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ELŻBIETA GORYŃSKA-GOLDMANN[1]

Poznan University of Life Sciences, Poland

CONSUMPTION OF FRUIT AND VEGETABLES IN POLAND IN THE CONTEXT OF THE EUROPEAN UNION COUNTRIES (EU-27)

Key words: fruit and vegetables, consumption, EU-27, typology, consumption pattern

ABSTRACT. The aimed of the research at presenting the volume and the diversification of the consumption of fruit and vegetables (F&V) in the 27 European Union (EU-27) countries during the 2010-2021 period, and was prepared the typology of countries, based on the consumption pattern of those products. The data on the F&V consumption volume in the EU-27 countries were taken from the food balances of FAO. The analysis shows that the F&V consumption volume in the analysed period was different. The annual F&V consumption in the 2019-2021 period in Poland was 200.1 kg/*per capita* and was by 5% higher than in the 2010-2021 period. Some huge disproportions in the F&V consumption volume were noticed among such countries as: Croatia, the Netherlands, Belgium and Luxembourg, as well as Czech Republic, Latvia, Cyprus, Hungary, Bulgaria, Slovakia and Lithuania. The significant changes in the F&V consumption volume that took place in the 2019-2021 period, compared to the 2010-2012 period, can be noticed in such countries as Croatia, Belgium, Bulgaria, Czech Republic, as well as Hungary, Slovenia and Germany. In the 2019-2021 period, in 6 of the EU-27 countries, the consumption of fruit decreased: it happened in Luxembourg, Italy, Croatia, Sweden, Denmark and Malta. The same thing happened to the consumption of vegetables in 8 countries: Greece, Italy, Portugal, Malta, Spain, Romania, Cyprus and Lithuania. Currently, the F&V consumption volume in the EU-27 countries corresponds to the recommendations of WHO. The Polish society, in terms of its F&V consumption volume in the macro-economic scale, was most similar to many societies of the Central Europe (i.e. Latvia, Czech Republic, Lithuania, Hungary, Slovakia and Bulgaria), as well as to the society of Cyprus (in those countries, in the 2019-2021 period, the F&V consumption volume was 180.9 kg/*per capita*/year).

[1] Corresponding author: gorynska-goldmann@up.poznan.pl

INTRODUCTION

The FAO data shows the distribution of differences in the fruit and vegetables (F&V) consumption. In 2021, the global consumption of fruit (excluding wine) was about 86.95 kg/*per capita* (Africa 66.7, Americas 133.03, Asia 79.91, Europe 103.27, Oceania 115.76). The annual, global consumption of vegetables in 2021 was 147 kg/*per capita* (Africa 63.33, Americas 81.95, Asia 187.38, Europe 148.56 kg/*per capita*, Oceania 124.68). In accordance with the WHO's recommendations, the daily F&V consumption for adults shall not be smaller than 400 g – or 5 portions of 80 g[2] (150 kg/*per capita*/year) [WHO 2020]. In the newest edition of The State of Food Security and Nutrition in the World report [FAO 2023], it was highlighted that the Europeans still do not consume enough fruit and vegetables. The Eurostat [2019] data shows that one-third of the EU population do not consume any F&V during the day. The estimations prepared by Freshfel Europe show that in 2021, in the EU-27 countries, the daily consumption of F&V was 365 g/*per capita*/day. The value was higher compared to 2020 by over 2% (358 g/*per capita*/day) and by over 25% compared to the average of the five previous years. Poland was among the few EU-27 countries that met the WHO's recommendations (416 g/day/*per capita* in 2021). The earlier research done by Elżbietę Goryńską-Goldmann et al. [2003] showed that the level of economic development is an important factor influencing the consumption of F&V. Countries on relatively lower level of economic development, in terms of the consumers' income, are those that differ most significantly from the recommended consumption patter: "At least five portions of fruit and vegetables per day" and do not follow the model of sustainable consumption. The identified profiles of consumers and presented socio-economical features of different groups of consumers in the EU showed insufficient consumption of F&V and confirm that it is necessary to increase to consumers' awareness.

