Role of Education and Health in Poverty Alleviation
A Cross Country Analysis

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CERTIFICATE

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Allah will exalt in degree those of you who believe and those who have been granted knowledge.

(Chapter: 58, Verse: 11)

Dedicated to my

Parents and Family

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Usman Ahmed Kamal

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ACRONYMS

CPI	Consumer Price Index
CPR	Chronic Poverty Research
CPRC	Chronic Poverty Research Centre
d.f.	Degree of Freedom
EFA	Education For All
e.g.	For example (exempli gratia)
etc.	And so forth (et cetera)
et al.	And others (Et alii/alia)
FEM	Fixed Effect Method
GDP	Gross Domestic Product
GIC	Growth Incidence Curve
GLS	Generalised Least Square
GNP	Gross National Product
HIES	Household Integrated Economic Survey
Ibid.	As cited before (Ibidem)
ICP	International Comparison Program
Ids	Identifications
i.e.	That is
IFPRI	International Food Policy Research Institute
IQ	Intelligence Quotient
IV	Instrumental Variable
LE	Life Expectancy
MDG	Millennium Development Goal
NES	Net Enrollment in Secondary Education
No	Number
OLS	Ordinary Least Square
OPHI	Oxford Poverty and Human Development Initiative
PovcalNet	Online poverty calculation software of the World Bank

PPP	Purchasing Power Parity
p.	Page
pp.	Pages
SAP	Structural Adjustment Program
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization
US	United States of America
WDI	World Development Indicators
WHO	World Health Organization
$	United States Dollar
%	Percentage

ABSTRACT

A world with lots of poor is not a satisfactory situation from both social and economic perceptions. For developing countries poverty is the largest hindrance in the process of development. Any serious aspiration to reduce poverty needs to identify the factors that have strong impact on poverty reduction and are also practicable from policy perspective. Available cross country studies about poverty often discuss poverty in relation to income variables. However, level of poverty is not only affected by income growth, other factors like education and health may also affect it. The benefits of education and health are not confined to income only (direct impact). There are many other positive externalities of education and health (indirect impact), which can help to reduce poverty.

This research is an attempt to explore, does the overall education and health situation of a country have a considerable impact on poverty magnitude and what contributes more towards poverty reduction; improved education or improved health? It also tries to find out to what degree a country was efficient to utilise its education and health expenditures. This study uses data of 40 developing countries for the period of 1999-2007. In this study Data Envelopment Analysis (DEA) has been used for empirical estimation.

The study concludes three key findings. First, in contrast to trickle down theory, achieving decent or high income growth rates do not ensure poverty reduction at similar pace. Second, improvements in educational and health outcomes are strongly and negatively associated with poverty incidence. However, educational

improvements appear to be more strongly correlated with decline in poverty headcounts as compared to health improvements. Third, efficient use of public expenditures (education expenditure and health expenditure in our case) not only results in improved educational and health outcomes (net secondary enrollments and life expectancy in our case), but it also permit a rapid poverty alleviation and improved income inequality.

Therefore, economic policy in developing countries, without neglecting income growth shall primarily focus on efficient use of public expenditures of education and health to ultimately achieve the goal of poverty alleviation.

CHAPTER 1

INTRODUCTION

Generally economic enquiry has to address the socioeconomic problems faced by human beings and look for their optimal solutions. In the literature 'poverty' has been considered as one of the most important problems of developing countries. In fact poverty is a complicated, multidimensional and greatly discussed issue throughout the world. There is ongoing debate on poverty from different angles since a couple of decades. Some of core concerns are, why does poverty exist throughout the world? What is happening to the poor of the world? How poverty can be reduced? Particularly, when someone talks about globalization, economic growth and living standards, then one also talks about poverty.

There are many definitions of poverty. For example, 'poverty is a situation in which a person has such a low income that he/she cannot avoid starvation' or 'poverty is a situation in which a person cannot fulfil his/her basic needs for living'. However, irrespective of semantic differences, by all definitions poverty is a despondent and miserable situation. Poor of every society experience the lowest utility band of that society. People living under poverty line are unable to fulfil their basic needs, such as essential nourishment, basic health and education. The biggest obstacle in improving the living standard of a person is poverty. Expansion in the earning of poor leads to better nutrition plan, improved health and better education and in turn better health and education help poor to earn more.

Poverty has been a continuous part of every society although with a difference in its incidence. Available literature on poverty indicates that high poverty rates can disturb the development process of a country in a number of ways. "No society can surely be flourishing and happy, of which by far the greater part of the numbers are poor and miserable" (Adam Smith 1776). Focus given towards poverty in recent decades by global bodies, such as the World Bank and United Nations Organisation, shows the grimness of this issue. Many poverty reduction programs have been practiced in recent decades by developing countries with the assistance of international organizations. At the Millennium Summit (2000) a Millennium Development Goal (MDG) was setup by the World Bank and United Nations Organisation to halve the extreme poverty till 2015 from its level of 1990[1].

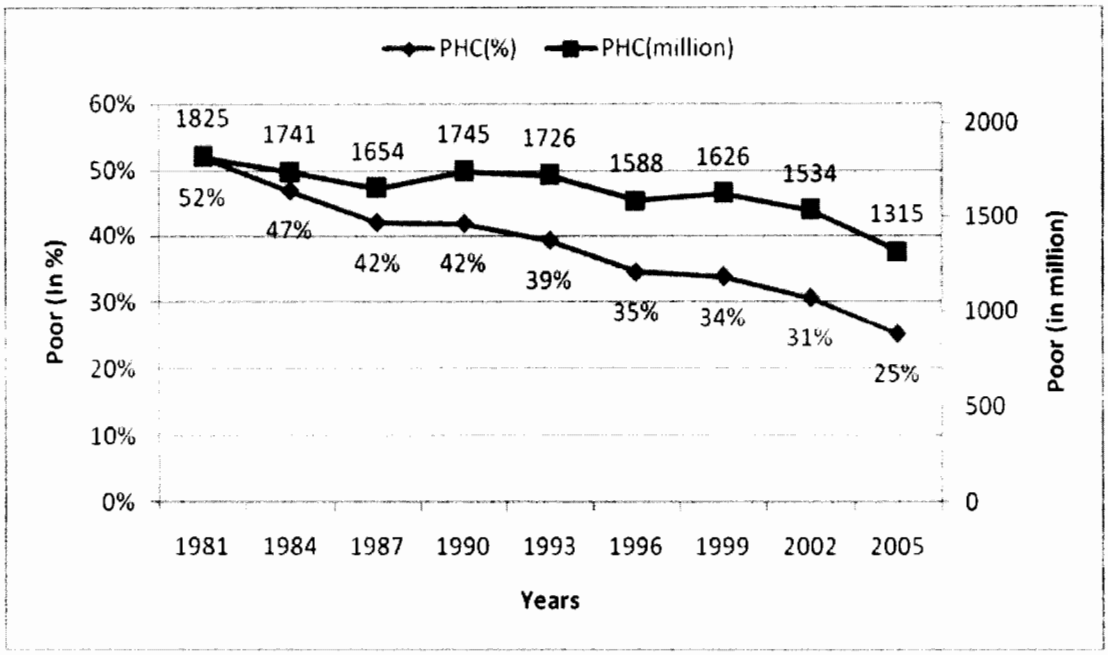
In the World Development Report of 1970s accumulation of physical capital was focused more to reduce poverty as compared to improvement in education and health. However, World Development Reports 1980s and 1990s uttered that improvements in health and education are important to promote growth in the incomes of poor people.

A reduction in poverty figures is commonly considered as a progress measure for developing countries. According to WDI (2008) anti-poverty programs are effectively resulting decline in poverty level bringing poverty at half of the level in 1990 as set by MDG. However, there are many serious concerns regarding this claim of success. For example, the achievement in poverty alleviation is not homogeneous throughout the world and elimination of widespread poverty is still a tough goal to

[1] Detailed elaboration of MDG goals is available at http://www. developmentgoals.org

achieve for many countries. Latest available estimates of the World Bank about poverty till 2005 reveal that about 25% of population is extremely poor around the world. One out of each four people is poor on the globe. Following figure explains change in the average incidence of poverty between 1981 and 2005 for 116 countries:

Figure 1: Incidence of Poverty (116 countries, at 1.25 US$ per day/person)



* Sources: "PovcalNet", available on the World Bank web site http: //www.worldbank.org ;
Author's calculations

We can see in figure (1) that during a period of 24 years poverty declined almost 26% (more than a half). When we look at the actual number of poor instead of percentage of poor, the situation seems sluggish rather than optimistic. In Figure (1) percentage of poor has declined continuously. However, actual number of poor showed mixed performance as these numbers increased instead of decreasing between 1990 and 1999. According to the population estimates given by World Bank for these

116 countries in 1981, total population of these countries was approximately 3504 million, which elevated up to 5205 million in 2005. Using these figures, numbers of poor were 1825 million in 1981 and 1315 million in 2005[2]. It shows that the number of people under poverty actually fell by 510 million since 1981. Thus, in numbers, achievement is even lesser than 1/3rd since 1981.

1.1. Problem Statement

Above stated overall figure describes only a part of the situation of poverty in the world. Rate of poverty reduction is not equal across countries. Some countries experienced high rates of poverty reduction in the past few years while many countries were unable to practice a considerable decline in poverty indices. Moreover, poverty reduction rates were also not constant for many countries during last decade. These differences of poverty alleviation rates among countries or within country over time, could be the results of different factors effecting poverty indices.

When any one thinks about poverty, one certainly comes across two basic questions. First, why the people are poor? Second, how poor can get rid of poverty? To have an appropriate solution for poverty we have to know the answers of certain basic questions. For example, does growth rate of per capita income influence poverty? Does distribution of realised income growth address poverty? Whether income growth could be pro-poor or anti-poor? Does the difference in the earning

[2] Author's calculation, by using World Bank estimates of population and incidence of poverty from the above mentioned data source.

ability of the low income and the high income groups cause poverty? Thus, empirical investigation about plausible poverty determinants is indispensable.

Many publications of the World Bank highlighted the significance of income and income inequality in relation with poverty. A lot of work has been done on the poverty throughout the world using income based variables, but poverty is not confined only to income or income differentials. In different studies high rates of income growth has been discussed as possible solution for poverty. However, realisation of high growth rate itself cannot provide solution for poverty until it warrant equable poor's share in it. If one ascertains on the basis of empirical findings that income variables explain only a part of poverty alleviation then there is a need to explore other possible factors affecting poverty, e.g. education, health etc.

1.2. Objectives and Hypotheses

By assuming that poor do not want to remain poor and others have to help them to escape from vicious cycle of poverty, the international organizations like World Bank and United Nations predominantly focus on income growth to alleviate poverty. Most of the time policy makers follow the goal of higher per capita income or reduction of income inequality to achieve the objective of poverty alleviation. However, education level and health of the earning person in household is an important factor for poverty risk (risk of being or becoming poor) not only for himself/herself but also to his/her family. As better education and health may effect the earning of a person positively, therefore estimates of educational and health related variables will be of much use for anti-poverty policy perspective. The prime

intention behind this study is to explore, does the overall education and health situation of a country have a considerable impact on poverty magnitude?

Thus, the study will test the following hypotheses:

1. Income growth affects the incidence of poverty
2. Improvements in education and health reduce poverty
3. Education is more effective than health to reduce poverty
4. Efficient use of public expenditures on education and health leads to poverty reduction

1.3. Significance of the Study

Generally, a theory is validated from empirical evidence and the empirical estimation requires theory as foundation of hypotheses. Therefore, this study is based on both theoretical discussion as well as empirical analysis. The study is distinctive because it investigates education and health as determinants of poverty in addition to the conventional income based determinants. Absolute poverty is a fundamental barrier to the development, particularly for the developing countries. Developing countries are spending huge funds with the coordination of international organizations in the pursuance of poverty alleviation. An effective and less expensive policy for poverty eradication is crucial as public resources are not unlimited. Ascertaining the efficiency of different countries to combat poverty will help us to identify the key factor in poverty reduction. These findings will also help us to come forward with appropriate policy recommendations.

