Studying the relationship between health and economic growth in OIC member states

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Abstract
One of the most significant parameters effective on human capital performance is the role of individual health and its related indexes in enhancing economic level of a country so that one of the important subjects is investment in individuals’ education. Among health features of a society we can refer to high life expectancy, low death rate in children, healthy nutrition, degree of medical advancements and the amount of costs that the government and family spend in the health sector and low-cost services before birth.

In this survey the relationship between health and economic growth in Organization Islamic Conference member states has been evaluated by means of time series data during the years 2001-2009 given to other effective factors on the economic growth such as life expectancy, fertility rate and etc through a data panel model (panel data) in the framework of a Semi log regression model. Obtained results reveal that increased life expectancy is leaded to enhance economic growth in these countries. Also there is a negative relationship between fertility rate and economic growth in the above sections.

Key words: Economic growth, Fertility rate, Life expectancy, Semi log regression model

1. Introduction
As we know health can affect production level of a country through various channels. The first channel that its impact has been referred in most studies is better efficiency of healthy employees comparing with others. Healthy employees work better and more than others and have a creative and more prepared mind. Beside this direct impact health has indirect impacts on production as well for instance health improvement in the human force will be followed by motivation to continue education and obtain better skills, since improvement of health conditions will increase investment attraction in education and educational opportunities from one side and will prepare the individuals to continue education and obtain more skills by enhancement of learning capability from the other side. Similarly, enhancement of health and health indexes in the society will encourage individuals towards more saving through reduction of mortality and increasing of life expectancy. Following increased saving in the society physical capital is enhanced and this issue will be effective indirectly on labor force productivity and economic growth (Weil, 2005).
As a result, due to the importance of health and hygiene on economic growth as essential components of human capital we have tried in this survey to study the impact of variables including life expectancy and fertility rate (as health indexes) and also variables like openness degree of economy and investment according to Bhargava et all’s research on economic growth of OIC member states.

2. Literature review

Studying the existing theories regarding the relationship between health and economic growth

Health is to provide total physical, psychological and social welfare that its meaning is not limited just to lack of disease realization or maim; rather it includes three axes of body, spirit and the society and thus any deficiency and damage that is incurred to each of these three axes will perturb the individual's balance and is resulted in lack of health.

Everyone knows importance of health as a basic right for life. According to Amartyasen health is a kind of empowerment that gives value to human life. It will be leaded to individual growth capacity and economic security for the individuals and families (Asefzade, 2008, p 34).

Whenever it is talked about financing in the health and treatment sector in health economy subjects, health is referred to as "industry". Applying economic concepts in the health economy branch is relatively new and returns back to the 1970's so that the first international conference of health and treatment economy was held in 1973. Also, health clear-sighted prefer to use the term "need" instead of "demand" in the scope of concepts of health economy, since elimination of needs before satisfaction of demand and desire make individuals to use loan possibilities.

Generally, health economy could be defined as studying quantity, price and value of limited resources that are allocated for health and treatment and manner of combination of these resources to produce certain services in order to reach the highest productivity and efficiency.

2.1 Effective factors on health status

2.1.1 Macro factors

Income is recognized as the most important factor which determines health status and there is usually a high correlation between low income and hygienic poverty. Researches demonstrate that deterioration of financial status is leaded to increased rate of disease and mortality in the society. The reverse relationship between poor health and income level of the society is true when different criteria like mortality, kind of dangerous diseases and degree of using health services and hospitals' admission are used to measure health status of a society except in exceptional cases. It is clear that access to sufficient income is the prerequisite to have access to other factors determining health such as housing, nutrition and education and this issue doubles its importance (Javadipour and Mojtahed, 2005, p 25).

Evidences show that amount of disease, mortality and injuries rate are more among the poor and their families than the society's average. Thus it is conceived that investment to improve health status of poor societies seems too necessary. Moreover, evidences demonstrate that relative poverty like abstract poverty has a close relationship with poor health and studies which show the relationship between (relative) poverty and health status have been accomplished in developed countries more. Since poverty impedes individuals from total participation in economic and social activities it appears that the best way to remove impacts of poverty on health status of the society is fighting with the poverty (Byrne, 2003, p 187).

