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QUALIFYING WORK

On the topic: **ANALYSIS OF THE CURRENT STATE OF CORONAVIRUS VACCINATION IN THE WORLD**

Performed by: higher education graduate of group ФМ18(5,0)англ-07
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Kharkiv – 2023

ANNOTATION

The qualification work examines the current state of vaccination for COVID 19 in the world. In the course of the study, approaches to the organization of vaccination in different countries of the world were analyzed, and the level of vaccination in Ukraine and Morocco was analyzed.

The qualification work consists of an introduction, 3 chapters, conclusions, a list of used sources and is laid out on 41 pages of printed text. The work is illustrated with 6 figures and 3 tables. The bibliography includes 34 information sources.

Key words: COVID-19, vaccination, international vaccination policy

АНОТАЦІЯ

У кваліфікаційній роботі розглянуто сучасний стан вакцинації при COVID 19 у світі. У ході дослідження проаналізовано підходи до організації вакцинації у різних країнах світу, проаналізовано рівень вакцинації в Україні та Марокко.

Кваліфікаційна робота складається зі вступу, 3 розділів, висновків, списку використаних джерел та викладена на 41 сторінках друкованого тексту. Робота ілюстрована 6 рисунками і 3 таблицями. Бібліографія включає 34 інформаційних джерел.

Ключові слова: COVID-19, вакцинація, міжнародна політика з вакцинації

CONTENT

LIST OF ABBREVIATIONS

WHO : the World Health Organization

Ministry of Health : Ministry of Health

SARS : Severe Acute Respiratory Syndrome

MERS : Middle East Respiratory Syndrome

COVID 19 : Wuhan coronavirus

CDC : Centers for Disease Control and Prevention

NIH : National Institutes of Health

LICs : Lifestyle Communities Ltd

CI : Continuous integration

A (H1N1) pdm09 : influenza A(H1N1)pdm09 egg-derived candidate vaccine viruses

INTRODUCTION

Coronaviruses (CoV) are a massive household of viruses that cause illness ranging from the frequent bloodless to greater severe diseases. An extraordinary mixture of political will, world collaboration and funding have enabled the fast improvement of COVID-19 vaccines.

Despite the document pace at which they have been developed, COVID-19 vaccines have nonetheless been subject to the same checks, balances, and scientific and regulatory rigor as any different vaccine, and have shown to be safe.

COVID-19 vaccines have reached billions of people worldwide, the evidence is overwhelming that no be counted which one you take, the vaccines provide life-saving protection in opposition to an ailment that has killed millions. The pandemic is some distance from over, and they are our excellent bet for staying safe. COVID-19 cases declined thru lots of 2022, due to combined herbal and vaccine-induced immunity, instances once more peaked in November in Australia, China, France, the United States, and elsewhere. By the give up of this year, political attention and resources to end the disease, which has killed extra than 6.6 million humans worldwide, have waned considerably. Epidemiologists and others are staring at China carefully as it lifts its longstanding “zero-COVID” strategy, which holds unknown risks for practicable future epidemiological shifts for the relaxation of the world.

Since getting in poor health with COVID-19 can purpose extreme illness or death, even in children, and we can not reliably predict who will have mild or extreme illness. COVID-19 vaccination helps protect you by means of developing an antibody response besides you having to experience doubtlessly extreme illness or post-COVID conditions.

The purpose of the study was to analyze the current state of of coronavirus vaccination in the world.

Research objectives:

- to conduct a review of literary sources on COVID 19 pandemy and vaccination;
- to investigate the international policy approaches in Coronovirus vaccination;
- to analyze the prevalence of COVID-19 in the world;
- to make comparative analysis for available vaccines;
- to study of level of COVID-19 vaccination in Ukraine and Morocco;
- to analyse comparison of costs for vaccination and immunization in Ukraine and Morocco.

The object of the research became literary sources on COVID-19 vaccination, the international regulatory and legal framework, research by international organizations, statistical data.

The subject of the study is the identification and assessment of modern aspects of COVID 19 vaccination.

Research methods. System, analytical and comparative, graphic and logical methods, method of descriptive and abstract modelling and generalization were used.

The scientific novelty and practical significance of the obtained results consists in conducting a comprehensive study on the current state of COVID-19 vaccination in the world, namely the systematization and summarization of literary data, the study of the legal framework regulating the organization of COVID 19 vaccination.

The results of the study were approved at the XXIX International Scientifical and Practical Conference of Young Scientists and Students TOPICAL ISSUES OF NEW MEDICINES DEVELOPMENT held on 19-21 April 2023 in Kharkiv.

Structure and scope of qualification work. The qualification work consists of the introduction, three chapters, conclusions to each chapter, a general conclusion, and list of used sources. The results of the study are presented on 41 pages of text, the number of figures – 6, number of tables – 3, and the list of references – 34 titles.

CHAPTER 1.
LITERATURE REVIEW ON THE ISSUE

COVID-19 has had a significant impact on our lives. The new norm now includes working from home and being under national lockdown. It is difficult for many wealthy nations with their cutting-edge medical infrastructure to combat the pandemic situation. Unexpectedly increased mortality rates compared to the first wave of covid-19 are linked to the second wave. The spread of mutant strains that make the virus highly contagious across the nation has presented new difficulties for researchers and scientists working to create vaccines and treat the illness. The effectiveness of the many vaccines developed by several Biopharmaceutical businesses and Research Centers, including Pfizer-BioNTech, Moderna, AstraZeneca, Bharat Biotech, and Sinoppharm, as well as the Gamaleya Research Institute of Epidemiology and Microbiology, on mutant strains of the virus is mixed.

1.1. Review COVID 19: symptoms, problem

A person's COVID-19 symptoms may differ from another person's, from one age group to another, or from one COVID-19 variety to another.

The following symptoms are some of the more frequently reported ones: sore throat, runny nose, sneezing, new or worsening cough, shortness of breath, or difficulty breathing; temperature equal to or greater than 38°C; feeling feverish; chills; weakness; fatigue; muscle or body aches; new loss of smell or taste; headache.

