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The Impact of Health Indicators on Economic Development and Social Wealth

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Abstract

Considering the researches of the scientific literature, that highlighted the strong connection between health, economics and the standards of living , the purpose of this paper is to identify to what extent the main indicators of health status have impact on long term economic growth. We used a sample of worldwide states, representing the data on which the analysis was conducted. Our research present the correlation between health work force density selected as independent variable and the dependent variables as: the number of infant deaths, life expectancy at birth, the increase of total revenues in GDP. The method used was linear estimation, both with simple regression and panel data model. The indicators were selected and processed from World Bank and World Health Organization data base. Our results confirm the research assumptions, regarding how the health work force density determine the decrease of infant mortality, an increase of life expectancy and the increase of total revenues in GDP. Health work force density plays the major role for the health system performance. We should reconsider the management of health system for a better coverage of people health needs, because the performance of human capital it is reflected subsequently in the economic competitiveness and social wealth.

Keywords: Health indicators, economic growth, health workers, management.

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1. Introduction

The health system contain all resources necessary for a healthy societal structure, productive and fully integrated into the labor force market. The quality of health services, the performance of the health work force and the optimum allocated resources has an important contribution to the increase of the living standards and on economic development [1]. Along time, various studies presented the most representative indicators for the health status the life expectancy at birth indicator, infant mortality rate and health work force.

Globally, there is an increased demand for health data [2], [3] in order to be developed and implemented the most performant health strategies in compliance with the real health needs. However, the health specialists emphasizes that the process for obtain and compilate health data is difficult and expensive. In accordance with Global Health Observatory data [4], the average life expectancy increased by 5 years between 2000 and 2015 but alarming values were registered in 2015 for the infant mortality rate. The annual infant deaths declined from 8.9 million in 1990 to 4.5 million in 2015 but the values are still high. In 2015, the 4.5 milion infant deaths ocured in the first year of life and also represented 75% of all deaths under five years according with Global Health Observatory Data [5].

Globally there is an obvious medical personnel deficit and an unequal ratio between population and health workers, respectivelly 23 health professionals per 10000 people. Few countries provide evidences for health workers and have a comprehensive and valid data base on available health workers [6]. The above mentions reflect that worldwide the health coverage is not so good and the health work force density is low.

Numerous studies presents that there are interdependences between the individual health status and the capacity to obtain revenues, areas with poor health being characterized by the lack of health workers and undeveloped infrastructure of health. In this regard, there is an obvious need to reform the health governance, to promote the importance of management public in order to increase the quality of citizens life [7] and also ensure a competitve organization of the healthcare staff [8]. We need to reconsider the management of human resources for health sector in order to ensure a better coverage of health services based on quality, availability and accesibility, performant results for people health needs. We should invest and innovate in the health system, because healthcare is the quintessential tool for the maintenance of population health wich is the pledge of long-term economic growth [9].

2. Review of the scientific literature

The influence of the health system for the economic environment was revealed more than 30 years ago and continues also into the present. Most studies highlighted the interdependencies between health, work force, income [10], [11] life expectancy at birth, infant mortality rate [12], [13], [14] social capital and the level of mortality [15] deflation and wealth [16].

Different scientific results show us the macroeconomic impact of health indicators, taking less into account the influence of health workforce density on the health indicators. Regarding the above aspects, a decrease with 45% of infant mortality rate it is influenced in a percent of 17% by the increase of incomes [17] and also the decrease of infant mortality rate it is influenced by life expectancy at birth [18]. Other authors emphasise that an increase with 1 year in life expectancy determine an increase with 1% in national productivity [19] and an increase with 1% in life expectancy determine an increase with 1,7%-2% in population [20]. More over an increase with 10% of life expectancy at birth explain an increase with 0.3% si 0.4% of economic growth in GDP [21]. Also life expectancy at birth and health status represents a predictible method to estimate the national income [22], the unemployment rate [23], the human capital stock and the economic growth [24].