Several evidences indicate that there is a high correlation between job and income level of individuals having license. Moreover, existence of poor life conditions in the beginning of life will decrease possibility of achieving higher scientific degrees (Javadipour and Mojtahed, 2005, p 27). Those individuals and societies that have higher education level and enjoy a higher knowledge level will certainly pay more attention to observe health and establish
suitable health facilities for themselves and their surrounding environment based on their learning and perceived importance of observing physical and mental health (Rosen, 1982, p 263). Because educational and scientific degrees are not lost in contrary to other effective social factors on health they would have a stronger impact on individuals' health status so that children with appropriate education will probably have more healthy preferences for life in adulthood. Especially they observe security and work health issues more in working period. Clearly there exists a positive and significant relationship between education level and health level of individuals. But education provides the possibility of employment and income for individuals more from another aspect and could affect health level through this (Pedrick, 2001, p 22).

According to Robinson (1997)'s theory a cohesive society is applied to the society in which individuals are active to obtain common purposes and despite existence of variety in such society variety and differences are not converted into conflict. It seems that strong social networks in neighborhoods and small communities can provide conditions of a healthier life from several ways (Robinson, 1997).

2.1.2 Micro factors
Economists believe that health is the result of a production function or relation in which the individual's health is determined as output by amounts of data. Since production of health in this approach reflects activities and preferences of individuals or families we can write it as below:

\[ H^i = (N^i, C^i, C^P, I, S^i, S^{mp}, T^i, E^i, M, \ldots ) \]

Where \( H^i \) is health of the ith family member, \( N^i \) is received nutrition by the ith family member, \( C^i \) is consumption of the ith family member, \( C^P \) is family consumption from a general product, \( I \) is number of family members, \( S^i \) is literacy level of the ith family member, \( m \) is related to the mother or spouse that often makes basic decisions regarding health of the family members.

\( T^i \) is using time by the ith individual \( E^i \) is stocks of the ith individual and \( M \) is stocks of the whole family.

Received nutrition is very important, as it has a significant and direct impact on health and because of this investment in nutrition seems very essential and fundamental to improve health status of the poor countries (Javadipour and Mojtabeh, 2005, p 30).

2.1.3 Impact of health on economic growth
Entrance of concept of human capital by Becker (1964) into the scope of economy science has opened another way for effectiveness of health expenditures on GDP. In this new way health expenditures have been leaded to increase human capital inventory and as a result GDP growth of countries through improving health indexes. Therefore, health expenditures and real gross domestic product in each country have mutual relationship based on theoretical principles and experimental observations and studying the impact of each of these two variables on the other variable won't be so valid without considering their mutual impact in terms of econometrics methods (Beheshti and Sajoudi, 2005, p 116).

Since the 1960's economic researchers have paid special attention towards portion of health expenditures from gross domestic product in most industrial economies. Thus effective factors on improvement of these expenditures have been studied in numerous researches. According to the obtained results in most studies gross domestic product of each country is the most important effective factor on health expenditures of that country. On the other side, health expenditures could affect gross domestic product of the country too. According to some economists health
Expenditures decrease gross domestic product level due to deviation of resources from generative investments (Beheshti and Sajoudi, 2005, p. 116).

Economic growth not only needs healthy people but also education and other supplementary investments, proportion of the labor force in the private and public sectors, active and reasonable market, appropriate sovereignty and institutional mechanisms of the society are the major factors of technical advancements. The growth resulted from private commercial sector must be completed by active role of the government in various scopes such as supplying investment in health and education, ensuring execution of rules and regulations and providing security and cooperation with the private sector for technical and scientific advancement. Of course we can't claim that investment in the health sector can solve issues of development rather investment in this sector should be in central section of total development and poverty elimination strategy (Saches, 2001).

