

Investigating the impact of income distribution on health status of Mamasani city people

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Abstract

The aim of this paper has been to investigate the impact of income distribution on health status of Mamasani City people. Calculations of this study were performed using the available statistics in time series of 1981-2017 and this issue has been investigated using Auto Regressive Distributed Lag (ARDL) and Microfit software. Based on the results of bounds tests and dynamic model estimation, there is a long-term relation among variables in the model and the considered model has no problem regarding the results of pathology tests. Based on the results of long-term model estimation, there is a positive relation between per capita income and dependent variable (health indicator) and also a negative relation was observed between inequality of income distribution, inflammation and unemployment rate and dependent variable (health indicator). The results of test of error correction indicate that health indicator (life expectancy) is rectified with a high speed than its deviation from long-term balanced relation. The results of model structural stability test confirm existence of structural stability.

Key Words: Health indicator, inequality of income distribution, income per capita, inflammation rate and unemployment rate, Mamasani City.

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INTRODUCTION

The notion of development has occupied the mind of many planners and decision makers for achieving progress and sustainable development since mid-20 century. In literature, development of human dignity and attitude has a special place so that the major objective of development is movement for promoting life quality and quantity in mental and physical dimensions and human munificence. Free from definitions as yet provided for the notion of development and being developed, their common and significant point is that development is a multi-dimensional notion that in case of realization and

improvement in all of these dimensions, being developed and following that sustainable development is realized. Investigating the evolutionary trend of development notion shows that at first reaching high economic growth was among main indexes indicating development of a country but in practice it was seen that mere creation of high economic growth couldn't be indicator and warrantor of development survival. So, it may be said that development will be realized when a considerable collection of social, economic and cultural indicators such as just distribution of income, healthcare, education, unemployment and poverty are improved (Teifouri and Akbari, 2013) Health is a topic which has a close relation with comprehensive development and progress such as economic growth and development. People of healthy society, in one hand, work more vivacious and happier and with more motivation, on the other hand, direct and indirect costs which lead to reduction of national income and as a result growth and development are decreased. For this reason today, all societies have a special attention to increase of the society health indicators (Khabazi and Zorieh, 2017). One of axial indicators of sustainable development is health and supplying physical, mental and social health of citizens is enumerated among main

requirements. Health as a form of investment is treated as a tool for preserving capability and efficiency of workforce. According to the definition mentioned in the articles of association of World Health Organization, health means complete mental, physical and social comfort and is not merely lack of illness or disability. Concerning the span of this definition, in this study, our purpose of health is physical health. Many factors influence health and health costs that in this study the special emphasis is on income distribution along with economic growth and unemployment. Income distribution explains how the shares of people of a country of national income are distributed. In other words, income distribution describes the existing inequality degree between the incomes of people of a country. One of the most important economic duties of government is reduction of income inequality. Since the distribution duty requires the government to analysis the changes of society people incomes using available instruments for reducing the inequality. The globalization continuous process has a great impact on welfare status of citizens of the world countries. As a result of this process, in 1990 alterative development indicators were provided. A numerous population believed that the country development is not well explained by classic economy growth indicators. Factors like wages inequality, working status, freedom and discrimination have found more and more weight in development and have been discussed (Kornél Halmos, 2011). Income distribution is one of oldest topics of economic theories. Few topics exist in the economy that like income distribution is influences by most economic policies and impacts economic variables. Considering significance of supplying requirements of low income groups, income distribution in doing policy makings has been generally one of concerns and is enumerated as a criterion for evaluating policies. So, most studies for evaluating economic policies consider income distribution. Now, globalization development is expressed with reduction of commercial obstacles and increasing of commerce level and also increasing of foreign investment (Alamdari, 2015). Today, preservation, development and health promotion in human societies is treated as the main and key policies for creating and developing social justice in countries. Since healthy human is axis of sustainable development, attention to health and effort for its preservation, promotion and development is always considered a priority. Health topic is a multi-dimensional subject that influences various factors and elements in its supply, development or destruction and all people, systems and organizations in the society play role in creating and also receiving health consequences. This study seeks to investigate the impact of income distribution on health status of Mamasani City people

RESEARCH HYPOTHESES

Considering the theoretical internal and foreign fundamentals and performed studies, the research hypotheses are as follow: Inequality of income distribution has a negative and significant impact on health indicator in Mamasani City. Per capita income has a positive and significant impact on health indicator in Mamasani City. The government income in healthcare section has a significant and positive impact on health indicator in Mamasani City. Unemployment rate has a negative and significant impact on health indicator in Mamasani City. Inflammation rate has a significant and positive impact on health indicator of Mamasani City.

