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Relation between Health and Wealth: Is it a Myth or a True Relationship? Evidence from Egypt

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Abstract

This paper investigates the relationship between health and wealth in the Egyptian economy during the period 1960-2010. We use life expectancy at birth as a measure for the health and gross domestic product per capita (constant 2000US$) as a measure for the wealth. We employ the cointegration analysis and utilize the linear and nonlinear forms. This paper concluded that for the linear model, the results indicate that there is a positive and significant relationship between health and wealth. For non-linear model, the results show that health and wealth have inverse U-shape relationship. This conclusion will help policy makers and researchers in developing countries with high fertility rate to consider a strategic health program to achieve impacts on nation's health and human wealth. However, further work need to be done in order to specify exactly which policies will be effective in improving economic growth and development in LDCs.

Keywords: Health, Wealth, life expectancy at birth, Cointegartion analysis

1. Introduction

For decades researchers documents the positive links between income and a wide array of health indicators (see reviews by Deaton, 2001; Robert, 2000b; and Wagstaff and Pamuk, 1998). In lower income countries, Case et al. (2002) provide evidence that these countries experience higher rates of asthma, heart conditions, hearing problems, digestive disorders and elevated blood lead levels. While in high income level countries they witness better health level. On the other side, there is a gap in literature between the relation between wealth and health. This is a surprising fact because we view wealth as a basic measurement that affects a person's health. The question is whether the same relationship exists between wealth and health.

The relation between wealth and health are interrelated and require decision makers to realize the core channels to achieve growth and development. Health role is vital for economic growth and the nation's wealth. The direct effect of wealth on health occurs via different levels. First, finance channels, saving provide a direct effect on health. In poor countries with low saving rates face a challenge to protect ill people. The second channel involved is education, as people with better

educated level are able to protect their health, and able to use the preventative and curative medical system. Third, financing agencies represented in: public sector, such as, governmental hospitals and clinics, and university hospitals, while private sector such as: private insurance companies, unions, nongovernmental organization (NGO) and household sector. Finally, the quality of the service provider represented in staff.

Improvement in health based on various macro input factors represented in the quality of education system, sufficient government expenditure scheme, effective clean environment regulation, quality of the service providers, and the cost of health service. These factors reflect on the human being health and the level of productivity in positive trend. We believe that population can be a curse in case if they are unproductive or a bliss if government invest them to sustain growth and wealth. Changes in fertility behavior in addition to health and investing in human capital is expected to have to have effects on life expectancy and economic growth. This paper contributes to literature by investigating Egypt as one of the developing countries characterized by high population density and volatile economic growth in the context of demographic transition. Initially, we explore the role of health as being an intermediate channel affecting wealth. Then we overview the literature and discuss empirical specifications and result. Finally we draw our conclusion and recommendations.

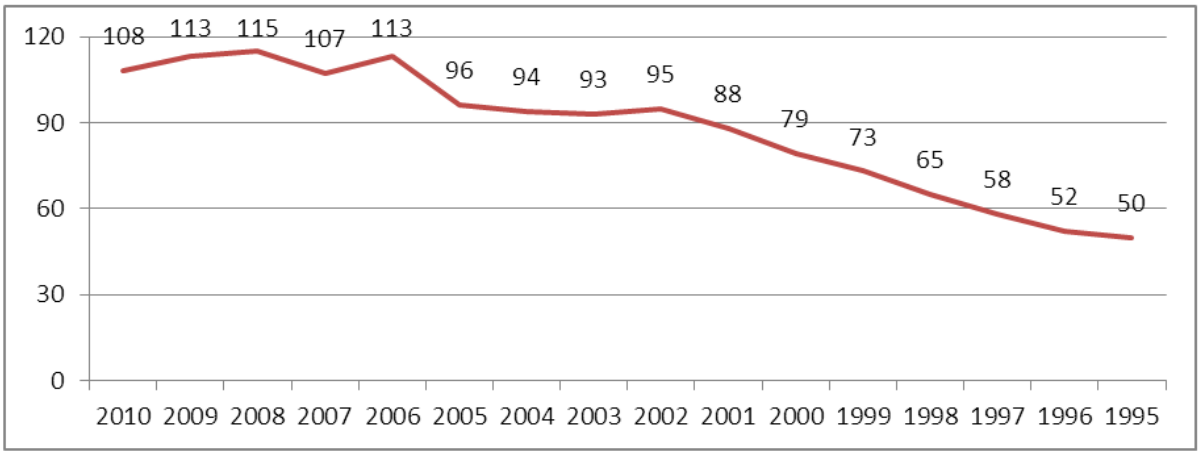
The Egyptian population started the 20th century with 10 million people and by the end was almost 70 million. Most of the increase that took place since the end of World War II, was due to an initial rapid decline in mortality, and decline in death rate. Before World War II, more than 250 out of every 1,000 Egyptian infants died before reaching their first birthday (Fargues 2000). Since the late 1940s, the infant mortality rate has dropped quite steadily. For at least 20 years this decline in mortality was not matched by a drop in birth rates. Data from the World Fertility Survey suggest that the total fertility rate (TFR)[1] for all of Egypt was 7.1% in the early 1960s, the TFR declined between from 5.9% in 1970 to 4.4 % in 1990 and finally to 2.7 % in 2010. United Nations projections suggest that the population will exceed 127 million by 2050 (United Nations Population Division 2003).