In the first to fourteen days following exposure, you can begin to exhibit symptoms. Usually, 3 to 7 days after exposure, symptoms start to manifest. Immunization protects against serious diseases

However, vaccinations are not always successful, and you still risk contracting an infection with or without symptoms.

SARS-CoV-2, like MERS-CoV and other human corona viruses, was first discovered in bats [1]. The Table 1.1 provides the zoonosis information.

Table 1.1

Comparative analysis between SARS, MERS and COVID 19.

			
Virus	SARS	MERS	COVID 19
Full Name	Severe Acute Respiratory Syndrome	Middle East Respiratory Syndrome	Wuhan Coronavirus (2019nCov) [4]
Origin	2003 in China [3]	2012 in Middle East, Africa and South Asia [3].	2019 in China (Wuhan) [4].
Confirmed cases	8,437 in 29 Countries [1]	2,494 in 27 Countries as of Nov 30, 2019 [3]	>130,000 as of Mar 12, 2020 in 46 countries [13]
Death Rate (as of March 7, 2020)	>10%	>35%	3%
Zoonosis	Bat > Palm Civet > Human [5].	Bat > Dromedary Camel> Human [5].	Bat > ?? > Human (Not known yet)
Symptoms	Fever, Shortness of Breath, Cough	Fever, Cough and Shortness of Breath	Fever, Cough and Shortness of Breath
Diagnosis	Diagnosis procedures are same for all those, three, and they include, along with the above symptoms the RT PCR to detect virus in stool, blood and nasal fluid, and Serological test for virus antibodies in the blood [5,8,13].		
Treatment	No antiviral therapy yet, only supportive and prevention strategy are advised. Vaccines are at an stage of development.		

Similar to the flu virus, SARS-CoV-2 can infect the respiratory system and spread by coughing and sneezing, especially to elderly and immune-compromised individuals (Fig 1.1) [2].

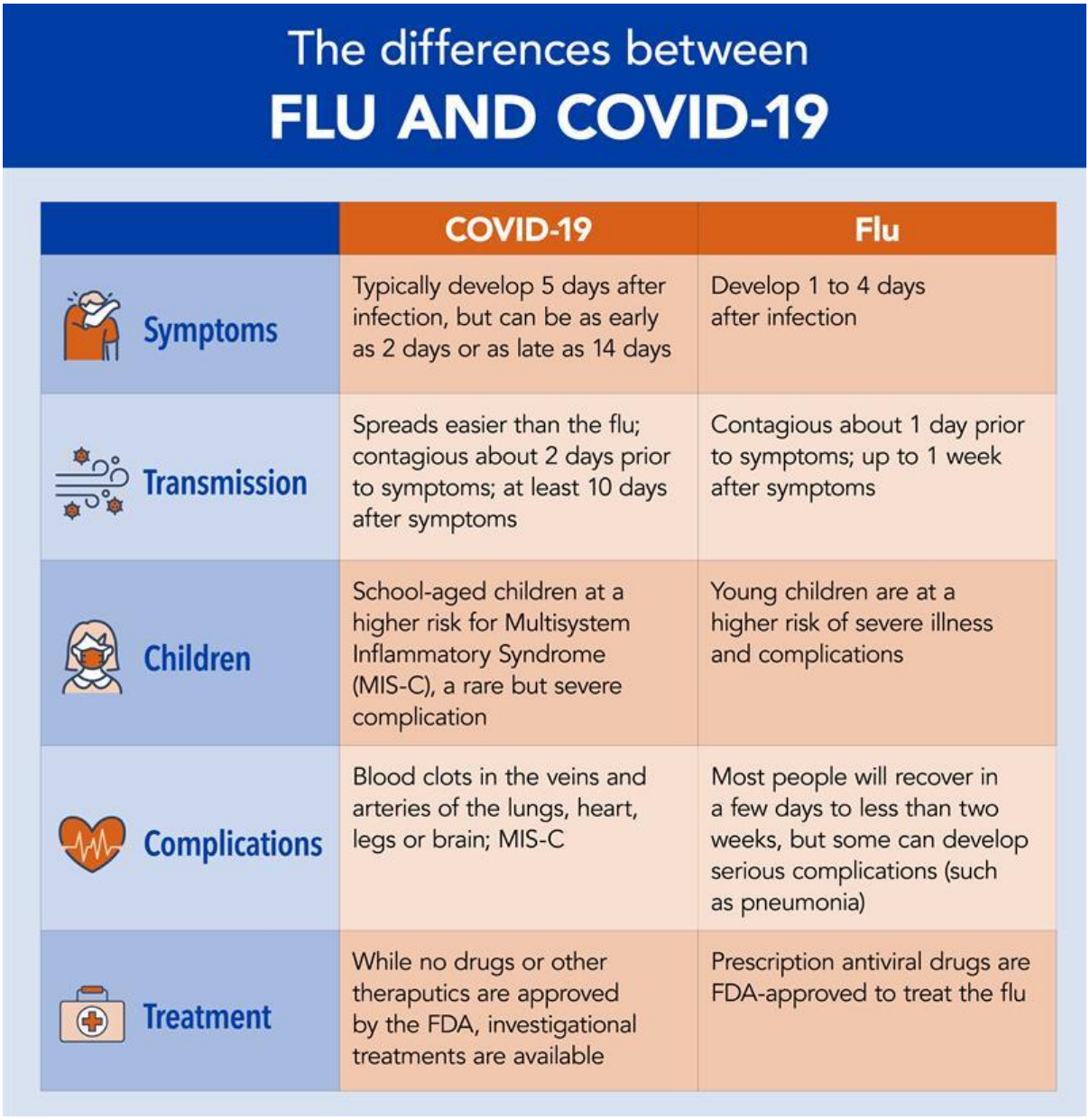

Fig 1.1 Comparative analysis between flu and covid 19

SARS-CoV-2, on the other hand, primarily targets the lower respiratory tract and causes lethal pneumonia, in contrast to other typical cold or allergy problems [3]. There are currently no cures or medications that can manage diseases; only prevention attempts have been made.