The FAO, IFAD, UNICEF, WFP, WHO report [FAO 2021a] shows that about 3 billion people cannot afford a healthy diet including F&V as well as the consumption of dairy products and protein-rich food. Too low consumption of F&V is a significant problem. It is estimated that about 14% of deaths caused by the gastrointestinal cancer, 11% of deaths caused by the ischaemic heart disease and about 9% of deaths due to the brain stroke are

[2] According to the WHO's recommendations, the amount of recommended F&V consumption varies depending on the age, sex and the level of physical activity of an individual person. The detailed recommendations, taking into account the age of the consumers, are as follows: 600 g of F&V for adults and youth (≥ 15 years old), 480 g of F&V for children aged 5-14, 330 g of F&V for children aged 0-4 [GNR 2021]. It is worth to highlight that the recommended minimum number of portions per day is 5, out of which 2 are fruit portions and 3 are vegetable portions (excluding potatoes, sweet potatoes, cassava and other starchy roots products). WHO informs that the optimal amount of F&V consumed depends on different factors, such as age, sex and physical activity. Because of that, the recommendations are aimed at adjusting every group that their individual nutritional needs.

a result of not sufficient consumption of such products [Willett et al. 2019]. According to a different report prepared by FAO and Ministry of Social Development and Family of Chile [FAO 2021b], the deficiency of F&V resulted globally in 3.9 million deaths in 2017. The results GBD 2017 Diet Collaborators [GBD 2019], Karen Lock et al. [2004], Carlijn Kamphuis et al. [2006], Emily Morgan [2009], Heiner Boeing et al. [2012], Marco Springmann et al. [2020], Annibale Cois et al. [2022], Bradley Ridoutt et al. [2022] and Simone Radavelli-Bagatini et al. [2022] show that a diet rich in F&V minimizes the risk of nutrient deficiencies, supports a healthy lifestyle and is beneficial in the treatment of obesity, cardiac diseases and diabetes. Fruit which are parts of reproductive plants contain a high level of sugars and oils. They are usually consumed as fresh products, snacks or ingredients of desserts or drinks. Vegetables are parts of plants (including leaves, fruit or unripe pods) that are consumed raw or cooked, added to salads or other spicy dishes. The common feature of such products are abundance of micro-elements and different forms, tastes and colours, adjusted to many different environments. The F&V biodiversity is a part of the biodiversity in farming, making the foundations for different food-production systems for the local and global economies and thus significantly improving the health and nutrition standards of people all around the world [Willett et al. 2019]. Apart from a positive influence on one's health, the diets rich in F&V and the diets rich in plants have an important influence on the climate through decreasing the environmental footprint [Clune et al. 2017, Mattsson et al. 2018, Fehér et al. 2020, Kwasek 2022]. The new scientific evidences confirm also the benefits of the diet rich in F&V in the treatment of COVID-19 and the changes in the nutritional patterns. The COVID-19 pandemic highlighted the role of such products in a diet, increasing the awareness of their nutritional value in Poland [Guzek et al. 2022, Dawid Rosiejka and Emila Korek 2022], Europe [Fanelli 2021, Madarász et al. 2022, Timpanaro et al. 2022] and in the whole world [Gorynia et al. 2021, Segovia et al. 2021, Kh'ng et al. 2022].

The EU implements a broad scope of initiatives in order to stimulate the consumption of F&V. It is also necessary to further stimulate the change of behaviour, education, products, investments in innovations and regulations concerning the food safety etc. [von Braun et al. 2023]. An important achievement in the context of increasing the consumption of those food products will be achieving by Poland and other UN countries the goals set out in the document: "Transforming our world: the 2030 Agenda for Sustainable Development" [UN 2015]. The goals connected to increasing the F&V consumption and achieving the sustainable F&V market are presented in the report FAO „Fruit and vegetables – your dietary essentials. The International Year of Fruits and Vegetables, 2021" [FAO 2020]. That report presents the actions and systematic approach that shall be undertaken in the F&V nutrition system in order to ensure the safety, better results and healthier diets for consumers.

Even the negative effects of too low consumption of F&V in the social and economic aspects only justify the need to carry out further research in order to undertake the necessary preventive steps. In the light of the effects of the COVID-19 pandemics, the identification of the size and diversity of the F&V consumption gains special importance, becoming the key element of refining the strategy promoting the increase in the consumption of those products. The importance of that issue is also expressed in the "Farm to Fork" strategy [COM2020/381, EC 2020], concerning the need to develop a sustainable consumption model. The article contributes to the theory of consumption by increasing the level of knowledge about the changes in the F&V consumption in Poland and other EU-27 countries. The aim of the research was to show the volume and diversity of F&V consumption in the EU-27 countries and to enhance the typology of countries based on the consumption pattern of those products.

MATERIAL AND METHODS OF RESEARCH

For the purposes of this paper, the data about the F&V consumption were gathered on the basis of the FAO food balances (FAOstat service). In order to eliminate any short-term deviations in the F&V consumption in the analysed countries, the research took into account the annual averages for the relevant periods, i.e. 2010-2012, 2013-2015, 2016-2018 and 2019-2021.