RESEARCH METHODOLOGY

This study is of library studies type. For collecting data, valid databases and internet sites such as central bank site and Iran statistics center have been used. Also, for answering the study questions and testing the hypotheses, econometrics methods have been utilized. In other words, after determining the suitable model (using available statistics) with econometrics techniques and methods and Microfit 4 software, the factors were estimated as tension. Then, using these factors and expression of intensity and weakness, their impact on health indicator in the considered function was analyzed and the obtained results will be used in providing appropriate approaches. For investigating the short term and long term relations between dependent variable and other model explanatory variables, after acquiring confidence of a co-integration vector, ARDL method (autoregressive model with distributed pause) have been used. Estimations of ARDL method are unbiased and efficient due to avoidance of problems like autocorrelation and inbreeding (Seddiki, 2000). ARDL method includes two stages. In the first stage, existence of a long term relation between variables will be investigated. Concerning the number of observations, maximum number of pauses is considered and due to the trend of Schwarz – Bayesian criterion, in shorter specification, this criterion shows better results in observations less than 100 (Tashkini, 2005). Immediately after estimation of dynamic equation (short term) the test of existence or non-existence of long term relation was performed. Now, for investigating this long term relationship obtained from this method, is not false, the following method is performed and the considered hypothesis is tested:

$$H_0 = \sum_{i=1}^p \phi - 1 \geq 0$$

$$H_1 = \sum_{i=1}^p \phi - 1 < 0$$

Figure 1:

Null hypothesis indicates lack of long term relation since its Short-Run Dynamics Relationship tends to long term relationship, is that sum of functions is less than one. Calculation of t quantity for doing the considered test is in this form that number one should be deducted from sum of factors with dependent variable and is divided into sum of standard deviation of the mentioned criterion.

$$t = \frac{\sum_{i=1}^p \hat{\phi}_i - 1}{\sum_{i=1}^p S\hat{\phi}_i}$$

Figure 2:

In this relationship, the s relation shows the standard deviation of factors with dependent variable pause, if the obtained modulus t is greater than modulus of the critical rates provided by Banerjee, Dolado and Mestre (1992), the null hypothesis is rejected and existence of long-term relationship is accepted. By confirmation of existence of long term relation between variables, Error Correction Model may be used. For investigating long term relation, Pesaran and Shin and Smith bounds test (200) based on the approach of estimating unbound error correction (UECM) including dynamic relationship and long-term balanced relation may be used. In this method, existence of short term relationship between studied variables by means of calculating F statistics calculation is tested for significance test of levels with variables pause in the error correction form. Its important point is that the mentioned F distribution is non-standard. If computational F places beyond the upper bound, the null hypothesis based on lack of long term relation is rejected and if it is placed lower than lower bound, the null hypothesis is accepted. The second stage of this analysis will be using ARDL options in estimating long-term relationships and the respective statistical deduction to their rates. It should be noticed that the beginning of this stage will be the only suitable time that in fact it was convinced about falsity of long-term relations between variables.

RESEARCH EXPERIMENTAL RESULTS

Identification and affirmation of the model

In this study, concerning theoretical studies the following model has been used for the hypothesis objectives:

$$LH_t = \beta_0 + \beta_1 LGDP_t + \beta_2 LHCE_t + \beta_3 LUE_t + \beta_4 LUN_t + \beta_5 LINF_t$$

In the above model:

H_{it} : Health indicator (life expectancy in the birth time)

$LGDP_t$: Per capita income logarithm

$LHCE_t$: Government cost logarithm in healthcare section

LUE_t : Logarithm of 10% share ratio of the most wealthy society people to percent share of the poorest people of the society (inequality of income distribution)

LUN_t : Unemployment rate logarithm

$LINF_t$: Inflammation logarithm

In this study, at first, dependent variables (inequality of income distribution, per capita income, government cost in healthcare section, unemployment rate and inflammation rate) and independent variable (life expectancy at the birth time) data for 2011 to 2017 were collected. Since the used data are as time series, at first reliability test was performed.

Investigating reliability of variables: Using econometrics methods are on this basis that the used time series variables are stable. A time series variable is stable when its autocorrelation variance and factors remain stable during time. So, before using variables, it is required that their stability or instability to be assured. In this study, unit root test has been used for investigating the validity of variables. Therefore, regarding unit root test in the surface, variables of unemployment rate, inflammation rate and inequality of income distribution were stable and the rest unstable. For determining the order of variables stability, variables which are not stable were differentiated that all instable variables become stable after one differentiation.