A world with lots of poor people is not a satisfactory situation from both social and economic perspectives. Pakistan is also one of those developing countries which have to deal with the evil of poverty. The central motivation to work on this issue was the yet unresolved poverty problem in developing countries like Pakistan. In the literature of economic development it is a prominent view that poor have some common characteristics which make them stay poor, usually known as "poverty trap". Therefore, useful results can be obtained by analysing the collective data set of different countries. The results from cumulative experience of developing countries in recent years can provide us a better track to address the problem of poverty.

1.4. Structure of the Study

In chapter 2 relevant literature has been reviewed starting from theoretical work to empirical studies. I have mentioned the methods and techniques used for studies by different authors and the results they presented.

Chapter 3 includes discussion on conceptual framework of the study in detail. In this chapter I have discussed universe of the study, selection of variables, collection of data and methods of investigation.

Chapter 4 deals with estimations, results and their interpretations.

Chapter 5 presents the conclusion of the study and provides some policy recommendations for poverty reduction programs.

The study ends with references and other relevant information provided in appendices.

CHAPTER 2

LITERATURE REVIEW

There is a vast literature on poverty, which can be classified into theoretical and empirical approaches. In theoretical approach the discussions are mostly about the nature, types and different aspects of poverty. Whereas in empirical literature more focus has been given to find out the evidence for the relationship of poverty and underlying variables from observed statistics. Literature can also be divided on the basis of micro and macro level approaches. In micro level studies primary data is used. However, macro level work mostly used secondary data.

2.1. Concept of Poverty

In reality there is no common definition of poverty for which every one agrees. Although definitions differ on what has to be considered as basic human needs, yet central meaning of poverty in all the definitions revolves around the "lack of fulfilment of basic needs". A combination of wide range of aspects and situations of life together constitutes poverty (Mikkelsen 2005). Poverty has many dimensions, for some it is purely an economic matter, for others it has social aspects too. Social point of view can be further divided into sub categories, for example, political and psychological poverty, etc. Sen's work (1992, 2001) widened the view of poverty beyond financial deprivation. Lack of education or poor health can limit capabilities

of individuals. Hence, people not enjoying education or health are to be considered as poor.

Ellis (1984) attempted to describe different types of poverty by using a causal relation to community. She examined poverty in relation to a model of causes affecting the welfare of a community. She suggested that one can operationally distinguish four major dimensions of poverty, namely economic, social, political and legal poverty. Some further social aspects of poverty were also discussed. She stated that the classification of poverty in different types will help to understand problems faced by the community. She further argued that distinguishing the various types of poverty will make easy to identify the areas where actions are needed.

Even within the economic notion, ideas of absolute and relative poverty exist. By using different meanings and concepts of poverty we may come across diverse methods of calculating poverty resulting in dissimilar estimates. From social point of view it is implicit that poverty is lack of resources, lack of access to education and health care, lack of access to clean drinking water, un-fulfilment of needs and little or no opinionated representation. On the other hand economic poverty means having no or few financial resources to fulfil basic requirements of daily life. It is a difficult task to quantify social aspects of poverty for measurement purposes. Therefore, economic measure of poverty is used frequently for empirical research.

Ravallion (2001) explained the techniques used by the World Bank to measure poverty. He described that the selected common poverty line (1 US$ a day) is typically prevailing poverty line of low income countries. Then he further explained that this poverty line has been converted to local currencies for consumption surveys

by using purchasing power parity (PPP) exchange rates. He stated that World Bank uses the best available consumer price indexes to convert the international poverty line in local currency. He also discussed some other measures undertaken by the World Bank while doing poverty surveys.

In another effort Ravallion (2003) explained how different measures or variables used for poverty can lead to dissimilar results and if the approaches are different then these results are not legitimate enough to deny opponent's findings. He also stated that even the difference of data sources can also lead to different findings due to the diverse techniques and methods used for data collection. According to him as incomes of people rise, societies naturally tend to adjust their views about minimum acceptable standards of living. This revision of people's notion asks for a comparable rise in poverty lines.

2.2. Income Growth and Poverty

A comprehensive meaning of income in literature is "the consumption and savings opportunity available to an entity usually expressed in monetary terms" (Barr 2004). At aggregate level GDP means domestic income and GNP means national income. People are considered poor when they do not have enough income to fulfil their basic needs. Individual's income plays a key role in his/her poverty status when we consider the economic measure of poverty either absolute or relative because in both approaches the premise behind the measurement is income or expenditure. We can say that same is the case with GDP and GNP per capita of a country at aggregate level with regard to country's poverty echelon.

Impact of growth on poverty mostly depends upon how this growth has been shared by the population of a country. If the most part of the economic growth is received by the rich then even high rates of growth will not reduce number of poor to large extent. It is logical to consider that an income growth will help less to reduce poverty in the presence of higher income inequality whereas income growth will help more to reduce poverty if income inequality is lesser in the society. Similarly if income inequality is rising as income grows then this income growth will not help the poor of that country.

Empirical studies reported mixed evidence regarding impact of growth on poverty incidence. Some studies exhibit robust poverty reduction effect of growth while others show slightest impact of growth on poverty. Pro-growth proponents are of the view that an increase in the per capita income of a country will ultimately leads to a decrease in the number of poor by increasing the income of individuals and vice versa. It is a familiar notion in literature that higher growth rates of per capita income ultimately leads to poverty reduction. On the other hand it is also a view that observed per capita income growth rates are not entirely capable of achieving the goal of poverty alleviation. The growth can even be anti-poor as happened in some countries (see literature review). For this reason some of the pro-growth proponents consider growth as a necessary condition but not the sufficient condition for poverty alleviation. Generally, growth rate of per capita income has been given a central objective status in poverty reduction programs throughout the world. However, countries experienced poverty reduction through economic growth in fact focused on the productive use of labour, the only asset owned by the poor (Squire 1993). This

finding clearly states that only pro-poor growth can help to reduce poverty significantly.

Some studies using regression analysis suggest that there is strong association between growth rates of average living standards and rates at which absolute poverty reduces e.g. (Ravallion and Chen, 1997)[3]. Similar type of negative relationship between poverty and growth was suggested by Ravallion and Datt (1996) and Ravallion and Datt (2002).

Besley and Burgess (2003) discussed the poverty trends on global scale. They showed where the poor are located on the globe and how their numbers have changed over time. They also discussed the relationship between poverty and per capita income by using regression estimation. Their findings showed that increases in income per capita are associated with reductions in poverty. They concluded that prevailing economic growth rates by themselves are not enough to cut the poverty by half in much of the world.

Amjad and Kemal (1997) did a time series analysis of poverty estimates for the period 1963-64 to 1992-93 for both the rural and urban areas of Pakistan. They used HIES survey data for analysis. They also examined the influence of macroeconomic policies and the effects of Structural Adjustment Programs (SAP) on the poverty levels. Their study suggested that the high growth rates explain the changes in poverty over time.

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[3] Ravallion and Chen (1997) used income or expenditure as welfare indicators, where income denotes household income per person, and expenditure denotes household expenditure per person.

Demery and Squire (1996) analyzed six African countries for the relationship of poverty with growth and income inequality. They checked growth effect on poverty by holding inequality constant and then they checked inequality effect by holding growth constant. They found that in all the countries growth was more effectual toward incidence of poverty as compared to inequality. They suggested that to help the poorest of poor more economic reforms and investment in human capital is essential.

On the other hand there are serious concerns whether focusing on growth promise to help the poor of country or not. Some studies show that economic growth does not guarantee adequate reduction in poverty as in case of some countries it has been observed. The World Bank's intervention to reform agriculture in the Philippines has resulted in anti-poor outcome even the rate of economic growth was satisfactory in the Philippines during that period (Borras et al. 2007). Gunetilleke (2000) reported that in Sri Lanka poverty reduction rate was below than expected at the observed rate of economic growth. These findings require careful analysis of poverty and growth.

Mujeri (2000) focused on trends in poverty headcount and growth during the period of 1983 to 1999 in Bangladesh. His work highlighted the effects of structural adjustments and economic reforms on poverty. He stated that the overall incidence of poverty in the country has been declining at the rate of less than 2% per year. He concluded that "along with a high growth rate, structure of (the) economic growth is (also) important which determines the mechanisms through which benefits of growth are transmitted to the poor". He further argued that "pro-poor economic growth can enhance income of the poor with direct impact on income poverty".

A recent work of Duclos and Verdier-Chouchane (2010) analyzed growth status of Mauritius and South Africa from anti-/pro-poor point of view. They said conditions are very different in both countries as South Africa has high income inequality and Mauritius has low income inequality as compared to other African countries. They demonstrated that due to patterns of income inequality, growth in South Africa has been anti-poor relatively over the period of 1995-2005. On the contrary, growth was absolutely pro-poor in Mauritius over the period 2001-2006.

Empirical evidence suggests that experiences of growth and poverty reduction vary from country to country. The above mentioned literature shows that income growth may or may not reduce incidence of poverty at same or adequate rate. The role of economic growth in poverty alleviation depends upon how anti-/pro-poor is the growth?

Following literature deals with literature on education and poverty as well as health and poverty.

2.3. Education and Poverty

Education means acquiring knowledge and skills. Formal education, usually known as schooling, is a process of transferring the knowledge and skills from one generation to another. Education process can be classified in many divisions starting from very basics of reading and writing to most sophisticated spheres of scientific knowledge and skill. Earning ability of individuals depends upon individual's IQ level, education, skills and accessibility of earning opportunities. Earning or return on education can be in terms of services, goods or financial means. The amount of return

on education depends upon the nature and quality of the required skills and knowledge.

People having knowledge and skills are commonly known as human capital and basic source for acquisition of human capital is formal education. According to human capital theory, education is an investment decision made by individuals, which will help them in future to get returns. In literature it has been argued that economic role of education or human capital is to foster the economic growth by increasing income of masses. Empirical evidence exists in favour of the view that higher the human capital, higher will be the growth rate of income. This is also correct for an individual who earns comparatively more than his/her fellow being who is relatively less educated. Different rates of return for different schooling levels have been calculated throughout the world. These rates vary from region to region depending upon various factors[4].

Shirazi (1994) investigated about the incidence of poverty and the socioeconomic profiles of the poor in Pakistan. He also tried to explore the possibility of poverty alleviation through *Infaq* using *Zakah* and *Ushr* collection. He revealed that in Pakistan "the proportion of poor households having highly educated heads is extremely low (and) majority of the educated heads of the poor household falls in the primary or below matriculation category of education". He also

[4] In his introduction to the *Wealth of Nations*, Adam Smith (1776, p. 1) states that the proportion between the annual produce of a nation and the number of people who are to consume that produce depends on "the skill, dexterity, and judgment with which its labour is generally applied."

demonstrated that "as the educational level of the head of the household increases the probability of that household being poor decreases".

Goh, Luo and Zhu (2009) investigated the effect of attained education on poverty during the period of 1989-2004 in eight provinces of China. Their finding was that education played an increasingly important role in household income determination for both urban and rural areas. Income gaps have increased between households with more and less human capital endowment.

Fafchamps and Quisumbing (1999) investigated whether human capital affected the productivity and labour allocation of rural households in four districts of Pakistan. They used survey data collected by International Food Policy Research Institute (IFPRI). Coefficients estimates for different equations were calculated by using regression method. Their results showed that "education raises off-farm productivity and induces rural Pakistani households to shift labour resources from farm to off-farm activities. This effect is strong, robust, and demonstrated via both the direct and indirect methods".

Maitra (2000) compared two data sets from South Africa to examine the effect of household characteristics on poverty and living standards. He estimated the results by using quantile regression. He concluded that a household, where the head has more than secondary school education, performs significantly better than all other households where the heads were comparatively less educated.

Gundlach, Pablo and Weisert (2002) studied the relationship between education and income inequalities. They utilized OLS and IV regression methods to estimate coefficients. According to their findings, "education seems to improve the

income distribution and thus may allow the poor to benefit from growth to a greater extent". Due to this effect of education they argued about the justification of a focus of economic policies on education to reduce poverty and to speed up development.

Sylwester (2000) used data of many countries to examine empirically whether allocation of more resources to education can affect the distribution of income within a country. His findings showed that public education expenditures appear to be associated with a decrease in the level of income inequality. He suggested that spending on education may be one way to reduce the level of income inequality.

