the number of students at all levels future progress in the education of the labor force, although these net enrollment rates do not automatically translate into levels of educational attainment because of dropouts and grade repetition. Table 4.7 presents the Net Enrollment Rate (NER) in primary level at the provincial level in Pakistan from 1995 to 2006 from PIHS and PSLM.⁵ The NER in Pakistan increased from 44 percent in 1995 to 56 percent in 2006 for both sexes. The NER in Punjab has been higher in Pakistan in 2006-07 as well as, was higher in 1995. Nearly a 12 percentage increase in NER occurred from 1995 to 2006 in Pakistan for both sexes. The Punjab and KPK have attained significant gain in NER from 1995 to 2006—38 percent and 40 percent for both sexes—reflecting the significant amount of budget spent on education during the last decade. Surprisingly,

⁴Gross enrollment ratio is defined as the number of pupils (of any age) who are enrolled in a particular level as a percentage of the total children of official school age population for that level. The net enrollment ratio is defined as the number of children of official school age for a particular level that are enrolled in that level as a percentage of the total children of the official school age population. Hence the difference between gross and net enrollment ratio indicates the extent of over-aged and under-aged enrollment.

⁵PIHS: Pakistan Integrated Household Survey and PSLM: Pakistan Social and Living Standard Measurement Survey

Table 4.5: *Percentage distribution of four broad age groups by age-sex and educational level in Pakistan at provincial level: 2005-2010*

Region	Male				Female			
	E1	E2	E3	E4	E1	E2	E3	E4
Pakistan								
15-19	20	22	50	8	37	21	34	8
20-24	21	17	42	19	43	16	24	17
25-34	27	15	38	20	58	14	17	12
35+	47	15	25	12	81	9	7	4
Punjab								
15-19	18	23	52	7	30	22	39	9
20-24	19	19	44	17	35	19	27	19
25-34	25	16	42	17	51	17	20	12
35+	46	15	28	11	78	10	8	3
Sindh								
15-19	27	21	41	11	45	18	28	9
20-24	25	16	35	24	49	14	20	17
25-34	31	15	28	26	60	11	15	14
35+	44	19	18	18	78	8	8	6
KPK								
15-19	15	20	58	7	48	21	27	4
20-24	18	12	49	20	58	14	18	10
25-34	25	11	44	21	74	9	11	6
35+	53	11	25	11	92	3	3	1
Balochistan								
15-19	30	20	45	4	53	18	26	4
20-24	33	11	38	19	67	9	16	8
25-34	41	8	30	21	83	5	7	5
35+	65	7	16	12	94	2	3	2

Source: PDHS 2006-07, E1=No Education
E2=Primary,E3=Secondary,E4=Tertiary

Table 4.6: *Gross enrollment ratios in percent, 2000-2009*

Level	Gender	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Primary	Male	82	83	84	85	91	94	89	93	93	92
	Female	56	56	57	62	66	71	69	76	77	77
Lower Secondary	Male	-	-	-	38	41	43	47	51	50	49
	Female	-	-	-	26	29	32	35	38	38	38
Upper Secondary	Male	-	-	-	24	27	24	24	26	28	28
	Female	-	-	-	21	23	20	19	20	21	22
Tertiary	Male	-	-	3	3	3	5	5	6	6	-
	Female	-	-	2	2	3	4	4	5	5	-

Source: Goujon & Wazir (2011)

Table 4.7: *Net enrollment rate in primary (in percent) at provincial level in Pakistan: 1995-2006*

Region	2006-07			2000-01			1995-96		
	Male	Female	Both	Male	Female	Both	Male	Female	Both
Pakistan	60	51	56	46	38	42	49	38	44
Punjab	64	59	62	47	43	45	50	39	45
Sindh	56	43	50	46	34	40	50	39	45
KPK	56	41	49	48	33	41	42	28	35
Balochistan	49	32	41	39	39	32	51	39	45

Source: PSLM 2006-07, PIHS-2000-01 and 1995-96

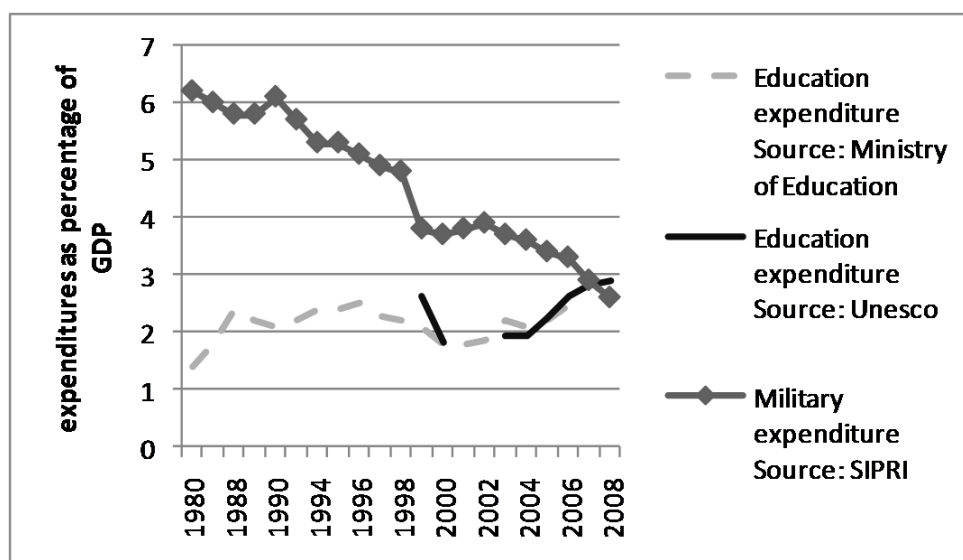
the trend in NER declined in Balochistan for both sexes. A significant gender parity is seen from the table 4.7 in the decades of 1990s. The gender discrimination in primary education has been declining over time, however in some regions it has existed substantially — e.g. in Balochistan in 2006-07(See Table 4.7). The progress in Punjab in the education sector has been striking, particularly for girls, which show that commitment and access of basic primary education has been provided to all segments of the society in the recent past in Punjab.

Pakistan is one of the largest countries in the world with largest out-of-school population—nearly 7 million of primary school age were out of school in 2008, of which 60 percent are girls—about the population of the Lahore city (Capital of Punjab Province). This means that one in ten of the world school-aged children who never attended school lives in Pakistan—approximately, 67 million primary school ages children were out of school in the world in 2008—reflecting that Pakistan was the second (after Nigeria) in global ranking of out-of school children in 2008.⁶ Furthermore, the access to education for poor household hindered the enrollment in the school particularly in rural areas in Pakistan. Nearly 49 percent of children aged 7 to 16 years from the poorest households in Pakistan were out of school in 2007, as compared to five percent for the children from wealthier households. This needs the call for further investment in the education sector in Pakistan, particularly in rural areas to bring out of school children into school. Figure 4.2 illustrates the spending on education as a percentage of GDP versus the spending on the military expenditure as a percentage of GDP in Pakistan from 1980 to 2008. The huge difference was existed in priorities of the government of Pakistan in the past. In 1980, more than 6 percent of GDP had been spent on the military whereas, the less than 2 percent being utilized on education. However, the difference between the two has been narrow over the past two decades. The research shows that, only one-fifth of the current military expenditures would be sufficient to attain the universal primary education in Pakistan (UNESCO, 2011).

Pakistan is committed to spend at least 4 percent of the GDP on education recommended by UNESCO. However, the expenditures on education have fallen in recent years—from 2.5 percent in 2006-07 to 2 percent in 2009-10. Recently, the spending on education was actually less than that of actual allocated budget—some provinces

⁶http://www.unicef.org/education/files/OOSCI_flyer_FINAL.pdf

Figure 4.2: Education and Military expenditures as percentage of GDP in Pakistan; Source: Goujon and Wazir (2011)



spent almost 60 percent of their education budget in recent years. The estimate suggests that to achieve the national and international (MDGs and EFA) targets in 2015, a 50 percent increment would be essential on current educational expenditures in Pakistan (Force, 2011).

4.3 Conclusion and Discussion

The current progress of the educational achievement in Pakistan makes an interesting contrast with the past. Since the illiteracy and failure of educational sector was inherited from British rules at the time of the independence of Pakistan in 1947. The newborn state Pakistan agreed at the time of independence to provide free and compulsory education (i.e primary education) to all schooling age children (age group 5-9). However, the targets for compulsory primary education in Pakistan had formulated more than a decade later from Independence in 1960s. Since that time, the targets for free and compulsory primary education had not been achieved in Pakistan and targeted dates for the goals repeatedly extended until recently. For instance, in 2010, Pakistan is far from attaining its elusive goals of free and compulsory primary education. However, Punjab recently seemed on a track towards universal primary education. It is worth mentioning that rapid population growth rate in Pakistan has been hindering the task of educational goals (particularly universal primary education) in Pakistan in the past. An addition of large numbers of school age children every year has spoiled the educational structure and need significant expenditures to meet the requirement of educational goals. Unfortunately, Pakistan was unable to provide the basic infrastructures and upgrade the educational system in the past.

The state of education in Pakistan become deteriorated by a number of factors, including insufficient physical infrastructure and facilities, strong and motivated polit-

ical commitment and fragmented education structure. A vital setback of failure of education in Pakistan has been an under-investment in education since four decades. Consequently, the poor quality of services and lack of access cripple the enrollment at all levels of education in Pakistan. The expenditure in the education sector in Pakistan was dismally low. The investments in education have been too low in the distant and recent past. In 1980, the government was spending four times more on military expenditures than on education. In 2002, the ratio of military to education spending was still above two. Pakistan was one of only 12 world countries that spent less than 2 percent of its GDP on education. With 44 percent of the working-age population has never been to school and education expenditure was less than 3 percent of its GDP in 2010, increasing from less than 2 percent for the period of 2000-2005. Governance related problems evident themselves in lack of transparency, accountability and tracking mechanisms as well as of partnerships between policy maker and service providers. The military expenditures in the recent and distant past have been significantly higher as compared to education expenditure or development budget in Pakistan. Whenever there is a financial constraint faced by government in Pakistan, education was the first choice to be axed. The educational system in Pakistan has been highly segmented—into English and Urdu medium and public and private—which creates the lack of optimal utilization of human resource and division of the societies persistent. Government of Pakistan announced that 2011 as the year of education and implemented emergency in education sector in Pakistan. Our projections (in next two chapters) reveal that the Millennium development goals for education for each province in Pakistan will not be achieved in 2015, if Pakistan retained the pace of enrollment in primary level in the recent past. This would require the radical changes in education structure and increase the budget for education.

Population projection by age, sex and level of education in Pakistan: 2010-2060

Summary¹

This chapter offers a comprehensive overview of the development of educational attainment during next five decades in Pakistan. By using the multistate cohort component population projection methodology, the population projection of Pakistan by age, sex and level of educational attainment has been executed from 2010 to 2060. First, we briefly explained the methodology and construct the input data for population projection of Pakistan. Based on projections results, we illustrated what could be the implications of future fertility and education developments on the size of the Pakistan population until 2060, according to several educational and fertility scenarios. This chapter also provides the potential of achieving the MDGs goals that of universal primary education and gender equity in Pakistan. Furthermore, we assess the demographic window of opportunities in Pakistan and discuss the role of education in this regard. Moreover, the analysis presented in this chapter indicates that the influence of female education on the future level of fertility and prospective of population growth in Pakistan.

¹This chapter is largely based on the Wazir et al., 2011

5.1 Introduction

The history of education is closely intertwined with the past and present demographic history of Pakistan. There are two explanations. First of all, levels of education are clearly influencing the demographic behavior of the people and the most visible impact of education is on women's fertility, which is systematically lower at higher levels of educational attainment as we will see in the case of Pakistan. Repercussions of education can be seen on other demographic indicators such as mortality e.g., maternal education lowers infant and child mortality, as well as maternal mortality.

Secondly, education at the macro-level acts as a good proxy for development. Hence measuring population levels of educational attainment, whether in the work force or in the overall population, is a valid measure of the well-being of individuals in terms of economic well-being (i.e. poverty and competitiveness of the economy or social well being e.g., autonomy of women, civil freedom). The case of Pakistan is puzzling. On one hand, education has been one of the top priorities in the political discourse for many decades, while at the same time, very little has actually been done in terms of investments in education and in 2000, with about one-third of the young population not enrolling in school.

