



THE FOOD-ECONOMY TANDEM IN MAINTAINING FAMILY HEALTH AND INSURING THE NATIONAL DEMOGRAPHY

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The present century is characterized by globalization and industrial revolution (eg the manufacture of food, medicine, textiles or footwear by 3D printing, the use of artificial intelligence in more and more professional or personal fields, the use of new fuel sources and advanced exploration of the planet Mars. Although the average age has increased globally, simultaneously with the above characteristics, many developed countries face a Total Fertility Rate (TFR) below the security threshold of 2.1, leading to the need for international immigration to secure the nation demography. In this paper we aimed to analyze the food-economy tandem in maintaining Romanian family health and ensuring the birth rate from a demographic point of view in Romania. The following databases were used to obtain demographic and economic information: Wordometer, Wikipedia, Eurostat, PubMed and ReseachGate. PubMed and ResearchGate databases were used to obtain information on the role of nutrition in increasing birth rates and demographics. In order to identify the solutions for the development of the birth rate and demography in Romania, the economic and legislative factors in the EU member states with FR 1.8 and 1.9 were analyzed.

Keywords: birth rate, demographics, economy, industry, food.

INTRODUCTION

The present century is characterized by globalization and the industrial revolution (eg the manufacture of food, medicine, textiles or footwear by 3D printing, the use of artificial intelligence in more and more professional or personal fields, the use of new fuel sources and advanced exploration of the planet Mars. Although the average age has increased globally, simultaneously with the above characteristics, many developed countries face a Total Fertility Rate (TFR) below the security threshold of 2.1¹, leading to the need for international immigration, in order to secure the nation demography.

Although the development of demography is influenced by the economy and finance (gross domestic profit-GDP per capita, industry, trade and services, population and social conditions, environment and energy, international trade, science and

technology, agriculture and technology, and transport), also by social factors (schooling, the degree of employment of women in socio-economic activities and belonging to a certain social category) and local – traditional aspects (as the cultural level, local customs and religion), worldwide there are very large differences that concern the ratio of nominal GDP per capita and the fertility rate (FR). Comparing GDP per capita 2019-2021 (depending on the reporting of statistical data) to the fertility rate 2020, in the sense of the above, we exemplify this situation in Africa: Nigeria \$ 2432: 5.4^{1,2}, Ethiopia \$ 974: 4.3^{1,3}, Democratic Republic of the Congo \$ 501: 6.0^{1,4}, North America: Canada \$ 52791: 1.5^{1,5}, Cuba \$ 9296: 1.6^{1,6}, Costa Rica \$ 12690: 1.8^{1,7}, South America: Argentina \$ 9890: 2.3^{1,8}, Bolivia \$ 3823: 2.8^{1,9} and Peru \$ 11516: 2.3^{1,10}. Regarding Asia, we exemplify a country in each geographical area (subregion): East Asia: China \$ 11819: 1.7^{1,11}, Central Asia: Kazakhstan \$ 9686: 2.8^{1,12}, South Asia - East: Philippines \$ 3646: 2.6^{1,13}, South Asia: India \$ 2191: 2.2^{1,14}, Southwest

Asia: Saudi Arabia \$ 23566: 2.3^{1,15}. European Union (EU) countries are no exception to the decline in the native population, such as Romania with the nominal GDP per capita ratio: FR of 14968: 1.6^{1,16}, Italy 34997: 1.3^{1,17} and Germany 51860: 1.6^{1,18}. The EU countries with the highest FR but below the safe demographic limit due to the native population are France with a FR of 1.9 and Sweden with a FR of 1.9, followed by Denmark – 1.9, Ireland – 1.8, followed by the Lower Countries (Netherlands) – 1.7, Belgium – 1.7, Lithuania – 1.7 and Latvia – 1.7¹. With the exception of Lithuania, all EU member states with a FR higher than 1.7, and have annual positive population changes (Latvia + 0.07%, Belgium + 0.44%, Lower Countries (Netherlands) + 0.22%, Ireland + 1.13%, Denmark + 1.8%, Sweden + 0.63% and France + 0.22%¹. The positive population change is represented by immigrants from various countries (including Romania) and continents, due to political, economic, social and economic factors from their native countries. The alarm signal is the negative annual population change of a country, which influences the demographics and the decrease of the population density/km². In the EU in this situation is Bulgaria with – 0.74% and 64 p/km², Romania with – 0.66% and 84 p/km², Croatia with – 0.61% and 44 p/km², Lithuania with – 1.35% and 45 p/km², Italy with – 0.15% and 206 p/km² and Poland with – 0.11% and 124 p/km².¹

