SECTION 3. DISEASES

3.1 Assessment of risk factors for the spread of COVID-19 infection in the world

Among the many and varied challenges of our time, a special place is occupied by the COVID-19 pandemic, which covers all countries of the world and causes an increase in mortality. Given the aggressiveness of the coronavirus and its variability, there is a need for interdisciplinary comprehensive studies of the problem by scientists in various fields to establish a set of factors for the spread of the disease and ways to combat it.

Formulation of the problem.

Countries around the world are significantly differentiated in terms of living standards, employment, health care systems, migratory mobility and turbulence, as well as mental characteristics and hygiene culture. To effectively counter the pandemic and control the spread of it, it is necessary to take into account all these factors, their specifics in the world to take measures to localize and reduce the incidence.

The aim of the study is to analyze the factors of coronary virus infection in the world and propose measures to eliminate them.

The information base of the study consisted of data from world statistics, in particular, the UN Population Division, the UN Statistics Division, the Organization for Economic Co-operation and Development (OECD-SOPEMI, the International Organization for Migration and others).

Research methods. The formation of a random sample of countries for analysis was carried out taking into account the following characteristics: the type of country by level of economic development, human development index and migration rating.

Using correlation and regression analysis, the interaction and closeness of the relationship between the following pairs of indicators were analyzed: population - the

proportion of patients; human development index (HDI) – recovery rate; number of diseases – migration rating (Table 1).

Table 1.

Initial data for calculating the regression correlation coefficients

Countries	Population, thousand persons (according to estimates on 01.01.2021)	The proportion of patients with coronavirus, %	Human Development Index, 2019 (additional 2020) [237].	Recovery rate, %	Number of diseases, persons 14.04.2021 ([238, 239].	Migration rating 2021 [240].
USA	331 431,527	9,5	0,926	94,6	31420331	3,03
Switzerland	8670,535	7,0	0,955	90,6	3678944	4,55
Japan	127390,000	0,38	0,919	93,3	482867	-0,75
Israel	8713,559	9,6	0,919	98,6	834247	2,05
Italy	60 218, 431	6,1	0,892	81,5	3678944	3,21
Kazakhstan	18 777,139	1,4	0,825	88,3	255028	0,39
Russia	143786,842	3,2	0,824	91,7	4589540	1,70
Turkey	83 835,750	4,2	0,820	89,0	3 487050	-1,55
Ukraine	43 579,234	4,0	0,779	77,0	1755888	- 0,26
China	1 424 548,267	0,006	0,761	94,6	90305	-0,43
Mexico	133 870,027	0,25	0,779	79,5	2250458	-1,46

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Uzbekistan	33 235,825	1,7	0,720	97,6	83802	-1,86
Mongolia	3178,904	0,34	0,737	54,8	10820	-0,78
Vietnam	98 360,145	0,003	0,704	91,6	2631	-0,23
India	1 487 197,754	0,84	0,645	92,7	12589067	-0,80
Myanmar	54 808,276	0,26	0,563	92,5	142511	-1,38
Ethiopia	112 759,070	0,19	0,485	75,3	215189	-0,20

Results of the research.

The conducted correlation-regression analysis of the selected indicators gives grounds to draw the following conclusions. The highest density of the relationship between the human development index and the share of recovery in the total number of patients with coronavirus: 0.6797, ie 67.9% of cases of recovery from patients due to HDI. The relationship between the number of patients and the population is 0.2589, between the number of patients and the migration rating of countries - 0.1390.

Student's *t*-test obtained as a result of regression analysis, give reason to draw the following conclusions. The number of diseases in the studied countries is a function of such factors as HDI and the proportion of people who recovered from the disease – *t*-statistics (-0.3784) and (-0.2111), respectively. This means that the main mobilization capabilities of countries in the fight against coronavirus are due to such social determinants as the availability of quality health care, the health care system and the mobility and effectiveness of health management.

The international community has intensified efforts to develop antiviral vaccines and vaccinate the population against coronavirus. Among the most common vaccines against coronavirus are: Oxford / AstraZeneca (more than 109 countries), Pfizer /

BioNTech (73 countries), Moderna (34), SinovacBiotech (28), Sinopharm / Beijing (23), SputnikV (21 countries), Sinovac (17).

Among the countries in the study sample, 58.3% of Israelis and 40% of US residents were fully vaccinated (2 doses). A significant proportion of vaccinated residents of Italy (18.61%), Switzerland (15.23%), Turkey (14.61%). In countries such as Myanmar, Uzbekistan, Ukraine, about 1% of the population is vaccinated, in China - 0.01%, in Japan - 1.1%, in Vietnam - 0.11%).