The rapid population growth was the result of a substantial decline in mortality triggered by the increased use of antibiotics and vaccinations, and by the spread of disease control and sanitation programs. These improvements substantially increased life expectancy at birth. But achieving "Good health" is obviously a multidimensional aspect and the impulsive need to pull off good health relies on complex factors. Egypt Human Development Report 2010 (EHDR) recorded values for the progress of the income index indicating a noticeable improvement in its income level, the increase in average GDP per capita between the 2008 and 2010 EHDRs took place despite the rise in the percentage of the poor from 19.6% to 21.6%, and the increase in the absolute number of poor.

Egyptian government health policy increased health expenditure remarkably during the period 1995 to 2010, figure one records the increase in per capita government expenditure on health (PPP int. $) in Egypt from 50 percent in 1995 to 108 percent in 2010. However, the increase in health expenditure did not meet the needs of the population demands and the demand of human resources for health. In Egypt, the Ministry of Education and Ministry of Higher Education control the supply of human resources for health (e.g. doctors and nurses) from a side, while the Ministry of Health controls a large part of the demand of human resources for health; as the government is committed -by law- to hire graduates of the faculties of Medicine and Nursing and schools of nursing. The main concern of the Ministry of education is to tune the balance between the demand required by health foundations and the available capacity of educational institutions rather than the quality of the population health. The demand for human resources for health in Egypt is influenced by many things other than population needs.

[1] The total fertility rate (TFR) is a useful measure for examining the overall level of fertility. It can be interpreted as the number of children a woman would have by the end of her childbearing years if she were to pass through those years bearing children at the currently observed rates. The TFR is calculated by summing the age-specific fertility rates. It is presented for women age 15-44 and women 15-49 to facilitate comparisons with other surveys in which the age range of interviewed women may differ from that in the 2005 EDHS.

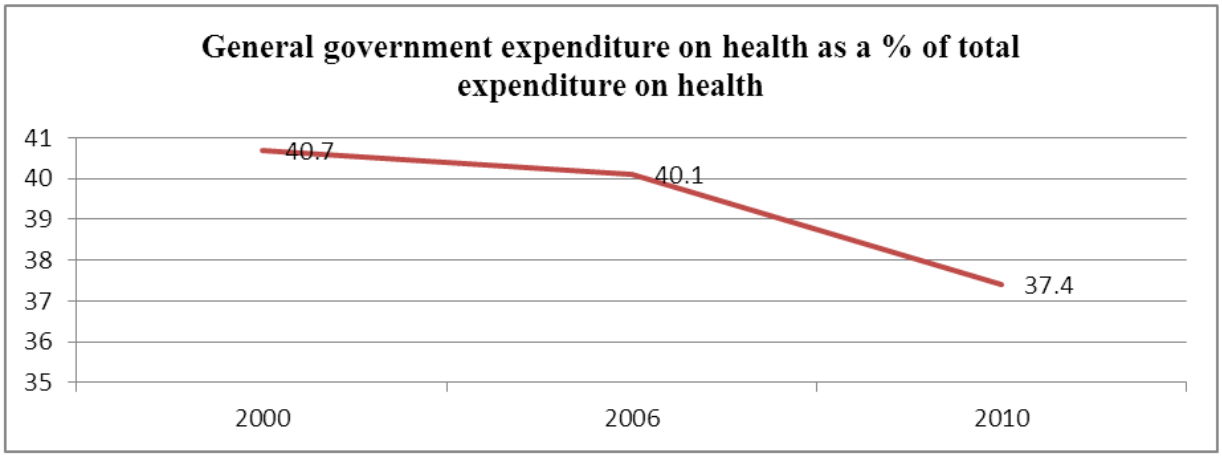
Figure 1: Egypt per capita government expenditure on health (PPP int. $) during 1995- 2010