Bounds test: For investigating co-integration (long term) between variables, there are two methods. The first method is Shean and Esmith bounds test (2001) based on estimation of unconstrained error correction model (UECM). Before discussing about the long-term balanced relation between available variables in the model, it is required that co-integration test is performed between all available variables. Here, bounds test which is based on estimation of unbounded error correction model (UECM) using estimator of ordinary least square has been used for testing existence or non-existence of long term relation between variables. For investigating long term relations between variables, the unbound error correction model related to the equation is estimated. F statistics obtained from bounds test which has been obtained from estimation of the mentioned model relating to the obtained equation and also the bounds of critical rates provided by Pesaran has been shown in table 1. Since in 95% level, the upper bound is equal to 3.81 and the lower level is equal to 2.65 and the rate of computational F statics for significance test of all factors (7.32) is more than the upper level, so the null hypothesis of lack long term relation may be rejected (table 1)

Table 1: Results of F test for existence of long term relation

در سطح 90 درصد		در سطح 95 درصد		Statistics F
I (0)	I (1)	I (0)	I (1)	
2.26	3.37	2.65	3.81	7.32

Source: research findings

Estimation of dynamic model: Based on study of Pesaran *et.al* (2001) using ARDL method considering appropriate pauses, the long-term factors of consistency among considered variables in a model may be obtained. In Johansson model, for all variables a similar pause is selected. While, in ARDL method, for all variables using criteria like Showarts-Bizin and Hanan- Quinn are selected for optimal pauses.

Table 2: The results of dynamic estimation with ARDL method

Variable	Factor	Standard deviation	(Probability level) statistics t
LH (-1)	0.1920	0.0522	36872 (0.0001)
LGDP	0.1509	0.0741	2.0349 (0.051)
LHCE	0.0755	0.0058	12.817 (0.000)
LUE	-0.8754	2.355	-3.7170(0.001)
LUE (-1)	-0.9058	0.6884	-1.3157 (0.084)
LUN	-0.2698	0.0110	-24.3759 (0.000)
LINF	-0.0851	0.0157	-5.3917 (0.000)
C	1.4522	0.4617	3.1450 (0.004)

R²= 0.84 F=45.21 (0.000) DW =1.81

Test Statistics	LM Version	F Version
A: Serial correlation	CHSQ (1)= 0.974 (0.755)	F (1, 26)=0.713 (0.791)
B: Functional form	CHSQ (1)= 1.4787 (0.224)	F (1, 26)= 1.124 (0.298)
C: Normality	CHSQ (2)= 0.052(0.975)	Not applicable
D: Heteroscedasticity	CHSQ (1)= 0.6359 (0.425)	F (1, 34)= 0.6121 (0.439)

Source: research findings

Based on the estimated results (table 2), the problem of autocorrelation or variance inequality, normality and consequential form have not existed in this model and the model confirmation has been acceptable. The determination factor is equal to 0.84 (which indicates that 86 of changes of health indicator have been explained by dependent variables) and F statistics equal to 45.21 indicates the high explanatory power of the model. In ARDL model, the co-regression long term relation presence is confirmed when the modulus of t statistics quantity is greater than its critical rate (for preforming this test, sum of factors with dependent variable pause should be deducted from one and divided to its standard deviation). The computational statistics has been obtained as follows:

$$t = \frac{0/19206 - 1}{0/052217} = \frac{-0/80794}{0/0522} = -15/47$$

Comparing the computational statistics (-15.47) with modulus of critical quantity of this test in 95% significance level (-4.43) which has been provided by Benjeri *et.al* (1992), the hypothesis of existence of a long term relation (co-integration) between model variables is confirmed. So, the long-term variable is estimated. 5-5 Estimation of long-term equation. After estimation of dynamic model (Short term) and proof of existence of long term relation, this relationship is estimated. The results of long term estimation have been shown in table 3.

