Postmodern Openings
ISSN: 2068-0236 | e-ISSN: 2069-9387
Covered in: Web of Sciences (WOS); EBSCO; ERIH+; Google Scholar; Index Copernicus; Ideas RePeC; Econpapers; Socionet; CEEOL; Ulrich ProQuest; Cabell, Journalseek; Scipio; Philpapers; SHERPA/RoMEO repositories; KVK; WorldCat; CrossRef; CrossCheck

2021, Volume 12, Issue 1, pages: 169-184 | https://doi.org/10.18662/po/12.1/253

The Determinants and the Evolution of the Health Policies in Cardiovascular Medicine in a Postmodern Vision

Mihaela TOMAZIU- TODOSIA[1], **Grigore TINICĂ**[2]

[1] PhD Student, Alexandru Ioan Cuza University of Iaşi, Doctoral School of Economics and Business Administration, Iaşi, Romania, mihaela.tomaziu@gmail.com

[2] Prof. Dr. George I.M. Georgescu" Cardiovascular Diseases Institute & "Grigore T. Popa" University of Medicine and Pharmacy, Iasi, Romania, grigoretinica@yahoo.com

Abstract: Public health is a scientific domain with significant population impact. Any irregularities or discrepancies affect all patients that depend on its normal function, therefore explaining the reason why public attention is always vastly invested in it. With a balanced health status in the population as primary goal, the domain of public health with its adopted policies stands at the frontlines. Public Health Policies can be resumed to three main aspects, based on the health system performance concept developed by the World Health Organization: population health status, citizen satisfaction with healthcare and the extent to which the system provides financial protection. Nowadays, with cardiovascular disease becoming the leading cause of death worldwide, the field of cardiovascular public health has gained significant general interest. The present article aims to address the importance of health policies from a determinants' perspective while taking into consideration the influence of population illness on health policy development.

Keywords: *health; health policies; cardiovascular medicine; development.*

How to cite: Tomaziu-Todosia, M., & Tinică, G. (2021). The Determinants and the Evolution of the Health Policies in Cardiovascular Medicine in a Postmodern Vision. *Postmodern Openings, 12*(1), 169-184. doi: 10.18662/po/12.1/253

1. Introduction

Nowadays, due to open border policies and numerous fast transportation opportunities, a community cannot be considered a distinct entity. When discussing public health of a vulnerable populace, other communities with which it might have come in contact must be taken into account. The less restricted movement of people and goods, as well as higher migration levels, pose risks that cannot be fully controlled by health authorities, despite the effectiveness of national policies adopted in the field. In such a free world, the development and health problems of less developed societies can indirectly affect developed societies and vice versa. As a strategic response, joint regional cooperation between countries, global organizations such as the World Health Organization and regional decisional bodies, such as the EU forum, have come into being, striving to find solutions for improving global and/or community health issues and standards of living.

The model towards which postmodernity tends is the American society, free and prosperous, with a comfortable life, with a democratic and tolerant administration, offering all citizens equal opportunities for affirmation. In this regard, public health policies play an essential role, as they dream of equity and non-discriminatory access to health care. Health policy can be defined as a set of development priorities in the broad field of medicine, aiming to strengthen general population health, secure adequate living standards and create optimal conditions for reaching maximum lifelong health potential. These targets remain the same throughout the globe, and each country, depending on its degree of development, will strive to implement them. Globally, cardiovascular disease is now the leading cause of death. With an approximate 17.5 million fatalities in 2005, it accounts for 30% of total global deaths. Of these, 7.6 million were caused by myocardial infarction, 5.7 million by stroke and 4.2 million by hypertension and other cardiac pathologies; approximately 80% were registered in low and middle-income countries. The World Health Organization (2008) warned that by 2025 approximately 20 million people will die due to cardiovascular diseases. (WHO, 2008, pp. 36-47).

2. Literature Review

The main risk factors for cardiovascular disease were identified in a generational study by D'Agostino et al. (2008) that began in 1948 and was completed in 2007, in Massachusetts. The study proved the impact of the following risk factors and calculated their absolute risk over a period of 10

years: age, diabetes mellitus, total cholesterol, systolic blood pressure, and smoking. Additionally, a global study by Yusuf et al. (2004) led by McMaster University of Canada identified the same risk factors for myocardial infarction adding stress, lack of daily fruit and vegetable intake and lack of daily exercise in over 37,000 patients from 55 different countries and cultural backgrounds. After studying the key factors that lead to cardiovascular disease, authors Groah et al. (2011), Lieberman et al. (2011) and Middleton et al. (2008) reached the conclusion that key cardiovascular risk factors remain the same in patients with good physical health, monetary wealth variations notwithstanding. Poor physical health, inactivity, and lack of medical supervision though, amplify all risk factors. Taking into account the severe impact cardiovascular disease has on life quality and expectancy, these pathologies were highlighted as priority for health improvements across Europe. According to Schwamm et al. (2006), both in Europe and the USA, hospital modernization often begins with cardiology departments, thus proving decision-makers' awareness of the importance of cardiovascular medicine to the health of the population.

