

State Policy and Social Inequality in Punjab



By

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Dedication

This work is dedicated

To

My Mother

&

My father Muhammad Iqbal Nasir (late)

All I have and will accomplish is only possible due to their love and sacrifices

CERTIFICATE

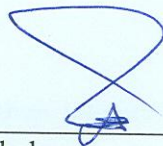
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Abstract

This study examines the state of disparities in social sector indicators of health and education that have resulted in social inequalities through a regional divide in Punjab. The study traces sources of this uneven social development in role of state policy through provision of basic education and health facilities by government which results in differentiated health and education outcomes across different regions of Punjab. For this purpose the study uses regional district-wise data on the respective social indicators at district level.

Chapter 1

Introduction and background

1.1 Introduction

Spatial differences in poverty, inequality and development is a topic that has gained immense importance in recent years as national and state or provincial level governments in developing countries have failed to deliver on their economic and social promises. This has resulted in uneven development across regions, while some regions develop and others remain under developed. The resulting cleavages between different regions are a cause of concern for development practitioners in general and policy developers in particular. For development practitioners because the idea that development of certain regions first, shall ultimately lead to development of lagged regions as implied in Neo-Classical convergence paradigm seems to have failed. For policy makers because the Urban bias inherent in development policies of developing countries has largely failed to initiate a process of sustainable development even in urban areas where infrastructure has become overburdened due to substantial rural urban migration. Most importantly, the inevitable unevenness and inequalities are exploited by populist politicians to advance their own political agenda on basis of class and ethnicity, thereby further hindering development cause through political division and polarization. (Jamal and Khan, 2003).

An important aspect of this uneven development is structural transformation in many developing countries, where services and manufacturing sectors have gained significant share

in GDP composition. In contrast, the share of agriculture sector in GDP has declined over the years, while still a sizeable population resides in rural areas. So the share of rural areas in income has declined over the years worsening the regional inequalities in the process of development. This is manifested by the fact that a majority of poor still live in rural areas.

There are different and divergent causes for this state of uneven development. A major role in this regard is played by State or government policy. While the Neo liberal paradigm has dominated the development economics arena post 1980s, the emergence of ‘Asian Miracles’ and especially China, quintessentially brings to light importance of State interventions in development. These growth miracles were brought about because of significant public investments in health, education, and infrastructure and in case of Korea and India through land reforms. This leads to rejuvenation in role of state in development after its demise in 1980s with emphasis on importance of ‘institutions’ and ‘good governance’. Another important reason is the weak political ‘voice’ of the poor in developing countries in setting and defining state policy and development agenda. In most developing countries, there is uneven balance of political power which leads to asymmetric balance of power in economic realm and hence unequal access to social services. This is due to historical factors where colonialists created a patron class of local politicians to maintain their hegemony and political stability.

This was especially true in case of Punjab, a province of Pakistan with a share of more than 56% of country’s population where the dominant political classes were provided economic favors such as granting lands to maintain and sustain their loyalty to the British. However, after the partition this political class maintained their political power through entrenched economic

dominance acquired in colonial era. The economic base was utilized to strengthen the political power by patronizing agents in rural constituencies. The clients were mostly rural elites, because Punjab has predominantly been rural, where majority of seats in provincial legislature even now are derived from rural areas. Moreover, Punjab also holds the key for forming governments at center, so patronizing became all too necessary. Henceforth, state development policy for improving access to social services remained neglected in this patronizing game. This was done through two channels: first, by blocking reforms such as educational and improvements in social service delivery in rural areas to maintain status quo, second, by allocating funds to urban/regional centers and their clients in rural areas. The latter was also necessary as urban residents are more informed and posed a danger to political stability through political movements. This all resulted in development of urban and regional centers which received preferential treatment from the state, while rural areas lagged due to neglect on part of the political elite.

Resultantly, differentiated developed regions emerged across Punjab, e.g. regions where land structures were relatively egalitarian and economic opportunities were available through education became industrialized and developed, while regions where land structure/tenure were highly skewed remained agrarian and under developed. In developed regions, social inequalities in terms of access to social services subsided while becoming severe in under developed regions. Most importantly, the obsession with economic development in our history has almost always ignored the social sector development process. Even now, this seems to be the case in Punjab where increasingly the focus is on infrastructure projects as compared to social sector. This is purely rational behavior exhibited by the political class as the former are physically

visible and have an immediate pay off through political dividends in the electoral process. While the latter, though being socially desirable are less beneficial as they have a long payback horizon.

In contrast to the political economy approach mentioned above where the political elite want to perpetuate their dominance through oppressive state institutions and public policies, resulting in social inequalities, there exists a link between equality and development which is economic in nature. This mechanism works through the fact that in regions with greater economic development and industrialization; the industrialists have an inherent economic incentive to invest in human capital and social sector development, i.e. health and education. This is supplemented by the evidence that returns to human capital investments are more in mature stages of development as compared to initial stages. So, economic growth with industrialization has an egalitarian effect. This is in contrast to the under developed agrarian regions, where returns to human capital are less and hence there is a disincentive for investments in human capital by landed elites (Galor, 2009). This again relates to Punjab's context where industrialized regions have less inequality with greater human capital as compared to under developed agrarian regions which have more inequality with lesser human capital.

This study seeks to examine the spatial social inequalities in Punjab with a focus on health and education.

1.2 Significance and contribution of the Study

Punjab's economy has quadrupled since 1972 (World Bank, 2008). During the period 1999-2000 to 2006-2007, her economy grew at a rate of 3.3% while rest of Pakistan grew at 2.5%

(Institute of Public Policy, 2012). The benefits of this growth in terms of social development, however, due to above mentioned reasons, have not been shared equally across Punjab. Besides, the state investments on development projects are unequal across different regions and resultantly there is disparity and uneven social development pattern throughout the province. There is high concentration of basic facilities like education and health in metropolitans and other big cities. While rural areas are at a significant disadvantage when it comes to social service delivery. Consequently, the migration from rural to urban areas is large enough. This has also resulted in pressure on urban infrastructure with inherent problems of urban poverty, crime and poor service delivery. A similar pattern holds in case of different regions. While the North and the Center have excelled economically and socially, the South and West Punjab have lagged (Cheema et al., 2008). There are various rural and suburban districts which, if properly developed and provided with basic facilities like education, health, employment and infrastructure can improve livelihoods of people. Similarly, there are different regional centers, which, given preferential treatment by government, may grow as poles of development.

By using district level data of social sector indicators this study seeks to provide empirical evidence on the state of social development across different districts of Punjab. This shall result in portraying patterns of spatial differences in development, with a focus on social rather than economic factors. The empirical analysis of social development at the district level is most pertinent in Punjab's case because government policy that awards preferential treatment to certain regions is directly enacted at the district level. Thus, examining the performance of districts is the appropriate level to determine the effect of these policies. District-level empirical analysis is important to bring out spatial variations across the districts of Punjab. Moreover,

there is much political debate off late on the creation of separate and independent provinces through partitioning of Punjab. The demand for the creation of the separate province is often based on intra-regional social inequalities in Punjab. While the debate has become much heated over the course of last five years, rhetoric has overshadowed fact and forensic based analysis. A contribution of this study would be to provide a research based discourse on intra-regional social inequalities in Punjab.

More importantly, this study shall not only highlight spatial social inequality and uneven development, but shall go one step further by examining the role of public policy in contributing towards spatial inequalities. Lastly, the spatial uneven development debate has become all more relevant in the context of 7th NFC award where a large resource pool is awarded to provinces along with devolution of public sector development to the provincial level. Highlighting the spatial inequalities becomes all the more important in this context of greater resource availability to the provinces.

1.3 Objectives of the Study

- To examine spatial patterns of development in education and health across different regions of Punjab.

- To examine the causes of these patterns of development in health and education.

1.4 Problem Statement

To examine the role of public policy through level of development of social sector (health and education) upon state of social inequalities in different regions of Punjab.

1.5 Organization of the Study

This rest of the study has been organized as follow. The second chapter is dedicated to review of relevant literature. The conceptual framework of the study has been discussed chapter 3. In next chapter results from regression analysis are discussed. Chapter five presents summary and conclusion of the study.

Chapter 2

Literature Review

Inequalities in access to social services across Punjab have been examined by Sikander and Shah (2012). They find that despite high growth rates Pakistan remains a poor performer in social service delivery. They contend that due to poor access to social services like education the poor are trapped in poverty. But if this access is provided, they may enter occupations with higher return and ultimately break out of the poverty trap. They look at access to four services: Education, health, physical infrastructure and safety nets. They find that inequality in access to health facility is very high in South Punjab and is rather low in Lahore and areas around it. Similarly they find inequality in access to secondary and high schools very low in Lahore, Gujranwala, Rawalpindi, Sialkot and Gujarat. They conclude that farther a district is from the provincial capital, Lahore, lesser are its chances of enjoying access to social services and that resources are concentrated at the center of province rather than its periphery.

