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Socioeconomic and demographic changes
The perspective of the Greek health care system

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Κοινωνικοοικονομικές και δημογραφικές αλλαγές. Οι προοπτικές του Ελληνικού Συστήματος Υγείας

Περίληψη στο τέλος του άρθρου

Recent socio-economic, demographic and epidemiological changes have directed the scientific community towards the development of a systematic theoretical model that can forecast the development of health care systems in the next 30 years. This article assesses the requirements generated by change in the health care services, and the ways in which they can be covered by new models adopted by health care systems. The socioeconomic and environmental changes are analyzed, using a holistic model applicable for both Greece and for the European region. This holistic model incorporates and extends the various possible innovative technological and scientific applications that affect employment, medical and biogenetic engineering, energy production, transport, consumer behavior patterns, inequalities, and indicators of human development and individual and global well-being. These variables determine the new health needs and the quantitative data by which these needs are measured, and also the possible economic scenarios. This holistic methodological analysis model provides the scope to determine the structural characteristics of new types of health care systems in 2050, in the context of sustainable preventive behavior and the impact of the digital world on the individual.

Key words

Demographic changes
Economic development
Epidemiological changes
Health care systems
Holistic analysis model

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1. INTRODUCTION

Since ancient times, people have faced an inherent fear of death and an inner desire to live and *"enjoy life until the last moment"*. In antiquity, in particular, life was considered to be a divine gift that should be appreciated and loved.[1] This is evident in the primordial struggle of human thought that alternated between metaphysical and pre-scientific philosophical conceptions. The dominance of these perceptions has proceeded from myth to scientific foundation in observing the natural causes of illness.

These strong ideological features are found in the myth of Asclepius, where his therapeutic efficacy, based on actual medical practice, was the cause for *"Zeus striking him with a thunderbolt, because Hades complained to Zeus that the underworld was in danger of being deserted"*.[2] In contrast, the pre-scientific and philosophical logic of Hippocrates, Democritus and Epicurus was based on the approach that the perishable nature of the soul and the mind was a symptomatology exclusively of matter.

Nowadays, the scientific community is making an attempt to approach these issues with the same inherent contradictions, taking into account both the technocratic unilateralist views and the holistic approach in the analysis of the complexity of the issues that concern us, using the *"Live-enjoy until the last chance"* mantra as a starting point.

Modern approaches define this dimension expressed by the mantra as the expectation of a healthy life, while the prevailing desired policy is that of not being *"dishonorable"*, just as that of the Athenians 2,500 years ago, in providing their elders with respectful care. It is recalled that *"Solon stipulated severe penalties and even exile for those who did not respect social and family obligations"*.[1] Despite the differences across the eras, these same anxieties and concerns are timeless and still prevail.

The subject under consideration focuses on the need to study the continuously changing health needs both quantitatively and qualitatively, in the context of the current financial constraints, social and demographic developments and the capabilities of the health care system to provide appropriate medical services, goods, and policies

for protection of the health of the population. Projection for the coming decades takes into account assessment of health in general and the health care system in particular.

As the title of the paper indicates, two main variables will be analyzed, namely the demographic changes and the related epidemiological developments, and the socio-economic changes and the resulting cultural developments.

The following fundamental questions will be addressed: What is the conceptual scope of these variables, what is their main causal framework, what are the dependent interrelated variables and statistical predictions, and how will these affect the health care system and the quality of the health of the Greek population? What financial, social and health policies can be promoted, to predict future developments in the light of optimism and realism?

2. FUNDAMENTAL QUESTIONS THAT ARISE FROM THE INTERACTION OF DEMOGRAPHIC AND SOCIO-ECONOMIC DEVELOPMENTS

As is well recognized, one fundamental question that must be examined is that of the possible effects of demographic developments. These effects could include a decline in the general population, but with an increase in the number of people aged 65+ and especially people over the age of 80 years, with increases in life expectancy and dependency index. In addition, the degree to which the country's population characteristics may be affected by national or international developments and migration should be studied.

The health care system should be examined and restructured so as to take into account the possible changes in the epidemiological model from the demographic developments. The available quantitative data on the prevalence and incidence of diseases must be clarified, and new health care needs must be identified and taken care of.

It should be examined whether the demographic changes regulate only the health care needs or if, and to what degree, they affect other socioeconomic indices, including employment, productivity, growth, the educational system and prevention policies. It also needs to be considered how the essential causal factors of the health status of the population and the nature of the health care system will shape new socio-economic indices.

Another fundamental issue is the environment and its improvement, encompassing the production process, environmental neutrality and ecological balance. The potential increase in research and development funding, scientific maturity and the transformation of knowledge into smart methods of production and technological innovation (e.g., nuclear fusion) that could generate an energy revolution may create linked and multiplier effects in environmental improvement which should be analyzed.

It is important to study whether demographic developments and new educational models can lead to a scenario of workforce reduction with favorable conditions for a human capital with a high level of know-how, advanced skills, a more experiential culture and critical thinking. Thought should be given to how this new found human capital potential can influence the way of life and create more favorable conditions in the applied field of health prevention policies.