Anderson (1972, 1989) and Roemer (1985, 1993) studied health policy determinants, noting a total of 39 strongly influencing factors, amongst which individual lifestyle scored highest, directly linking to the degree of national development. Naturally, the relationship between risk factor and illness is not exclusive, with the aforementioned factors contributing to the appearance of various other diseases, further consolidating the need for correct health policies. A number of studies, from which the Omran (1971), Reddy (2002), and Gupta et al. (2011) can be referenced, strived to elucidate all risk factors that, through their impact on the etiology of cardiovascular pathologies, can determine the development and implementation of health policies.

According to Kesteloot et al. (2006), the decrease of cardiovascular mortality rates in Europe and North America can be divided into two phases. The first (between 1970 and 1990) was linked to control measures of population risk factors, and involved changes in smoking policies, substitution of vegetable fats for animal fats, and promotion of physical activity. The second phase (in the 1990s) is attributed to a better policy management of acute cardiovascular risk factors, as well as long-term medication use and innovative evidence-based medical procedures. The message to take home from this study is the singular importance of funding and a reliable foundation and further good management of public health, these being key factors in the decline of cardiovascular mortality rates. (Kesteloot et al., 2006, pp. 107-113).

Authors must sign the Copyright agreement before the article can be published. This transfer agreement enables LUMEN Association (Asociatia Lumen) to protect the copyrighted material but does not relinquish the proprietary rights. The copyright transfer covers the exclusive rights to reproduce and distribute the article, including reprints, photographic reproductions, microfilm or any other reproductions of similar nature and translations. Authors are responsible for obtaining from the copyright holder permission to reproduce any figures for which copyright exists.

3. The evolution of health policies in a postmodern vision

The term "public policy" entered the specialized studies and the Romanian vocabulary rather late, at the end of the '90s and, there are still many ambiguities at the level of common sense on the scope of this notion. (Bondar, 2007, pp. 122 – 143). At least at the beginning of the European integration process, health policy was of secondary importance. The original Treaties (Treaty establishing the European Coal and Steel Community, 1952; Euratom Treaty, 1957 and the Treaty of Rome establishing the European Community, 1958) contained few provisions relating to health, referring only to research and cooperation between the Member States for safety and health of workers in the coal and steel industry, protection of the population against ionic radiation, etc. The first provisions of the Treaty establishing the European Community also concerned health, but only in connection to establish the internal market. For example, Article 36 of this Treaty allowed the Member States to restrict the free movement of goods if such a measure was justified in terms of the protection of health and life of humans and animals. (Constantin, 2002, pp. 92 – 94). The first more substantial appearance of health in the European treaties occurred with the Single European Act (1987). It has resulted in the extension of the Community's powers of action in the field of occupational health and safety or the protection of the environment and consumers, in particular as regards food, pharmaceuticals, and so-called "hazardous substances". It also established a legal basis for consumer protection requirements to be taken into account in the Single Market. At the same time, it laid the foundations for a system of mutual recognition of the professional qualifications of doctors, dentists, nurses, and paramedical staff in the Community, as well as regulations on the pharmaceutical market.

The main turning point, however, was the Maastricht Treaty (1993), which added a title to the founding treaty called "Public Health". It outlines

some specific areas in which it is possible to intervene to achieve this goal: "disease prevention, measures that must be taken to have the best possible health, drug addiction." At the same time, the European Council has the right to take "incentive measures" or to issue (by a qualified majority of votes) recommendations (not countersigned). (Paulus, 2002, pp. 61 – 73). Although the role of the European Union in health and health policy has gradually increased from one treaty to another, this role remains limited to its competencies in other areas. However, although theoretically the U.S. health policy. concerns only public health, not medical care, in practice, European legislation has a major impact, especially indirectly on the organization and distribution of health care in the Member States, and European courts nevertheless regularly take initiatives in relation to health care. According to a recent study by the European Association of Health Management, between 1958 and 1998, no less than 250 European initiatives (regulations, directives, recommendations, decisions) had an impact on the health care systems in the Member States. (Constantin, 2002, pp. 92 – 94).

