DOI: 10.37100/2616-7689/2020/8(27)/1
UDC 330.837 : 502.57
JEL CLASSIFICATION: E 11, Q 21, Q 28, Q 31

IMPACT OF CORONAVIRUS ON THE STATE OF FOOD SECURITY AND TREATMENT OF MEDICAL WASTE

ВПЛИВ КОРОНАВІРУСУ НА СТАН ПРОДОВОЛЬЧОЇ БЕЗПЕКИ ТА УТИЛІЗАЦІЯ МЕДИЧНИХ ВІДХОДІВ

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Статтю присвячено результатам аналізу, проведеного Світовим банком, згідно з яким пандемія COVID-19 ставить під загрозу не тільки економічний розвиток, але й досягнення останнього десятиліття в галузях здоров'я та освіти, охорони довкілля. Наведено приклади сповільнення економічної активності у зв'язку із введенням карантину та зниження антропогенного впливу на навколишнє природне середовище. Зазначено, що кризи на кшталт епідемій та економічний спад відвертають увагу від глобальних екологічних проблем. Наголошено, що надалі прихильникам сталого екологічного розвитку, відновлювальної енергетики та свідомого споживання потрібно докладати ще більших зусиль, щоб не допустити повернення суспільства до брудних технологій, а для фінансування та суспільної підтримки – показати, як зміни клімату кореспондуються із сьогоднішніми проблемами. Доведено, що сповільнення економічної діяльності внаслідок епідемії – це серйозний виклик для охорони довкілля, з одного боку, та можливості – з іншого. Після рецесії та зниження викидів, як правило, відбувається швидке зростання. Держави посилено інвестують у великі виробничі та інфраструктурні проєкти, щоб прискорити процес створення нових робочих місць та виходу з кризи. Вказано на важливість інвестування відповідно до принципів сталого розвитку, зокрема недопущенні будівництва вугільних ТЕЦ, заводів з виробництва одноразового пластику, розроблення нових родовищ нафти.

Проаналізовано два ключові аспекти впливу COVID-19 на стан економіки, екології та соціуму: геопросторова продовольча безпека та нагромадження проблем у сфері медичних відходів. Вагомість першої визнано на найвищому рівні, а ідеолог її вирішення – Всесвітня продовольча програма ООН – є Нобелівським лауреатом 2020 року. В той же час досліджено, що головна екологічна заповідь – зменшити, повторно використати,

переробити (reduce, reuse, recycle) – в умовах пандемії не реалізується. Усі купують медичні маски, хоча їх ефективність доведена для захисту здорових людей від вірусу протягом короткого часового періоду (маски потрібно міняти кожні дві години, а носити за умови наявності симптомів вірусу або перебування поруч із зараженими особами). Зазначено, що Південна Корея та ЄС розробляють план зелених економічних стимулів для виходу з кризи, ООН закликає інші країни переконатися, що їхні посткризові інвестиції є дружніми щодо клімату. Акцентовано на доцільності наслідування цього прикладу в Україні, розробляючи екологічні та економічні плани виходу з рецесії вже зараз. Зокрема, важливо підтримувати зелений бізнес, переорієнтовувати так зване брудне виробництво, а також здійснювати пошук оптимальних шляхів поводження з медичними відходами.

Ключові слова: *пандемія COVID-19, сталий розвиток, регіональні екологічні ризики, продовольча безпека, поводження з відходами.*

The article focuses on the results of a new analysis conducted by the World Bank, according to which the COVID-19 pandemic threatens not only economic development, but also the achievements of the last decade in the fields of health and education, environmental protection. Examples of slowing down economic activity through the introduction of quarantine and reducing the anthropogenic impact on the environment are given. Crises such as epidemics and economic downturns usually divert attention from global environmental issues. The authors of the article argue that in the future, advocates of sustainable environmental development, renewable energy and conscious consumption will need to make even greater efforts to prevent society from rolling back to dirty technologies, and for funding and public support they will need to demonstrate how the same Climate change corresponds to today's problems. It has been proven that the slowdown in economic activity due to the epidemic is a serious challenge to the environment, on the one hand, and opportunities – on the other. After a recession and reduced emissions, there is usually a rapid increase. States are investing heavily in large-scale production and infrastructure projects to quickly create jobs and emerge from the crisis. It is now extremely important that these investments take place on the principles of sustainable development. It is impossible to allow the construction of new coal-fired CHPs, disposable plastic plants, and the development of new oil fields.