Akhtar (2008) looks at the state of inter and intra-regional inequalities across Pakistan's four provinces. The authors have examined the convergence hypothesis (unequal regions are expected to converge towards egalitarian regions) using data on outcome variables like poverty levels and consumption inequalities. He argues that these inequalities have historical and geographical causes that which the terms 'structural'. The author points out that from 2001-2002 to 2006-07 districts councils in Central Punjab received between 50% to 60% share of the expenditures expenditure allocated for district councils of Punjab. These allocations are based on population share criteria and indicate failure of Punjab government to allocate more resources to backward Southern Punjab. He also cautions against decentralization with the

caveat that elites may hijack the power reproducing further inequality between and within regions.

Ercelawn (1991) while looking upon regional economic disparity across Pakistan notes that Punjab had the highest poverty in four provinces. Even with its relatively high growth rate Punjab still has a relatively high incidence of poverty both in rural and urban areas highlighting the spatial differences in development in Punjab. A similar observation was made in one of the pioneering study on regional economic and social indicators conducted by Hamid and Hussain (1976) for West Pakistan. The study noted that both inter and intra provincial inequalities increased over time. Most strikingly, the regional disparity was negatively correlated with level of growth in a province. The study further pointed that this phenomenon was primarily because of growth under market mechanisms where already developed regions grow faster than the less developed regions. This is because developed regions are attractive for investments due to concentration of facilities like banking, communication, technically trained manpower thereby further attracting human and capital investments and negatively affecting skills and endowments of less developed areas.

Addressing the above mentioned causes of uneven economic and social inequality across regions in Pakistan, Hussain (1993) argued for putting regionally equitable development at the heart of planning in Pakistan asking that any policy initiative must take into consideration its impact on regional growth and poverty alleviation by both the government and the NGOs.

A study by Khan and Rehman (2012) suggests that human capital is the impetus required for economic growth contending that in contrast with trickledown effect of economic growth, human capital has a direct effect upon poverty as it increases both the productivity and remuneration, hence producing an improvement in living standards and increasing output. They further argue that in absence of investments in human capital i.e. health and education the physical assets remain underutilized. Moreover, educated work force also leads to creation, execution and adoption of technologies according to endogenous growth theory. Similar views have also been expressed in World Bank Report (1980):

“Studies have shown that economic return on investment in education seems in most instances, to exceed returns on alternative kind of investment, and that developing countries obtain higher returns than the developed ones.”

Jamal and Khan (2003) note that regional inequalities has mostly been measured in one-dimensional economic terms and use a multivariate index of inequality to rank districts in four provinces of Pakistan. They also point out that differences in development between provincial capital district and other districts is quite marked. Specifically they note that 28 percent of Punjab population lived in highly developed areas in 1981 (Lahore, Rawalpindi, Faisalabad and Gujranwala) and this proportion increased to 35 percent in 1998 - Lahore, Rawalpindi, Sialkot, Jhelum, Gujranwala, Faisalabad, Gujrat and T.T. Singh - all these being districts located in northern and central Punjab. This phenomenon of uneven regional development is also backed by other studies which further illustrate that developed districts of Punjab lie in northern and

central region while underdeveloped districts lie in western and southern Punjab (Pasha et al., 1982 and Akhter et al., 2007).

Even looking at poverty levels in different Divisions of Punjab during the period of 1998-1999 to 2004-2005 in a study by Ali et al. (2010) it is clear that low poverty prevails in areas like northern and central Punjab whereas high poverty areas are concentrated in western and southern Punjab. Cheema et al. (2008), concurring with Ali et al. find high incidence of poverty in rural south and west of Punjab, with one out of two household being poor on average as compared to urbanized north and center. Moreover, even when multiple development indicators are considered a very similar picture emerges with south and west being much behind than the north and center.

Siddiqui (2008) looks at the role of public policy through provision of basic services such as health and education, which facilitate the capability development of the population. It contends that capability development affects poverty negatively and that Pakistan ought to focus on human development first and foremost which would also raise productivity ultimately. It proves that certain areas like Islamabad have high literacy and low mortality rates with significant public investments while an area like Layyah has been left far behind. The study calls for region specific interventions with a specific focus on social sector development.

Based on the level of host of social sector indicators a World Bank Report on Pakistan's development concludes that Pakistan lags behind other countries with similar level of per capita income. (World Bank, 2002). In this respect, the report identifies four social sectors i.e.

education, health, nutrition and growth of population. Pakistan is facing the problem of social gap, which implies that the government policies regarding education and health facilities are not up to the mark. In addition to this, the report also refers to the Social Action Plan (SAP), which was developed and implemented during 1990s. The purpose of the action plan was to improve the social sector services such as health and education. The result of the plan showed some success but at cumulative level it failed to improve the social gap. The Social Action Plan was successful only at the level of population growth and rural supply and sanitation. The plan had failed to properly incorporate and implement the policies regarding the increasing school attendance. One of the reasons of the failure of the policies regarding school attendance was the expenditure gap i.e. the difference between actual and required expenditure increase with the gradual implementation of plan.

Channa (2012) in her research report “Social Protection in Pakistan” refers to the government policies regarding the implementation of social protection programs with focus on health and education. The paper examines public interventions regarding social protection. The report describes the social protection in terms of education and health. The parameters discussed in the report are based on the district level data. The report also discusses the Worker’s Children Education Ordinance, which was formulated in 1972. The purpose of the ordinance was to improve the education outcome by providing free education to children. Analyzing the report, Channa (2012) concludes that government policies proved inadequate in reducing state of inequalities in social protection programs across districts.

Malik (2011) in his “Policy Analysis of Education in Punjab” analyses the Punjab Education policy after the insertion of article 25-A. The Article is about the state’s responsibility to provide free and compulsory education to all children between the age of 5 to 16 years. The report indicates that the Punjab is considered as the major contributor of manpower and education is the base of human capital development so the education policy needs to be implemented at an equal level in all districts of Punjab. The report also discusses the criticism on the education policy in Punjab. The critics are of the view that the province lacks the institutional arrangements to accommodate all the out of school children in schools - existing schools do not have enough capacity both in terms of area and internal facilities to accommodate all out of school children. In addition to this, the education policies do not provide any preferential treatment to lagging districts which may be the cause of inequality in education indicators across districts.

Khan (2009) in her research report on “Education Order in Punjab: A District Level Study” examines the education outcome across the districts of Punjab and provides a comparative study of government policies across all the districts. The tool for the data analysis used in the research report is Education Index (EI). The report shows that the education system and policy patterns followed within the districts of Punjab were not significantly different during the last 10 years and the lowest rank district would remain at the same level if the current policies persist. The recommendation provided in this report is that the government should give significant support to education system and its infrastructure to reduce the inter-district inequalities in education.

Arif and Arif (2012) in research report on “ Socio- Economic Determinants of Child Health in Pakistan” use the PSLM survey for 2004-05. The purpose of the paper is to examine the factors that contributes significantly towards child mortality rate. The factors, which are identified in the report are economic, demographic, geographical and environmental. The paper considers the mortality rate of the children upto 4 years. The sample selected for the report is 13,540 children of pakistan from different districts. The sample is diaggregated on the basis of climatic zones, and urban-rural population. The report evaluates the socio economic reasons of child mortality. The findings of the study suggests that accross rural geographical zones health infrastructure that provides the guidelines regarding personal hygeine to residents of of rural areas needs considerable improvement. The report also suggests that inequality in governeemt provision of basic health service continues to be mainly driven by the assumption that rural area residents are as much hygeine concious as are the urban residents. The report argues that this assumption is fundamentally flawed. The reason is low literacy level in rural areas and this indicates th importance of education in imroving health outcomes.

Bennet (1999) in his research report on “Correlates of Child Mortality in Pakistan” evaluates and identifies the factors involved in child mortality Rawalpindi, a district of Punjab. The findings suggest that government run family planning programs fall short of the required standard. The study also suggests that differences in public perception regarding family planning programs proved to be an important factor of high child mortality rate.

UNFP (2014) identifies shortcomings of public health care especially with reference to elderly women in Punjab. The shortcomings identified include lack of experienced doctors and other

relevant human capital, lack of guidelines regarding health care and insufficient funding for provision of health services.

In addition to this, another research on “Socio-Demographic correlates of the health seeking behaviors in two Districts Punjab examines the health seeking behavior between urban and rural population in Nankana Sahib located in central Punjab and Bhawalnagar in southern Punjab (Mushtaq, et al., 2011). The report concludes that the poor people living in rural areas have access only to government hospitals. The poverty makes it difficult to afford health care, dissatisfaction in terms of service quality and longer distance are the major constraints to proper utilization of government health facilities in southern Punjab. The access of the rural poor in southern Punjab to only public hospital makes the health care scenario all the more disappointing.

Chapter 3

Conceptual Framework, Data Sources and Methodology

3.1 Introduction

Government provision of health and education services generates impact on the basic health and education outcomes. These factors affect the quality and quantity of education and health services available to people and hence play a vital role in development of human capital. This chapter describes; the conceptual framework, data and the methodology used to link the public provision of these basic facilities with health and education educational outcomes.

3.2 Conceptual Framework

Siddiqui (2008) examines public provision of health and education services at the district level and then looks at their impact upon education and health outcomes. The methodology adopted is used to gauge the quality of public policy with respect to health and education at the district level. The proxy for education and health services are numbers of primary schools and number of health units respectively. We investigate the impact of these basic government services on education and health indicators.