Datt and Ravallion (1998) in their paper on selected set of Indian states showed that "differences in trend rates of poverty reduction among states are attributed to differing growth rates of farm yield per acre and differing initial conditions". They hold the view that initial advantages of better human resources were major reasons to observe significantly higher long-term rates of poverty reduction.

Despite the possible difficulties in quantifying the real contribution of education to economic growth (Mitch 2005), education has always been considered a dominant tool for reducing poverty through productivity enhancement which is also a key factor for the sustainable economic growth. Easterly and Levine (2000) have shown that productivity growth explains most of the economic growth of developed countries and capital accumulation explains only a small part. Although total factor productivity relates to labor, land and capital, yet the role of labor productivity is more important than all other factors of production. Education and skill promote

labor productivity and consequently labor productivity positively influences the productivity of other factors of production.

Poverty is correlated with a range of family background variables including parental education, which also influences children's educational outcomes (Berg 2008). Chronic Poverty Report (2004) of CPRC referred to evidence showing that formal education has been strongly associated with decreased possibility of chronic poverty. It also indicated that the level of schooling, at which this might happen, can vary between countries. Chronic poverty reports showed that low education is one of key factors to keep people poor over the decades or lifecycle (CPR, 2008). Our concern here is absolute poverty so we will not discus literature of chronic poverty as it requires addressing a vast area of non-quantitative aspects of poverty and other social variables.

It is commonly known that absolute poor of developing countries usually have low or even no education. According to EFA (2007) report the children most likely to be out of school or to be dropped out, live in rural areas and come from the poorest households. The underlying aim of Early Childhood Care and Education program was to provide strong foundation in early childhood to escape from poverty in future.

Geda *et al.* (2005) tried to explore the determinants of poverty in Kenya by using household data. They revealed that among all the variables "in all models the most important determinant of poverty status is the level of education. Lack of education is a factor that accounts for a higher probability of being poor".

Londoño (1996) suggested that inadequate education was the most important factor holding back Latin American economic growth and thus sustaining high levels

of inequality and poverty. He came to conclude that improved education can bring a large and relatively quick reduction in poverty due to its effect on individual's earning and growth.

Freeman (2003) used pooled time series data to examine the relationship of poverty and the macro economy in different regions of United States. He suggested that poverty solution has less to do with macroeconomic conditions and more to do with changing the characteristics, such as the skills and education levels, of the poor population itself.

Harper, Marcus and Moore (2003) provided a comprehensive review of the literature on poverty reduction. Their discussion covered a number of key social processes which can affect poverty. They also highlighted the significance of education as a means of poverty reduction. They argued that a good quality formal education widens horizons and increases future employment opportunities. They concluded that education can facilitate upward economic and social mobility, a better-paying and safer job and general wellbeing. Their conclusion confirmed the importance of education in breaking different aspects of poverty cycles ranging from individual earning to parental and family effect.

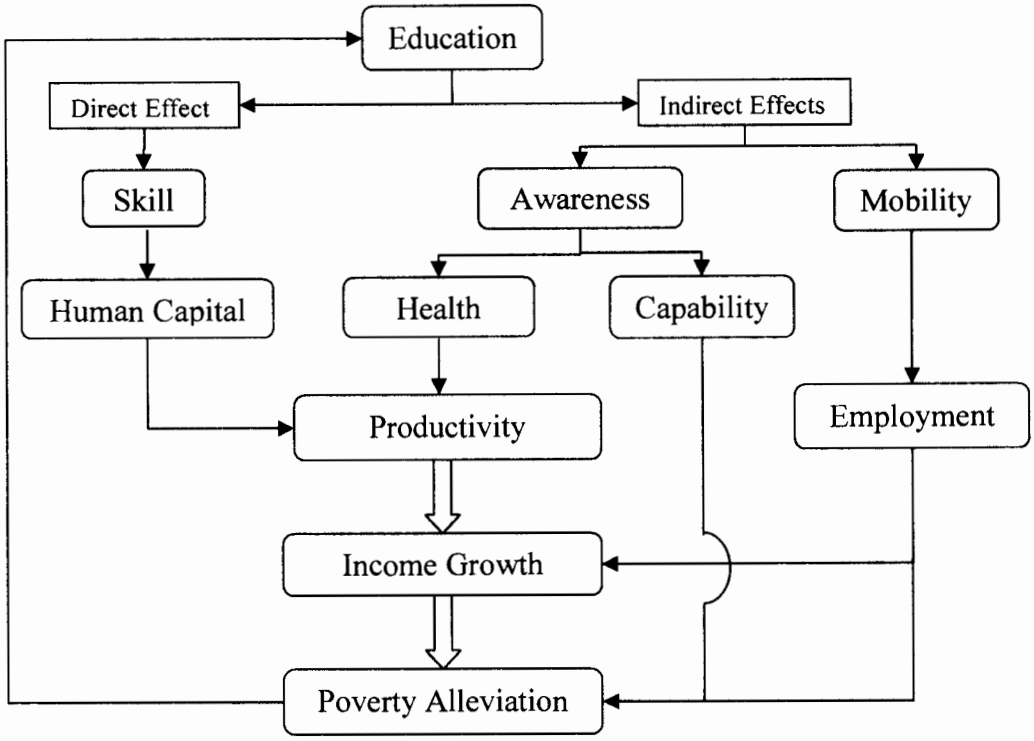
Berg (2008) mentioned that "throughout the world it has been found that the probability of finding employment rises with higher levels of education, and that earnings are higher for people with higher levels of education". According to Berg (2008) "this connection between education and poverty works through three mechanisms. Firstly, more educated people earn more. Secondly, more (and especially better quality) education improves economic growth, economic

opportunities and incomes. Thirdly, education brings wider social benefits that improve economic development and especially the situation of the poor, such as lower fertility, improved health care of children and greater participation of women in the labor force".

Verner (2004) used the education and poverty data of Paraíba and the Northeast Brazil for the period from 1981 to 1999. By using probit analyses he revealed that to break the intergenerational transmission of poverty, education sector needs extensive actions. Low quality education leads to low income, which in turn perpetuates poverty. He concluded that education attainment is the single most important poverty reducing factor. All levels of education from primary to tertiary are significant and negatively associated with the probability of being poor.

Education influences both the ability of the individuals to earn income and their decisions which increase the probability of success in lifetime. Literature supports the view that these direct and indirect benefits of education result in changes in people's behavior and this behavioral change inevitably has an impact on overall level of poverty. Thus, direct and indirect impacts of education on poverty can be illustrated in the following flow diagram:

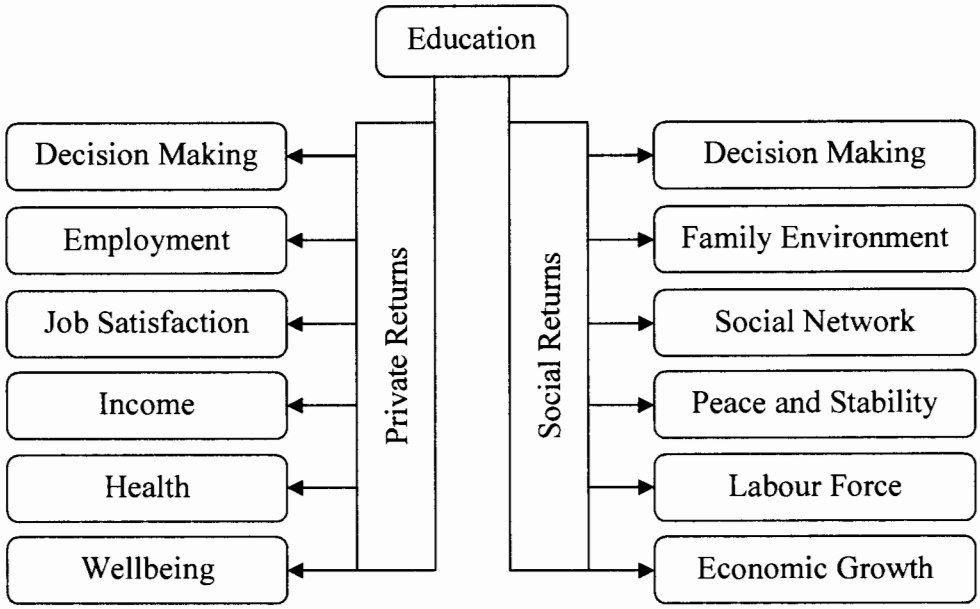
Figure 2: Impact of Education on Poverty Alleviation



From another but similar point of view education pays-off through both private and social returns. A distinction between private and social returns to education is that private returns refer to benefits received by the individual who acquires the additional schooling and social returns refer to benefits gained by society from individual's schooling. Private returns include economic benefits such as higher lifetime earnings, lower levels of unemployment and greater job satisfaction. They may also include consequences such as improved health and longevity. According to human capital theory schooling raises earnings because it enhances workers' skills thus making employees more productive and more valuable to employers. Riddell

(2004) believed that strong positive relationship between education and earnings is one of the most well established relationships in social science.

Figure 3: Private and Social Returns of Education



As discussed previously education can impact poverty in many ways other than improving human capital. There are a number of externalities of education and these can help poor to get out of poverty status. For example, reading ability can help to understand instructions on a medicine or on a fertilizer bag or even a general health care notice in newspaper. Obviously, instructions on medicine will help to be healthy and instruction on fertilizer bag can help to increase output of an agriculture farm. Similarly, a basic analytical skill may help a person to compare different price packages in market and to prefer one according to his/her need. An educated father prefers education for its next generation due to its realized importance (Harper,

Marcus and Moore 2003). These are few examples out of many externalities of education and there are many more externalities which have been discussed widely in the literature on human capital. It can be concluded that income effect and externalities of education help people to improve their life patterns in a number of ways and then these improved patterns help them to get rid of poverty.

These discussions lead to two conclusions. First, education can increase the earning of individual by enhancing the productivity and thus can significantly help to reduce poverty. Second, the impact of education on poverty does not work only via income or productivity mechanism (direct impact) but also via a number of externalities (indirect impact), for example through reduced infant mortality, better decisions, improved health and parental education, etc. These conclusions suggest "education" as a key variable in poverty alleviation.

Following literature focuses on the relationship between health and poverty.

2.4. Health and Poverty

According to World Health Organization (WHO) health is defined as "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity"[5]. In general, health is the level of functional and metabolic efficiency of human being. This efficiency is sometimes measured in terms of health condition of human being like Bio Mass Index (BMI). However, for health related

[5] Official Records of the World Health Organization, no. 2, p. 100.

analysis at country or global level different types of health measures are used in empirical studies, e.g. life expectancy, mortality rates, etc.

Better health is supposed to increase working and intellectual capabilities of people. Health is a vital element of human capital and is considered as requirement for increase in productivity of labour. Physical capability to do work depends upon individual's health status. Healthy workers are more productive and they can work for more hours of work per day as compared to unhealthy workers. This higher productivity and ability to do work more help individuals to earn more than others. Healthy people usually live longer than the sick people. It means they will have more life time to generate income.

Todaro and Smith (2007: 397-403) stated that improved health also affects school performance and healthy people can benefit society in many ways. Healthy children are usually better in learning and they do not need to be absent from school or colleges due to sickness, which results growth and improvement in human capital of society.

Squire (1993) in his analysis reviewed the efforts done to reduce poverty in developing world. He compared empirical statistics and there was no estimation model used to observe the affects of social indicators such as health and education on the poverty. He used country and regional figures of poverty headcount, growth and health measure to compare them. He drew three conclusions; 1) Economic growth should be encouraged to induce productive use of labour so that poor can earn to get rid of poverty, 2) Public spending is an important source to improve health and

education attainment of poor and 3) Provision of subsidized social services is better than direct cash transfer.