4. Health policies in the field of cardiovascular medicine

Health policies relating to cardiovascular pathologies were first developed after the Second World War when full restructuralization of public services was undertaken in a large number of countries worldwide. Numerous organisations were established in the 1950s, aiming to help rebuild destroyed economies and provide basic needs and services for the population. In all developing regions, infant mortality from cardiovascular causes in the 1950s exceeded 125 per 1,000 live births with rates in Africa and Asia exceeding 180 per 1,000. Average life expectancy in the poorest countries varied from 35 to 51 years in some Latin American states (Greenberg et al., 2005, pp. 5-35). In this respect, medical care, as well as the implementation of a set of certain rules i.e. the beginning of health policies, were an integral part in the effort to reduce infant mortality in the following decades. The United Nations (UN) among other philanthropic organizations took the first step towards a decrease of infant mortality due to cardiovascular disease and an increase in life expectancy worldwide, through funding of welfare programs and the ratification of human rights to medicine and good health (Filmer and Pritchett, 1997, pp. 1-46). According to Chamie (2004), however, some of these health policy gains that led to a reduction in mortality rates occurred before major global health care was fully established (Chamie, 2004, pp. 1-6).

Currently, with the exception of the least developed countries (especially sub-Saharan Africa), the projections show that by 2050, infant mortality rates due to cardiovascular disease in developing countries will be significantly reduced, roughly equaling that of industrialized countries of today, and thus the mean life expectancy between Third and First World countries will only differ with about 10 years. Therefore, we can safely state that such policies are essential, especially taking into consideration the ascending statistical tendency of cardiovascular diseases versus that of infectious pathologies in developing states (Chamie, 2004, pp. 1-6).

5. Determinants of health policies

Loyd-Jones et al. (2006) categorize the determinants that play an important role in developing cardiovascular diseases, namely non-modifiable factors and factors that can be changed in turn by other variables. Non-modifiable factors such as age, gender, ethnicity, and heredity are unchangeable by individuals. The incidence of cardiovascular diseases increases with the aging of the population; ethnicity and heredity are also recognized as impactful, knowing that people with cardiovascular family history are at greater risk. Modifying risk factors are those that a person can change, such as blood cholesterol levels lowered by dietary changes, obesity, physical inactivity, high blood pressure, nicotine, and alcohol consumption. Obesity and physical inactivity are particularly associated with a higher incidence of cardiovascular mortality.

5.1. Obesity

Song et al. (2016) have shown that obesity is linked to premature mortality through an increase of diabetes, stroke, and other associated cardiovascular problems. According to Cawley (2011) and Farwell et al. (2017) risk factors for obesity and the cardiovascular system are widespread especially in urban settings (two to three times higher than rural areas) requiring urgent policies to prevent the growth of chronic diseases. The latter study also underlines that 27% of industry employees were overweight while 41% were borderline obese. The stated reason was sedentary lifestyle combined with very low physical activity. Thus, a positive association between body mass index and cardiovascular disease occurrence was established, the authors fully supporting the importance of better policies in this field.

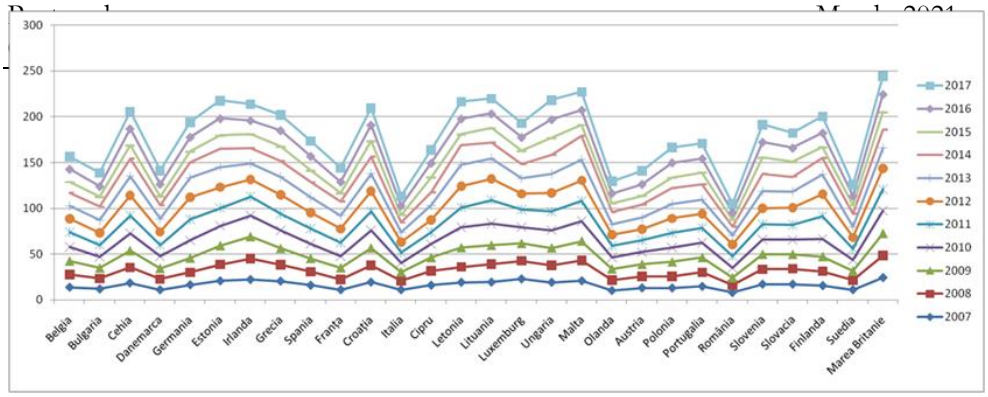

Figure 1: Evolution of Adult Obesity Rate in the European Union

Source: authors' conception, based on data available at
https://ec.europa.eu/health/sites/health/files/state/docs/2018_healthatglance_rep_en.pdf

Regarding European obesity rates, they have an ascending tendency according to the statistics, although Romania seems to occupy the last place. The highest rate of obesity among adults is seen in Hungary (18.2% in 2015, 20% in 2016 and 21.2% in 2017), followed by the UK (18.9% in 2015, 19, 5% in 2016 and 20.1% in 2017). Romania is ranked last, with an average annual growth rate of about 2% and an obesity rate of 7.5% in 2015, 7.9% in 2016 and 9.4% in 2017.