Also in this article, the authors analyze two key aspects of the impact of COVID-19 on the economy, environment and society: geospatial aspects of food security and the accumulation of problems in the field of medical waste. The importance of the former is recognized at the highest level, and the ideologue of its solution – the UN World Food Program – became the 2020 Nobel Laureate. At the same time, the main environmental commandment "reuse, recycle, reduce" in a pandemic does not work. Everyone buys medical masks, although their effectiveness has been proven to protect healthy people from the virus for a short period of time (masks should be changed every two hours and worn if you are near an infected person or have symptoms of the virus yourself).

It is already known that South Korea, followed by the EU, is developing a plan of green economic incentives to overcome the crisis. The UN is urging other countries to make sure their post-crisis investments are climate-friendly. Ukraine should follow suit, creating environmental and economic recovery plans now. In particular, it is important to support green business and reorient dirty production, as well as look for optimal ways to handle medical waste.

Key words: *COVID-19 pandemic, sustainable development, regional environmental risks, food security, waste management.*

Problem statement. According to a new analysis conducted by the World Bank, the COVID-19 pandemic threatens not only economic development but also the achievements of the last decade in the fields of health and education, and environmental protection. This will have a particularly strong impact on the poorest countries. Investing in human capital (knowledge, skills and health that accumulate throughout a person's life) plays a key role in unlocking capacity and accelerating economic growth in each country.

Economists around the world have long predicted a global cyclical economic crisis, the precondition for which was the recapitalization of markets. However, no event – neither Brexit nor the US-China trade war – suited the trigger for the coronavirus pandemic. Researchers say that the obvious consequences of the pandemic are accompanied by still hidden trends: capital outflows, isolation, as well as a high degree of

uncertainty, due to which businesses are deprived of the opportunity to build any plans, while tangible assistance from the state.

In this article, we will analyze two key aspects of the impact of COVID-19 on the economy, environment and society: the geospatial aspects of food security and the accumulation of problems in the field of medical waste. The importance of the former is recognized at the highest level, and the ideologue of its solution – the UN World Food Program – became the 2020 Nobel Laureate [1]. The main ecological commandment «reuse, recycle, reduce» does not work in a pandemic. Everyone buys medical masks, although their effectiveness has been proven to protect healthy people from the virus for a short period of time (masks should be changed every two hours and worn if you are near an infected person or have symptoms of the virus yourself).

Analysis of previous research and publications. Studies of the problems of the impact of the pandemic on sustainable development are relevant in modern scientific articles. The first results of the resonance study by modeling methods were presented on February 16, 2020 in the report of the National Laboratory of Imperial College of Great Britain [2]. The model demonstrated the catastrophic consequences of the "no countermeasures" scenario for the health care systems of the United States and the United Kingdom – 2,5 million and 500 thousand deaths, respectively, which dramatically affected the change of state policy to combat the epidemic. Since the beginning of the epidemic, dozens of scientific papers have been published on the development of prognostic models and methods for predicting the spread of COVID-19. The working group at the Presidium of the National Academy of Sciences of Ukraine developed the SEIR_U model for calculating the balance relations of vulnerable groups, and also proposed epidemiological measures, which are currently the main weapon in the fight against the COVID-19 pandemic [3]. Epidemiological measures, which are currently the main weapon in the fight against the COVID-19 pandemic, have a negative impact on the economy and cause significant concern in society [4]. In the context of the above, the publication of Serhiy V. Komisarenko concerning [5].

The purpose of the article is to determine the prerequisites for the formation of food and health security in a pandemic and the vectors of their optimization with the participation of international actors.

Basic material. Pandemics in general are not just a serious public health problem – they cause catastrophic crises in countries where the infection has occurred. The virus has now spread to more than 200 countries, affecting the world's progressive economies, including the United States, Germany, China, Italy, South Korea, India, Switzerland, Sweden, Singapore, France, Australia, Britain, Finland, and the Netherlands. Japan, Belgium and Germany. Their economic activity has slowed down significantly due to the introduction of quarantine, and the anthropogenic impact on the environment has decreased. The obvious positive consequence of the epidemic was the improvement of air quality – due to quarantine on the streets of cities reduced the number of cars, and only companies that produce vital products and services continued to work. As a result, by mid-2020, for example in China, carbon dioxide emissions have been reduced by a quarter compared to the same period in the past [6]. Coal use at the country's six largest power plants fell by 40 % over the same period. Combined emissions from industrial processes, production and construction account for 18,4 % of global anthropogenic emissions. The financial crisis of 2008–2009 led to an overall reduction of emissions by 1,3 %, in 2020 – this figure will be about 0,3 %.