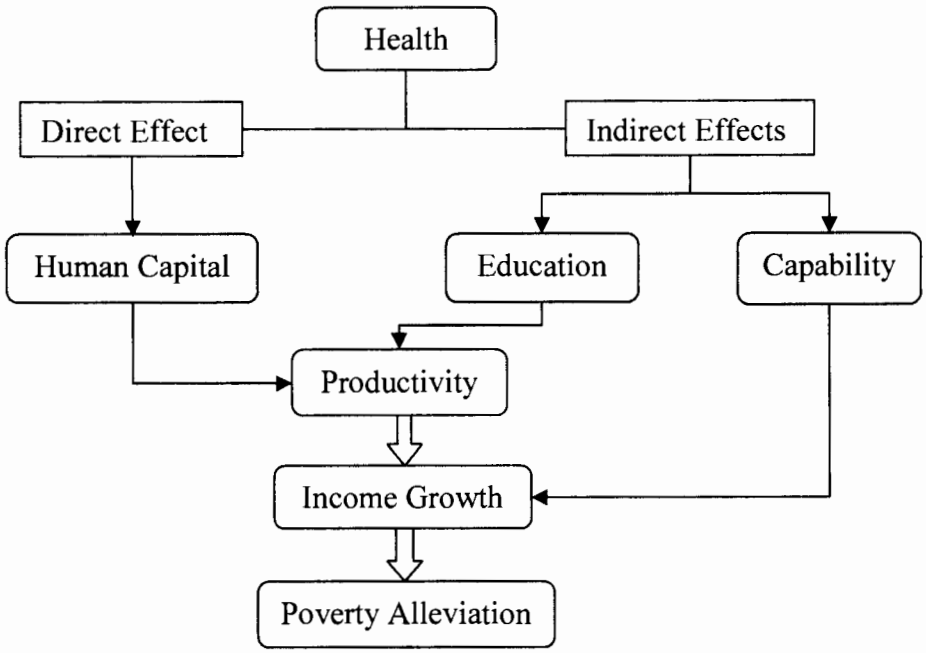
Gunetilleke (2000) discussed health and education related policy framework and achievements of Sri Lanka. He did descriptive analysis of the present situation of Sri Lanka regarding selected social variables like quality of life, public expenditures and poverty. He stated that difficulties in accessing education and health facilities hindered people to gain advantages of improved education and health. Access of poor to education and health was one of his suggested priorities to reduce poverty effectively.

Lawson (2004) used Uganda's household panel data to investigate how ill health influences poverty status of poor. He used logit and probit regressions to obtain results. He found that ill health and long term sickness is associated with people moving into poverty. He further found that ill health is also causing reductions in assets like land and livestock because poor have to sell their assets to face ill health.

Godlonton and Keswell (2004) examined the impact of health status on poverty status of family in South Africa. They used body mass index as proxy of health and found that family with more unhealthy (underweight) individuals are likely to be income poor. They stated that households having unhealthy heads are even more likely to be poor. He also stated that these findings are invariant to the choice of poverty line.

Keeping in view the above literature we can illustrate different health attributes, which can affect poverty, in the following figure:

Figure 4: Impact of Health on Poverty Alleviation



Thus, health is another important factor affecting the income of poor. In literature of health economics a view has been developed that weak health conditions limit the capacity to do work. In addition, low health conditions in itself are considered as an aspect of poverty in broader concept of poverty.

Above discussion suggest that improved health can impact earning of individuals positively through different ways and consequently help them to escape from poverty. Therefore, health is an important asset, especially for poor people as most of poor people can earn only by providing labour.

CHAPTER 3

CONCEPTUAL FRAMEWORK

This chapter deals with the universe of the study, selection and justification of variables, collection and compilation of data as well as discussions regarding the methods of estimation for empirical analysis of data set.

As discussed before, claims exist in favor of both theories that economic growth helps the poor and may not help the poor to overcome the problem of absolute poverty. Another important concern is that whether the acquired growth is benefiting the poor or not. Same growth rate of per capita income can impact poverty to different extent in different countries depending on who is ultimate gainer of economic growth. If economic growth is anti-poor then it will not have a considerable impact on poverty reduction no matter how high is the rate of growth. On the other side a pro-poor growth can effectively reduce the poverty even if rate of growth is not very high.

Governments spend their revenues on both education and health as a part of public expenditure. Public spending on education and health reflects that how much a government is emphasizing on human development within a country. However, governments cannot increase these public spendings to an unlimited level as the revenue resources of governments are scared and choices have to be made to use these resources efficiently. In this scenario, along with the "amount" of reserved funds for public spending the "efficient use" of funds is equally important.

3.1. Universe of the Study

World Bank has classified all the world countries on the basis of their incomes in four groups, namely low income, lower middle income, upper middle income and high income countries. This study includes all the countries except high income countries, because absolute poverty is not a big issue in rich countries. Thus, a set of 40 developing countries (see appendix 1), for whom data requirements are fulfilled, is selected as a sample. Constraint of data availability restricted us to select 40 developing countries and to use data of 9 years from 1999 to 2007. Particularly, proxy variable of education i.e. net enrollments in secondary education was available only since 1999 to 2007. Details of data collection are discussed in section 3.3.

3.2. Selection of Variables

This study includes the variables of per capita GNP growth, poverty headcount, Gini coefficient, net enrollments, life expectancy as well as education and health expenditure. The selected variables are explained as well as justified in the following.

3.2.1. Per Capita GNP Growth

Income growth at country level is usually measured in terms of GDP or GNP, so higher growth means higher income and vice versa. On the other hand we also know that poverty headcount calculates the national individuals below poverty line. So in relation to poverty it is simply preferable to use statistics of GNP instead of GDP as it also works via concept of national product.

Another rationale to use GNP is that it also includes the income earned abroad by country's citizens and a bulk of this income also comes to country in the form of remittances. It is also a common fact that many of poor families live on the income sent from abroad by the family member(s). Comparing growth in absolute and per capita GNP, it is obvious that per capita GNP growth is a better measure to use for poverty estimation than absolute GNP growth as it will have the population effect in it.

3.2.2. Poverty Headcount

Economic poverty is measured in both absolute as well as in relative terms. For both measures poverty can be defined as an inability to afford an adequate level of income or consumption, where this adequate level is defined as bare minimum in former and average in later[6].

Absolute and relative measures of poverty vary across countries. Relative type of poverty cannot be used for comparison between countries because no equivalent base line exists in relative poverty measures. Different countries apply different poverty lines for the measurement of absolute poverty but this difference exists only at currency levels. The basic concept behind absolute poverty measures is the "command over commodities" and these commodities are similar in all surveys as supervised by the World Bank. For cross country analysis same reference poverty line will produce better results at aggregate level. Using purchasing power parity (PPP) exchange rates based on CPIs of 1993 of developing countries Chen and

[6] Oxford Dictionary of Economics

Ravallion (2001) constructed a poverty line of 1.08 US$ per day/person, which is known as "Dollar a Day" poverty line. A revised version of poverty line using data of CPIs of 2005 has also been developed, which is 1.25 US$ per day/person[7].

Although poverty figures are usually collected by surveys which use money based poverty lines but afterwards the practice of calculating poverty statistics varies widely. These practices range from simple "headcount" method to little sophisticated ones like "poverty gap" or "Watts" measure. Headcount measure considers the number of poor as a ratio of total population whereas the later two measures estimate the extent of poverty.

According to Morduch (2008) "the headcount registers no change when a very poor person becomes less poor. Nor does the headcount changes when a poor person becomes even poorer". If we look from another angle this so-called "flaw" of headcount measure is a plus point. As "dollar a day" poverty line is already a minimum survival income therefore a progress must not be considered until the poor attain income level above the poverty line. According to another critique on the measure of headcount "focusing on individuals just below the poverty line may show rapid poverty alleviation and hence can be used as a deceptive tool by policy makers". However, this could be realized if the poverty analysis covers only one point of time. When study covers more than one period, number of poor just below poverty line reduces by each succeeding period which will show less progress in each next point of time. So, overall robustness of cause towards poverty reduction will be adjusted automatically. Above discussion reasonably justify the use of headcount measure.

[7] Chen and Ravallion used data for both poverty from International Comparison Program (ICP)

This common headcount method is based on income/expenditure of individuals and both are commonly used for the measurement of absolute poverty. The selection of measure mostly depends upon the subject matter of study and the policy point of view. In this study I have used the definition of absolute poverty for the purpose of estimation as it has been used in most of the empirical studies by various authors and leading institutions like the World Bank etc[8].

3.2.3. Gini Coefficient

A common and widely used measure of income distribution is Gini coefficient[9]. Value of Gini coefficient ranges between 0 and 1 where 0 shows perfectly equal and 1 shows perfectly unequal income distribution. When Gini coefficient is 0 all the individuals of society have same income and Gini coefficient equals to 1 means only one person has the whole income. Simply we can say that higher the value of Gini coefficient more income inequality exists in the society.

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[8] Recently some multidimensional measures like OPHI of poverty are constructed. However, data of these types of measures is available for only few years. Therefore absolute measure of economic poverty is used in this study.

[9] Gini coefficient was developed by Italian statistician Corado Gini in 1912. In principle, Gini coefficient is a mathematical derivative of Lorenz curve. Gini coefficient, being a measure of income distribution, represents over all structure of income distribution among population. Gini coefficient provides the level of income inequality of the society by calculating the ratio of two areas, area between the line of equality and Lorenz curve divided by the total area of triangle in which the curve lies. If Lorenz curve lies on the line of equality then the value of Gini will be 0 and if Lorenz curve equates the area of triangle then the value of Gini will be 1.

There are different ways to measure income distribution among the population of a society[10]. Gini index is most frequently used inequality index in empirical studies because it satisfies four important principles, namely anonymity, scale independence, population independence and transfer principle (Todaro 2007). Besley and Burgess (2003) stated that "although Gini coefficient is one dimensional measure of distribution and even such measures can miss important changes in income distribution, (yet) it represents the only mean of looking at the relationship between inequality and poverty for a broad range of countries".

3.2.4. Net Enrollment Rate (Secondary Education)

Sources of education vary between informal sources, e.g. libraries, internet and museums and formal sources, e.g. schooling and institutional trainings. The number of people within a nation who undergo schooling is usually much higher than the number of people who have gone through trainings. Gross and net enrollment rates are common measures which denote the number of students enrolled for schooling. Both enrollment rates are widely used as measure of education for country level investigations. Net enrollment rates are more appropriate way to know how many people go through formal education in a country. The advantage of using net enrollment rates over the gross enrollment rates is that the former does not overstate the numbers as in case of later due to repeaters and replacements. Some one may suggest using literacy rate as a measure of education. However, the definition of

[10] Asset inequality is another variable which can be used as a measure of inequality. However, ratio of asset-rich and income-poor people is very low as compared to income-rich and asset-poor people. Therefore, income inequality measure can fulfil the requirement of inequality variable.

literacy rate proposes that only literacy will not help a person to earn enough income to meet his/her essential expenditures[11]. Whereas formal education measures will provide suitable data sets for this purpose. Secondary level education seems to have more forceful effect towards poverty alleviation of relevant country[12]. The reasons for this forceful effect are several. First, secondary education provides more job opportunities as compared to primary education. Second, secondary education pays off much higher wages as compared to primary education. Third, demand for more educated and skilled workers increases due to improvement in technology, thus, the income of skilled labour increases. These aspects of secondary education suggest net enrollments in secondary as better proxy variable of education for our study.

3.2.5. Life Expectancy

Life expectancy means, according to the known human's experience, how many years a person can expectedly live in certain environmental and health conditions. Life Expectancy (LE) measure shows expected number of years of life. Usually life expectancy is measured at birth therefore it is also called as life expectancy at birth. Life time earning of a person depends upon average earning rate and total working life. Long life probably allows a person to increase his/her working life which increases total life income of that person. This reasoning suggests life expectancy measure as more suitable measure as compared to other health measures like infant mortality, etc.

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[11] Literacy rate means proportion and number of persons within the population who can both read and write a short simple statement on their everyday life with understanding. (http: //data.un.org/)

[12] Professional (vocational and technical) education can effectively contribute in improving human capital. However, due to non-availability of data it is not included in this study.

3.2.6. Education and Health Expenditures

Government usually allocates public resources for administration, debt servicing, economic infrastructure and social infrastructure. The last one primarily constitutes expenditure on education and health. Ratios of these expenditures to GDP, or to the total government expenditure reflect that how much a government laid emphasis on human development as compared to other options. Both the ratios are commonly used in empirical studies. In this study we will use the ratio of education expenditure to total government expenditure and the ratio of health expenditure to total government expenditure. As both the ratios are also part of government total spending therefore, this ratio seems to be better representative of government's priority.