Human capital usually refers to the people who are in the labor force, differentiated by their health status and their skill levels, conveniently approximated by levels of educational attainment. Contemporary research reveals that, education has a positive effect on socio-economic status and health of the people. Universal basic education was proved to be a key factor for the macro economic development (Lutz et al., 2008). It is well established fact that better education leads to higher individual income and long-term economic growth. The research shows that not only universal primary education would drive the country toward higher economic growth, but together with at least lower secondary education, is necessary to bring the large segment of society out of poverty. Education is a long-term investment and considered one of the best investment societies can make for better life of their next generations (Lutz et al., 2008). Universally, higher education is associated with healthier and longer life for males and females alike: highly educated peoples lived on average longer than their counterparts who have no education (See details in KC and Lentzner, 2010). Virtually in every society, female education has a significant negative effect on infant mortality rates and maternal mortality rates (Fuchs et al., 2010; Bhat, 2001). The number of children highly dependent on the level of the education of women—better educated women have fewer children and find better access to birth control than less educated ones (Bongaarts, 2008). Furthermore, literacy is an essential tool for eradicating poverty and increased participation in labor force (Cameron and Cameron, 2006). Birdsall et al., 1993 looked at the cost of low schooling and large gender gap. They found that, in 1985, Pakistan's income would have been 25 percent higher had they achieved Indonesia's 1960 primary enrollment rate and about 16 percent higher if female enrollment rates had been at the same level as for boys. Therefore, if Pakistan had invested more in education in 1960, it would have much higher economic growth rates today. As well, Nasir and Nazli, 2000a showed also that "the allocation of government funds is skewed towards higher education so that the benefits of public subsidy on education

are largely reaped by the upper-income class.” Special efforts by the government to promote education started mainly in the 1980s but were very unsuccessful due to political instability. In his distinguished lecture, Stern, 2001 has argued that, education plays a vital role in the development because of two reasons. On one hand, the quality and quantity of education, particularly primary education greatly influencing the governance (See also Lutz et al., 2010 for this argument) and labor force. On the other hand, the universal primary education is obligatory for ensuring that all segments of society will benefit evenly from macroeconomic growth. The attainment of universal primary education has a significant effect on wage employment. An increase of additional one year of the schooling raised the wages by 10 percent (Stern, 2001). It is also evident in Pakistan that, the districts that have been higher level of education and literacy have higher level of development (SPDC, 2003). Therefore, the importance of education in bringing economic and social change is lucid.

Investments increased in the last ten years, but the inertia of education diffusion is such that it will take many more years before Pakistan can benefit from a well-educated work force in a country where population growth remains very high – slightly below 2 percent. As an effect of fertility reductions, the schooling age population (5-19) started to decline since 2008 – after growing at a yearly rate above 3 per cent between 1967 and 1996. This implies a relative decrease of pressures on the Pakistani school system that will be facing the challenge of increasing the “quantity” of education offered (school facilities, teachers, etc.), while not compromising on the quality (Behrman et al., 1997). Another challenge will be to create the economic conditions to employ those populations since the working age population is growing very fast in Pakistan, above 3 per cent per year on average. In this chapter we review changes in the literacy and education levels of the population over the last few decades. Based on projections, we will show what could be the implications of future fertility and education developments on the size and quality of the Pakistani population until 2050 based on several scenarios.

5.2 Methodology

5.2.1 Multistate Population Projection Methodology

The methodology is based on the multi-state population projection method and executed by using the PDE population projection software². The multistate approach is primarily based on the multidimensional expansions of mortality, fertility and migration. The concept of the multistate model is based on the decomposition of population by age and sex into the desired number of “states” originally developed for geographical units with movement between the “states” being migration stream (Rogers, 1975a). However, it can reflect any clearly defined subgroup of the population, such as education, religion, etc. The details of the methodology can be found elsewhere (KC et al., 2010; Lutz et al., 1998).

²Developed at the International Institute for Applied Systems Analysis in 1993, it can be downloaded free of charge from this link: www.iiasa.ac.at/Research/POP/pub/software/pde/pdesetup.zip

In projecting the cohorts forward, differential survival rates are applied to the different education groups in the population. The information on the differentials was assessed from large literature reviews in Pakistan as well from modeling exercises based on past data. The details of these adjustments are provided below. The different education groups essentially treated as a separate sub-population in Pakistan. At younger ages, transitions between the education categories may also occur. The analysis is based on the assumption that changes in educational attainment are uni-directional, in other words, individuals can only move from the ‘no education’ status to primary, and on to secondary, but never revert to a lower status. We collect the data (typically around the year 2010) which gives the total population by sex, five-year age groups and the four education categories for Pakistan. Our methodology for population projection of Pakistan can be summarized as follows:

- A jump-of population composition by five-year age group, sex and four level of educational attainment for Pakistan was derived.
- Age-sex and educational level specific mortality rates derives in Pakistan. Survival ratios for each educational group applies to project the population at the next time step.
- Age and sex-specific educational transition rates applies.
- Age-sex and education specific net international migrants is added or removed.
- Age-sex and education specific in-and-out internal migrants adjusted.
- Age education specific fertility rates applies to determine the new born cohorts in Pakistan.
- Using a bottom-up approach: each province projects one (five years) step ahead separately. Sum up the age-sex and education specific population for all provinces and adjusted (if needed) proportionally to the national level. (Used in next chapter)

5.2.2 Jump-off population by age, sex and level of educational attainment

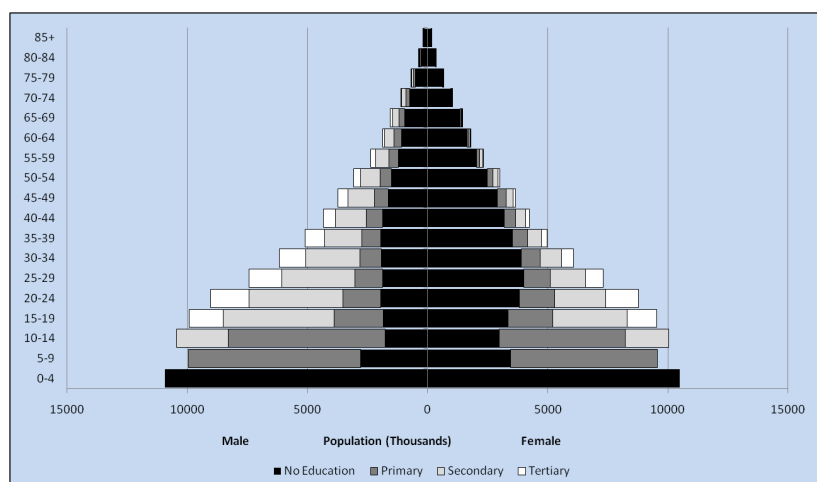
The first step of the population projection by level of education requires population distribution by age, sex and educational level. We already discussed and constructed the age and sex distribution of each province in Pakistan in chapter three of this book. Before proceeding further, it is important to define the education categories in Pakistan, which is later used in our projection. The education system in Pakistan consists of six levels—starting with Primary education to University degree. It is necessary to cover the entire educational level in a precise and consistent manner. The large number of educational categories would limit the availability of the vital rates for each educational category particular in developing countries such a Pakistan. Likewise, the small number of educational categories would not attract the audience and policy makers in Pakistan. For instance, economists would need the distinction between secondary and tertiary education to access the rate of return of education on individual income. Therefore, we have defined the four categories for each province

in Pakistan namely into: No Education, Primary, Secondary and Tertiary. Table 5.1 presents a more precise definition of the categories and the correspondence between the national educational structure and the international framework (ISCED). Based on the definition of categories presented in Table 5.1, the population by age, sex and level of education for each province computed from Pakistan demographic health survey (PDHS 2006-07).

Table 5.1: Pakistan ISCED Mapping

Category	ISCED97	National educational level	Duration	Official Entrance
			(in years)	age (in years)
Primary	Pre-Primary (0)	Pre-Primary education	3	3
	Primary (1)	Primary (Grade I-V)	5	5
Secondary	Lower Secondary (2)	Middle level (Grade VI-VIII)	3	10
		Vocational Institutes	2	10
	Upper Secondary (3)	Metric level (Grade IX-X)	2	13
		Intermediate (Grade XI-XII)	2	15
		Technical education	3	15
		Nursing	3	15
		Primary teaching certificate (PTC)	2	16
	Post-Secondary & Non-Tertiary (4)	Certificate in Training (CT)	2	17
		Paramedical	1-2	17
Tertiary	First stage of Tertiary (5)	B.A, B.Sc.	2	17
		B.Sc. (hons)	3	17
		Bachelor of Edu. (B.Ed.)	3	17+
		Engineering	4	17
		Medical degree (M.B.B.S.)	5	17
		M.A, M.Sc., M.Ed.	2	19+
		Master of Philosophy (M.Phil)	2	22
	Second stage of Tertiary (6)	Doctor of Philosophy (Ph.D)	3-5	22

Figure 5.1: *Population Pyramid of Pakistan in 2010, by level of education; Source: Own Calculation*



The population of Pakistan is subdivided into four educational categories - no education, primary education, secondary education and tertiary education based on the above classification. Each sub population is further stratified by five years age-group and sex to which are applied education specific fertility, mortality and migration. Furthermore, transition rates between education categories allow the modeling of changes in the education sector. The Population pyramid of Pakistan in 2010 by four levels of education is shown in Figure 5.1.

5.3 The future path

5.3.1 Fertility

The pace of fertility decline in Pakistan, which started in the early 1990s, had been very slow compared to other countries in the South Asian region. The basic premise for the scenario making on future fertility is that the fertility transition that is underway essentially continues in future. The evidence shows that Pakistan is in the middle of its demographic transition and forecasts further fertility decline in the future (see chapter two for more details about fertility levels and trends in Pakistan). In the longer horizon, the future level of fertility will determine the general socio-economic and cultural changes. The prediction of these trends is not easier than that of the direction of fertility change itself. In this context, the national policies and family-planning programs will play a significant role, if these policies are well integrated into other government policies (e.g. on education and health) and particularly, if the socio-economic development of the population has reached a certain point at which large segment of the society considered the family size limitation advantageous.

We need to consider three scenarios of fertility (Table 5.2), namely High, Medium and National Fertility Goal (NG) to answer the following question: **Based on the past experience of fertility stagnation and slower decline in Pakistan, whether fertility transition have the right pace to achieve the national population policy**

Table 5.2: *Projection of TFR by level of education in Pakistan from 2010-2060*

	Observed in 2006-07	Base-year 2005-2010	High 2025-30	Medium 2025-30	NG 2025-30
No Education	4.8	4.2	3.4	2.8	2.4
Primary	4.0	3.6	2.8	2.4	2.1
Secondary	3.1	2.8	2.2	2.0	1.8
Tertiary	2.3	2.0	1.6	1.7	1.4
Total	4.1	3.7	2.9	2.4	2.1
Total in 2055-60			2.3	1.8	1.3

Source:PDHS 2006-07 and author's calculation base on UN 2010

Table 5.3: *Education specific and total TFRs for Andhra-Pradesh (India) 2005-06*

Mother's education	Total fertility rates
No Education	2.1
Primary	1.9
Secondary	1.8
Tertiary	1.6
Total	1.8

Source:NFHS-3 India 2005-06

goals 2010 (National Goal scenario), and most importantly what will be the consequence in term of population growth if these goals are achieved or not? The TFR in the High and Medium scenarios follow the assumption of the United Nations 2010 World Population Prospects (TFR respectively 2.3 and 1.8 in 2055-60) and the NG scenario typically implements the target set by the government of Pakistan in its National Population Policy (NPP) 2010: 3 children per women by the year 2015-2020, and replacement fertility level fertility (i.e. 2.1 children per women) by 2025-30. Beyond 2025-30, the NPP does not assume any specific goal. Because of the pace of decline in the NG scenario in the near future will be much faster than in the High and Medium scenarios, we assumed a continuation of the rapid pace using the low fertility scenario of the UN leading to a TFR of 1.3 in 2055-60.

In the High scenario, the educational fertility differentials obtained by keeping the relative ratio of different education specific fertility to the overall total fertility rate in 2005-10 constant over the projection period. For the Medium and the NG scenarios, we assumed convergence, meaning that fertility differentials by education tend to diminish as fertility declines. We chose the relative ratios of the different education specific fertility to the overall total fertility rate observed in the Indian state of Andhra Pradesh that had reached below replacement fertility level in 2005-06 – TFR is 1.8 according to the National Fertility and Health Survey 3 (NFHS) – as a target and assume that in 2055-60, Pakistan will have education-specific fertility rates to those of Andhra Pradesh state (India) today (See Table 5.3).

It is important to note that Andhra Pradesh had experienced a rapid fertility decline in very short time period (TFR 4.5 in 1971-73 to 2.7 in 1992-94 and 1.79 in 2005-06) like some other southern India States e.g. Kerala and Tamil Nadu, where on

an aggregate level, female education and literacy has been proven to be one of the strongest variable explaining fertility decline (Bhat and Rajan, 1990), together with improved health facilities (James, 1999).

5.3.2 Education

Pakistan records on the education front have not been impressive due to low levels of public expenditure on education. In chapter 4, we have clearly shown that the Pakistani educational system has thus failed to provide the basic infrastructure, eliminate gender imbalances and the quality of education, which would be required to enjoy the full collateral benefits of education such as high levels of economic growth and well-being. In this context, we defined three scenarios of educational attainment (see Table 5.4) based on the assumption that education will be crucial for socio-economic development in Pakistan. The assumptions are set in terms of age and sex specific transition probabilities between levels of education to model the age specific proportion of young men and women (here between age 5 to 24 years) who make the transition from no education to primary, from primary to secondary, and from secondary to tertiary education³.

The essential element of the human capital projection is the transitions between educational categories. This means how people moves between educational groups. The education categories are uni-directional. Indeed, once the people have attained the higher level of education, they never go back to the previous groups throughout their life span. This follows from the definition of formal level of educational attainment chosen here, which is only possible approach based the available empirical data.

In the case of forward projection, four education groups need three sets of transition rates by age and sex for each province in Pakistan. First transition happened in age group 5-9 from No education (E1) to Primary (E2). The timing of the transition reflects the particular feature of the national school system in Pakistan. For example, the official age of entry into school, number of grades in primary, lower and upper secondary and so on in Pakistan (See the details of entry age into each educational level in Pakistan in 5.1). The definition of each education category with ISCED level is shown in table 5.1. The current education structure in Pakistan has been divided into six levels: primary, middle, metric, and intermediate, bachelor and university graduates. The primary level consisted of grade one to five (ISCED 1). The usual entry age and duration of primary level is 5 years and compulsory for all children in all provinces in Pakistan. This is clearly the case for the transition from no formal education (E1) to primary (E2) at age group 5-9, but the transition also happened in age group 10-14 because some children entered late into school and repetition rate at the primary level has been very high particularly, it is true for poor regions like Balochistan and KPK. Therefore, we have assumed that, the transition from no education (E1) to primary (E2) happened in two age groups, 5-9 and 10-14 for all provinces in Pakistan.