1.2. The importance of Coronavirus vaccination in the world

The COVID-19 vaccine is presenting a means to exit this stage of the epidemic. Without them, many experts think that great fatality would have resulted from natural herd immunity failing to return society to its usual status quo.

Numerous health organizations, including the WHO, have endorsed this. If immunizations weren't available, stringent behavioral restrictions might have been necessary going forward.

Fortunately, multiple vaccines received emergency permission at the start of 2021 and started to be distributed in nations all over the world. Nearly 300 million vaccination doses had been given around the world as of March 2021. The numbers indicate a potential return to "normal.

However, global COVID-19 vaccination faces several challenges which may impact its success.

A- Production, affordability, and allocation of COVID-19 vaccinations

The issue of providing the vaccine to those who need it most and reducing discrepancies in vaccination access is one that has been raised more and more recently. According to some study, those who live in prosperous areas are more likely to have access to vaccinations, while those who live in less affluent areas run the danger of having less accessibility. In order for the immunizations to function as effectively as possible, access not be determined by financial status. As is the case in the UK, it is ideal to vaccinate high-risk individuals first, followed by less susceptible populations.

More COVID-19 vaccine doses are needed than at any other time in history for any illness. As a result, substantial production efforts are needed to guarantee that needs are met. Although the vaccination itself is effective, its effectiveness will be diminished if sufficient doses cannot be provided in a timely manner.

Fortunately, unlike many other vaccines, COVID-19 has not been underfunded, and it appears that this investment will continue to support the need for modified vaccines that cover the most recent COVID-19 variants.

B- Public opinion of COVID-19 vaccination

A significant potential obstacle to the effectiveness of COVID-19 immunizations is the public's unfavorable perception of the vaccine. According to a poll conducted in June 2020, 71.5% of respondents said they would be very or somewhat inclined to take the COVID-19 vaccination, leaving almost a third who would be less willing. The potential effectiveness of the vaccination to stop the spread of COVID-19 could be seriously impacted if sizable segments of the population chose to reject it. Low acceptance rates are particularly prevalent in some populations; in Russia, for instance, less than 55% of those polled said they would accept the vaccination.. [4].

This problem can be solved by educating the public on the value of receiving the COVID-19 vaccine and by being open and honest about the process of developing the vaccine and the frequency of potential side effects. People's trust in the decision to provide vaccinations, without which the world will not be able to defeat the epidemic and resume "normal" life, can be increased through education.

The data is overwhelming that, regardless of the COVID-19 vaccination you receive, the vaccines give life-saving protection against a disease that has killed millions of people after reaching billions of people globally. They are our best chance of remaining safe because the pandemic is far from ended.

There are four categories of vaccines in clinical trials: WHOLE VIRUS , PROTEIN SUBUNIT, VIRAL VECTOR and NUCLEIC ACID (RNA AND DNA). Some of them attempt to smuggle the antigen into the body, while others create the viral antigen using the host's own cells. [5].

WHOLE VIRUS. The immune response is elicited by several conventional vaccinations using entire viruses. There are basically two methods. Viruses that are weaker but still capable of reproducing themselves are used in live attenuated vaccinations. Utilizing viruses with genetic information removed, inactivated vaccines can no longer multiply but nevertheless elicit an immune response. Both kinds use well-proven technology and regulatory approval processes, but live attenuated ones pose a danger of disease transmission to individuals with weakened

immune systems and frequently require careful cold storage, making their use more difficult in nations with little resources. People with weakened immune systems can get inactivated viral vaccines, albeit cold storage may also be necessary.

PROTEIN SUBUNIT. Subunit vaccines employ bits of the pathogen, frequently protein fragments, to elicit an immune response. While doing so minimizes the danger of adverse effects, it also raises the possibility of a poorer immunological response. They frequently need adjuvants since doing so helps to stimulate the immune system. The hepatitis B vaccine is an illustration of an existing subunit vaccine.

VIRAL VECTOR. Genetic material, such as RNA or DNA, is used in nucleic acid vaccines to provide cells the instructions they need to produce the antigen. This is typically the viral spike protein, as it is in the case of COVID-19. Once inside human cells, this genetic material employs the protein-making machinery to create the antigen that will set off an immune response. These vaccinations have the advantages of being inexpensive and simple to produce.

The immune response ought to be potent because the antigen is produced in great amounts inside our own cells. A drawback is that no DNA or RNA vaccines have been approved for use in humans up to this point, which could make regulatory approval more difficult. Additionally, RNA vaccines must be stored at extremely low temperatures, such as -70C or lower, which may be difficult for nations without specialized cold storage equipment, especially low- and middle-income nations.

NUCLEIC ACID (RNA AND DNA). By giving cells genetic instructions to manufacture antigens, viral vector vaccines also function. However, they differ from nucleic acid vaccines in that they convey these instructions into the cell using a virus that isn't harmful and isn't the goal of the vaccination. The adenovirus, which causes the common cold, is one type of virus that has frequently been utilized as a vector. Similar to nucleic acid vaccines, the antigen is produced by our own cells using those instructions in order to elicit an immune response. Since viral vector vaccines can imitate actual viral infection, they ought to strongly elicit an immune response. The risk that many people may have previously been exposed to the viruses being

employed as vectors, however, means that some may be immune to it, making the vaccine less effective.

Conclusions to Chapter 1

The economic, medical, and public health infrastructure in China as well as, to a lesser extent, in other nations, particularly its neighbors, has been put to the test by this virus outbreak. Only time will be able to determine how the virus might affect our life in the future. Furthermore, zoonotic virus and disease outbreaks are expected to persist in the future. Therefore, efforts should be made to develop comprehensive strategies to prevent future outbreaks of zoonotic origin in addition to containing this outbreak.