Bloom and Malaney (1998) in a study for the time period 1965-1990 for 78 countries perceived that the mortality crisis in the first half of 1990 in Russia was leaded to decrease life expectancy from 70 to 65 which was resulted in reduction of gross domestic product equal to 1.8-2.7 percent with regard to in year 1990 and income per capita growth was reduced to one third (Ghanbari, 2009, p. 196). In this study life expectancy was regarded as the main variable representative of health and academic years in guidance school, abundance of natural resources, saving of the government, institutional quality and geographical conditions were considered as other variables.

Rivera and Currais (1999) showed that countries having more health expenditures had higher economic growth. Health care expenditures per capita in their study were used as an index for health of the society. They estimated the relationship between health and growth of OECD member countries in the time period 1960-1990 using health expenditures as a descriptive variable and an index for health in the growth regression. Also they considered investment in health as a descriptive variable for the output. Analysis of the role of health investment in human capital accumulation has been referred in their study and they have shown that education is not the only effective factor in labor force performance and its productivity.


Bloom and Canning (2000) performed estimations based on various conducted researches about the developing countries. The general conclusion is that in countries in which life expectancy is higher about five years growth rate of real income per capita is higher about 0.3% to 0.5%.

They examined the impact of health on productivity from four ways:

- A healthier labor force produces more because it has more mental and physical ability and is absent less in his work place due to his illness or of his family.
- Individuals with higher life expectancy have more motivation for investment in education and obtain a higher output from such investments.
- Amount of savings (for the retirement period) is increased by increasing individuals' age because of health improvement and as a result investment process will be facilitated.
- Health improvement in the form of increasing life and health of children could be a motivation to decrease impregnation; consequently individuals participate more in the labor market and obtain higher income per capita.

Bloom and Canning considered national production as a function of its inputs, i.e. physical capital, labor force and human capital with three elements of education, work experience and health. The relationship between efficiency and effectiveness of these inputs with total factor productivity has been studied in this model. The major result is that health has a significant impact on the economic growth. It means that one year increase in life expectancy is
leaded to 4% increase in national production and shows that increasing of costs to improve health is justifiable by virtue of the impact that it has on productivity of the labor force.

Bhargava et al (2001) inserted ASR along with climatic conditions, commercial openness and ratio of investment to gross domestic product as the representative variable of health status in the growth function in the time period 1965-90 for 92 countries. The obtained result showed the positive relationship between health and economic growth. Collective data in this study was analyzed for GDP series and such data was based on adjustments in purchasing power (based on PWT). In addition, GDP series on the basis of official rate of foreign currency were obtained through various econometrics methodologies. A framework was compiled for modeling of mutual relations among GDP growth rates and descriptive variables in this study and the relationship between income and life expectancy was restudied. Although health of the people in a country could just be determined moderately at national level, but results of this model show important impacts of ASR on growth of low-income countries.

Heshmati (2001) studied the relation between health expenditures and gross domestic product in a research through generalized Solow model. He inserted health expenditures as the variable representative of health status in the growth function. Then he concluded that health expenditures have a positive and significant impact on gross domestic product growth and existence of health expenditures makes impact of human capital on the economic growth insignificant.

Research result of Bloom et al (2004) regarding the impact of life expectancy beside other variables (labor force experience, physical capital inventory, labor force and average academic years) on economic growth confirmed this relationship too. The main result of their study is that health has a significant impact on economic growth so that increasing of one year of the society's life expectancy is leaded to increase national production equal to 4%. Positive and high impact of health on productivity and economic growth could justify increasing of health expenditures and improvement of health status in the society.

Rivera and Currais (2004) tried to improve explanatory power of Cobb-Daglas production function by not inserting education and health storage in this function. They studied the impact of elements of the government's expenditures in the health sector on labor force productivity and economic growth using data related to Spain for years 1973-93. These researchers found out in their study that constructive expenditures of the government in health affairs haven't had a significant impact on economic growth. They noted more time is needed to observe impacts of the government's constructive expenditures in this sector on productivity and economic growth.