Using the basic framework mentioned above the study develops models to gauge how government investments in health and education impact health and education outcomes proxied by health and education indicators like infant mortality and literacy rate. Two separate models for health and education have been developed. The focus on health and education is meant to emphasize the development of basic human capabilities. The study uses regional classification

of Punjab by Cheema et al. (2008) to segregate Punjab into northern, central, southern and western regions.

First, a region wise profile is developed for input i.e. public provision of basic health and education facilities and output i.e. infant mortality and literacy rate.

Second, these outcomes are then related to public provision of health and education facilities across different districts of Punjab. The health and education models are explained below:

3.3 Variable Specification-Health Model

The health model has the following variables.

3.3.1 Dependent Variables:

- Infant Mortality Rate
- Under five Mortality Rate

Infant Mortality Rate

Infant mortality is the outcome of the quantity and quality of health services available to residents of a certain region (district). Greater and better the provision of health services, the lesser would be infant mortality rate i.e. the death of a child of less than one year. Infant mortality rate is typically used for measuring capabilities development. 77 infants die out of every 1000 births in Punjab (UNICEF, 2008). The rate is likely to vary across districts of Punjab.

Under five Mortality Rate

The number of children who die by the age of five years per thousand live births per year is known as the under-five mortality rate. The under-five mortality rate in Punjab was recorded to be 112 in the year 2003-2004 which declined to 111 in year 2007-2008. This variable is a reflection of provision of basic health facilities in a district and how they impact health of children.

3.3.2 Independent Variables:

- Public Access to Health Facilities
- Number of Basic Health Units (BHU)
- Government provision of safety nets
- Distance from Lahore
- Public Access to Drinking Water
- Population Density
- Literacy Rate

Public Access to Health Facilities (BHUs)

Public access to health facilities reflects the percentage of population enjoying access to basic health units within half hour's distance in a district. In Punjab, the population enjoying public access to basic health units within half hour's distance is 75% but this may be different in different regions of Punjab as categorized in the beginning of the study. This variable is expected to have a negative relation with health outcomes of a district - Districts having more percentage of population with access to basic health units within half hour's distance shall have

people with easy access to health facility and hence a lower infant and under five mortality rate while those having less percentage of population with access to basic health units within half hour's distance shall have people with difficult access to health facility and hence a higher infant and under five mortality rate.

It must be noted here that these facilities are basic health units and not big hospitals. This is a limitation of the study and is due to two factors. First, the data on big hospitals in different districts is not available with reference to distance from a certain point in the district. Second, big hospitals do not exist in all the districts. Given these limitations, the study uses public access to basic health units as indicator of access to health facilities.

Number of Basic Health Units (NBHU)

This particular variable measures the total number of basic health units in different districts of Punjab. The number of health units also varies across different regions in Punjab. These facilities play a critical role in providing essential basic health services in a district thus impacting health outcomes of a district. This variable is expected to have a negative relation with health outcomes of a district - districts having more BHUs shall have more population with access to health facilities and a lower infant and under five mortality rate and vice versa.

Government Provision of Safety Nets (GPSN)

Government provided safety nets in a district include pensions, subsidies and family support programs through utility stores and other government schemes of social protection. Due to data constraints, BISP (Benazir Income Support Program) has been considered in this study.

Looking at data of Punjab it is pertinent to highlight that these safety nets are again concentrated in areas like Lahore and Rawalpindi while other districts remain at a significant disadvantage. This is important because considering the massive national poverty level and its variance across regions, these safety nets and their variation across regions can play substantial role in impacting health outcomes by affecting incomes. For detailed analysis, social protection is disaggregated into three further dimensions including i) those receiving pensions, ii) those receiving subsidized medicine, subsidized /free medical check-ups or free books for education iii) those purchasing goods from utility stores. All the three measures of social protection are expected to have a negative relation with health outcomes of a district e.g. Districts with greater population enjoying safety nets shall have a lower infant and under five mortality rate through savings in income and vice versa.

Distance from Lahore (DfL)

The distance of a district from Lahore suggests how this distance impacts health outcomes in the district. The distance from Lahore of a given district is important in the sense that it is the second biggest city of Pakistan after Karachi and the provincial capital of Punjab so major health facilities like hospitals are concentrated in Lahore. People residing in other districts have to travel to Lahore for availing certain medical facilities. This in turn can have an impact upon health outcomes of a given district. This variable is expected to have a positive relation with health outcomes of a district e.g. Districts at more distance from Lahore shall have less number and high quality of health facilities and a higher infant and under five mortality rate while those near Lahore (at less distance) shall have more better quality of health facilities and a lesser infant and under five mortality rate.

Public Access to Drinking Water (PADW)

Public access to drinking water measures the percentage of household population with access to drinking water on their dwelling/premises in a given district. The access may be different in different regions of Punjab. This is important because easy access to drinking water mitigates number of diseases. Most importantly due to significance of hygiene in affecting mortality rates, this variable is used as a proxy of hygiene facilities in a district. This variable is expected to have a negative relation with health outcomes of a district - districts having more percentage of households with access to drinking water shall have better hygiene conditions and a lower infant and under five mortality rate while those having less percentage of households with access to drinking water shall have adverse hygiene conditions and a higher infant and under five mortality rate.

Population Density (PD)

Population density is defined as measurement of population per unit area. This is generally expected to have a positive impact on health outcomes as having a health facility in densely populated area has low managing cost and better return due to economies of scale. However, after a certain limit increase in population may adversely affect quality of health facilities by burdening the infrastructure.

Literacy Rate 10 years and above

Literacy is defined as the ability to read and write. It is considered to be an important indicator for monitoring progress towards universal education. Literacy rate includes the ability to read and write in any language but it excludes Quranic reading. The male and female literacy rate of

Punjab were 63% and 44% respectively in 2007. The literacy rate in 2007 shows improvement over 2003, however there are marked difference across regions.

Literacy rate is expected to have a negative relation with health outcomes of a district as higher literacy rate in a district is expected to lead to better hygiene, self-care and a proactive approach to disease management. Therefore districts with higher literacy rate are expected to have a lower infant and under-five mortality rate and vice versa.

3.4 Methodological Framework-Health Model:

Now based on the foregoing, our empirical model for health is as follows:

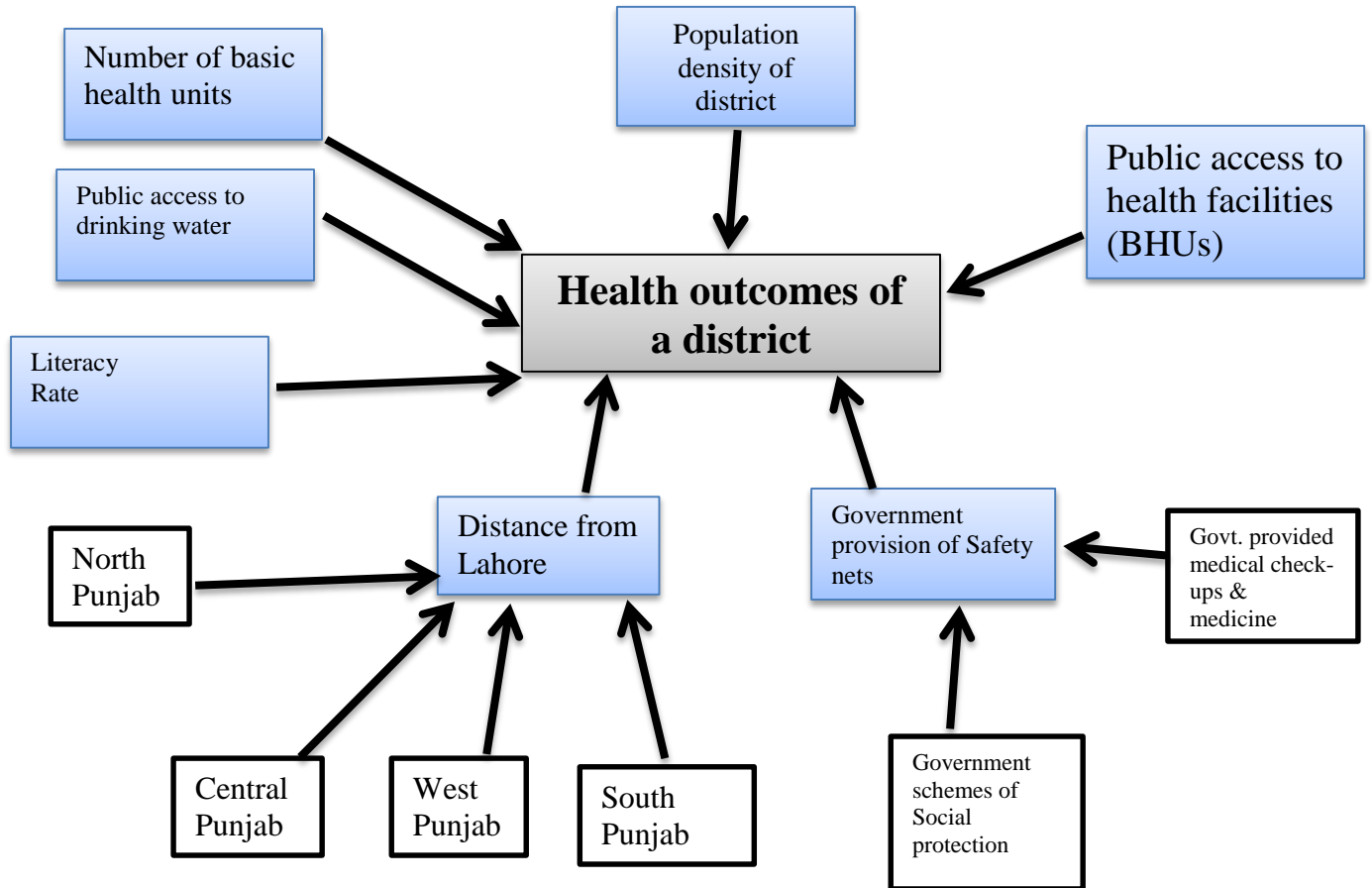
$$HO = \alpha_0 - \alpha_1 PAHF - \alpha_2 NBHU + \alpha_3 PD - \alpha_4 GPSN + \alpha_5 DL - \alpha_6 PADW - \alpha_7 LR + \varepsilon \quad 3.1$$