Fewest studies are centered on the influence of health work force density on the health system results [25], [26]. Even though there are interdependencies between health, mortality rate, work force and economic growth, there is not known precisely the effect of health work force on the economic development [1] and this aspect should be investigated more well.

3. Aims of the research

Considering the results of scientific studies that explain the influence of life expectancy to the increase of national income and economic development, the first aim of our research is to know to what extent the density of the health workforce contributes to the increase of life expectancy at birth. The first hypothesis we tested was: Higher health work force density is, higher the life expectancy at birth is.

Secondly, we wanted to know if health work force density influences the level of infant mortality, taking into account that different researchers explain the fact that long run the high levels of infant mortality affect the development of human capital and produce macroeconomic fluctuations. In

this regard, the second hypothesis we tested is: Higher the work force is, lower the infant mortality rate is.

Thirdly, we wanted to investigate the impact of health workforce density to the total revenues in GDP and to economic well-being. The third hypothesis tested was: Higher health work force is, higher the total revenues in GDP are.

4. Methodology of the research paper

In this research we used two statistical methods of estimation. We used the panel data analysis and the simple linear regression analysis. The simple linear regressions method allowed us to observe the relationships and the strengths between the variables selected for the linear association. Our panel data model pointed out both the cross sectional correlations, the period one and also the time series effect. The panel data analysis was conducted on a period of four years, from 2010 to 2013, because we had similar information for all components in terms of indicators, number of years, countries included.

The sample consists of states worldwide. Data processing was done through the econometric technique in Eviews. We computed the panel model using the fixed effect and the random effects. We tested the fixed effects in order to discover if besides the constant that is specific for each observation, another constant appears either for measuring the cross sectional effect, either for measuring the period effect. In order to test the significance of the fixed effects, we used the test of redundant fixed effect. In order to accept them, the p-value should be less than 10%, which means that the effects are significantly. In order to choose between fixed effect and random effect, we tested the relevance of random effect, using the Hausman test. Hausman test implies that both random and fixed effects are consistent estimators and the random effect model is efficient, while the alternative hypothesis is related with the fact that only the fixed effect is consistent. While a p-value close to 1, reveals that the null hypothesis is accepted, a value close to 0 means that the null hypothesis is rejected, and the fixed effect is indicated to be used. Simple linear regression was used when the results found on panel data were not reliable.

The indicators used in this research paper were available on data base of World Health Organization and World Bank. The four indicators selected were: a) health work force density; b) the number of infant deaths, respectively the subcategory named the under-five mortality rate (per 1000 live births); c) life expectancy at birth; d) total revenues, excluding grants

(%GDP). We selected the health work force density indicator as the independent variable and the others indicators mentioned above the dependent variables in order to discover the marginal contribution of the independent variable to the dependent variables and the effects obtained are presented below.

5. Main findings the research

The first results were obtained through the panel data analysis, including 34 countries, were we identified that for the entire period 2010-2013 there is a positive correlation between health work force density and life expectancy at birth (see the table 1) The results obtained are valid because we reject the null hypothesis that says that all coefficients are zero (the significance of test F). Regarding the statistically significance of the coefficient, the constant is 0.47 and its significance threshold is at 1%. We discover that an increase with 1 of the health work force density (per 1000 population), determine the life expectancy increases with 0. 47 years, that is 172 days, the coefficient being statistically significant at 1% We tested the fixed and the random effects, but the results were not relevant. The model present autocorrelation (DW=0.08), and the errors don't have a normal distribution. The results confirm the first hypothesis that the higher health work force density is, higher the life expectancy at birth is.