Crises such as epidemics and economic downturns usually divert attention from global environmental problems. In the future, proponents of renewable energy and conscious consumption will need to work even harder to prevent society from moving back to dirty technology, and for funding and popular support, they will need to demonstrate how climate change is affecting today's challenges. And also how to turn the crisis into opportunities – for cleaner air and water.

The slowdown in economic activity due to the epidemic is a serious challenge to the environment, on the one hand, and opportunities, on the other. After a recession and reduced emissions, there is usually a rapid increase. States are investing heavily in large–scale production and infrastructure projects to quickly create jobs and emerge from the crisis. It is now extremely important that these investments take place on the principles of sustainable development. It is impossible to allow the construction of new coal–fired CHPs,

disposable plastic plants, and the development of new oil fields.

It is already known that South Korea, followed by the EU, is developing a plan of green economic incentives to overcome the crisis. The UN is urging other countries to make sure their post–crisis investments are climate–friendly. Ukraine should follow suit, creating environmental and economic recovery plans now. In particular, it is important to support green business and reorient dirty production, as well as look for optimal ways to handle medical waste [7].

Health care workers account for 8 per cent of cases. At least 105 of them have died. 10,327 children have been diagnosed with COVID-19 and 5,100 have recovered [8]. One child under 9 died in Chernivtsi region. Children account for 6 per cent of cases (Fig.). The regions with the highest numbers of confirmed COVID-19 cases are Kyiv city (11,1 per cent of confirmed cases), Lviv (10,8 per cent), Kharkiv (8,2 per cent), Chernivtsi (7.,8 per cent), and Ivano-Frankivsk (7,2 per cent).

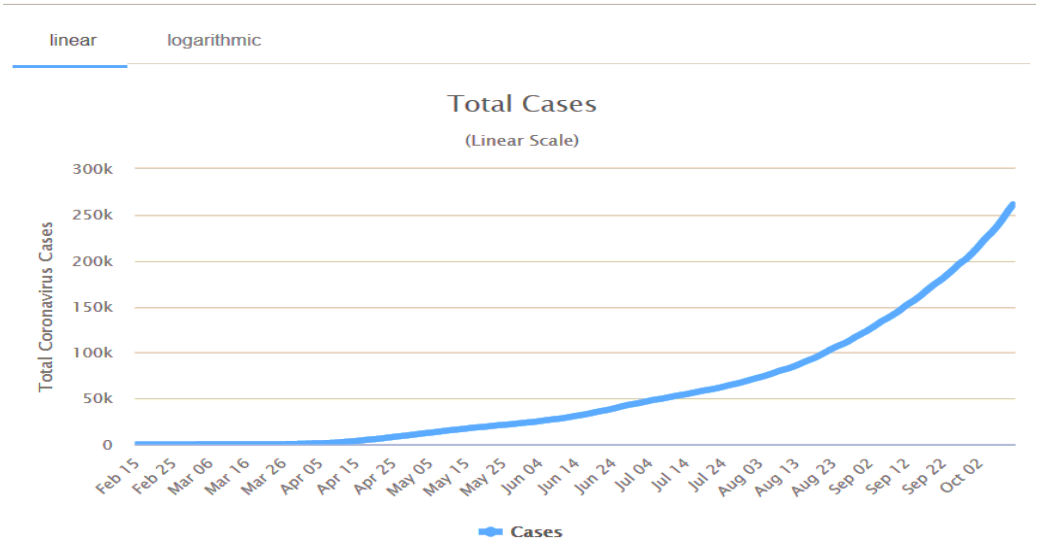

Fig. Total Coronavirus Cases in Ukraine [9]

When studying the global statistics on the pandemic, the comparison of Ukraine in the world rankings of causes and effects, we must remember the following. Caution must be taken when interpreting all data presented, and differences between information products published by WHO – such as the WHO COVID-19 Situation Reports – national public health authorities, and other sources using different inclusion criteria and different data cut-off times are to be expected. While steps are taken to ensure accuracy and reliability, all data are subject to continuous verification and change. All counts are subject to variations in case detection, definitions, laboratory testing, and reporting strategies between countries, states and territories [10].