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Factors of counteraction to the virus such as mental peculiarities – the ability of the population to strictly adhere to the requirements of preventing the spread of the virus, self-isolation, high sanitary and hygienic culture – proved to be quite effective. The population of China - the country of origin of the coronavirus - was 90 thousand (0.006%) to 1.5 billion in Japan, the proportion of patients was 0.38% of the total population.

The pragmatic use of Confucian moral and ethical principles, norms and rules played an important role in counteracting the coronavirus pandemic in East Asian countries. It is obvious that the organization of social life on such principles played a role in the localization of coronavirus diseases, consistent search and development of vaccines and, at the same time, not excessive enthusiasm for vaccination of the population.

An important role in limiting the spread of infection belongs to international migration. The study found that due to the strict policy of governments to restrict migration, the migration rating of India (-0.80), Japan (-0.75), the United States (-0.87), Italy (-0.49), etc. decreased. A similar trend is characteristic of countries with

traditionally low migration ratings. At the same time, there is an increase in the migration rating of China by 7% and Turkey – by almost two thirds.

The risk factors identified by us have a significant impact on the course of many chronic diseases, in particular, pathology of the cardiovascular system. Data on the course of diseases such as arterial hypertension, diabetes mellitus on the background of SARS-CoV-2 infection indicate a more unfavorable course and a more likely risk of complications compared to patients who were not infected. And, given that patients with diabetes belong to the category of higher cardiovascular risk, accordingly, a higher risk of mortality is expected in this category of patients. According to the WHO, the mortality of patients with diabetes mellitus on the background of COVID infection reaches 9%, while in patients with arterial hypertension this figure reaches 8%. Also, it should be noted that traditional therapy can have a direct impact on improving these indicators. Thus, the effect of ACE inhibitors on the greater vulnerability of cells to the action of SARS-CoV-2 is described. In patients with diabetes, blood glucose levels are associated with a reduced immune response and increased mortality as a result. The ADA's recommendations even call for the elimination of biguanides and SGLT2 in patients with severe diabetes and their use of insulin [241].

Also, SARS-CoV-2 infection has its effect on other pathological conditions, which are based on endothelial dysfunction – coronary artery disease and chronic heart failure. The effect of the virus on endothelial cells causes their apoptosis, followed by ischemia and hemostasis disorders. This is confirmed by the results of numerous morphological studies, which reveal focal necrosis of blood vessels of various organs. In the case of chronic heart failure, in addition to endothelial damage, primary myocardial damage, increased pulmonary artery pressure with the development of right ventricular failure and the appointment of antibacterial and antiviral drugs that can cause acute arrhythmias have a major impact.

In addition, it is known to increase the risk of thromboembolic complications in patients with COVID-associated pneumonia. These changes are primarily associated with the development of acute respiratory distress syndrome. Clinical manifestations

can be varied — myocardial infarction, ischemic stroke, venous thromboembolism. If in patients with mild and moderate forms of the disease the risk of thrombotic complications was observed in 2.6% of 229 hospitalized patients, in patients with severe forms this indicator reached 35.3% of 170 hospitalized (Piazza et al., 2020). Therefore, high risk factors for thrombotic complications in individuals with COVID-19 (Spyropoulos, 2020) have been identified:

- age > 65 years;
- concomitant, in particular, cancer;
- previous VTE in the anamnesis;
- thrombophilia;
- sedentary lifestyle;
- increased level of D-dimer (more than twice the upper limit of normal).

Accordingly, it is recommended to conduct early risk stratification in these categories of patients to determine the optimal treatment and prevention tactics. ISTH proposes to determine the duration of thromboprophylaxis after discharge from 14 to 30 days, although the optimal duration remains unclear. Prevention of thromboembolism in patients who do not require hospitalization is currently not recommended. In the presence of complications such as pulmonary embolism and myocardial infarction, treatments recommended for patients without COVID-19 should be used.

Given the global nature of the problem, the significant differences in the social sphere between highly developed countries and other countries, should take into account both the leading experience and national characteristics and capabilities of different health care systems.

The second phase of ongoing health care reform in Ukraine needs to be adjusted to address the challenges and experiences posed by the effects of the COVID-19

pandemic. There are many problems in our country related to epidemiological surveillance, infection control and safety and infection in medical institutions. To increase the capacity of the national health care system, it is necessary to implement a number of organizational, diagnostic (in the early stages) and therapeutic measures. At the level of local self-government, the system of emergency medical care needs to be restored. The low level of provision of specialized vehicles by mobile medical teams deprives patients of the opportunity to treat in an outpatient setting. The low level of income of the population dictates the need to provide free (or affordable) diagnostics and testing for COVID-19. The problem of premature liquidation of infectious diseases departments in municipal medical institutions was extremely noticeable in the conditions of a pandemic. Building a network of infectious diseases hospitals and improving staffing in epidemiologists, hygienists, and laboratory diagnostics specialists will help increase preparedness for existing and new challenges and ensure effective treatment of patients.