

Effects of Inflation on Women's Health in Selected Middle-income Countries

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Abstract

Good health has always been considered as one of many variables that affects human life. From economic point of view, health can be considered as a sustainable good like any other economic commodity. All people are born with healthy reserves, some less and some more, and take advantage of it. Accomplished researches show that several variables affect health. One of these variables is inflation. The main purpose of this research is to examine the theoretical relationship between the inflation rate and women's health (life expectancy, mortality rates) in the selected middle-income countries using panel data. The results of the estimation using Fixed Effects model and Generalized Method of Moments (GMM) of those selected countries for the period of 1997-2011, show that inflation has significant negative impacts on the life expectancy of women and significant positive impacts on the mortality rate of women in the selected middle-income group of countries.

JEL Classification: E31, I1, I12

Keywords: Life Expectancy, Mortality Rate, Inflation, Health

Introduction

There are various definitions of "Health" in Economic Literature. From World Health Organization's (WHO) point of view, health not only means the absence of disease and illness, but also involves the entire physical, psychological and social welfare. From the perspective of the human capital theory; health may be considered as a sustainable commodity like any other economic commodity. All people are born with healthy reserves, some less and some more, and take advantage of it.

Since there is no doubt about the importance of health as a fundamental right in life, it can be said that health is a capacity that gives value to human life. In other words, the health is a wealth. Arrow believes that there is a fundamental difference between the goods of "health economics" and other goods.¹ The main factors listed are: government intervention, uncontrollable uncertainty in various aspects of the health, and externalities. Also, another important distinction between the health economics and other sectors of the economy is the third-party agent factor. Health Economics - by its recommendations to purchase goods or services (including drugs, testing or surgery) – is the medical third-party agent which affects the market.[1]

Since most goods in Health Economics are essential goods, one of the tasks of economists is to check out the financial issues related to Health Economics. In this regard, inflation - as a factor that has the greatest impacts on the purchasing power and the health of individuals – plays an important role. Therefore, this study will examine the theoretical relationship between the inflation rate and women's health in the selected countries.

In this direction, the principal objective of this paper is to study the aforementioned theoretical relationship and the level of influences of inflation on the women's health in the selected group of middle-income countries. In this paper, Static & Dynamic Panel Data (SPD & DPD) model has been used in order to test the following hypotheses:

1. Inflation has a negative and significant effect on the women's "life expectancy" which is a good index for the health economics in the group of selected countries.
2. Inflation has a positive and significant effect on the women's "mortality rate" as a good index for health economics in the group of selected countries.

The data is from World Bank (WB).¹ In this paper, the middle-income group of selected countries consists of Iran, Brazil, Bulgaria, Costa Rica, India, Lithuania, Latvia, Morocco, Mexico, Panama, Peru, Romania, Russia, Turkey, Sri Lanka, Saint Lucia, Iraq and Pakistan.^{2,3} In the following, after a review of the theoretical and research backgrounds, the model will be introduced and then estimated; and finally, the political conclusions and recommendations will be presented.

Theoretical Basis

Inflation is usually associated with actual or potential increase in the general price level, or in other words, with reducing the purchasing power of the monetary unit. Inflation exists in most countries, more or less; but its rate is different in various societies and in different periods. Inflation is less problematic in developed countries, because these countries are not plagued by hyperinflation or chronic inflation. But developing countries are facing with intense inflation that leads to many negative effects such as increased inequality in the distribution of income; increasing consumption, saving and investment decline; the diversion of resources to production of unnecessary goods and services; economic slowdown and expansion of a variety of administrative and financial corruption.

As mentioned, increasing poverty is one of the problematic consequences of inflation. High food prices may be an immediate threat to household food security, undermining population health, retarding human development, and lowering labor productivity for the economy in the long term.[2]

Brinkman et al.[3] assess the potential effects of the global financial crisis on food consumption, nutrition, and health by examining various transmission channels. Focusing on the effects of high food prices on food consumption, they show that a food consumption score – a measure of diet frequency and diversity – was negatively correlated with food prices in Haiti, Nepal, and Niger; and argue that a large number of vulnerable households in developing countries reduced the quality and quantity of their food consumption, and faced the risk of malnutrition as a result of the global financial crisis.[3] Today, preservation, expansion and promotion of health in the human societies are construed as one of the most fundamental and key

¹ www.worldbank.org

² The group of middle-income countries consists of Iran, Brazil, Bulgaria, Costa Rica, India, Lithuania, Latvia, Morocco, Mexico, Panama, Peru, Romania, Russia, Turkey, Sri Lanka, St. Louis, Iraq, and Pakistan. These countries selected because availability of their relevant data.