Table 1. Regression analysis between Health work force density and life expectancy

Dependent variable (**Life expectancy at birth)**	
Variables	Coefficient
Constant	68.7972***
Health work force density	0.4770***
R squared	18.19%
F statistic and probability	26.4621***
DW	0.08
Effects fixed and random	No significance
Normality	No

Data source: Made by the authors
Where ***, **, * shows the significance threshold at 1% 5% and 10%

Regarding the second hypothesis we tested, the results were estimated including 40 countries, with 110 observations (there are periods

when the data is missing from one variable included into the analysis). The results for the entire period 2010-2013 provide evidence that there is a negative correlation between health work force density and the number of infant deaths (See Table 2). When the health work force density increases, the number of infant deaths decreases. Overall, an increase with 1 in the density of health work force (per 1000 persons) determines a decrease with 7.46 (per 1000 living births) in the number of child deaths. The fixed and random effects are not relevant. Regarding the statistically significance of the coefficients, we reject the null hypothesis both for the constant at for health work force density. The coefficient of health work force is 7.4629, different from zero, significant at 5%. The F statistic is 5.157 and the model is statistically significant (the p value of F is statistically significant at 1%). There are evidences of positive correlation between the errors of the model, DW is below 2. The results confirm the second hypothesis that the higher the work force is, lower the infant mortality rate is.

Table 2. Regression analysis between Health work force density and Infant mortality rate

Dependent variable (Children deaths- under five mortality rate (per 1000 live births)	
Variables	Coefficient
Constant	128.5945***
Health work force density	**-7.4629****
R squared	4.55%
F statistic and probability	5.1572**
DW	0.01
Effects fixed and random	No relevance
Normality	No

Data source: Made by the authors
Where ***, **, * shows the significance threshold at 1% 5% si 10%

The third point of our research is testing hypothesis the higher the health work force is, higher the total revenues, excluding grants (% of GDP) is. By linear simple regression, using 24 data found on 24 states, we obtained that when the health work force increases with 1 (per 1000 person), total revenues excluding grants (%GDP) increases with 0.56% (see the table 3). The results reveal that there is a positive correlation between the increasing of the health work force density and the increasing of total revenues excluding grants (%GDP). The model is statistically significant, the

probability associated with F is 0.0901 is smaller than 10%. This results obtained are valid only for 2013. The results for the entire period 2010-2013 were not statistically significant because few states reported data for 2010. Regarding the autocorrelation, we could have it as DW is higher than 2, but there is a lack of heteroscedasticity which is currently a good thing.

Table 3. Regression analysis between Health work force density and total revenues excluding grats (% GDP)

Dependent variable (total revenues excluding grants (% GDP)	
Variables	Coefficient
Constant	24.0990***
Health work force density	0.5643*
R squared	12.49%
F statistic and probability	3.1427*
DW	2.36
Heteroscedasticity	No
Normality	Almost

Data source: Made by the authors
Where ***, **, * shows the significance threshold at 1% 5% si 10%

The above results reveal the importance of the health work force density on the economic development through the influences that are reflected on the values of the main indicators of health. In this regard the attention for the health work force density should be reconsidered in order to increase the quality of health services and to ensure better results for health system.

6. Conclusions

The research results reveal that health work force density has influence on the values of health indicators and that means multiple indirect effects on economic development as other scientific studies presented. There is an obvious connection between health results, economic environment and health workers. However few scientific studies emphasizes the role of health work force density on economic development and the fact that the health workers plays the major role for ensure health system functionality. The research hypothesis are valid, the health work force

density determines the increase of life expectancy at birth, the increase of total revenues in GDP and the decrease of infant mortality

We obtained that an increase with 1 (per 1000 person) of health work force density implies an increase of life expectancy with 0.47 years, that is 172 days and this aspect as other authors presented, has effects on the development of human capital and work productivity. Also through the linear regression analysis, we obtained that an increase with 1 (per 1000 persons) of health work force density, reduces the infant mortality rate with 7.46 (per 1000 living births) and increase the total revenues in GDP with 0,56%. The research results explain the economic value of health system for society and the importance of health workers for the health system results.

The limits of the research are based mainly on data availability and on the lack of reporting of several countries. In order to extend the research results for future we intend verify the correlation between central government debts and the endowments with medical equipment, both applied on cross sectional data and on panel data, because our first results in this regard were not statistically significant.