Chakraborty (2004) studied the impact of life expectancy beside variables such as population growth rate, average investment to gross domestic product, rate of access to secondary education, commercial transaction relation, export portion of raw materials and penetration rate of telephone (as a representative for public substructures) for 95 countries in the time period 1970-90 that a result similar to previous researches confirmed this positive impact.

Erdil and Yetkiner (2004) studied causality between health expenditures and gross domestic product in a group of countries with different income levels during the years 1990-2000. According to obtained results, causality in low and moderate income countries (that Iran is among them) exists just from income to health expenditures, while health expenditures in high-income countries affect gross domestic product.

Sadeghi and Emadzade (2004) studied independent role of physical capital and human capital on production growth in Iran using Cobb-Daglas function. They calculated tension of the above factors with regard to gross domestic product by means of statistics of the period 1967-2002. This study emphasized two points. First is that human capital factor has always been a steady and significant variable that its coefficient in growth functions is positive.
The second point is that human capital develops abilities, skills and gaining experiences to achieve stable economic growth and development through education.

Howitt (2005) analyzed channels through which health capital of labor force in a country affects economic long-term growth by Schumpeterian Growth Theory. The obtained result from this growth model is that child and mother health have a major role in human capital of the individual's infancy period. He considered this issue as a suitable justification for the government's investment in children and mothers' health.

Cole and Neumayer (2005) considered the impact of malnutrition, malaria and accessibility to healthy water as health variables. Other variables of this research included commercial openness, inflation rate and portion of the agricultural sector from gross domestic product. This research was conducted for 152 countries during the period 1965-95. Results reveal negative impact of these three variables on economic growth.

Acemoglu (2006) in a study entitled "impact of life expectancy on economic growth" states that recent agreement in scientific assemblies and policy making demonstrates that disease environment and health status at present have been created through high income difference among the countries. Discussion about health status improvement is not just to improve life rather it stimulates rapid economic growth too. He studies this issue through estimating the impact of life expectancy on economic growth in this article. Conclusions illustrate that increased life expectancy is leaded to considerable increase of population. Considerable birth rate is not controlled to recompense increased life expectancy. He perceived that impact of life expectancy on total GDP is low and this impact has been grown about more than forty years. Hence increasing of population growth is not sufficient for compensation.

Mojtahed and Javadipour (2006) studied the impact of health expenditures on economic growth in the form of a case study of the selected developing countries including Iran. The applied statistical population consists of thirty three developing countries in the time period 1990-98. They examined the impact of health expenditures on economic growth through generalized Solow's model and by means of inter-country approach and panel data model. Results of their study demonstrate that in addition to human capital, health capital that is specified with health expenditures variable has a positive and significant impact on economic growth. Also through simultaneous tests they have shown that health expenditures variable is affected by economic growth and have stressed the point that the viewpoint which regards the problem of lack of physical capital as the most basic challenge of developing countries in the process of growth and development is rejected. In contrary the new approach that introduces human capital including education and health as the building block of growth and development is accepted.

Bukhari and Butt (2007) have shown by means of Hopkins and MC Donald' approach (2000) that causality in Pakistan has been from gross domestic product to health expenditures during the period 1972-2000 and health expenditures have had no impact on production.

Several studies have been conducted in Iran regarding studying the relationship between health and economic growth that are referred below.

Taghavi and Mohammadi (2007) examined the impact of improving human capital indexes on economic growth in Iran in a study entitled "impact of human capital on Iran's economic growth during the years 1960-2003. They confirmed positive impact of these variables on economic growth by means of different indexes like percentage of literate individuals in the country as well as average academic years of the labor force. Also they have emphasized
that importance of investment in labor force is not less than economic plans and is one of the reasons of investments' failure in the country, ignorance of the role and importance of human force in the growth and development process.