Table 3: The results of long-term equation estimation

Variable	Factor	Statistics t	Probability level	Result (significance level 95%)
LGDP	0.1630	2.1040	0.044	Significance
LHCE	0.0375	0.9071	0.372	Insignificance
LUE	0.2285-	7.1987-	0.000	Significance
LUN	0.2125-	8.4430-	0.000	Significance
LINF	0.1480-	3.6959-	0.001	Significance
C	1.7974	3.4130	0.002	Significance

Source: research findings

As it is observed in long term relation (3), all variables except government cost in healthcare section, is significant in confidence level 95%. The variable of income distribution inequality is significance and has a negative factor equal to 0.22. This factor shows that in long term by assuming stability of other variables, 1% increase in income distribution inequality, health indicator (life expectancy) will be reduced 0.22%. The variable of unemployment rate is significant and has a zero factor and the first hypothesis is confirmed. The variable of pre capita income is significant and the variable factor is equal to +0.16 which shows that the growth of pre capita income has a significant and positive impact on health indicator (life expectancy), that is, if per capita income increases 1 percent, by assuming stability of other factors, health indicator (life expectancy) increases 0.16% and this result confirms the second

hypothesis. The variable of government cost in the healthcare section in confidence level of 5 and 10% has not become significant and the third hypothesis is rejected. By 1 percent increase of unemployment rate, health indicator (life expectancy) reduced 0.21%. So, the 4th hypothesis is confirmed. The variable of inflammation rate and variable factor is equal to -0.14 which shows that inflammation rate has a significance and negative impact on health indicator (life expectancy), that is, if the inflammation rate increases one percent, by assuming other factors stability, health indicator (life expectancy) reduces 0.14%. So, the fifth hypothesis is confirmed.

Estimation of error correction model: Auto-regression method with distributive pauses adjusts and estimates error correction model (ECM) for long term relation for investigating short term deviation of variables from its balanced rates. Since in the above regression, existence of long-term relation was confirmed, in the following the regressions error correction is investigated. The results obtained from error correction model estimation have been shortly provided in table 4.

Table 4: The results obtained from error correction equation

Variable	Factor	Statistics t	Result (confidence level 90%)
$ecm(-1)$	0.8247-	9.8036-	Significance
$R^2 = 0.84$ $F = 78.49$ (0.000) $DW = 1.81$			

Source: research findings

In the model of error correction, factors of all variables are significant in short term relation in significance level 90 and 95% in statistical respect. What is most significant in error correction model, is factor of error correction method (-1) which indicates speed of regulation of imbalance process. As it is observed, this factor is significant and has a negative sign and confirms the co-integration between variables. According to theoretic expectations, if move from one period to the next period, 82% of deviation rate in life expectancy function from its long term route is corrected by model variables in the next period.

The results of structural stability test: Factors stability has been investigated with CUSUM and CUSUMSQ that the test results show that the factors of estimated model are stable during the investigated period. As the results of estimation and diagrams of cumulative and square waste show that 5% confidence interval has not been cut by diagrams. So, null hypothesis based on existence of structural stability of parameters is accepted.

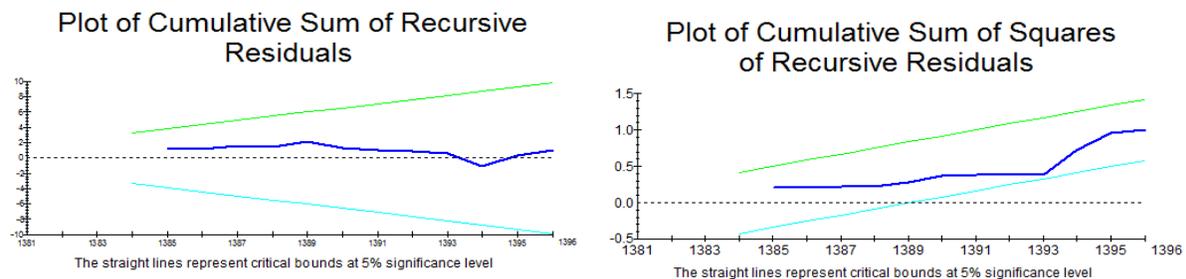


Figure 1: The results of structural stability test with statistical calculation of culmulative waste (CUSUM) and square cumulative waste (CUSUMSQ)

CONCLUSION AND SUGGESTIONS

Health is influenced by income distribution in every society and this indicates that people health in societies with more just income distribution will become better. Income inequality has caused fewer budgets to be assigned to health and makes the poor groups health more vulnerable. For health improvement, we shouldn't only rely on primary care system, but we should also focus on hypotheses like improvement of income inequality, since improvement in income distribution causes rising of life level of a wide class of people through improvement of their health affairs, nutrition and education. By economic development and reduction of income inequality, the individuals and families accessible income increases and

through this, society people health is supplied and promoted. Concerning the results of this study, necessary policies and measurements should be performed for improvement and stability of income growth in the country and then, policy makers are recommended to concentrate their attention and effort on the regions of the country like Mamasani city which are faced more income inequality. Considering the negative impact of inflammation and unemployment indicators on health index, adjust their planning and policies towards reduction of unemployment and inflammation to provide the ground for improvement of health status in the society.

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