In equation 3.1 the dependent variable HO represents the Health outcomes of a district in Punjab measured by using average of infant mortality and under five mortality rates. These are the dependent variables (taken one by one) which are related to the independent variables. The independent variable PAHF denotes Public access to health facilities. This variable affects health outcomes of a district. NBHU represents Number of basic health units which again impacts health outcomes of a district. Both of these are used as measures of Public health policy in a district.

PD indicates the population density of the district which is a control variable. GPSN is Government provision of Safety nets in a district, it is expected that greater provision of these

shall lead to improvements in health outcomes. While D_iL indicates distance of that district from Lahore, the expectation is that districts closer to Lahore would have better health outcomes due to proximity to better health facilities. PADW indicates Public access to drinking water which is the percentage households with access to drinking water on their premises/dwelling. It is expected that districts with greater public access to drinking water shall have better hygiene conditions and lower infant and under five mortality rate. Lastly, LR is literacy rate, it is expected that high literacy rate in a district may lead to improvements in health outcomes due to better self-care, hygiene and proactive approach to disease management.

3.5 Pictorial presentation of Health-Model:



3.6 Variable Specification-Education Model:

The education model has the following variables.

3.6.1 Dependent Variables:

- Literacy 10 years and above
- Net Primary Attendance Rate

Literacy Rate 10 years and above

Literacy is defined as the ability to read and write. It is considered to be an important indicator for monitoring progress towards universal education. Literacy rate includes the ability to read and write in any language but it excludes Quranic reading. The male and female literacy rate of Punjab are 63% and 44% respectively. The literacy rate in 2007 shows improvement over 2003, however there are marked difference across regions.

Net Primary Attendance Rate

Net Primary attendance rate is defined as the ratio of number of children of primary school age currently attending primary or secondary school out of the total number of children of primary school surveyed. The net primary attendance rate of Punjab is 53% (MICS 2007). The rate shows an overall improvement as the rate was 51% in the year 2003-2004. Wide regional and across districts variation in Net Primary attendance rate exist.

3.6.2 Independent Variables:

- Population Density
- Public Access to Education Facilities
- Number of Primary Schools
- Government provision of safety nets
- Distance from Lahore
- Gender Parity Index

Public Access to Education Facilities (PAEF)

Public access to education facilities reflects percentage population enjoying access to government primary education facility within two kilometer distance in a district. Access to government primary schools varies across different regions of Punjab. This variable is expected to have a positive relation with education outcomes of a district - districts having more population with access to government education facilities within two km distance shall have a higher net primary attendance and literacy rate while those having less population with access to education facilities within two km distance shall have a lower net primary attendance and literacy rate.

Number of Primary Schools (NPS)

This particular variable measures the total number of government primary schools in different districts of Punjab. The number of government primary schools also varies across different regions in Punjab. Primary schools play a critical role in providing basic education in a district thus impacting education outcomes of a district. This variable is expected to have a positive relation with education outcomes of a district - districts having more primary schools shall have

more population access them and a higher net primary attendance and literacy rate while those having less primary schools shall have less population access them and hence a lower net primary attendance and literacy rate.

Government Provision of Safety Nets (GPSN)

As discussed earlier under health model, all the three measures of social protection are also expected to have a positive relation with education outcomes of a district - districts with greater population enjoying safety nets shall have a higher net primary attendance rate and literacy rate through savings in income and vice versa.

Distance from Lahore (DfL)

This variable looks at distance of a district from Lahore and gauges how this distance impacts education outcomes in that district. The distance from Lahore of a given district is important in the sense that it is the second biggest city of Pakistan after Karachi and the provincial capital of Punjab so major education facilities like universities are concentrated in Lahore. Moreover the number of government primary schools and their standard of education in districts at distance from Lahore is far below the level of education available in Lahore. This variable is expected to have a negative relation with education outcomes of a district - districts at more distance from Lahore shall have less number and low quality of education facilities and a lower primary attendance and literacy rate while those near Lahore (at less distance) shall have more and better quality of education facilities and a higher net primary attendance and literacy rate.

Gender Parity Index (GPI)

Gender Parity Index measures the proportion of girls to boys in primary schools. Gender parity index for primary school in Punjab is 0.98 (UNICEF, 2008), indicating that more boys attend primary school than girls. This variable shall point to variation in gender attendance in primary schools across districts indicating how inclusive are basic education facilities provided by the government. It is important in the sense that imparting education to a girl leads to improving likelihood of educating future generations as an educated mother is likely to strive more for educating her children. This variable is expected to have a positive relation with education outcomes of a district - greater the gender parity index in a district, greater would be the number of girls enrolled in schools against boys and vice versa.

Population Density (PD)

Population density is defined as measurement of population per unit area. This is generally expected to have a positive impact on education outcomes as having an education facility in densely populated area has low managing cost and better return due to economies of scale as compared to less populated area and hence a higher primary attendance and literacy rate. However, after a certain limit increase in population may adversely affect quality of education facilities by burdening the infrastructure. Inclusion of population density in the model will allow us to examine the magnitude and direction of the impact population density has upon education outcomes.

3.7 Methodological Framework-Education Model:

Now based on the foregoing, our empirical model is as follows:

$$\mathbf{LR} = \alpha_0 + \alpha_1\mathbf{PAEF} + \alpha_2\mathbf{NPS} + \alpha_3\mathbf{PD} + \alpha_4\mathbf{GPSN} - \alpha_5\mathbf{D_iL} + \alpha_6\mathbf{GPI} + \epsilon \quad \mathbf{3.2}$$

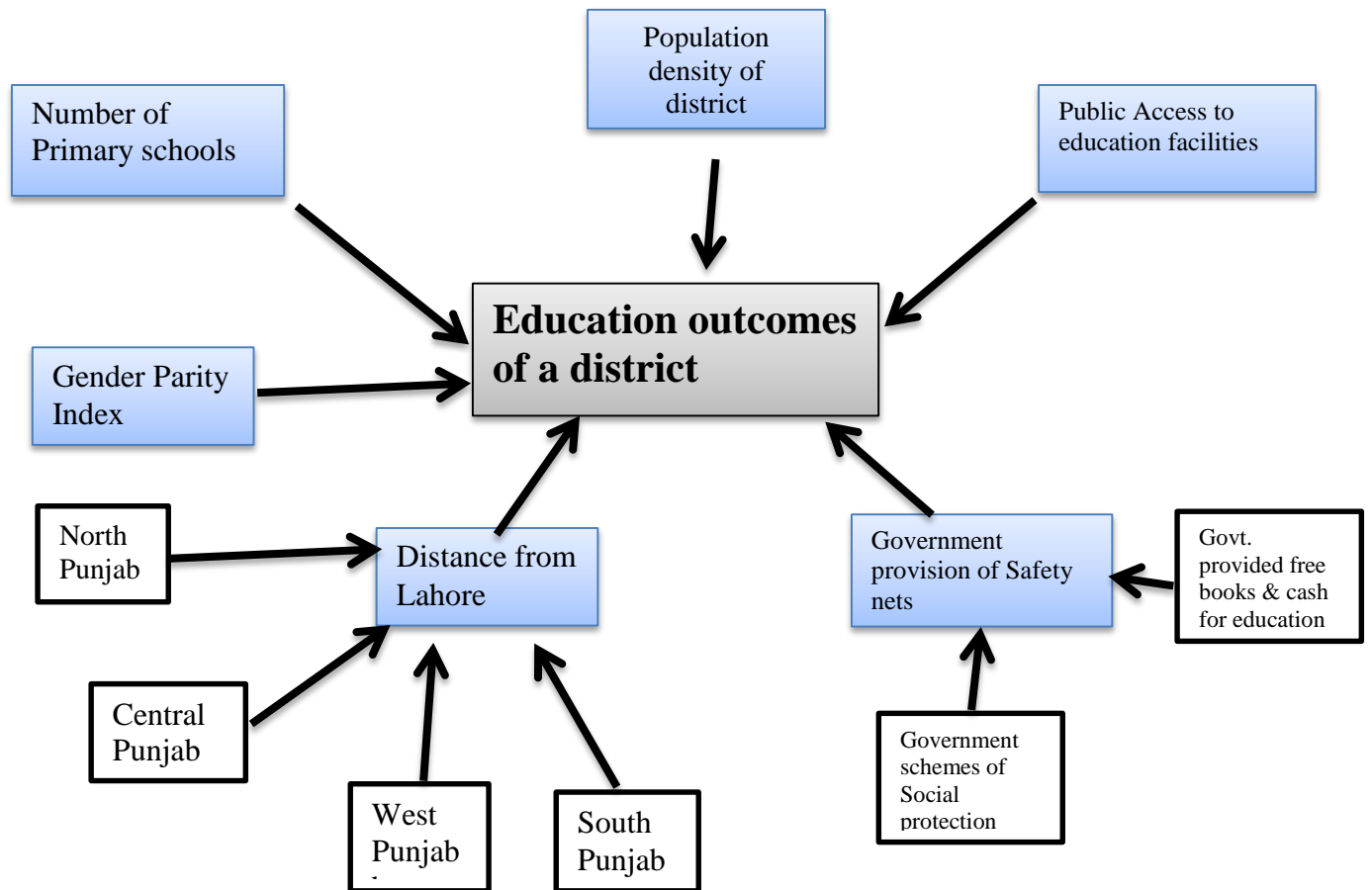
To test robustness we have also estimated the model by replacing LR with NPAR.

