

HEALTH AS ONE OF THE GOALS OF THE AGENDA 2030. POLAND IN COMPARISON WITH EU COUNTRIES

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Abstract: *2030 Agenda for sustainable development* is a plan of world development that assumes elimination of poverty, decent life for all the people and ensuring peace by 2030. Health issues are one of the essential objectives of Agenda 2030. The purpose of the paper is to evaluate the position of Poland in comparison with the European Union states with respect to selected indices of health condition and health care, as well as to test, with the use of taxonomic methods, which European Union states are similar in terms of health protection. The analysis of the basic health and health care indices shows considerable diversity among European countries with respect to the residents' health situation, size of expenditures on health care or the number of medical staff. Conducted analysis shows that in 2017 most European Countries (15 out of 28) were countries of high and moderate level of health situation and health care. In the ranking of EU countries analysed with respect to the level of health condition and health care, in 2017 the leading positions were occupied by Sweden, Finland, Holland, Ireland and Spain, whereas Latvia, Romania, Lithuania, Bulgaria, Croatia and Hungary were at the end of the list.

Keywords: 2030 Agenda, public health, European Union, Poland.

1. Introduction – 2030 Agenda

Between 25th and 27th September 2015, the summit of 2030 Agenda for Sustainable Development was held at the UN headquarters in New York. There were over 100 heads of states and governments, as well as representatives of religious groups, business and civil society participating in the event. They adopted a document entitled "*Transforming our World: the 2030 Agenda for Sustainable Development*". The Agenda includes 17 Goals of Sustainable Development (SDG) and 169 target values that world countries should strive towards. Among the goals of Agenda 2030, one (target 3) concerns the sphere of health:

Goal 3: Ensure healthy lives and promote well-being for all at all ages.

The goal of all the countries (both developed and developing countries, as well as international organisations of these countries) is to reduce poverty in the world through undertaking joint efforts in three areas of sustainable development, i.e. social, economic and environment protection. It is important to efficiently implement actions oriented on improvement of the quality of life through growth in prosperity, with continuous care about the condition of the natural environment and sustainable management of resources. Implementation of the provisions of 2030 Agenda and its goals represents pro-development actions that will allow for formation of sustainable future with respect for the present and future generations.

In further part of the case study, the goal of 2030 Agenda that concerns health and ensuring healthy lives and promoting well-being for all the people is analysed. Its achievement is especially associated with actions supporting reduction of health problems (eradication of many diseases) and reduction of mortality rate.

Specialists in the area of demography pay special attention to the ongoing process of population ageing. Demographic projections predict the growth of the share of people of retirement age in Poland from 15.7% in 2007 to 33.8% in 2050 (Kubiak, 2010). Both with respect to life expectancy and healthy life years, Poland is still far from most of the EU countries. Despite achieved economic development and increase of the level of life of the population, life expectancy of both men and women in Poland was shorter than the average in the EU. In 2017 in Poland, healthy life years reached 63.5 years for women, which represented 78% of their life expectancy. On the other hand, in 2017 healthy life years for men reached 60.6 years which represented almost 82% of their life expectancy. Thus, in 2017, the difference between life expectancy for women and men was less than 8 years; whereas the difference between healthy life expectancy for women and men was almost 3 years. In 2017, the mean healthy life expectancy for women in Poland was by 11.3. years longer than the lowest rate reported in Latvia (52.2 years) and by 10 years shorter in comparison with the highest rate, reported for the residents of Malta (73.6 years). In the case of men, healthy life expectancy was by 10 years longer than in Latvia (the lowest rate among the EU member states – 50.6 years) and by 12.6 years shorter than the mean life expectancy in Sweden – 73.2 years (the highest rate among EU member states). There are usually differences between healthy years of life between women and men in favour of women, which is the result of high mortality rate among men (Denmark, Luxembourg, Austria, Portugal, Romania, Finland, Sweden, Slovenia and Great Britain are exceptions here).

Elderly people (i.e. people aged 65 and more) constituted in 2018 (the latest statistical data available on Eurostat webpage were for this year) in Poland over 17% of the total population (as compared to 2007 – 13.4%), whereas the average for the whole European Union reached almost 20% (as compared to 2007 – 17%).

