

CHAPTER 2

REVIEW OF LITERATURE

2.1 Introduction

Economists are likely to regard good health as one of the most important assets a person can have. Life cycle models have explained how one's health status can determine the future income, wealth and consumption (Lilliard and Weiss 1997; Smith 1998; Smith 1999). Nowadays it is possible to say that every person could expect to live a long and healthy life. We could say its economic value is huge and health gains result in economic growth and provide an escape from ill-health traps in poverty (World Health Organization 1999).

In a simple but important sense, health is wealth. Amartya Sen (1999) has characterized poverty as "capability deprivation". The Human Development Index (HDI), introduced in 1990 by Mahbubul Haq and his colleagues, reflects achievements in "the most basic human capabilities—leading a long life, being knowledgeable, and enjoying a decent standard of living" (UNDP 1990) that can be represented as health, education and income which are indeed the three pillars of human development.

The World Development Report for 1993 begins by summarizing the enormous and unprecedented gains in health in the second half of the 20th century, "In 1950 life expectancy in developing countries was forty years; by 1990 it had increased to 63 years. In 1950 twenty-eight of every 100 children died before their fifth birthday; by 1990 the number had fallen to 10. Smallpox, which killed more than 5 million annually in the early 1950s, has been eradicated entirely" (World Bank 1993). Bloom and Sachs (1998) have argued that widespread ill-health in a country may create an adverse climate for international trade and foreign direct investment.

Determinants of Health

Health is determined by genetic, social, cultural, economic and environmental factors. But health, in return, has economic implications. To put it simply, health

contributes to economic outcomes, at both individual and country levels. The factors of genetics, lifestyle, living and working conditions (access to and use of healthcare services, education, wealth, housing and occupation) and the more general socio-economic, cultural and environmental conditions and health care can be considered as inputs of health. Productivity, labour supply, education and capital information are considered as outputs of health. Several determinants of health can be influenced by public policies. The WHO (2003) says the main determinants to health are:

- Our economy and society (*"The social and economic environment"*).
- Where we live and what is physically around us (*"The physical environment"*).
- What we are and what we do (*"The person's individual characteristics and behaviour"*).

Measurement of Health

It is difficult to measure health and to determine its effect on growth. Whereas education can be indexed by years of schooling and road building by kilometres of asphalt, the aggregate health of a nation is not easily measureable. Health is generally captured as the absence of negative factors such as infant mortality, or by positive factors like life expectancy which in itself is heavily influenced by infant mortality (World Bank Report 2009).

Progress in Health

The studies show that the average health of the world's population has improved over the last two centuries. Availability and consumption of food has increased because of improved agriculture. There is a better understanding of disease transmission which has increased public knowledge about infectious diseases and provision of better services of healthcare. These factors have helped to lower infant mortality, reduce morbidity, and extend life expectancy, thereby allowing people to enjoy a better quality of life.

Until the late eighteenth century, countries of the world including the rich countries suffered from inadequate food production and high incidence of malnutrition. Boosts in agricultural output, particularly in the twentieth century, led to improvements in

nutrition. These nutritional gains account for roughly 40 per cent of the increase in life expectancy over the last 400 years according to pioneering research by Fogel (1986).

Millennium Development Goals (MDGs)

Eight MDGs are described in the United Nations Millennium Declaration. They were established following the Millennium Summit of the United Nations in 2000. All the United Nations member states numbering 189 and at least 23 international organizations agreed to help achieve the following MDGs by 2015:

1. To eradicate extreme poverty (people living on less than \$1.25 a day) and hunger.
2. To achieve universal primary education.
3. To promote gender equality and empowerment of women.
4. To reduce child mortality rates by two-thirds between 1990 and 2015.
5. To improve maternal health (reduce the maternal mortality ratio by three quarters between 1990 and 2015, and achieve universal access to reproductive health by 2015).
6. To combat HIV/AIDS, malaria, and other diseases.
7. To ensure environmental sustainability.
8. To develop a global partnership for development.

Each goal has specific targets and dates for achieving them. New commitments targeted women's and children's health and new initiatives were taken in the worldwide battle against poverty, hunger and disease.

WHO's Commission on Macroeconomics and Health

According to the report of the World Health Organization's Commission on Macroeconomics and Health (CMH), a 10% increase in life expectancy at birth increases economic growth of annual GDP by 0.3-0.4%, and investment in public health in developing countries produces economic benefits for the people and for the countries as a whole (WHO 2001).

A fundamental goal of economic development is improvement in the health and longevity of the poor which is an end in itself (CMH). The linkages of health to poverty

reduction and to long-term economic growth are much stronger than generally understood. The burden of disease in some low income regions, especially sub-Saharan Africa, is a strong barrier to economic growth. Therefore, there has been a growing interest to understand the relationship between health and economic growth.

Mushkin (1962) discusses human capital formation with the help of health services, and education that people can develop themselves when they invest in these assets and they will earn in the future with them. Grossman (1972) and Bloom and Canning (2000) argue that healthy individuals are more efficient in consequence and obtain higher productivity levels. Barro (1996) comments that health is a capital productive asset and an engine of economic growth. Therefore, by this argument we can consider health as a determinant of human capital. Hamoudi and Sachs (1999) suggest that there is a cycle of simultaneous impact between health and wealth.

According to the WHO, there is strong evidence that economic growth is strongly related to decline in child mortality (WHO 2001). With economic growth, ability of individuals to demand and avail of better healthcare, sanitation, housing, nutrition, etc., increases. Growth also increases the capacity of governments to supply more and better healthcare and to improve access to it. However, this strong relationship should not be taken for granted. The income elasticity of child mortality is not as high as it is for poverty, and economic growth alone will not be enough to attain the child mortality MDGs target by 2015⁴. Empirical evidence tends to suggest that public health expenditure is not a significant determinant of child mortality after controlling for income and other factors such as female education. However, the higher aggregate health expenditure at a given income level does not yield better health outcomes. It is the way in which health expenditure is allocated for health outcomes. Investment in primary health care cost of some programmes such as immunization, as well as investment that lead to real increases in health-related human resources and physical infrastructure can have a significant impact on child mortality. A careful plan is needed to attainment the child mortality MDG by 2015. In addition, female education is a significant determinant of the

⁴Every day in developing countries, 20,000 girls below 18 years give birth, according to a new report issued by the UN Population Fund, (UNFPA, 2013). Adolescent pregnancy directly impacts health, education, employment and a girl's rights. <https://www.unfpa.org/public/global/publications>

MDG indicator and, hence, must be included in any analysis of policy options. Poverty reduction itself would also facilitate reductions in child mortality.

2.2 Role of Health

For human welfare, improvement in health may be as important as improvement in income. Recognition of the link between health and income is important for policy-making. Investment in health, even in the poorest of the developing countries, may be a priority. The health policies can improve health and influence economic development even in the poorest countries.

It is recognised that a high level of national income leads to a high level of health for the population. Many studies show that there is an intrinsic relation between health and wealth. According to them, being healthy and having access to high quality health care facilities increases productivity and income. High income levels and how they are allocated lead to declines in child mortality, as well as investment in primary healthcare, and better levels of female education. With increase of national income, more people will have access to safe water and sanitation, and better healthcare services.