3.3. Collection and Compilation of Data

Coming to discussion on data set, currently the availability of data is much easier as compared to 10 to 15 years ago. Also data available now have less discrepancies and errors as compared to past because of improved statistical tools and better survey mechanism of both national and international institutes. These improved data sets have dual implications of facilitating the researchers in empirical studies and widening of research horizons. Now quality and quantity of available data has endorsed more precise empirical testing of the subject matter.

There were some valuable measures which were taken while compiling the data set. Selection of data sources is based on "who is more concerned about what?" This consideration regarding source of data helped me to collect updated, improved

and statistically better data in comparison to other alternative sources. Data for poverty headcount and Gini coefficient have been downloaded from the World Bank online source PoveCalNet. Data for per capita income and net enrollment rates were taken from UN data source. Data for each variable was taken from the same single source across the time series as well as cross-section units. It was necessary because different data sources may have used different techniques and tools for data collection. Moreover, maximum available data for both time series and cross-section units was collected to minimize the artificial effect of interpolation or extrapolation implements.

Apart from above mentioned precautionary measures some specific steps were taken in the collection of data for each variable. While fetching the poverty headcount ratios from the World Bank online source, revised version of poverty line (1.25 US$ per day/person at PPP 2005) was used. Data source permitted me to use per capita income growth at PPP US$. UN data source was also approached for statistics of net enrollment rates because UNESCO had collected the data regarding net enrollment rates by standardizing the years of education for secondary level which is advantageous for cross country comparison.

A data set of total population of 40 countries met the above mentioned required criteria. Data set constitutes of 40 countries as cross-section units and 9 years as time series units for each cross-section unit starting from 1999 to 2007 (for detailed list of selected sample countries see appendix 1).

Data for poverty headcount (P) and Gini coefficient (Gini) was available at frequency of three years with beats of 1999, 2002 and 2005. For data interpolation

average annual income growth was calculated by using two nearest edge values whereas for extrapolation overall average annual income growth was calculated by using all available values. For the variable of per capita income growth (PIncome) there were no missing values. Enrollment rates of secondary level were missing for few countries in UN data source. Among some of these countries only one or two time series units of data were missing. In no case a country was selected having more than four missing data points in complete time series of any variable. Similar interpolation and extrapolation method was adopted here to generate missing values for the variable of net secondary enrollments.

3.4. Methods of Estimation

Two well-known data analysis techniques, namely Exploratory Data Analysis (EDA) and Data envelopment Analysis (DEA) are used for data analysis.

3.4.1. Exploratory Data Analysis

Exploratory Data Analysis (EDA) can provide us useful facts regarding the concerned variables. EDA can describe trends in poverty and income growth of selected countries. EDA can also help us to classify countries into two groups. First, countries in which income growth help the poor significantly. Second, countries in which income growth do not help the poor. EDA analysis is executed with the help of Microsoft Excel and Eviews 7.0.

3.4.2. Data Envelopment Analysis

Economic literature emphasizes on positive correlation between public spending on education and health and improvements in human capital. Investments in health and education are now considered by global entities as important means to reduce number of poor. It makes sense to assume that in a country choice of allocation of resources for education and health will possibly impact poverty trends.

In poverty reduction policy an important choice is that how much government should spend on education and health. Allocation of resources toward any policy of poverty reduction requires at least two tier empirical understanding. One, how much education and health improvements are correlated with poverty alleviation? Second, how efficiently a country uses its previously allocated funds in both the sectors? These empirical understanding will help governments to direct their limited resources toward more efficient and effective sector to achieve rapid poverty reduction rates.

Governments usually spend on both sectors to achieve the larger social development goal. For example, governments may have the objectives of higher net enrollments as well as improved health of masses. However, indirectly poverty reduction or improved income distribution could be one of the social goals of government behind these public spending.

Let us assume that, as inputs, a country has two expenditures i.e. education expenditure and health expenditure. In function form it can be written as

$$I = \{\text{education expenditure, health expenditure}\} \quad \ldots (1)$$

We also assume that, as outputs, the country has four objectives which can be written as

O = {reduction in poverty, reduction in income inequality, increased enrollments, increased life.expectancy} ... (2)

According to broader concept of poverty these four objectives can be considered as anti-poverty objectives[13].

In this study a non parametric method named as "Data Envelopment Analysis (DEA)" has been used to obtain useful results. Data Envelopment Analysis is a performance measurement technique which can be used for evaluating the relative efficiency of different decision-making units (DMUs). In our case governments are assumed as DMUs which takes decisions regarding how much funds should they allocate to spend on education and health. DEA will help us to identify the most efficient, less efficient and inefficient countries by using above assumed input/output variables.

DEA is commonly used in different research areas, e.g. economics, finance etc. It measures relative efficiency by comparing all DMUs with "the best" DMU. Basic objective of DEA is to find a best DMU to be followed in decision making process by other DMUs. There are several benefits of using DEA. Some benefits, as stated in the literature, are:

[13] It is assumed that the set of output variables do not strictly define poverty status of a country. However, it's a desired set of outputs as any improvement in these outputs will help to reduce poverty, either commonly known economic poverty or broadly defined poverty.

- It can handle multiple input and multiple output models.
- It can have very different units of inputs and outputs.
- It doesn't require the assumption of a functional form relating inputs to outputs.

By definition DEA is a technique of measuring productive efficiency of different decision-making units DMUs. Basic CCR model, which is named after Charnes, Cooper & Rhoades, is used in this study with constant return to scale (CRS). It is assumed that countries want to maximize the output at a given input cost, i.e. education and health expenditure, to achieve efficiency. In literature this efficiency is also known as technical efficiency. DEA is executed by using online DEA software available at http://www.deaos.com/

CHAPTER 4

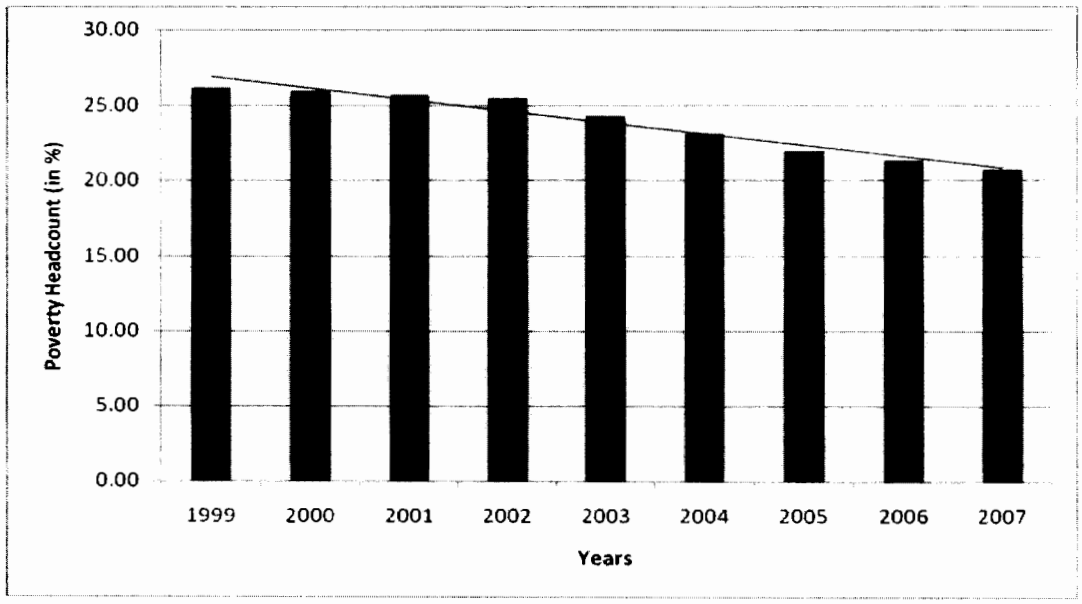
DATA ANALYSIS AND RESULTS

This chapter starts with Exploratory Data Analysis (EDA) and thereafter results of Data Envelopment Analysis are presented. Through discussions and interpretations of results are also presented.

4.1. Exploratory Data Analysis

Following graph shows the average trend of incidence of poverty for 40 selected countries at aggregate level during the period of 1999-2007[14]:

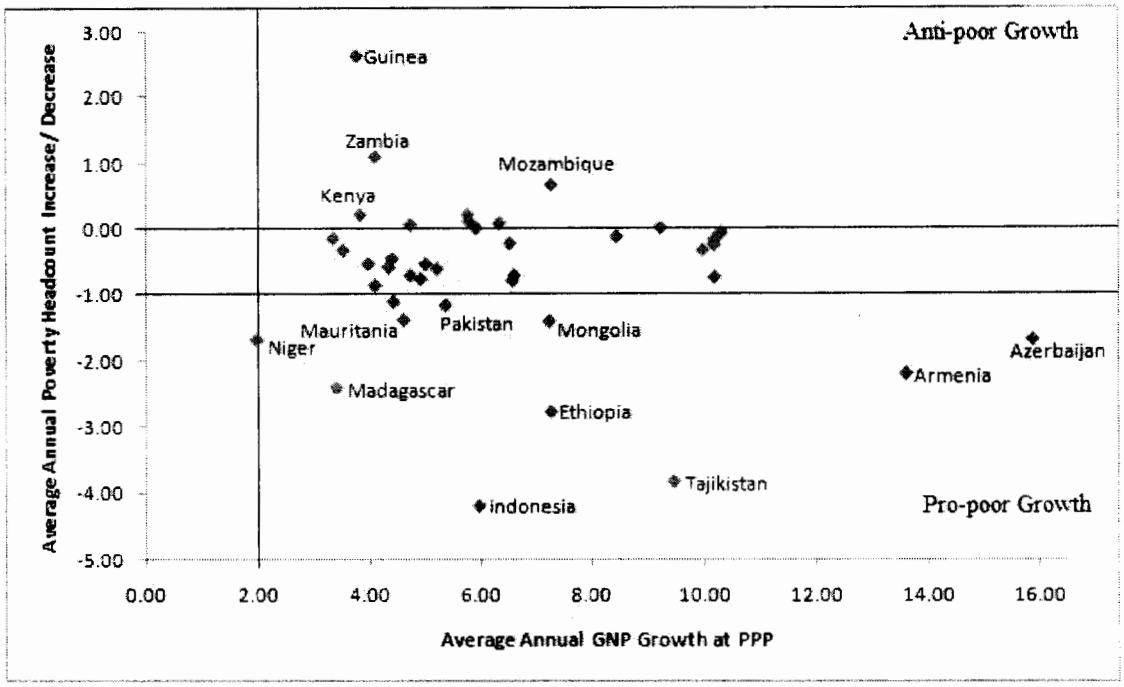
Figure 5: Average Trend in Poverty (40 countries, 9 years)



[14] For Box plot graph of poverty headcount data see Appendix 4.

Figure 6 places 40 countries on their respective positions according to their average GNP per capita growth and average increase or decrease in poverty incidence over the period of 9 years (1999-2007).