CHAPTER 2.
STUDY OF THE CURRENT STATE OF REGULATING POLICY OF VACCINATION

The discussion of COVID-19 immunization with patients should be centered on healthcare providers and public health authorities. Vaccines have a considerable impact on infection and serious illness because they are essential in preventing hospitalization and deaths from infectious diseases, as well as helping to stop their spread. The additional protective behaviors needed to locally control the pandemic must be known by both those who have received vaccinations and those who have not [9].

A previously unheard-of level of public interest in vaccines has emerged as a result of the COVID-19 pandemic's global impact. This includes emphasizing the creation of vaccinations as well as their regulatory assessment and safety oversight. Mass media and social media have played a large role in this coverage. Some people have expressed worries about becoming vaccinated, delayed getting vaccinated, or are vehemently opposed to vaccination as a result of reports of unpleasant events (side effects). Individual faith in national safety monitoring systems varies as well. The fact that many, but not all, children and young adults are less clinically impacted by COVID-19 infection and that some people may see minimal value in immunizing this demographic presents another barrier in promoting the relevance of COVID-19 vaccination. Consistently and clearly communicating is therefore necessary to assist people in making the crucial decision to receive vaccinations of evidence and uncertainty. [9].

2.1 International policy in Coronavirus vaccination

Pandemics necessitate swift action. Serology testing is a useful tool since it produces data that can be used to guide planning for upcoming pandemics or outbreaks. Therefore, serology testing is crucial and relevant throughout the entire

epidemic. Pre-pandemic: to perfect testing for more accurate and effective use of resources and better financial management. To effectively identify illness cases and trends during a pandemic and assist vaccination and conflict management plans. Post-pandemic: to compile information and proof that will serve as a roadmap and improve readiness for unforeseen events.

In order to employ serology testing appropriately during this challenging issue, European nations and other nations across the globe must conduct these evaluations and fix any inadequacies. The first step is to gather reliable data to support the use of serology testing. Collaboration across nations is crucial for advancing knowledge and providing an accurate evaluation of existing and upcoming pandemics.

We have identified some critical knowledge gaps that may worry decision-makers when considering this strategy, especially when time and resources are limited. Despite mounting evidence from a variety of vaccine-preventable diseases pointing to serology testing as a tool to provide sound and essential data to guide critical decision-making at different points of the immunization activities. But current national policies, regional suggestions, and historical data all point to the importance of serology testing for the COVID-19 immunization campaign and the application of regulations for a return to normalcy.

The decision-makers involved in planning and implementing COVID-19 vaccination strategies in Europe, such as national immunization technical advisors, ministries of health, and other independent decision-making bodies, can use the recommendations in this paper to inform their decisions on global, national, and subnational health policy. Aspects of this text may also help to forge crucial alliances and partnerships with the scientific community and important national research institutions, enhancing efforts by governments and academics to work together to fill knowledge gaps. As a result, the review and suggestions made are meant to aid in decision-making, increase awareness, direct advocacy efforts, and inspire more research. The epidemic is still present, thus readers should keep in mind that the

contents of this article must be viewed in the context of the circumstances and period of time surrounding its creation (Fig 2.1) [6].