Source: World Health Organization 2011

In addition, the progress in Egypt total expenditure on health as a percentage of gross domestic product during 2000 record was 5.6%, that increased to 6.3 % in 2006, thendroped to 4.7 in 2010 (WHO, 2011). Although, the Egyptian government expenditures on health as a % of total expenditure on health was not maintaining a stable increase in this level, it recorded 40.7 % as a percent of the total expenditure on health during 2000 to drop to 37.4% by 2010, (see figure 2). These values is considered to be low percentages compared with the Egyptian population.

Figure 2: General government expenditure on health as a % of total expenditure on health during 2000 to 2010



Source: World Health Organization 2011

It is worth noting that despite improvements in life expectancy rate at birth total (years) from 70 to 73 there is still a significant number of Egyptians live in slums, with poor and overcrowded housing, limited food supply, and inadequate access to clean water, good quality health care, and education. The poorest 20 percent of the Egyptian controlled only 9 percent of wealth during year 2008, while the wealthiest 20 percent controlled 40 percent of the country's wealth with a drop 2 percent in year 2000, (WDI, 2011). This inequality in income rooted to the government policies as it focuses on the Northern cities e.g. Cairo and Alexandria in its investment plans more than the south rural areas.

Inequality also spread to a certain extent to the education sector as the household wealth level is a major determinant of higher education enrollment. However, we found that almost half of those who

are or have been to university came from the richest wealth quintile (richest 20%); only 4% came from the poorest wealth ones (poorest 20%). In 2008, United Nation Population Division report reasoned this to the free higher level of education that the government adopted since 1962. Resulting in an urban/rural differential where 39% of rural youth compared to 61% of urban youth finish higher education[2]. Consequently, youth in rural area with limited capacity for learning and working endure higher limitation in human developments that is transmitted to their children. Egyptian Government efforts to raise the human level of development focusing on the education, health and income are not sufficient as it is still facing continuous inherited problems.

2. Literature Review

From the theoretical point of view, the standard neoclassical model of the limits of improvement in health and life expectancy highlights that increased life expectancy increases the population number while reducing the capital-labor ratios and decreasing the per capita income. However, endogenous growth models in the tradition of Becker and Barro (1988) propose that human capital investment and fertility responses may offset the severe predictions of the neoclassical model. Other researchers provide a strong relationship between initial levels of health and economic growth, using life expectancy at birth as their basic measure of overall health of the population. They conclude that improved health is associated with faster economic growth and supported the positive relationship between health and economic growth (Gallup, Sachs and Mellinger, 1999).

Nora Lustig (2006) conducted in Mexico during 1970-95 to study the relationship between health and growth using life expectancy and mortality rates of different age groups as health indicators. It was observed that health is responsible for approximately one-third of long term economic growth. Results showed that low health levels are linked to poverty trap. There is a clear imperative to focus on improving the health status of the population to unleash higher economic growth and lower poverty rates. Moreover, Acemoglu (2006), in a study entitled "impact of life expectancy on economic growth" investigated the recent agreement in scientific assemblies and policy making bodies that disease environment and health status at present have been created through high income differences among the countries. The study discussed that health status improvement does not only improves the quality of life but also stimulates rapid economic growth. The conclusions drawn from this study was that the increase in life expectancy led to a considerable increase in population, however considerable birth rate was not controlled to compensate increased life expectancy