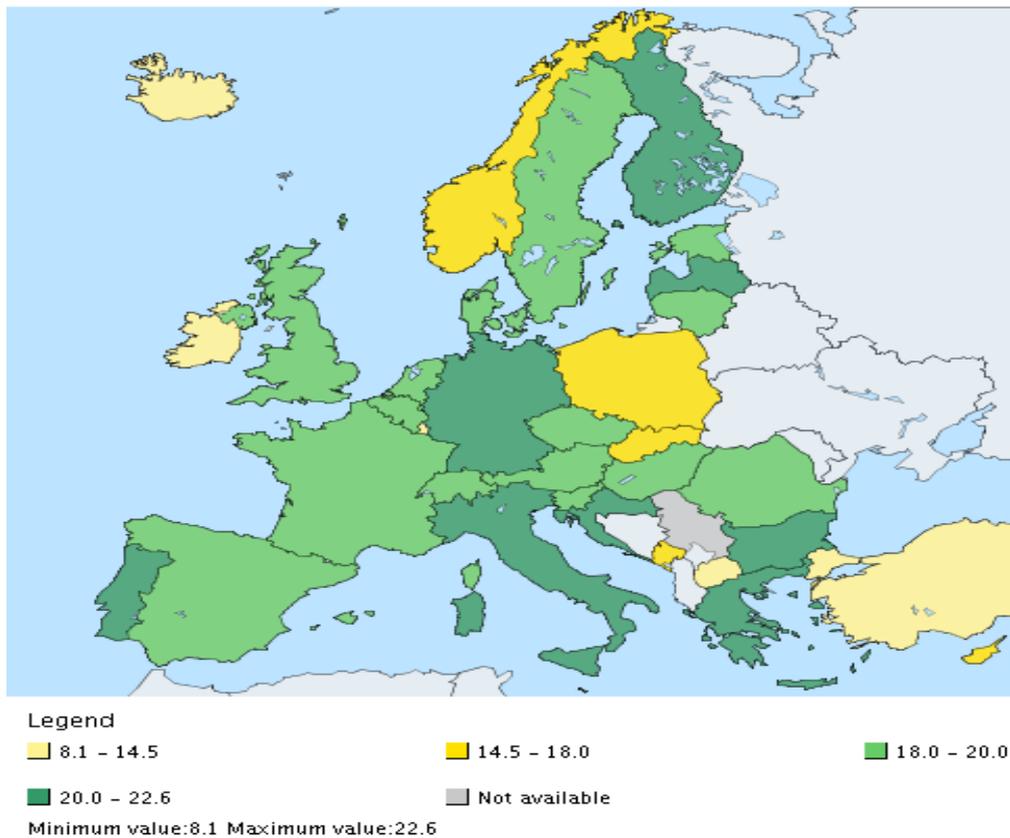


Figure 1. Proportion of population aged 65 and over (% of total population) in EU countries in 2018. Source: own study on the basis: Eurostat <http://ec.europa.eu/eurostat/data/database>, 15.07.2019.

Eurostat data show that in 2018 the highest rate of elderly people was reported in Italy (people aged 65 and over constituted almost 22.6% of the population), in Greece (around 22%), in Germany, Finland and Portugal (around 21.5%). The lowest rate of elderly people was observed among residents of Ireland (around 14%), Luxembourg (14.3%), Slovakia (15.5%) and Cyprus (around 16%). The process of population ageing is most apparent and intense in the Southern and Western Europe, where around 1/5 of residents were people of elderly age (which is shown in data in Figure 1).

Therefore, it can be supposed that in the future the demand on medical services provided by doctors specialised in treating elderly people and places in care and nursing centres (sanatoriums and hospices) will grow. Thus, it is important to perform regular analyses concerning health condition and health care of the residents of the European Union states, so that the situation in this sphere is continuously monitored.

The main goal of the paper is to evaluate the position of Poland in comparison with European Union states with respect to selected indices of health condition and health care, as well as to create, on the basis of Z. Hellwig's measure of development, a ranking of studied countries that will enable to determine which European Union countries are best developed and which are least developed with respect to indices showing expenditures, real resources of health care and effects of the health care system.