³ It should be noted that, the data used in the model were available during the period of 2002-2011.

policies to establish social development and justice in the countries. Since the health of people is, on one hand, one of the pillars of sustainable development and, on the other hand, is necessary for benefiting of human beings from the blessings of development, paying attention to health and doing efforts to preserve, promote and develop it, is always regarded as a priority.

Health study is a multidimensional subject which several and diversified factors/elements leave impact on its provision, development or destruction, and all individuals, systems and organizations in the society play a role in the creation and, also, reception of consequences of health.[4]

Morris et al. (2007) believe that health economics involves application of the theories, models and empirical-economical techniques for analyzing the decision-making of individuals, producers of the health commodities and governments, regarding the health. Considering what was propounded, indices relevant to health economics, including hygienic and medicinal costs, life expectancy or mortality rate in a country, accessibility of hygienic facilities, population growth, index of gross rate of birth, mortality rate of children less than five years old, mortality rate of mothers due to complications of pregnancy and delivery, and Total Fertility Rate (TFR) are indices of human development and index of health share from GDP.⁴ In addition to factors mentioned, the literacy level of women, the ratio of physicians to total population, the ratio of nurses to total population, received calorie per day, pharmaceuticals expenses, variables related to employment and income inequality have been mentioned to be some of variables affecting the health as well.[5]

The social determinants of health, as one of the main arenas of the health economy, are raised in this regard. Even though taking care of health may lead to improvement of the individuals' health, determination of the economic and social conditions which are sources of occurrence of disease leaves much impact on the promotion of individuals' health.[6] Concept of the social determinants of health presented by World Health Organization (WHO) refers to the circumstances in which the individuals are born, grow, live and grow old. Inequality in these cases leads to inequality in the individuals' health.[7] One of the most important of these conditions is household's economic situation.

In addition, economic policies can affect prices that influence on human capital levels, and thus

productivity, which in turn plays an important role in health inequalities.[8] Increasing poverty creates unemployment, class gap, and explosive behavior due to divorce and bad behavior of parents with children within families. It gradually creates domestic violence that then finds a way into the community. Studies show that violence begins in the mothers' womb. In other words, when mothers suffer from family misbehaviors, these feelings spread through the blood to the fetus. After the birth of children, parents' behavior has an important role in the violence and aggression in children. Scientific research shows that poor nutrition affects health through the immune system, increasing the incidence and severity of diseases.[9-10] One approach in assessing rising costs in national economies is the examination of annual variations in the Consumer Price Index (CPI). The Medical Consumer Price Index (MCPI), in particular, allows health researchers and policymakers to examine the change in price of selected medical goods and services over time, thus providing insight into the complex working of the medical market. One caveat in the use of the MCPI is its failure to keep pace with technological changes over time and the ensuing revisions in products and services. Another drawback of indexing and MCPI fluctuations is that the method represents the hypothetical purchase of a basket of medical goods and services as opposed to medical goods and services that are actually consumed, often at different prices altogether (i.e. discounted contractual allowances).[11]

Reviews

Since the relationship between "Inflation and Health" is a topic that may be assumed as an interdisciplinary research (economic and health), and since interdisciplinary studies in recent decades have become prevalent, there are few cross-national researches in this field. But because purchasing power reduces with rising inflation; in fact, people are getting poorer; the relationship between "poverty and health" studies conducted in this section may be meaningful.