5.2. Inactivity

The authors of Siegel et al. (2009) support new health policies that include recommended physical activity levels, after demonstrating that high blood pressure is directly associated with sedentarism. The results have shown that severely inactive women have up to 55% higher risks of developing high blood pressure compared to women of the same age who practice regular physical activity. Additionally, approximately 25% of all global ischemic heart disease cases are based on the individual's physical inactivity (Siegel et al., 2009, pp. 1115-1121). According to Weir et al. (2006) worldwide, more than 60% of adults do not reach their corresponding levels of physical exercise in order to maintain a healthy cardiovascular system. Physical inactivity shows a higher prevalence amongst women, elderly individuals, and people with disabilities. (Weir et al., 2006, pp. 771-780). A study by Rengma et al. (2015) conducted in India supports the importance of physical inactivity as a major degrading health factor, recognizing it as the result of a progressive change in lifestyle towards a more sedentary model. The study focused on unhealthy diets and physical inactivity, highlighting their direct link to obesity, and showing excess body weight as the main

cause of approximately 60% cases of diabetes and cardiovascular diseases in the Indian subcontinent. (Rengma et al., 2015, pp. 199-208).

5.3. Hypertension

In 2006, Gemmell et al. built a model to estimate the possibility of reducing acute myocardial infarction and stroke risks in England. The authors assessed for one year the effect of several public interventions on pathology incidence using the following variables: population size, incidence, proportion of population with each risk factor and cause of death. The results revealed 73,522 new preventable cases, of which 59,680 were directly linked to high cholesterol and 18,105 to high systolic blood pressure (Gemmell et al., 2006, pp. 339-343). Taking these results into account, the National Health Service (NHS) prioritized a coronary heart disease program and the government redirected funds towards a national program in which screening (for myocardial infarction, diabetes, and stroke) was made available to all citizens. UK data for the period 2006-2007 reveals national cardiovascular incidence rates lowered with 3.6% (2008) (National Health Service, 2011, pp. 11 – 55). High blood pressure in people under 50 years of age is associated with higher pathology incidence; a study by Dauchet et al. (2007) estimated that a 5 mmHg decrease in systolic blood pressure reduces mortality rates for stroke by 14% and for coronary heart diseases by 9%. Furthermore, a 10% decrease in cholesterol would result in a 15% decrease in coronary artery disease mortality. (Dauchet et al., 2007, pp. 1650-1656).

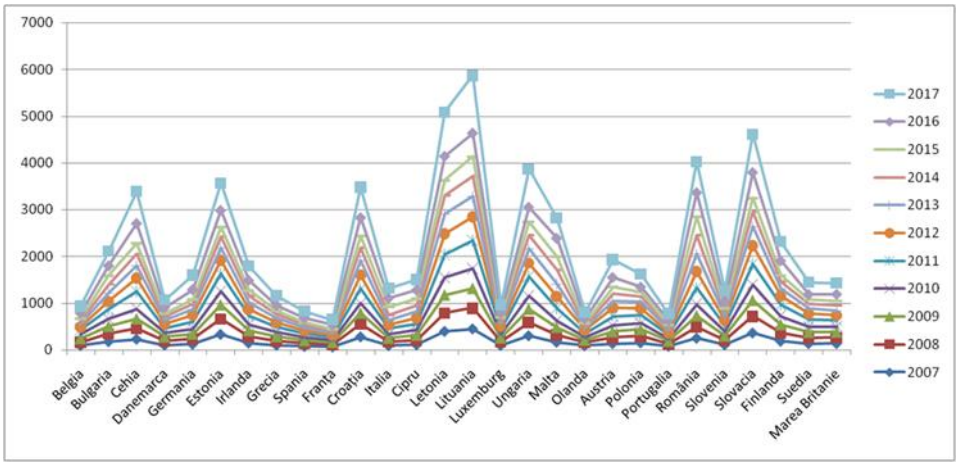

Figure 2: Number of people who have died of high blood pressure in the U.S.

Source: authors' conception, based on data available at https://ec.europa.eu/health/sites/health/files/state/docs/2018_healthatglance_rep_en.pdf

Statistics show that the number of men who have died from high blood pressure is higher than the number of women in all EU Member States. The analysis shows that Romania is on the 3rd place in terms of mortality caused by hypertension; in first place is Lithuania, followed by Slovakia. In 2017, the lowest mortality rate due to the effects of high blood pressure is found in France, with a number of 107 deaths caused by this condition. In Romania, for the analyzed years, the number of deaths due to cardiovascular diseases, respectively of hypertension is increasing, respectively in 2007 we counted 249 deaths from this cause, and in 2017 the number of deaths is 667.