2. Research objective, subject and methods

The goal of the paper is to evaluate the position of Poland in comparison with European Union states with respect to selected indices of health condition and health care. European Union states will be divided with the use of Z. Hellwig's measure of development and selected rates available on Eurostat website, into typological groups of countries that are similar in terms of health situation and health care. The research period is 2017.

In this research, the level of development of the health care system will be characterised with the use of Z. Hellwig's synthetic taxonomic measure of development (Grabiński et al. 1989; Warzecha, 2009; Szkutnik et al., 2015) that enables to order the studied objects (states) with respect to the analysed phenomenon.

Diagnostic variables included in the study should be standardised (because the variables occurring in the research are expressed in various measurement units, thus they cannot be directly aggregated) according to the formula, while applying the following standardisation method:

$$Z_{ij} = \frac{x_{ij} - \bar{x}_j}{s_j} \quad (1)$$

where:

z_{ij} – standardised values of j-variable in i-state,

x_{ij} – empirical values of j-variable in i-state,

\bar{x} – arithmetic mean of j-variable,

s_j – standard deviation of j-variable.

Then the values for model object, i.e. the one that takes the most desired values of the studied variables, should be determined. In the next stage, while applying Euclidean distance, the distance of a given object from the model object should be calculated according to formula 2:

$$d_{i0} = \sqrt{\sum_{i=1}^n (z_{ij} - z_{0j})^2} \quad (2)$$

where:

d_{i0} – distance of i-object from the model,

z_{ij} – standardised value of j-variable for i-object,

z_{0j} – standardised value of the model for j-variable.

Then, Z. Hellwig's measure of development, Z_i , will be calculated according to formula 3 and 4:

$$Z_i = 1 - \frac{d_{i0}}{d_0} \quad (3)$$

$$d_0 = \bar{d}_0 + 2S_0 \quad (4)$$

where:

Z_i – measure of development of i-state,

d_{i0} – distance of i-object from the model,

\bar{d}_0 – arithmetic mean of distances of objects from the model,

S_0 – standard deviation from distance of objects from the model.

Z. Hellwig's measure takes the values from the range [0;1]; a higher value of the measure represents a better situation of a given object (state) in terms of the analysed phenomenon.

On the basis of values of the taxonomic measure of development, studied objects (states) can be grouped into homogenous classes (i.e. of similar level of development). The studied countries of the European Union will be divided into four typological groups according to the method of three means (Młodak, 2006):

- class I – high level of health situation and health care when $z_i > \bar{z}_{li}$
- class II – moderate level of health situation and health care when $\bar{z}_i < z_i \leq \bar{z}_{li}$
- class III – low level of health situation and health care when $\bar{z}_{2i} < z_i \leq \bar{z}_i$
- class IV – very low level of health situation and health care when $z_i \leq \bar{z}_{2i}$

where:

\bar{z}_i is the mean of the measure of development,

\bar{z}_{li} , \bar{z}_{2i} are indirect means of the values of measures of development.

3. Research results

The levels of health situation and health care of the European Union residents are characterised with the use of variables describing their various aspects, while selected indices are used to monitor goal 3 of 2030 Agenda and are available on Eurostat websites. The research period is 2017. Table 1 shows potential diagnostic variables used to evaluate the health condition together with their statistical descriptions (in the table, variables that are stimulants are marked with S and destimulants with D symbol). Destimulants were changed into destimulants and, while taking into consideration substantive premises and statistical data availability for all studied 28 EU countries (it was checked whether the variables have appropriate variability – coefficient of variation Vs over 10%) variables x_2 , x_{13} , x_{14} were removed from the group of potential variables. As data included in Table 1 show, the studied EU countries were most diversified with respect to self-reported unmet need of medical examination and care; incidence of tuberculosis among men and women, as well as maternal mortality per 100 thousand live births.

After standardising the variables, taxonomic measure of development, Z. Hellwig's synthetic measure (Z_i) was calculated. On the basis of data included in Table 2 and in Figure 1 it can be seen that in the ranking of the European Union states studied in terms of health situation and health care in 2017 – the leading positions were occupied by Sweden, Finland and Holland, whereas Latvia, Romania and Lithuania were at the end of the list.