References

[1] Suhrcke M, McKee M, Regina Sauto Arce, Tsolova S, Mortensen J. The contribution of health to the economy in the European Union. Luxembourg: Office for Official Publications of the European Communities, 2005, p. 1-133, Available from: https://ec.europa.eu/health/archive/ph_overview/documents/health_economy_en.pdf

[2] World Health Organization. Global Health Observatory data repository. [Internet]. [Unknown place] Global health workforce statistics [cited 2017 Jan 10]; [about 1 screen]. Available from: http://apps.who.int/gho/data/node.main.HWF?lang=en

[3] Allutis C, Bishaw T, Frank MW. The workforce for health in a globalized context- global shortage and international migration. Global Health Action [Internet]. 2014 Feb [cited 2016 Nov 10]; 7:1-6. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3926986/pdf/GHA-7-23611.pdf DOI: 10.3402/gha.v7.23611

[4] Global Health Observatory World Health Organization. Global Health Observatory data [Internet]. [Unknown place] Life expectancy [cited 2017 Jan10]; [about 1 screen]. Available from:

http://www.who.int/gho/mortality_burden_disease/life_tables/situation_trends_text/en/

[5] World Health Organization. Global Health Observatory data [Internet]. [Unknown place] Infant Mortality [cited 2017 Jan 10]; [About 1 screen]. Available from: http://www.who.int/gho/child_health/mortality/neonatal_infant_text/en/

[6] World Health Organization. Media Centre. [Internet]. [Unknown place] Global health workforce shortage to reach 12.9 million in coming decades [cited 2017 january]; [About 1 screen]. Available from: http://www.who.int/mediacentre/news/releases/2013/health-workforce-shortage/en/

[7] Androniceanu A. Good democratic governance based on a new model. Administration and Public Management Review. [Internet].2015 [cited 2016 Dec 22]; (24), 44-55. Available from: http://www.ramp.ase.ro/en/_data/files/articole/2015/24-04.pdf

[8] Androniceanu A. Particularities of the human resources policies in an international organization. Administration and Public Management Review. [Internet]. 2014 [cited 2016 Dec 22]; 22: 41-47. Available from: http://www.ramp.ase.ro/en/_data/files/articole/2014/22-03.pdf

[9] Androniceanu A, Ohanyan G. Comparative approach on education and healthcare in Romania and Bulgaria as beneficiaries of the IMF financial assistance. Administration and Public Management Review. [Internet]. 2016 [cited 2016 Dec 22]; 26: 25-48. Available from: http://www.ramp.ase.ro/en/_data/files/articole/2016/26-02.pdf

[10] Grossman M. On the concept of health capital and the demand for health. JPE [Internet]. 1972 Apr [cited 2017 Jan 10]; 80(2): 223–255. Available from: http://economics.sas.upenn.edu/~hfang/teaching/socialinsurance/readings/Grossman72%283.1%29.pdf

[11] Bloom D, Canning D. Health and economic growth: Reconciling the macroeconomic evidencies.. CDRL Publications [Internet]. 2005 Feb [cited 2017 Dec 10]; 42:1-15. Available from: http://cddrl.fsi.stanford.edu/publications/health_and_economic_growth_reconciling_the_micro_and_macro_evidence

[12] Preston SH. The Changing Relation between mortality and level of economic development, Population Studies Journal [Internet]. 1975 July [cited 2017 Jan 10]; 29(2): 231–248. Available from: http://www.jstor.org/stable/2173509 DOI: 10.2307/2173509

[13] Muray C. J. The infant mortality rate, life expectancy at birth and linear index of mortality as measures of general health status. Int J Epidemiol [Internet]. 1988 Mar [cited 2017 Jan 10]; 17(1): 122-128. Available from: https://academic.oup.com/ije/article-abstract/17/1/122/749766/The-Infant-Mortality-Rate-Life-Expectancy-at-Birth DOI: https://doi.org/10.1093/ije/17.1.122,