An interactive circle/network must be created and analyzed between improving the quality of the environment and ways of life (prevention), and instituting a health care system that can provide the product of scientific maturity in biotechnological and robotic innovation and remote digital intervention, with assessment of the possible outcome.

The social conditions, and the ways in which they will affect the models of care and treatment must be analyzed. For example, social isolation, an increase in the numbers of people living alone, rapid structural changes in family relationships and population aging can all put increasing pressure on the effective provision of high-quality health care.

On the other hand, social conditions can become the main agent for urban redesign, with residential redevelopment, that in combination with the evolution of technology could lead to more favorable social conditions and new models of care and treatment. Finally, it is important to examine to what degree health economists and social decision makers are able to understand these organizational changes and to anticipate the constantly changing healthcare needs.

Obesity, diabetes mellitus (DM), hypertension, cardiovascular disease (CVD), neoplasms, mental illness and transmittable diseases, and external causes of illness appear to be potentially preventable and treatable in the light of the changes that will take place in the social and cultural context, in the transformation of the family structure, in lifestyle and in the post-technological healthcare system. Cultural and environmental changes can mutually form the focal point of a review of a multidimensional health policy (fig. 1).[3]

3. DEMOGRAPHIC DEVELOPMENTS

Demographic variables constitute a broad field of analysis, with a wide range of rates, ratios, and proportions. The

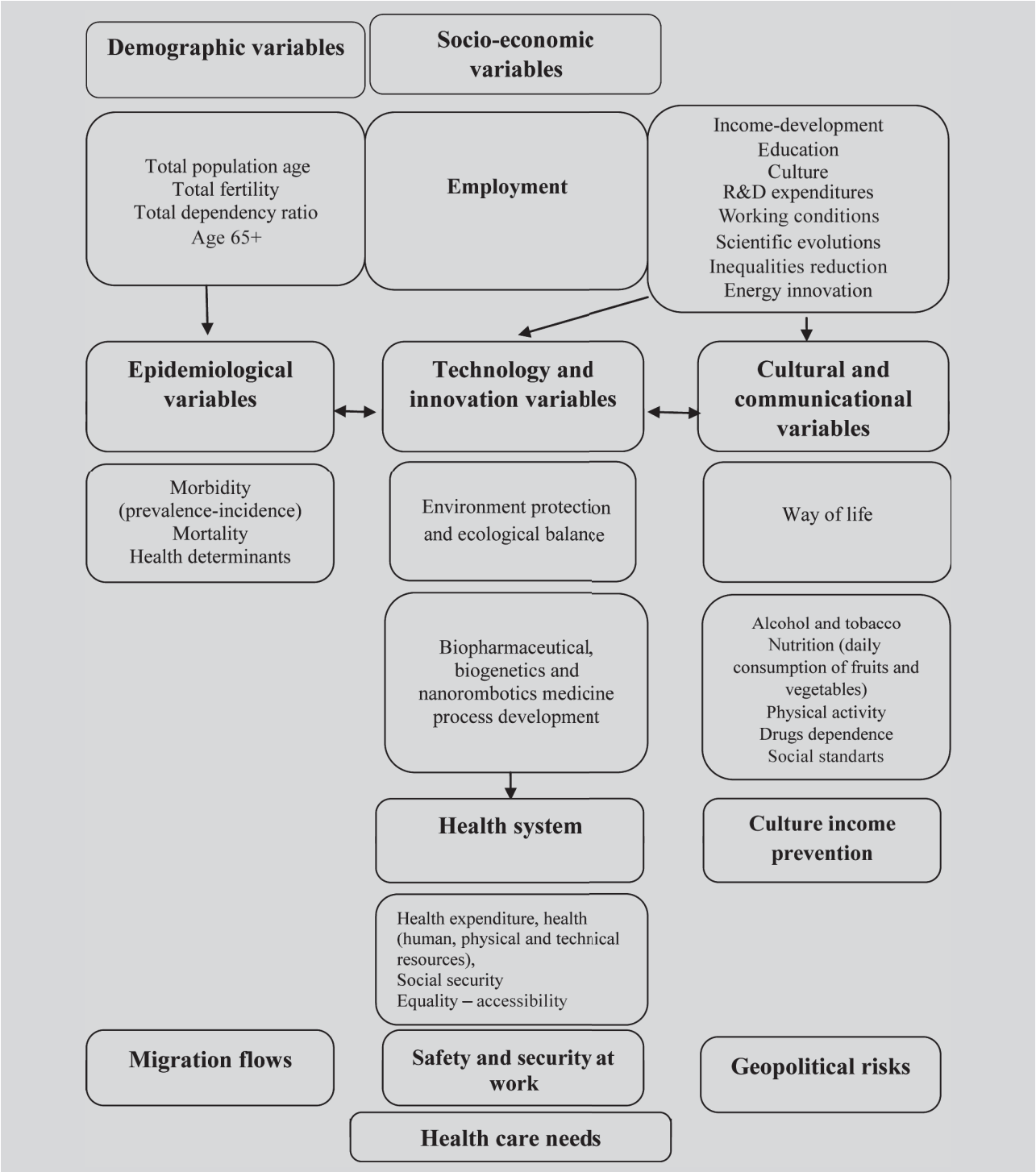

Figure 1. Interaction of demographic and socio-economic variables.

