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INNOVATION IN HEALTH ECONOMICS: AN OVERVIEW OF HUMAN LIFE VALUATION METHODS IN MONETARY VALUES

Abstract

This article deals with the issue of the monetary value of health and human life with respect to the development of socio-economic development strategies. The focus has been placed on the listing and evaluation of methodologies for the valuation of life and health and identifying areas of possible applications. At the same time, attempts were made to clarify the reasons why these methods are met with moderate interest of public entities. The summary lists the areas in which the use of health and life valuation methods can contribute to improving the quality of the processes of diagnosis and increasing the efficiency of strategic plans.

Key words

health economics, valuation of human life, cost-benefit analysis, value of a statistical life

Introduction

Developed world economies are devoting more and more resources to the protection of life and health. In Poland, the health care sector accounts for more than 7% of Gross Domestic Product. In 2030, EU spending on health care will amount to as much as 14% of GDP.[62] Due to the fact that ensuring the safety and health of the population is one of the main functions of the state, the public sector plays a particularly important role in the protection of health. This is confirmed by the level of government spending on health care, which in Poland accounts for about 70% of total health expenditure.[63]

The protection of health and life has a price. Making rational social choices in public administration policy must account for both the expenditure analysis and the benefits. While indicating the costs of various health care measures is relatively unproblematic, it is much more ambitious to determine the benefits. The two main evaluation methods used, Cost-Effectiveness Analysis and Cost-Benefit Analysis, have their advantages and disadvantages. The fundamental difference between the methods is the way in which the economic benefits are expressed. The first type of analysis refers to quality units and the other to monetary units. Both methods are improved using increasingly sophisticated statistical methods.[64]

The incalculability of the benefits indicated in the Cost-Effectiveness analysis has prompted many researchers to develop the Cost-Benefit Analysis, where the outcomes of health and life are expressed in dollars.[65] While over the past three decades, economists from all over the world have done a lot of research into the valuation of life and health, important issues remain unresolved. These include the relationship between the value of life and the value of one year of life and the way in which the value of life may depend on age and health,[66] the kind of work done[67] or the demographic structure and income of societies[68]. Establishing the specific reasons for the limited application of research is a separate matter.

[62] J. Hady, M. Leśniowska, Nakłady na ochronę zdrowia a kondycja sektora ochrony zdrowia w wybranych krajach Unii Europejskiej, „Finansowy Kwartalnik Internetowy <<e-Finanse>>", vol. 7, 2011/4.

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[66] P. Abelson, Establishing a Monetary Value for Lives Saved: Issues and Controversies, Office of Best Practice Regulation, Department of Finance and Deregulation, Sydney 2008.

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[68] J. Aldy, K. Viscusi, The value of a statistical life: A critical review of market estimates throughout the world, National Bureau of Economic Research, Cambridge 2003.

It seems that the reasons for this are related to issues surrounding the valuation of human health and life, which present extremely sensitive problems. Although there is no doubt that the human life and health are one of the essential factors of development, the valuation of these goods and the determination of their value in monetary units presents many problems, not only of calculation, but of the proper choice of conversion apparatus, primarily ethical. Although health and life-cycle procedures are widely used in the insurance sector, public policy practice is rarely based on these indicators of socio-economic strategies. Indicators of valuation of human life are rarely found in operational research and planning processes, such as the amount of funds that could be used to reduce traffic accidents.

There are relatively few analyses in Poland regarding the issues described above. This may be due to psychological conditions. Government institutions find it difficult to admit that a citizen's life has a certain finite value that can be expressed in monetary units. However, it should be possible to determine the *value of statistical life (VSL)*, which would make comparisons of the economic efficiency of various public policies comparable. In the literature, VSL is defined as the amount that the public is prepared to invest *ex-ante* to save the life of one person whose identity they do not know in advance.[69]

An overview of human life valuation methods
There are two methods used to valuate the value of human life: Cost of Illness (COI) and the Willingness-to-Pay (WTP) methodologies. The first approach (COI) is based on the concept of the cost of illness *ex-post*, understood as the sum of all identifiable costs associated with a lack of health, including loss of income and medical expenses. The value of health improvements is expressed by the sum of the increase in earnings and the avoided medical expenses. The value of life is valued as discounted income from work. However, the COI methodology has disadvantages, as it does not account for the moral costs of suffering or malaise. It also does not apply to inactive people and is based on the unjustified assumption that improving health always translates into increased revenue.[70]

The flaws of COI have encouraged health economists to develop an alternative approach that uses the Willingness-to-Pay (WTP) approach. Within the three main lines of analysis, the relationship between remuneration and occupational risk, consumer behavior and declared preferences is assessed.[71]

In assessing the relationship between remuneration and occupational risk, the employees are expected to pay premiums in exchange for higher-risk jobs. The assessment is based on the strong assumption that employees are competent to assess occupational risk in their work. According to Jones-Lee & Loomes[72], this may be a sufficient reason to falsify the model's credibility.

Consumer behavior assessments examine the tendency to pay for increased security when using a particular product. For example, according to H. Andersson[73], based on the tendency to pay for a safer car by Swedish consumers, it can be stated that the value of a Swedish resident's statistical life is between $ 1 and $ 1.5 million at 1998 prices.

In contrast, Contingent Valuation uses direct questionnaires to determine the respondent's willingness to pay for an additional year of life, a defined improvement in the quality of life, or a reduction in the risk of a disease. Research of this type is fraught with weaknesses. Respondents are often unable to translate their preferences into money, since their health and life are priceless.