³ Although transitions can in theory happen at any age – for instance, those who become literate by the mean of adult literacy campaigns.

The issue becomes more problematic for transition from primary (E2) to secondary (E3) in Pakistan, in which certain proportion may be expected to happen in age groups 10-14 and 15-19. The secondary category consists of three levels: middle (lower secondary), Metric and higher secondary (intermediate). The duration of middle-level education is three years starting from the age of ten (10) until the age of 13 in all provinces in Pakistan. The second level of secondary education comprises metric level education (grades 9-10). The duration of metric level is two years with an official entry age of 13 years and will complete until the age of 15 years for every regions in Pakistan. After matriculation, the secondary schools issue the certificate of matriculation. The third level of secondary education contains the intermediate level (grades 11-12). The duration of intermediate level is also two years, and after matriculation students either do intermediate or poly-technical education, nursing and/or PTC (see table 5.1). Our definition of secondary categories includes the lower and upper secondary levels, which starts from the age of 10 and will continue until the age of 17. Thus, we have assumed here that the transition from primary education (E2) to secondary education (E3) will happen in the age group 10-14 and 15-19 for each province in Pakistan.

The timing of transition to E4 will require more consideration as compared to E3 in Pakistan. The transitions to tertiary education (E4) clearly happen in a broad range of age groups, i.e., 15-19 and 20-24 and beyond. The main problem is that the age at transition to E4 varies greatly between provinces. For example, in Sindh and Balochistan, students enter late into college and universities. Therefore, some transition from E3 to E4 is happened in age group 25-29. The bachelor degree is considered as the first level tertiary degree in ISCED framework. Table 5.1 shows the entry age to the first tertiary level is 17 years. Student either take bachelor level (honor), engineering or medical degree. After completion, students receive the graduate degree from the university. Accordingly, we have assumed here, that the transition from secondary education (E3) to tertiary education (E4) will happen in the age group 15-19 and 20-24 (in some cases 25-29) for each province in Pakistan.

The transition probabilities between the level of education which models the flow of the population of schooling age—from no education to primary, from primary to secondary and from secondary to tertiary education. Here, we are considering three scenarios of education namely “Constant,” “Trend” and “National Goal (NG)” to answer the following question: *“Based on the trend in educational improvement in the last 15 year (Scenario Trend), does each province have the right pace of educational improvement to reach the goals set by the national⁴ and international agenda⁵ (Scenario Goal), and more importantly, What will be the consequence in terms of the future educational attainment of the working-age population?”*

⁴NEP: National educational Policy (1998-210) <http://www.moe.gov.pk/edupolicy.htm>

⁵Such as that of the United Millennium Development Goals (MDGs) for education and the UNESCO Education For All (EFA) initiative <http://www.unesco.org/en/efa/>

5.3.2.1 Constant Education Scenario

The “Constant” scenario assumes that the transition probabilities at the base year from no education to primary, primary to secondary and secondary to tertiary are kept constant throughout the projection period. It means that the zero expansion of schooling enrollments. This scenario is not presented as a likely future, but shows the progress already embedded in the educational structure of today—the education momentum. Regardless of constant transition rates, the adult education levels improve as younger and more educated cohorts, as a result of recent improvement in education, are replacing the older cohorts.

The Constant scenario assumes constant transition as observed in the population aged 5-24 in 2010, to show the progress that already embedded in the present levels of educational attainment. The Trend scenario looks at the pace of change in the last two decades and prolongs it into the future. It will be compared to the Goal scenario that shows the unlikely case that Pakistan attains the national and international targets in terms of education. A comparison between the Trend and the Goal Scenarios will show to what extent Pakistan has adopted the right pace of educational improvements to attain the targets set by national and international agencies.

5.3.2.2 Trend Education Scenario

Informally, the trend scenario assumes that the educational expansion will converge on an expansion trajectory based on the cohort trends for individual provinces. It is assumed here that the rate of change in the transition probabilities for some specified cohorts at the primary and secondary level as observed in the past would continue into the future in specific province in Pakistan. To estimate the historical cohort trend, it is implicitly assumed that each birth cohort’s age specific educational attainment should be used as a substitute for schooling at the time birth cohort was of primary or secondary level. It further assumes that primary school entry occurs a maximum at age 10. This would imply that at least by the age of 10; children are enrolled in the primary level, while for secondary school entrance took place at age 15. In this fashion, the educational attainment at the primary level of the birth cohort of 1980-85 is an indication of the transition into the primary level in 1990-95. Table 4.4 shows the percentage distribution of educational attainment at the primary, secondary and tertiary level by birth cohorts for male and female in Pakistan. It is evident from the table that, the females are lagging behind the males in enrollment at all levels. The primary school attainment was 21 percent of the birth cohort 1960-65 (aged 45-49 in 2010) for females who enrolled in primary school approximately 35 years ago, while the males of the same cohort, who have enjoyed much progress in primary attainment (57 percent was attained primary level). The primary school attainment was 75 percent for birth cohort 1980-85; 79 percent for birth cohort 1985-90; and 80 percent among birth cohort 1990-95. Therefore, based on this cohort extrapolation method, these trends are assumed to continue into the future (fit a logarithmic trend line on the birth cohorts at primary, secondary and tertiary levels). The cohort extrapolation method was applied for each education category in each province as well as at national level up to 2060. The targeted transition probabilities for primary, secondary and tertiary

Table 5.4: *Proportion of respective age groups in education (in percent)*

Mother's education	Base year 2010		Trend Scenario 2055-60		Goal Scenario 2055-60
	M	F	M	F	Both Sexes
No Education	17	30	12	11	0
Primary	83	70	88	89	100
Secondary	61	45	55	46	80
Tertiary	18	16	19	20	50

Source: Own Calculation

education⁶ in 2060 are linearly interpolated from 2010 to 2060 in all provinces in Pakistan.

5.3.2.3 National Goal Scenario

In addition to the above education trajectories, an optimistic scenario has been defined. The objectives in terms of education set on the national⁷ and international agenda are the following:

- Universal primary education: All children should be able to complete primary education by 2015-20 (MDGs and National Education Policy).
- All gender disparities will be eliminated from all levels of education by 2015-2020.
- Enrollment in secondary and tertiary education should increase. We translated this into specific targets: 80 per cent of 10-14 years (male and female) old would be enrolled in secondary and 50 per cent of 20-24 years (male and female) old would be enrolled in tertiary education by 2055-60.

5.3.3 Mortality and Migration

The age and sex specific mortality and migration rates⁸ follows the latest medium variant of the United Nations world population prospects (2010). The mortality differentials are set according to findings of KC et al., 2010⁹. Age and sex specific net international migration figures are further distributed proportionally among educational categories.

⁶Transition are set in age group 5-9 for primary, 10-14 for Secondary and 15-19 for tertiary education

⁷In fact, the government has not formulated specific numerical goals for secondary and tertiary education. The targets are interpretations of the wish of the government to increase participation in higher level of education. The policies for education and population has formulated at federal level, there is no specific targets set by the government of Pakistan at provincial level.

⁸UN 2010 provides the total number of migrants but not the age and sex specific structure which we estimated through a residual analysis.

⁹According to K.C. et al. (2010), the life expectancy at age 15 of the population in the no-education category is on average one year less than that of the population in the primary education category, three years less than that of the population in the secondary education category and five years less than that of population in the tertiary education category.

Table 5.5: *Scenario Matrix*

		Education		
		Constant (Ec)	Trend (Et)	National Education goal (Eng)
Fertility	High (Fh)	FhEc	FhEt	FhEng
	Medium (Fm)	FmEc	FmEt	FmEng
	National Fertility Goal (Fng)	FngEc	FngEt	FngEng

Table 5.6: *Total Population (in million) of Pakistan from 2010 to 2060 under different education and fertility scenarios*

Fertility	education						
	Base year	Constant		Trend		NG	
	2010	2030	2060	2030	2060	2030	2060
High		249	345	249	341	248	320
Medium	174	233	279	233	278	233	271
NG		235	267	235	266	234	259

Source: Own Calculation

Table 5.5 shows the matrix of the nine scenarios derived from the different fertility (3 sets) and education (3 sets) assumptions, aiming at studying the concomitant effect of fertility and education on future population and human capital. Due to space limitation, each scenario cannot be mentioned.

5.4 Results and Discussion

Rapid population growth rate is unavoidable in Pakistan, at least in the near future, as shown in Table 5.6. Even if we assume that Pakistan will manage to achieve below replacement fertility in the low variant – TFR of 1.3 in 2055-60, the population would still grow significantly from 174 million in 2010 to 259 million under the national goal education scenario. A doubling (to 345 million in 2060) of population would only occur in the case of the High fertility scenario, where fertility is declining slowly to reach 2.3 in 2055-60 and enrollment stagnates (Constant education scenario). Education attainment could have a profound effect on the total population: Under the High fertility scenario, if Pakistan would achieve the national educational goals, then the total population would be 25 million less compared to the Constant education scenario – or 7 per cent in 2055-60. A lesser difference of 19 million in 2060 is found in the total population between the scenario where Pakistan achieves its education and fertility goals, and that would be more realistic, where it achieves Medium fertility and follows the Trend in education development: 259 million vs. 278 million.

Figure 5.2 shows the population pyramids by age, sex and four educational level of Pakistan in 2010 and the results of three alternative scenarios for education in 2060, under the assumption of a Medium fertility scenario. In 2010, the pyramid clearly shows the improvements in school enrollments over the last three decades: The younger cohorts are better educated than the older ones, both for men and women. In 2010, 50 per cent of the working age population (WAP) – aged 20-64 which accounted for 49 percent of the total population — had not received any education: one-third of the male WAP and two-thirds of the female WAP (see also Figure 5.3. According to the Trend education scenario (Figure 5.2), which assumes that all future cohorts benefit from increase in enrollment ratios as observed over the recent past, the pace of change would not be enough to ensure that all children enroll into primary education as can be seen from the share with no education in age groups 5-9 and 10-14. Consequently, Pakistan would not be able to achieve the Millennium Development Goals (MDGs) in 2015, and not even in 2060. Therefore, this calls for an intensification

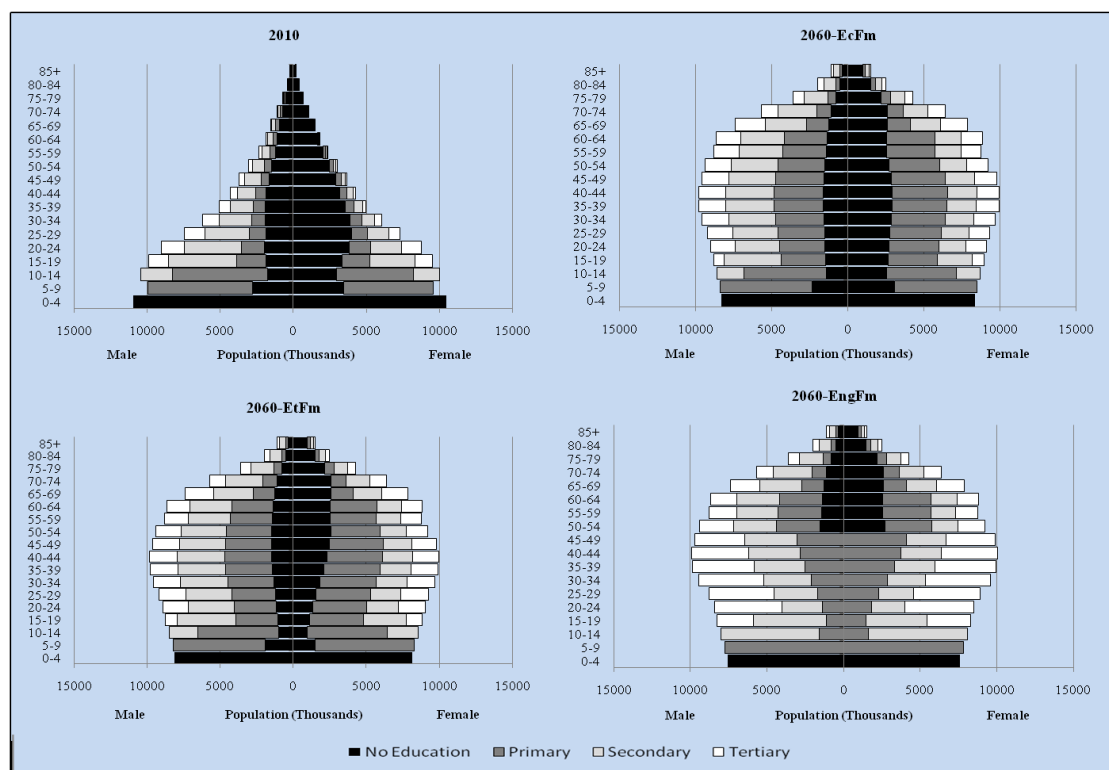
of investments in basic education to ensure that more children can enroll in schools, particularly in rural and remote areas, especially for girls. The proportion of the WAP with no education would decline to 20 percent in 2060 – 15 per cent for males and 23 per cent for female, based on the Trend education scenario.