A study by Bloom and Canning (2000) points that there are four mechanisms that link health and economic growth. These mechanisms are related to health as a factor that leads to an improvement in work productivity (labour health), child cognitive development (investment in education and better school attendance), increase in savings by making possible a longer life span, and number and age structure of population.

The effects of population health can be seen both at the macroeconomic and individual levels, but their extent is an important issue.

Health as a Driver of Economic Development

Illness and death have come down over the last 50 to 100 years by the development of medical science like vaccines, antibiotics and other pharmaceutical products. Economic growth has helped people to access better nutrition, education and public goods (such as supply of water and sanitation, and control of disease vectors) that

reduce the transmission of disease. In richer countries more people are able to access all these facilities.

Do improvements in health themselves help growth? “Extending the coverage of crucial health services.....to the world’s poor could save millions of lives each year, reduce poverty, spur economic development, and promote global security” (WHO 2001: i). Some researchers (for example, Bloom and Canning) have found a significant link between health and growth and have used this finding to argue for large increases in government spending on health. Both directions of causality between health and income are difficult to measure and estimate.

Bloom and Canning (2003) say, “The key issue is not that spending on health would be good, it is whether spending on health is better than other uses of the limited funds available in developing countries.” Studies show that better health may lead to income growth, but this does not necessarily mean that governments of developing countries should spend more of their budgets on healthcare. As public spending on healthcare might not be the best way to achieve health goals, other socio-economic factors may affect more than public spending.

Microeconomic Evidence: Evidence of most empirical studies in the high-income countries at the individual level relates to the effect of health on labour supply and productivity. Effects of ill health on participation on labour force have been examined in Germany (Riphahn 1998; Lechner and Vazquez-Alvarez 2004), Ireland (Gannon and Nolan 2003) and Sweden (Lindholm, Burström and Diderichsen 2001). Effects of ill-health as a factor that affects retirement has been shown for several EU countries by Jiménez-Martin et al. (1999), for Germany by Siddiqui (1997) and for the United Kingdom by Disney et al (2003). The effect on earnings or wages has been shown, for instance, by Contoyannis and Rise (2001) and Gambin (2004) for the United Kingdom. Dhombres and Brunello (2005) have proved a wage-depressing effect of obesity in several EU countries, especially for women.

Many microeconomic studies examined the effects of varying health inputs on health outcomes themselves. Several studies (Chavez, Martinez and Soberanes 1995), Behrman et al. (2003), Alderman and Yang (2005), and Hoddinott and Kinsey (2006)

have examined the long-run effects of childhood nutrition. They find that better nutrition leads to improvements in school completion, height, IQ and wages. Studies of the effect of adult nutrition (Strauss 1986; Basted et al. 1979; and Thomas et al. 2004) similarly find positive effects on labour input and wages.

Weil (2005) examined the role that health differences play in productivity and also assessed how much would be the gain in income for poor countries as a result of an improvement in the health of the population. Weil uses microeconomic estimates of the effect of health on individual outcomes to construct macroeconomic estimates of the proximate effect of health on GDP per capita in order to explain income differences between the rich and poor countries.

Economic growth raises the demand for good healthcare and it increases availability of food and improves health. The question is whether causality works in reverse: does health affects economic growth and how is it important compared with other potential factors?

The Commission on Macroeconomics and Health recommended that increased spending on health is a way to promote economic growth, and to raise both health status and household earnings (WHO 2001). “Historical research, cross-sectional analysis, and innovative ways of integrating household factors into cross-country studies have pushed the methodological envelope, but the results remain inconclusive. Research is hamstrung by lack of data and imprecise measures of health” (World Bank 2009).

Health as Human Capital

Mushkin (1962) wrote in an article in the *Journal of Political Economy*, “Health is an investment and investment in health, is important for economic growth”. Behrman (1996) showed that the returns to investment in health were even greater than the returns to education, overturning the dogma of that time. According to United Nations Development Program (UNDP, 1990), health is one of the indicators of human development. Why it is necessary for countries to invest in health and what kinds of interventions should one apply in order to improve it in the developing world?

Grossman (1972) attests that ill health affects worker productivity. Mankiw, Romer and Weil (1992) reinforce the importance of not only education, but also health and nutrition in a broader analysis of human capital. Fogel (1994), Barro (1996), and Barro and Sala-i Martin (2004) examined the relationship between economic growth and health, establishing a link between wealth and health, the latter having a potential impact on the former, and vice-versa. Barker (1992), and Behrman and Rosenzweig (2004) suggest that early health investments are crucial for adult productivity. Investment in prevention of infectious diseases can improve population health at low cost, suggesting that even modest gains from health will generate very high rates of return.

The situation with health is different compared with education. Measurement of the value of change in human productive capacity due to health is difficult. A large number of health indicators have been used in studies, and the difficulty is in measuring the multiple dimensions of the healthy state that influence the human capital potential (Murray and Chen 1992). Life expectancy has been the metric most commonly used by economists, but it does not capture all the aspects of an individual's current health that may affect productive capacity. A year of life tells little about the state of that life or its quality.

Economic growth can lead to improvements in other quality-of-life indicators, but sometimes it does not, and at other times it does so only after a lag (Easterly 1999). In short, health has a potential impact on wealth and vice versa.

Health and Poverty

Today one of the most important priorities is reduction of poverty. The International Monetary Fund (IMF), OECD countries, United Nations (UN) and World Bank Group have jointly described seven international development goals. The first is to "Reduce the proportion of people living in extreme poverty by half between 1990 and 2015."

"The body is poor people's main asset, but one with no insurance" (World Bank 2002). Ill-health, therefore, imposes a higher level of risk on the poor. When disease, injury, or some other form of ill-health strikes down the principal asset of the poor, they

cannot earn the money needed to provide themselves and usually others too with food or medicines.

“Causes of greater ill-health among the poor are manifold and interrelated. Poor nutrition, for example, weakens the body’s defences against infection. Infection, in turn, weakens the efficiency of absorption of nutrients. The main asset of the poor, their bodies, is left without insurance. When any form of ill-health strikes down their principal asset, they cannot earn the money needed to provide themselves and usually others too with food or medicines. In other words, a health shock is highly likely to be catastrophic” (WHO 2002).

Poverty creates ill-health because it forces people to live in environments that make them sick, without decent shelter, clean water or adequate sanitation. WHO supports countries to design and implement the health policies in response to the needs of poor. WHO ensures that the health perspective is reflected in poverty reduction strategies and medium term expenditure frameworks, and helps in the development of the sector-wise approaches. WHO database on health in Poverty Reduction Strategy Papers (PRSP), discusses about the health challenges in a particular country, the proposed health strategies to meet those challenges, and the mechanism to monitor progress.

Health and Education

Health affects education and education affects economic outcomes. The first mechanism is effect of better child health on school attendance, ability and learning. The second mechanism is the effect of lower mortality and a longer prospective life on increasing incentives to invest in human capital. It increases the benefits of education for the individual (Kalemli-Ozcan Ryder and Weil 2000). In addition, lower infant mortality may encourage parents to invest more resources in fewer children, leading to low fertility but high levels of human capital investment in each child (Kalemli-Ozcan 2002).