Table 1.

Potential diagnostic variables for the evaluation of the health situation and health care system in EU countries and their description

Variable symbol and name	Average	Vs in %
	2017	2017
X ₁ - Self-reported unmet need for medical examination and care /(D)	2.52	109.2
X ₂ - Overweight by body mass index /(D)	54.31	9.3
X ₃ - People killed in accidents at work (the number of fatal accidents per 100,000 persons in employment) /(D)	1.89	49.95
X ₄ - The proportion of the population who declare that they are affected either by noise from neighbours or from the street /(D)	15.98	31.42
X ₅ - People killed in road accidents (the number of fatal accidents per 100,000 persons in employment) /(D)	5.36	35.25
X ₆ - Exposure to air pollution by particulate matter** /(D)	14.07	38.7
X ₇ - Death rate due to chronic* diseases in males /(D)	176.55	44.06
X ₈ - Death rate due to chronic diseases in females /(D)	93.31	27.42
X ₉ - Percentage of smoking males aged 15 and more /(D)	31.21	29.80
X ₁₀ - Percentage of smoking females aged 15 and more /(D)	20.82	25.42
X ₁₁ - Incidence of tuberculosis in males (per 100,000) /(D)	4.31	91.60
X ₁₂ - Incidence of tuberculosis in females (per 100,000) /(D)	1.74	72.86
X ₁₃ - Healthy life years and life expectancy at birth – males /(S)	77.2	4.50
X ₁₄ - Healthy life years and life expectancy at birth - females	82.9	2.50
X ₁₅ - Self-perceived health by level of perception % of population Very good or good /(S)	67.15	14.91
X ₁₆ - Obesity rate by body mass index /(D)	16.65	20.24
X ₁₇ - Healthy life years at 65 – females /(S)	61.92	11.75
X ₁₈ - Healthy life years at 65 – males /(S)	61.52	10.32
X ₁₉ - Expenditure on health in % of GDP /(S)	8.4	20.42
X ₂₀ - Practising physicians per 100,000 inhabitants /(S)	228.38	34.81
X ₂₁ - Nurses and midwives per 100,000 inhabitants /(S)	522.55	53.83
X ₂₂ - Maternal mortality (per 100,000 live births) /(D)	8.43	67.00
X ₂₃ - Neonatal mortality (per 1,000 live births) /(D)	2.39	34.91
X ₂₄ - Under 5 mortality (per 1,000 live births) /(D)	4.2	37.19

* - Chronic diseases included in the indicator are malignant neoplasms, diabetes mellitus, ischaemic heart diseases, cerebrovascular diseases, chronic lower respiratory diseases and chronic liver diseases.

** - The indicator measures the population weighted annual mean concentration of particulate matter at urban background stations in agglomerations. Fine particulates (PM_{2.5}) are those whose diameters are less than 2.5 micrometres. Their deleterious health impacts are more serious than PM₁₀ as they can be drawn further into the lungs and may be more toxic.

Source: own study on the basis: Eurostat <http://ec.europa.eu/eurostat/data/database>, 10.07.2019, <http://ec.europa.eu/eurostat/data/database>.

On the basis of Z. Hellwig's measure of development, 4 typological groups of diverse level of health situation and health care were identified.

Class I – i.e. the countries of the highest level of health situation and health care include Sweden, Finland, Holland, Ireland and Spain. This group of countries is characterised by significantly higher values than the EU mean of such rates as subjective evaluation of the health condition of the population (good or very good condition); expenditures on health in % GDP; the number of doctors per 100 thousand people and the number of nurses and midwives per 100 thousand people. This group of countries is also characterised by remarkably lower values than the EU mean of such indices as incidence of tuberculosis among men and women; maternal mortality (per 100 thousand live births); infant mortality (per 1,000 live births) and mortality below the age of 5 (per 1,000 live births).

