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The Impacts of Healthcare Spending on Health Outcomes: New Evidence from OECD Countries

Sevilay Karaman, Duygu Ürek, İpek Bilgin Demir, Özgür Uğurluoğlu, Oğuz Işık

ABSTRACT

Objective: This study aimed to reveal the impacts of the selected healthcare spending indicators on the selected health outcomes for OECD countries.

Materials and Methods: In this study, the data for OECD countries were analyzed by stepwise multiple regression analysis. Healthcare spending as a share of GDP, public and private healthcare spending per capita and pharmaceutical spending per capita were used as independent variables; infant and maternal mortality, male and female life expectancy at birth, and in 80 years, and self-reported health were used as dependent variables.

Results: According to the results, it was found out that public healthcare spending per capita has a significant impact on maternal and infant mortality, male and female life expectancy at birth and in 80 years. Also, private healthcare spending per capita was found as an important determinant of self-reported health.

Conclusion: Based on the results, it can be suggested that it is necessary to increase the public support for mother-child health services to reduce maternal and infant mortality; and for services for improvement and promotion of health to increase life expectancy at birth and in 80 years. It is considered that improvements in the minimum income levels of individuals and increasing government promotion within the scope of the complementary health insurance offered by the private sector will have a positive impact on the individuals' perception of health status.

Keywords: Healthcare spending, health outcome, OECD countries

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Department of Health Care Management, Hacettepe University, Ankara, Turkey

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Correspondence Duygu Ürek, Hacettepe University Faculty of Economics and Administrative Sciences, Department of Health Care Management, 06800 Beytepe Campus, Ankara, Turkey
Phone: +90 312 297 63 56
e-mail: duyguurek@hacettepe.edu.tr

INTRODUCTION

Human capital has an important role in economic growth and development of countries (1). Especially good health status, an important part of human capital, is considered one of the conditions required for sustainable, long term economic development (2, 3). Improvements in health status can contribute to the welfare of countries by improving individuals' production and consumption in the short term and return on investment in production activities in the long term (1, 4, 5).

It is very hard for an individual to conduct any economic activity without good health status; even so, it is not possible for that activity to be productive. Therefore, initiatives and investments for the improvement of individuals' health should always be given priority in most countries. It can be said that especially sufficient and effective spending has critical importance in the improvement of the health of individuals, and thus, societies. Healthcare spending covers all public and private expenditures for the final consumption of healthcare goods and services (6). Among these expenditures, especially spending by the state (particularly for the poor community) is important as it can improve the health and welfare of human capital which supports the continuous economic development of the country by improving access to healthcare services and the quality and affordability of these services (5, 7).

In the literature, it can be seen that the causal relationship between health outcomes and healthcare spending has attracted the attention of researchers recently (1, 8, 9). Despite many studies, there is still no consensus on the impacts of monetary health inputs on health outcomes, and contradictory findings are obtained most of the time (8–10). Moreover, it was found out that many studies only focused on one or two of the health outcome indicators - particularly infant mortality or life expectancy (1, 5, 11, 12). It was reported that it also applied to the spending indicators, which were taken as input variables (1, 8, 11). In this study conducted considering the concerned limitations of these studies in the literature, an effort was put to determine the impacts of healthcare spending on health outcomes for OECD countries using different spending and outcome indicators. This study is expected to provide contributions to the literature in this regard with the obtained results.