5.4. Smoking

According to Mokdad (2004), smoking is strongly associated with an increased risk of coronary heart disease in female patients with comorbidities such as type 2 diabetes. Furthermore, numerous studies have demonstrated the cause-incidence relationship between smoking and a plethora of chronic diseases that share an inflammatory substrate such as coronary heart disease, chronic hepatitis, chronic myopathy, osteoporosis, depression, and others. When taking into consideration the cardiovascular risk factor, quitting smoking substantially reduces the percentages.

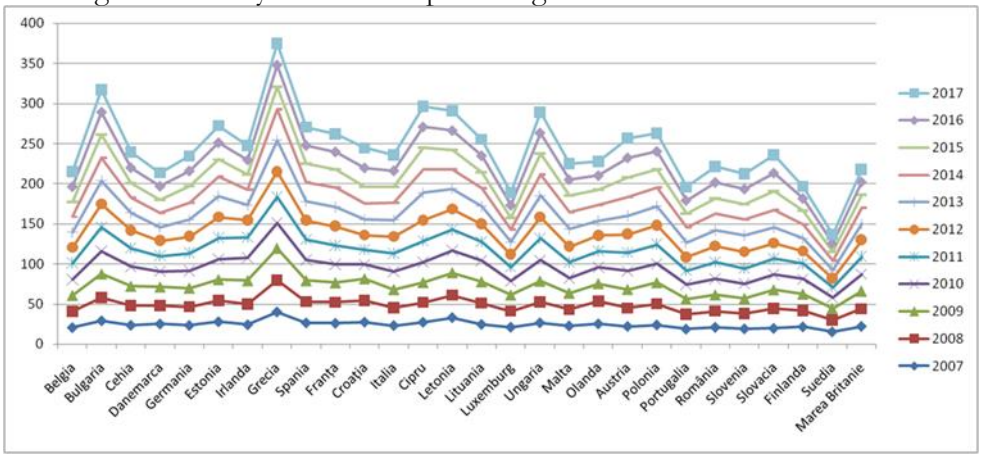

Figure 3: Changes in daily smoking rates amongst adults

Source: authors' conception, based on data available at https://ec.europa.eu/health/sites/health/files/state/docs/2018_healthatglance_rep_en.pdf

Statistics show that the smoking rate decreased considerably from 2007 to 2017; Romania is among the last places in the ranking, in terms of

smoking rate, respectively 20.8% in 2007 and 19.8% in 2017, this means that the Romanian population does not smoke much. For 2007, statistics show that Greece (40.0%) is in first place in terms of smoking rate, followed by Bulgaria (29.0%) and Latvia (27.9%); in 2017, on the first place in the ranking is Bulgaria (28.2%), followed by Greece (27.3%) and Hungary (25.8%). For Romania, statistics show a decrease in the number of smokers; Sweden ranks last in statistics (15.2 in 2007 and 10.9 in 2017), followed by Luxemburg (21% in 2007 and 16% in 2017).

5.5. Pollution

Pollution is an acknowledged cardiovascular risk factor causing inflammatory reactions in vivo, and thusly leading to the formation of atherosclerotic plaques and their associated deviations in circulatory physiology. A study by Sharma et al. (2009) brings forth the significance of these processes, both the arrhythmogenic properties and their role in neurovascular pathophysiology. Bhatnagar (2004) also supports, through a 10 year epidemiological study, the considerable increase in cardiovascular incidence rates brought on by short term and chronic exposure to high concentrations of pollutants in the air (Bhatnagar, 2004, pp. 479-485).

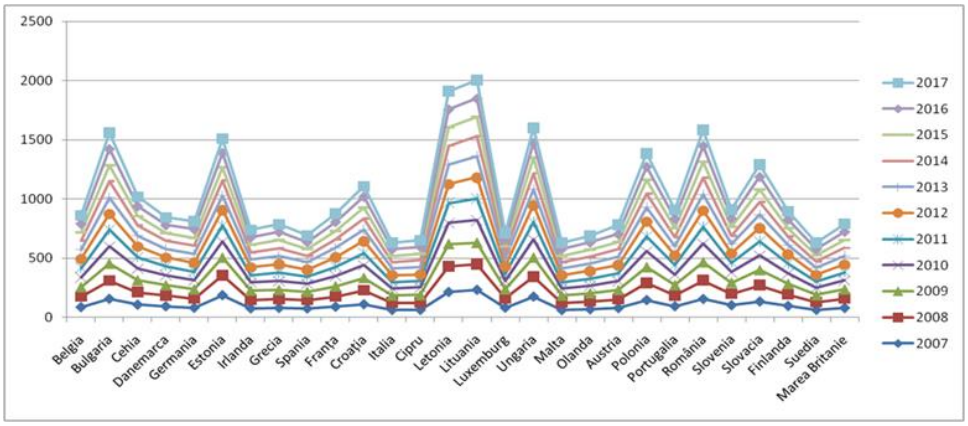

Figure 4: Mortality due to pollution in the U.E.