$$\mathbf{NPAR} = \alpha_0 + \alpha_1\mathbf{PAEF} + \alpha_2\mathbf{NPS} + \alpha_3\mathbf{PD} + \alpha_4\mathbf{GPSN} - \alpha_5\mathbf{D_iL} + \alpha_6\mathbf{GPI} + \varepsilon \quad \mathbf{3.3}$$

In equation 3.2 and 3.3 the LR represents the Literacy Rate while the NPAR represents the Net Primary Attendance Rate. The independent variable PAEF denotes Public access to education facilities while NPS represents Number of primary schools. Both the variables are meant to capture the impact of public policy towards education.

PD indicates the population density of the district which is a control variable. GPSN is Government provision of Safety nets in a district, it is expected that greater provision of these shall lead to improvements in education outcomes (measured by literacy rate and net primary attendance rate). While D_iL indicates distance of a district from Lahore, the expectation is that districts closer to Lahore would have better education outcomes (both literacy rate and net primary attendance rate) due to proximity to better education facilities. Lastly, GPI indicates Gender Parity Index which is the ratio of girl's attendance in primary schools to boy's attendance, it is expected that high Gender Parity Index in a district may lead to improvements in education outcomes (both literacy rate and net primary attendance rate).

3.8 Pictorial Presentation of Education-Model:



3.9 Data Methodology and Sources:

Data for all the variables has been obtained from MICS and Punjab Development Statistics. The following methodological sequence has been used.

- 1) Profile for health and education using descriptive statistics is developed for different regions.
- 2) Correlation among all the variables has been examined.
- 3) We have estimated regression for health and education models described earlier.

The three kind of analysis described above have been conducted at district level. To draw regional comparison the districts have been classified into four regions i.e. central, northern, southern and western regions etc. The classification of Punjab into region is borrowed from Cheema et al. (2008). The range of factors that kept in consideration, by Cheema et al. to classify the regions include geographical boundaries, official district and division borders, regional economic differences, variations in irrigations, agriculture and cropping patterns, differences in farm-size, land tenure patterns and distinct historical, cultural and linguistic influences in each region.

The regional classification of districts is given in table 3.1.

Table 3.1 Division of Punjab into different regions based upon grouping of districts

Central Punjab	Northern Punjab	Southern Punjab	Western Punjab
Faisalabad	Rawalpindi	Bahawalpur	D.G Khan
Jhang	Attock	Bahawalnagar	Layyah
T.T Singh	Chackwal	R.Y Khan	Muzaffargarh
Gujranwala	Jehlum	Multan	Rajan Pur
Gujrat		Khanewal	Bhakkar
Hafizabad		Lodhran	Khushab
M. Baha-Ud-Din		Vehari	Mianwali
Narowal			
Sialkot			
Lahore			
Kasur			
Okara			
Sheikhupura			
Pakpattan			
Sahiwal			
Sargodha			

Chapter 4 Results

4.1 Education Model-Region Wise Analysis

We have to estimate the following models:

$$\mathbf{LR} = \alpha_0 + \alpha_1\mathbf{PAEF} + \alpha_2\mathbf{NPS} + \alpha_3\mathbf{PD} + \alpha_4\mathbf{GPSN} - \alpha_5\mathbf{D}_i\mathbf{L} + \alpha_6\mathbf{GPI} + \varepsilon \quad \mathbf{3.2}$$

$$\mathbf{NPER} = \alpha_0 + \alpha_1\mathbf{PAEF} + \alpha_2\mathbf{NPS} + \alpha_3\mathbf{PD} + \alpha_4\mathbf{GPSN} - \alpha_5\mathbf{D}_i\mathbf{L} + \alpha_6\mathbf{GPI} + \varepsilon \quad \mathbf{3.3}$$

Where: LR= Literacy Rate

NPAR = Net Primary Attendance Rate

PAHF = Public Access to Education Facilities

NPS = Number of Primary Schools

GPSN = Government provision of safety nets

D_iL = Distance from Lahore

GPI = Gender Parity Index

PD = Population Density

We begin our analyses by reporting the regional averages of all the variables included in the education model.

Table 4.1 Regional averages- Variables of Education Model

Region	Education Outcome		Public Access to Education Facilities	No. Of Govt Primary Schools	Population Density	Gender Parity Index	Gov. Provision of Safety Nets			Distance from Lahore
	Net primary Attendance rate	Literacy Rate					Receiving Pensions	Getting Benefits from Govt.	Purchasing Goods From Gov. utility Stores	
	NPAR	LR					PAEF	NGPS	PD	
Center	57.75	61.88	95.8	1283.9	770.0	0.9802	5.3	17.0	8.8	136.3
North	70.25	73.25	96.8	1101.0	310.0	0.9802	22.8	16.5	30.0	288.1
South	46.71	48.86	91.1	1471.1	400.0	0.9920	2.5	14.6	6.4	364.1
West	40.14	48.71	83.8	1159.4	170.0	0.9920	5.6	9.9	11.6	402.2
Total Average (For Punjab)	53.71	58.18	91.88	1253.85	412.50	0.99	9.05	14.50	14.20	297.68
Standard Deviation	11.44	10.21	5.13	141.76	222.08	0.01	8.03	2.80	9.31	101.82
Maximum Average	70.25	73.25	96.80	1471.10	770.00	0.99	22.80	17.00	30.00	402.20
Minimum Average	40.14	48.71	83.80	1101.00	170.00	0.98	2.50	9.90	6.40	136.30

Northern region has the highest Net Primary attendance rate of 70%. The Central region has the second best NPAR of 57%. Southern region follows with a NPAR of 46% while the Western region performs most poorly with a NPAR of 40%.

Northern region has the highest Literacy rate of 73%. The Central region has the second best Literacy rate of 61% followed by Southern region with a Literacy rate of 48.86%. Here again the Western region performs most poorly with a Literacy rate of 48.71%.

Regarding public access to government education facilities, the Northern region has the highest percentage of population with access to government owned education facilities (96%). Expectedly, this is followed closely by Central region, which has the second highest percentage of population with access to government education facilities i.e. 95%. This is followed by Southern region with 91% of population with access to government owned education facilities. Western region has the least percentage of population with access to government owned education facilities (83%).

The number of government owned primary schools shows wide regional variation. Southern region has the most number of government primary schools i.e. 1471, followed by Central region with 1283 government primary schools. While the Western region has the third highest number of government owned primary schools i.e. 1159.

In case of population density, Central region is indicated as the region with most population density (770 people per square km) followed by Southern region with relatively less dense population (400 people per square km). Northern region has the third highest population density (310 people per square km). Least dense region turns out to be western region (170 people per square km).

Gender parity index looks at the percentage of females enrolled in primary schools in ratio to percentage males. In all four regions, the gender parity index hovers around .98 and .99.

Moving on to the government provision of safety nets, which are further dis-aggregated into three factors. Northern region has the highest percentage of households (22%) receiving pension which tells that more people from the region worked in government services, this could be due to higher literacy rate of the region and her proximity to the federal capital, Islamabad. This is followed by Western region with only (5.56%) and Central region with (5.31%) percentage of households receiving pensions. Southern region has the lowest percentage of households receiving pensions. In terms of getting educational benefits from government like free books, again Central and Northern regions are ahead with almost the equal percentage of households i.e. 16% receiving these benefits. Southern region has the third highest percentage of households getting these benefits (14%) while the Western region has the lowest (9%). In case of purchasing

goods from utility stores, here again Northern region is far ahead of other regions with 30% households availing these facilities. However, here Western region has second highest percentage of households availing these facilities (11%). Central region has third highest percentage of households (8%) availing these facilities while Southern region has the lowest percentage of households availing these facilities (6%).