variables selected for the current analysis, for reasons of descriptive economics, are broken down and quantified into the main indicators that affect the epidemiological model and the disease characteristics of the Greek population (tab. 1).[4–6]

Subsequently, an attempt is made to analyze the inversion of the population (age) pyramid, which is characterized by a low proportion of younger population and high proportion of older population, a high migration quota and a multicultural population composition, shifting of

the age-specific fertility rate, a declining fertility rate and an increasing mortality rate, an increasing life expectancy, etc., and to predict the possible scenario of demographic developments for the next 3–4 decades. In other words, this study attempts to predict a new epidemiological model and the resultant changing health needs.

3.1. A possible demographic and epidemiological scenario

The scenario presented here is based on predictions for 2050 and 2060 for health care planning. At the national level, according to the United Nations (UN) data,[4] a rapid

Table 1. Probabilistic projection of demographic and epidemiological trends in Greece, 2020–2060.

Indeces	2018–2020	2050	2060
Total population (both genders)	10,423,000	9,028,000	8,400,000
Population frequencies and percentages for age 65+ (both genders)	2,323,000 22.3%	3,271,000 36.2%	3,059,000 36.4%
Population frequencies and percentages for age 80+ (both genders)	786,000 7.5%	1,257,000 13.9%	1,418,000 16.9%
Population frequencies and percentages for age 15–64 (both genders)	6,677,000 64.1%	4,709,000 52.2%	4,387,000 52.2%
Population frequencies and percentages for age 0–14 (both genders)	1,423,000 13.6%	1,049,000 11.6%	954,000 11.4%
Male life expectancy at birth (0 years) Female life expectancy at birth Life expectancy at birth (both genders)	M: 80.52 F: 85.08 M+F: 82.80	M: 84.00 F: 88.01 M+F: 85.97	M: 85.15 F: 89.14 M+F: 87.10
Healthy life expectancy at birth (0 years) (both genders)	M: 70.5 F: 73.6 M+F: 72.0	M: 76.5 F: 79.5 M+F: 78.0	M: 79.0 F: 81.0 M+F: 80.0
Total fertility rate (mean values)	1.26	1.46	1.54
Age-specific fertility rates (births per 1,000 women of reproductive age) in Europe	(15–19) – 10.2 (20–24) – 45.3 (25–29) – 92.0 (30–34) – 102.5 (35–39) – 58.6 (40–44) – 13.8 (45–49) – 0.9	(15–19) – 6.3 (20–24) – 35.7 (25–29) – 92.0 (30–34) – 118.9 (35–39) – 71.7 (40–44) – 17.7 (45–49) – 1.3	(15–19) – 6.2 (20–24) – 35.5 (25–29) – 92.6 (30–34) – 121.2 (35–39) – 72.9 (40–44) – 17.7 (45–49) – 1.3
Number of births (mean values)	71,400	67,400	59,000
Number of deaths (mean values)	117,000	129,000	134,000
Crude birth rate (in 1,000 inhabitants)	6.9	7.4	6.9
Crude death rate (in 1,000 inhabitants)	11.4	14.1	15.7
	2020–2025	**2045–2050**	**2055–2060**
Age standardized mortality ratio, circulatory diseases (in 100.000 inhabitants)	251 (2010)	≤100	≤80
Age standardized mortality ratio, malignant neoplasm (in 100.000 inhabitants	149 (2010)	≤90	≤70
Under-five mortality (probability of dying between birth and exact age 5 years)	More developed regions 5 Europe 4 Greece 3	3 2 2	2 2 1
Premature mortality at the age of 30–70 years (probability of death %) from non-communicable and mental mortality diseases such as cardiovascular disease, neoplasm, diabetes mellitus and chronic respiratory diseases	12.4 (2017)	7	6
Mortality rate attributed to household and ambient air pollution (per 100,000 population)	28	10	8

population decline and age restructuring is predicted.

The population will decline from 10,400,000 persons in 2020 to 8,400,000 in 2060. People over 65 years of age will increase from 22.3% in 2020 to 36.4% in 2060. People over the age of 80 years will increase from 786,000 (7.5% of the total population) in 2020 to 1,418,000 (16.9% of the total population) in 2060. The child population will decrease from 1,423,000 in 2020 to 954,000 in 2060.

Annual births will decrease from approximately 87,000 in 2018 to 65,000–70,000, on average, during the period 2020–2060. The difference between the crude birth rate and the crude mortality rate, which currently ranges between 6.9‰ and 11.4‰, will change to between 6.9‰ and 15.7‰. A low total fertility rate is anticipated, at 1.5 for woman of reproductive age by 2060, while age-specific fertility will undergo a small shift for the ages 30–44 years (30–34 years: 102.5–121.2) (35–39 years: 58.6–72.9), (40–44 years: 13.7–17.7), but be fairly stable for the age-groups 25–29 years and 45–49 years and present a small further decline for the ages 15–24 years.