Jamison and Leslie (1990) review the links between health conditions – children who are not prepared to attend school, failure of many students to learn in school, and unequal participation of girls in schooling. Around 30 million children are born in developing countries annually for whom physical development is impaired as a result of

poor nutrition in uterus (United Nations' Administrative Committee on Coordination, Subcommittee on Nutrition, 2000). Moreover, malnourished children are less likely to enrol in school, and those who ultimately enrol do so at a later age (UN 2004).

Nutritional deprivation in older children can also impair their cognitive development. In most of the studies regarding the role of nutrition (Balasz et al. 1986; Pollitt 1997 and 2001), a deficit in key nutrients such as iron and vitamin A is associated with retardation in the development of cognitive abilities.

Several studies (Chavez and Martinez 1995; Behrman et al. 2003; and Alderman, Hoddinott, and Kinsey 2006) have examined the long-run effects of childhood nutrition. They find that better nutrition leads to improvements in school completion, IQ, height and wages. Studies of the effect of adult nutrition (Strauss 1986; Strauss 1997; and Basta et al. 1979; Thomas et al. 2004) similarly find positive effects on labour input and wages. Bleakley (2007) and Miguel and Kremer (2005) find treatment to combat nutrition deficiency in school attendance.

A year of education increases wages by about 10 per cent in developing countries (Patrinos and Psacharopoulos 2004). In the United States a standard deviation gain in either mathematics or language test scores corresponds to 8 per cent higher wages (Krueger 2003). There is evidence that in developing countries the effects may be even higher. The effects of childhood health on educational outcomes and cognitive development may be even more substantial (Glewwe 1996; Moll 1998).

Biological and cultural forces affect the health of girls and can impede their educational attainment. When illness strikes a family, girls often discontinue their studies to assume responsibilities for household chores.

Health and Demography

Whenever mortality declines, it is followed by a decline of fertility after a lag. When mortality declines, first it brings better sanitation and public health. So long as fertility does not change, the decline in mortality increases population. In the second

phase, fertility rates start declining as well, until population growth is restored to earlier levels, and then sometimes even lower levels than before.

Lower mortality and improved survival rates of the global population of the nineteenth and twentieth centuries not only increased population, but also led to significant increases in the number of young people because the largest improvements in mortality were initially among the infants. In the long run, changes in population age structure can have significant economic implications.

According to Shultz (1997), reduction in child mortality leads to a lower desired fertility. For McKeown, Record and Turner (1962, 1975), mortality declines when health measures such as immunization programmes, improvements in sanitation, easier access to clean water and better nutrition are implemented. Fuchs (1994) also attributes decreasing child mortality to rising standard of living, access to education, and lower fertility (in New York City between 1900 and 1930). In developing countries, health advances tend to lower infant and child mortality.

Kalemlı-Ozcan et al. (2000) concluded that lower mortality rates not only increase the expected length of a child's life span, but also lower its variability. A higher rate of decline in fertility than in mortality reduces the expected number of surviving children, which eventually will cause a net decline in population.

It is difficult to find significant effects of overall population growth on economic growth. It is possible to consider the components of population growth separately. High birth and low death rates both generate population growth, but they seem to have quite different effects on economic growth (Bloom and Freeman 1988; Kelley and Schmidt 1995).

Empirical studies by Bloom and Canning (2000) over the past 15 years have shown that population growth has a small and insignificant effect on a country's economic growth. According to their finding, the countries with low death and birth rates do well in terms of economic growth and conversely countries with high death and birth rates do badly. Bloom, Canning and Sevilla (2004) find that the demographic dividend

increases the potential labour supply but that its effect on economic growth depends on the policy environment.

Inequality in Health

WHO (2002) aptly describes inequality thus, “In poor countries, income protects against many of the causes of diseases, while in rich countries income inequality indicates the quality of social arrangements, stress and mortality. Still, there is no need to assume that the relationship between income and mortality changes with economic development. If it is poverty, not inequality, that drives mortality, the effects of inequality will endure, for even in rich economies there are some who are not so rich”

Inequalities in health arise because of variations in the three classes of determinants of population health (Evans et al. 1994; Olsen et al. 2003). The first is genetics which explains inherited diseases through natural variations in human biology. Second, the physical and social environment includes working conditions, population, cultural norms and position in the social hierarchy. Third, health-related lifestyle refers to people’s behaviour regarding diet, exercise and substances used.

Inequality in health can be in different ways. One is between different ethnic groups in the population, not only within developing countries but also in Europe as a result of immigration there since the Second World War. One is differences between geographical areas both within and between countries. They can be between social classes. They can also be between the employed and unemployed. Besides, it can be between different levels of educational achievements, income groups and sexes.

There are vast differences between developed and developing countries in health status. For example, in Bangladesh, one out of eight children die before the age of one year, while in Japan it is one per 142. In most developing countries infants born in rural areas have a much lower chance of survival than in urban areas. We would expect inequality to be greater in developing countries because inequality in the distribution of income is greater too.

By reducing income inequality, one would expect intuitively that population health could be improved for the simple reason that the effects of income on health are greater among the poor than among the rich. Health is a concave function of income. The effect of income on reducing the probability of death at the bottom of the income distribution is much greater than at its top. As a result, if income is redistributed from the rich, whose health is not much affected, to the poor, whose health is much more responsive to income, average health will improve. Other things being equal—and here that includes average income—nations or other groups with a more equal distribution of income will have better average group health. The same is true internationally- anything that raises the GDP of poor countries relative to that of rich countries will improve average health. Within the poor countries, infant and child mortality are likely to be particularly sensitive to changes in income near the bottom of the distribution, so that once again redistribution towards the poor will reduce child mortality even without raising average income.

Kopparty (1994) pointed out that high class/high caste groups show a number of important differences in a variety of health practices in comparison with the low class/low caste groups. Social cultural beliefs like food habits, dressing, household occupation, family norms and unequal access to health service in different social groups play a major role in determining health status. Many socio-economic disparities are unjust and unfair since they put certain groups of people at a disadvantage not only economically, socially and politically, but also in terms of their possibilities to be healthy (Hosseinpoor et al. 2006).

Governments and international organizations have recognized the need to reduce the health inequalities among social and economic groups. India even committed herself to achieving the goal of health for all by 2000 in accordance with the path breaking declaration of 1978. More than thirty years have passed since then but the commitment not only remains an elusive goal, and still there is gender bias, economic bias, status bias and bias of availability of welfare funds in India (Feinstein 1993; IIPS and Macro International 2005-06; Joe et al. 2008). In developing countries, gap in the demographic and health-related outcomes between the rich and poor are large (Baker et al. 1993; Gwatkin 2000; Wagstaff, 2002; Joe et al. 2008).

An analysis by Singh and Arokiasamy (2010) shows that 55 per cent of inequality in IMR is due to poor economic status. Overall, 65.7 per cent inequality is explained by poor economic status, castes and Muslim religion. In India inequalities persist around economic class, caste and religious groups, and often social class determines economic class, i.e., lower the social class, lower the economic class. Deaton (2001) argued that income inequality is not a major determinant of health of the population.