This is far from the 7 per cent – 5 per cent for male and 9 per cent for female – that would be achieved under the NG scenario. The momentum of education diffusion is clearly visible on the pyramid for that particular optimistic scenario, where still in 2060, the population above 50 years of age still entails a large share of uneducated people. Lack of education often results in illiteracy and the spread of adult literacy campaign would need to intensify in order to bring literacy to the population who have never or barely been enrolled, and are beyond schooling age, as was effectively implemented in India. Historically adult literacy campaigns have not been a priority of the government of Pakistan although some initiatives have been launched in the 1980s and 1990s (Goujon and Wazir, 2011).

On the other hand, there will be significant increase in the share of the WAP with a primary education, from 14 per cent in 2010 to 36 per cent 2060, according to Trend scenario (see figure 5.3). Improvements will be significant for the share of the population with a tertiary education, which will triple over the projection period from 11 per cent in 2010 to 37 per cent in 2060 under the NG scenario (EngFm). The projection results show the overall long time horizon needed to see the effect of the implementation of higher education in Pakistan. For instance, the Trend scenario shows a slight increase in the proportion of highly educated – secondary and tertiary education together – in the WAP, from 36 percent in 2010 to 46 per cent in 2060, while the corresponding proportion for NG scenario will be 67 per cent in 2060.

Figure 5.2 also shows that the Trend education scenario would not be enough to remove the gender gap which persists at all levels. For example, the proportion of uneducated women aged 20-24 years in 2010 is twice than the share of uneducated men. One out of four women aged 15 and over will be out of school, while the proportion for men is “only” 16 per cent. Under the NG scenario, the proportion of uneducated women of aged 15 and over would be 16 per cent compared to 8 per cent for men in 2060, all due to the momentum of education diffusion. The impact of educational improvement is clearly visible for secondary and tertiary education in the NG scenario, which implements rapid improvements in education (i.e. universal primary education). The gender gap that was noticeable regarding secondary education in 2010 will persist although it will be attenuated. In 2010, the population with some secondary education in female aged 20-64 years was 6 million (5 percent) compared to 15 million (34 percent) for male. In 2060, according to the Trend education scenario, the WAP would be 18 million (21 per cent) and 28 million (34 per cent) for female and male respectively. The future educational attainment of the population under the education Trend scenario reflects the education policy orientations of the government of Pakistan in recent years. In 2010, the share of tertiary educated women of working age was only 5 per cent (3.2 million), and corresponding share for men was 14 per cent (6.4 million). The gender gap would be eliminated in 2060, based on the Trend scenario; the share of female and male in the WAP with a tertiary education would

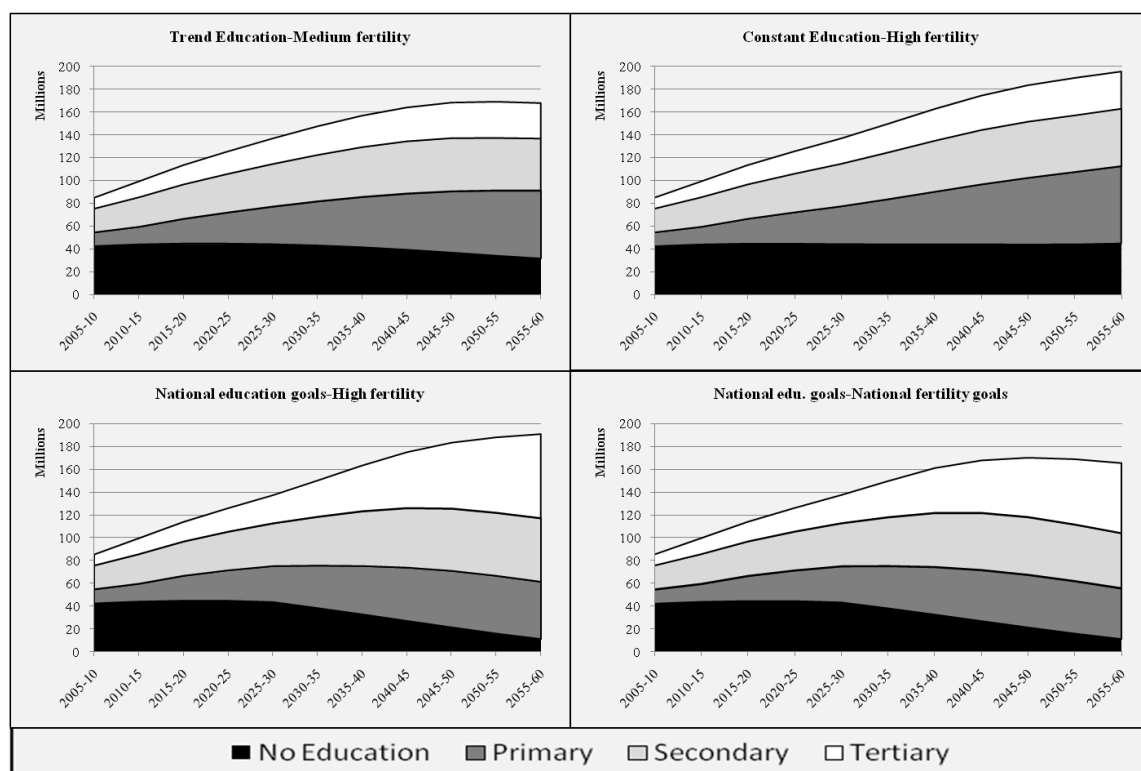
Figure 5.2: Population pyramid by age, sex and educational attainment for Pakistan in 2010 and in 2060 according to three education scenarios, Constant, Trend and NG, and Medium fertility variant; Source: Own Calculation



reach 18 per cent (15 million) and 20 per cent (16 million) respectively – which reflects that women have benefited from an increased access to tertiary education in the recent past. Still, the lack of investments in female education in the past will hamper the development of Pakistan far into the future as it is hindering the full participation of women in the labor force. In 2008, according to the Labor Force Survey, women accounted only for 20 per cent of the active labor force.

This calls for a need to increase the scope of the adult educational campaign to bring literacy to almost all the working-age population in the country, as has been successfully implemented in India, and to a lesser extent in Egypt. Historically, tackling adult literacy has not been a priority for the government of Pakistan, although some initiatives have been launched. During the Ayub era (1959-1969), literacy programs were run under the community development program at the village level. In the 1980s, the Literacy and Mass Education Commission (LAMEC) were set and started a new adult literacy campaign through the “Nai Roshni School.” Under this initiative, many adult literacy schools were set up all around the country. Furthermore, under the slogan “each one teaches one”, it was mandatory for those persons who had passed intermediate exams to convert one illiterate to literate. The Nai Roshni program taught a few thousands adults how to read and write, but it was a mixed success, mainly because of corruption, following its termination in the 1990s during the first Bhutto regime. A benchmark effort was launched in 2002 during the Musharraf regime which estab-

Figure 5.3: *Share of working age population (20-64) by level of education in Pakistan for 2010-2060, different education and fertility scenarios; Source: Own Calculation*



lished the National Commission for Human Development¹⁰ (NCHD) at the federal and provincial level to set up adult literacy centers in local communities to provide basic literacy skills to individuals (especially women) between the ages of 11 and 45, who were either never enrolled before or dropped out of school before acquiring literacy skills. So far the 120,263 adult literacy centers of the NCHD have provided 2.5 million adults, 90 percent of which are females with literacy skills.

5.4.1 Meeting the education goals in Pakistan

Based on past experience, it does not come as a surprise that Pakistan will not be able to achieve the educational development goals (either national or international) in the future, if the pace of change witnessed in the recent past continues. Table 5.7 shows the access to education of boys and girls according to the Trend education & Medium fertility scenario, shedding some light on the feasibility to achieve the Millennium development goals of universal primary education and gender gap elimination by 2015. In view of those results, there would still be 31 per cent of the 5-9 age-group who would not go to school by 2015 far from the full intake envisioned by the MDG for education, with a large gender gap as 34 per cent of girls and 27 per cent of boys aged 5-9 would not be in school in 2015. In fact, the MDGs would not even be achieved by 2060 as 21 per cent of the children in that age group would still not be enrolled fifty years from now, which calls for further investment in the education sector. Moreover,

¹⁰<http://www.nchd.org.pk/ws/>

Table 5.7: Access to education of male and female, in per cent, Trend education scenario and Medium fertility scenario, 2015-20 and 2055-60.

Fertility	2015-2020			2055-60		
	Boys	Girls	Total	Boys	Girls	Total
No Education	27	34	31	23	18	21
Primary	84	72	78	89	87	89
Secondary	50	34	42	55	46	50
Tertiary	19	15	16	19	21	20

Source: Own Calculation

gender disparities will be far from eliminated at both levels of primary and secondary education in 2015 where girls would still have 12 per cent less chances than boys to reach a primary education and 16 per cent less to enroll into secondary education in 2015.

Although improvements would be significant by 2060, the probability of girls enrolling in primary and secondary schools would still be 2 percent, and 9 per cent respectively lower than for boys. Interestingly, and as mentioned before, gender disparities would be eliminated at the level of tertiary education, where the increase in the last few years has been substantial and even more so for girls than boys. Hence, by 2015 female would still have 4 per cent less chances than male to enter a tertiary education, but the relationship would be reversed by 2060 where more women than men would enroll in tertiary education. Even though, the projection also shows that the rapid increase at secondary and tertiary level foreseen by the national goals would also be quasi-impossible to be reached by 2060 according to present pace.

5.4.2 Influence of education on fertility

Figure 5.4 compares the output of four different scenarios in terms of the educational attainment of women of reproductive age (typically 15-49 years). In 2010, the share of illiterate fecund women exceeded 50 per cent. According to the Trend education scenarios, two significant improvements will happen in the future. The share of women with no formal education will decline from 55 per cent in 2010, to 19 per cent in 2060. In the meanwhile, the proportion of primary educated women will increase significantly – from 15 per cent in 2010 to 40 per cent in 2060. The share women with a tertiary level will increase from 10 per cent in 2010, to 18 per cent in 2060. Under the NG scenario, the share of women with no formal education will be eliminated in 2060. The comparison of different education scenarios shows the tremendous potential impact of educational attainment of future mothers, and may serve as an input to estimate future levels of fertility and of infant and child mortality.

Figure 5.5 clearly shows the significant difference in total fertility rates according to different education scenarios, and hence education composition of women in fertile ages. The Trend and Constant education scenarios are quite close, indicating from the past two decades the improvements were not sufficient to impact on fertility levels.

If Pakistan would attain the national educational goals under the medium fertility, total fertility rate in 2060 would be 0.12 children per woman less as compared to Trend education scenario. On the other hand, according to NG fertility scenario, the

Figure 5.4: Share of women aged (15-49) by level of education in Pakistan, 2010-2060;
Source: Own Calculation