Life expectancy at birth, for both genders, will increase from 80.52 to 85.15 years for men and from 85.08 to 89.14 years for women. Healthy life expectancy at birth (HALE) will increase by 4.7 years and 5.7 years in 2050 and 2060, respectively. The present low infant mortality rate (under five years mortality) will remain at very low levels and from 3 deaths per 1,000 live births will decrease to just 1 death per 1,000 live births.

The mortality rate attributed to household and ambient pollution will be significantly reduced from 28/100,000 in 2020, to 10/100,000 in 2050. The standardized mortality ratio due to circulatory diseases is estimated at less than 100 deaths per 100,000 people in 2050 compared with 251 in 2011. The standardized mortality ratio due to malignant neoplasm will decrease to 90 and 70 deaths per 100,000 people, in 2050 and 2060, respectively. The risk of premature mortality (probability of death as %) at the ages of 30–70 years from non-transmittable and mental diseases, such as the CVD, neoplasms, DM and chronic respiratory diseases, is predicted to decrease from 12.4% in 2017 to 7% in 2050 and 6% in 2060.[4–6]

These population changes and the projected epidemiological estimates at national level will depend mainly on the global demographic developments and the dynamics of migration flows. Migration pressures will be intensified by population growth, low growth rate, social inequalities, a decline in the democratic functioning of countries, environmental factors, increased mortality, high levels of unemployment, unequal redistribution of world wealth and awareness of consumer disadvantage as communicated through the media and social networks in less developed countries.

Is a rapid global population increase predicted in reality? Table 2 depicts the projections and the factors that should be taken into account.

Today's Europe of 747 million people, including Russia, is estimated to contract to 667 million by 2070, reducing the world population by 10.7%. Conversely, the least developed countries will have a further population increase of +130%, resulting in a total increase of from 1.1 billion in 2020 to 2.5 billion in 2070 (tab. 2).[4]

The fundamental question that arises from this scenario is what can be considered a positive, and what a negative development? Will the negative and or positive developments affect the health care system in the same way?

3.2. Positive consequences

Extension of life expectancy, reduction of years-lost-in-good-health life expectancy, an increase of individuals aged 65+ years, and mainly an increase in the population aged over 80 years, very low child mortality (that reduces the risks from the increasingly shifting specific fertility age), reduction in mortality attributed to household and atmospheric pollution, reduction in mortality from major diseases and, above all, reduction in the risk of premature mortality at the age of 30–70 years, can all be considered positive.

3.3. Negative effects

Reduction in the population and births, decrease in the child population and a dramatic increase in the age dependency ratio (age 0–19 years + age 70+ years/age 20–64 years), will all affect the socio-economic developments negatively, and will lead to a change in the pattern of productive human capital. On the other hand, they will create a lower level of demand for health care services (especially for pediatric and gynecological services) due to population decrease, but above all, a prolonged healthy life expectancy, due to the improvement of non-medical health determinants, will be ensured. There will therefore be a shift from therapeutic health care to palliative care (e.g., care hospices, in-patient long-term care, residential long-term care facilities and home-based and rehabilitative care) for people over the age of 80 years. At the same time, the reduced demand will increase patient satisfaction, as a result of more effective and higher quality services.

Table 2. Total population projections (both genders combined), by region and country for 2020, 2050, 2060 and 2070 (in millions).

	2020	2050	2060	2070	% change 2020–2070
World	7,795	9,735	10,151	10,459	+34.2
Europe (Russian Federation included)	747	710	689	667	-10.7
Greece	10.4 10.7	9.0 9.6	8.4	7.8	-25.0
USA	331	379	391	404	+22.1
More developed regions	1,273	1,280	1,267	1,254	-1.5
Less developed regions	6,521	8,455	8,884	9,205	+41.2
Least developed regions	1,057	1,876	2,159	2,427	+129.6
Less developed regions excluding least developed regions	5,464	6,578	6,725	6,777	+24.0
Eastern Europe	293	261	251	239	-18.4
Northern Europe	106	115	116	117	+10.4
Southern Europe	152	137	127	118	-22.4
Western Europe	196	196	194	192	-2.0

USA: United States of America

3.4. Socio-economic developments

Socio-economic developments determine both the country's development and the level of the services provided by the health care system.[3] The degree of interaction between a country's level of development and the population health status is determined by the correlation of the underlying causal factors of illness and health.

Health status depends on income, educational level, lifestyle, psychosocial behavior against health risks, sociocultural values, environmental conditions, the balance of ecosystems, biological-genetic factors, and the health care system and equality of accessibility in the provision of health care services.[7] The health care system depends on the economy, and on science and technology, and on innovation in organization and digital transformation. What is the meaning of a higher or lower growth rate? Higher growth rates mean higher gross domestic product (GDP), higher public fiscal scope, and higher research spending, a greater investment in human capital and, consequently, a higher educational level and, above all, higher income of the population.

The consequences of moving from one level of development to a higher one, according to the possible scenarios for 2050 and 2060, exert a multiplier effect on a number of factors that improve socio-economic indicators and the health care system.