2.3 Theoretical Studies

Different theories of economic growth produce different answers to the question of how health conditions affect a country's per-capita GDP overtime (Barro 1996). For example, the neoclassical growth theory of Solow (1956) and Swan⁵ (1956) implies that in the long run only the level of per capita GDP will be affected, not the growth rate, which is determined by the global rate of technological progress.

Until 1990s, human capital was mainly considered in the form of education. Later the health determinant also became its essential part. For instance, David Bloom, Canning and Sevilla (2001) formulated a production function model in which they included work experience and health as human capital. They found that good health has a positive, sizable and statistically significant effect on aggregate output. Similarly, there are many studies (Barro 1996; Kalemli-Ozcan, Ryder and Weil 2000; Strauss and Thomas 2001; Bhargava, Jamison and Murray 2001; Bloom, Canning and Sevilla 2001; Bloom, Canning and Graham 2003; Alsan, Bloom and Canning 2004; Bloom, Canning and Sevilla 2004; Jamison, Lau and Wang 2004, and many more) that show how good health of the population can add to the growth of the economy.

Grossman (1972), Mankiw et al. (1992) and Barro (1996) have developed models that include health capital as a significant variable for economic growth. Grossman develops a model that allows health capital formation, seen as a capital good, to be able to work, to earn money, and to produce domestic goods.

⁵ The neoclassical growth model, also known as the Solow–Swan growth model or exogenous growth model, is a class of economic models of long-run economic growth set within the framework of neoclassical economics. Neoclassical growth models attempt to explain long run economic growth by looking at productivity, capital accumulation, population growth and technological progress.

Life expectancy is the most used variable to represent health. It is defined by the United Nations as the average number of life years since birth according to the expected rate of mortality by age. But it is not clear whether the definition of life expectancy is the best definition for health capital. Bhargava et al. (2001) mention life expectancy does not reflect the productivity of the labour force accurately and capital formation and innovation need the labour force to be active and healthy during most of its working life. Also, Evans et al. (1994) mention that death and health factors could not be related. Therefore, it is not certain whether life expectancy completely measures the impact of health on economic growth. If the health variable is not well specified, it can lead to measurement errors or omitted variable bias, failing to have a true estimation by health.

The effect of health on individual productivity shows a relationship between population health and aggregate output. Shastry and Weil (2003) estimate a production function model of aggregate output using microeconomic estimates of the return to health. They show that when adult survival rates improve, it leads to a rise in population heights. They find that cross-country gaps in income levels can be explained in part by differential levels of physical capital, education, and health, with these three factors making roughly equal contributions to differences in income levels.

Gallego (2000) mentions that a theoretical solid structure integrating health and economic growth has not been developed. He attributes this to the lack of interaction between the contributions of health economics and economic growth theory.

2.4 Empirical Studies

Empirical evidence strongly suggests that health is a robust determinant of economic growth (Barro, 1996; Kalemli-Ozcan, Ryder and Weil 2000; Strauss and Thomas 2001; Bhargava, Jamison and Murray 2001; Bloom, Canning and Sevilla 2001, 2004; Bloom, Canning and Graham 2003; Alsan, Bloom and Canning 2004; Jamison, Lau and Wang 2004, among others). In some studies, initial health status (life expectancy or adult mortality) proved to be a more significant predictor of subsequent growth than the education indicators employed (Barro 1997). Bhargava, Jamison and Murray (2001) show in the context of a panel regression that the 5-year growth rate of per capita GDP depends, among other factors, on a country's adult mortality rate.

Causation of Income and Health

Income works to health through the effect of the private purchase of the inputs to good health, e.g., nutrition, medicines and healthcare (Schultz 1999; Viscusi 1994), the expansion of public goods and services (Anand and Ravallion 1993), reduced fertility and consequent improved maternal health (Bloom and Canning 2000) or better education and lifestyle choices (Feinstein 1993). On the other hand, micro-economic studies have established that ill-health makes workers less productive (Deolalikar 1988; Basta et al. 1979) and can cause permanent disablement (Murray and Lopez 1997a,b). Disease treatment and prevention usurp scarce economic resources (World Bank 1999).

In an empirical analysis, Bloom et al. (2001) follow the Solow model with human capital. They find that health capital is a significant variable for economic growth under the two-stage least squares method. For Latin America, the Pan-American Health Organization finds a strong correlation between economic growth and the regional health, estimating regressions similar to Barro's (1996) where health is much more robust than schooling (Mayer et al. 2000).

In health economics, the endogenous causality between health and income has been the topic of several studies. Smith (1999) uses life cycle models which link health condition with future income, consumption and welfare to explain the direction of the causality of the impact of health over income. According to this, Bloom and Canning (2000) explain this direction of the causality with education, indicating healthy people live more and have higher incentives to invest in their abilities since the present value of the human capital formation is higher. Higher education creates higher productivity and consequently higher income.

Health status serves both as an indicator of population welfare and, in some of the studies, as a determinant of economic growth rates. Fogel (1994) shows that about one-third of the increase in income in Britain during the nineteenth and twentieth centuries could be attributed to improvements in health and nutrition.

Other studies have found that groups of children during their first three years of life with higher calorie intake had higher incomes and, therefore, were more economically productive approximately 20 years later.

Bryant (1969) points out that health and health services can improve economic development and bring about social and economic changes within a region. In an empirical study, Sorkin (1977) concluded that health (reductions in mortality) had an important impact on economic growth during the early twentieth century. He says that improvement in the health status in developed nations will have little impact on economic growth, but the impact could be different for developing nations. He points out how health programmes could make an impact on the economic development of the developing nations. The first way is through productivity gains and increasing man-hours of work. The second way is making feasible the development of previously unsettled regions. Sorkin mentions a major health programme could initiate the development of areas where economic activity was deterred by unfavourable health matters. The third way is improving innovation by changing the attitudes of people.

According to a World Bank study by Wang et al., (1999) income growth is less important for improving outcomes than other factors such as access to health technology (data from 1952 to 1992). According to the World Bank, 45 per cent of the reduction of child mortality can be accounted for by the generalization and utilization of new knowledge, 38 per cent is due to the educational achievements of female adults, and only 17 per cent to the sheer effect of income. Therefore, like economic growth, new technologies, new investment and new labour requirements are significant for health improvements. Economic growth can lead to improvements in life indicators, but sometimes it does not, and at other times it does so only after a lag of variable length.

Bhargava et al. (2001) find a positive relationship between adult survival rate and economic growth. Results remain similar when adult survival rate is replaced by life expectancy. However, fertility rates have a negative relationship with economic growth because life expectancy is influenced by child mortality. Growth in workforce is mostly lower than population growth. Resultantly, high fertility rate reduces economic growth by putting extra burden on scarce resources.

At the macro level, very little is known of the association between income/economic growth and health (Gupta and Mitra 2003; World Bank 2004). Gupta and Mitra (2003) examined the relationship between health, poverty and economic growth in India for the years 1973/74, 1977/78, 1983, 1987/88, 1993/94, 1999/2000 based on data for 15 Indian States. Their econometric analysis showed that per capita public health expenditure positively influences health status, poverty declines with better health, and growth and health have a positive two-way relationship.