The analysis of the F&V consumption in the EU-27 countries in the 2010-2021 period allowed to prepare the typology of countries based on the consumption patterns. The taxonomic analysis using the Ward's method allowed to assess the diversity of the EU-27 countries, described with the use of some basic features. It leads to determining the groups of objects based on their development similarities, as well as to creating a unified objects' classes due to their characteristics [Wysocki 2010]. A multivariate analysis of the F&V consumption was carried out in the following steps: choosing the basic features for the research (4 features presenting the average, 3-year consumption volume of F&V for a given period), performing the normalisation of the basic features' values with the use of the classic standardisation and preparing the classification of the objects (27 EU countries) with the use of the Ward's method.

RESULTS

THE VOLUME OF FRUIT AND VEGETABLE CONSUMPTION IN POLAND AND THE EU-27 COUNTRIES

There are significant differences in the volume of the F&V consumption among Poland and other EU-27 (Table 1, Figure 1). The annual F&V consumption in Poland in the 2019-2021 period was 200.1 kg/*per capita* and was by 4.9% higher than in the 2010-2021 period. The highest F&V consumption volume was in Croatia (436.5 kg), then the Netherlands (342.8 kg), Belgium (327.3 kg) and Luxembourg (313.8 kg). The lowest F&V consumption volume was in Lithuania (162.6 kg), Slovakia (164.8 kg), Bulgaria (169 kg), Hungary (174.8 kg), Cyprus (184.0 kg), Latvia (193.2 kg) and Czech Republic (198.5 kg). The difference between the highest and the lowest F&V consumption volume was 273.9 kg/*per capita*. When we compare the volume of the annual consumption of F&V for the 2010-2012 period, we may notice that the highest increase in the consumption was in Croatia (111%) and then Bulgaria (43%), Belgium (39%), Bulgaria (43%) and Czech Republic (28%). Such countries as: Hungary, Slovenia and Germany noted an increase of or about 20%. In some countries, there was a decrease in the consumption volume: to -5% in Sweden, Portugal and Romania, to -10% in Luxembourg and below -15% in Mata (-17%), Greece (-19%) and Italy (-20%).

The annual consumption of fruit in Poland in the 2019-2021 period was 65.5 kg/*per capita* and was by 15.5% higher than in the 2010-2012 period. The highest fruit consumption volume was in the Netherlands (181.2 kg), Luxembourg (151.7 kg), Portugal (149.2 kg) and Greece (140.6 kg). The lowest fruit consumption volume was in Lithuania (59.3 kg), Latvia (63.7 kg), Poland (65.5 kg), Slovakia (70.6 kg) and Bulgaria (70.8 kg). The difference between the highest and the lowest volume of the annual consumption of fruit was 121.9 kg/*per capita*. In six of the EU-27 countries, there was a decrease in the fruit consumption volume. The biggest decrease – by over 44 kg – was in Luxembourg (the consumption decreased by 22.6%). In Italy, Croatia and Sweden there was a decrease by about 20%, while in Malta the consumption decreased by 7% whereas in Denmark it was only by 0.1%. The highest – by over 91% – increase in the consumption of fruit *per capita* between the 2010-2012 and the 2019-2021 period was in Belgium (increase in the consumption by 52.3 kg), then by about 40% in Bulgaria, Latvia, Romania and Lithuania.

The annual consumption for the 2019-2021 period in Poland was 134.6 kg/*per capita*, similarly to the 2010-2012 period. The highest increase in the consumption of vegetables was in Croatia (351.0 kg) and Belgium (217.6 kg), then – by about 150-160 kg – in Luxembourg (162.2 kg), the Netherlands (161.7 kg), Germany (159.7 kg), Romania (155.9 kg), Sweden (154.9 kg) and Austria (154.5 kg). The lowest, below 100 kg, consumption of vegetables was in only 4 out of 27 EU countries, i.e. in Hungary (88.3 kg), Slovakia (94.2 kg),

Table 1. The consumption of fruit and vegetables in the EU-27 countries in the 2010-2021 period