Table 1. Indicators related to healthcare spending in OECD countries, 2015

Countries	Share of GDP	PBHS	PRHS	PharmaS
Australia*	9.1	2.888,8	1.399,9	698.2
Austria	10.3	3.854,8	1.245,2	857.7
Belgium*	10.4	3.597,2	1.059,2	583.5
Czech Rep.	7.3	2.031,3	434.7	420.2
Denmark*	10.3	4.121,4	784.3	492.2
Estonia	6.5	1.426,5	458.6	393.3
Finland	9.4	2.972,8	1.020,4	610.2
France*	11.1	3.517,2	947.0	849.9
Germany	11.2	4.521,4	831.3	1043.7
Greece	8.4	1.305,8	869.2	625.4
Hungary	7.2	1.276,5	636.5	614.5
Iceland	8.6	3.345,1	760.6	593.1
Ireland*	9.9	3.521,9	1.560,1	702.0
Israel**	7.1	1.535.5	855.5	89.1
Japan*	10.8	3.591,2	678.0	744.5
Korea	7.4	1.429,6	1.105,3	459.5
Luxemburg	6.0	5.589,9	1.228,0	651.9
Mexico	5.9	550.1	504.4	317.8
Netherlands**	10.9	4.299,7	1.003,7	612.6
Norway	10.0	5.286,2	903.9	648.3
Poland	6.3	1.192,3	511.3	395.0
Portugal	9.0	1.763,8	899.9	521.4
Slovak Rep.	6.9	1.641,7	417.7	727.5
Slovenia	8.5	1.957,6	773.2	599.0
Spain	9.2	2.258,8	921.3	707.8
Sweden	11.0	4.406,0	860.3	569.6
Switzerland	12.1	4.820,5	2.715,1	678.4
Turkey	4.1	778.7	217.9	266.6
UK	9.9	3.286,2	839.1	473.5
USA*	16.5	4.457,2	4.578,3	1260.1
OECD Mean	9.0	2907,5	1034.0	606.9

Source: OECD Health Data, 2018. OECD: Organisation for Economic Co-operation and Development; GDP: Gross domestic product; PBHS: Public healthcare spending per capita (PPP, $); PRHS: Private healthcare spending per capita (PPP, $); PharmaS: Pharmaceutical spending per capita (PPP, $). *2014; ** 2013

Table 2. Indicators related to health outcomes in OECD countries, 2015

Countries	FLEB	MLEB	FLE80	MLE80	IM	MM	SRH
Australia*	84.4	80.3	10.3	8.7	3.4	6	85
Austria	83.7	78.8	9.7	8.3	3.1	4	69
Belgium*	83.9	78.8	10.4	8.5	3.4	7	74
Czech Rep.	81.6	75.7	8.5	7.2	2.5	4	60
Denmark*	82.8	78.7	9.8	8.2	4.0	7	71
Estonia	82.2	73.2	9.7	7.8	2.5	9	54
Finland	84.4	78.7	10.1	8.4	1.7	3	65
France*	86.0	79.5	12.0	9.5	3.3	9	68
Germany	83.1	78.3	9.4	8.1	3.3	6	65
Greece	83.7	78.5	9.2	8.7	4.0	3	74
Hungary	79.0	72.3	8.0	6.8	4.2	17	57
Iceland	83.8	81.2	9.7	8.5	2.2	4	77
Ireland*	83.5	79.3	9.8	8.2	3.5	8	83
Israel**	83.9	80.3	9.7	8.8	3.1	5	82
Japan*	86.8	80.5	11.7	8.8	2.1	5	30
Korea	85.2	79.0	10.1	8.0	2.7	11	35
Luxemburg	84.7	80.0	10.5	8.8	2.8	10	72
Mexico	77.7	72.3	9.6	8.7	12.5	38	66
Netherlands**	83.2	79.5	9.7	8.0	3.8	7	76
Norway	84.2	80.5	9.9	8.3	2.3	5	76
Poland	81.6	73.5	9.4	7.6	4.0	3	58
Portugal	84.3	78.1	9.7	8.0	2.9	10	46
Slovak Rep.	80.2	73.1	8.1	6.9	5.1	6	66
Slovenia	83.9	77.8	9.9	8.1	1.6	9	65
Spain	85.8	80.1	10.7	8.8	2.7	5	72
Sweden	84.1	80.4	9.8	8.3	2.5	4	81
Switzerland	85.1	80.8	10.3	8.7	3.9	5	81
Turkey	80.7	75.3	8.8	7.3	10.7	16	68
UK	82.8	79.2	9.5	8.4	3.9	14	74
USA*	81.3	76.5	9.7	8.3	5.8	9	90
OECD Mean	83.3	78.0	9.8	8.2	3.8	8.3	68