A study of 14 major states of India by Duraisamy and Mahal (2005) for the period 1970-2000 indicates that the effect of health measured by life expectancy is positive and significant on economic growth. There is evidence of a significant effect of per capita income and per capita public expenditure on health on life expectancy. This analysis shows that a thousand rupee increase in per capita health expenditure would lead to a 1.3 per cent increase in life expectancy, while a 10 per cent increase in per capita income is required to increase the life expectancy by about 2 per cent. Production function estimates indicate that the effect of health (life expectancy) on Net State Domestic Product (NSDP) is very high, in fact, much higher than the effect of the inputs of capital and labour. In a World Bank (2004) study, the effects of per capita GDP, per capita health expenditure and female literacy on infant mortality were examined using state-level data for the period 1980-99 based on an econometric framework. The results show that both per capita public spending on health and per capita GDP are inversely related to IMR, but they are not very robust to alternative specifications of the model. (Duriasamy and Mahal, 2005).

According to the study by Pritchett and Summers (1996), the long-run income elasticity of infant and child mortality in developing countries lies between -0.2 and -0.4. They calculated that over half a million child deaths in the developing world in 1990 alone can be attributed to the poor economic performance in the 1980s.

By using Granger Causality techniques and Error Correction on the time series data of Pakistan for the period 1972-2006, Haq and Khan (2008) found that per capita GDP is positively influenced by health indicators in the long run and health indicators cause the per capita GDP. However, in the short run health indicators fail to put significant impact on per capita GDP. It reveals that health indicators have a long run

impact on economic growth. It suggests that the impact of health is only a long run phenomenon and in the short run significant relationship does not exist between health variables and economic growth, and high levels of per capita income can be achieved by increasing and improving the stock of health human capital, especially if current stocks are at lower end.

Hadian et al. (2008) examined the effect of health expenditure on economic growth in Iran for the period 1980-2004. They used Solow model and evaluated the results by Hussmann test. The findings show a positive and statistically significant effect of health expenditure and population growth on economic growth.

A study by Salmani and Mohammadi (2009) shows that public health expenditure had a positive and meaningful effect on economic growth in the long run in Iran. They use growth model of aggregate production function (based on growth accounting) for the period 1971-2002. The study by Ghanbari and Basakha (2008) shows the same result, and it also proves that public expenditure on health has a positive effect on economic growth - more than expenditure on education in Iran.

Emadzade et al. (2010) used a method derived from Romer's endogenous growth model, a panel data approach, for the period 2000-2007 with cross-sectional data for 27 provinces of Iran. This study shows the positive effect of household health expenditure growth and government investment expenditure on economic growth in the provinces of Iran. Moreover, the results show a negative relationship between consumer price index (CPI) and economic growth of each province. Household health care expenditure had a significant effect on economic growth in the provinces.

Mehrara Musai (2011) examined the short and long run relationships between health expenditure (as a measure of health) and GDP in Iran over the period 1970 to 2008, by using Autoregressive Distributed Lag (ARDL) approach to co-integration and Error Correction Models (ECM) suggested by Pesaran et al. (2001). The study finds that, there exists a co-integrating relationship among GDP, health expenditure, capital stock, oil revenues and secondary enrolment ratio (as a proxy of education). This study shows that the impact of health expenditure on output is statistically insignificant and trivial in size. In other words, health expenditure has not been contributing to the output level of

the economy in the short and long runs. It can be attributed to low productivity of inputs, and inefficiency of investments and facilities in health sector.

Faisal and Waheed (2011) estimated the relationship between human capital and economic growth in Pakistan by using the Cobb-Douglas production function. Their study confirms the long run positive relationship between human capital and economic growth. The health adjusted education indicator for human capital was found to be a highly significant determinant of economic growth.

Hassan and Cooray (2012) found that male life expectancy has a positive effect on income growth, while female life expectancy has a negative effect. They used a production function-based approach, the role of health as a regular factor of production, and lag differences of life expectancy and school enrolments and lagged growth rates of other inputs as instruments for controlling the endogeneity of health in the growth regressions in 83 countries during 1960–2009.

The studies show that good health raises the level of human capital and has a positive effect on productivity and economic growth. But empirically the nature of the relationship between health and income is still not clearly defined and it is more difficult due to the possible existence of endogeneity between these two variables.

It is believed that personal income affects health and income may also play its part through issues of relativity and deprivation. It may even be possible that these latter indirect effects are more important determinants of health than individual income. Even in rich societies, the nature of the relationship between income and health status is not clearly understood.

In India the empirical studies show that people with a higher recurrence of diseases spend a higher proportion of their family income for health care than their richer counterparts. They also receive a lower share of public subsidies on health care. Around 80 per cent of the expenses for health care are covered by out-of-pocket sources which often poses an enormous burden on the underprivileged households.

Cross-country Studies

Cross-country studies of the impact of health on income levels and growth rates go back at least to the first of the World Bank's World Development Reports (WDRs) on poverty (World Bank, 1980; Hicks, 1979; Wheeler, 1980). The stronger effects of health on income levels were found by using better data and an aggregate production function methodology (World Bank 1993, p. 21). More recent studies have examined the effects of life expectancy around 1965 on economic growth and in the subsequent 15 to 25 years (Barro 1997; Sachs and Warner 1997; Bloom and Williamson 1998).

Malenbaum (1970) on the basis of macroeconomic data of 22 poor countries shows how the influence of health factors on output seems to be larger when compared with other economic and social variables. He suggests that health programmes could change the lives of the poor by taking their own decisions and to have the feeling to influence the events on their everyday activities.

Public health programmes (by reducing sicknesses) have beneficial effects on health by preventing the loss of vital nutrients due to infection (Scrimshaw et al. 1959).

Preston (1975), by using cross-country evidence, suggests that the effect of improvements in income on health was greater for the poorest countries than for the richest countries. He analysed cross-country data on life expectancy and national incomes for periods 1900, 1930 and 1960, and observed that the curves showed an upward shift over time. For a given income level, life expectancy was the highest in 1960s. Moreover, per capita GDP above \$600 (at 1963 prices) had little impact in raising the highest life expectancy (approximately 73 years) in the 1960s. He attributed approximately 15 per cent of the gains in life expectancy to income growth, but it was less for nutrition and literacy. However, analyses of historical data show larger benefits from improved nutrition (Flood et al. 1991; Fogel, 1994). Therefore, it is likely that the impact of health indicators such as the adult survival rate (ASR) on growth rates would depend on the level of GDP. For example, ASR should be important for explaining economic growth at low levels of GDP.

Bhargava et al. (2001) found that the ASR has a positive effect on growth rate of per capita GDP, and that a 1 per cent increase in ASR increases the growth rate by 0.05 per cent for the poorest countries. They found strong effects in low-income countries, viz., the effects of initial health status on growth over a shorter period (5 years) in selected countries. Studies have found strong positive direct as well as indirect effects operating through rates of investment in physical capital

There is also literature that focuses on causality in the reverse direction, i.e., from income to health. Much of this work is based on micro-level data that focus on the impact of income on the health status of households and their members (Behrman and Deolalikar 1988; Strauss and Thomas 1998).