Country	Consumption [kg/*per capita*/year]											
	total				vegetables				fruit			
	2010-2012	2013-2015	2016-2018	2019-2021	2010-2012	2013-2015	2016-2018	2019-2021	2010-2012	2013-2015	2016-2018	2019-2021
Austria	257.7	254.4	248.6	272.0	142.9	138.3	137.6	154.5	114.9	116.1	111.0	117.5
Belgium	234.8	302.3	300.4	327.3	177.4	185.4	180.8	217.6	57.3	116.9	119.6	109.6
Bulgaria	118.0	132.4	155.8	169.0	68.4	73.4	95.8	98.2	49.6	59.0	60.0	70.8
Croatia	206.6	198.9	394.4	436.5	102.6	102.9	310.7	351.0	104.0	96.0	83.7	85.5
Cyprus	178.8	169.6	177.6	184.0	100.2	96.3	87.4	94.7	78.6	73.2	90.2	89.2
Czech Republic	154.6	157.1	176.9	198.5	85.0	89.7	99.2	107.4	69.7	67.5	77.7	91.2
Denmark	262.0	242.7	251.3	262.3	148.8	133.2	141.9	149.3	113.2	109.5	109.4	113.0
Estonia	207.7	228.2	232.2	220.6	131.8	140.5	139.1	132.2	75.9	87.7	93.1	88.4
Finland	210.2	216.6	217.5	223.9	103.0	106.4	109.2	113.0	107.3	110.2	108.3	110.9
France	211.9	209.6	234.6	232.5	110.1	107.5	117.6	113.9	101.8	102.2	117.0	118.7
Germany	220.4	230.5	238.7	261.9	128.3	131.0	138.0	159.7	92.1	99.4	100.6	102.1
Greece	362.9	308.0	270.2	293.7	234.3	188.1	159.8	153.2	128.6	119.8	110.5	140.6
Hungary	145.8	159.0	162.0	174.8	81.6	87.9	90.7	88.3	64.1	71.0	71.2	86.5
Ireland	268.0	289.6	296.1	279.1	133.0	132.0	125.5	141.5	135.0	157.7	170.6	137.6
Italy	298.1	272.1	262.9	237.9	147.0	136.2	134.5	108.6	151.1	135.9	128.4	129.2
Latvia	169.5	191.6	199.4	193.2	124.1	141.8	144.3	129.5	45.4	49.8	55.1	63.7
Lithuania	147.8	146.8	163.5	162.6	104.4	99.7	103.8	103.3	43.3	47.2	59.7	59.3
Luxembourg	340.8	331.5	317.8	313.8	144.7	139.1	140.7	162.2	196.1	192.4	177.1	151.7
Malta	282.9	284.1	277.5	234.2	193.2	198.6	190.1	150.7	89.7	85.5	87.4	83.5
Netherlands	305.3	356.0	381.0	342.8	139.7	162.8	183.0	161.7	165.6	193.2	198.0	181.2
Poland	190.7	183.4	201.4	200.1	134.0	124.9	137.9	134.6	56.7	58.5	63.5	65.5
Portugal	279.3	267.1	277.2	266.6	158.9	146.9	142.5	117.4	120.4	120.3	134.7	149.2
Romania	276.4	284.0	298.2	271.2	194.6	198.2	199.2	155.9	81.7	85.7	99.1	115.3
Slovakia	144.3	125.5	136.9	164.8	86.6	69.7	75.9	94.2	57.7	55.8	61.0	70.6
Slovenia	217.6	230.6	246.7	269.9	91.7	101.0	112.9	143.7	125.9	129.6	133.8	126.1
Spain	215.6	213.7	246.5	216.0	129.8	125.0	130.6	104.0	85.8	88.8	115.9	112.1
Sweden	256.9	260.5	248.2	254.6	137.0	140.8	141.2	154.9	119.9	119.7	107.0	99.7

Source: own compilation based on the FAOstat data

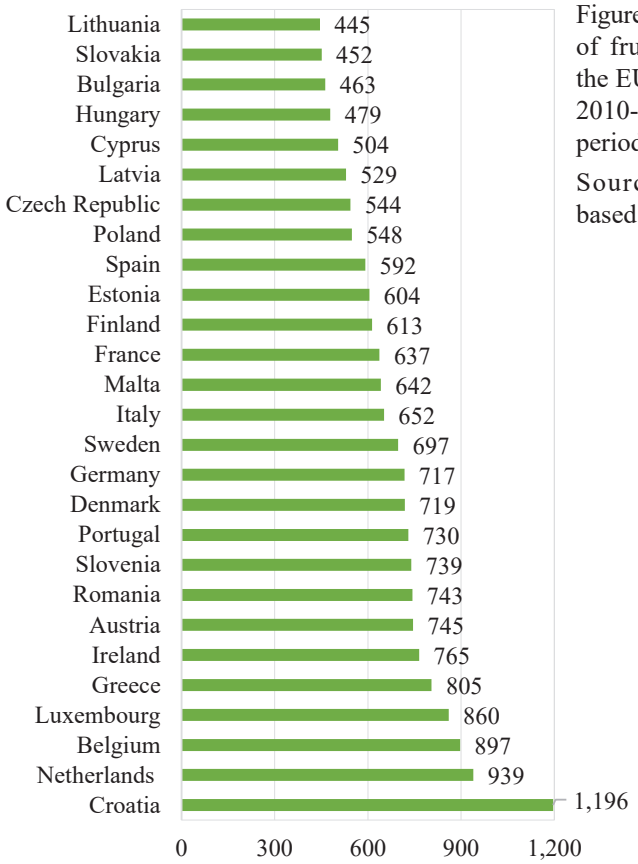

Figure 1. Daily consumption of fruit and vegetables in the EU-27 countries for the 2010-2012 and 2019-2021 period in g/*per capita*