A recent paper by Acemoglu and Johnson (2007) further investigated the changes in life expectancy with dates of global health interventions to combat 15 major diseases. They studied 47 countries at various levels of development, during period 1940 to 1980, they offer little evidence for the causal effect of life expectancy on income per capita differs during different phases of development. Cervellati and Sunde (2009) argue that the increase in life expectancy reduces income per capita in countries that did not go through the demographic transition. In post-transitional countries the gains in life expectancies leads to an increase in per capita income. Additionally, Bloom, Canning and Fink (2009) argue that Acemoglu and Johnson's results are based on the assumption that initial health and income do not affect the subsequent economic growth. The healthiest nations in 1940 are those that benefitted least from the health interventions and also the ones that grew the most, giving a negative relationship between health interventions and growth. Furthermore, Cervellati and Sunde (2011) studied 47 countries showing that wealth exhibits a V-shaped relation with health. Thus, they argue that only after the onset of the demographic transition, life expectancy had a causal positive effect on wealth.

[2] This high unemployment can be explained by the fact that young people in poor households have a lower reservation wage, and hence accept any possible form of employment. While, young graduates from the highest socio-economic classes rely on their parents to remain unemployed until a suitable job is found.

On the other side, Zachary Zimmer (2008) studied the relation between wealth and disability in one of the world's poorest regions – rural Cambodia. The research presents a U shape relation but the paper speculates on possible causal directions (both from wealth to health and vice-versa). Moreover, Hansen C. (2012) used panel data from 119 countries during the period 1940 to 1980. He discovered that wealth traces a U-shaped path as a function of the level of national health and that excluding the possibility of a nonmonotonic path might lead to wrong conclusions about the wealth–health nexus. Therefore, the main message is that when studying this relationship over time, a form of nonlinearity for health should be included in the empirical model. Scholars' results using panel data to identify the relation between health and wealth either presents a U – shape or V- Shape relation. The reasons rely on the stage of development and the demographic transition for each country. In an early stage of development, the effect of health improvements on wealth is negative because, at this stage, the only effect is to increase the size of the population which possibly has an adverse effect on wealth.

3. Empirical Specifications and Results

We investigate the relationship between health and wealth in the Egyptian economy during the period (1960-2011). The basic empirical specification is given by the following reduced form relationship between wealth and health.

3.1. Model and Data

We employ linear and nonlinear models so we estimate the following two models.

$$GDP = \beta_0 + \beta_1 Life \quad \text{(Model 1)}$$

$$GDP = \beta_0 + \beta_1 Life + \beta_2 Life^2 \quad \text{(Model 2)}$$

GDP represents the level of wealth measured by the log of Gross Domestic Product per capita (constant 2000 US$). Life represents level of health which is measured by log of life expectancy at birth[3]. We collect data for Gross Domestic Product (GDP) and life expectancy at birth from the World development indicator.

3.2. Empirical Results

Our methodological approach in this paper is structured as follows: first, we test for stationarity in the time series for all the variables using the augmented Dickey–Fuller (ADF) test (Dickey and Fuller, 1979). The results indicate that the variables are non stationarity as we see from table (2).

Table 1: Augmented Dickey-Fuller unit root tests

Variables	Lags	Constant	lags	Constant and trend
LGDP	1	-0.4636	1	-2.7009
DLGDP	0	-4.104277***	0	-4.0604**
LLife	3	-2.1289	3	-0.116317
D(Llife)	2	-0.252436	2	-0.436988
DD(LLife)	1	-0.943081**	1	-0.685901**
LLife2	3	-0.010527	3	-0.873052
D(LLife2)	2	-0.711936	2	-0.389649
DD(LLife2)	1	-2.924523*	1	-0.3.657034**

(*), (**) and (***) indicate 10 %, 5% and 1% level of significant, respectively.
Akaike Information Criteria (AIC) is used to select the lag length
DX represents the first difference of variable x
DDX represents the second difference of variable x

[3] The total life expectancy at birth is the average number of years a child would live if prevailing patterns of mortality of the total population at the time of his/her life. This also is expected to have direct relationship with the rate of economic growth in the economy. This is because as the living condition improves, human longevity is expected to be enhanced and vice-versa. This is achieved when there is improvement in health expenditure.