Sources: OECD Health Data, 2018, and The World Bank, 2018. OECD: Organisation for Economic Co-operation and Development FLEB: Female life expectancy at birth; MLEB: Male life expectancy at birth; FLE80: Female life expectancy in 80 years; MLE80: Male life expectancy in 80 years; IM: Infant mortality; MM: Maternal mortality and SRH: Self-reported health. *2014; ** 2013

MATERIALS and METHODS

Purpose and Model of Research

The present study aims to illustrate the impacts of the selected healthcare spending indicators [healthcare spending as a share of gross domestic product (GDP), public and private healthcare spending per capita and pharmaceutical spending per capita] on the selected health outcomes [infant mortality, maternal mortality, male and female life expectancy at birth, male and female life expectancy in 80 years and self-reported health] for OECD countries. The model of research designed in this regard is as follows (Fig. 1):

Data and Variables Used in the Research

Healthcare spending as a share of GDP, public and private healthcare spending per capita and pharmaceutical spending per capita were considered as independent variables in this study. Public healthcare spendings are financed through social security contributions, various forms of taxation to various branches of government and from external sources, while private healthcare spendings include private insurance premiums, direct payments or out-of-pocket expenditures (13). Public and private healthcare spending per capita and pharmaceutical spending per capita indicators were adjusted according to the purchasing power parity (PPP) for inter-

Table 3. Results of stepwise multiple regression analysis of the effects of healthcare spendings on health outcomes

Dependent variables	MM	IM	MLEB	FLEB	MLE80	FLE80	SRH
Selected variables	PBHS	PBHS	PBHS	PBHS	PBHS	PBHS	PRHS
Beta	-0.39	-0.39	0.65	0.47	0.41	0.42	0.45
p-value	(0.037)	(0.034)	(<0.001)	(0.009)	(0.026)	(0.021)	(0.013)
R^2	0.15	0.15	0.42	0.22	0.16	0.18	0.20
F	4.794	4.944	19.898	7.909	5.499	6.007	7.045
p-value	(0.037)	(0.034)	(<0.001)	(0.009)	(0.026)	(0.021)	(0.013)

Input variables: Share of GDP; PBHS: Public healthcare spending per capita (PPP, $); PRHS: Private healthcare spending per capita (PPP, $); PharmaS: Pharmaceutical spending per capita (PPP, $). Output variables: MM: Maternal mortality; IM: Infant mortality; MLEB: Male life expectancy at birth; FLEB: Female life expectancy at birth; MLE80: Male life expectancy in 80 years; FLE80: Female life expectancy in 80 years; and SRH: Self-reported health

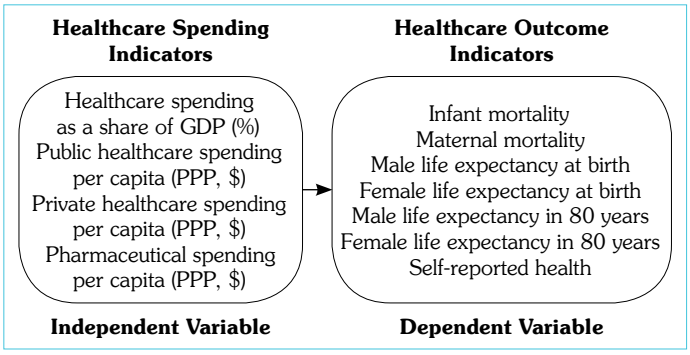

Figure 1. Research model

country comparability. Infant mortality, maternal mortality, male and female life expectancy at birth and in 80 years and self-reported health were used as dependent variables.