Hadian, Shojaee and Rajabzade (2008) state that health expenditures are among the important factors which constitute economic growth along the labor force and physical capital in studying the impact of health expenditures on economic growth in Iran and believe that expenditure in this sector is led to economic growth and development. Assumption of growth based on health expenditures along other factors like labor force and physical capital for Iran's economy during the years 2005-2007 has been studied in this research. They used Solow's model and research results were evaluated by Hausman test. Findings of this research show positive and statistically significant impact of health expenditures and positive impact of other factors like capital and labor force. Finally they conclude direct impact of health expenditures on economic growth and its indirect impact on economy through decreasing mortality of active population of the country as well as decreasing inability rate and absenteeism through reduction of diseases.

Beheshi and Sojoudi (2008) studied the long-term relationship between health expenditures of the government and gross domestic product in Iran during the period 1960-2005 and income tension of health expenditures. Results of Bond test and Johansson's convergence (1991) illustrate that there is only one long-term relationship between health expenditures of the government and gross domestic product which has had a positive and significant impact on government's health expenditures. Similarly, amount of income tension of health expenditures has been close to one and these expenditures are of essential expenditures type.

Ghanbari and Baskha (2009) studied impacts of changing health expenditures of the government on Iran's economic growth during the years 1960 to 2005. They regarded the government's health expenditures in their study as an index for health and used neoclassic growth model. Also they applied variables such as real gross domestic product, physical capital inventory, active population and educational and health expenditures of the government. They used vector auto-regression method on the basis of Johansson-Yussilus approach to estimate their model (Salmani and Mohammadi, 2010, p 79).

The applied theoretical model in this study is an equation that has been explained by Weil (2005) as below:

\[ Y = AK^\alpha (LY)^\beta \]

Where Y is gross domestic product, A is total productivity or TFP, K is physical capital inventory and L is labor force.

Also Salmani and Mohammadi's survey (2009) about studying the impact of government's health expenditures on economic growth in Iran examines the impact of government's health expenditures as an index for health on Iran's economic growth. They used Augmented Aggregate Production Function (APF) Growth Model on the basis of growth accounting approach. Basis of this model is production function estimation approach in growth accounting methodology during the period 1972-2003. Results of the study confirm existence of a positive relationship between the government's health expenditures and economic growth. Also, existence of a long-term relationship and convergence relation among the government's health expenditures per capita, other variables of the model and economic growth have been confirmed. Studying of results' strength shows that other health criteria like consumption costs per capita of households have a positive and significant impact on health and treatment and economic growth.

Mehr Ara and Fazaeli (2010) studied the relationship between health expenditures and economic growth in Middle East countries and North Africa (Mena) for a sample included thirteen countries during the years 1995-2005 using co-integration analyses based on pooling data. They perceived that although two variables of health expenditures...
and gross domestic product in this group of countries are not stationary but there is still a long-term balanced relationship between these two variables. Likewise, they found out that there are no evidences showing luxury of health protection in this region in the short-term and even long-term. Results of their study are as the following:

Contrary to evidences obtained from other countries and regions income tension of health product in MENA region is smaller than 1 so that this product is not a luxurious one. Thus, it is not expected that these countries allocate a more portion of their income to health expenditures by increasing of gross domestic product. Estimation of adjustment factor indicates high viscosity in health expenditures of such countries in facing with income shocks. So, more attempts towards increasing efficiency of the current health expenditures have a special importance in the above countries.

Main purpose of this section is to study the impact of all kinds of health indexes on the economic growth. Variables representative of health in most of the conducted researches include life expectancy, mortality rate, health expenditures, fertility rate and etc. On the other side, fertility rate in most cases has a negative impact on economic growth and life expectancy has a positive impact on it. Therefore, given to the accomplished studies as well as Bargawa ET all’s study modeling and estimation of health impacts on economic growth will be performed in the next section.

3. Research methodology

In this section effective factors on economic growth of fifteen OIC member states (Indonesia, Iran, Pakistan, Bangladesh, Burkina Faso, Saudi Arabia, Kirgizstan, Kuwait, Mali, Malaysia, Egypt, Somalia, Uzbekistan, Tajikistan and Turkey) will be studied through pooling data method. Therefore, we explain the model first.