Average distance from the provincial capital, Lahore is lowest for Central region (136 km) as Lahore is a part of this region, followed by Northern region (288km). Western and Southern regions are the most distant regions from Lahore - at an average distance of 402km and 364km respectively.

4.2 Education Model-Correlation Analysis

Moving forward, a simple correlation analysis is initially conducted on expected relationship in the described education model. The results are represented in table 4.2:

Table 4.2 Correlation results- Net Primary Attendance Rate

	<i>NPAR</i>	<i>PAEF</i>	<i>NGPS</i>	<i>PD</i>	GPI %	<i>GPSN(RP)</i>	<i>GPSN(GBFG)</i>	<i>GPSN(PGFG)</i>	<i>DFL</i>
NPAR	1.00								
PAEF	0.76	1.00							
NGPS	-0.17	-0.18	1.00						
PD	0.27	0.27	-0.06	1.00					
GPI %	0.56	0.63	-0.10	0.36	1.00				
GPSN(RP)	0.57	0.34	-0.15	-0.03	0.34	1.00			
GPSN(GBFG)	0.33	0.34	-0.10	0.27	0.07	0.05	1.00		
GPSN(PGFG)	0.54	0.26	-0.11	-0.01	0.19	0.84	-0.05	1.00	
DFL	-0.55	-0.69	0.18	-0.52	-0.61	-0.12	-0.37	0.00	1.00

Table 4.3 Correlation results- Literacy Rate

	<i>LR</i>	<i>PAEF</i>	<i>NGPS</i>	<i>PD</i>	<i>GPI %</i>	<i>GPSN(RP)</i>	<i>GPSN(GBFG)</i>	<i>GPSN(PGFG)</i>	<i>DFL</i>
LR	1.00								
PAEF	0.74	1.00							
NGPS	-0.08	-0.18	1.00						
PD	0.41	0.27	-0.06	1.00					
GPI %	0.75	0.63	-0.10	0.36	1.00				
GPSN(RP)	0.67	0.34	-0.15	-0.03	0.34	1.00			
GPSN(GBFG)	0.17	0.34	-0.10	0.27	0.07	0.05	1.00		
GPSN(PGFG)	0.60	0.26	-0.11	-0.01	0.19	0.84	-0.05	1.00	
DFL	-0.60	-0.69	0.18	-0.52	-0.61	-0.12	-0.37	0.00	1.00

The correlation matrix shown in above tables 4.2 and 4.3 suggest that public access to education facilities has a strong positive relation with both the literacy rate and net primary attendance rate, which is as expected. This is supported by the fact that Northern and Central regions enjoy the greatest access to education facilities and hence have the highest literacy and net primary attendance rates.

In contrast, the number of government primary schools has negative relation with both literacy rate and net primary attendance rate which is against expectation. This is explained by Southern region having the highest number of government primary schools, still having a very low literacy and net primary attendance rate in Punjab. Similarly, the Western region has higher number of government primary schools than Central region but a markedly lower literacy and net primary attendance rate as compared to Central region.

If we were to look at the attendance rate, literacy rate and the population numbers one would have expected greater number of government primary schools in Central and Northern regions however this is not the case as the most number of schools are in Southern region. The lesser number of schools in Central and Northern region is explained by the pupils availing private

schooling. Incidentally the Central and Northern regions are relatively well off as well (Cheema et al. 2008). The higher income levels in central and northern region allow people to avail private schooling which reduces the demand to establish government schools. On the other the number of public schools in southern and western region is relatively high, because given the poverty level prevailing in the two regions, people cannot afford private schooling. Moreover, despite the availability of government owned schools, still poverty may not allow the parent to send their children to schools. Because sending children to schools has an opportunity cost in the shape of loss of income that the children could earn. In poor households this cost could be significant. This may explain the unexpected correlation between number of primary schools and enrolment or the literacy rate.

Population density has the positive relationship with both the literacy rate and attendance rate. This is again as per expectation. Government provision of safety nets; receiving pensions, getting education benefits from government and purchasing goods from utility stores have positive relation with both variables through indirect effect on income and are again as per expectations. Lastly, both the variables are strongly correlated with distance from Lahore, i.e. as distance from Lahore increases, literacy rate and net primary attendance rate decrease.

Summarizing the correlations discussed above it is evident that all variables have expected relation with both the NPAR and Literacy rate except the number of government primary schools. A holistic look at the correlations and the regional profile suggests that relationships might be rooted in relative prosperity of a region or otherwise.

4.3 Education Model-Regression Analysis:

We have estimated the following education models:

$$\mathbf{LR} = \alpha_0 + \alpha_1\mathbf{PAEF} + \alpha_2\mathbf{NPS} + \alpha_3\mathbf{PD} + \alpha_4\mathbf{GPSN} - \alpha_5\mathbf{DL} + \alpha_6\mathbf{GPI} + \varepsilon \quad \mathbf{3.2}$$

$$\mathbf{NPAR} = \alpha_0 + \alpha_1\mathbf{PAEF} + \alpha_2\mathbf{NPS} + \alpha_3\mathbf{PD} + \alpha_4\mathbf{GPSN} - \alpha_5\mathbf{DL} + \alpha_6\mathbf{GP} + \varepsilon \quad \mathbf{3.3}$$

The results from regression analysis are presented below:

Table 4.4 Regression Results-Education Model

Variables	Literacy rate	Net Primary Attendance rate
Public Access to Education Facilities	0.471*** 0.179	0.881*** 0.315
Number of Government Primary Schools	0.002*** 0.001	0.003*** 0.002
Population Density	3.56 1.479	0.769 2.608
Gender Parity Index %	1.686 0.523	0.519 0.923
Pensioners (% Population)	0.414*** 0.203	0.1567*** 0.3590
Getting education benefits from government (%Population)	0.031*** 0.076	0.1405*** 0.1352
Purchasing goods from utility stores (%Population)	0.304*** 0.14	0.3893*** 0.2480
Distance from Lahore	-0.011*** 0.008	-0.072*** 0.0145
R2	0.91	0.87
N	34	34

*** denote significant at 1 percent level of significance, * denote significant at 5 percent level of significance and *** denote significance at 10 percent level of significance*

The estimated models explain 91% and 87% of the variation in literacy rate and net primary enrolment rate respectively.

The increase in the public access to education facilities provided by government contributes significantly towards the literacy rate and net primary attendance rate, where in case of literacy rate a one unit increase in access leads to increase in literacy rate by almost 0.47 units. The result is in line with the expectation that the literacy rate should increase with the increase in public access to education facilities. Similarly, the increase in the public access to education facilities provided by government also contributes significantly towards the net primary attendance rate where a one unit increase in access leads to increase in net primary attendance rate by almost 0.88 units. The result is again as expected.

The results show that the impact of increase in the number of government primary schools on literacy is positive and statistically significant however the size of the coefficient is relatively small - one unit increase in provision of public primary schooling leads to an increase in literacy rate by a meager 0.002 units. Similarly for net primary attendance rate, one unit increase in the number of government primary schools increases the net primary attendance rate by a meager 0.003 units. The reason for the smaller impact could be as explained earlier, under correlation analysis, the relative prosperity of certain regions and poverty of others. The prosperity in northern and central regions allow people to avail private schooling, therefore the additions of public schools does not make a large impact upon educational outcomes. On the other hand the level of poverty in southern and western regions may inhibit parents from sending their children to schools despite the increase in number of schools. This again explains the small size of the relevant coefficients.

The results show that population density positively influences education outcomes. However the relationship is insignificant. Similarly the gender parity index has positive relation with both variables i.e. literacy rate and net primary attendance which is as per expectation. But here again, the relationship is insignificant.

Regarding government provision of safety nets; receiving pensions, the results show that the increase in pension significantly increases the literacy rate as well as the net primary attendance rate which is as per expectation.

Getting education benefits from government schemes of social protection again shows positive relationship with both variables i.e. literacy rate and net primary attendance rate which is as per expectation and also statistically significant. The co-efficient of getting education benefits from government schemes of social protection in case of literacy rate is 0.031 i.e. due to an increase of one unit in the education benefits from the government, the literacy rate improves by 0.031 units. The co-efficient of getting education benefits from government schemes of social protections in case of net primary attendance rate is 0.14 i.e. due to an increase of one unit in the education benefits from the government, the net primary attendance rate improves by 0.14 units.

Purchasing goods from government utility stores again leads to increase in the literacy rate which is again as per expectation and also significant. The co-efficient is 0.30 i.e. due to an increase of one unit in this factor the literacy rate improves by 0.30 units. Similarly purchasing goods from government utility stores leads to increase in the net primary attendance rate which

is again as per expectation and also significant. The slope co-efficient is 0.38 i.e. due to an increase of one unit in this factor the net primary attendance rate improves by 0.38 units.

The distance from Lahore also shows significant negative relationship with the literacy rate which is negative as per expectation i.e. with an increase of one unit in distance from Lahore literacy rate decreases by almost 0.01 units. Similarly, it shows negative and significant relation with net primary attendance rate i.e. an increase in distance of one unit from Lahore decreases net primary attendance rate by almost 0.07 units.