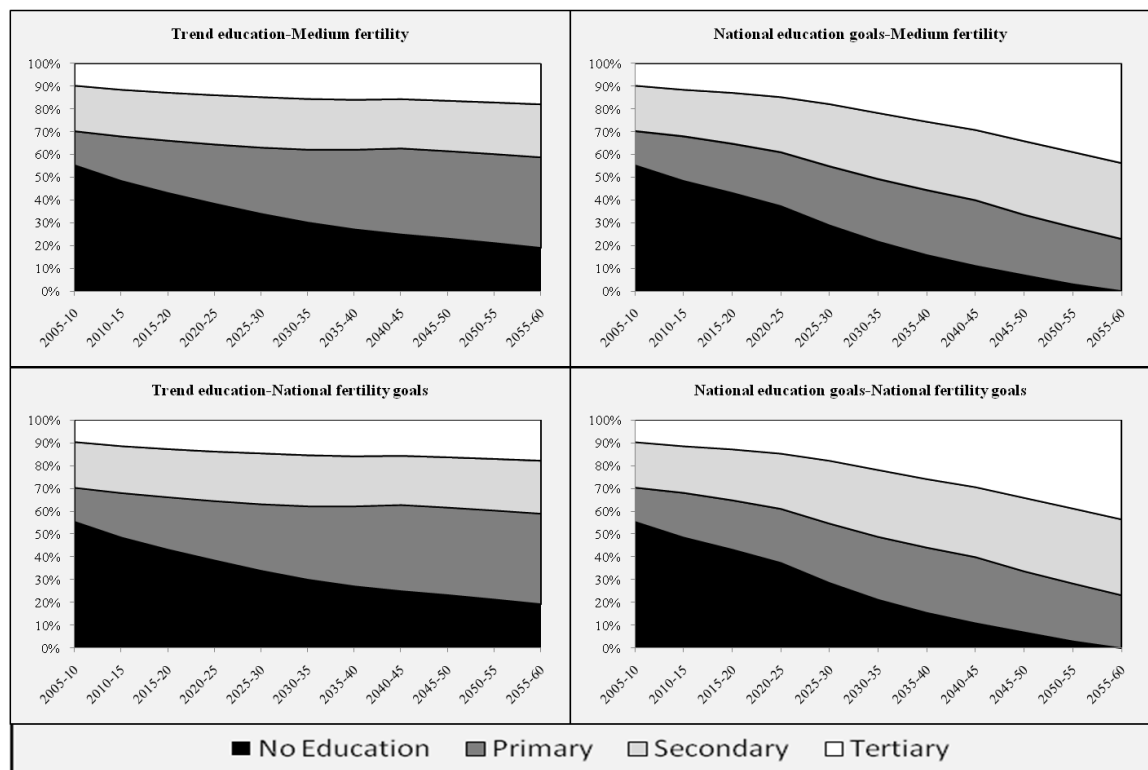
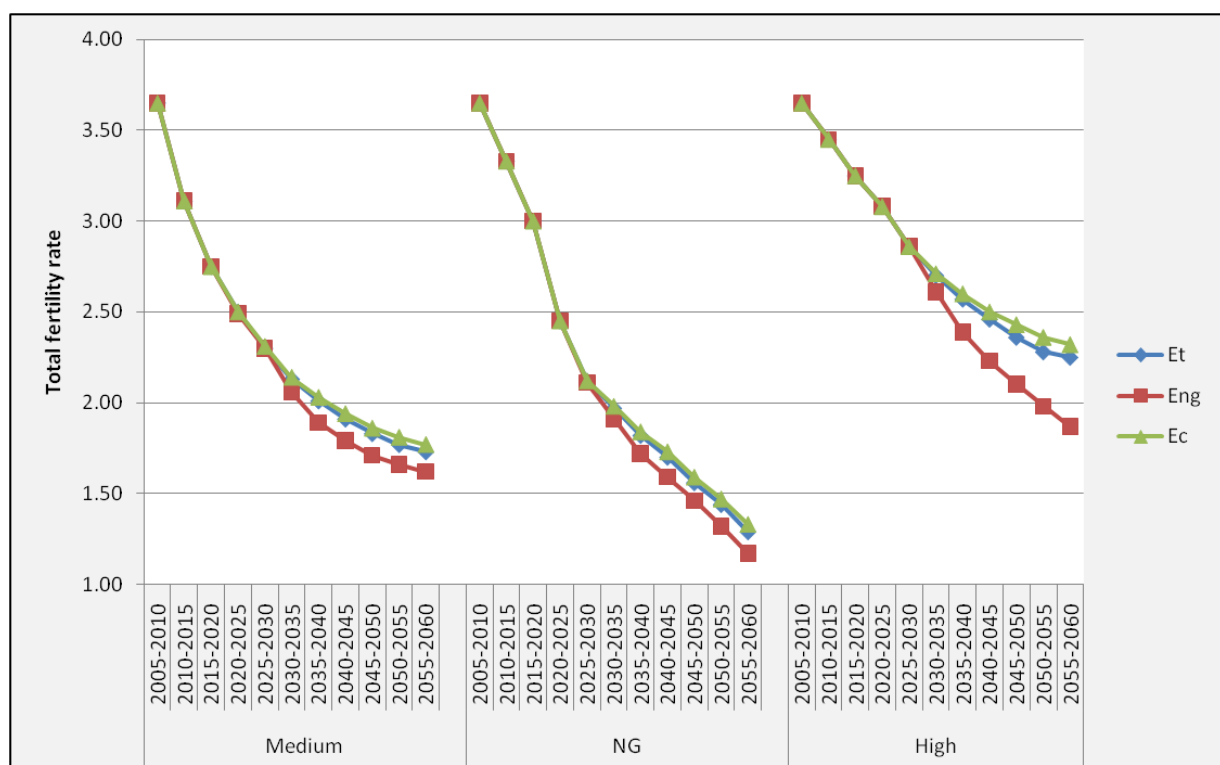


Figure 5.5: Total Fertility rate in Pakistan under three fertility and three education scenarios;
Source: Own Calculation



difference in TFR between national education goals and Trend education will be 0.13 children per women. It is worth noting here, although it is highly hypothetical and counter intuitive, that, if national educational milestones are accomplished under a high fertility scenario, the TFR in 2060 would be 0.42 children less as compared to Trend education scenario – TFRs: 1.8 vs. 2.2.

5.5 Conclusion

The future of Pakistan and its ability to develop is highly dependent on progress in the educational attainment of the population, in a context of rapid population growth. This study demonstrates the importance of investments in education in the near future so that Pakistan can harvest the fruit of long term human capital development. Lack of investment in primary and secondary education, poor infrastructure and political instability have failed Pakistan for the achievement of satisfactory levels of education in Pakistan, especially for females. As a result, Pakistan will fail to achieve the Millennium Development Education Goals, in terms of universal primary education for boys and girls. The scenarios that we looked at in this paper show that Pakistan needs to boost up the speed of change in education, especially since Pakistan will be soon experiencing a demographic bonus, a relative increase in the size of the working age population in comparison to the inactive part of the population – the young and old generations – which is most favorable for socio-economic development, that is if the country manages to increase the quality of human capital by 2060. We show that female education is very crucial and high political commitments will be needed, for advancing through the demographic transition, and economic development. The past lack of investments in female education will hamper the development of Pakistan far into the future unless effective adult educational campaign are implemented to bring at least literacy to many women who come to adulthood without being able to read and write.

Notwithstanding, the existence of population policy and family planning program since 1965s, Pakistan has never, in reality, had a successful population policy. Therefore, it is strongly suggested here that, the effective population policy must be assigned top priority and need more investment in female enrollment and literacy. This study pinpoints the three major areas where the urgent policy concern and investments will be needed: exploiting the windows of opportunity, illiterate adult population and female education.

Population projection by age, sex and level of education by provinces of Pakistan: 2010-2060

Summary

In this chapter, we implement the multistate population projection at the provincial level of Pakistan. The details about fertility scenarios and education scenarios will be discussed. We extended the methodology presented in previous chapter at national level of Pakistan and applied for each province in Pakistan. The difference between national and provincial level population projection is the internal migration. We used the internal migration estimates presented in chapter three. Based on projection results, we demonstrated that what could be the implications of future fertility and education developments on the size of the population of each province until 2060 according to several educational and fertility scenarios. The purpose of this study is to explore present and future human capital of Pakistan at the provincial level by age and sex. It will assess the potential for the achievement of the Millennium Development Goals (MDGs) and Education for all (EFA) for each province in Pakistan, especially universal primary education and gender equality and how realistic are the national goals for educational attainment in the view of the present speed of change in the education sector for each province in Pakistan, using the population projection methodology. The chapter also evaluates when each province enjoy the demographic window of opportunities, how to utilize this demographic bonus, and importantly what role did education play in this context.

6.1 Introduction

Each province in Pakistan, particularly, Balochistan and KPK have been facing several challenges in terms of human development and economic growth. Low level of educational attainment, Poor health status and low standard of living has led the population into poverty. The provinces in Pakistan significantly diverged in the poverty index. In 2005, KPK was the poorest province in Pakistan—38 percent of population lives below poverty line—and Sindh has relatively better position as compared to other regions—22 percent of the population lives below the poverty line (Chapman et al., 2008). Women are particularly at a disadvantage in accessing education; 65 percent of the working-age population (aged 20-64) are females with no education and hardly make up one-fifth of the secondary and tertiary educated working-age population in Punjab. On the other hand, in Balochistan, the situation of educational attainment has been more dismal particular, for female. Nearly, 61 percent of total working age population (aged 20-64) has no formal education, whereas, the proportion of uneducated women has 84 percent in 2010.

This study explores human capital development in Pakistan at the provincial level in present and future. The population projection was carried out by level of educational attainment of Pakistan at provincial level by age and sex. To our knowledge, this is the first time that a population projection by age, sex and educational level at the provincial level in Pakistan has been implemented. In the following analysis, we only consider on the educational attainment aspects of human capital by age and sex at the provincial level in Pakistan since the data on health, and labor-force participation are scarce. The objectives of the paper are as follows:

- It will assess the potential for the achievement of the United Nations Millennium Development Goals (MDGs) and education for all, especially universal primary education and gender equality at the provincial level in Pakistan. It will assess how realistic national goals of educational attainment are in view of the current speed of change observed in the education sector.
- We will assess when each province enjoy the demographic window of opportunities, how to utilize this demographic bonus, and importantly what role did education play in this context?

6.2 The Future Path

6.2.1 Fertility

We are here considering two fertility scenarios of fertility for each province in Pakistan, namely “Medium (Fm)” and “National Fertility Goal (Fng)”. In fact, the targets of fertility in each scenario is assumed at national level and using the relative ratio of TFR of each province to the national-level TFR. The details of fertility scenario at national and provincial level can be found in chapter 3. For both scenarios (Medium and NG) convergence will be assumed, meaning that fertility differentials by education will converge to some specific level as the fertility declines. We choose the relative

Table 6.1: *Projection of TFR by level of education in Pakistan from 2010-2060*

	Base Year	Medium	NG
	2005-2010	2025-30	2025-30
Punjab			
No Education	4.20	2.71	2.38
Primary	3.65	2.40	2.10
Secondary	2.95	2.05	1.80
Tertiary	2.15	1.67	1.46
Total	3.47	2.28	2.00
Total TFR in 2055-60		1.70	1.23
Sindh			
No Education	4.63	3.00	2.62
Primary	3.64	2.50	2.18
Secondary	2.49	1.96	1.72
Tertiary	2.22	1.79	1.56
Total	3.83	2.52	2.20
Total TFR in 2055-60		1.90	1.35
KPK			
No Education	4.36	2.89	2.53
Primary	3.22	2.32	2.03
Secondary	2.95	2.14	1.87
Tertiary	1.88	1.64	1.43
Total	3.83	2.52	2.20
Total TFR in 2055-60		1.90	1.35
Balochistan			
No Education	3.91	2.66	2.33
Primary	2.85	2.14	1.87
Secondary	2.66	1.99	1.74
Tertiary	1.17	1.32	1.16
Total	3.65	2.40	2.10
Total TFR in 2055-60		1.79	1.29

Source: PDHS 2006-07 and Own calculation

ratios of different education specific fertility to overall fertility levels observed in the South Indian state of Andhra Pradesh and adopted these fertility differentials for all provinces in Pakistan in 2055-60. Between the projections (2005-10 to 2055-60) period relative ratios is interpolated.

6.2.2 Mortality

The pace of mortality decline in each province in Pakistan will essentially continue in the future. A two-year gain in life expectancy at birth per decades will be assumed for male and female at the provincial level and mortality differentials by education follow the findings of (KC et al., 2010). The age and sex-specific mortality rate have been derived from UN model life table 2010 for all projection period and for each province. The estimated life expectancy at birth for each province in Pakistan is shown in table

Table 6.2: *Projected Education Transition probabilities at the provincial level in Pakistan (in percent)*

Categories	Base year (2010)		Trend Scenario(2060)	
	Male	Female	Male	Female
Punjab				
No Education	13	22	08	04
Primary	87	78	92	96
Secondary	59	48	56	52
Tertiary	17	19	18	24
Sindh				
No Education	26	40	23	26
Primary	74	60	77	74
Secondary	52	37	47	34
Tertiary	24	17	21	18
KPK				
No Education	12	37	06	12
Primary	88	63	94	88
Secondary	65	31	66	41
Tertiary	20	10	21	13
Balochistan				
No Education	31	47	23	18
Primary	69	53	77	82
Secondary	50	30	53	40
Tertiary	19	08	20	10

Source: Own Calculation

2.14.

6.2.3 International and internal migration

Migration trend is the most unpredictable part of the population projection. Age and sex structure of migrants is sometime available from censuses or surveys for developed countries and virtually absent from the developing world. The updated estimates of international migration in Pakistan as well as at provincial level is not available in recent years. The future net international migration numbers at provincial level is distributed proportionally. Age and sex specific internal international migration numbers are further distributed proportionally among educational categories in each province.

6.2.4 Education

We have assumed the three education scenarios for each provinces in Pakistan as was assumed at the national level in the previous chapter. Table6.2 shows the projected education transition of each province in Pakistan for 2010 and 2060 based on the trend education of the respective province.

Table 6.3: *Total Population (in million) at the provincial level in Pakistan from 2010-2060*

Region	Fertility	Base year	Education		
			Constant	Trend	NG
		2010	2060	2060	2060
Punjab	Medium	101.3	156.6	155.9	154.0
	NG		145.0	144.3	141.9
Sindh	Medium	40.7	67.3	67.1	65.6
	NG		62.1	61.9	60.9
KPK	Medium	24.0	47.0	46.6	45.2
	NG		43.3	43.0	42.2
Balochistan	Medium	7.7	14.0	13.9	13.4
	NG		12.9	12.9	12.6

Source: Own Calculation

6.3 Results and Discussion

6.3.1 Does education make a difference to the total population size?

Rapid population growth is practically inevitable in each province in the past and at least in the near future. Even though we assume that each province in Pakistan will manage to achieve replacement fertility levels by 2025 under NG scenario, the population of each province would grow and almost double by the middle of the century due to the population momentum. Table 6.3 shows the total population size for each province of Pakistan from 2010 to 2060. A first look at the results show that (See Table 6.3) even though fertility will decline significantly by 2025-30 in all four provinces in Pakistan, the population would still be increasing—from 101.3 million to 155.9 million from 2010 to 2060 in Punjab, from 40.7 million to 67.1 millions in Sindh, from 24.0 million to 46.6 million in KPK and from 7.7 million to 13.9 million in Balochistan under trend education scenario and medium fertility assumptions. This population momentum would lead to further increase in the school age and working-age population for each province in Pakistan— meaning that more children will be enrolled in school, there is a need for more infrastructure for schools, particularly in rural areas in less developed provinces. Although, each province will manage to achieve below replacement fertility (Table 4.1) in National goal scenario, the population in each province would still grow substantially from 2010 to 2060 (See table 6.3). Educational attainment could have a profound effect on the total population size of each province; the difference of 3 million people from constant education to the national education goal scenario would attain in Punjab under the national goal scenario in 2060, one million different in Sindh and KPK and 0.3 million difference in Balochistan would have achieved under the similar scenario.