Source: on compilation based on the FAOstat data

Cyprus (94.7 kg) and Bulgaria (98.2 kg). The difference between the highest and the lowest volume of the annual consumption of vegetables was 262.7 kg/*per capita*. For the analysed period, the decrease in the consumption of fruit and vegetables was observed in eight EU-27 countries and the biggest decrease – by 81.1 kg was observed in Greece (the consumption decreased by 35%), Portugal, Malta and Italy (the consumption decreased by almost 22%-26%). The highest, by over 240%, increase in the consumption of vegetables *per capita* between the 2010-2012 and 2019-2021 periods was in Croatia. The increase by almost 57% took place in Slovenia, by 44% in Bulgaria and by approximately 25% in Belgium, Czech Republic and Germany.

In the light of the data presented, we may conclude that in Poland the F&V consumption level for the 2019-2021 period was consistent with the WHO's recommendations and amounted to 548 g/*per capita*/day. In the other EU-27 countries, the consumption of F&V also was no lower than the recommendations, i.e. 400 g/*per capita*/day what means that the WHO's recommendations on the F&V consumption were met. The compliance with

the WHO's recommendations (400 g/*per capita*/day of F&V) was also confirmed in the research by Mariola Kwasek [2022] and the estimation from the report by Freshfel Europe. Nevertheless, the report showed that the daily consumption of F&V in Poland in 2021 was 419 g/*per capita*. That recommendation, apart from Poland, was also met by Portugal, Belgium, Romania, Greece and Italy. The highest average consumption of F&V in the EU-27 countries, exceeding 500 g/day/*per capita*, was in 2021 in Portugal (539 g/day/*per capita*), Belgium (531 g/*per capita*/day) and Romania (526 g/*per capita*/day). In Greece, in 2021, the average consumption of F&V was 463 *g/per capita*/day, in Italy it was 431 g/*per capita*/day and in Spain it was 416 g/*per capita*/day. In over a half of the EU-27 countries, the average consumption of F&V was below 300 *g/per capita*/day. The lowest daily consumption of F&V was in Sweden (253 g/*per capita*), Finland and Croatia (252 g/*per capita*), Czech Republic (251 g/*per capita*), Ireland (249 g/*per capita*) and Slovakia (216 g/*per capita*). There difference in the average F&V consumption between the extreme countries, i.e.: Portugal and Slovakia, was 2.5 and between Portugal and Poland it was 1.3.

It is worth noticing that the COVID-19 pandemic, despite posing a threat to people, increasing the worries concerning health and disturbing the goals of sustainable development concerning the wealth, had also some positive effect on the goals of the sustainable consumption. The trend of the increasing consumption of F&V was also noted in the Freshfel Europe report, showing that it is a significant element of the positive direction of changes. That change can be connected to the informed decisions of consumers who, being influenced by some experiences connected to the pandemics, have started strengthening their immune system, as well as valuing healthy eating habits and the benefits of the F&V consumption for the environment.

EU-27 COUNTRIES WITH A SIMILAR VOLUME OF FRUIT AND VEGETABLES CONSUMPTION

Based on the presented volume of F&V consumption among the EU-27 countries, it is hard to point to which level they are similar or differ from one another. It is possible to discern major differences between objects by comparing boxplot characteristics, like minimum data point, 1st quartile (Q 25%), 2nd quartile, median, mean, 3rd quartile (Q 75%), 4th quartile and maximum data point. In such a visual form, the outliers are easy to identify as they are marked with the circles (Figure 2).