The annual positive changes for the population and the increase in FR are due to legislative factors, which are essential in the development of demography: the provisions of the Labor Code and the Family Code, the child allowance system, maternal and child protection programs, family planning policy and abortion legislation. These positive changes in the population and the increase in population density/km² are sustainable with one condition that becomes essential for any state: quality food and quality ratio: optimal and sustainable price, so that native residents or

immigrants can have a balanced economic and financial, social, service (including health), environment and energy, transport, also science and technology.

In this paper we aim to analyze the food-economy tandem in maintaining Romanian family health and ensuring the birth rate from a demographic point of view.

MATERIAL AND METHODS

The following databases were used to obtain demographic and economic information: Wordometer, Wikipedia, Eurostat, PubMed and ReseachGate. PubMed and ResearchGate databases were used to obtain information on the role of nutrition in increasing birth rates and demographics. In order to identify the solutions for the development of the birth rate and demography in Romania, the economic and legislative factors in the EU member states with FR 1.8 and 1.9 were analyzed. The following keywords were used: gross domestic product GDP per capita, birth rate, demographics, economy, industry, food in relation with the studied countries.

RESULTS

EU Member States with a FR between 1.8 and 1.9 are Denmark, Ireland, France and Sweden. The comparative analysis of the demographic indicators for the previously mentioned countries and Romania were presented in Table 1.

The demographic indicators, annual birth rate changes, FR and density, showed a big difference between Romania and Denmark, Ireland, France or Sweden in terms of annual population change and density (p/km²).

Table 1

Comparative analysis of demographic indicators for Romania, Denmark, Ireland, France and Sweden

Demographic indicator	The country				
	Romania	Denmark	Ireland	France	Sweden
Population number (2021) ¹	19237691	5792202	4937786	65273511	10099265
Annual population change (2021) ¹	-0.66%	+0.35%	+1.33%	+0.22%	+0.63
FR* (2021) ¹	1.6	1.8	1.8	1.9	1.9
Density (p/ km ²) (2021) ¹	84	137	72	119	25
Urban population (%) (2021) ¹	55	88	63	82	88
Middle age (2021) ¹	43	42	38	42	41

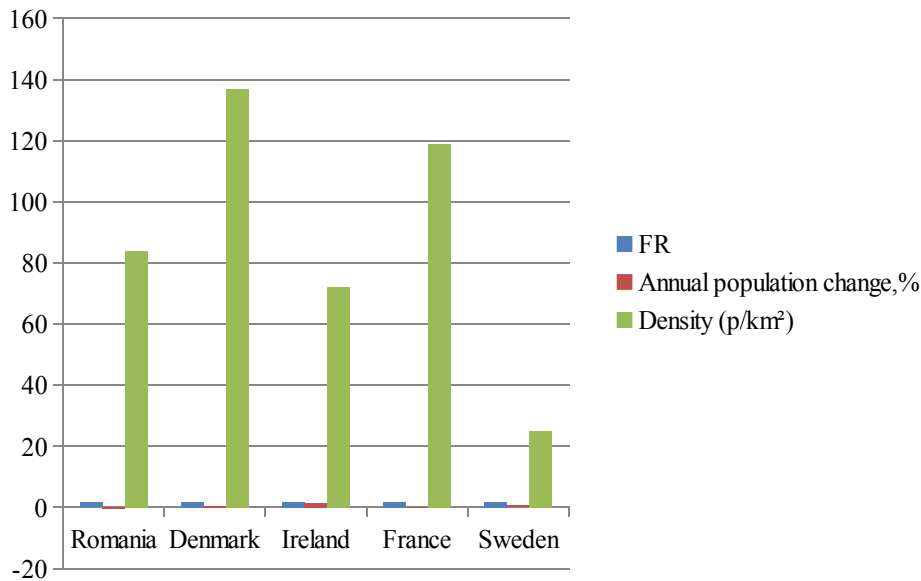


Figure 1. Graphical representation of FR, annual population change and density.