Class II, i.e. the class of moderate level of health situation and health care includes the biggest number of EU countries. They are United Kingdom, Denmark, Germany, Cyprus, Belgium, Luxembourg, Italy, Czech Republic, Austria and Malta. This group of countries is characterised by higher values than the EU mean of such indices as the rate of people who declare that they are affected by the noise from the neighbours or streets; the rate of obese people and the number of nurses and midwives per 100 thousand people. But this group of countries is also characterised by significantly lower values than the EU mean of self-reported unmet need of medical examination and care.

Class III – of low level of health situation and health care includes France, Greece, Slovakia, Slovenia, Estonia, Portugal and Poland. This group of countries is characterised by significantly higher values than the EU mean of such rates as self-reported unmet need of medical examination and care, and the rate of smoking women aged 15 and more.

The last – class IV of the lowest level of health situation and health care includes Bulgaria, Hungary, Croatia, Lithuania, Romania and Latvia. This group of countries is characterised by considerably higher values than the EU mean of majority of indices, especially such as fatal accidents at work; number of people killed in road accidents; death rate due to chronic diseases in females and males; percentage of smoking males aged 15 and more; incidence of tuberculosis among females and males; maternal mortality (per 100 thousand live births) and neonatal mortality (per 1,000 live births). But this group of countries is also characterised by significantly lower values than the EU mean of the values of subjective evaluation of people's health situation as % of population (good or very good situation); expenditures on health in % GDP; the number of doctors per 100 thousand people and the number of nurses and midwives per 100 thousand people.

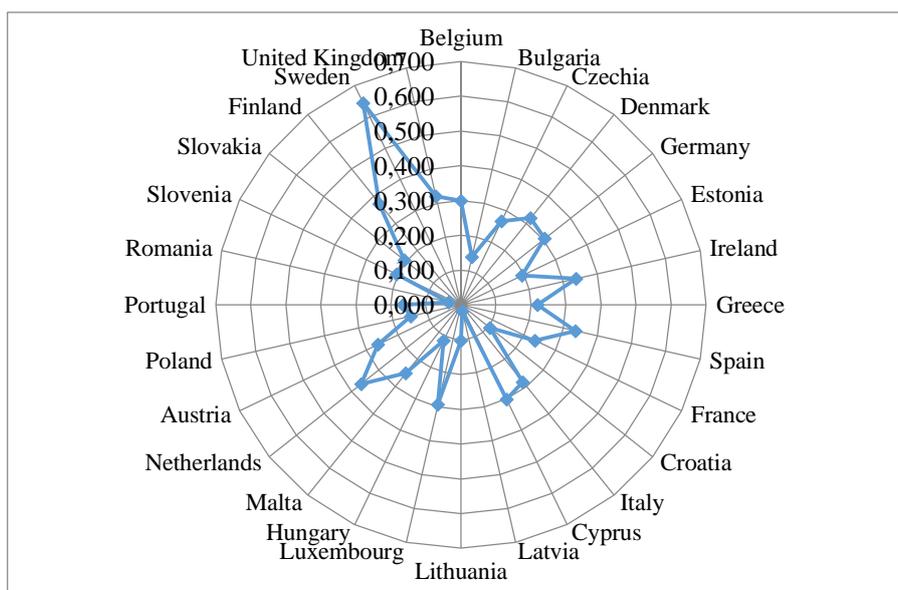


Figure 1. Z. Hellwig's measure of development in 2017. Source: own calculations using data from Eurostat and Excel, <http://ec.europa.eu/eurostat>, 17.07.2019.

Table 2.

The values of Z. Hellwig's (Z_i) synthetic measure for European Union states in 2017 as divided into typological groups (from class I – the lightest grey to class IV – the darkest grey)