Hierarchical clustering is the most common statistical technique in which clusters are formed sequentially by starting with the most similar pair of samples and forming higher clusters step-by-step. Hierarchical agglomerative CA was performed on the mean-centered dataset by means of the Wards method, using Euclidean distances as a measure of similarity. This method uses the analysis of variance approach to evaluate the distance

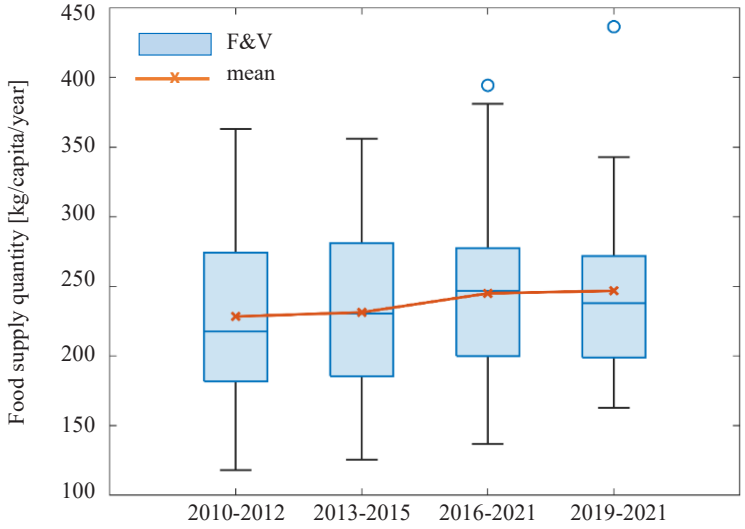

Figure 2. The comparison of the average F&V consumption in the researched countries (objects) in the 2010-2021 period

Source: own estimation based on Eurostat data

between clusters, attempting to minimize the sum of squares of any two clusters that can be formed at each step [Wysocki 2010].

The analysis of the F&V consumption level in the EU-27 countries, based on the FAOstat data in the 2010-2021 period, allowed to prepare the typology of countries based on their consumption patterns. The 27 analysed objects (EU-27 countries) were characterized by diagnostic variables (the volume of the F&V consumption).

The analysis of the clusters allowed to create a dendrogram (Figure 3), in which all the 27 EU countries were grouped into four, statistically significant in terms of similarities, clusters. The typological groups are characterised by similar patterns within clusters and differ between them:

- group I – represented by Poland, Latvia, Czech Republic, Cyprus, Lithuania, Hungary, Slovakia and Bulgaria; the volume of the F&V consumption in those countries in the 2010-2012 period was 156.2 kg/*per capita*/year and in the 2019-2021 period – 180.9 kg/*per capita*/year;
- group II – represented by Malta, Italy, Portugal, Romania, Ireland, Luxembourg, Greece, the Netherlands and Belgium; the volume of the F&V consumption in those countries in the 2010-2012 period was 294.3 kg/*per capita*/year and in the 2019-2021 period – 285.2 kg/*per capita*/year;

– group III – represented by Spain, France, Finland, Estonia, Slovenia, Germany, Sweden, Denmark and Austria; the volume of the F&V consumption in those countries in the 2010-2012 period was 228.9 kg/*per capita*/year and in the 2019-2021 period – 246 kg/*per capita*/year;
– group IV – represented by only one country – Croatia that significantly differs from the characteristics of all the abovementioned groups; there was an increase of the average annual consumption of F&V from 206.6 kg/*per capita* in the 2010-2012 period to 436.5 kg/*per capita* in the 2019-2021 period; there was a step change in the consumption volume.

We may notice that Croatia differs from other EU-27 countries. The F&V consumption in Croatia during the 2019-2021 period was much higher than during other analysed periods (Table 1, Figure 3).