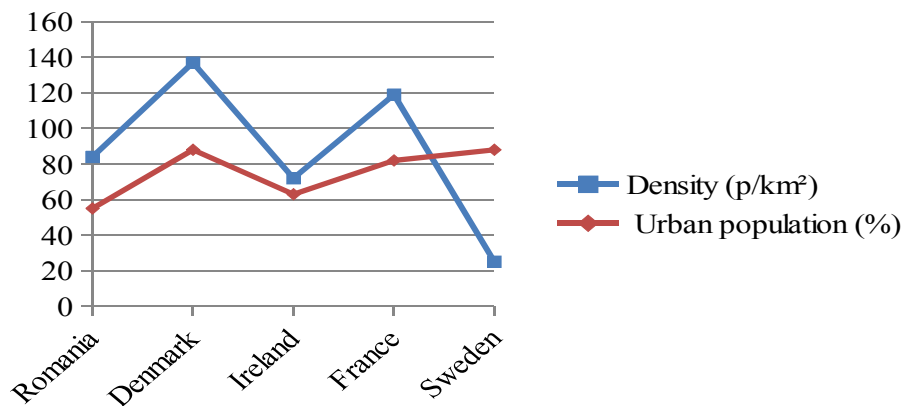


Figure 2. Graphical representation of population density and urban population.

Although in the last 15 years, new companies with foreign capital have been set up in urban areas, such as commercial networks or companies with technical activity, in Figure 2 it can be observed that among the analyzed countries, Romania has the lowest percentage of population living in the urban environment.

To compare the economic efficiency of countries, the per capita internal profit (GDP per capita) was used. Mathematically, GDP per capita is expressed as follows:

$GDP\ per\ capita = \frac{GDP}{number\ of\ inhabitants}$,
 or $GDP\ per\ capita = \frac{[(private\ consumption + state\ consumption + investment + (exports - imports)]}{number\ of\ inhabitants}$,

where:

- Private consumption represents the expenditure of each household (eg durable goods, food or other perishable goods and

services) in the economy and is the largest component of a country's GDP;

- State or public sector consumption is the sum of all state expenditures for finished goods and services, salaries of public sector employees, weapons, medicines, etc;
- Investments includes investments in factories and equipment, with household spending on new housing included in this category;
- Exports are the gross exports of one country, including goods and services, intended for consumption in another country, and
- Imports are the gross imports, ie products manufactured by other countries.¹⁹

The comparative analysis of GDP per capita and FR related to the five countries (Romania, Denmark, Ireland, France and Sweden) can be followed in Table 2.

Table 2

Comparative analysis of GDP per capita and FR for the five countries (Romania, Denmark, Ireland, France and Sweden)

The country	Economic and financial indicator / 2021: GDP per capita, \$	Demographic indicator / 2021 FR
Romania ^{1,16}	14968	1.6
Denmark ^{1,20}	63829	1.8
Ireland ^{1,21}	Not mentioned*	1.8
France ^{1,22}	44995	1.9
Sweden ^{1,23}	52477	1.9

As can be seen in Table 2, Romania has the lowest GDP per capita and the lowest FR. GDP per capita is 3 times lower compared to France and 3.5 times lower compared to Sweden, both with a FR of 1.9. Given the significance of the aforementioned GDP per capita, as well as inflation, Romanian families have to spend a very large part on the “daily basket” (basic food), which makes them reserved in terms of increasing the birth rate by giving birth more than one child per family, or even one child.

Whether we are talking about agriculture, horticulture or animal husbandry and the food industry, these are the 5 basic branches of any society needed to ensure the food of the population and the healthy development of the birth rate. They can be certified organic or conventional.

From the point of view of the agro-industrial indicator, and the ecological field, the statistic analysis for the 5 analyzed countries can be viewed in Table 3.