Bargawa ET all’s model is used in the present survey to study the relationship between health and economic growth that its total form is used as below:

\[
\text{GROWTH}=F\left(\text{GDPR}, \text{OPEN}, \text{ING}, \text{LIFEX}, \text{FERTI}\right)
\]

Where GROWTH is economic growth, GDPR is real gross domestic product, ING is ratio of investment to GDP, OPEN is openness degree of economy, LIFEX is life expectancy (in adults) and FERTI is fertility rate.

Experimental findings for effective variables on economic growth are represented in table (1) for 15 countries during the years 2001-2009. Results of tests show that fixed effects method is more appropriate. The considerable point is that 1-given to the represented model ING (ratio of investment to GDP) and OPEN (openness degree of economy) weren't effective in OIC member states, thus we omitted them from the model, 2- clearly there was a time process in the applied variables, so we eliminated this problem by insertion of @TREND, 3- the researcher tried to obtain tensions by making variables logarithmic but he was unable to make economic growth variable logarithmic due to negative economic growth in some countries (like Iraq, Bahrain, Afghanistan and etc). Hence LIN-LOG or semi-logarithm models were applied (Abrishami, 2010, p 203). As a result, the final estimation shows in Table 1.

Insert Table 1

Results reveal that signs of the estimated coefficients for all variables are consistent with theoretical principles. Also as it is observed we can state that effectiveness of adults' life expectancy on economic growth is more than gross domestic product given to large amount of lifex coefficient. F-test and Hausman test must be conducted in order to prove accuracy of estimations and select the proper method. Then analysis of the model and coefficients are done.
3.1 F-test to specify fixed effects method

In order to determine the issue that the intercept must be regarded as common or different for the variables the following hypothesis is considered:

$$H_0: \beta_{12} = \beta_{12} = \cdots = \beta_{12}$$
$$H_1: \beta_{12} \neq \beta_{12} \neq \cdots \neq \beta_{12}$$

Null hypothesis states that the intercept is identical for various sections and it is possible to apply OLS method. Statistic F is used as below in order to test the above hypothesis:

$$F = \frac{(RSS_r - RSS_{RF})/m}{RSS_r/(nt-k)}$$

If the calculated F is more than the table F, then null hypothesis is rejected and thus restricted regression is not valid and various intercepts should be considered in estimation.

Table 2 observed that Prob is less than 0.05, thus fixed effects method must be used.

But Hausman test should be studied in the following as well.

3.2 Hausman test

For estimation through pooling data method first it must be determined whether the model is of fixed effects or random effects type. To do this we use Hausman test. When this test is done in Eviews another output is obtained that chi-square statistic of Hausman test is appeared in its first row. If prob is less than 0.05, fixed effect model is accepted at confidence level 95% and higher and if it is larger than 0.05, random effects model is accepted.

Note:
Given to output of Hausman test in which this test has been faced with problem and a warning message is observed in it Hausman test in such circumstances will not be accurate in determining fixed effects or random effects. Therefore, we have to find out its accuracy or inaccuracy from random effects estimation.

In estimation based on random effects coefficients haven't been significant. On the other side, Durbin-Watson statistic and R-squared have no good amount. But the more important point is amount of RHO for cross-section random, since amount of RHO is less for idiosynkratic random we can say it is not the estimation basis of random effects and must have an estimation based on fixed effects. Thus, given to the applied tests the estimated model is confirmed by fixed effects method. Now we are going to discuss about coefficients and statistics.

4. Analysis Result

All coefficients are significant (Prob<5%) and absolute value of their statistic t is more than 2. On the other hand, fertility rate coefficient is negative and coefficients of gross domestic product and life expectancy are estimated to be positive. This issue is consistent with research literature and has been estimated accurately. On the other hand, R-squared has been estimated equal to 74% which shows that 74% of changes related to the dependent variable are explained by independent variables. The next statistic is DW that is discussed to study autocorrelation in the model. As it is observed this statistic is estimated about 2 which reveals lack of autocorrelation in the model.
considerable point is that by inserting AR (1) the researcher has tried to omit autocorrelation of auto-regression type from the model and this has been conducted accurately, because Prob is totally zero. Now we are going to examine the most important question of the survey:

Does increasing adults' life expectancy have a positive and significant impact on economic growth of OIC member states? Given that LIFEX is significant we can say adults' life expectancy has a positive and significant impact on economic growth of OIC member states. On the other side, its relation with economic growth is positive and direct. Also, as it is observed given that lifex coefficient is large (193) we can say effectiveness of adults' life expectancy on economic growth is higher than gross domestic product that its coefficient is equal to 76.