Comparing the presented methods of human life valuation, it should be emphasized that each method has its advantages and disadvantages.

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[69] P. Abelson, Establishing a Monetary Value for Lives Saved... op.cit.
[70] J. Segel, Cost-of-Illness Studies—A Primer, RTI-UNC Center of Excellence in Health Promotion Economics, 2006.
[71] P. Abelson, Establishing a Monetary Value for Lives Saved... op.cit.
[72] M. Jones-Lee, G. Loomes, Eliciting Measures of Value for Health and Safety, [in:] 9th Australian Workshop on Safety-Related Programmable Systems, Brisbane, 2004.
[73] H. Andersson, The value of safety as revealed in the Swedish car market: an application of the hedonic pricing approach, " Journal of Risk and Uncertainty" 2005.

Determinants of the economic value of human life

The area where calculations based on the valuation of health and life is commonly used is the insurance sector. For the calculation of life insurance contributions, modeling of the total value of the damage in the combined or individual risk model is used, accounting for the monetary value of health and life. However, these indicators must be set so that the total value of benefits paid does not exceed the total value of contributions paid. The life valuation indicators used are therefore only indicative and balanced. The aspect of sustainable development in the context of financial engineering is completely ignored here.

In the study of the determinants of economic development, there is no finite set of universal measurements that are fixed over time and accepted in all countries. Moreover, there are no easy ways and persuasive methodologies to use comparative models of development for different socio-economic systems. All indicators illustrating social issues are characterized by spatial variability and varying information content, and are subject to dynamic evolution over time. Among the so-called social indicators, *strictly* demographic indicators are used, such as age and occupational structure of the population, the percentage of the population having access to water supply and sewerage, but also life and health criteria, such as infant mortality per 1,000 births, number of doctors per 1,000 residents, and the number of beds in hospitals. At the same time, the Human Development Index (HDI) is used in the statistics of the United Nations. This indicator is derived from the following values: average life expectancy, percentage of children enrolled in school, average duration of study, percentage of the population over 15 years of age who read and write and GDP per capita. The HDI accepts values from 0 to 1. A value above 0.80 indicates a high level of development, values in the range 0.50-0.79 - average, while values below 0.50 can describe a low level of development.

Among the most commonly used indicators illustrating the level of socio-economic development, there is no valuation of human life and health. It seems that for the correct structure of socio-economic growth models and development strategies, it is necessary to base not only on cumulative indicators of living standards and wellbeing, but also on the valuation of health and life in monetary units.

Applying methods of human life valuation in the public sector policy

The valuation of life and health seems to be particularly important from the point of view of building the effectiveness of the health care sector, where pro-development parameters are important, and not just simple records *ex-post*, which are about setting trends of life span based on demographic data. The methodology of prognosis and strategic planning in this area, enhanced by the COI and Willingness-To-Pay (WTP) methodologies, would allow not only the broadly understood costs of illness but also the value of improving the health of the individual and the local community in the context of the long-term development prospects of the health care sector.

The issue of health and life valuation directly affects the development of sustainable strategies (long-term) and sustainable (short-term) business plans, in which three groups of conditions - economic, social and environmental - are declared. The uncontrolled or poorly controlled development of the industry, the mechanics of agriculture, and ubiquitous motorization lead to environmental imbalances, which in turn affects human life and health, reduced productivity and profitability, and rising costs of illness. Sustainable strategies should be based on the calculation of the *value of statistical life - VSL*.

An important manifestation of properly conducted public policy is the level of social wellbeing, measured, among other factors, by life span and level of satisfaction or happiness. The better these indicators, the higher the value of life and health. Willingness-To-Pay (WTP) is the most appropriate method for calculating the value of life and health in the context of contentment and satisfaction. This method seems to be appropriate not only for measuring the level of satisfaction and social wellbeing but also for issues related to the provision of broadly understood safety, both socially and individually. However, we must be aware that establishing a statistical value of life based on the *Willingness-To-Pay* concept is linked to high subjectivity of the scores obtained and the limited comparability of the results between different societies or cultures.

Conclusion

The use of life and health valuation indicators is crucial for the proper planning of socio-economic development. The incorporation of VSL into a set of public policy instruments can allow for comprehensive socio-economic analyses, as well as economic synthesis at regional or industry levels, benchmarking and comparative analyses.

Avoiding valuation of life in public policy leads to the fact that economic analyses are incomplete, inconsistent and can be the basis for decision-making only to a limited extent.

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INNOWACJE W EKONOMII ZDROWIA. PRZEGLĄD METOD OCENY WARTOŚCI LUDZKIEGO ŻYCIA W JEDNOSTKACH MONETARNYCH

Abstrakt
Artykuł dotyczy problematyki zmonetaryzowanej wartości zdrowia i życia człowieka w zastosowaniu do budowania strategii rozwoju społeczno--gospodarczego. Skoncentrowano się na wymienieniu i dokonaniu oceny metodologii służących wycenie życia i zdrowia oraz wskazaniu obszarów możliwych zastosowań. Jednocześnie podjęto próbę wyjaśnienia przyczyn, dla których metody te spotykają się z umiarkowanym zainteresowaniem podmiotów publicznych. W podsumowaniu wymieniono obszary, w których stosowanie wskaźników wyceny życia i zdrowia może przyczynić się do podniesienia jakości procesów diagnozy społecznej i zwiększenia efektywności budowanych planów strategicznych.

Słowa kluczowe:
ekonomia zdrowia, wycena ludzkiego życia