Barro (1997), and Barro and Sala-i-Martin (2004) use data set of countries including life expectancy at birth (LEB), years of educational attainment and other factors that could potentially affect the growth of per capita income. The results indicate that the log of LEB has a positive and statistically significant effect on growth rate with a coefficient of 0.042 (an annual rate of increase of per capita real GDP of 4.2 per cent). Mayer (2001) concludes that improvements in adult survival were linked to improvements in growth performance in Brazil and Mexico. Gyimah-Brempong and Wilson (2004) find that 22 per cent and 30 per cent of the growth rate of per capita income in sub-Saharan Africa and OECD countries respectively can be attributed to health.

Bloom and Canning (2000) cover 31 countries with a combined population of 3.1 billion as in 1990 for which sufficient data are available. They argue that if life expectancy had been 10 per cent higher in 1990, this would have had a strong positive effect on income growth and a modest negative effect on income inequality over the following 25 years. The estimates suggest that these health improvements alone would lift 30 million people out of absolute poverty by 2015. Two-thirds of them would have lived in India and a third in Africa, mirroring the huge importance of health for regions at an early stage of development.

Bloom, Canning and Sevilla (2004) review several studies based on a cross national dataset for countries that include health as an explanatory variable in growth

equations. They use a production function model of economic growth with a measure for human capital: the indicators of health, education and labour market experience. They report evidence from more than a dozen cross-country studies which show that health has a positive and statistically significant effect on the rate of growth of per capita GDP. Their empirical findings reveal that an increase of one year in LEB raises the growth rate of GDP by 4 per cent. Health in the form of life expectancy has appeared in many cross-country growth regressions and investigators generally find that it has a significant positive effect on the rate of economic growth (Bloom and Canning 2000, 2001).

Shastri and Weil (2003) and Weil (2005) use a different methodology to estimate the share of cross-country variation in income that can be associated with differences in health status. Combining microeconomic estimates of the impact of health on productivity with a macroeconomic accounting model, they decompose aggregate country output into a (residual) productivity term, plus the return to certain factors including physical capital, educational human capital and health human capital. Measures of output, physical capital and educational capital (by years of schooling) are readily available for some countries, although admittedly a subset, particularly for education. The challenge is to construct a measure of health that is relevant to productivity (World Bank 2009).

Life Expectancy

Life expectancy at birth is the number of years a random new-born baby can expect to live. Life expectancy (or the adult survival rate) in a country is a broad measure of population health. Long lives and high incomes are highly correlated in a statistical sense. This is documented by the celebrated Preston curves (1975). Preston had in mind a causality running from income to life. He has stressed how average life expectancy increases at any given level of income. Middle-income countries today, for example, have reached per capita income levels close to that of the United States around 1900. Yet, in 1900 life expectancy in that country was only about 49 years whereas in many middle-income countries today it exceeds 75 years and, indeed, is close to that of the United States. The twentieth century witnessed extraordinary and unprecedented declines in mortality rates at all ages” (WHO 2002).

Higher life expectancy leads to a higher rate of return on human capital investment. The future gains from earnings can be realized only if a person lives long enough to enjoy them. Better trained workers can expect more by raising life expectancy. The relation of education to income is well established. Studies show a very strong positive correlation between life expectancy and years of schooling. The correlation is both ways. It has been shown that school enrolment is a good predictor of good health (Lleras-Muney, 2001). In England the average number of years of schooling rises from 2.3 for the cohort born between 1801 and 1805 to 9.1 for the cohort born between 1897 and 1907. It rises even further to 14 for 1974 through 1992 cohorts. The other correlation is also likely to be at work as the decline of youth mortality directly raises the return to early age education. Ram and Schultz (1979) point to the post-World War II experience of India as evidence that the improvement in mortality has created an important incentive to increase education at any age.

According to a study by Schultz (2005), some of the world's lowest life expectancies - less than 50 years - are seen in sub-Saharan African countries that typically also suffer from extremely low levels of per capita income and often negative economic growth rates. Although underdeveloped countries often lack the resources needed to invest in health care systems, it also seems likely that poor health will itself retard growth and consequently income.

In many cross country regressions there is a positive and significant effect of health (life expectancy) on the rate of economic growth. But this does not establish that health directly benefits growth. Those studies show that a one-year improvement in a population's life expectancy contributes to a 4 per cent increase in output. They have extended production function models of economic growth for two variables of human capital: work experience and health. Thus, they have shown that good health has a sizable, positive and significant effect on aggregate output (Garima 2006).

One major problem in the empirical studies of the impact of health on economic growth is using life expectancy as a proxy variable of health. However, health as life should be measured in all its dimensions: mortality, morbidity, disability and expectancy. Life expectancy takes into account mortality, but it is not perfectly correlated with the rest of the health dimensions (Evans et al. 1994). Moreover, it reveals only the lifetime of the

stock of human capital, saying nothing about the time in the labour force of this capital or the problems caused by the aging population. This is a problem because, even though there is a solid connection between health, productivity and economic growth, health capital depreciates over time (Grossman 1972).

Barro (1991) estimates that life expectancy is significantly correlated to subsequent growth. By using post–World War II data he estimates that a 10 per cent increase of life expectancy could raise economic growth by 0.4 per cent yearly for the subsequent decades. There are clearly many potential explanations for these correlations. Life expectancy is, first of all, a summary statistic of many determinants of health and such regressions are silent on which of these dimensions are really important.

Child Mortality

Economic growth is strongly related to decline in child mortality. Growth increases the capacity and ability of individuals to demand and consume better health care, housing, nutrition, etc. It also increases the capacity of governments and other players to supply more and better health care and to improve access to it through improved infrastructure. However, this strong relationship should not be taken for granted. The income elasticity of child mortality is not as high as it is for poverty, and economic growth alone will not be enough to attain the MDGs target for child mortality by 2015.

Over half of Asia's children under-five suffer from low weight-for-age, and a third of them suffer from low weight-for-height. Nearly one in five new-borns in Asia has low birth weight (less than 2.5 kg) and nearly 60 per cent of women suffer from nutritional anaemia. About 30 per cent of new-borns have low birth weight in India whereas in China it is 6 per cent, which is about the same as that in Japan and the western industrial democracies (World Bank 1990). Therefore, there are large differences in various aspects of well-being across poor countries (Dasgupa 1993).

The IMR is still one of the most important indicators of the progress of development. The determinants of IMR based on various studies (Rosero-Bixby 1986; Wennemo 1993; Ahmad et al. 2000; Rutstein 2000; Hanmer et al. 2003) are: (a) child

care factors like proportion of immunized children, proportion of malnourished children and medical care for children with diarrhoea; (b) maternal care factors like prenatal medical care, medical care during pregnancy and delivery in a health facility; (c) demographic factors like fertility rate; and, (d) socio-economic factors like per capita income, expenditure on public health, mother's education and living conditions.