3.5. Research – science – environment

The development of research, science and technology is related to innovation in the energy sector, and consequently, environmental protection and policies against climate change, new technologies for reducing the production of plastic, but also attitudes regarding its use, which have multiple positive consequences for the environment, namely the soil and marine species, and policies for the purification of natural carbon absorbers (soil, forests, oceans), based on supporting electric means of transport, controlling for livestock methane emissions, and supporting energy saving and energy efficiency, promoting a circular economy and production neutrality, change in transport patterns, and climate-oriented use of goods and services.

These scientific and technological developments, which will lead to better environmental quality, reversal of a declining climate quality and reduction of pollution and ecological imbalance, will provide the framework for positive epidemiological developments across the spectrum of morbidity and mortality.

3.6. Technology and working conditions

Technological developments are contributing to better working conditions and ergonomic interventions, which, while aiming to increase productivity, also contribute to improving health and safety at work, thereby reducing health care needs and absence from work.

Scientific and technological innovation is already leading to the development of biogenetics, nanotechnology and robotic medicine. Expansion in these fields will lead to a drastic improvement in optimal medical practices, therapeutic and interventional.

Financial optimization is expanding and improving the transport networks, with reinforcement of public transport, resulting in a reduction in external causes of death.

The combination of a higher educational level and a higher income will result in an improvement in dietary patterns, consumer behavior and lifestyle in general. There will be a transition from the overconsumption model of growth to the model of human development, which guarantees reduction of health care needs and reform of health care policies from the medical and social models to the establishment of holistic health care models, of health and wellness, according to One Health – WHO: *"One health is an approach to designing and implementing programmes, policies, legislation, and research in which multiple sectors communicate and work together to achieve better public health outcomes"*.

Economic growth and fiscal balance contribute to the improvement of the quantitative and qualitative characteristics for the provision of health care services, in both the public and private sectors. This can be achieved through the fiscal capabilities for increased funding of the public health system. At the same time, increase in the income of Greek consumers is leading to higher market coverage of the private health sector to meet their needs. The scope for increasing the private health sector will always depend on the degree of consumer satisfaction with the public health care system.

Human development presupposes a reduction in inequalities, and it has been found that the Gini coefficient is lower in the most developed European countries. This contributes to both a reduction in inequalities and improved access to the health care system, as a result of development of social protection systems.

Since the economic optimization indicators are not sufficiently holistic to assess the progress of the health and quality of life of the population, it is suggested that they should be combined with social indicators, to provide the basis for formulation of more comprehensive health and social protection policies.

Social indicators are specialized statistical tools for measuring the evolution of the quality of health, nutrition, housing, education, income distribution and other aspects of cultural and social development.

These indicators refer to factors that are more relevant to the ultimate goal of a complete and healthy life than, for example, the income index, and they can more fully reflect the human, social and cultural costs of material prosperity, and also global problems, such as environmental pollution.

To this end, three indicators have been selected, the first and second of which can be sufficiently well calculated and estimated. The third indicator is mentioned because it contains important economic, political and socio-cultural variables.

Firstly, the Human Development Index (HDI) refers to the degree to which a country's basic human capabilities are developed. Specifically, it shows whether people can lead to a long and healthy life, and are educated and enjoy a decent life through increase in their income; it is calculated on three dimensions, health, education, and income.[3,8]

Secondly, the Better Life Index (BLI), which includes the interaction of 11 sub-indicators: housing (living conditions, labor costs and housing prices), income (family wealth and income), work (profit, job security and unemployment), community (quality of social support network), education (educational level), environment (quality of the environment), governance (participation in democracy), health (healthy life expectancy), life satisfaction (degree of personal assessment of the level of well-being), safety (number of violent attacks and assassinations), work-life balance (allocation of working time and time for child care and other socio-cultural needs).[9]

Thirdly, the World Happiness Index (WHI), which is the holistic definition of development. This indicator analyzes six main variables: Real GDP per capita, healthy life expectancy, generosity, lack of corruption, the presence of another person on whom a person can rely, and the freedom of the individual to make life choices.[10,11]

The WHI is being expanded and is gaining a comprehensive conceptual approach, including four fundamental indicator sections: Peace and security (state of peace or war, refugees and asylum seekers, violent deaths, poisoning, suicide, traffic accidents, victims of natural or technological disasters – earthquakes – cyclones – rainfall – floods – nuclear leaks, fires, criminal acts and financial security); freedom and democracy (democratic functioning and respect for institutions, freedom of the press, women's rights-property rights, freedom of being elected, free movement, free sexual expression, freedom to divorce, children's labor rights, non-forced marriages, access to compulsory education, abolition of the death penalty and torture, etc.); quality of life (GDP/inhabitant, Gini index, this is the level of redistribution of income and produced wealth – the degree of equality, life expectancy and healthy life expectancy, suicide, environment and clean air, etc.); culture and communication (percentage of research funding for GDP development, education-training and duration of school attendance, newspapers per capita, percentage of internet users, etc.).[8]

4. A POSSIBLE SOCIO-ECONOMIC SCENARIO

According to the data in table 3, the following possible scenarios for the development of socio-economic indicators can be established:

GDP will increase at an average rate of 1.5% by 2060, taking into account the relevant recurring cyclical fluctuations, the duration of occurrence of which has now been reduced, firstly, by strengthening the uncertainty of international financial crises and secondly, by the resulting shocks of geopolitical claims.