6.3.2 Age and Sex Population distribution by level of education

Figure 6.1 illustrates the population pyramid by age, sex and level of education of Punjab in 2010 and the results of three alternative scenarios of education in 2060, under

the assumption of two fertility scenarios (Fm and Fng) and two educational scenarios (Et, Eng). In 2010, the pyramid (Figure 6.1 and 6.2) undoubtedly shows the improvement in educational attainment over the generation of the people in Punjab and KPK. The younger cohorts are better educated than the older cohorts, equally for both male and female. In 2010, 55 percent of females in Punjab and 69 percent in KPK have never been enrolled in the school whereas, the proportion of male who have no formal education was 37 percent in Punjab and 39 percent in KPK. The situation is worse at higher level of education-the proportion of male who have at-least secondary education was 36 percent in Punjab and KPK, whereas 21 percent for females in Punjab and 12 percent in KPK have at least secondary education in 2010. According to the trend scenario-which assume that all future cohorts benefit from the increase in an enrollment ratio as observed over the last two decade-the pace of change would not be enough to ensure that all children enroll into primary education in Punjab in 2015-20 as can be seen of the age group 5-9 with no education (Figure 6.1). The similar pattern in the age group 5-9 for male and female will be observed in all provinces (Figures not shown here). Consequently, the MDGs would not be achieved for all provinces in Pakistan in 2015-20 and not even in 2060. This needs a call for the imperative attention to investment in basic education on the emergency basis to ensure that more children will be enrolled in school in all provinces, particularly in rural areas of each province. The proportion of female with no education in Punjab would decline to 22 percent and 35 percent in KPK in 2060 and 17 percent for male in Punjab and KPK according to trend education and medium fertility scenario. This is far from 15 and 22 percent for female and 10 percent for male in Punjab and KPK respectively—that would be achieved in 2060 under National education and fertility goals scenarios in Punjab. The situation of educational attainment is deteriorating in Balochistan, particularly for females, where 76 percent of female and 53 percent of male in 2010 were never enroll in school. In 2060, the proportion that never attends school would become 42 percent for female and 33 percent for male under trend education and medium fertility goals (Figure has not presented here for Balochistan).

The figure 6.1 and 6.2 illustrate that the trend education scenario would not be enough to remove the gender gap in all provinces, which persists at all levels of education. In 2010, the proportion of female with no education aged 20-24 years has twice than the share of uneducated male in Punjab and Sindh. Whereas, the gender gap has widened in KPK and Balochistan in the age group 20-24 for no education categories (58 and 67 percent of females and 18 and 33 percent of males in KPK and Balochistan were never attended the school respectively). The gender gap at the primary level has been pervasive in all provinces in Pakistan. In 2010, the proportion of females with primary education in age group 5-9 was 74 percent in Punjab and 58 percent in KPK, while for males the proportion was 80 percent and 72 percent in Punjab and KPK respectively. The gender gap would not be eliminated in 2060 at the primary level in all provinces. Interestingly, gender disparities would be reversed at the primary level in Punjab—where female enrollments in last few years have been tremendous and even more so for girls than boys in future (92 percent girls and 85 percent boys in primary level in Punjab in 2060).

Figure 6.1: Population pyramid by age,sex and educational attainment for Punjab in 2010 and 2060; Source: Own Calculation

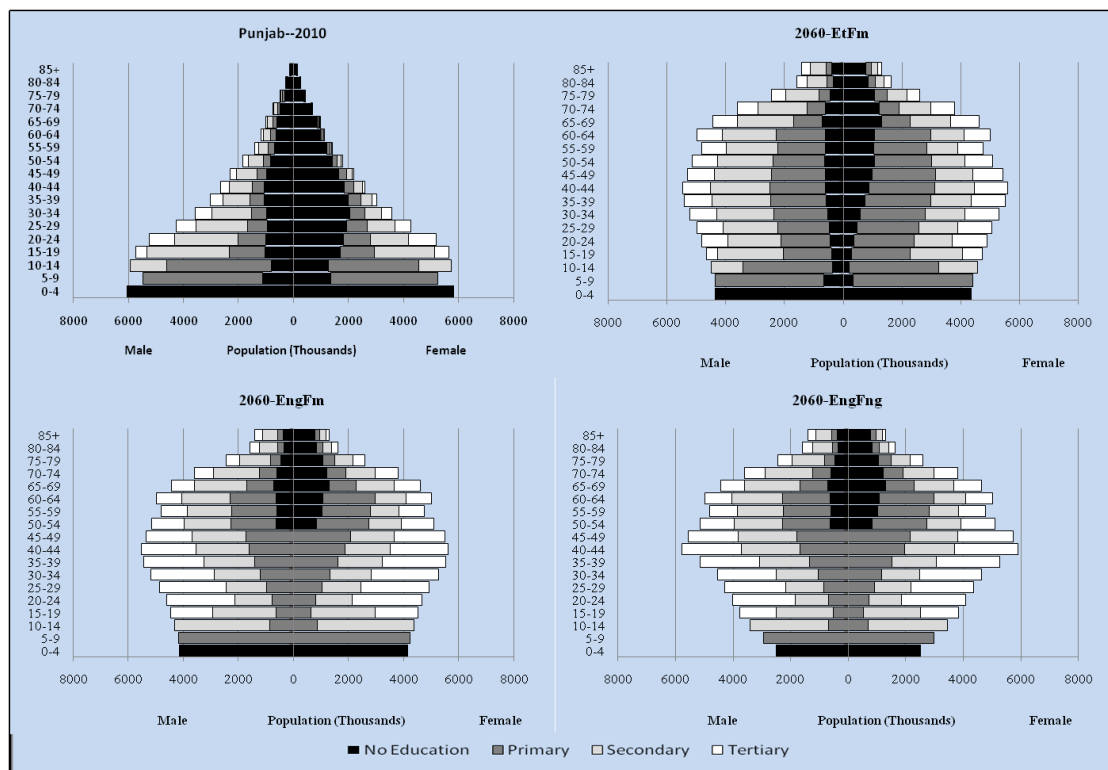
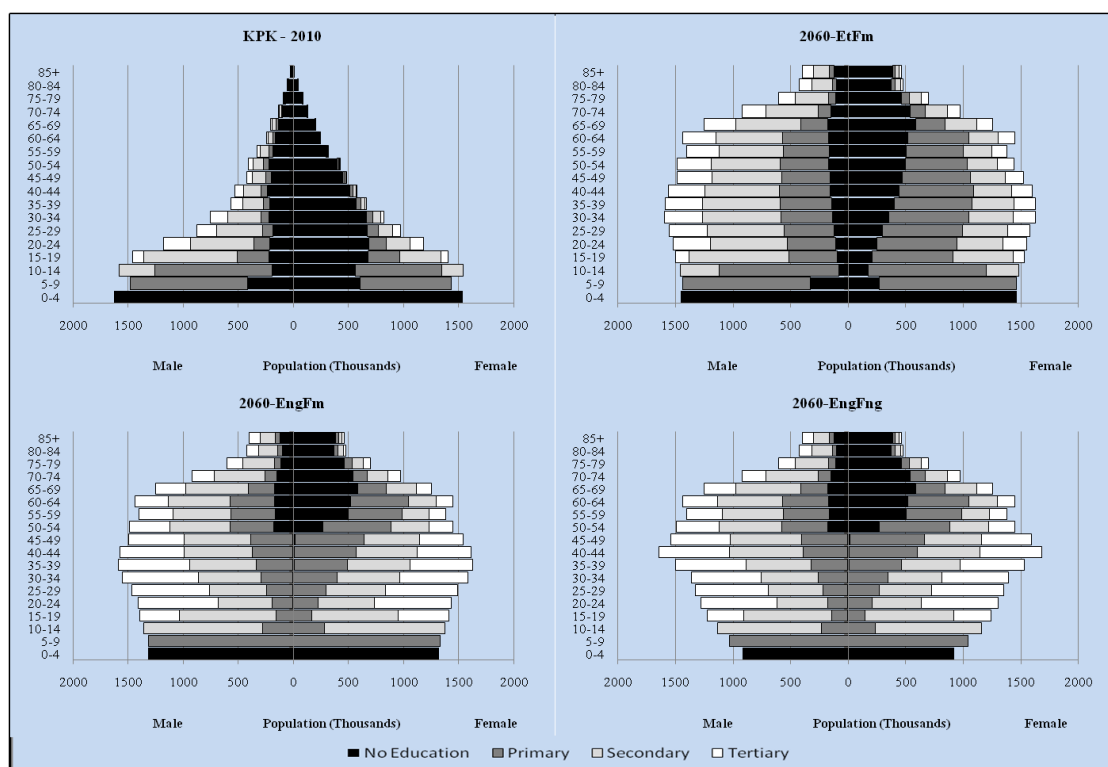


Figure 6.2: Population Pyramid by age, sex and level of educational attainment for KPK in 2010-2060; Source: Own Calculation



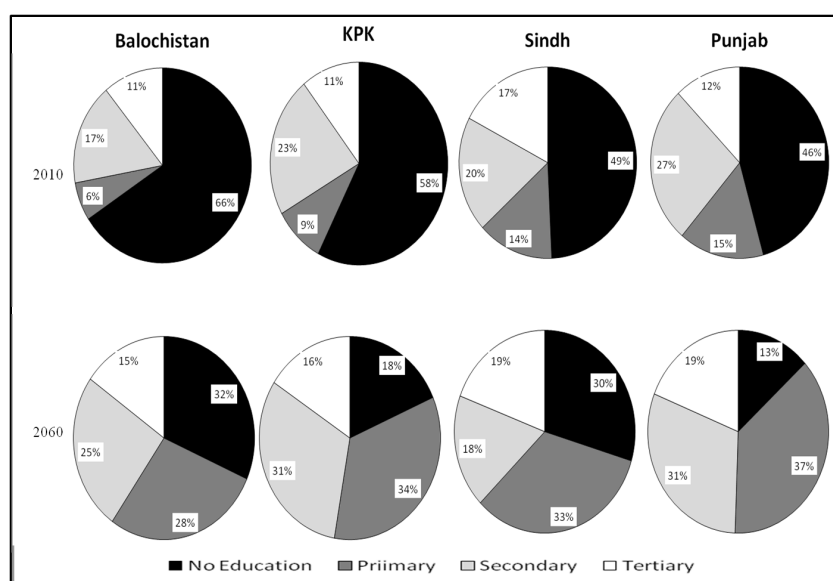
6.3.3 The Window of Opportunities

Due to the population momentum, numerous cohorts born before the fall of fertility will shift up to the next level and enter the working-age population. Therefore the next challenge is to take appropriate action to get benefits from this youth bulge. If the sufficient amount of opportunities existed in the labor market, these cohorts can be very favorable to economic development for the country. Low level of the dependency ratio to economically active people will create new opportunities for economic and social development. During this period, household savings are encouraged, a reduction on the burden on public schools and other government services; labor-force participation increase and number of taxable adults per dependents will rise. Furthermore, families can spend more money on each child due to lower family size. This phase is typically known as the “demographic window of opportunities” or “demographic bonus.” Nonetheless, this demographic bonus does not have a sole factor that ensures the economic and social development. Nor does the rising share of working-age population lead straightforwardly and certainly to development. In fact, if the government does not fabricate the employment opportunities, social and economic conditions are not favorable and it cannot able to absorb the growing working-age population. This large youth cohorts may become a heavy handicap for country, associated with political and social disruption and civil conflicts.

In 2010, 46 percent in Punjab and 58 percent in KPK of the working age (20-64) population had received no education. Figure 6.3 illustrates that according to trend education and medium fertility scenarios in 2060, this proportion would decline to respectively 13 percent and 18 percent in Punjab and KPK. This is far from the 5 percent and 7 percent that would be achieved under the goal scenarios (EngFng) in Punjab and KPK respectively. The share of illiterate working-age population of southern provinces (Balochistan and Sindh) in 2010 was 66 percent and 49 percent respectively. In 2060, this proportion would decline to 32 percent and 30 percent in Balochistan and Sindh respectively according to trend education and medium fertility scenario. This is far behind from 13 percent and 10 percent in Balochistan and Sindh respectively under goal scenarios. The fact that this optimistic scenario does not lead to fully educated working-age population is due to educational momentum. As we can see from Figure (6.2), the uneducated proportion of the population of aged 50 year and older would have a significant share in 2060.

There are several patterns of changes in the level of educational attainment in the future that reflects the emphasis of education development in the recent past. In 2010, the share of primary education to the working-age population was 15 percent in Punjab. According to the trend scenario in Punjab, the share of primary education would be 37 percent in 2060 which is far from 30 percent under goal scenario in 2060. There is overwhelming evidence that the changes in past 15 years in secondary and tertiary education in Punjab were tremendous. In 2010, 27 percent and 12 percent of the working-age population in Punjab has secondary and tertiary level education respectively. Under the trend scenario, the share of secondary and tertiary education in Punjab would increase to 31 and 19 percent for working-age population in 2060. The fact that government of Punjab has invested greatly in the education sector in the

Figure 6.3: Share of the working age population (20-64) by level of education (EtFm) at provincial level in Pakistan from 2010-2060; Source: Own Calculation



recent past, particularly in primary and secondary levels and since women have benefited from an increasing access in universities in the recent past. Consequently, the share of tertiary education for females would double—from 10 percent in 2010 to 20 percent in 2060 under the trend scenario.