Few hypotheses are offered for explaining the stagnation of IMR in India during the 1990s. Claeson et al. (2000) mentioned lower social, cultural and health status of women as possible factors contributing to the stagnation of IMR. Das and Dey (2003) indicated that in the states with low and moderate levels of infant mortality, the stagnation in IMR could be attributed to neonatal mortality since post-neonatal mortality has been controlled to a certain extent.

The study by Gupte and Mayur (2008) found that the combination of high female literacy and low corruption brought out the best results. Though the effect of female literacy continued to be the most important determinant of IMR, states that were less corrupt seem to be able to take advantage of improved female literacy to affect IMR.

Empirical evidence tends to suggest that public health expenditure is not a significant determinant of child mortality after controlling for income and other factors such as female education. However, investments in primary health care and implementation of cost-effective interventions such as immunization programmes lead to real increases in health-related human resources, physical infrastructure and access can and do have a significant impact on child mortality.

In addition, one needs to be cognizant of cross-sector synergies as female education is a significant determinant of MDG indicator and, hence, must be included in any analysis of policy options that could help precipitate decline in child mortality. Poverty reduction itself, due to the non-linear gradient between income and health, would also facilitate reductions in child mortality (Tadon, 2007).

The effect of better health on population growth is ambiguous. In the short run, higher child survival leads to more rapid population growth. Over longer horizons, lower infant and child mortality may lead to a more-than-offsetting of decline in fertility so that

the Net Rate of Reproduction falls (Bloom and Canning 2000; Kalemli-Ozcan, Ryder and Weil 2000).

Mortality

Much of the literature reveals that the developmental and socio-economic factors play a vital role in reducing mortality rates. The cross section study by Shen and Williamson concluded that per capita GDP demonstrates most significant effects on maternal mortality. It also suggested that the success of lowering maternal mortality in LDCs depends on the efforts to increase the status of women including the policies aimed at increasing women's education and health services.

Some studies suggest an inverse relation between the rate of improvement in health conditions and the rate of economic growth, at least in the short run and in advanced economies in recent decades. Moreover, in modern industrialized nations, it is not hunger but harmful caloric over consumption and its pathologic effects (overweight, diabetes, hypertension, cardiovascular disease and cancer) which are a matter of concern (Isaacs and Schroeder, 2005).

Though it is increasingly accepted that in the short run economic growth may have harmful effects on health, in the long term a beneficial impact of economic growth on health improvement is usually accepted. Since it is proved that the poorest countries have the worst health indicators and income growth is directly translated into improved health conditions (Pritchett and Summers 1996), it is tempting to apply the same reasoning to high or medium income countries, assuming for instance that the capacity to generate higher earnings facilitates an increase in the consumption of health-related goods such as adequate food or medicine and healthy changes in lifestyle (Lopez-Casasnovas et al. 2005).

In the United States and Britain, some historical periods of rapid economic growth during the early years of industrialization have been shown to coincide with increasing mortality (Easterlin 1999; Haines et al. 2003; Higgs 1979; Szreter 1998). In India and China during recent decades of high economic growth, decline in mortality rates have

been small compared with strong drops in mortality during the slow-growth decades before economic liberalization (Cutler et al. 2006).

In the field of historical demography, however, expectations about the impact of economic growth in the long-run decline of mortality are generally modest. For instance, according to the estimates by Samuel Preston, only between 10 per cent and 25 per cent of the massive international decline in mortality between the 1930s and the 1960s could be attributed to improved standards of living measured in terms of per capita income (Preston, 1976; Preston 1996), an estimate that has not been seriously challenged to date.

2.5 Socio-economic Development

The term “socio-economic position” is used to address the social and economic factors that influence the position(s) individuals and groups hold within the structure of society, i.e., which social and economic factors serve as the best indicators of the location in the social structure that may influence health (Berkman, 2000).

The review of literature shows that socio-economic status (SES) and health are strongly related in both developing and industrialized countries, as well as in welfare states and liberal democracies. Some dimensions of SES cause health, others are caused by health, and still others are mutually determined with health. Some of them fall into all three categories simultaneously. These differential patterns of causality make a single theory of socio-economic gradients in health difficult to propound. In childhood parental resources - education and income, for example - have a potent effect on health. Parental behaviours, which themselves are influenced by SES, play some role in the determination of child health (Case and Paxson 2002).

There are socio-economic inequalities in health, with poor people exhibiting a worse health status while being less likely to use health services. Health in a region is compromised by low income, unemployment, want of education and lack of health insurance among some population groups. Low welfare levels are correlated with poorer health outcomes, and that this should influence strategies to reduce poverty and health inequalities. It is important that health policy-makers consider how to improve the quality of data emanating from the public health surveillance systems. This would ensure that

health investments are properly channelized with the potential to reduce inequalities and ensure longer term improvements in health (Health and economic development in south-eastern Europe, WHO, 2006).

Wilkinson (1996) found evidence suggesting that the health of a population depends on equality of income distribution rather than average income. Thus, rising average incomes can be associated with declining health if the resultant wealth is concentrated among a few hands. Some of the most consistent evidence on socio-economic inequalities in health comes from British mortality data. During the 1980s and 1990s, mortality was consistently lower among men in the higher socio-economic classes than in the lower classes, regardless of employment status. As Wilkinson showed, the relationship between income and life expectancy is steeply linear up to a level of about US\$ 5000 per capita gross national product (GNP). By examining cross-sectional data from 11 OECD countries, he demonstrated a strong correlation between income inequality and life expectancy. The link between socio-economic status and health are not completely clear, and the optimal policy response is difficult to determine. Improving childhood health may lead to superior socio-economic outcomes later in life in addition to current health improvements.

The empirical finding shows a strong positive correlation between education (measured as years of formal schooling completed) and good health. There are three possible explanations (not mutual inter-dependent) to the observed correlation: (1) more education improves health; (2) better health leads to more education; and (3) there is no direct causality between health and education. Instead, the positive correlation is explained by a third variable such as genetic characteristics or time preferences which affect both health and education. From a health policy perspective, it is important to distinguish among these three possible explanations.

2.6 Health Expenditure

Studies have shown that healthcare expenditure is closely related to a country's GDP level and economic growth (Whynes 1992; McCoskey and Selden 1998; Hansen and King 1996, 1998; Newhouse 1977, 1987; Parkin et al. 1987; Govindaraj et al. 1997; Jayasinghe et al. 1998; Van der Gaag and Barham 1998; Cowan et al. 1996; King 1996;

Burner and Waldo 1992, 1995). But a theoretically optimal level of health expenditure and an optimal growth rate are rarely investigated. Based on Solow, a theoretical model is developed by Lucas and Romer (1980) to discuss the role of health capital in economic growth. The model shows that convergence is present between poorer and wealthier countries when both physical and health capitals are considered. The long-term increase of healthcare expenditure raises a great concern about the allocation of public resources.

Richer countries can afford higher expenditure on public health. As income increases, the quality of living also improves. Health services in most of the developed countries are observed to be luxury goods (Clemente et al. 2000; 2004) for which spending increases faster than the growth of income (Newhouse 1977; Leu 1986, Gerdtham et al. 1992).