Summarizing the above results it is apparent that the public access to education facilities plays a positive role in influencing education outcomes. However, the number of government primary schools weakly affects these outcomes. This as explained earlier might be related to regional prosperity or poverty. The significant positive impact of in kind social protection programs upon education outcomes reinforces the expectation that expenditure cut thus availed provide room for spending on education which improves educational outcomes. The negative relationship between distance from Lahore and the education outcomes again informs that it is basically the poverty constraint which impedes educational outcomes.

4.4 Health Model-Region Wise Analysis

We have to estimate the following model:

$$HO = \alpha_0 - \alpha_1 PAHF - \alpha_2 NBHU + \alpha_3 PD - \alpha_4 GPSN + \alpha_5 DfL - \alpha_6 PADW - \alpha_7 LR + \epsilon \quad 3.1$$

Where: HO = Health Outcome = Average of Infant and Under Five Mortality Rate

PAHF = Public Access to Health Facilities

NBHU = Number of Basic Health Units (BHU)

GPSN = Government provision of safety nets

D_fL = Distance from Lahore

PADW = Public Access to Drinking Water

PD = Population Density

LR= Literacy Rate

We begin our analyses by reporting the regional averages of all the variables included in the health model.

Table 4.5 Regional averages- Variables of Health Model

Region	HEALTH OUTCOME	Govt Provision of Safety Nets in district								
	Mortality Rate =Average of infant and Under 5 mortality rate	Public Access To health Facility (BHUs)	Number Of Basic Health Units	Population density	Public Access To Drinking Water	Receiving Pensions	Getting Benefits from Govt	Purchasing Goods From Govt utility Stores	Literacy Rate	Distance from Lahore
	HO	PAHF	NBHU	PD	PADW	GPSN(RP)	GPSN(GBFG)	GPSN(PGFG)	LR	DFL
Center	87.06	52.99	82.06	770.00	94.38	5.31	16.97	8.81	61.88	136.33
North	57.38	72.85	66.50	310.00	82.75	22.80	16.50	30.00	73.25	288.10
South	111.86	68.74	80.14	400.00	93.00	2.54	14.56	6.43	48.86	364.06
West	103.93	61.59	45.14	170.00	91.14	5.56	9.86	11.57	48.71	402.24
Total Average (For Punjab)	90.06	64.04	68.46	412.50	90.32	9.05	14.47	14.20	58.18	297.68
Standard Deviation	20.88	7.55	14.74	222.08	4.52	8.03	2.81	9.30	10.21	101.81
Maximum Average	111.86	72.85	82.06	770.00	94.38	22.80	16.97	30.00	73.25	402.24
Minimum Average	57.38	52.99	45.14	170.00	82.75	2.54	9.86	6.43	48.71	136.33

In terms of mortality rates, Southern region performs most poorly with a mortality rate of 111, followed closely by Western region with a mortality rate of 103. The Central region has a much lower mortality rate of 87, while the Northern region has the least mortality rate of only 57.

The Northern region's population enjoys greatest access to BHUs - government maintained health facilities (72%) relative to other regions in Punjab. Intriguingly, this is followed by population in Southern region, which has the second highest percentage of population with access to government maintained health facilities i.e. 68%. This is followed by Western region with 61% of population with access to government maintained health facilities. Central region has the least percentage of population with access to BHUs. But this does not mean that the central region has a weaker health infrastructure because our variable (i.e. BHUs) does not take into account access to big hospitals situated in big cities like Lahore which is part of this region. In reality the major health infrastructure in of Punjab in terms of big hospitals is concentrated in Lahore which more than compensates for lack of access to government maintained health facilities i.e. BHUs in the Central region. We would like to emphasize that the government maintained health facilities taken as a variable here are of a basic nature and cater to basic health needs only.

Looking at number of basic health units, Central region has most number of basic health units i.e. 82 followed interestingly by Southern region with 80 basic health units and the Northern and Western region with 66 and 45 basic health units respectively. The relatively lower number of units in the North may be compensated by of the region proximity to federal capital, and the availability of bigger hospitals in Rawalpindi, a populous district of the province.

The public access to drinking water has the most interesting values, where Northern region has the least percentage of population (83%) with access to drinking water and the Central region has most percentage population (94.38%) with access to drinking water. The access percentage is more or less similar in other regions but in no case this access is less than 80%.

Northern region has the highest Literacy rate of 73%. The Central region has the second best Literacy rate of 61% followed by Southern and Western regions with a Literacy rate of 48.9 and 48.7% respectively.

The remaining three variables in health model are population density, government provision of safety nets and distance from Lahore. These variables are also part of our education model. The discussion regarding these three variables under the education model in section 4.1 is also relevant here.

4.5 Health Model-Correlation Analysis

Moving forward, a simple correlation analysis is initially conducted on expected relationship in the described health model, with results reproduced in table 4.6:

Table 4.6 Correlation results- Health Outcome

	<i>HO</i>	<i>PAHF</i>	<i>NBHU</i>	<i>PD</i>	<i>PADW</i>	<i>GPSN(RP)</i>	<i>GPSN(GBFG)</i>	<i>GPSN(PGFG)</i>	<i>DFL</i>	<i>LR</i>
HO	1.00									
PAHF	0.04	1.00								
NBHU	0.01	-0.22	1.00							
PD	-0.34	-0.16	0.05	1.00						
PADW	0.05	-0.07	-0.24	0.25	1.00					
GPSN(RP)	-0.49	0.01	-0.10	-0.03	-0.49	1.00				
GPSN(GBFG)	-0.21	-0.21	0.07	0.27	0.31	0.05	1.00			
GPSN(PGFG)	-0.51	0.05	-0.16	-0.01	-0.34	0.84	-0.05	1.00		
DFL	0.42	0.37	-0.21	-0.52	-0.30	-0.12	-0.37	0.00	1.00	
LR	-0.70	-0.24	0.14	0.41	-0.06	0.67	0.17	0.60	-0.60	1.00

Table 4.6 shows that public access to health facilities, number of basic health units and public access to drinking water have a positive but weak relation with health outcome (mortality rate), which is against expectation. This is supported by the fact that apparently the Central region has the least percentage of population with access to health facilities, yet it has the second lowest

mortality rate in Punjab. This may be because the Central region comprising number of more dense districts including Lahore enjoys access to bigger hospitals, which typically are located in dense districts. Similarly, the Southern region has the second highest number of basic health units, still it has the highest mortality rate in Punjab while the Central region has the least number of basic health units has the second lowest mortality rate in Punjab. This, as stated earlier is explained by access of the region's population to bigger and better health facilities in denser districts including Lahore. A similar pattern holds in case of Northern region which has the third highest number of basic health units, however it has the lowest mortality rate which may be result of its proximity to federal capital Islamabad and its better health infrastructure. The assertion of bigger and better health infrastructure in dense districts and its impact on improved mortality rate is supported by the negative relation of population density with health outcome which is as per expectation. As most densely populated region turns out to be Central, which when combined with bigger hospitals may be cause of second lowest mortality rate. Another factor that might be contributing to lower mortality rates in the northern and central region could be the relatively higher literacy rates of the two regions – the higher literacy rate would allow people to take a proactive approach to health care and also ensure greater hygiene consciousness. Bothe the proactive approach and hygiene consciousness are likely to positively influence health outcomes.

All regions have more or less similar percentage population with access to drinking water, but in no case this access is less than 80%, which when combined with varying mortality rates across regions suggests weaker relation of mortality rate with drinking water.

Apart from the above, the remaining variables have expected and strong relations with health outcome (mortality rate). All three government provision of safety nets; receiving pensions, getting health benefits from government and purchasing goods from utility stores have negative relation with health outcome (mortality rate) through indirect effect on income which is as per expectation. In case of receiving pension, Northern region has the highest percentage of households receiving pensions while the Southern region has the lowest percentage. Table 4.6 shows that pensions are positively correlated with mortality rate. A possible channel through which pensions may be correlated with the mortality rate is the literacy rate. A higher percentage of persons receiving pensions in a region imply that more people were in government jobs from the region. This in turn informs that more people were literate in the region which is a fact. As stated earlier, the higher literacy level in the North might have contributed to better hygiene and preventive care among the households in the region. Hence, the lower mortality rate in the region. The converse would be true for the Southern region. In case of getting health benefits from government again Northern and Central regions are ahead of Southern and Western regions. These health care benefits would have contributed to lower mortality rates in Central and Northern regions. In case of purchasing goods from government utility stores, households in Northern regions have more access to subsidized goods from utility stores, the savings thus availed might have been used for obtaining better health care. Negatively impacting the region's mortality rate.

The health outcome (mortality rate) is correlated strongly by distance from Lahore, i.e. as distance from Lahore increases, so does the mortality rate which is in accordance with expectation. Average distance from Lahore is lowest for the Central region (136 km) which

may be related to second lowest mortality rate in this region due to bigger and better health infrastructure in Lahore. This is followed by Northern region (288km) and its lowest mortality rate due to bigger and better health infrastructure in Islamabad and the higher literacy rate. Western and Southern regions are the most distant regions from Lahore, at average distances of 402km and 364km respectively. This may be an indication of highest mortality rate in these two regions as they are at significant distance from bigger and better health facilities in Lahore and Islamabad located in Central and Northern regions respectively.