Figure 6: Groups of Countries with Pro-/Anti-Poor Growth[15]



Above figure provides us useful information about countries in different aspects. Countries which are above the upper horizontal line experienced increase in poverty on average in 9 years period. Countries which are below the lower horizontal line experienced a decrease of more than one percent on average in poverty incidence. We can see that all the selected countries have more than 2 percent average GNP per

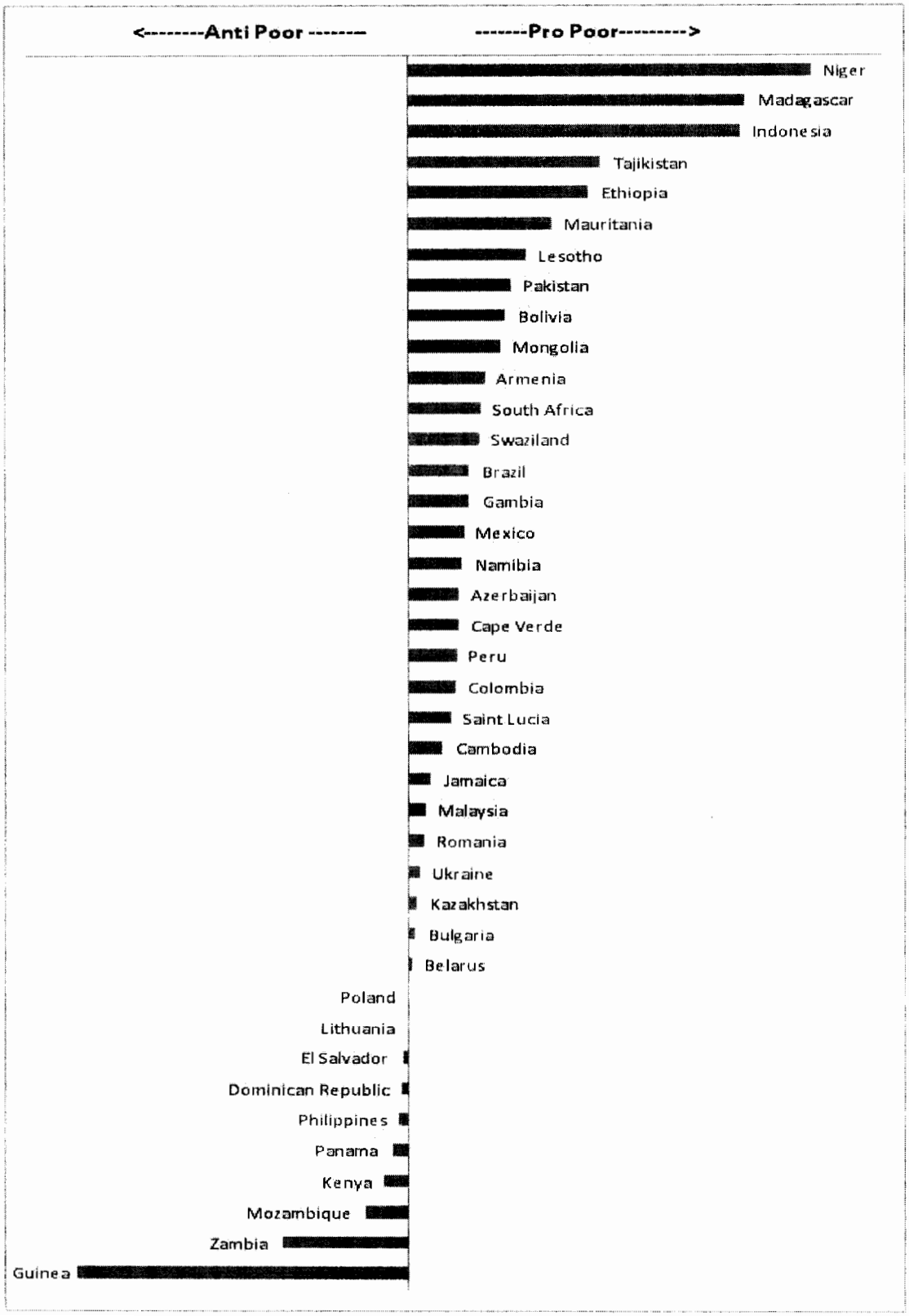
[15] These pro-/anti-poor classifications and ranks of countries do not provide exact information what percentage of growth is directed toward poor. However, they provide information about what percentage of poor is getting benefit from economic growth.

capita growth. However, we can classify countries into three groups. Through this classification we can identify how income growth in each group has affected the poor. In some countries income growth was anti-poor and in other countries income growth was pro-poor[16]. For third type of countries income growth was turned more toward rich and less toward poor as it did not help one percent of the poor. We can also observe that many of the countries are in this third group.

Even within specified classification we can rank countries from most pro-poor to least pro-poor and from least anti-poor to most anti-poor. For example, Niger experienced much more pro-poor income growth as compared to Azerbaijan as in both countries poverty fell on average 1.70% per year despite the large difference between growth rates of both countries. In our set of 40 countries Indonesia is starkest example with average poverty reduction of 4.20% per year. On the other side Guinea was worst as incidence of poverty increased on average of 2.64% per year even the growth rate was 3.78 during that period. In Pakistan average growth rates were decent and average per year poverty reduction was also moderate. We can categorize Pakistan's income growth as fairly pro-poor income growth. Figure 7 provides even more precise information regarding the country's pro-/anti-poor income growth status. Figure 7 is obtained from ratio of average poverty reduction to average growth rate.

[16] When any country experiences at least one percent reduction on average in poverty incidence then we assume its growth as pro-poor growth. On the other hand if any country's poverty incidence is rising on average then we consider its growth as anti-poor growth.

Figure 7: Ranking of Countries according to Pro-/Anti-Poor Growth



If we look figure 6 and 7 together then we can understand that only having high growth rates do not ensure sufficient poverty reductions. Although economic growth rate in Niger was hardly fair even then poor of Niger benefited from it significantly. On the lowest side growth rate in Guinea was fair however, this income growth worsened the condition of poor in Guinea instead of serving them.

As stated before, ratio of education and health expenditure to the total government expenditure tells us how much a country is focusing on its human capital. Figure 8 and 9 show education and health expenditures of all countries as a percentage of government's total expenditure.

In resource allocation toward education Lesotho is on top with an average of 13% of total government spending and Cambodia is on bottom with an average of 1.6% of total government expenditure. South Africa is highest spender of health expenditure with an average of 8.31% of total government expenditure and Indonesia is lowest with an average of 1.97% of total government expenditure.

Figure 8: Education Expenditure as % of Total Government Expenditure

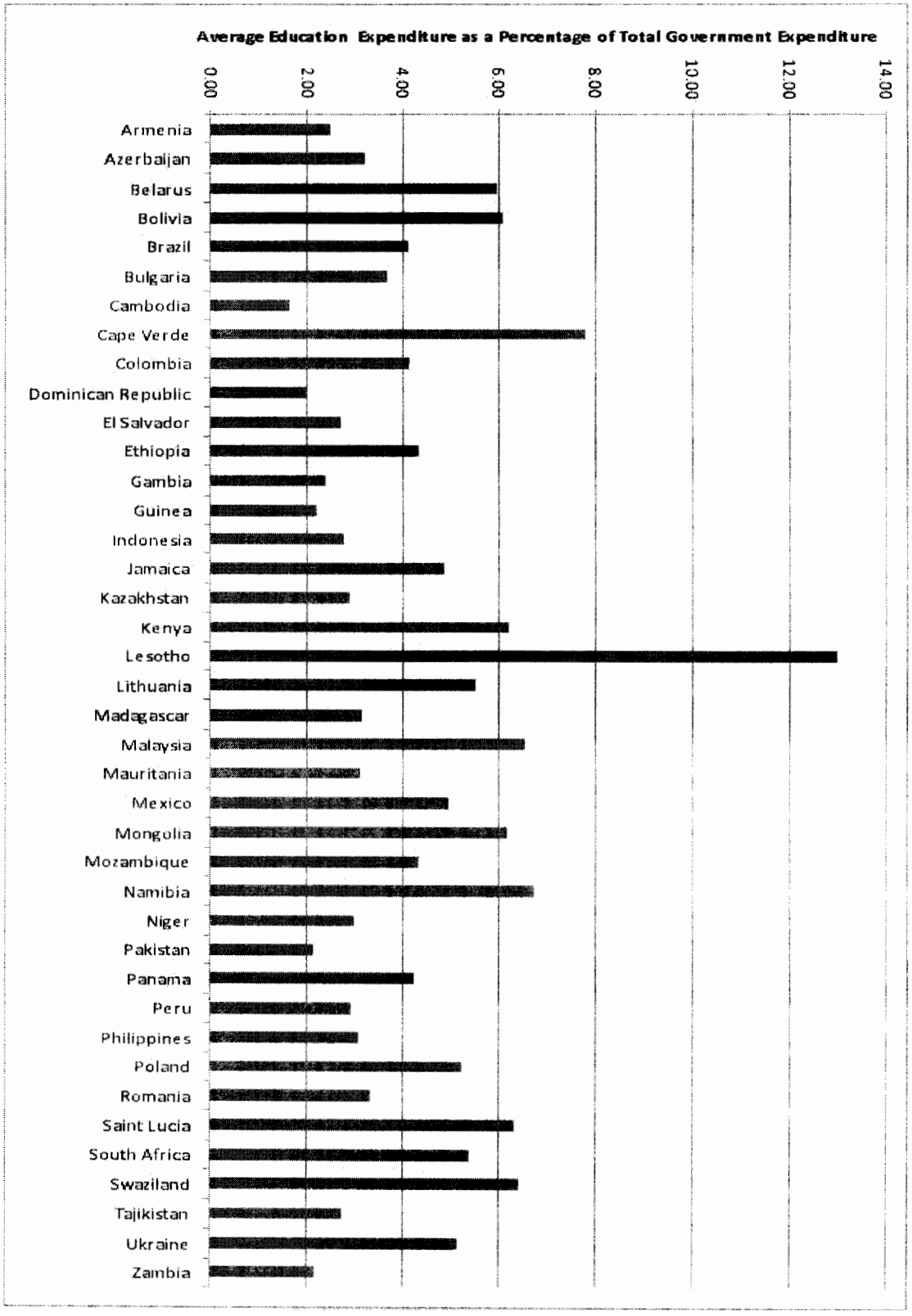
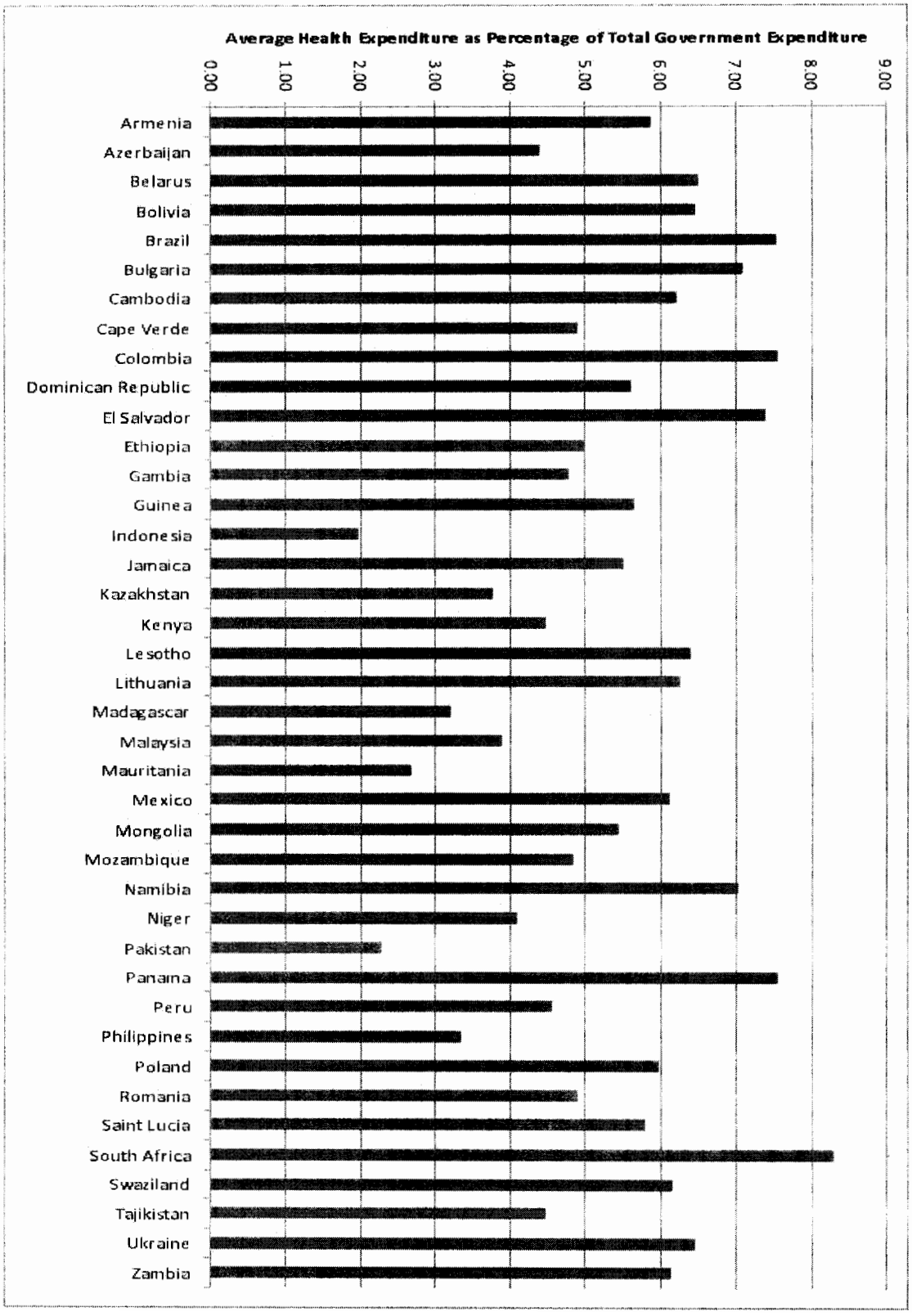


Figure 9: Health Expenditure as % of Total Government Expenditure



Following table shows the correlations between selected variables:

Table 1: Correlations between Selected Variables

	PHC	GINI	NES	LE
PHC	1			
GINI	0.238885	1		
NES	-0.82538	-0.25867	1	
LE	-0.81316	-0.14999	0.76553	1

We can see that strongest correlation exists between net enrollments in secondary education and poverty headcount. Negative sign indicates that an increase in net secondary enrollments is strongly associated with a decrease in incidence of poverty. Second strongest correlation exists between years of life expectancy and poverty headcount and it is also negative. Both the education and health measures are also negatively correlated with income inequality in same pattern (education more and health less correlated with negative sign). Positive correlation between poverty headcount and income inequality suggest that a rise in income inequality is positively correlated with rise in poverty headcount.