Source: authors' conception, based on data available at https://ec.europa.eu/health/sites/health/files/state/docs/2018_healthatglance_rep_en.pdf

Pollution is a harmful factor in health, which is why statistics show worrying data on the mortality rate due to this. Thus, for 2017, Lithuania ranks first in terms of mortality due to this (155), followed by Latvia (153).

Romania is on the 3rd place in the ranking, together with Bulgaria, respectively in 2017 it faced a number of 135 people; Romania is followed by Hungary (126) and Estonia (119). The lowest mortality rates are found in Sweden (53) and Malta (54).

5.6. Stress

Stress and the human bodies' response to it are part of our genetic makeup, a necessary attribute that enhanced humanity's chance of survival and subsequent evolution. Although its' necessity cannot be disputed, especially in terms of giving an individual the needed motivation towards action, both short and long-term stress have significant pathophysiological effects. Short-term high levels of stress induce headaches, migraine, nausea, dizziness, irritability, and cognitive difficulty especially in performing simple, day to day, tasks. Long-term stress though, can contribute to an imbalance in the immune system, increasing the risk for a number of chronic pathologies (Plutzky, 2001, pp. 10K - 15K).

In the contemporary age, stress has become a daily influence, regardless of occupational field. Mental stress strains an individual, especially today when the toll exerted by psychological fatigue resulting from excessive work schedules or deadlines needing to be met is augmented by the influx of constant information presenting economic upheavals, social reordering, natural and manmade calamities, etc. Cardiovascular diseases are known to be part of the large group of illnesses that are brought on by high levels of chronic stress; studies from 2005 by Akinboboye et al. highlighting the sheer danger that it brings to coronary heart disease patients, the authors equating it to straining physical effort (Akinboboye et al., 2005, pp. 418-427).

Depression, social isolation, and lack of quality psychological support, all of which are direct results of a stressful contemporary lifestyle, have the same impact on cardiovascular health as hypercholesterolemia, chronic tobacco consumption and high blood pressure levels (Dragland et al., 2003, pp. 1286-1290). It is thusly increasingly obvious that multidisciplinary consultation is mandatory when developing health policies, behavioral and lifestyle changes having to be taken into account alongside the strictly medical aspects.

6. Conclusions

The determinants of health policies are represented by:
(1) biological factors - age, gender, genetics;

(2) personal behavior and lifestyle - diet, smoking, alcohol, exercise, risk-taking;

(3) psychosocial environment - family structure, community networks, culture, social exclusion;

(4) Physical environment - air, water, housing, transport, noise, waste disposal;

(5) socio-economics - employment, education.

In order to achieve a balanced health status globally, all of the aforementioned factors must be addressed in the policies. Nowadays, globalization has left a strong mark on all countries, making it difficult to separate the needs of one nation or community and consider them objectively. In such an environment shaped by world politics, lawmakers must take into account the impact that global health problems have on national health policy and vice versa. Each state can and should contribute to global health efforts by sharing values, experience, and competence, while also taking concrete measures specifically tailored to its' populace. This strategic minefield is the medium which experts developing cardiovascular health policies must navigate safely, while constantly prioritizing the welfare of all affected or at risk individuals and safeguarding the present and future wellbeing of the healthy.

Acknowledgments

This work was cofinanced from the European Social Fund through Operational Programme Human Capital 2014-2020, project number POCU/380/6/13/125015 "Development of entrepreneurial skills for doctoral students and postdoctoral researchers in the field of economic sciences".

References

Akinboboye, O., Nichols, K., Wang, Y., Dim, U. R., & Reichek, N. (2005). Accuracy of radionuclide ventriculography assessed by magnetic resonance imaging in patients with abnormal left ventricles, *Journal of Nuclear Cardiology*, *12*(4) pp. 418 – 427, DOI: 10.1016/j.nuclcard.2005.04.003.

Anderson, O. (1972). *Health care: Can there be equity? The United States, Sweden, and England,* New York: Wiley Publications.

Anderson, O. (1989). *The health services continuum in democratic states: An inquiry into solvable problems*, UK: Ann Arbor, MI, Health Administration Press.

Bhatnagar, A. (2004). Cardiovascular pathophysiology of environmental pollutants, *American Journal of Physiology-Heart and Circulatory Physiology*, 286, pp. 479 – 485, doi.org/10.1152/ajpheart.00817.2003 .

Bondar, F., (2007), *Politici publice și administrație publică*, [Public policies and public administration],București: Ed. Polirom

Cawley, J. (2011). *The Oxford Handbook of the Social Science of Obesity*, New York: Oxford University Press.

Chamie, J. (2004). *World Population Prospects,* The 2002 Revision, Volume III: Analytical Report, New York.