The HDI index, from 0.875 in 2018 will approach 0.930 in 2060, which will balance the multicultural changes from immigration flows and social cohesion and will ensure an increased level of equality.

The Gini coefficient will decrease from 0.340 in 2018 to 0.280 in 2060. This possible scenario depends on whether the predictions on the following variables will be achieved: Employment in the age group 20–64 years will increase from 58% in 2018 to 70% in 2050 and 75% in 2060, as a necessary development to balance the significant increase in the total age dependency ratio from 54.9% (2018) to 85.9% in 2060. Expenditure on research and development will increase from a low rate of 1.2% in 2018 to 3% in 2050 and 3.5% in 2060. The percentage of the Gross Fixed Capital Formation (as % of GDP) will rise from 13.1% to 25% in 2018 and to 29% in 2060. Performance according to the Program for International Student Assessment (PISA) score will exceed 500 points in the coming decades. The forest area (% of total land area) will remain at 31.7%, and will show a small increase to 35% in 2060. Zero carbon dioxide emissions will be achieved by 2050, with an increase in the proportion of alternative energy consumption in total energy consumption from 17.5% today, to 50% in 2050 and to 60% in 2060.

Table 3. Socioeconomic changes in Greece, 2020–2060.

Indexes	2018–2020	2050	2060
Real average annual percentage rate of change of the GNI		1,5%	
GDP in current prices in billions €	187.5 (2019)	253	279
GDP in current prices Per capita in €	17,989	27,992	33,234
Human development index	0.872	0.920	0.930
Gini coefficient	0.340	0.290	0.280
International student assessment program (PISA score)	454 467 455	510+	520+
Labor force participation rate (employment rate) (20–64)	58%	70%+	75%
Total dependency ratio ([age 0–19+age 70+]/age 20–69)	54.9%	79.2%	85.9%
Social protection expenditure (as % of GDP)	25%	30%	30%
Health expenditure (as % of GDP)	8.2%	10%	10%
R&D expenditures (as % of GDP)	1.2	2.2	2.5
Gross fixed capital formation (as % of GDP)	13.1	25%	29%
Carbon dioxine emissions per capita (in metric tonnes)	5.9	Net-zero greenhouse gas emissions (global warming up to 1.5 °C), climate-neutral	Net-zero greenhouse gas emissions, climate-neutral
Percentage (%) of renewable energy consumption in the total energy consumption	17.5%	50%	60%
Forest area (% of total area) 2016	31.7%	37%	
Inpatient bed occupancy rate (%)	74%	87%	90%
Inpatient care average length of stay (average hospitalization duration in days)	4.2	3.5	3.2
Ratio of nurses to doctors (employed in hospitals)	1.5	3.5	4
Ratio of nurses to population (per 1.000 inhabitants)	3.2	9	10

R&D: Research and development, GNI: Gross national income, GDP: Gross domestic product

Expenditures for social protection and health are projected to increase in 2050 by 30%, and by 10% of GDP. It is also estimated that the redistributive dominance of pension over health and social care will be balanced. In the future these sectors will function communicatively, due to increase in the elderly population, but also because of the structural change in the system for provision of health and social care services. Improvement in the quality of public and common goods and services will result in a reduction in the demand for a further increase in social spending, due to the contribution of real development and the consequent behavioral changes.

The performance in the hospital sector will improve further, regarding the indicators of average duration of hospitalization rate from 90% to 74% in 2060, and average length of stay to 3.2 days in 2060 from 4.2 days, and the nursing staff will be empowered, overturning the current ratio of 1.5 to 4 nurses per doctor. At the same time, it is estimated that the educational outflows in the nursing specialties will change the ratio of 3.2 nurses per 1,000 inhabitants to 10 per 1,000 inhabitants in 2060, in order to cover the needs of long-term inpatient care and home care support (tab. 3).[12–16]

5. CONCLUSIONS

The demographic and socio-economic scenarios described above will contribute to a complete reengineering of the country's health system, thus achieving digital transformation of the health care services, implementation of bio-awareness and biosafety models, utilization of nanotechnology, robotics, artificial intelligence and biogenetics in diagnosis, interventional medical procedures, immunotherapy, etc., full implementation of the electronic patient record, maximization of tele-medicine, long-term home care, with the development of integrated primary health care networks, and use of more intelligent medical care devices in the diagnosis and monitoring of patients. At the same time, there will be improvement in working conditions, and in the environment and infrastructures, increase in electric and zero-emission transportation and optimization of land use (land, forests, sea, water). All of these changes will bring about behavioral changes and reduce premature mortality for the age-group 20–70 years.

Does this scenario of the provision of a complete reengineering of the health care system show a satisfactory degree of feasibility and likelihood of achievement of the set objectives?