Literacy rate has the strongest negative relation with health outcome (mortality rate), which is as per expectation as districts with higher literacy rate were expected to have lower mortality rate due to better self-care, better hygiene and proactive approach to disease management.

Summarizing the above correlation it is evident that all variables except public access to health facilities, number of basic health units and public access to drinking water have expected relation with health outcome (mortality rate). As explained earlier the weaker correlation for public access to health facilities and number of basic health units is due to non-inclusion of bigger hospitals in our data set.

4.6 Health Model-Regression Analysis:

We have estimated the following health model:

$$HO = \alpha_0 - \alpha_1 PAHF - \alpha_2 NBHU + \alpha_3 PD - \alpha_4 GPSN + \alpha_5 DfL - \alpha_6 PADW - \alpha_7 LR + \varepsilon \quad 3.1$$

The results from regression analysis are presented below:

Table 4.7 Regression Results-Health Model

Variables	Mortality Rate	Mortality Rate
Public Access to health Facilities (BHUs)	-0.198*** 0.18	-0.131*** 0.194
Number of basic health units	0.141 0.136	0.18 0.137
Population Density	-0.35* 7.07	-.6592** 7.077
Public access to drinking Water	0.936 0.814	0.238 0.834
Pensioners (%Population)	-1.712 1.267	-0.064 1.1721
Getting health benefits from Government (%Population)	-0.464** 0.357	-0.23** 0.335
Purchasing goods from utility Stores (%Population)	-0.844 0.657	-1.208 0.7
Distance from Lahore	0.017*** 0.036	0.059*** 0.035
Literacy Rate	-0.1648** 0.676	
R2	0.760	0.61
N	34	34

*** denote significant at 1 percent level of significance, * denote significant at 5 percent level of significance and *** denote significance at 10 percent level of significance*

The estimated models explain 76% of the variation in mortality rate. The explanation of the model reduces to 61% when literacy rate is excluded as an explanatory variable which manifests the importance of literacy in explaining the mortality rate.

The results show that public access to health facilities contributes significantly towards the mortality rate where a one unit increase in access leads to almost 0.13 units decrease in the mortality rate. The result is in line with the expectation that the mortality rate should improve with the increase in public access to health facilities.

Number of basic health units provided by the government in different districts of Punjab has a positive relation with mortality rate which is against expectation. However, the relationship is insignificant. This insignificance could be, as explained earlier, due to non-inclusion of bigger hospitals in our data set. The reasons for non-inclusion have also been explained earlier. The results indicate that population density has a negative and significant impact on the mortality rate. The coefficient tells that an increase in population density by one unit decreases the mortality rate by almost 0.65 units. Public access to drinking water, a proxy for hygienic facilities, has a positive but insignificant relation with mortality rate. Government provision of safety nets; receiving pensions bears a negative but insignificant relationship with mortality rate.

Getting health benefits from government schemes of social protection shows a statistically significant negative relationship with mortality rate. This is as per expectation. The coefficient of getting health benefits from government schemes of social protections is -0.23 i.e. due to an

increase of one unit in the benefits from the government, the mortality rate improves by 0.23 units i.e. the mortality rate is reduced.

Purchasing goods from government utility stores has the expected negative relationship with mortality rate. However, the relationship is insignificant. The distance from Lahore shows statistically significant and positive relationship with the mortality rate. The relationship is as expected; i.e. an increase of one unit in distance from Lahore increases mortality rate by almost 0.05 units.

The literacy rate indicates a negative and significant relation with mortality rate which is again as per expectation and significant i.e. an increase in literacy rate by one unit improves mortality rate by almost 0.17 units which indicates how increasing education may lead to improvements in mortality rate.

Summarizing the whole above, it can be stated that public access to health facilities, population density, enjoying health benefits from government and an increase in literacy rate lead to improvement in mortality rate, while, the increase in distance from Lahore negatively affects the mortality rates. Most of the relationships seem to be rooted in literacy and prosperity or otherwise.

We have estimated augmented versions of the education and health models discussed above. The models have been augmented by including regional dummies for the different regions of Punjab. The results are shown in the appendix.

Chapter 5

Summary and Conclusion

We began this study with the objective of examining the spatial patterns of development in education and health sector across regions of Punjab. Our descriptive analysis suggests that the South and the West of Punjab significantly lag behind Center and North of Punjab in terms of both the education and health outcomes.

Our regression analysis shows that education outcomes are influenced by: public access to education facilities, number of government primary schools, social protection and distance from the provincial capital, Lahore.

This implies that not seeking education is rooted in poverty. When the poverty constraint is relaxed either by access to government schools or social protection programs, education outcomes improves. The statistical significance of distance from Lahore also corroborates this assertion, as the districts closer to Lahore are more developed with lesser poverty and hence more literate (Cheema et al. 2008). This is where the government's targeted provision of education could be helpful in improving education outcomes. One example is government of Punjab's programs like Education Voucher Scheme (EVS) wherein schools are paid for increasing attendance.

Our regression analysis also shows that health outcomes are influenced by: public access to health facilities, population density, social protection, literacy rate and distance from the provincial capital i.e. Lahore.

As in case of education, the health model also suggests relation with poverty. Relaxation of the income constraint through social protection or public access to government health facilities leads to improved health outcomes. This contention is supported by the statistical significance of distance from Lahore; as the districts farther from Lahore are relatively poor (Cheema et al. 2008), the health outcomes in such districts are also poorer. Our results also show that increase in population density positively influences health outcomes; because more people have access to better health facilities at lower per unit cost. Most importantly, importance of education in improving health is manifest by its positive impact on health outcome which indicates how imparting education can lead to better health as with better literacy in a district the population can develop better hygiene, self-care and a proactive approach to disease management. Moreover better literacy is also related with prosperity enabling people to spend more on health care.

The West and South of Punjab being most poor, policy interventions can play a major role through better provision of health and education facilities in the lagging regions. This should be supplemented by provision of safety nets in less developed and poorer South and West regions. Otherwise the inequalities in education and health outcomes highlighted in this study will only persist and may worsen in the long run.

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Appendix

Education and Health models: Inclusive of regional dummies

To explore how regional inequalities within Punjab might have influenced education and health outcomes, we have augmented our education and health models given by equation 3.2, 3.3 and 3.1 respectively by adding regional dummies for three regions, namely, northern Punjab (D1), Western Punjab (D2) and Southern Punjab (D3). Central Punjab has been used as the reference category.

The results show that inclusion of regional dummies does not materially alter the results reported in the main body of thesis in respect of health and education outcomes — the signs of all the variables which significantly influence education and health outcomes remain unchanged.

The location of a district in northern and western Punjab positively influences education outcomes while location of a district in southern Punjab negatively influences education outcomes. The results regarding health outcomes are similar, except that unlike education, health outcomes are negatively influenced, if the district is located in western Punjab.

The results of education and health models, inclusive of regional dummies are respectively shown in table A1 and A2.

Table A1: Regression Results-Education Model (with regional dummies)

Variables	Literacy rate	Net Primary Attendance rate
Public Access to Education		
Facilities	0.121* 0.344	0.654** 0.564
Number of Government Primary Schools	0.0001* 0.0009	0.0008*** 0.0006
Population Density	2.81 2.653	0.342 1.206
Gender Parity Index %	0.352 0.321	0.245 0.833
Pensioners (% Population)	0.321** 0.109	0.095*** 0.178
Getting education benefits from government (%Population)	0.011*** 0.0654	0.031*** 0.1986
Purchasing goods from utility stores (%Population)	0.208*** 0.098	0.234*** 0.1234
Distance from Lahore	-0.001*** 0.034	-0.034*** 0.0256
D1 (North Region)	0.543*	0.436**
D2 (West Region)	0.371*	0.324**
D3 (South Region)	-0.304***	-0.253**
R2	0.71	0.57
N	34	34

** denote significant at 1 percent level of significance, * denote significant at 5 percent level of significance and *** denote significance at 10 percent level of significance

Table A2: Regression Results-Health Model (with regional dummies)

Variables	Mortality Rate	Mortality Rate
Public Access to health Facilities (BHUs)	-0.116* 0.234	-0.096* 0.087
Number of basic health units	0.131 0.234	0.093 0.331
Population Density	-0.16* 9.11	-.436** 5.073
Public access to drinking Water	0.765 0.899	0.136 0.874
Pensioners (%Population)	-0.897 0.342	-0.021 0.654
Getting health benefits from Government (%Population)	-0.211** 0.653	-0.12* 0.331
Purchasing goods from utility Stores (%Population)	-0.765 0.987	-0.806 0.098
Distance from Lahore	0.009* 0.042	0.042** 0.067
Literacy Rate	-.1235** 0.987	
D1 (North Region)	-0.232*	-0.347**
D2 (West Region)	0.0521***	0.0431**
D3 (South Region)	0.224**	0.294*
R2	0.66	0.51
N	34	34

** denote significant at 1 percent level of significance, * denote significant at 5 percent level of significance and *** denote significance at 10 percent level of significance