Hitiris and Posnett (1992) estimated the effect of income on health using cross-country time series data. Then they re-examined previous results and confirmed a strong positive relationship between health spending and per capita GDP by using different conversion methods to calculate the estimated relationships. Some non-income variables are also important, but the direct effect of these factors is small.

Grossman (1999) notes that healthcare expenditure and health outcomes are not the same: the model he describes “...Emphasizes the difference between health as an output and medical care as one of many inputs into the production of health”. Wagstaff (1986) says, “it has become increasingly accepted that medical care is not usually the major determinant of health.” Evans and Stoddart (1990) think that health is only determined by healthcare as an “incomplete, obsolete and misleading framework”. As Bonds et al. (2009) note “the literature on the interaction between income and disease tends to be unidirectional and to focus on either the effects of (i) income on health or (ii) health on income”.

Spending on health is not just a cost, it is an investment. Health expenditure can be seen as an economic burden⁶, but the real costs to society are the direct and indirect

⁶Snapshots: Health Care Spending in the United States and OECD Countries, January 2007, <http://www.kff.org/insurance/snapshot/chcm010307oth.cfm>

costs linked to ill-health as well as a lack of sufficient investment in relevant health areas. It has been estimated that the annual economic burden of coronary heart disease can amount to 1 per cent of GDP⁷, and the costs of mental disorders to 3-4 per cent of GDP⁸. Healthcare spending should be accompanied by investment in prevention, protection and improvement in the population's overall physical and mental health which, according to OECD data, currently amounts to an average of 3 per cent of its member states' total annual budgets for health compared with 97 per cent spent on healthcare and treatment⁹.

Berta Rivera and Luis Currais (2003) found that countries with lower levels of health spending obtain larger benefits when the other determinates of growth are held constant. Determining a casual effect of health on income depends on the availability of adequate instruments. Main factors that contribute to increases in health spending are: the extent of public coverage, demographic changes (especially rise in the numbers of the elderly as a proportion of the population), technological changes, the continual increase of relative prices (due to general inflation and the specific health prices), intensity of the utilization level of health services, and the increasing use of diagnostics and other technical procedures. Aging population and new medical technology place further demands on health systems.

Baldacci (2004) found that spending on health within a period of time affects growth within that period, while lagged health expenditures appear to have no effect on growth. He mentioned from this result that the direct effect of health expenditure on growth is a flow and not a stock.

2.7 Research in Health and Economic Growth

There are two approaches to estimating the effect of health and economic growth. The first is the effect of health from microeconomic studies and their use to calibrate the size of the effects at the aggregate level. The second is to estimate the aggregate relationship directly using macroeconomic data.

⁷ Suhrcke, M., M. McKee, R. Sauto Arce and S. Tsoлова, J. Mortensen (2005), *The contribution of health to the economy in the EU*, Brussels.

⁸Gabriel, P. and M.R. Liimatainen (2000). *Mental Health in the Workplace*. International Labor Organization: Geneva.

⁹OECD Health Data 2006, *Statistics and Indicators for 30 Countries*. CDROM, Paris.

Limitations of Data and Measurement of Health

In the research on the links between health and growth, there are some measurement problems from the selection of variables and the validity of those measures to the econometric problems that emerge where there is reverse causality. Sweden has historical statistics that are probably the best in the world because of early development of a statistical registration system. Using these statistics, it is possible to analyse the long-term relation between economic growth and health progress. Accurate health statistics are a public good that only governments and inter-governmental organizations can provide.

Measuring “health” is tricky and no measure aptly captures morbidity and mortality (Schultz 2005). According to World Bank report (2009), the use of life expectancy or infant and child mortality rates as measures of health status is not without ambiguity for both conceptual and practical reasons. First, these indicators attempt to measure aspects of health that might be related to productivity, including the extent to which individuals experience, or are at risk of bad health, encompassing both morbidity (illness) and premature death. Mortality is also a one-time event and remains rare even in high mortality settings. Despite the heavy reliance on mortality statistics to measure health, for all these reasons mortality is a sub-optimal measure of “health”. Second, at a practical level, accurate measures of life expectancy require good vital registration data, particularly on deaths. In some developing countries, these data simply do not exist, and estimates of life expectancy are based on child mortality rates, using standard life tables to impute infant mortality levels (adjusting for guesses about mortality risks in the population where necessary). While the cross-country pattern of life expectancy levels is likely to be reasonably accurate, data on changes in life expectancy may well embody large errors due to a variety of (unmeasured) causes of such changes.

A major difficulty in measuring the economic effect of health is the two-way causality between wealth and health (Smith 1999). Another difficulty is the lack of consensus on what is meant by health. Different studies use different health measures: self-assessments of health, biomarkers, medical records, limitations on physical functioning and anthropometric measurements have all been used as health indicators. Each of these approaches may fail to provide a complete picture of an individual’s health status, giving rise to a problem of measurement error. In addition, it is necessary to

separate the effect of investments in health from the effect of natural or genetic variation in health (Schultz 2005).

One solution to these problems in measuring the effect of health on worker productivity is to establish the causal paths in the data through the use of timing of health shocks and income or wealth responses (for example, Adams and others 2003). Case, Fertig, and Paxson (2005), controlling for parental influences and education, find that childhood health has a significant impact on adult health and earnings. Yet another approach to establishing causality is to use instrumental variables. For example, Schultz (2002) instruments adult height with childhood health and nutrition to argue that each centimetre gain in height due to improved inputs as a child in Ghana and Brazil leads to a wage increase of between 8 and 10 per cent. Strauss and Thomas (1998) provide a survey of studies in this area.

Therefore, there are four difficulties in assessing the existing work in health. The first is the issue of measurement. “Health” is measured differently in different studies. There is a wide variety of health measures in microeconomic studies. All of them aim at measuring some aspect of morbidity at the individual level. Similarly, macroeconomic studies use a variety of indicators, but they focus on measures of the mortality rate such as life expectancy. It is difficult to compare studies that use such different notions of “health.” The second difficulty is causality. Given that income affects health and health affects income, we have to disentangle the two directions of causality. The third issue is one of timing. There is growing evidence of long-term effects of early childhood health on cognitive and physical development which affect productivity as an adult. This implies that health effects in the macro economy may have long time lags, given that the average worker may have been born 40 or more years before, making the macroeconomic relationship difficult to estimate. The fourth issue is the effect of health on the economy, holding all other factors fixed, and the effect on a more general equilibrium framework where other factors respond to improved health. Some studies measure the partial equilibrium effect, whereas others attempt to capture the induced changes in other factors and the general equilibrium impact.

Although measures of the health of population are highly predictive of future economic growth, there is a debate about how to interpret the link. However, Acemoglu,

Johnson and Robinson (2003) argue that differences in health are not large enough to account for much of the cross-country difference in incomes and that the variations in political, economic and social institutions are more central. They argue that health does not have a direct effect on growth, but serves in growth regressions as a proxy for the pattern of European settlement, which was more successful in countries with a low burden of infectious diseases. Even if a causal interpretation of the effect of health on individual productivity and economic growth is accepted, the argument for using health as an input depends on there being low-cost health interventions that can improve population health without first having a high income level. However, the number of such interventions that can be implemented is large (Commission on Macroeconomics and Health 2001).