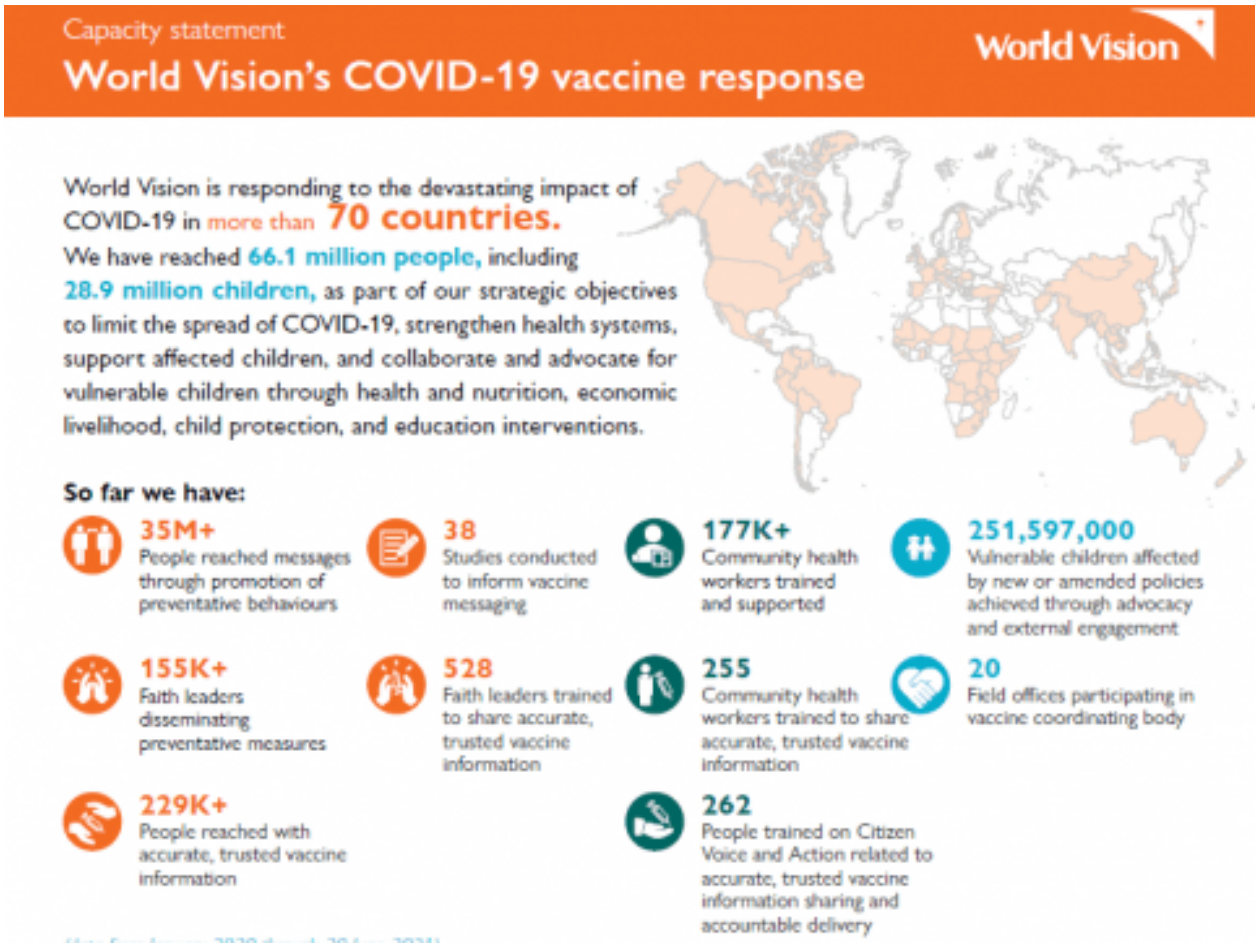

Fig 2.1 World vision of covid 19 vaccine response [7].

The policy imperatives for vaccine equity. Due to both moral and practical considerations, vaccine inequality is becoming a more significant topic in discussions about both public health and international policy. First, in order for everyone to have access to necessary medications and vaccinations, that right must be recognized as a fundamental human right. Second, pandemics strike in waves and have a disastrous impact on health systems, especially (though not primarily) those in LICs and LMICs. Third, as a pandemic virus spreads farther and faster, there is a greater chance that more virulent or transmissible varieties may appear. These variants could evade current vaccine formulations, endanger the entire world's population, and delay the world's economic recovery . Uncoordinated COVID-19

immunization might result in losses to the global gross domestic product (GDP) of up to USD 9.2 trillion, over half of which would be in industrialized economies, according to the International Chamber of Commerce. Therefore, it is crucial to ensure a system for fair global need-based pandemic immunization.

This viewpoint will not only examine the present global policy discussion but will also take into account the challenges that nations, particularly LICs and LMICs, have in setting up their national health systems such that COVID-19 vaccines are prioritized for purchase and distribution. While the 1995 World Trade Organization (WTO) Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) and its effect on vaccine access are currently receiving a lot of attention, which is understandable, this attention should not divert attention from the need to address other, related health inequities between and within countries. Notably, barely a third of Member States now comply with the key requirements of public health systems needed to uphold the duties to ensure fundamental health security and essential public health services, more than a decade after the WHO amended the International Health Regulations (IHR) in 2005. One of the main causes that vaccination coverage for various infectious diseases, including COVID-19, is still far from ideal for the majority of the world's population is the inability to strengthen frail and underfunded health systems. [8].

Each WHO member state should accept the idea of voluntary license sharing and technology transfer through a pool of technology that is controlled by a fair intellectual property system. To increase vaccine equality in a sustainable manner, contextualized, dynamic understandings and country-specific versions of health systems strengthening are required. [8].

The most recent Global Covid-19 immunization Strategy (1) from the World Health Organization lays out the crucial steps that Member States should take to meet their COVID-19 immunization goals.

• In environments where vaccination coverage (including boosters) is insufficient, vaccines should be distributed to high priority populations.

• It is urged that nations spend money on developing vaccines with better qualities.

• Promote fair distribution and quick access to vaccines with improved properties for all nations through manufacturing agreements.

• Look at the possibility of creating administration strategies for adult vaccinations.

• Improve health information systems to more effectively track the development of possible medical emergencies and provide information on when and how to implement policies.

• Ensure that the COVID-19 immunization campaign continues after 2022.

The World Health Organization (WHO), which was established in the middle of the 20th century, put in place global institutional structures that allowed both the global north and south to agree on the existence of an international health crisis.

After first showing up in the Chinese city of Wuhan in late 2019, the WHO labeled Covid-19 a global pandemic in March 2020. When Covid-19 first appeared, not much was known about the virus. Simply put, the responses of different nations to Covid-19 varied according on their capacities and other cultural, social, political, and economic considerations. Some nations, notably the US, dismissed Covid-19 as nothing more than a hoax, while others had stricter measures regarding it, such as social seclusion, contact tracing, lockdowns, identifying asymptomatic persons, testing kits/methods, and halting foreign and domestic travel.

Midway through 2020, it was clear that the Covid-19 epidemic was one of the deadliest disasters of the twenty-first century. By June 2021, 4 million deaths globally were attributed to COVID-19, according to WHO estimations. The development of Covid-19 vaccines has since given rise to fresh discussions in the field of international political economy (IPE). This essay attempts to make connections to comprehend the distribution of the Covid-19 vaccinations by drawing on Susan Strange's (1988) theoretical framework of four key structures in IPE: security, production, finance, and knowledge.

2.2 Prevalence of COVID-19

Through a comprehensive review and meta-analysis, this work seeks to determine the prevalence of post-coronavirus disease 2019 (COVID-19) globally.

On July 5, 2021, PubMed, Embase, and iSearch were searched, with verification running through March 13, 2022. We meta-analyzed the prevalence of post-COVID-19 conditions at 28+ days after infection using a random-effects framework and DerSimonian-Laird estimator.

Of the 50 studies included, 41 underwent meta-analysis. The estimated pooled global prevalence of the post-COVID-19 condition was 0.43 (95% CI,.39-.46). Estimates for patients who were hospitalized and those who weren't were 0.54 (95% CI,.44-.63) and 0.34 (95% CI,.25-.46), respectively. Asia had the highest regional prevalence estimates (0.51; 95% CI,.37-.65), followed by Europe (0.44; 95% CI,.32-.56), and the United States (0.31; 95% CI,.21-.43). Global prevalence was predicted to be 0.37 (95% CI,.26-.49), 0.25 (95% CI,.15-.38), 0.32 (95% CI,.14-.57), and 0.49 (95% CI,.40-.59), respectively, over the first 30, 60, 90, and 120 days following infection. With a prevalence of 0.23 (95% CI,.17-.30), fatigue was the most prevalent symptom. Memory issues came in second (0.14; 95% CI,.10-.19).