In economic studies, subjective well-being measures have been used to understand and explore a large range of topics. They include: unemployment, inflation, health, job conditions, and income. [12-17]

The historical decline of mortality has been attributed to various factors associated with economic and social advancement, including the rising availability of material (maternal????) goods, urbanization and improvement of physical

⁴ Gross Domestic Product

infrastructures and housing, increasing levels of education, improvement in personal and social hygienic behaviors, medical advances, the disappearance of slavery, and other significant reductions in discrimination for gender, religious, or ethnic reasons. [18-19]

With respect to self-rated health status and exposure to risk factors, the Ontario Health Survey of (1990), Canada's Health Promotion Survey Special Study on the socially and economically disadvantaged, published by Wilkins (1988), the Wentworth (1991) study, and the research by Stephens & Fowler (1990) about health promotion survey; all found a correlation between perceived health status and household income. As well, those in lower income brackets reported a lower rating of self-help, lower satisfaction with health status, a lower level of happiness, a lower level of satisfaction with social life, and a lower measure of personal well-being. [20-22]

The first studies in this area may be attributed to Cohen. [23] This study examines the impact of poverty on women's health. The results show that the educational process includes information about how poverty affects health and the behaviors that impact on health. Because of the socioeconomic status of physicians, the EFPO study found that physicians were seen as distant from poverty-related issues that affect some of their patients and likely to find it difficult to empathize. Thus, the role of education and insurance can be very helpful for women. [23]

In addition, according to one study in Kenya about women, poverty and adverse maternal outcomes by Izugbara & Ngilangwa, [24] it was found that urban poor women in Nairobi associate poverty with adverse maternal outcomes. However, their accounts and personal experiences about the impact of poverty on maternal outcomes underscore dynamics other than those typically stressed in the existing literature. To them, poverty primarily generates adverse maternal outcomes by exposing women to exceedingly hard and heavy workloads during pregnancy and the period surrounding it; to intimate partner violence; as well as to inhospitable and unpleasant treatment by service providers. In this paper results tell us that poverty has wider and more intricate implications for maternal outcomes than are acknowledged in extant research. To deliver their expected impact, current efforts to promote better maternal outcomes must be guided by a more thorough perspective of the link between women's livelihoods and their health and wellbeing. [24]

The negative association found between economic growth and health progress in the most recent half-century, though quite at odds with traditional views of the relation between economic growth and improvement in the various dimensions of human well-being, is consistent with modern studies revealing a short-term tendency of death rates to increase during economic expansions in industrialized countries in recent decades. [25-26]

Since economic growth is often accompanied by inflation, so it can be concluded that the relationship between inflation and Health is verified. Among the studies that have been done in this area is the study by Granados and Ionides. [27] This study by using time series analyses in Sweden showed that the effect of the economy on health occurs mostly at lag 0 in the 19th century and is lagged up to 2 years in the 20th century. These findings are shown to be robustly consistent across a variety of statistical procedures, including linear regression, spectral analysis, cross-correlation, and lag regression models. Models using inflation and unemployment - as economic indicators - reveal similar results. Evidence for reverse effects of health progress on economic growth is weak and unobservable in the second half of the 20th century. [27]

After them, Lee et al [2] have examined the relationship between food prices and health in developing countries. A panel dataset covering 63 developing countries has been used from 2001 to 2010 to make a comprehensive assessment of the effects of food price inflation and volatility on population health measured by infant mortality rate, child mortality rate, and the prevalence of undernourishment. The results show that rising food prices have a significant and adverse effect on all three health indicators in developing countries. Furthermore, the impact of food prices is more severe in the least developing countries although the effect is moderated in countries with a greater share of agriculture in gross domestic product. [28]

One of the studies very close to the subject of this paper is the research that has been done by Virts & Wilson (2014) with using time series analyzes during the periods 1965–81; to study the relationship between inflation and health care price. This analysis implies that attempts to influence the cost effectiveness of health care through regulation or controls designed to influence the pattern of changes in health care prices would have been counterproductive. The result shows that changes in the patterns of actual consumption of health care goods and services will need to be relied upon for potential impact on the growth of expenditures for health care both by government, in public programs,

and by businesses in their medical protection of employees. [29]