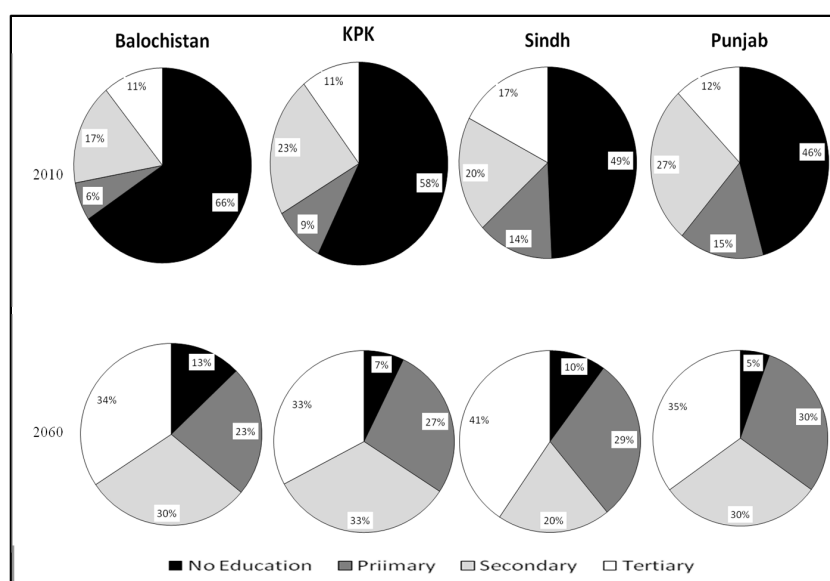
Educational attainment of the population change slowly changes in enrollment patterns which only affect the attainment of new cohorts reaching working age but not for older cohorts. Because depending on the population growth rate, it takes a different amount of time for each province before the changes in the education of the young are reflected in the education profile of the population as a whole. This phenomenon is known as educational momentum. For example, if the population growth rate is high, young cohorts are large compared to their older cohorts and educational composition of the population is dominated by recent enrollment patterns. On the contrary, if the population growth is low, the average educational composition of the population depends on the educational attainment among the older cohorts and only when these cohorts are replaced, then the population composition fully reflects improvement in enrollments. These effects can be observed in all provinces in Pakistan except Punjab where the population growth was low and educational enrollment was quite significant in the recent past.

6.3.4 Meeting the Educational Goals

It does not seem plausible that Pakistan at the national nor at the provincial level will be able to reach the international and national educational development goals in the recent and distant future if it does not extend the pace of change witnessed in the recent past. Table 6.4 illustrates the access¹ of education of male, female and total population

¹ Access is based on the proportion of the relevant schooling age group achieving the relevant education level

Figure 6.4: *Share of the working age population by level of Education (EngFng) at provincial level in Pakistan from 2010-2060; Source: Own Calculation*



by level of education according to trend education and medium fertility for 2015-20 and 2055-60. It shows that the feasibility to achieve the Millennium development goals of universal primary education and gender disparities by 2015 and 2060 at the provincial level in Pakistan. There would be still 21 percent of the age group 5-9 in Punjab—who would not be enrolled in school by 2015-20—far-off from full intake envisaged by MDGs and EFA targets with substantial gender disparities observed, as 24 percent for female and 19 percent for male would not be enrolled in school. In fact, the universal primary education goal would not even be accomplished in all provinces in Pakistan by 2015-20 or even will not in 2055-60, which require further investment in the education sector in all provinces, particularly in rural areas. There is enormous heterogeneity existing within provincial levels in Pakistan for attaining the MDGs goals; there would be still 21 percent of age group 5-9 in Punjab for both sexes, 44 percent in Sindh, 33 percent in KHP, and 55 percent in Balochistan for same cohorts, respectively who would not go to school by 2015-20. Even this milestone will not be met by 2060 for each province. However, Punjab will be in a better position among other provinces in terms of children intake. Furthermore, according to the trend scenario, the Sindh and Balochistan province will be far behind from other provinces in educational development—35 percent and 36 percent student would complete the secondary education by 2015-20 respectively. Moreover, the gender disparities at the primary and secondary level will not be accomplished in all provinces by 2015-20 nor even in 2060, the gender gap would be highest at the primary level in Balochistan, where 14 percent fewer chances to enroll at the primary level for girls than boys in 2015-20.

Nevertheless, the improvement would be significant by 2060; the gender gap would still exist at all levels of education for each province. Interestingly, the gender gap would be eliminated or even reverse at one-level – tertiary education in Punjab, where the increase in enrollment at the tertiary level for girls has been substantial in last decade—24 percent for female and 18 percent for male in 2060—due to the fact that

Table 6.4: Access to education of male and female at provincial level in Pakistan (in percent),
Trend Scenario for 2015 and 2060

Region	2015-20			2055-60		
	Male	Female	Total	Male	Female	Total
Punjab						
No Education	19	24	21	15	08	11
Primary	87	79	83	92	96	94
Secondary	52	39	46	56	52	54
Tertiary	16	17	17	18	24	21
Sindh						
No Education	39	48	44	37	37	37
Primary	74	61	68	77	74	76
Secondary	41	28	35	47	34	41
Tertiary	20	15	17	21	18	20
KPK						
No Education	27	39	33	23	18	20
Primary	88	65	77	94	88	91
Secondary	59	27	43	66	41	53
Tertiary	19	09	14	21	13	17
Balochistan						
No Education	51	58	55	46	39	43
Primary	70	56	63	77	82	80
Secondary	46	26	36	53	40	46
Tertiary	17	08	13	20	10	15

Source: Own Calculation

in recent decades, more investment and opportunities has encouraged for girls in Punjab. Even though, the projection also shows that the rapid increase at the secondary and tertiary level was foreseen by the national educational goals at the provincial level in Pakistan, it would also be quasi-impossible to be reached by 2060 according to the present pace.

If we access the progress of EFA goal in Pakistan that address the 50 percent improvement in level of adult literacy by 2015, then we assume that the “No Education” category in the projection best represents the proportion of illiterate in the total population². Table 6.5 shows the total population (in percent and in million) of Pakistan at provincial level aged 15 year and older by 2010 and 2060 according to the trend education and medium fertility scenario. The EFA goals of 50 percent improvement of adult literacy would not be achieved in 2015-20 in all provinces in Pakistan. The proportion of illiterate population aged 15 and older in Punjab would decline from 32 percent (10.9 million) in 2010 to 12 percent (8 million) in 2060. According to trend scenario, more than 50 percent improvement will be attain in KPK from 2010 to 2060—from 33 percent (2.4 million) to 11 percent (2.1 million)—although in absolute number the difference will be negligible. From Table 6.5, indeed the 50 percent improvement in adult literacy would only be realized after 2050 in Punjab and KPK. Moreover, in Sindh and Balochistan, the pace of decline will be slow during the projection period. It would be difficult to imagine the scale of the adult literacy campaign needed to halve the number of illiterates from the 53 million persons above age 15 and older lining in Pakistan at the moment.

The past lack of investment in female education will be hindering Pakistan’s development far into the future unless adult education campaigns are reinforced to at least render the many girls who come to adulthood without literacy skills, and are able to read and write. The lack of qualification of women is a handicap for the development of Pakistan as it prevents their full participation in the labor force. In 2005, according to Labor Force Survey, women accounted for only 19 percent of the active labor force population aged 20-64 in Pakistan, particularly female in Balochistan. According to the trend scenario, the substantial decline would be accounted of illiterate female population from 57 percent in 2010 to 19 percent in 2060 in Punjab. Furthermore, in KPK more than 50 percent improvement would be accomplished from 74 percent in 2010 to 33 percent in 2060 (See Table 6.5). Thus, though illiteracy of “future women” is eradicated early in the population period, the problem of the many women without education who already exist is unaddressed. In absolute terms, it means 34 million women in 2010 will rise to those with no education to 31 million in 2060.

6.4 Conclusion and Policy Prescription

Each province in Pakistan will face rapid population growth in the near and distant future as well as having a large proportion of working-age population. The future of each province in Pakistan and its development is highly dependent on the ability to progress towards the educational attainment of its population particularly for working

²See details in Chapter 4 for the difference between No Education and Illiteracy

Table 6.5: *Share (in percent) and absolute population (in million) of male, female and total population in Pakistan at provincial aged 15+ with No Education in 2010 and 2060, EtFm Scenario*

Region	Year	Male		Female		Total	
		Share	Absolute	Share	Absolute	Share	Absolute
Punjab	2010	32	10.9	57	18.9	44	29.8
	2060	12	8.0	19	12.6	16	20.6
Sindh	2010	35	4.7	63	7.8	48	12.5
	2060	24	6.7	37	10.1	31	16.8
KPK	2010	33	2.4	74	5.6	54	8.0
	2060	11	2.1	33	6.3	22	8.3
Balochistan	2010	48	1.2	79	1.7	63	2.9
	2060	28	1.6	40	2.2	34	3.9

Source: Own Calculation

age population. The attainment of certain levels of education in each province in Pakistan has failed so far in terms of provision, access and quality, particularly for females and a number of factors are contributing such as: neglecting the education sector, political instability and poverty. Consequently, each province in Pakistan will fail to achieve the MDGs for education, that of universal primary education and eliminating gender disparities and other objectives on the national and international agenda such as EFA. Even though, these goals cannot be met until 2060 in every region in Pakistan. The scenarios that we looked at shows that the pace of advancing education has to be dramatically improved if each province would like to achieve all these goals by mid-century. In the next decades, the size of working-age population in every province will be prominent and dependency ratios keep low; there is a “window of opportunities” waiting to be exploited. This is more vital, because age structure will be more favorable in 2025, if well educated could be major assets in the government’s hands. The bonus will not be automatic, but require sound economic policy and significant investment in education and job market. To materialize the demographic bonus, government should strive for faster economic growth with potential to meet the targets of industrialization and modernization particularly in the less-developed provinces such as KPK and Balochistan. Therefore, investment should be made in education of the population in general and the labor force, in particular.

Conclusion and policy Implications

7.1 Conclusion and Discussion

Pakistan currently faces two enormous challenges, mounting population growth and a vicious poverty trap. It copes with rapid population growth –increasing approximately five times from the first census in 1951 from 32 million to 173 million to 2010. The country has currently undergone in a middle phase of demographic transition, which results in a large population of working age and unfortunately large share of the labor force has been uneducated. Due to this huge uneducated youth , it will increasingly put the country at risk of political unrest, particularly the large youth cohorts have been associated with higher risk of political violence in developing countries, where the youth has few alternatives besides unemployment and poverty (Urdal, 2006). Pakistan is at risk of similar destabilizing. The other danger that deteriorates the development in Pakistan, is the country has been stuck in a poverty trap, where low levels of education, particularly female education that hindered the country driving the road to higher development.

Indeed, rapid population growth will be the prime trouble facing Pakistan in the first half of 21st century. The probability that the population of Pakistan will start to decline in 2060 seems very low. During next five decades, population momentum would contribute significantly in population growth for each provinces in Pakistan. Currently, Pakistan is passing through the period of demographic dividend. Therefore, Pakistan will need to adopt a development model capable of absorbing the large working-age population. The age structure will become very youthful in next 50 years, the large working-age population, if well educated, skilled and sufficiently employed, could be a key asset for the country, and Pakistan will be prosperous socially and economically. If this fails, it will be confronted with many problems. Moreover, the two key areas where the prime concern of the government and immediate policies will be highly needed, that is; demographic dividend and the population momentum. This implies that in the process of formulating population policies in near future in Pakistan, these two important factors will be considered.

The first objective of the study was to document the education and population dynamics at provincial level in Pakistan and to assess the contribution of the momentum in

the population growth over the next five decades in Pakistan at the provincial level. Chapter two concluded that significant spatial variation exists in Pakistan in terms of demographic and education dimension. Therefore, every demographic debate in Pakistan should consider the regional variation as well.

The second objective of this research was to execute the probabilistic population projection of Pakistan at provincial level. The projections that we have presented here reveal that the population of Pakistan would increase to 281 million by 2060 with 80 percent probability that somewhere between 241 and 326 million. We have investigated many implications for this prospect for Pakistan's development, especially in relation to education. One major conclusion drawn from our research is the significance of conducting analysis at the provincial level rather than the national level in Pakistan. For example, the probabilistic population projections and the analysis of future trends in education would both look significantly different if they were executed on the national and provincial level separately. This implies that the considerable spatial diversity exists in Pakistan as well as the significant socio-economic conditions and trends prevails at the provincial level. The prospective addition of nearly 108 million inhabitant to Pakistan's population in 2060 will have major administrative and political implications. It is worth mentioning that albeit the fertility will decline significantly in Pakistan at national and provincial level at or below the replacement level in 2060, even though the population grew substantially. This implies that the population momentum would play a vital role in population growth in near and distant future in Pakistan.