From data presented in Table 3 (except for Ireland which has only 1.63% of the country's area certified organically, but more animals certified organic compared to Romania which has the lowest FR), the other three EU member states which have FR of 1.8 (Denmark) and 1.9 (France and Sweden) have larger areas and agricultural plant/animal raw materials, much larger than our country. The large number of ecological operators in Romania is explained by two characteristics: the increase of agricultural productions in small farms according to the standard production coefficients (SO) and the increase of economic agents number (ecological operators) with the field of activity related to the commercialization of ecological products, imported or domestic).

Although information on pesticide sales quantity by type of pesticide is confidential in EU-Eurostat statistics, the frequency of pesticides sold is still high and can be traced in Table 4.

Table 3

Statistical analysis of the 5 countries analyzed from the point of view of the agro-industrial indicator, ecological field

Ecological agro-industrial indicator	The country				
	Romania (FR 1.6)	Denmark (FR 1.8)	Ireland (FR 1.8)	France (FR 1.9)	Sweden (FR 1.9)
Ecologically certified area (% of country area) (2020) [24]	2.86	11.09	1.63	7.72	20.43
Ecologically certified economic operators * (2020) [24]	9647	4186	Not mentioned*	Not mentioned*	5730
Organic crop production * (2020) [24]	229794	Not mentioned	Not mentioned, but in 2019 5907 were reported	Not mentioned, but in 2019 742480 were reported	Not mentioned, but in 2019 403300 were reported
Ecological animals (2020) [24]	1148	Not mentioned, but in 2019: 772794	37721	Not mentioned, but in 2019 815000 were reported	Not mentioned for the period 2012–2020
Organic production of aquaculture products (2020) [24]	975	Not mentioned, but in 2019: 6003	30430	Not mentioned, but in 2019: 5511	Not mentioned for the period 2012–2020

* Ecologically certified economic operators are represented by farmers, stockbreeders, processors, as well as traders of organic products; Not mentioned – There is no information in the Eurostat database at the time of this paper; Organic crops can be represented both by feed for animals certified organically, or in conversion, and by other plant resources, such as. vegetables, fruits or herbs/spices.

Table 4

Volumes of pesticides sold in the EU between 2017 and 2020 for the countries previously analyzed

Year	The country				
	Romania (FR 1.6)	Denmark (FR 1.8)	Ireland (FR 1,8)	France (FR 1,9)	Sweden (FR 1,9)
2017 ²⁴	4 600 276	483 731	633 474	29 786 228	264 768
2018 ²⁴	4 541 509	438 345	601 996	39 064 721	222 579
2019 ²⁴	4 020 810	436 363	992 282	24 483 508	164 279
2020 ²⁴	Not mentioned*	Not mentioned	Not mentioned	Not mentioned	222 207

* Not mentioned in the Eurostat database at the time of this paper

Analyzing the quantity of pesticides sold, we observe a balance in Romania and Denmark for the period 2017–2019, and an increase in sold for Ireland in the same period and also in Sweden for 2019–2020. The use of pesticides is conditioned by the following factors: climate change and the EU legal system and the respective legislative regulations of each country and their surplus, which decreases the number of technological operations, such as the application of treatments, the reduction of human resources and fuel costs, all leading to a cost of production/ha or per capita (in the case of feed), lower than for organic production.

In addition to the increase in agricultural production, due to the intensive system applied, and implicitly the improvement of economic indicators such as turnover and profit, the use of pesticides brings great disadvantages to both the soil and the people who apply them. treated with pesticides.

The major risks to human health are heavy metals from plant resources, fish, grain, tubers, water, air and soil.^{25,26} They can cause neurotoxicity, headache, irritability^{26,27}, cancer²⁶⁻²⁸, severe damage to reproductive system²⁷ and gastrointestinal tract^{26,27}, kidney and lung damage²⁶, abdominal pain²⁶ and cardiovascular disorders²⁶. Improper use of pesticides, such as harvesting and consuming fruits, vegetables, grains and tubers during pesticide storage, can lead to respiratory problems (asthma, bleeding, chronic bronchitis)²⁹, neuronal and renal.³⁰ Accumulation of pesticides in the body can cause metabolic degradation, attention deficit, autism, neurotoxic effect^{30,31}, myocardial damage³², cancer³³⁻³⁵, brain tumors.³⁶ They produce lipid peroxidation, stimulating the production of free radicals and disrupting the body's antioxidant capacity.^{34,37} Free radicals have a destructive effect on LDL cholesterol and are most likely responsible for sclerosis^{34,38}, have the ability to change the structure of DNA.^{34,39,40}

Another important factor for increasing the birth rate, respectively in ensuring the future of the

nation is to maintain the health status of the population. In addition to other illnesses, depression is a wake-up call for the health systems of all EU Member States.