2017			2017		
Country	Z_i	Rank	Country	W_i	Rank
Sweden	0.644	1	Sweden	96.7	1
Finland	0.372	2	Finland	96.5	2
Netherlands	0.364	3	Netherlands	95.4	3
Ireland	0.337	4	Luxembourg	95.3	4
Spain	0.335	5	Australia	95.3	5
United Kingdom	0.320	6	Denmark	95.1	6
Denmark	0.320	7	Ireland	94.5	7
Germany	0.306	8	Germany	94.1	8
Cyprus	0.302	9	Spain	93.8	9
Belgium	0.300	10	United Kingdom	93.3	10
Luxembourg	0.293	11	Belgium	93.1	11
Italy	0.284	12	France	92.9	12
Czech Republic	0.267	13	Italy	92.4	13
Austria	0.263	14	Malta	92.0	14
Malta	0.252	15	Slovenia	91.8	15
France	0.234	16	Czech Republic	91.6	16
Greece	0.219	17	Cyprus	91.5	17
Slovakia	0.206	18	Portugal	90.9	18
Slovenia	0.203	19	Greece	89.2	19
Estonia	0.194	20	Estonia	88.7	20
Portugal	0.166	21	Poland	87.7	21
Poland	0.146	22	Slovakia	87.5	22
Bulgaria	0.141	23	Croatia	86.1	23
Hungary	0.114	24	Hungary	85.6	24
Croatia	0.105	25	Lithuania	85.3	25
Lithuania	0.103	26	Latvia	84.2	26
Romania	0.035	27	Romania	81.3	27
Latvia	0.018	28	Bulgaria	80.1	28

Source: own calculations using data from Eurostat and Excel.

Table 2 also comprises the ranking of EU states based on W_i index (result from the range 0-100 as calculated on the basis of indices related to the goal of sustainable development no. 3 – the rates describing health on a global scale as calculated for 156 countries) which is available in „SDG Index and Dashboards” report (Lafortune et al., 2018).

The result over 90 points was achieved by 18 countries of the European Union, whereas 11 states of the European Union (Sweden, Finland, Netherlands, Luxembourg, Denmark, Ireland, Germany, Spain, Austria, United Kingdom, Belgium) are in the group of 20 countries reaching the highest results globally (calculations were made for 156 countries).

Data included in the report show that over the last five years the European Union as a whole has developed in terms of almost all goals of sustainable development. Furthermore, the greatest progress was made with reference to the goal no 3 of the sustainable development analysed in this paper, i.e. *Ensuring healthy lives and promoting well-being for all at all ages*, and goal no. 4, i.e. *Ensuring inclusive and equitable quality education and promoting life-long learning opportunities for all*. These are also the goals for which the European Union countries are leading in world rankings of their achievement (Lafortune et al., 2018).

4. Poland’s actions for ensuring healthy life and promoting well-being for all at all ages

As the Report of the Ministry of Entrepreneurship and Technology (Report, 2018) shows “reducing incidence of civilizational diseases and mortality due to them, as well as reducing inequalities in the access to health care, development of health awareness, as well as early detection of diseases are the priority for Poland. It is also necessary to increase expenditures on health protection with simultaneous maintenance of spending flexibility as well as improvement of the level of quality of health care system and patient safety. The Polish system of health protection also demands development of the e-health sphere. Increase in medical staff in the system has continuously been the priority for many years, in response to diversified needs of specific age groups, mainly including children and elderly people, and due to the necessity to improve the working conditions of medical staff.

Due to the above, Poland is implementing various types of health policy programs so that the assumed goals in the sphere of public health could be implemented best. The examples of already completed or still being implemented programs in Poland are shown in Table 3.