The answer is yes, as long as we move on to alternative models of socio-economic development that will focus on extensive investment in human capital, providing high quality public goods and services, reversal of the sociocultural perceptions of the technical professions, sustainable economy, synergy in the economic production system, controlled inflows of economic migrants, fairer redistribution of financial resources, and institutional integration of the EU, which will constitute the starting point for substantial human development (fig. 2).[7]

The development of the economy of the future can ensure an effective relationship between competitiveness and respect for the individual and social needs, and it encompasses a holistic combined approach towards a different economic way of thinking.

These major changes, which will ensure economic efficiency and equity, competition and respect for individual and social needs, will also require the improvement of sociocultural indicators such as that of global happiness (fig. 3).[8]

Based on the above rationale, the importance of the methodological issue of a multidimensional national and supranational approach to mutually beneficial demographic and socio-economic developments, both for substantial human development and for the health system, has been highlighted. It has also been confirmed that the transition from the early over-consumption model to the model of enjoying the benefits of sustainable preventive behavior and social collectivity, can contribute to the socially necessary structural reform. This reform framework is perceived as a necessary condition for creating a new transitional narrative, from the temporary satisfaction of instinctive and acquired needs to the holistic satisfaction of the sociocultural needs, as a fundamental condition for improving the health of the population. Improvement in the quality of the social goods provided will maximize the satisfaction of the citizens, and will also ensure optimization of the effectiveness of the health system.

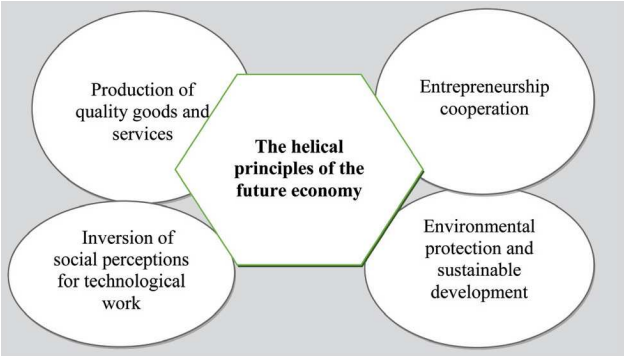

Figure 2. The synergy of education – culture, quality characteristics of economy, entrepreneurship, and sustainable development.

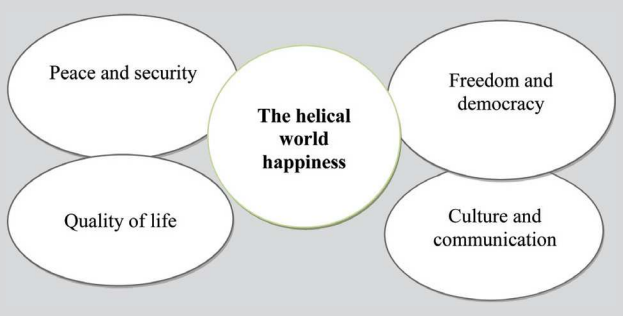

Figure 3. The helix of production of world-wide happiness and development.

ΠΕΡΙΛΗΨΗ

Κοινωνικοοικονομικές και δημογραφικές αλλαγές. Οι προοπτικές του Ελληνικού Συστήματος Υγείας

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Οι κοινωνικο-οικονομικές, δημογραφικές και επιδημιολογικές αλλαγές οδηγούν την επιστημονική κοινότητα στη σκιαγράφηση ενός συστηματικού θεωρητικού μοντέλου σχετικά με τον τρόπο προσέγγισης της ανάπτυξης των συστημάτων υγείας, σε μια 30ετή προβολή. Το παρόν άρθρο επιδιώκει να προβλέψει τις ανάγκες οι οποίες θα προκύπτουν στις υπηρεσίες υγειονομικής περίθαλψης, καθώς επίσης πώς αυτές οι ανάγκες θα καλύπτονται από τα νέα μοντέλα που θα υιοθετήσουν τα συστήματα υγείας. Για τον σκοπό αυτόν αναλύονται οι οικονομικές, κοινωνιολογικές και περιβαλλοντικές αλλαγές, προκειμένου να δομηθεί η αρχιτεκτονική ενός ολιστικού μοντέλου ανάλυσης τόσο για την Ελλάδα όσο και για τον ευρωπαϊκό χώρο. Το εν λόγω ολιστικό μοντέλο ενσωματώνει και τις πιθανές τεχνολογικές και επιστημονικές καινοτόμες εφαρμογές. Οι τελευταίες επηρεάζουν τις μορφές απασχόλησης, την ιατρική και τη βιογενετική μηχανική, την παραγωγή ενέργειας, τις μεταφορές, τα πρότυπα συμπεριφοράς των καταναλωτών, τις ανισότητες και τους δείκτες ανθρώπινης ανάπτυξης, ευημερίας και παγκόσμιας ευτυχίας. Αυτές οι επεξηγηματικές μεταβλητές αφ' ενός διαμορφώνουν τις νέες ανάγκες υγείας και αφ' ετέρου καθορίζουν τόσο τα ποσοτικά τους δεδομένα όσο και τα πιθανά οικονομικά σενάρια. Το συγκεκριμένο ολιστικό μεθοδολογικό μοντέλο ανάλυσης παρέχει την ευκαιρία να προσδιοριστούν, για το 2050, τα δομικά χαρακτηριστικά των νέων μορφών συστημάτων υγείας, υπό τη διορατικότητα της επικράτησης της βιώσιμης προληπτικής συμπεριφοράς και της επίδρασης του ψηφιακού κόσμου στο άτομο.