The second step is to test for cointegration using the Johansen technique (Johansen, 1995), which is carried out in a context of a vector auto regression (VAR) model. Whether or not the variables included in the VAR model they are cointegrated. It has implications for the form of that model and for the type of causality test supporting it is the appropriate technique. If the Johansen tests support the conclusion that the variables are not cointegrated, then causality tests must be based on a VAR model in first differences. If, however, the variables are cointegrated, then causality tests should be based on an error correction model (ECM). So, the third step is to test for causality by employing the appropriate types of causality tests. Table (2) shows that we have long –run relationship among the variables. So we will proceed to estimate the Error Correction Model (ECM).

Table 2: Johansen cointegration tests (1995)

Model 1			
Rank	**Eigen value**	**Trace statistic**	**5% Critical value**
0	.	22.1454	15.41
1	0.36174	1.0421*	3.76
2	0.02193		
Model 2			
0	.	88.7028	29.68
1	0.81221	8.4263*	15.41
2	0.12718	1.8973	3.76
3	0.03876		

We proceed to estimate error correction model (ECM) for the models. Table (3) presents the results of error correction model for both models. The first model (linear model) shows positive and significant correlation between health and wealth at 1 % level of significance. This means that the improvements in the health will lead to an increase in the wealth of the Egyptian economy. We use the non-linear model to estimate the shape between the health and wealth. Column (2) shows a positive B1 and negative B2 – both statistically significant at the 1 % level of significance. This means that the curve which describe the relationship between wealth and health take an inverse U-shaped relationship for the Egyptian economy and the turning point is 69 years.

To explain the inverse relation between wealth and health it passes through two stages. In the first stage, the improvements in the wealth (measured by life expectancy) will lead to improvement in wealth. i.e.: the worker will be healthier and so productivity is expected to be high. In the second stage, we have two opposite effects. The first is an increased productivity of the labour (positive effect). The second effect is increased population size (as a result of the improvement of the health). Consequently, this will make pressure on the economic growth and exhaust the benefits seen from improving the health. In the second stage the negative effect was higher than the positive effect and this will lead to a negative relationship between health and wealth.

Table 3: Error Correction Model

	GDP	**GDP**	**Turning point**
LLife	3.2789***	12.12516***	-
	(0.118732)	(2.6985)	
LLife2		-1.429004***	69
		(0.34728)	

*** indicate 1 % level significant. Standard errors (SE) in parentheses

6. Summary and Concluding Remarks

This research adds to the literature of the relation between health and wealth via empirical analysis to the Egyptian economy, during the period 1960-2010. We try to focus on one country using time series

data and apply cointegration analysis. Previous work relied on panel data but in this study we tried to focus on one country using time series data and apply cointegration analysis. We estimated linear and non-linear models. For the linear model, the results indicated that there is a positive and significant relationship between health and wealth. For non-linear model, the relationship between health and wealth follows an inverse U-shape relationship, Egypt witness an inverse relationship with a turnaround value of about 69 years of life expectancy, i.e., this means that improving the health in the long run put more pressure on the economic growth and consumes it, and health problems is an obstacle ahead of enjoying the growth in economic growth.

Improving health in Egypt among all governorates is a challenge the government is facing, especially with present of high inequality among governorate. The unavailability of data among governorate over a long time posed a limitation in the present work for a deep analysis in each governorate. And, to achieve better government expenditure allocation in the health sector must be parallel with higher quality of the service provider. The issue that required a new perspective to restructure insurance health program to be a tool for investment not consumption approach.

For policy implication, we believe that the way to improve the economic growth is to improve the skills of the labour via education to prevent transmission of poverty across generation. This is in agreement with previous reports supporting the direct effect of education on poverty. Furthermore, the ministry of education and higher education need to match the market needs with the supply from the educational institutions. This is expected to be one of the effective policies that can be implemented in the health and wealth sectors which will results in improved economic growth and development. We think that if the population exceeds 127 million by 2050, as it is estimated to be, while the government adopting their insufficient policies to deal with health expenditure, then the health measurement will deteriorates pressure and will have severe negative impacts on economic growth in the near future.

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