We discovered that the prevalence of depression symptoms during COVID-19 was more than three times greater than the most current population-based estimates of mental health in the US in this population-representative survey research of US people. This increase in the prevalence of depressive symptoms is greater than that observed following prior mass traumatic events, which is likely due to COVID-19's far greater significance and its social and economic ramifications compared to other, earlier researched mass traumatic events. During the early stages of the COVID-19 pandemic in the US, this study was undertaken. On April 13, 2020, the survey's last day, there had been more than 23,000 US fatalities and more than 600,000 verified cases.

Addressing treatment for these individuals will be an interesting and important discussion for health professionals, particularly if a large number of depression cases

are due to situational factors. While further data will be needed to assess the trajectory of depression in the US population and potential treatment for affected populations, it seems important to recognize the potential for the mental health consequences of COVID-19 to be large in scale, to recognize that these effects can be long-lasting, and to consider preventative action to help mitigate its effects.[28] In particular, this burden is being borne by economically and socially marginalized groups, suggesting that individuals with low income and with fewer resources may benefit from particular policy attention in coming months.

According to these findings, the prevalence of depressive symptoms in the US during COVID-19 was more than three times higher than it was prior to the pandemic. People who were more exposed to stressors, had poorer economic and social resources, and reported more depressive symptoms. Plans for after COVID-19 should take into account the foreseeable rise in mental illness, particularly among populations at risk. [11]

By mid-July 2020, the number of undiagnosed cases in the US is predicted to be close to 17 million.

Researchers from the National Institutes of Health say that the prevalence of COVID-19 during the spring and summer of 2020 in the United States was far higher than the known number of cases, and that the illness had an unequal impact across the nation. The researchers calculate that there were 4.8 undiagnosed instances of COVID-19 for every confirmed case during this time, totaling an extra 16.8 million cases by July alone. In addition to socioeconomic, health, and demographic information, the team's study of blood samples from individuals who had not yet been identified with SARS-CoV-2 infection provides insight into the virus's undiscovered spread and subgroup susceptibility to undiagnosed infection.

Antibodies that recognize SARS-CoV-2 antigens, also known as protein sections from the virus, were found using an enzyme-linked immunosorbent assay. These antigens can be bound to by antibodies in a blood sample. Out of the roughly 8,000 blood samples, the scientists discovered that 304 were seropositive—that is, they contained antibodies against the SARS-CoV-2 virus. During the study period,

the researchers calculated that 4.6% of adult Americans had COVID-19 that had not yet been diagnosed. They came to the conclusion that there were approximately 4.8 cases of COVID-19 that went undiagnosed for every diagnosed case.

The team found that:

- the youngest participants, those between the ages of 18 and 44, had the highest estimated seropositivity, at 5.9%;
- estimated seropositivity was higher in women than in men (5.5% versus 3.5%, respectively);
- participants in the Mid-Atlantic and Northeast regions had the highest rates (8.6% and 7.5%, respectively; participants in the Midwest had the lowest rates (1.6%);
- urban participants had a higher estimated seropositivity (5.3%);
- The estimated seropositivity rate for respondents who identified as Black/African American was 14.2%, followed by those who identified as Native American/Alaska Native (6.8%), Hispanic (6.1%), white/Caucasian (2.5%), and Asian (2%) respondents.

Following up with the enrolled patients is being done by the researchers in order to assess seroprevalence six and twelve months later. This will involve new analyses to distinguish between antibodies from infection and antibodies from vaccination, as well as antibody reactivity to variations of concern. [12].

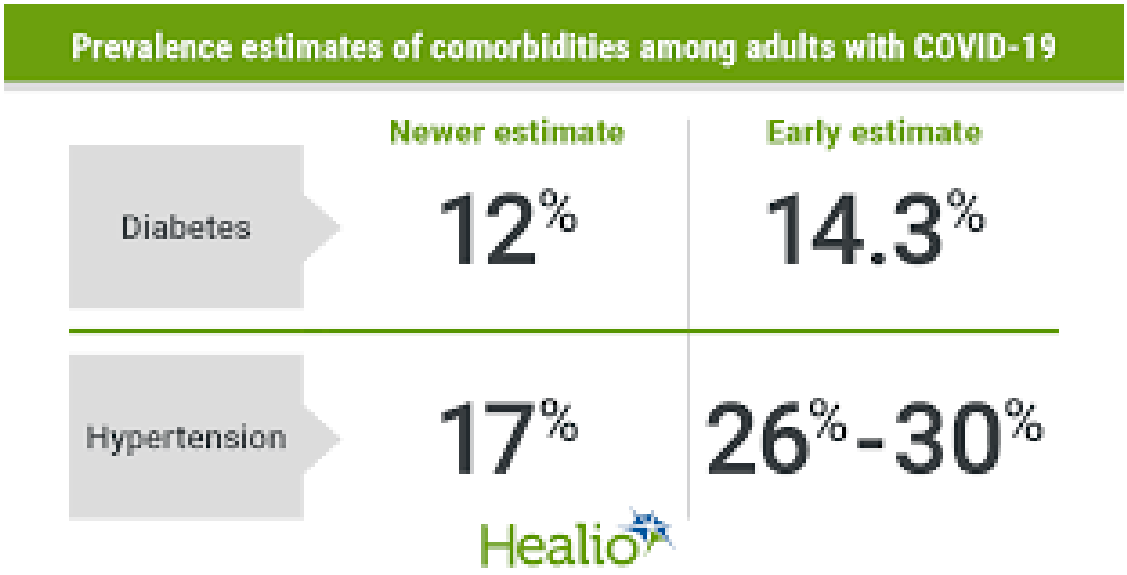

Fig 2.2 Prevalence of diabetes, hypertension among covid 19 [13].