Regional environmental risks in the context of food security have increased since the introduction of quarantine measures in Ukraine.

- Sustainability of small-scale and family farms in case of quarantine. MDETA is extremely concerned about possible consequences of implementing quarantine measures in family and small-scale farms with limited quantity of employees, especially involved in animal farming.
- Possible reduction of capacity of veterinary labs and specialized phytosanitary quarantine labs. As a preventive measure SSFSCP is promoting FAO principle of biosecurity under conditions of COVID-19 outbreak [11].
- Closure of seed shops (Donetsk oblast, Kirovograd oblast). As the sowing campaign has already started, and in many regions it is necessary to re-saw winter crops due to climate conditions in winter 2019-2020, deficit of seeds due to closure of seed shops and small distributors can have a serious impact on small-scale crop producers.
- Complexity of personnel movements (all round the country). It is very difficult to agricultural producers, especially involved in animal farming, to organize transportation of critical staff to the workplaces according to acting extraordinary sanitary rules.

- Impossibility of finding alternative key specialists, in case of quarantine (Cherkassy and Ternopyl oblast). Lack of qualified personnel is obvious even in normal conditions, but it may become a critical point for producers, especially involved in animal farming, due to unexpected quarantine of the key specialist (for ex. Veterinarian).
- Possible restriction of transportation of agricultural machinery in case of quarantine (Kherson oblast). This concern is coupled with possible delays in delivery of spare parts for machinery during the agricultural works. None of the regional authorities identified the lack of fuel as an existing problem.
- Possible delays in delivery of pesticides (Kyiv oblast). Although there is no deficit of pesticides in the market (all deliveries to the major distributors in Ukraine has been done before the middle of February), possible restriction of activities of distributors' warehouses coupled with possible restriction in movements may cause significant delays in deliveries to the farmers' warehouses or fields. It is also unclear whether agricultural aviation will be allowed to fly for spraying.
- Possible regional outbreaks of COVID-19 due to simultaneous return of the migrants from EU to rural areas (Zakarpatska and Lviv oblast). This specific concern is relevant for the whole country, but for the Western Ukraine it is really critical (example – full quarantine in certain areas of Chernivtsi oblast with zero agricultural activities).
- Huge problems for homestead farming (Kyiv city). Majority of urban population in Ukraine has small plots of land with little houses in the rural areas, known as dachas. Regional transportation ban and specific risk of COVID-19 to the elder population makes trips to dachas very complicated, hence putting pensioners in front of horrible dilemma – either to travel and be in risk due to virus or to face real hunger starting from autumn.

According to the State Customs Service, exports of goods from Ukraine in the first 7 months of 2020 amounted to $ 26,632 billion, which is 7 % less than last year, imports fell by 13 % to $ 28,848 billion. The negative balance was recorded at $ 2,216 billion (table).

Table

The volume of foreign trade in goods in January-July 2020, million US dollar*

Countries	2020				Changes to the previous year		
	Turnover	Exports	Imports	Balance	Commodity circulation	Exports	Imports
Total	55480	26632	28848	-2216	-10 %	-7 %	-13 %
European Union	22461	9922	12539	-2616	-14 %	-19 %	-11 %
Commonwealth of Independent States	7946	3353	4592	-1239	-27 %	-13 %	-35 %
Others	25074	13357	11717	1639	2 %	5 %	-2 %

* Source: State Statistics Service of Ukraine.

The regional structure of exports has remained traditional for recent years: most agricultural products were exported to Asia ($ 4.99 billion), followed by the EU ($ 2.9 billion) and Africa ($ 1.57 billion). Changes in traditional markets are associated with general economic turbulence and a high degree of uncertainty in global markets. On the one hand, demand for basic agricultural commodities has not declined, despite the crisis caused by COVID-19, and at the same time the price situation for some crops (maize) remains unfavorable.

UNICEF is currently appealing for US$23 million for the COVID-19 response in Ukraine, in addition to an existing humanitarian appeal of US$9.8 million to support families with children in the conflict-affected east. As of yet, UNICEF has received 52 per cent of the funding required the 2020 Humanitarian Appeal for Children, and 11 per cent of the funding needed for the COVID-19 response across the country .

From the beginning of 2020 to the end of June, the total export of agricultural products amounted to $ 10,4 billion , according to the State Statistics Service. Ukraine exported the most to China, Egypt, India, the Netherlands and Spain.