4.2. Data Envelopment Analysis

As stated before let us assume that a country has four goals when it decides to spend on education and health. This assumption allows us to consider following sets of inputs and outputs.

I = {education expenditure, health expenditure} ... (1)

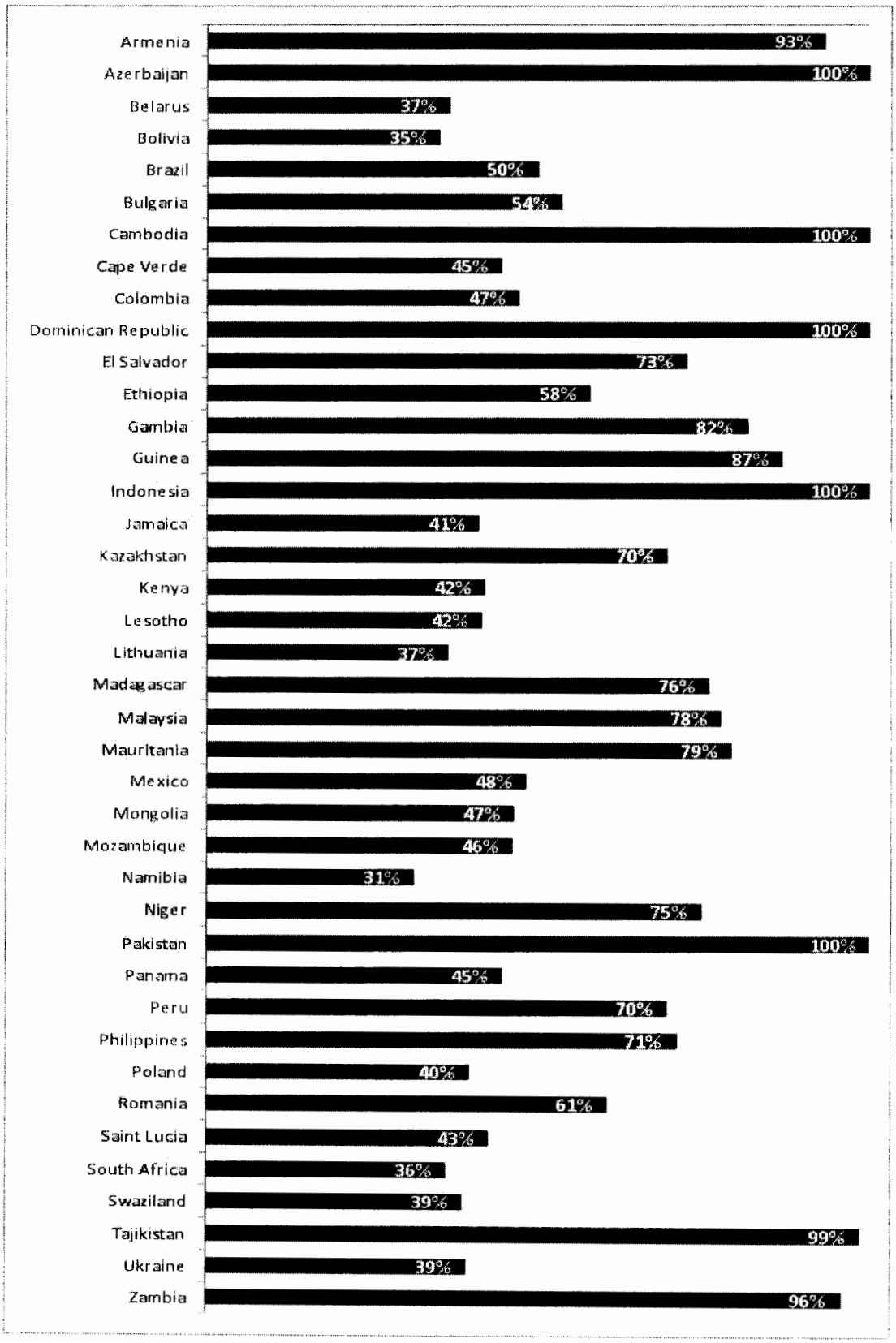
O = {reduction in poverty, reduction in income inequality, increased enrollments, increased life expectancy} ... (2)

Figure 10 shows the estimated efficiencies of selected set of 40 countries. On the basis of their efficiency we can classify these countries into three main groups (100% efficiency = most efficient countries, 50% to 99.9% efficiency = less efficient countries, 0% to 49.9% efficiency = inefficient countries).

Before going to figure 10 it is worth noting, these efficiencies are calculated by using all input and output variables[17]. A country can be most efficient if it achieves highest efficiency in any input-output combination. For example, if country 'A' is most efficient as compared to other countries in using input 'one' to produce output 'one' then it will be at efficiency level of 100%. On the other hand if a country 'B' is most efficient as compared to other countries in using input 'two' to produce output 'two' then it will also be at efficiency level of 100%. Another important understanding is that DEA uses input-output ratios to estimate efficiencies. Therefore, it is simply possible that in absolute terms a country shows less progress and in DEA it becomes relatively more efficient as compared to a country which was similar in

[17] All DEA calculations were done by taking averages of both input variables and by taking total progress of all output variables. Rescaling of negative outputs was also done to convert them to minimum positive outputs, as outputs were necessary to be positive. For other efficiencies like each output separately against all inputs see appendix 2. It will provide additional help to understand figure 9.

Figure 10: Efficiency Ranking with all Inputs and all Outputs



absolute progress. Similarly, it can also happen in opposite direction.

Figure 10 shows that Azerbaijan, Cambodia, Dominican Republic, Indonesia and Pakistan were the 5 most efficient countries, 17 countries were less efficient and 18 countries were inefficient. These results show efficiency of countries while considering all output variables.

However, we can dig out even more useful information if we do this analysis for a single output. For example, if we want to know that what is the efficiency level of country if the government's objective was only to reduce absolute poverty? Figure 11 shows efficiency of all countries in absolute poverty reduction by using education and health expenditure as inputs. Most efficient country in absolute poverty reduction was Indonesia and most inefficient country was Guinea. 11 countries were in less efficient category and 28 countries were inefficient to reduce incidence of poverty. Pakistan was on 5th from top in achievements against absolute poverty.

An important concern here is that why countries differ in efficiencies? It could be the case that if a country is using its education expenditure efficiently to improve educational output (net enrollments in secondary education) then this efficiency may help the country to fight well against absolute poverty. Similarly, efficient use of health expenditure to improve health indicator (life expectancy) may also help to shrink poverty.

It is also important to know that whether efficiency in educational output (i.e. net enrollments) is more important or efficiency in health output (i.e. life expectancy) is more important. Correlations between efficiencies of table 2 can provide us useful understanding.

Figure 11: Efficiency Ranking with all Inputs and one Output: Absolute Poverty

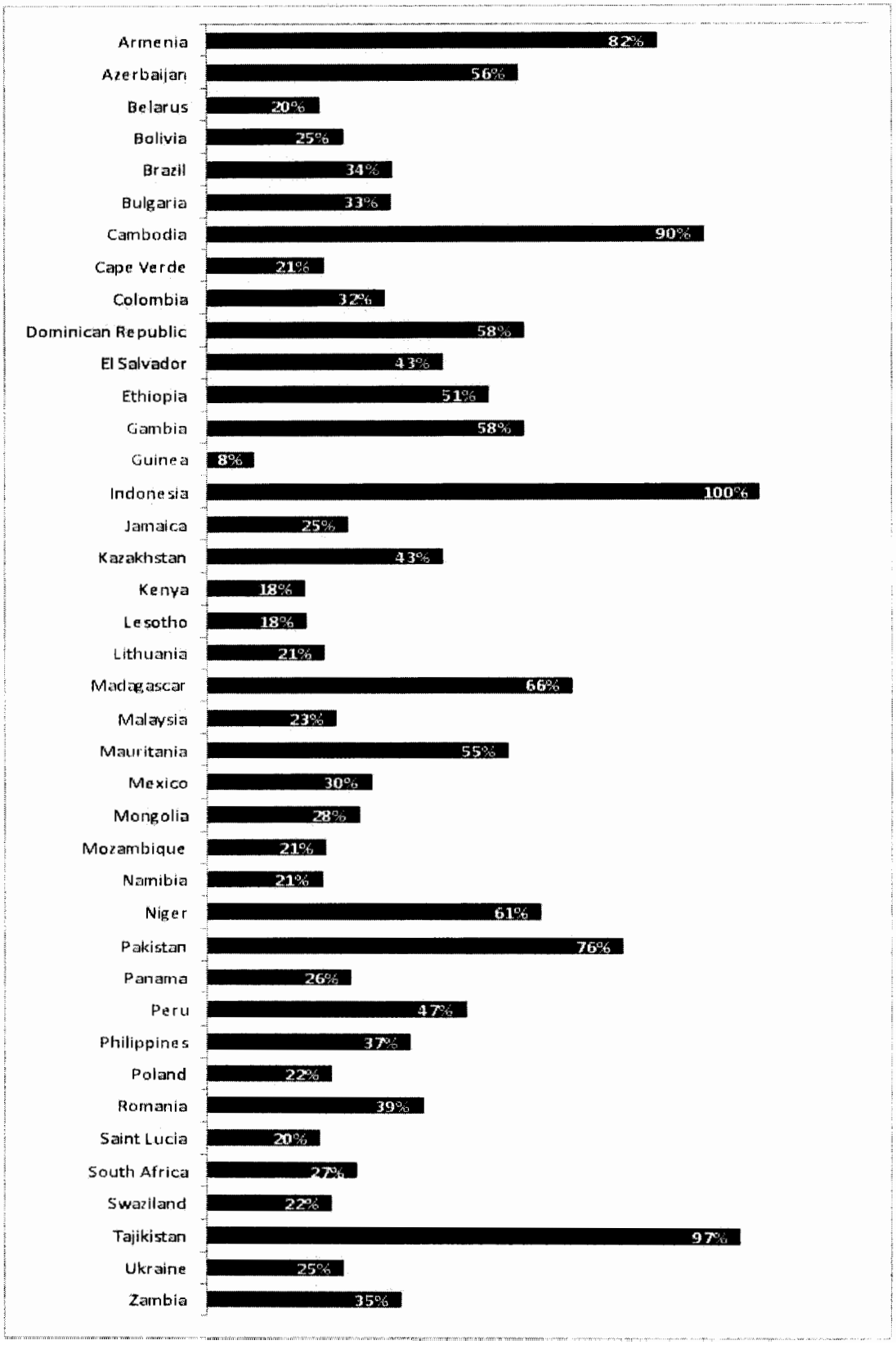


Table 2[18]: Correlations between Efficiencies of Selected Variables: Absolute Poverty, Education and Health