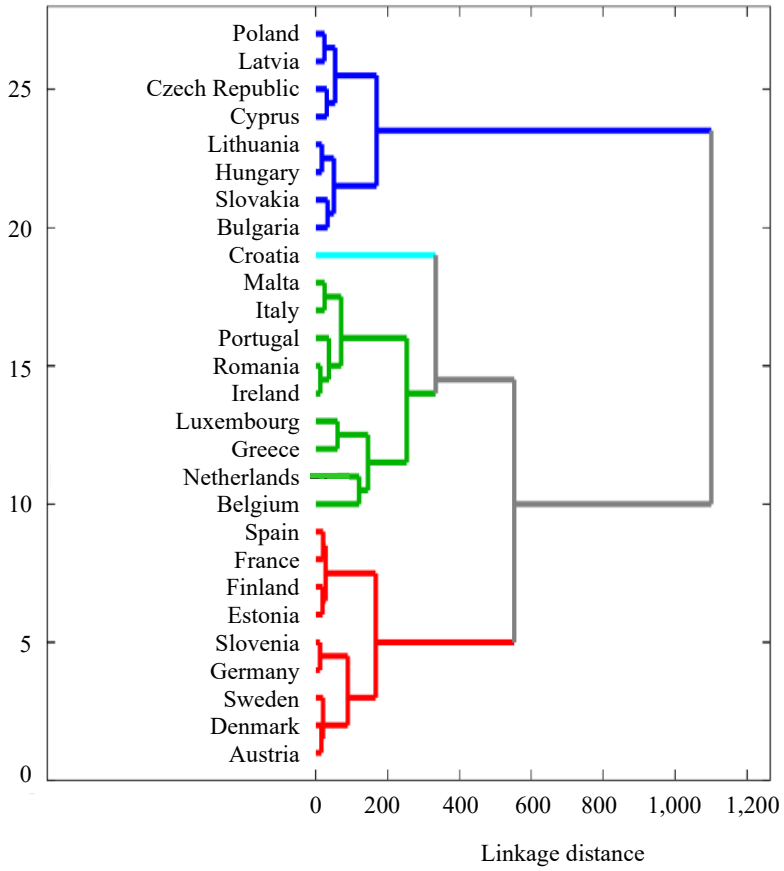

Figure 3. Dendogram of the consumption patterns for fruit and vegetables in the EU-27 countries
Source: Author's estimation based on the Eurostat data

The distribution of the F&V consumption volumes in the EU-27 countries that are part of the clusters lead to conclusions that the best situation, in terms of meeting the WHO's recommendations (400 g/*per capita*/day, i.e. about 150 kg/*per capita*/year) is in the societies belonging to the II, III and IV clusters (groups). They are characterised by the highest consumption of fruit and vegetables. The structure of the clusters of all 4 groups shows that no society of the EU-27 countries has any problems with meeting the WHO's recommendations. The relatively worst situation is in Poland, Latvia, Czech Republic, Cyprus, Lithuania, Hungary, Slovakia and Bulgaria. Those countries are characterised by the lowest volume of the F&V consumption among the EU-27 countries. It is worth noticing that the differences in the F&V consumption volumes among the European countries are largely caused by economic and non-economic factors (including geographical factors) what was proven in other papers of Elżbiety Goryńskiej-Goldmann et al. [2023], as well as in the research done by Tonje Holte Stea et al. [2020], Mariola Kwasek [2022] and Anna Murawska [2023]. According to the FAOstat statistics, the higher consumption of F&V can be noticed in the countries of the Western Europe. A significant meaning has also the level to which the consumption of F&V in the EU-27 countries may rise. In order to determine it, the consumption saturation shall be taken into account.

THE REASONS OF THE LOW FRUIT AND VEGETABLES CONSUMPTION

The problem of the low F&V consumption demands the identification of its causes, introduction of standards and shaping of the pro-health policy, balanced diet and the proper consumption of fruit and vegetables, what lies within the responsibility of FAO, WHO, EFSA (European Food Safety Authority) and, outside of the EU and UN, national and international organisations, such as International Alliance of Associations and Movements 5 a day – AIAM5. The problem may be not sufficient availability of fruit and vegetables (in almost every part of the world) to meet the daily demand. In some parts of the world there are not enough fresh fruit and vegetables, especially in the countryside [FAO 2020]. Fruit and vegetables are highly perishable compared to other categories of products, i.e. grains, some processed meat and dairy products. The information provided by WHO [2022] confirms that fresh fruit and vegetables compared to other categories of food are much more often involved in incidents concerning the food safety, including the microbiological threats. Moreover, the F&V products are often more expensive than processed and highly processed food what also may discourage customers from buying them [Stanisławska and Głowicka-Wołoszyn 2015, Smoluk-Sikorska 2023]. Áron Török et al. [2023] pointed out that fresh F&V are luxurious goods, and the role of the price, as a single attribute, is often assessed with other features of F&V. Different F&V products

have different levels of nutrients and taking care of their diversity is time consuming, so it causes a problem for many people, as we often do not have enough time to prepare healthy meals. Fresh products are beneficial for both consumers and the whole food system. For example, the F&V sector helps to increase the biological diversity, creating a sustainable environment and improving the sources of income for farmers and people performing works related to the value chains [WHO 2020]. In their choices, the customers are often more willing to choose faster and easier options. A significant influence have also taste preferences, as some consumers may not like the taste or texture of F&V and thus avoid them in their diet [Stangierska et al. 2022, Török et al. 2023]. The research performed by Tonje Holte Stea et al. [2020] and Elżbieta Goryńska-Goldmann et al. [2023] show that not everybody is aware of the health benefits of the regular F&V consumption and meeting the recommendations by WHO. Moreover, many producers and advertisers still, alongside with F&V, promote highly-processed food that is often unhealthy and in such way influence the decisions made by consumers [FAO 2023].