The rapid population growth rates in the past and as well as the future for each province in Pakistan have also a political implication. It could work against the continuation of political cohesion. Since 1973, the representation of each province of Pakistan in Parliament was on the basis of population of each province primarily according to the 1972 census. On one hand, the rationalization of the continuation of population growth in most of the provinces in Pakistan particularly in Punjab—which have the largest share of seats in Parliament—they should not be penalize by a loss of political representation in Parliament. On the other hand, the small provinces in Pakistan (KPK and Balochistan) have the least share in the current political structure. The share of parliament seats solely depends on the size of the population of each province in Pakistan. Therefore, each province in Pakistan have sustain the significant population growth in the past and will likely to continue in future in order to sustain the significant share in the parliament. This requires an immediate policy action to curb the population growth. Our projections revealed a widening divergence of population growth rates between the northern and southern provinces in Pakistan. It illustrates that population growth rates in all provinces except Punjab will continue to significantly higher for coming five decades. Such high population growth signifies that southern (particularly in Sindh and Balochistan) perceptions that those provinces are economically backward and contributes less than their fair share to the federal government (particularly in revenue), and Punjab always dominates because of their large population size. Punjab has always maintained the largest share of the total population in Pakistan in the past and will sustain largest share of the total population in 2060. Other provinces in Pakistan are also growing fast in the near future and increase their

share in the total population in Pakistan. This factor needs a heed policy implication.

The third objective of this research was to evaluate the human capital development at the provincial level in Pakistan and assess the concomitant effect of education on fertility and population growth. The prospect of Pakistan and its capacity to develop is highly dependent on advancement in the educational attainment of the population. So far, shortage of investment in primary and secondary education, poor infrastructure and political instability hindered the achievement of satisfactory levels of education in Pakistan, especially for females. Consequently, Pakistan will fail to accomplish the Millennium Development Education Goals in terms of universal primary education and gender equity. The scenarios that we have looked, show that Pakistan needs to enhance the speed of change in education, since Pakistan is experiencing a demographic bonus and it will likely continue into the future—at least next 40 to 50 years. This window of opportunities, which is most favorable for socio-economic development—if the country manages to increase the quality of human capital by 2060. We show that female education is very critical and high political commitments will be desirable, for advancing through the demographic transition and economic development. This study demonstrates that the significance of investments in education in the near future so that Pakistan can reap the fruit of long-term human capital development. The past lack of investments in female education impeded the development in Pakistan and will continue far into the future unless effective adult educational campaigns are implemented to bring at least literacy to many women who come to adulthood without being able to read and write.

Our research reveals that considering the spatial heterogeneity in human capital development and population growth in Pakistan has a substantial effect on the outcomes and is necessary to evaluate the contribution of each province to the population growth and the prospect for development. Each province in Pakistan faces rapid population growth in the future as well as large proportion of working-age population. The future of Pakistan is highly reliant on the ability to progress towards the educational attainment of its population particularly for less-developed provinces (e.g. KPK and Balochistan). The attainment of certain levels of education at the provincial level has been disastrous so far in terms of provision, access and quality, particularly for females. Therefore, each province in Pakistan will fail to achieve the MDGs goals for education at the provincial level—that of universal primary education and eliminating gender disparities and other objectives on the national and international agenda (such as EFA). Although the speed of convergence in some province will be significant as compared to the others (e.g in Punjab). Even though, these goals cannot be met until 2060 in all provinces in Pakistan. The scenarios of education that we have looked at, shows that pace of advancing education has to be dramatically improved if the country would like to achieve all these goals by mid-century. To materialize the demographic dividend, government should struggle for faster economic growth with potential to meet the targets of industrialization and modernization particularly in the less-developed provinces such as KPK and Balochistan. Consequently, investment should be made in education of the population in general, and the labor force, in particular.

7.2 Policy Recommendations

7.2.1 Education, Education and Education

Almost universally, the importance of education as a major factors affective socio-economic and human development has been widely recognized. The Human Development Index (HDI) most widely used indicator to evaluate the socio-economic progress in a given country. HDI consists of three components, and education is one of them. Virtually better education is associated with lower mortality and fertility, better health, economic growth and democracy. Female education is negatively correlated with fertility at the individual level—women with higher education have fewer children. Therefore, universal primary education together with universal secondary education, particularly for females has been necessary to boost the economic growth and limit the population growth. The state of education in Pakistan constitutes a foremost reason for the country's limited progress in every corner of the development. Pakistan's future development is solely reliant on the capacity of the country to educate it population so that people live prosperous economically and socially. Furthermore, the women in Pakistan, if sufficiently educated and socially empowered, will become a dynamic member of the labor force and consequently, enabling Pakistan to enjoy the fruits of a demographic dividend. Therefore, MDGs, adult literacy campaign and female education should be the priority of the Pakistan into the coming decades. Moreover, the committed policies, and resources will be highly needed to fulfill above criteria.

7.2.2 Effective Population Policies

Since the formation of first population policy in 1965, population issues have long been neglected in Pakistan. Technically, decline in the birth rates translate into the significant reduction in the population growth rate only possible over the longer time horizon. This need a better illustration of this requirement of the population policy rather than the element of fantasy which has repeatedly characterized in Pakistan's stated objectives for lowering the birth rate. In 1983, for example, the population policy goal was the reduction of the birth rate from 40 to 37 per 1000 by 1987—a level not attained by 2000, when the birth rate was still about 38. The Ministry of population Welfare—issued the population policy documents in the year 2002—which set the medium term objective of achieving replacement fertility by 2015. In 2006-07, the latest Pakistan demographic and Health Survey reveals that the level of the total fertility rates in Pakistan was 4.1 children per women. The goals of the population policy 2002 has been look ambitious—a decline of two children per women in one decade. Therefore, Ministry of Population Welfare has revised the policy draft and set the new goals. It is unclear, what is achieved by setting such unrealistic goals? Thereby, effective population policies essentially required strong political commitment together with the development of other sectors, such the economy, education and health.

7.2.3 Recognize Spatial Dimension in Pakistan

As we have shown in the preceding chapters, the provincial dimension is an important source of heterogeneity in the socio-economic and demographic analysis in Pakistan. Each province has different cultures, languages and socio-economic development. This study considers such important dimension both retrospectively and prospectively. Provincial demographic processes are interlinked and will jointly determine the growth and structure of the population in the different provinces. It is important for policy makers to understand the provincial heterogeneity in demographic processes and formulated the policies for Pakistan's development accordingly.

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Abstract (German Version)

Alle Provinzen in Pakistan haben seit den 1970er Jahren ein bedeutendes Bevölkerungswachstum zwischen 2 und 4 Prozent pro Jahr erfahren. Das rasante pakistanische Bevölkerungswachstum hat die sozio-ökonomische Entwicklung in der Vergangenheit behindert, und Pakistan steht vor der Aufgabe, ein Entwicklungsmodell zu erarbeiten, das den künftigen Anstieg der Bevölkerung auffangen kann. Das Bevölkerungswachstum ist vor allem auf den großen zeitlichen Abstand zwischen dem Rückgang der Sterblichkeit und dem Rückgang der Fertilität zurückzuführen. Folgt man der Theorie des demographischen Übergangs, wäre als Reaktion auf den Rückgang der Sterberaten seit den 1970er Jahren eine sinkende Geburtenrate zu erwarten gewesen. Aufgrund der politischen Instabilität, der geringen sozio-ökonomischen Entwicklung und der ineffektiven Bevölkerungspolitik, konnten die Zielvereinbarungen für die Verringerung der Fertilität jedoch bisher nicht umgesetzt werden. Das Hauptziel unserer Forschung besteht darin, das Niveau und die Entwicklung sowohl der Bevölkerung als auch deren Bildung für alle pakistanischen Provinzen zu untersuchen, und zwar sowohl rückblickend als auch die zukünftige Erwartung. Die Ergebnisse der Projektionen zeigen, dass die Bevölkerung Pakistans (auf nationaler Ebene und in den Provinzen) in den nächsten fünf Jahrzehnten weiter stark wachsen wird. Für dieses zukünftige beträchtliche Wachstum der Gesamtbevölkerung Pakistans ist das sogenannte „population momentum“, also die Trägheit der Bevölkerungsentwicklung, verantwortlich. Im Jahr 2010 ist etwa die Hälfte des Bevölkerungswachstums auf dieses „population momentum“ zurückzuführen. Dies führt zu einem weiteren Anwachsen der Bevölkerung im erwerbsfähigen Alter. Da das Bevölkerungswachstum beginnt, sich zu stabilisieren, als Folge des demographischen Übergangs, wird Pakistan, einschließlich aller Provinzen, eine Zeitfenster mit besonders günstiger demographischer Konstellation durchschreiten: Für die nächsten 30 bis 40 Jahren wird die Mehrheit der Bevölkerung im erwerbsfähigen Alter sein. Unsere Projektionen zeigen aber auch, dass Pakistan Ergebnis nicht in der Lage sein wird, die Millenniums-Entwicklungsziele (MDGs) in Bezug auf Bildung bis zum Jahr 2015 zu erreichen, und selbst bis 2060 nicht, wenn die Bildungsbeteiligung im Primärbereich nicht mit einer deutlich höheren Geschwindigkeit verbessert wird als in der jüngsten Vergangenheit.

Curriculum Vitae

M. ASIF WAZIR

*World Population Program
IIASA, Laxenburg, Austria
Email: asifwazir01@gmail.com
wazir@iiasa.ac.at*

Education

- 2004 M.Sc. (Statistics) with distinction: BZ University Pakistan
Master Thesis: Outlier Models & Prior Distribution in Bayesian Linear Regression
- 2001 B.Sc. (Mathematics, Statistics and Economic)

Employment

- 2008– Research Scholar (Guest), World Population Program, IIASA
- 2005–08 Lecturer in Statistics, Govt. Degree College, Bhagtanwala, Sargodha

Computing Skills

- Proficient user of R and STATA
- Handling Survey data in SPSS and STATA
- Latex
- Basic Knowledge of C++ and excel VBA
- Office Application in Windows (i.e Power point, Words, Excel, Access)

- Linux

Publications¹

Articles:

- *Wazir, A. (2012). "Population dynamics in Pakistan: Past, Present and Future", Human Development Report 2012, SDPI, Islamabad Pakistan
- *Anne, G., Wazir, M, Asif. 2011. "Human Capital and Population Development: Pakistan and the "Cannon and Butter Dilemma"." in Understanding Pakistan Through Human and Environmental Systems, Laurel J. Hummel and Richard L. Wolfel, (Eds), U.S. Army War College Center for Strategic Leadership, West Point, NY, 157-182pp.
- Wazir, A., Goujon, A., Lutz, W., (2011), "Alternatives population and education trajectories for Pakistan", IR-11-029, International Institute for Applied System Analysis, Laxenburg, Austria.
- Anne, G., Wazir, A. (2011). "Pakistan faces choice: Education or unrest", Option, winter 2011- 2012, p-24, IIASA, Laxenburg, Austria.

Conference Proceeding:

- Wazir A, Samir, KC. 2012. "Effect of Education on Adult health and Disability in Pakistan: A Sub-national Perspectives." in PAA 2012 Annual Conference. San Francisco CA, USA (Will be held 3-5 May 2012)
- Wazir M. Asif, A.G. 2010. "Does education matter? Population projection of Pakistan at provincial level by educational attainment." in BSPS 2010 Annual Conference. University of Exeter United Kingdom: BSPS. (Held 13-15 September 2010)
- Wazir M, A. 2010. "Cultural Integration, Religion and fertility among selected migrants groups in Europe." Presented in the workshop: Multi-state Demographic Estimates and Projections of Culture, Religiosity and Migrants in Europe, March 1-2, 2010. IIASA.

Poster Presentations:

- Population and human capital development in Pakistan to 2050. XXVI International Population Conference of the IUSSP, Marrakesh, Sep 27-Oct 2, 2009. <http://iussp2009.princeton.edu/abstractViewer.aspx?submissionId=92102>
- Defusing the Population bomb: Stochastic Forecast of Pakistan at regional levels. University College London and Leverhulme Trust symposium on human population growth and global carrying capacity 25-26th May 2011, London

Research Interest

¹* represents peer reviewed publication

- Human Capital development in developing countries
- Multi-State Modeling
- Probabilistic Population Projection
- Health, Disability and Social-economic Characteristics
- Fertility and Female Education
- Age structural transition and demographic Dividend in developing countries.
- Education and Poverty
- Modeling of component of Population change (Fertility, Mortality).

Grants and Award

2011	UCL-Leverhulme Trust Population Footprints travel grants, London 25-26 May 2011.
2010	European Science Foundation grant for QMSS2 summer School in R, Romania.
2010	British Society for Population studies Travel Grant, BSPS Annual Meeting 2010 University of Exeter, UK
2010	Travel grants for PRB Winter School in Policies and Reproductive Behavior Pad-ova, Italy.
2009	IUSSP travel grant, XXVI International Population Conference of the IUSSP, Marrakesh, Sep 27-Oct 2, 2009.
2008	PhD scholarship from Higher Education Commission Pakistan, University of Vienna, Austria.
2003	Master of Science award with distinction, BZ University, Multan Pakistan

Professional Membership

- IUSSP
- Asian Population Association (APA)
- Population Association of America (PAA)
- European Population Association (EPA)

Reference

- Profess Wolfgang Lutz, Program Leader: World Population Program (IIASA)
Director: Vienna Institute of Demography (VID) Director: Research institute
for Human Capital Development (WU) Ph: +432236807294; Email: lutz@iiasa.ac.at
<http://www.oeaw.ac.at/wic/index.php?id=16>
- Anne Goujon, Research Scientist, Vienna Institute of Demography (VID) Ph:
+431515817719; Email: anne.goujon@oeaw.ac.at:
http://www.oeaw.ac.at/vid/staff/staff_anne_goujon.shtml
- Samir KC, Research Scholar: World Population Program (IIASA) Ph: +432236807424,
Email: kc@iiasa.ac.at
<http://www.iiasa.ac.at/Research/POP/Staff/index.html?sb=31>