Data presented in Table V shows that although the depression rate is highest in the countries with GDP per capita, respectively \$ 44995 in France and \$ 5247 in Sweden, these countries have the highest FR in the EU, compared to Romania which has the highest lower GDP and lower FR of 1.6. An important aspect of this analysis is the small percentage (4.6%) of people suffering from depression.

Table 5

Information on depression in the EU countries analyzed (Romania, Denmark, Ireland, France and Sweden) (% of the country's population)

Year	The country				
	Romania (FR 1.6)	Denmark (FR 1.8)	Ireland (FR 1,8)	France (FR 1,9)	Sweden (FR 1,9)
2021	4.6%	6.3%	5.8%	7.0%	9.2%

Data presented in Table V shows that although the depression rate is highest in the countries with GDP per capita, respectively \$ 44995 in France and \$ 5247 in Sweden, these countries have the highest FR in the EU, compared to Romania which has the highest lower GDP and lower FR of 1.6. An important aspect of this analysis is the small percentage (4.6%) of people suffering from depression.

Summarizing the analyzed indicators, Table 6 presents the Romanian tandem of food - economy in maintaining family health and ensuring the future of the nation in terms of demographics. In addition, we evaluated education, science and technology, environment and energy, international trade and transport.

Table 6

The Romanian food-economy tandem in maintaining family health and ensuring the future of the nation from a demographic point of view plus education, science and technology, environment and energy, international trade and transport

Proposed action	Necessary actions	Expected results
Extending schooling and increasing the quality of special and technical education	Completion/ amendment of legislation on the re-establishment or development of special schools and technical high schools, with classes adapted to the progress of this century.	Qualified people, respectively qualified human resources for Romanian economic agents.
Development of the industry through economic and financial aid	Completion/ amendment of the legislation on the Labor Code, including in terms of the maximum number of weekly/ monthly working hours, and the Fiscal Code	Jobs, decrease of stress/ depression due to lack of jobs, increase of purchasing power and implicitly of GDP per capita, respectively of the country's GDP, decrease of population migration, family health, positive population change (from the point of view of immigrants), increase in population density/ km ² ,
Stimulating organic farming and the food industry	Completion/ modification of the Fiscal Code	Maintaining family health by preventing diseases caused by pesticides and/ or other chemicals, ensuring quality food and a quality ratio: optimal price for as many people as possible, environmental protection
Major stimulation of the use of renewable energy sources	Completion/ modification of the Fiscal Code	Environmental protection
Development of services, including transport	Infrastructure development	Increasing the number of jobs, decreasing migration, increasing GDP per capita and the country's GDP, increasing purchasing power, etc.
International commerce	Infrastructure development	Growth of the country's GDP and consequently the sustainability of all areas of the economy
Proposed action	Necessary actions	Expected results
High prevalence disease screening programs	Completing/ amending the medical legislation and the Fiscal Code	Maintaining the health of the population and preventing the increase of the costs of the health system with the hospitalization and treatment of sick people, maintaining jobs, healthy families.
Completion/ modification of the Family Code, of the Fiscal Code regarding the child allowance system, family planning policy	Stimulating the birth rate	Increasing the birth rate and demographics of the country
Maternal and child protection programs	Completion/ modification of the Family Code, of the Fiscal Code regarding the child allowance system, family planning policy	Increasing the birth rate and demographics of the country

Regardless of how Table 6 is viewed, it can be seen that the food-economy tandem plays a key role in the health of the family and in ensuring the future of the nation from a demographic point of view.