Similarly, fertility rate has a negative and significant impact on economic growth with a blocking period. Its sign has been estimated negative too. Therefore, if fertility rate is increased in the previous period, economic growth will be decreased in the current period.

Generally we can state that gross domestic product and life expectancy have a positive and significant impact on economic growth and openness degree of economy and investment have no impact on economic growth. Moreover, fertility rate has a negative and significant impact on economic growth. It is notable that direction of coefficients (being positive or negative) is consistent with internal and external studies and there is no confliction in this regard. As it was observed given that lifex coefficient is large (193) we could say effectiveness of adults' life expectancy on economic growth is higher than gross domestic product that its coefficient is equal to 76 and this shows importance of the above issue. Hence we can say that policy-making of governments must be in a way to increase life expectancy especially in adults to be leaded to enhancement of national production and economic growth. Thus, most likely we can say that fertility rate and population growth in OIC member states decreases economic growth. Now it is better that governments pay more attention to the human force health in macro and micro policy-makings. Usually individuals with higher educational level have more public health, as a result have more income and to the same degree can invest more to obtain higher health. More emphasis on education and increasing of mothers' knowledge and health are leaded to enhancement of work output of women and their participation rate in the market, so birth rate will be reduced in the societies. It could be said that one part of societies especially in villages and poor areas always suffer from health problems (like shortage of drinking water, unawareness from personal health and etc) that this is certainly leaded to decrease human capital and economic growth. Hence despite governments target the poor by their helps they should compile economic policies to invest in nutritional, educational and health programs for human capital improvement too, so economic development strategy is institutionalized in their countries.
References


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Annexure

Table 1 - Experimental results related to impact of health indexes on economic growth of OIC member states

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOGLIFEX</td>
<td>193</td>
<td>0.0082</td>
</tr>
<tr>
<td>LOGFERTI(-1)</td>
<td>-19</td>
<td>0.0064</td>
</tr>
<tr>
<td>LOGGDPR</td>
<td>76</td>
<td>0.0000</td>
</tr>
<tr>
<td>@TREND</td>
<td>5</td>
<td>0.0000</td>
</tr>
<tr>
<td>AR(1)</td>
<td>0.9</td>
<td>0.0000</td>
</tr>
<tr>
<td>C</td>
<td>-1050</td>
<td>0.0002</td>
</tr>
<tr>
<td>DW=2.1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$R^2 = 69\%  \quad R^2 = 74\%$

Table 2 - Results of F-test
Redundant Fixed Effects Tests

<table>
<thead>
<tr>
<th>Effects Test</th>
<th>Statistic</th>
<th>d.f.</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cross-section F</td>
<td>5.850621</td>
<td>(14,109)</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Table 3- Output of Hausman test
Correlated Random Effects – Hausman Test

<table>
<thead>
<tr>
<th>Test Summary</th>
<th>Chi-Sq. Statistic</th>
<th>Chi-Sq.d.f</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cross-section random</td>
<td>0.000000</td>
<td>4</td>
<td>1.0000</td>
</tr>
</tbody>
</table>

Table 4- estimation results based on random effects model

<table>
<thead>
<tr>
<th>Effects Specification</th>
<th>S.D</th>
<th>Rho</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cross-section random</td>
<td>1.387128</td>
<td>0.2027</td>
</tr>
<tr>
<td>Idiosyncratic random</td>
<td>2.751406</td>
<td>0.797</td>
</tr>
</tbody>
</table>