The overall finding regarding the prevalence of diabetes during COVID is that patients with SARS-CoV-2 (COVID-19) exhibit a high prevalence of diabetes, and that the presence of diabetes is a factor in the illness' severity and prognosis.

Diabetes may make it easier to contract COVID-19 because it increases viral cell penetration and impairs immune response.

All individuals with diabetes with COVID-19 infection must maintain proper blood glucose management.

In today's world with limited access to healthcare facilities, telemedicine can be quite helpful for managing people with diabetes. [14].

The conclusion of the COVID-19 public health emergency and what it means for the CDC and the data we present are the subjects of a series of Weekly Review articles. The first issue came out on February 24th, 2023, and the last two issues were out on April 14th and May 12th.

Expectations for public health have radically shifted as a result of the COVID-19 pandemic, particularly in terms of how quickly reliable health information is distributed. It provided a chance to further alter how data is gathered, used, and shared both inside the CDC and outside of it. When the public health emergency ends on May 11, that momentum won't slow down. With certain modifications, CDC will continue to monitor and publish COVID-19 data while enhancing our capacity to respond to future public health emergencies.

Our response to the problems public health has had for too long, which the pandemic has brought to light, is the Data Modernization Initiative (DMI). The CDC is establishing a future where data can spread more quickly than illness through this project. Our ultimate objective is to obtain better, quicker, and more useful data for public health decision-making at all levels [15].

The epidemic highlighted the value of accurate statistics throughout the country's public health system. The CDC is aiming to improve COVID-19 public health surveillance (Fig 2.3).

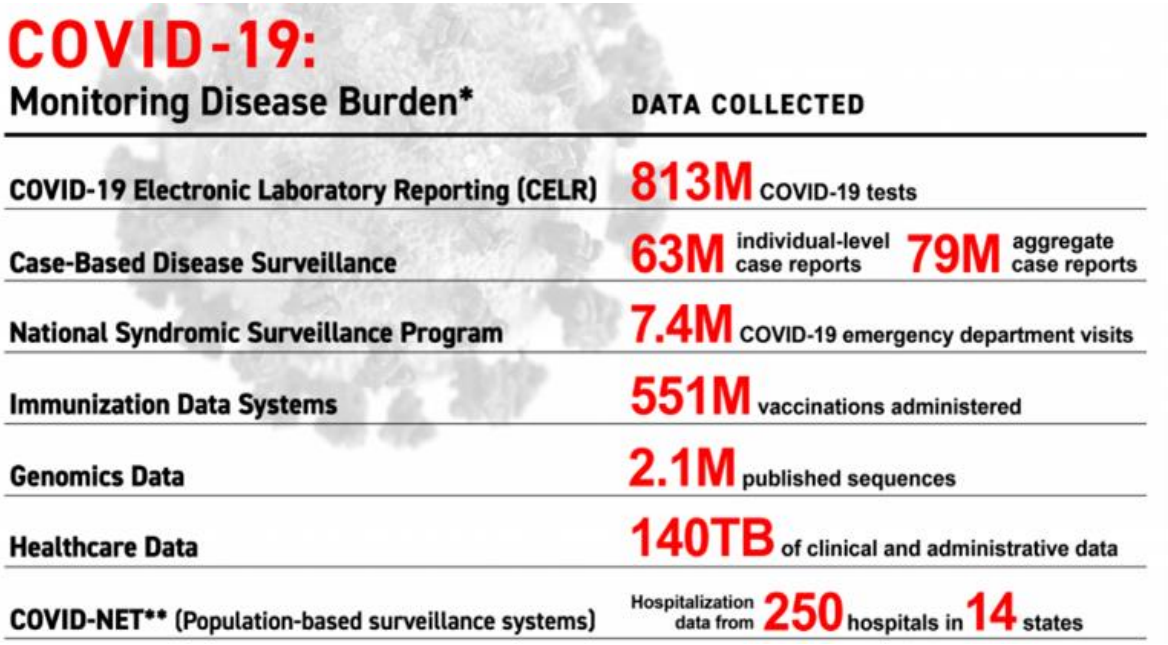

Fig 2.3 Results ow world monitoring COVID 19 [15].

Understanding disease severity and the range of illness. Monitoring and tracking vaccine distribution, uptake, and effectiveness. Identifying outbreaks. Identifying trends in SARS-CoV-2 transmission. Identifying trends in transmission intensity. Identifying outbreaks. Providing data to start case and contact investigations.

Estimate illness burden, estimate trends, impacts, and clinical and public health requirements; evaluate effects on healthcare systems; track effects of disease and actions on health equity.

The goal of DMI is to unite the public health community so that it can interact effectively with the healthcare system, engage the public in meaningful dialogue, increase health equity, and be equipped to safeguard and advance public health. The advancements we made during the pandemic are now creating a pathway for a new type of surveillance and improved methods for handling public health data.

Conclusions to Chapter 2

1. Study demonstrates that the COVID-19 vaccination policy is a complex issue, and there is no one-size-fits-all approach to its implementation. However, the study identifies some best practices that can be adopted by countries to improve their vaccination programs, such as transparent communication, equitable distribution, and collaboration between the public and private sectors. The study provides valuable insights that can inform policymakers and stakeholders in their efforts to combat the COVID-19 pandemic.

2. Globally, on 1 April 2023, there have been 767 364 883 confirmed cases of COVID-19, including 6 938 353 deaths, reported to WHO. 70% of the world population has received at least one dose of a COVID-19 vaccine. 13.39 billion doses have been administered globally, and 66,122 are now administered each day. 30% of people in low-income countries have received at least one dose.