Changes in the stock markets, where companies buy and sell, affect not only the

companies themselves and traders. They affect the way investments are made in the world, as well as pensions and other savings in many countries, because, for example, pension funds often invest clients' money in securities. All major indexes of the world's leading stock exchanges in Japan, Britain and the United States have fallen significantly since the disease began to spread late last year. Since the beginning of the new year, the FTSE has fallen by 34,1 %, the Dow Jones Industrial Average – by 31,1 %, and the Nikkei – by 28,7 %. At the same time, the American Dow Jones and the British FTSE have experienced record declines in more than 30 years – since 1987.

These figures mean that investors fear that the spread of coronavirus will stop economic growth and government action to support the food sector will be insufficient. In response, central banks in many countries have begun lowering interest rates to make money cheaper and loans more affordable for farmers. In theory, this should also support consumer demand. Among those who went to lower the discount rate, the US Federal Reserve and the Bank of England [12].

Losses for the Ukrainian economy from the introduction of quarantine restrictions could amount to 50 billion US dollars. Losses for the economy can be calculated in 2 indicators: losses in the cost of human lives and losses in% of GDP. Calculation for the first indicator: if we abolish quarantine completely, we could lose 120 thousand lives. Calculation for the second indicator: losses are estimated on the basis of forecasts for falling GDP from the International Monetary Fund and the consensus forecast of the Ministry of Economic Development, Trade and Agriculture. Losses due to quarantine for the economy are equal to 50-54 billion US dollars, which is calculated as the net present value of losses. For the United States, the cost of statistical life is 10 million US dollars [13].

Despite a temporary cut in global carbon emissions, the International Energy Agency has warned that the economic shocks caused by the coronavirus outbreak could hinder or delay companies' investments in green energy. In addition, the largest climate event of the year, the 2020 UN Climate Change Conference, scheduled for November, may be postponed indefinitely due to the epidemic. This will lead to the fact that the struggle of mankind against anthropogenic climate change will greatly slow down. The unprecedented widespread use of disposable masks and gloves will result in serious pollution of the environment with large amounts of plastics and other synthetic materials that are resistant to liquids and very slowly degrade. At the same time, it is not recommended to wear medical masks for more than one day, and wet wipes made of similar material cannot be used more than once.

This led to the fact that in the city of Wuhan in China, which was the epicenter of the epidemic in the country, about 200 tons of medical waste was formed in one day – several times more than before the epidemic and four times more than the only one waste recycling plant in the city [14]. A study by environmental NGO Ocean Asia, conducted on Soko Island in Hong Kong, found that a large number of discarded masks were washed up on a 100-meter beach. The consequences of contamination with such medical waste are far-reaching. When they are released into their natural habitat on land, animals mistakenly eat them as food. This can lead to serious health problems, including death.

Today, the disposal of medical waste is not only an environmental problem. Now the entire planet is struggling with the new dangerous Covid-19 virus, the spread of which, according to WHO, will be extremely difficult to stop. If the first 100,000 cases of the disease were recorded within three months, then the last 100,000 people fell ill in 12 days. Therefore, right now, improper disposal of medical waste potentially infected with coronavirus endangers the health and life of the population, raising the risk of epidemiological danger to the maximum critical level. The French use pyrolysis-type incinerators, in which hazardous medical, biological and toxic waste is rendered harmless. These stoves are located near residential areas, but at the same time no harmful substances get into the air. There is no smoke or bad smell. The coal that is formed after combustion is used as a raw material for the production of paving slabs and bricks [15].

Conclusion. Realization of the existing goals of food security remains a top priority due to the pandemic and alarming economic vulnerability of most regions of Ukraine. International partners continue to focus on the economic vulnerability of the population and implement initiatives to reduce the income gap by creating income-generating activities, including job creation [16]. These include own production through agricultural initiatives such as the distribution of seeds, tools and agricultural equipment to support farmers. Research also shows an increase in the level of structural poverty in Ukraine in 2020. The share of households whose share in food expenditures

exceeds 60 % of income decreased from 26 % in 2017 to 17 % in 2019. However, their share is expected to reach 22,1 % by the end of 2020 [17]. The pandemic has increased waste production and reduced waste recycling. Some cities have suspended waste disposal programs to reduce the risk of coronavirus. Some manufacturers have generally used quarantine as an opportunity to return to the use of disposable bags and plastic utensils. However, society is steadily moving towards a "zero waste" system, looking for new tools for the collection and disposal of hazardous medical components.