Methods

In this paper, we have used some different relevant variables and entered them into the adapted forms of Equations 1 and 2 to evaluate the effects of inflation on the health of women in the selected middle-income countries

$$WLE_{it} = \alpha_1 + \alpha_2 HC_{it} + \alpha_3 INF_{it} + \alpha_4 NIPC_{it} + \alpha_5 FC_{it} + \epsilon_{it} \quad (1)$$

$$WMO_{it} = \beta_1 + \beta_2 HC_{it} + \beta_3 INF_{it} + \beta_4 NIPC_{it} + \beta_5 FC_{it} + \epsilon_{it} \quad (2)$$

Where WLE is the Women's Life Expectancy; WMO is the Women's Mortality Rate; HC is Human Capital (enrollment, secondary (% gross)); NIPC is National Income Per Capita; FC is Physical Capital (Gross capital formation (constant 2000 US\$)); The symbols δ and ϵ , i and t show respectively error term, countries and periods. Then we investigated the relationship between each of the independent variables included in the models of health economics.

For this purpose the Fixed Effects model was used. After that, Hausman & GMM test and Method of Maximum Likelihood were used for verification of the coefficients. In order to study the statics/stagnation or lack of stagnation of the variables, Panel Unit Root test has been used. Results obtained from the test of Im, Pesaran and Shin (IPS) for all the variables have been used in Table 1. Based on the results of static test, all variables are in the static level.

Then these variables can be used in the model according to stationary test results. In order to estimate equations, the fixed and random effects method (static panel) has been used. For this purpose, we applied a special type of panel data method.

Therefore, in order to determine existence (lack of existence) of width (latitude) from origin, F statistic was used for each of the countries separately. With

regard to rate of the F statistic calculated in Table 2, zero hypothesis of the test based on usage of the common "least squares method" is denied. As a result, regression 3 (minimum common squares) is not valid, and the width from various sources (the fixed or random effects methods) must be included in the models. Then, to decide which method (fixed or random effects) should be employed, Hasman test is used. Considering rate of the statistic (χ^2) obtained from accomplishment of calculations for these regressions in Table 2, Zero hypothesis based on usage of method or the random effects is denied with probability of 99%. Therefore, fixed effects method may be confirmed as an approximation of the models which its results are shown in Tables 2 and 3.

In addition to estimating models by using fixed and random effects estimators, the empirical model in this paper is estimated using the generalized moment of movement estimator (GMM) as well as relying on the dynamic panel data models in 2011-1997 period. There are many advantages for this method of estimation. GMM estimator with individual specific effects observed in the model; that is done by inserting the lag dependent variable as an explanatory variable in the model; provides better control over creation of explanatory variables Model. The results of the models by using GMM are presented in Table 3.

Results & Conclusion

In this study, we have used women's life expectancy and women's mortality rates to measure the health of women. Results obtained from estimation of Functions in the selected middle-income countries during 1997-2011 (Tables 2 and 3) show that:

Inflation has a significant negative impact on women's life expectancy as an indicator of health economics in the selected countries; so that, one percent increase of inflation reduces the women's average life expectancy as much as 0.000963 units.

Table1. The results for inflation effect on women health by Fixed Effects method in the group of the selected countries during 1997-2011 period.

Regression type			
Results	P-Value	IPS Test	Variables
I ₀	0.0011	-3.05327	WLE
I ₀	0.0014	-2.98520	WMO
I ₀	0.0000	-32.4670	INF
I ₀	0.0000	-12.3523	HC
I ₀	0.0000	-12.5019	FC
I ₀	0.0000	-15.3576	NIPC

Source: calculated by EVEIWS.6 software

Inflation affects the health of individuals through different ways. From one hand, households' expenditures increase by any growth of inflation, which in turn leads to the reduction of share of various sectors, including hygiene and medicine. This reduction means less medical care and harms the health. On the other hand, psychological effects of inflation have destructive influence on the individuals as well as a negative impact on their morality and behavior. Thus, the hypothesis related to the negative and significant relationship between inflation and women's life expectancy in the group

of selected middle-income countries cannot be rejected. Also according to these results, inflation has positive and significant effects ($\cong 0.0156$) on the women's mortality rate, as an index of health economics in the group of selected countries. In other words, women's mortality rate has been increased by increase of inflation, that in fact, it is considered one of the bad effects of inflation. Therefore, the hypothesis about influence of inflation on the women's mortality rate cannot be rejected in the group of selected countries.