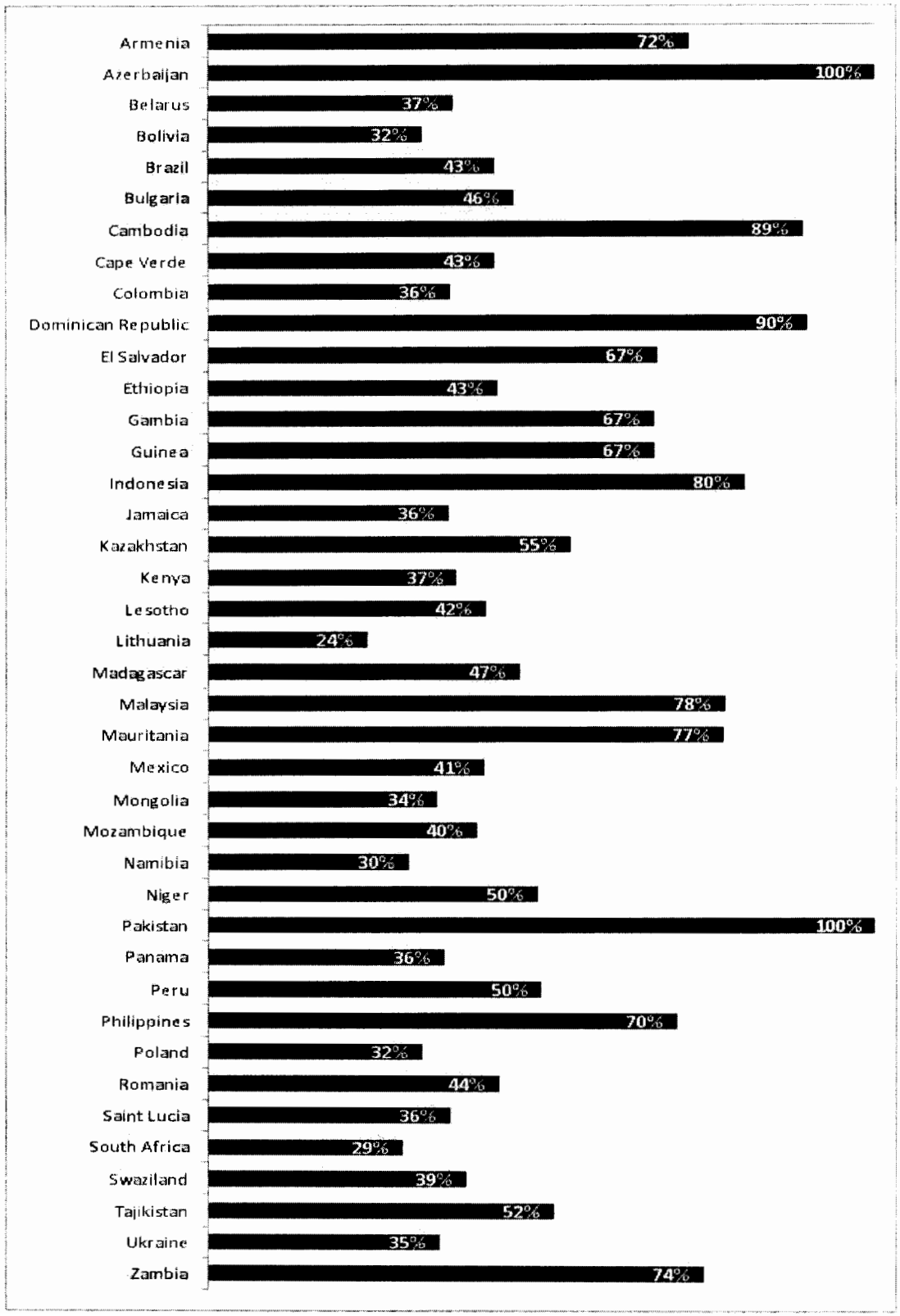
	Efficiency in Absolute Poverty Reduction (inputs=edu_exp, health_exp) (output=reduction in absolute poverty)
Efficiency in Education (input=edu_exp) (output=net enrollments)	0.62
Efficiency in Health (input=health_exp) (output=life expectancy)	0.59

We can see that efficiencies of absolute poverty are highly correlated with efficiencies of education and health. These correlations suggest that if a country can efficiently use its education or health expenditure to improve respective educational and health outcomes then the chances are more to experience reduction in absolute poverty. In general we can also assert that although both education and health sectors are important however, education sector plays more important role in poverty alleviation as compared to health sector.

We can also find the efficiency level of country in reducing income inequality. Figure 12 shows efficiency of all countries in income inequality reduction by using education and health expenditure as inputs. Pakistan and Azerbaijan was two most efficient countries in reduction of income inequality during this period. 15 countries were less efficient and 23 countries were inefficient in reducing income inequality.

[18] It is important to note that these and forthcoming correlations are calculated on the basis of relative efficiencies and not on the basis of the original data. For details of efficiencies of all countries see appendix 2 and 3.

Figure 12: Efficiency Ranking with all Inputs and one Output: Income Inequality



Correlations between efficiencies of table 3 can provide us useful understanding.

Table 3: Correlations between Efficiencies of Selected Variables: Income Inequality, Education and Health

	Efficiency in Income Inequality Reduction (inputs=edu_exp, health_exp) (output=reduction in income inequality)
Efficiency in Education (input=edu_exp) (output=net enrollments)	0.71
Efficiency in Health (input=health_exp) (output=life expectancy)	0.55

We can see that efficiencies of income inequality reduction are also strongly correlated with efficiencies of education and health. These correlations suggest that if a country can efficiently use its education or health expenditure to improve respective educational and health measures then the chances are more to experience reduction in income inequality. In general we can also assert that although both education and health sectors are important however, education sector played much more important role in reducing income inequality as compared to health sector.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

The results of estimations of this study enable us to draw following conclusions.

First, it can be ascertained from the results that in selected 40 countries some countries experienced pro-poor income growth and income growth in other countries did not help the poor.

Second, achieving decent or high growth rates of income do not ensure (as suggested in trickle down theory) poverty reduction at similar pace.

Third, improvements in educational and health outcomes are strongly and negatively associated with poverty incidence. However, educational improvements appear to be more strongly correlated with decline in poverty headcounts as compared to health improvements.

Fourth, educational and health outcomes are also negatively but moderately correlated with level of income inequality.

Fifth, efficient use of public expenditures on education and health not only result in improved educational and health outcomes (net secondary enrollments and life expectancy), but it also permit a rapid poverty alleviation and improved income inequality.

Two major conclusions can be drawn from above estimates of whole data set. First, per capita income growth was not key contributor in poverty alleviation in selected countries during the observed period. Second, improved education and health emerged as main contributor in poverty alleviation.

As discussed earlier, enhancement of earning ability of people is due to better education and health. These both improvements interestingly may influence the poverty to decrease even if there is low growth in overall per capita income. Due to increased income of the poor even at low income growth poor can be uplifted in a sustainable way. This is the difference between "making people enable" and "making people capable".

The most suitable way to give a share from income growth to local poor is to provide them required education, skills and better health facilities. This will also be a permanent barrier to prevent people going back into poverty trap because less productive workers with lower skills are likely to be laid off first, when ever any business goes for contraction. Keeping in view the above mentioned conclusions the economic policy in developing countries, without neglecting income growth, shall primarily focus on promoting education and health services to ultimately achieve the goal of poverty alleviation.

No study is perfect from every aspect. Therefore, each study provides some further scope for research. As mentioned before, there were data constraints which placed some confines on the extent of this study. Although this study signifies the key role played by education and health in poverty alleviation in sampled developing countries, however, still there is space for further study which may include more

developing countries or may include larger time period. There is also scope for further study which may consider other classifications of educational levels, e.g. tertiary education or/and vocational education.

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APPENDICES

Appendix 1: List of Selected Sample Countries

No	Ids	Country Name	No	Ids	Country Name
1	ARM	Armenia	21	MDG	Madagascar
2	AZE	Azerbaijan	22	MYS	Malaysia
3	BLR	Belarus	23	MRT	Mauritania
4	BOL	Bolivia	24	MEX	Mexico
5	BRA	Brazil	25	MNG	Mongolia
6	BGR	Bulgaria	26	MOZ	Mozambique
7	KHM	Cambodia	27	NAM	Namibia
8	CPV	Cape Verde	28	NER	Niger
9	COL	Colombia	29	PAK	Pakistan
10	DOM	Dominican Republic	30	PAN	Panama
11	SLV	El Salvador	31	PER	Peru
12	ETH	Ethiopia	32	PHL	Philippines
13	GMB	Gambia	33	POL	Poland
14	GIN	Guinea	34	ROM	Romania
15	IDN	Indonesia	35	LCA	Saint Lucia
16	JAM	Jamaica	36	ZAF	South Africa
17	KAZ	Kazakhstan	37	SWZ	Swaziland
18	KEN	Kenya	38	TJK	Tajikistan
19	LSO	Lesotho	39	UKR	Ukraine
20	LTU	Lithuania	40	ZMB	Zambia

Appendix 2: Estimated Efficiencies of Selected Variables with 2 Inputs (%)

Output(s)	All 4	Poverty	Inequality	NES	LE
Country Name	**Efficiency**	**Efficiency**	**Efficiency**	**Efficiency**	**Efficiency**
Armenia	93	82	72	43	75
Azerbaijan	100	56	100	53	65
Belarus	37	20	37	29	34
Bolivia	35	25	32	25	35
Brazil	50	34	43	43	47
Bulgaria	54	33	46	37	51
Cambodia	100	90	89	100	100
Cape Verde	45	21	43	30	39
Colombia	47	32	36	45	46
Dominican Republic	100	58	90	99	86
El Salvador	73	43	67	58	64
Ethiopia	58	51	43	50	50
Gambia	82	58	67	78	79
Guinea	87	8	67	85	85
Indonesia	100	100	80	100	100
Jamaica	41	25	36	21	41
Kazakhstan	70	43	55	44	70
Kenya	42	18	37	36	40
Lesotho	42	18	42	21	22
Lithuania	37	21	24	25	37
Madagascar	76	66	47	61	72
Malaysia	78	23	78	32	48
Mauritania	79	55	77	51	73
Mexico	48	30	41	45	41
Mongolia	47	28	34	46	38

Output(s)	All 4	Poverty	Inequality	NES	LE
Country Name	**Efficiency**	**Efficiency**	**Efficiency**	**Efficiency**	**Efficiency**
Mozambique	46	21	40	31	46
Namibia	31	21	30	29	30
Niger	75	61	50	49	73
Pakistan	100	76	100	90	100
Panama	45	26	36	35	45
Peru	70	47	50	65	70
Philippines	71	37	70	63	69
Poland	40	22	32	30	40
Romania	61	39	44	36	61
Saint Lucia	43	20	36	41	36
South Africa	36	27	29	34	30
Swaziland	39	22	39	18	26
Tajikistan	99	97	52	80	74
Ukraine	39	25	35	18	39
Zambia	96	35	74	96	77

Appendix 3: Estimated Efficiencies of Selected Variables with 1 Input (%)

Output(s)	NES	LE
Country Name	**Efficiency**	**Efficiency**
Armenia	36	33
Azerbaijan	38	44
Belarus	20	28
Bolivia	17	30
Brazil	32	25
Bulgaria	29	27
Cambodia	100	32
Cape Verde	17	39
Colombia	34	25
Dominican Republic	87	34
El Salvador	50	26
Ethiopia	34	40
Gambia	61	40
Guinea	72	36
Indonesia	63	100
Jamaica	14	33
Kazakhstan	31	50
Kenya	23	39
Lesotho	9	22
Lithuania	17	29
Madagascar	41	62
Malaysia	17	48
Mauritania	33	67
Mexico	31	31
Mongolia	30	35
Mozambique	21	37

Output(s)	NES	LE
Country Name	**Efficiency**	**Efficiency**
Namibia	19	25
Niger	35	50
Pakistan	61	85
Panama	27	25
Peru	47	43
Philippines	43	57
Poland	20	32
Romania	26	39
Saint Lucia	27	32
South Africa	25	18
Swaziland	12	23
Tajikistan	59	43
Ukraine	13	28
Zambia	84	30

Appendix 4: Box-Plot of Poverty Headcounts