References

1. The Nobel Peace Prize (2020). – *The Norwegian Nobel Committee.* Retrieved from https://www.nobelprize.org/prizes/about/prize-announcement-dates.

2. Neil M Ferguson, Daniel Laydon, Gemma Nedjati-Gilani et al. (2020). Impact of non-pharmaceutical interventions (NPIs) to reduce COVID-19 mortality and healthcare demand. *Imperial College London* (16-03-2020), doi: https://doi.org/10.25561/77482.

3. Brovchenko I. (2020). In Ukraine. Svitohliad. 2020. 2 (82): 2–14. Retrieved from https://www.mao.kiev.ua/biblio/jscans/svitogliad/svit-2020-15-2/svitoglyad2020-2-2-brovchenko.pdf [in Ukrainian].

4. National coronavirus response: A road map to reopening (2020). *American Enterprise Institute.* Retrieved from https://www.aei.org/research-products/report/national-coronavirus-response-a-road-map-to-reopening.

5. Serhiy V. Komisarenko (2020). Scientist's pursuit for coronavirus sars-cov-2, which causes covid-19: scientific strategies against pandemic. Visn. Nac. Akad. Nauk Ukr. 2020.(8): 29-37 https://doi.org/10.15407/visn2020.08.029 [in Ukrainian].

6. Pollution in China falls during coronavirus outbreak (2020). – *CNN*. Retrieved from https://edition.cnn.com/videos/world/2020/03/16/china-coronavirus-covid-19-climate-impact-pollution-pkg-watson-intl-hnk-vpx.cnn.

7. Coronavirus could weaken climate change action and hit clean energy investment, researchers warn (2020). Retrieved from https://www.cnbc.com/2020/03/13/coronavirus-could-weaken-climate-change-action-hit-clean-energy.html.

8. Flash Report COVID-19 Impact (2020). – *UNICEF*. Retrieved from https://www.unicef.org/ukraine/media/8791/file/UNICEF%20Ukraine%20COVID-19%20Flash%20Report%2015%20September%202020.pdf.

9. COVID-19 CORONAVIRUS PANDEMIC (2020). – *Worldometer*. Retrieved from https://www.worldometers.info/coronavirus/ country/ukraine.

10. Coronavirus disease (COVID-19) pandemic (2020). – *World Health Organization.* Retrieved from https://www.who.int/emergencies/diseases/novel-coronavirus-2019.

11. The principles of biosecurity of enterprises and farms in conditions of strict quarantine have been developed (2020). – *Food and Agriculture Organization of the United Nations (FAO UN).* Retrieved from http://www.consumer.gov.ua/News/5787/Rozrobleno_printsipi_biozakhistu_pidpriemstv_ta_gospodarstv_v_umovakh_zhorstkogo_karantinu?fbclid=IwAR33dF24rYYPeCkVSlZ0Or6eWbcWj0h4NS0WHdvZXG-NjsXlu FykIFrGtmc.

12. Coronavirus in numbers: how the world economy has changed (2020). – *BBC News.* Retrieved from https://www.bbc.com/ukrainian/features-51994936.

13. Losses for the Ukrainian economy from quarantine amount to 50 billion US dollars (2020). – *KSE Leadership Team.* Retrieved from https://kse.ua/ua/about-the-school/news/29348 [in Ukrainian].

14. Reducing emissions and mountains of medical waste: the environmental impact of the COVID-19 epidemic (2020). – *Hi-tech.* Retrieved from https://hightech.fm/2020/05/06/covid-ecology.

15. Healthcare waste: what to do with it? (2020). – United Nations Environment Programme (UNEP)'s. Retrieved from https://www.unenvironment.org/news-and-stories/story/healthcare-waste-what-do-it.

16. Mitigating impacts of COVID-19 on food trade and markets (2020). – *FAO.* Retrieved from http://www.fao.org/news/story/en/item/1268719/icode.

17. The impact of the coronavirus crisis on poverty (2020). – *Ptoukha Institute for Demography and Social Studies of the National Academy of Sciences of Ukraine.* Retrieved from https://idss.org.ua/arhiv/poverty_forecast.pdf [in Ukrainian].

Стаття надійшла до редакції 12 жовтня 2020 року