Table 3*Health policy projects implemented in Poland in 2016-2022*

Programme name	Description
Programme of complex diagnostics and intrauterine therapy.	Preventive program for reducing the number of complications and consequences of congenital malformations and fatal diseases. Project for 2014-2017.
Screening programme for new-born babies	The program which aims to reduce the mortality of new-borns, infants and children due to congenital defects of metabolism and to prevent severe and persistent physical and intellectual disability resulting from these defects.
Programme of complex protection of procreative health	The program which aims to increase the access to high-quality services in the field of infertility diagnosis and treatment.
Coordinated care of a pregnant woman	Health services. The program implemented since 2016.
POLKARD Programme of Prevention and Treatment of Diseases of the Cardiovascular System	Funded retrofitting and equipping of medical entities involved in the diagnosis and treatment of cardiovascular diseases with medical equipment. Prevention of cardiovascular diseases. Provision of services by Day Units of Heart Failure and creation and keeping medical records. Program for 2017-2020.
National Programme Against Neoplastic Diseases	Actions related to promotion of prevention.
Programme for Combating AIDS and Preventing HIV Infections for the years 2007-2011	The state's policy towards the HIV epidemic and AIDS has been defined in law. Poland implements an anti-retroviral treatment program for people living with HIV. Program for 2017-2021.
Depression prevention program. National Program of Mental Health Protection.	The program which aims to prevent mental health problems and improve mental well-being. Creation of tools for screening to diagnose mood disorders. The access to websites www.zdrowiepsychiczne.org and www.pozytywnyrozwoj.org . Expert advice in the field of mental health. Education and information campaigns regarding available help in the sphere of mental problems. Programs for 2016-2022
Programme for the Prevention of Drug Addiction Program for prevention and solving alcohol problems	Programme related to the subject of addictions - preventing and solving problems associated with the use of psychoactive substances and behavioural addictions.
Trauma centres for adults	To reduce the mortality and trauma of people injured in accidents (including road accidents) trauma centres for adults have been established in Poland, where trauma patients and victims of accidents are treated. There are also plans to create trauma centres for children .
Tele-medicine and tele-care	It is possible to determine the health condition through ICT systems or communication systems, the regulations enabling the physician, dentist, nurse and midwives to practice, as well as regulations enabling the provision of pharmaceutical services also via tele-information systems or communication systems have been introduced. The National Health Fund has introduced a new range of healthcare services, i.e. geriatric tele-consultation, cardiologic tele-consultation and cardiac hybrid tele-rehabilitation.
Electronic Platform for the Collection, Analysis and Sharing of digital resources on Medical Events (P1),	A project within which there are plans to implement IT systems that will help to streamline processes related to the planning and providing health services, as well as monitoring and reporting their implementation.
e-services	e-Blood - computerization of public blood services and development of haemotherapy supervision, e-Zdrowie in SP ZOZ MSWiA [<i>Independent Public Health Care Centre of the Ministry of the Interior and Administration</i>]-implementation of integrated IT systems and development of modern medical e-services to improve the accessibility, quality and efficiency of public services

Cont. table 3.

Clean Air Programme	To improve health situation, actions aimed at comprehensive improvement of air quality - reduction of air pollution, especially dust pollution will be held.
Improving diets, nutritional state and physical activity of the society	Organization of health picnics throughout the country in towns of less than 5 thousand residents; its aim was to encourage local communities to start exercising. Consultations of dieticians were organised during the meetings.

Own case study based on Realizacja Celów Zrównoważonego Rozwoju w Polsce [*Implementation of the Goals of Sustainable Development in Poland*], Raport 2018 [*Report 2018*], Ministerstwo Przedsiębiorczości i Technologii [*Ministry of Entrepreneurship and Technology*], <https://www.gov.pl/web/przedsiębiorczosc-technologie/monitoring-realizacji-agendy-2030>, 15.07.2019.

5. Conclusions

There is a close relationship between health and other elements of sustainable development. Living in good health means care about the environment, competent management of natural resources and thus sustainable use of the natural environment, reduction of social and economic inequalities (income inequalities, unemployment) and ensuring better quality of life. Implemented research problem concerns an important and current issue of health situation and health care of the residents of the European Union states. Demographic changes and population ageing in the countries of the European Union are the main reasons for increase in expenditures on health services that governments have to adapt the health care system to the present needs of the residents.

The analysis of the basic health and health care indices shows considerable diversity among European countries with respect to the residents' health situation, size of expenditures on health care or the number of medical staff.

Conducted analysis shows that in 2017 most European Countries (15 out of 28) were countries of high and moderate level of health situation and health care. In the ranking of EU countries analysed with respect to the level of health condition and health care, in 2017 the leading positions were occupied by Sweden, Finland, Holland, Ireland and Spain, whereas Latvia, Romania, Lithuania, Bulgaria, Croatia and Hungary were at the end of the list.

The analysis of the health situation and health care presented in this study is only a small section of the issue, however application of Z. Hellwig's measure of development allowed to evaluate the diversity in the level of development of health care systems in the countries of the EU and to identify groups of EU countries of a similar level of the studied phenomena.

To conclude, it should be added that in rapidly changing circumstances of the environment, health indices need to be constantly monitored to achieve the goals in the sphere of public health assumed in 2030 Agenda strategies and programs.

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