Data on the indicators of healthcare spending and health outcomes are provided in Table 1 and Table 2. As sufficient data were not available for these indicators in the last three years (2016, 2017 and 2018) in the OECD database, data from 2015 were used. On the other hand, the World Bank data were used as the OECD database did not have sufficient data for maternal mortality among outcome indicators for a significant part of the countries. Furthermore, due to missing parts in 2015 data for some of the countries (Australia, Belgium, Denmark, France, Ireland, Israel, Japan, Netherlands and USA), all indicators in these countries were revised according to the nearest year, 2013 or 2014. Additionally, as no data were available for any year in some of the indicators and the year of data was too old in other indicators in Canada, Chile, Latvia, Italy and New Zealand data, these five countries were excluded from the analysis and the remaining 30 countries in total were taken into evaluation in this study.

Data Analysis

In this study, a multiple linear regression analysis was conducted to evaluate the impacts of the healthcare spending indicators on the selected health outcomes. Due to the small sample size (n=30), a stepwise multiple regression analysis was used (14). All statistical analyses were carried out in SPSS (Statistical Package fort he Social Sciences) v21.0. The Durbin-Watson statistic and Variation Inflation Factor (VIF) were calculated and the level of significance was taken 0.05 to determine if there was multiple correlation and autocorrelation in the established regression models.

RESULTS

Table 3 outlines the results of the stepwise regression analysis conducted to demonstrate the impacts of the healthcare spending indicators on the selected health results. For the regression models, the Durbin Watson statistic under 2,5 and Variation Inflation Factors less than 10 point to the absence of multiple correlation and autocorrelation (15) were accepted.

The statistical estimations for the regression models demonstrate that all of the models were significant and eligible for use. Public healthcare spending per capita among spending variables was found out to be the most important indicator of maternal mortality, infant mortality, male and female life expectancy at birth, male and female life expectancy in 80 years among health outcomes. The public healthcare spending per capita variable's coefficient of explaining these health outcomes is 0.15, 0.15, 0.42, 0.22, 0.16 and 0.18, respectively. Accordingly, it was determined that public healthcare spending per capita significantly affected negatively infant mortality and significantly affected positively male and female life expectancy at birth, as well as male and female life expectancy in 80 years.

Private healthcare spending per capita was found out to be the most important indicator of self-reported health among health outcomes. The private healthcare spending per capita variable's coefficient of explaining self-reported health is .20. Accordingly, private healthcare spending per capita was found out to significantly affect positively self-reported health.

DISCUSSION

This study was conducted based on the data of 30 OECD member states to demonstrate the impacts of healthcare indicators on health outcomes. Healthcare spending as a share of GDP, public and private healthcare spending per capita and pharmaceutical spending per capita were used as healthcare spending; infant mortality, maternal mortality, male and female life expectancy at birth and in 80 years and self-reported health were used as health outcomes.

In the literature, it can be observed that results vary between country groups and variables and difference depends on data types and methods of estimation (16–19). As a result of the findings from this study, maternal mortality and infant mortality reduces with

increased public healthcare spending per capita, which is parallel to the literature. For example, in the studies conducted with 1985 data from Sri Lanka (20), 1999–2004 data from 47 African countries (1), 1995–2010 data from 20 Eastern Mediterranean Countries (EMC) member states (9), 1995–2013 data from BRICS (Brasil, Russia, India, China and South Africa) countries (7), and 2000–2014 data from 25 countries (21) it was determined that infant mortality reduced with increased public healthcare spending per capita. In the study made with the data from 34 Asian countries, it was determined that the most important indicator of infant mortality was public healthcare spending per capita (22). In the study conducted with 2000 data from 127 member countries of the Development Assistance Committee (DAC) of the OECD (23) and 1999–2010 data from 19 Middle East and South Africa countries (24), similarly, lower rates of infant mortality and maternal mortality were obtained with higher rates of public healthcare spending per capita. In a country or a region, with the start of the provision of simple and basic public healthcare services, including mother-child healthcare programs and immunization and increased public funding allocated to these fields, maternal and infant mortality rates will significantly drop down (25).