Constantin, V., (2002), *Documente de bază ale Comunității și Uniunii Europene*, [Basic documents of the Community and the European Union], Ed. a II-a, Iași: Ed. Polirom

D'Agostino, R. B., Sr. Vasan, R. S., Pencina, M. J., Wolf, P. A., Cobain, M., Massaro, J. M., & Kannel, W. B. (2008). General cardiovascular risk profile for use in primary care: the Framingham Heart Study, Circulation Journal, 117(6), pp. 743 – 753, doi.org/10.1161/CIRCULATIONAHA.107.699579.

Dauchet, L., Kesse-Guyot, E., Czernichow, S., Bertrais, S., Estaquio, C., Péneau, S., Vergnaud, A., C., Chat-Yung, S., Castetbon, K., Deschamps, V., Brindel, & P., Hercberg, S. (2007). Dietary patterns and blood pressure change over 5-y follow-up in the SU.VI.MAX cohort, *The American Journal of Clinical Nutrition*, 85(6), pp. 1650 – 1656, doi.org/10.1093/ajcn/85.6.1650.

Dragland, S., Senoo, H., Wake, K., Holte, K., & Blomhoff, R. (2003). Several culinary and medicinal herbs are important sources of dietary antioxidants, *The Journal of Nutrition*, 133(5), pp. 1286 – 1290, doi.org/10.1093/jn/133.5.1286.

European Coal and Steel Community. (1952). Treaty establishing the European Coal and Steel Community. ECSC Treaty. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=LEGISSUM%3Axy0022

European Economic Community. (1958). Treaty of Rome establishing the European Economic Community (EEC Treaty). https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=LEGISSUM%3Axy0023

European Economic Community. (1987). The Single European Act. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=LEGISSUM%3Axy0027

European Union. (1993). The Maastricht Treaty on the European Union. https://europa.eu/european-union/sites/europaeu/files/docs/body/treaty_on_european_union_en.pdf

Farwell, S. L., Reylander, K., Iovine, M., & Lowe-Krentz, L. (2017). Novel Heparin Receptor Transmembrane Protein 184a Regulates Angiogenesis in the

Adult Zebrafish Caudal Fin, *Frontiers in Physiology*, 8, pp. 671 – 682, doi.org/10.3389/fphys.2017.00671.

Filmer, D., & Pritchett, L. (1997). Child Mortality and Public Spending on Health: How Much Does Money Matter?, *Policy Research Working Paper*, no. 1864, pp. 1 – 46, Washington: World Bank, doi.org/10.1596/1813-9450-1864.

Gemmell, I., Heller, R. F., Payne, K., Edwards, R., Roland, M., & Durrington, P. (2006). Potential population impact of the UK government strategy for reducing the burden of coronary heart disease in England: comparing primary and secondary prevention strategies, *Quality and Safety in Health Care*, 15(5), pp. 339 – 343, DOI: 10.1136/qshc.2005.017061.

Greenberg, H., Raymond, S., & Leeder, S. (2005). Cardiovascular Disease And Global Health: Threat And Opportunity, *Health Affairs Journal*, 2, pp. 5 – 35, doi.org/10.1377/hlthaff.w5.31.

Groah, S., L., Nash, M. S., Ward, E. A, Libin, A., Mendez, A. J., Burns, P., Elrod, M., & Hamm, L. F. (2011). Cardiometabolic risk in community-dwelling persons with chronic spinal cord injury, *Journal of Cardiopulmonary Rehabilitation and Prevention*, 31(2), pp. 73 – 80, DOI: 10.1097/HCR.0b013e3181f68aba.

Gupta, R., Guptha, S., Joshi, R., & Xavier, D. (2011). Translating evidence into policy for cardiovascular disease control in India, *Health Research Policy and Systems*, 9(8), pp. 1- 12, DOI: 10.1186/1478-4505-9-8.

Kesteloot, H., Sans, S., & Kromhout, D. (2006). Dynamics of cardiovascular and all-cause mortality in Western and Eastern Europe between 1970 and 2000, *European Heart Journal*, 27(1), pp. 107 – 113, doi.org/10.1093/eurheartj/ehi511.

Lieberman, J. A., Hammond, F. M., Barringer, T. A., Goff, D. C., Norton, H. J., Bockenek, W. L., & Scelza, W. M. (2011). Adherence with the National Cholesterol Education Program guidelines in men with chronic spinal cord injury, *The Journal of Spinal Cord Medicine*, 34(1), pp. 28 – 34, DOI: 10.1179/107902610x12883422813589.

Loyd-Jones, D. M., Leip, E. P., Larson, M. G., D'Agostino, R. B., Beiser, A., Wilson, P. W., Wolf, P. A., & Levy, D. (2006). Prediction of lifetime risk for cardiovascular disease by risk factor burden at 50 years of age, *Circulation Journal*, 113(6), pp. 791 – 798, doi.org/10.1161/CIRCULATIONAHA.105.548206.