[14] Waldmmann RJ . Income distribution and infant mortality. Q J Econ [Internet]. 1992 Nov [cited in 2017 15 Jan]; 107(4):1283-1302. Available from: https://academic.oup.com/qje/article-abstract/107/4/1283/1846943/Income-Distribution-and-Infant-Mortality DOI: https://doi.org/10.2307/2118389

[15] Kawachi I, Kenedy BP, Lochner K. Social capital, income inequality and mortality. Am J Public Health [Internet]. 1997 Oct [cited 2016 Dec] 87(9): 1491-1498. Available from: https://www.researchgate.net/publication/13907275_Social_Capital_Income_Inequality_and_Mortality

[16] Andrei A, Galupa A, Androniceanu A, Georgescu IA. Monetary Policy With Constant Real Stock Of Bonds. Economic Computation And Economic Cybernetics Studies And Research. [Internet]. 2016 [cited 2016 Nov 10] 50(3), 101-116. Available from: ftp://www.ipe.ro/RePEc/cys/ecocyb_pdf/ecocyb3_2016p101-116.pdf

[17] Alleyne GA, Cohen D, Health, economic growth and poverty reduction, Geneva: World Health Organization Library Cataloguing-in-Publication Data. 2002. p.1-113. Available from: http://apps.who.int/iris/bitstream/10665/42492/1/9241590092.pdf

[18] Reidpath DD, Allotey P, Infant Mortality rate as an indicator of population health. J Epidemiol Community Health [Internet]. 2002 May [cited 2017 Jan 20]; 57(5): 344-6. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1732453/

[19] Bloom D, Canning D. The Effect of Health on Economic Growth, a Production Function Approach, World Development Journal [Internet]. 2004 Jan [cited 2016 Aug]; 32(1):1-13. Available from: http://www.sciencedirect.com/science/article/pii/S0305750X03001943

[20] Acemoglu D, Johnson S. Disease and Development: The Effect of Life Expectancy on Economic Growth. Journal of Political Economy Internet]. 2007 Dec [cited 2016 Aug]; 115 (6): 925–985. Available from: http://www.journals.uchicago.edu/doi/pdfplus/10.1086/529000

[21] Husain MJ. Contribution of health to economic development: A survey and overview. Economics E-journal [Internet]. 2010 Apr [Cited 2016 Aug];

No.185: 1-40. Available from: http://www.economics-ejournal.org/economics/journalarticles/2010-14

[22] Malik G An examination of relationship between health and economic growth [Internet]. 2006 Sept [cited 2016 Dec]: ICRIER, Working paper No.185: 1-29. Available from: http://www.icrier.org/pdf/Working_Paper_185.pdf

[23] Incaltarau C, Horodnic VA, Botezat DL, Astarastoae V, Oprea L. Is health status associated with macroeconomic development? Analysing all-cause and cardiovascular diseases mortality: some evidences from Romania: Revista Romana de Bioetica [Internet]. 2015 Mar [cited 2016 Aug]; 13(1): 159-175. Available from: http://www.bioetica.ro/index.php/arhiva-bioetica/article/view/1031

[24] Peykarjou K, Gollu RB, Gashti HP, Shahrivar R. Studying the relathionship between health and economic growth in OIC member states.: IJCRB [Internet]. 2011 Dec [cited in 2016 Nov]; 3(8): 1041-1054. Available from: http://www.journal-archieves13.webs.com/1041-1054.pdf

[25] Deaton A. Health, Inequality and Economic Development: Journal of Economic Literature [Internet]. 2003 Mar [cited 2016 Nov]; Vol.XLI: 113-158. Available from: https://www.princeton.edu/~deaton/downloads/Health_Inequality_and_Economic_Development.pdf

[26] Chakraborty, S. Endogenous Lifetime and Economic Growth. Journal of Economic Theory [Internet]. 2004 May [cited 2016 Dec]; Vol 116(1): 119-137. Available from: http://www.economie.ens.fr/IMG/pdf/chakraborty_2004.pdf