CONCLUSIONS

The research allowed to present the scale of F&V consumption in Poland and other EU-27 countries, showing huge disproportions between countries, especially between Croatia, the Netherlands, Belgium and Luxembourg, as well as Czech Republic, Latvia, Cyprus, Hungary, Bulgaria, Slovakia and Lithuania. The annual F&V consumption in the 2019-2021 period in Poland was 200.1 kg/*per capita* and was by 5% higher than in the 2010–2021 period. Noticeable changes in the consumption of F&V in the 2019–2021 period compared to the 2010–2012 period took place in Croatia, Belgium, Bulgaria, Czech Republic, Hungary, Slovenia and Germany. In the 2019–2021 period, in six of the EU-27 countries, the consumption of fruit decreased: Luxembourg, Italy, Croatia, Sweden, Malta and Denmark. The same thing happened to the consumption of vegetables in eight countries: Greece, Italy, Portugal, Malta, Spain, Romania, Cyprus and Lithuania.

The Polish society, in terms of its F&V consumption volume in the macro-economic scale, was most similar to many societies of the Central Europe (i.e. Latvia, Czech Republic, Lithuania, Hungary, Slovakia and Bulgaria) as well as to the society of Cyprus (in those countries, in the 2010-2012 period, the F&V consumption volume was 156.2 kg/*per capita*/year, and in the 2019-2021 period, the consumption volume was 180.9 kg/*per capita*/year). The biggest differences were noticed in relation to the societies of Malta, Italy, Portugal, Romania, Ireland, Luxembourg, Greece, the Netherlands, Belgium and Croatia.

Currently, the consumption of F&V in Poland, as well as in the other EU-27 countries, is in compliance with the WHO's recommendations. In Poland, the F&V consumption level in the 2019-2021 period was 548 g/*per capita*/day. Nevertheless, any interpretations shall be done carefully, as the data presented in this paper show the volume of the F&V consumption and do not include the number of portions per day and the frequency of the F&V consumption (what refers to a different WHO's recommendation, i.e. "At least five portions of fruit and vegetables per day").

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KONSUMPCJA OWOCÓW I WARZYW W POLSCE W KONTEKŚCIE PAŃSTW UNII EUROPEJSKIEJ (UE-27)

Słowa kluczowe: owoce i warzywa, konsumpcja, UE-27, typologia, wzorzec konsumpcji

ABSTRAKT. Celem artykułu jest ukazanie poziomu i zróżnicowania konsumpcji owoców i warzyw w 27 krajach UE w latach 2010-2021. Dokonano typologii krajów według wzorca konsumpcji tych produktów. Dane o konsumpcji owoców i warzyw w UE-27 zaczerpnięto z bilansów żywnościowych FAO. Z analizy danych wynika, że poziom tej konsumpcji w krajach UE-27 w analizowanym okresie był zróżnicowany. Roczna konsumpcja owoców i warzyw w latach 2019-2021 w Polsce wynosiła 200,1 kg/na mieszkańca i była o 5% wyższa niż w latach 2010-2012. Znaczące dysproporcje w poziomie konsumpcji owoców i warzyw wystąpiły pomiędzy takimi krajami, jak: Chorwacja, Holandia, Belgia i Luksemburg a Republika Czeska, Łotwa, Cypr, Węgry, Bułgaria, Słowacja i Litwa. Wyraźne zmiany w poziomie konsumpcji owoców i warzyw, które zaszły w latach 2019-2021 w stosunku do okresu 2010-2012, można dostrzec w Chorwacji, Belgii, Bułgarii, Republice Czeskiej, a następnie na Węgrzech, w Słowenii i Niemczech. W latach 2019-2021 zmniejszyło się spożycie owoców w 6 krajach UE-27: Luksemburgu, Włoszech, Chorwacji, Szwecji, Danii i na Malcie, a warzyw w 8 krajach: w Grecji, Włoszech, Portugalii, na Malcie i Cyprze, w Hiszpani, Rumuni i na Litwie. Obecnie poziom konsumpcji owoców i warzyw we wszystkich krajach UE-27 koresponduje z zaleceniami żywieniowymi WHO. Społeczeństwo polskie z poziomem konsumpcji owoców i warzyw w skali makroekonomicznej było najbardziej podobne do społeczeństw Europy Środkowej (Łotwy, Republiki Czeskiej, Litwy, Węgier, Słowacji i Bułgarii) oraz Cypru (w tych państwach w latach 2019-2021 rocznie konsumowano 180,9 kg owoców i warzyw na mieszkańca).

AUTHOR

ELŻBIETA GORYŃSKA-GOLDMANN, PHD
ORCID: 0000-0002-0884-4772
Poznań University of Life Sciences, Poland
Department of Economics and Economics Policy in Agribusiness
e-mail: gorynska-goldmann@up.poznan.pl

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