In the study, it is observed that the rates of male and female life expectancy at birth, as well as male and female life expectancy in 80 years, get higher with the increased rate of public healthcare spending per capita, which is parallel to the literature. For example, in the studies conducted with 1960–1997 data from USA (10), 1988 data from 21 OECD countries (14), and 2000–2014 data from 25 countries (21), it was found out at life expectancy at birth increased with increased public healthcare spending per capita. As healthcare services help the longer length of life by supporting individuals' strength, power and energy of life, as the spending of the public in this field increases, the provision of basic healthcare services, mainly protective healthcare services, will expand and the risk of diseases will drop down. Therefore, individuals' average lifetime will be longer.

In this study, it was also determined that private healthcare spending per capita positively affected the perceived health status. Individuals' private healthcare spending is closely related to their income level. Because with an increased level of income, people tend to prefer private health insurance or private healthcare spending more, it can be assumed to reflect positively on their health status. The studies in the literature also demonstrate a strong relationship between the perceived health status with income level (26–29).

CONCLUSION

In this study, it was tried to evaluate the casual relationships between healthcare spending indicators and health outcomes with a stepwise multiple regression analysis using the data from 30 OECD countries. As a result of the study, it was found out that public healthcare spending per capita has a significant impact on maternal and infant mortality, male and female life expectancy at birth and in 80 years; and private healthcare spending per capita has a significant impact on self-reported health.

Based on the finding that public healthcare spending per capita has a significant impact on infant mortality and maternal mortality, considered to be health indicators, it can be concluded that it is necessary to increase public funding for protective healthcare services, such as mother-child health to reduce these mortalities. Regulations for increasing public funding for these areas also need to be supported by economic and social policies. Moreover, public healthcare spending per capita also has a significant impact on the length of life. In this respect, it can be assumed that it is important to increase public support for services, especially for the development and promotion of health for obtaining an important improvement in both the lifetime and life quality of individuals.

Because especially healthcare spending positively affects self-reported health and individuals' income level also has an important role at this point, it can be assumed that improvements in the minimum income level individuals will indirectly affect their health status in a positive way. In this respect, it can be concluded that increasing government promotion within the scope of the complementary health insurance offered by the private sector will have a positive impact on the individuals' perception of health status.

Considering the possibility of different factors affecting health outcomes for different country groups, another recommendation of this study is to conduct future studies with a design of research to include different country groups and make comparisons between country groups.

Ethics Committee Approval: This study is carried out over existing data, therefore it does not require any human/animal subjects to acquire an ethical approval.

Peer-review: Externally peer-reviewed.

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REFERENCES

1. Anyanwu JC, Erhijakpor AEO. Health expenditures and health outcomes in Africa. African Development Bank Economic Research Working Paper Series, 2007. No: 91. Available from: https://www.afdb.org/fileadmin/uploads/afdb/Documents/Publications/26820442-EN-ERWP-91.PDF
2. Makuta I, O'Hare B. Quality of governance, public spending on health and health status in Sub Saharan Africa: a panel data regression analysis. BMC Public Health 2015; 15: 932. [CrossRef]
3. Ilori IA, OLAlere SS, BAbatola MA. An empirical analysis of public health expenditure on life expectancy: Evidence from Nigeria. BJEMT 2017; 17(4): 1–17. [CrossRef]
4. Somi MF, Butler JR, Vahid F, Njau JD, Abdulla S. Household responses to health risks and shocks: A study from rural Tanzania raises some methodological issues. J Int Development 2009; 21(2): 200–11.
5. Boachie MK, Ramu K. Public health expenditure and health status in Ghana. MPRA 2015; 1–17. [CrossRef]
6. OECD. Health at a glance 2017: OECD indicators. Paris; OECD Publishing: 2017.
7. Arun JV, Kumar D. Public health expenditure of BRICS countries–An empirical analysis. Int J Med Sci Public Health 2016; 5(11): 2212–6.