DISCUSSIONS

The quality of life of each individual is based on the state of well-being, health, environment adaptation, satisfaction, joy and happiness. Through its complexity, health includes the physical, mental and social well-being, balance between the psyche and the physical of the human being and the adequate fulfillment of his aspirations and needs.⁴¹ To these are added the biological aspects through morphological,

functional integrity and internal homeostasis, psychological from a cognitive, emotional and behavioral point of view, respectively social and spiritual.⁴¹ Through specific physiological processes, food and how it is served are essential for health and quality of life, regardless of age, they also contribute to cultural, social and psychological development^{42,43} and satisfaction.⁴³⁻⁴⁵

The biological value of food of plant origin is directly proportional to the geographical area and the relief area where the fodder used for animal feed is grown, respectively the vegetables and fruits used for human consumption, to these constibuid: composition, pH and texture of the soil, altitude – distribution of temperature and precipitation variation, atmospheric humidity, predominant wind direction, light, sun and the presence/

absence of irrigation and perennials, respectively. It is also given by the type of agriculture applied – intensive^{25,40}, or ecological.⁴⁶

In addition to the physico-chemical and sensory quality of raw materials, the biological and sensory value of food is strictly dependent on the type of heat treatment applied during food processing, or heating.⁴⁷ Thus, by heat-treating food with microwaves, such as salmon fillets, decreases the amount of lipids⁴⁸, the antioxidant activity of coconut water⁴⁹, increases the degradation of phytosterols, which can lead to impaired quality and safety food.⁵⁰

The way food is consumed and perceived influences the perception of food and is influenced by the texture, taste, aroma and colors of food. To these are added the atmosphere, music, noise and stress, as well as whether they are consumed with family, friends or alone. Other key factors are eating habits, nutritional information, cognitive factors and knowledge of food composition⁵¹, taste sensitivity^{52,53}, age and sex and body weight, whether the taster/consumer is a smoker or not⁵⁴, and consumption of certain pharmacological substances.⁵⁵ The media is a determining factor in the consumption and perception of food, both in Romania, and in other countries.⁵⁶ Hedonism is also influenced by music played during the consumption of food, or alcoholic beverages, such as beer⁵⁷⁻⁵⁹, as well as by musical celebrities who promote a food or drink.⁶⁰

Like the colors⁶¹⁻⁶², music can influence the emotional state⁶³, giving a state of relaxation or stimulation, happiness or sadness.⁶⁴⁻⁶⁵

Minimum breakfast and family dinner contribute to the development of emotional balance and communication between its members.

Regardless of age, in addition to the factors mentioned above, food consumption and the occurrence of suffering are directly related to lifestyle. In addition to lack of physical activity, alcohol and smoking, air pollution⁶⁶, excess and high frequency of certain foods, lifestyle can be one of the factors influencing internal homeostasis and underlying the occurrence of certain disorders⁶⁷, such as: decreased serum vitamin D levels in the consumption of a large amount of coffee⁶⁸, obesity^{69,70}, diabetes, cardiovascular risks^{71,72}, increased cholesterol, gastroesophageal reflux⁷³, etc. Complementary to all the mentioned factors and which can lead to the appearance of sufferings, the socio-demographic factors also have an important role. They can lead to conditions such as dementia⁷⁴, irritable bowel syndrome⁷⁵, obesity, diabetes, gastroesophageal reflux disease, alcoholism⁷⁶,

depression, etc. Through campaigns and television broadcasts, the media can negatively influence the behavior of the population, especially young women, by causing anxiety and depression.^{77,78}

From a psychosocial point of view, as in the case of other sufferings, the appearance or prevention of depression is also correlated with the food consumed, through the action they have on the pathophysiological mechanisms.

Ensuring family health, increasing birth rates, and decreasing migration are strictly dependent on GDP per capita growth in countries with a FR of 1.9, in correlation with securing jobs through the development of industry, transport and services, economic and financial stimulation of agriculture, animal husbandry, horticulture and the food industry for organic products and environmental protection. To these factors it can be add screening programs on high prevalence diseases and supplementing/ amending the Family Code, the Fiscal Code on the child allowance system and the family planning policy.

CONCLUSIONS

Ensuring family health and birth rates is the basic for ensuring Romania's future in terms of demographics. These are in strict accordance with the food supply and the economy, respectively with the political factor for sustainability.

Conflict of interest: Nothing to declare.

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