Table 2. The results of models estimation and their verification tests.

Independent Variables	Dependent Variables	
	Women's Life Expectancy (WLE)	Women's Mortality Rate (WMO)
	Function 1	Function 2
C	71.34106**	145.7014**
INF	-0.002344**	0.015579*
HC	0.049745**	-0.615666**
FC	4.10E-11**	-3.57E-10**
NIPC	0.000680**	+0.004404**
R-Squared	0.924212	0.950312
D.W	0.392348	0.393092
Included Observations	158	157
F-Statistic	62.30	142.57
P-Value	0.0000	0.0000
Hausman Test	19.15	13.17

Note: The interpretation of table marks: (**) illustrates a very high level of meaningfulness, $\{T > 2\}$; (*) represents high level of meaningfulness and $\{1.8 < T < 2\}$.

Source: calculated by EVEIWS.6 software.

Table 3. Inflation Impact on Women's Health in the group of generalized method of moments in the selected middle-income countries for the 1997-2011 period.

Coefficient	Dependent Variable:	Dependent Variable:
	Women's Life Expectancy (WLE)	Women's Mortality Rate (WMO)
	Function 3	Function 4
WLE(-1)	(0.924936)***	-
WMO(-1)	-	(0.889031)***
INF	(-0.000963)***	(0.008377)**
HC	(0.006207)***	-0.098703)***
FC	(2.13E-12)***	(-4.60E-11)***
NIPC	(5.13E-05)***	(+0.001578)***
J-Statistic ⁵	8.396012	12.03188

Note: The interpretation of table marks: (**) illustrates a very high level of meaningfulness, $\{T > 2\}$; (*) represents high level of meaningfulness and $\{1.8 < T < 2\}$.

Source: calculated by EVEIWS.6 software.

⁵. J-statistic means the Sarjen statistic is used to test the correlation between the residuals and instrumental variables.

Gross rate of enrollment in the secondary school level, which is an index of human capital (HC), plays a significant role as the women's life expectancy index in the group of middle-income selected countries. From the perspective of education, skilled workforce has a key role in the health of individuals. Also, social healthy relationships have a positive effect on the mental health of individuals. These social relationships are improved by increasing of the human capital, including literacy level. Developments of human capital lead to decrease of crime, felony and law breaking. So these developments are useful for society's health.

Also, according to the results, National Income Per Capita (NIPC) has significant impact on the women's life expectancy as an index representing the health economics in the group of mentioned countries. There exists a powerful relationship between national income and rate of individual's health, but nature of this relationship is not clear. Various studies show that higher income doesn't lead to higher length of life. But, evidences show all agents dependent on the high income such as better teaching and feeding, more social relationships, family stability and ect, lead to increase of the health. In this study, the positive and significant impact of per capita national income on life expectancy as well as significant negative impact on female mortality rates in the selected countries has been confirmed. These results represent positive effects of income on women's health in the selected countries.

Furthermore, real gross capital formation (constant 2000 US\$); as Physical Capital (FC) index; has a positive and significant effect on the women's mortality rate which is a health economics indicator in the group of middle-income selected countries. High level of physical capital can create more infrastructures regarding hygiene and treatment which leads to more facilities in the field of health. Higher physical capital also leads to greater levels of welfare in society and more life expectancy. Estimation of coefficients in the models shows that more than 90% of changes of the indices suggesting the health economics (women's life expectancy, women's mortality rate) in the group of the selected middle-income countries have been explained by independent variables.

Recommendations

With regard to the results of this paper, the following policy advices have been suggested:

1. Adoption of policies in order to increase the life expectancy and promote the health level of the societies through the ways such as:
 - A. Increase of efficiency of governments' costs in healthcare.
 - B. Equitable distribution of health facilities and services.
 - C. More usage of the modern technologies in the health system.
2. Promoting the level of per capita physical capital and effectiveness in usage of physical capital.
3. Establishment of possibilities for all people to reach the required health services.
4. Prevention from increasing of medical costs due to technological improvements.
5. Increasing the share of government and insurance companies in provision of people's medical costs.
6. Creation of financial participation in equitable supply of the health system.

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