Middleton, J. W., Leong, G., & Mann, L. (2008). Management of spinal cord injury in general practice - part 2, *Australian Family Physician*, 37(5), pp. 335 – 338, https://www.racgp.org.au/afpbackissues/2008/200805/200805middleton.pdf.

Mokdad, A. H., Marks, J. S., Stroup, D. F., & Gerberding, J. L. (2004). Actual Causes of Death in the United States, 2000, JAMA: Journal of the

American Medical Association, 291(10), pp. 1238 – 1245, DOI: 10.1001/jama.291.10.1238.

National Health Service. (2011). available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/228978/8373.pdf, [Accessed 28 April 2020].

OECD/EU. (2018). *Health at a Glance: Europe 2018: State of Health in the EU Cycle*, OECD Publishing, Paris, available at https://ec.europa.eu/health/sites/health/files/state/docs/2018_healthatglance_rep_en.pdf, [Accessed 28 April 2020].

Omran, A. R. (2005). The Epidemiologic Transition: A Theory of the Epidemiology of Population Change, *Milbank Quarterly*, 49(4), pp. 509 – 538, DOI: 10.1111/j.1468-0009.2005.00398.x.

Paulus, A. T., Evers, S. M., Fecher, F., (2002), Cross Border Health Care: An Analysis of Recent ECJ Rulings, European Journal of Law and Economics, Vol .14(1), pp. 61 – 73, DOI: 10.1023/A:1015642601282

Plutzky, J. (2001). Inflammatory Pathways in Atherosclerosis and Acute Coronary Syndromes, *The American Journal of Cardiology*, 88 (suppl), pp. 10K - 15K, doi.org/10.1016/S0002-9149(01)01924-5.

Reddy, S. K. (2002). Cardiovascular diseases in the developing countries: dimensions,determinants, dynamics and directions for public health action, *Public Health Nutrition*, 5(1A), pp. 231 – 237, DOI: 10.1079/phn2001298.

Rengma, M., Sen, J., & Mondal, N. (2015). Socio-Economic, Demographic and Lifestyle Determinants of Overweight and Obesity among Adults of Northeast India, *Ethiopian Journal of Health Sciences*, 25(3), pp. 199 – 208, DOI: 10.4314/ejhs.v25i3.2.

Roemer, M. (1985). *National strategies fo r health care organization: A world overview*, Ann Arbor, MI, UK: Health Administration Press.

Roemer, M. (1993). National health systems throughout the world, *Annual Review of Public Health*, 14, pp. 335 – 353, doi.org/10.1146/annurev.pu.14.050193.002003.

Schwamm, L., Reeves, M. J., & Frankel, M. (2006). Designing a sustainable national registry for stroke quality improvement, *American Journal of Preventive Medicine*, 31(6), Suppl 2, pp. 251- 257, doi.org/10.1016/j.amepre.2006.08.013.

Sharma, V. K., Yngard, R. A., & Lin Y. (2009). Silver nanoparticles: green synthesis and their antimicrobial activities, *Advances in Colloid and Interface Science*, 30(145) (1-2), pp. 83 – 96, DOI: 10.1016/j.cis.2008.09.002.

Siegel, L., Sesso, H., Bowman, T., Lee, I., Manson, J., & Gaziano, M. (2009). Physical activity, body mass index and diabetes risk in men: A prospective

study, *The American Journal of Medicine*, 122(12), pp. 1115 – 1121, doi.org/10.1016/j.amjmed.2009.02.008.

Song, T., Chi, L., Chu, C., Chen, F., Zhou, C., & Chang, Y. (2016). Obesity, Cardiovascular Fitness, and Inhibition Function: An Electrophysiological Study, *Frontiers in Physiology*, 7, pp. 1124 – 1134, doi.org/10.3389/fpsyg.2016.01124.

Weir, B. S., Anderson, A. D., & Hepler, A. B. (2006). Genetic relatedness analysis: modern data and new challenges, *National Review of Genetic*, 7(10), pp. 771 – 780, DOI: 10.1038/nrg1960.

World Health Organization. (2008). World Health Statistics, WHO Press, France, pp. 36 – 47, available at https://www.who.int/gho/publications/world_health_statistics/EN_WHS08_Full.pdf, [Accessed 28 April 2020].

Yusuf, S., Hawken, S., Ounpuu, S., Dans, T., Avezum, A., Lanas, F., McQueen, M., Budaj, A., Pais, P., Varigos, J., & Lisheng, L. (2004). Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): case-control study, *Lancet,* 364(9438), pp. 937 – 952, DOI: 10.1016/s0140-6736(04)17018-9.