Λέξεις ευρετηρίου: Δημογραφικές αλλαγές, Επιδημιολογικές αλλαγές, Μοντέλο ολιστικής ανάλυσης, Οικονομική ανάπτυξη, Συστήματα υγείας

References

1. ΣΚΟΥΜΠΟΥΡΔΗ Α. *Αθήνα: Μια πόλη μαγική*. Εκδόσεις Ι. Σιδέρης, Αθήνα, 2006:201–202
2. ΛΑΜΠΡΙΝΟΥΔΑΚΗΣ ΒΚ. Η φροντίδα της υγείας και η εξέλιξη της Ιατρικής κατά την αρχαιότητα. *Αρχαιολογία & Τέχνες* 2007, 102:10–14. Διαθέσιμο στο: https://www.archaiologia.gr/wp-content/uploads/2011/07/102-2.pdf
3. ΣΟΥΛΗΣ Σ. *Εφαρμοσμένη κοινωνική πολιτική: Σχεδιασμός υπηρεσιών υγείας και κοινωνικής προστασίας*. Εκδόσεις Παπαζήση, Αθήνα, 2015:237–278
4. UNITED NATIONS. World population prospects 2019: Methodology of the United Nations population estimates and projections (ST/ESA/SER.A/425). Department of Economic and Social Affairs Population Dynamics, United Nations, New York, 2019:1–50. Available at: https://population.un.org/wpp/Download/Probabilistic/ Population/
5. WORLD HEALTH ORGANIZATION. Greece: Profile of health and

well-being. WHO Regional Office for Europe, Copenhagen, 2019:1–40. Available at: http://www.euro.who.int/_data/assets/pdf_file/0010/308836/Profile-Health-Well-being-Greece.pdf
6. WORLD HEALTH ORGANIZATION. World health statistics 2019: Monitoring health for the SDGs, sustainable development goals. WHO, Geneva, 2019:1–132. Available at: https://apps.who.int/iris/bitstream/handle/10665/324835/ 9789241565707-eng.pdf?sequence=9&isAllowed=y
7. ΣΟΥΛΗΣ Σ. *Οικονομική της υγείας*. Εκδόσεις Παπαζήση, Αθήνα, 1998:55–82
8. UNITED NATIONS. Human development report 2019. Beyond income, beyond averages, beyond today: Inequalities in human development in the 21st century. United Nations Development Programme (UNDP), New York, 2019:1–366. Available at: http://hdr.undp.org/sites/default/files/hdr2019.pdf
9. ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT. OECD guidelines on measuring subjective well-being. OECD, Paris, 2013:1–270. Available at: https://www.oecd.org/statistics/oecd-guidelines-on-measuring-subjective-well-being-9789264191655-en.htm
10. HELLIWELL J, LAYARD R, SACHS J. World happiness report 2013. The Earth Institute. Centre for Economic Performance, Columbia University, New York, 2013:1–156. Available at: https://s3.amazonaws.com/happiness-report/2013/ WorldHappinessReport2013_online.pdf
11. HICKS S, TINKLER L, ALLIN P. Measuring subjective well-being and its potential role in policy: Perspectives from the UK Office for National Statistics. *Soc Indic Res* 2013, 114:73–86
12. ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT. Health at a glance 2019: OECD indicators. OECD, Paris, 2019:1–243. Available at: https://www.oecd-ilibrary.org/docserver/4dd50c09-en.pdf?expires=1636657721&id= id&accname=guest&checksum=31F8799BB40E4C7C6ABF731F05BB86D8
13. ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT. Health at a glance: Europe 2020 – State of health in the EU cycle. OECD, Paris, 2020:1–237. Available at: https://www.oecd-ilibrary.org/docserver/82129230-en.pdf?expires=1636657494&id=id&accname=guest&checksum=25E70276468BC4EA48EA7091036E059A
14. WORLD BANK. World development indicators. National Accounts. World Bank, Washington, 2019. Available at: https://databank.worldbank.org/source/world-development-indicators
15. EUROPEAN COMMISSION. State of health in the EU: Greece – Country health profiles. OECD, European Observatory on Health Systems and Policies, Paris, 2019:1–24. Available at: https://ec.europa.eu/health/sites/health/files/state/docs/2019_chp_gr_ greece.pdf
16. ΥΠΟΥΡΓΕΙΟ ΠΕΡΙΒΑΛΛΟΝΤΟΣ ΚΑΙ ΕΝΕΡΓΕΙΑΣ. Μακροχρόνια στρατηγική για το έτος 2050. Υπουργείο Περιβάλλοντος και Ενέργειας, Αθήνα, 2019:1–78. Διαθέσιμο στο: http://www.opengov.gr/minenv/?p=10173

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