8. Farag M, Nandakumar AK, Wallack S, Hodgkin D, Gaumer G, Erbil C. Health expenditures, health outcomes and the role of good governance. Int J Health Care Finance Econ 2013; 13(1): 33–52. [CrossRef]
9. Rad EH, Vahedi S, Teimourizad A, Esmaeilzadeh F, Hadian M, Pour AT. Comparison of the effects of public and private health expenditures on the health status: A panel data analysis in Eastern Mediterranean Countries. Int J Health Policy Manag 2013; 1(2): 163–7. [CrossRef]
10. Lichtenberg FR. Sources of US longevity increase, 1960-1997. Cambridge, MA: National Bureau of Economic Research; 2002. pp.1–33.
11. Bein MA, Unlucan D, Olowu G, Kalifa W. Healthcare spending and health outcomes: Evidence from selected East African countries. Afr Health Sci 2017; 17(1): 247–54. [CrossRef]
12. Nsereko MM. Healthcare expenditures, health outcomes and governance in Africa. Department of Economics California State University, USA, Master Thesis. 2018.
13. Novignon J, Olakojo SA, Nonvignon J. The effects of public and private health care expenditure on health status in sub-Saharan Africa: new evidence from panel data analysis. Health Econ Rev 2012; 2(1): 22.
14. Babazono A, Hillman AL. A comparison of international health outcomes and health care spending. Int J Technol Assess Health Care 1994; 10(3): 376–81. [CrossRef]
15. Hair JFJ, Black WC, Babin BJ, Anderson RE. Multivariate data analysis. 7th ed. New Jersey: Pearson Prentice Hall; 2010.
16. Filmer D, Pritchett L. The impact of public spending on health: does money matter? Soc Sci Med 1999; 49(10): 1309–23. [CrossRef]
17. Gupta H, Baghel A. Infant mortality in the Indian slums: case studies of Calcutta metropolis and Raipur city. Int J Population Geography 1999; 5(5): 353–66. [CrossRef]
18. Berger MC, Messer J. Public financing of health expenditures, insurance, and health outcomes. Applied Economics 2002; 34(17): 2105–13. [CrossRef]
19. Thornton J. Gene family phylogenetics: tracing protein evolution on trees. EXS 2002; 92: 191–207. [CrossRef]
20. Anand S, Ravallion M. Human development in poor countries: On the role of private incomes and public services. J Economic Perspectives 1993; 7(1): 133–50. [CrossRef]
21. Raeesi P, Harati-Khalilabad T, Rezapour A, Azari S, Javan-Noughabi J. Effects of private and public health expenditure on health outcomes among countries with different health care systems: 2000 and 2014. Med J Islam Repub Iran 2018; 32: 35. [CrossRef]
22. Shetty A, Shetty S. The correlation of health spending and infant mortality rate in Asian countries. Int J Contemp Pediatr 2014; 1(2): 100–5. [CrossRef]
23. Bokhari FA, Gai Y, Gottret P. Government health expenditures and health outcomes. Health Econ 2007; 16(3): 257–73. [CrossRef]
24. Akıncı F, Hamidi S, Suvankulov F, Akhmedjonov A. Examining the impact of health care expenditures on health outcomes in the Middle East and North Africa (MENA) Region. J Health Care Finance 2014; 41(1): 1–23.
25. Raghupathi V, Raghupati W. An empirical analysis of the status of country-level public health. Health Policy and Technology 2015; 4(2): 156–67. [CrossRef]
26. Kennedy BP, Kawachi I, Glass R, Prothrow-Stith D. Income distribution, socioeconomic status, and self rated health in the United States: Multilevel analysis. BMJ 1998; 317(7163): 917–21. [CrossRef]
27. Cott CA, Gignac MA, Badley EM. Determinants of self rated health for Canadians with chronic disease and disability. J Epidemiol Community Health 1999; 53(11): 731–6. [CrossRef]
28. Shibuya K, Hashimoto H, Yano E. Individual income, income distribution, and self rated health in Japan: cross sectional analysis of nationally representative sample. BMJ 2002; 324(7328): 16–9. [CrossRef]
29. Blakely TA, Lochner K, Kawachi I. Metropolitan area income inequality and self-rated health--a multi-level study. Soc Sci Med 2002; 54(1): 65–77. [CrossRef]