Chapter 3.
MODERN STATE OF VACCINATION LEVEL IN UKRAINE AND MOROCCO AND COSTS FOR THEM

3.1. Comparative analysis for available vaccines in pharmaceutical market

During the COVID-19 pandemic, acute respiratory viral infections (ARVI) are particularly deadly due to their great prevalence. Vaccination is the most effective method of preventing the ARVI. Aim. to examine the Ukrainian vaccine market for pharmaceutical products. Materials and procedures. Data from the State Register of Medicines of Ukraine for 2020, details on the influenza and ARVI epidemic seasons reported by the Center for Public Health of the Ukrainian Ministry of Health, and announced wholesale prices for vaccinations in Ukraine for December 2020 served as the study's source material. Frequency analysis and descriptive analysis were employed. Discussion and conclusions. The structural study of the ATC categorization revealed that influenza viral vaccines of the J07B B group were offered on the pharmaceutical market. According to the frequency study, there were 665.000 doses of vaccines under 4 trade names on the Ukrainian pharmaceutical market in 2020, and every single one of them was made abroad, in France, the Netherlands, Great Britain, or Korea. 75% of the vaccinations purchased were produced in France. One dosage of the vaccination might be purchased for between 185.00 and 249.69 UAH. It was discovered that between 2016 and 2020, a 190-fold rise in vaccination doses purchased for the general public. The number of people who received vaccinations jumped by 123%, from 106683 to 238079. Conclusions. Following the research According to research, there were 4 trade names for foreign vaccines on the Ukrainian pharmaceutical market in 2020–2021. One

Ukraine administered approximately 6.99 million first doses, over seven million second doses, nearly 599 thousand booster shots, and about 23 thousand additional doses of COVID-19 vaccine developed by Pfizer and BioNTech as of February 20, 2022. Furthermore, the country used vaccines by AstraZeneca

(Covishield), Sinovac (CoronaVac), Moderna, and Johnson & Johnson (Janssen) for COVID-19 vaccination.

The objectives are to assess the pharmacoeconomics of COVID-19 vaccination and to assess the vaccine's cost-effectiveness in Ukraine.

We used models to examine the economics of the coronavirus vaccination. Using statistics from the Ministry of Health of Ukraine's official website, an example would be the population of Ukraine. Apri-May 2021

The transmission model was the tool we utilized to examine the vaccine strategy. Data were gathered from reputable sources. For the evaluation of high transmitters, we set up an age group model. For the purpose of determining the most cost-effective vaccination method, four options were assembled and examined: vaccination for everyone, no vaccination, vaccination for old age alone, and high transmitters' vaccination.

Results: Based on the country's economic situation and pandemic, we have examined the cost-effective plan for Ukraine. The vaccination of older persons was discovered to be the most cost-effective for Ukraine. These studies looked at how discount rate effects on QALYs in Ukraine. High transmitters' ratio was shown to be 8.8% higher when we vaccinate as opposed to the old. According to this analysis, it would not be as cost-effective to first immunize the older population. If the vaccine is made available early and pre-existing immunity is assumed, the cost-effectiveness for high transmitters has changed from the elderly in Ukraine to high transmitters, while the vaccine's price has doubled.

Morocco achieves the highest COVID-19 vaccine rates in Africa in the first phase. The global economy and public health continue to face major challenges from the coronavirus disease 2019 (COVID-19) pandemic, which is still spreading. The authorities in Morocco established a complete and stringent containment for a period of four months at the beginning of the pandemic.1 The government implemented numerous measures when the nation saw its first cases of novel coronavirus strains, including extending the national state of emergency and enforcing a national curfew at night. The number of cases has decreased because to these actions. Morocco is

still the second-most severely impacted nation in Africa by COVID-19, behind South Africa, with 483 410 cases. [18].

Every country has tried to lower the necessary dosage since the vaccine's launch. Table 1.2 includes information for African countries that had started the COVID-19 vaccination as of February 28, 2021. As we can see, there aren't many countries, and Morocco has a much smaller population than other countries. While vaccination rates were below 1% in other countries, Morocco had 3 597 903 doses (9.75% per 100 people). Morocco had a somewhat higher immunization rate after one month compared to France (6.97%), Italy (7.12%), and Spain (7.71%) after two months. Morocco has a progressive immunization schedule. Priority is given to those who labor in the front lines, including teachers, security personnel, government officials, senior citizens, and those with underlying medical conditions. After that, the immunization will be given to all adults according to age. [18].

Table 3.1

COVID-19 vaccine doses administered in African countries as of 28 February 2021 [18].

Country	Total administered doses	Administered doses per 100 people
Morocco	3 597 903	9.75
Algeria	75 000	0.17
South Africa	70 725	0.12
Senegal	25 653	0.15
Egypt	1315	0.0
Zimbabwe	18 843	0.13

Authorities have reassuringly provided vaccine doubters with an overview of the nation's regulatory structure for vaccine licensure. Since August, the health ministry has also started a large media campaign to educate, reassure, and motivate people to become inoculated. Furthermore, the nation's top leaders were among the first to receive the vaccination. [18].

Pregnant women in Morocco had fewer vaccinations than anticipated during the A (H1N1) pdm09 pandemic. The primary factors influencing pregnant women in Morocco's acceptance or rejection of the monovalent A (H1N1) pdm09 vaccination, as well as the information sources that influenced their decision-making process, were examined in a qualitative study utilizing open-ended questions. 123 pregnant women, both vaccinated and unvaccinated, who were in their second or third trimester between December 2009 and March 2010 made up the study sample. . In the neighborhoods of Casablanca and Kenitra, they took part in 14 focus group talks and eight in-depth interviews. Reasons for vaccination resistance were found using thematic qualitative analysis: (1) resistance to the monovalent A (H1N1) pdm09 vaccine; (2) conspiracy theories about the A (H1N1) pdm09 pandemic; (3) claims that Moroccans cannot receive the monovalent A (H1N1) pdm09 vaccine; (4) lack of knowledge about the monovalent A (H1N1) pdm09 vaccine; and (5) logistical difficulties associated with vaccination services. Acceptance of vaccines was influenced by two factors: modeling and perceived advantages. Family, community, mass media, religious figures, and healthcare professionals all had a significant impact on decision-making, indicating the need for widespread advocacy for vaccination (fig 3.1).

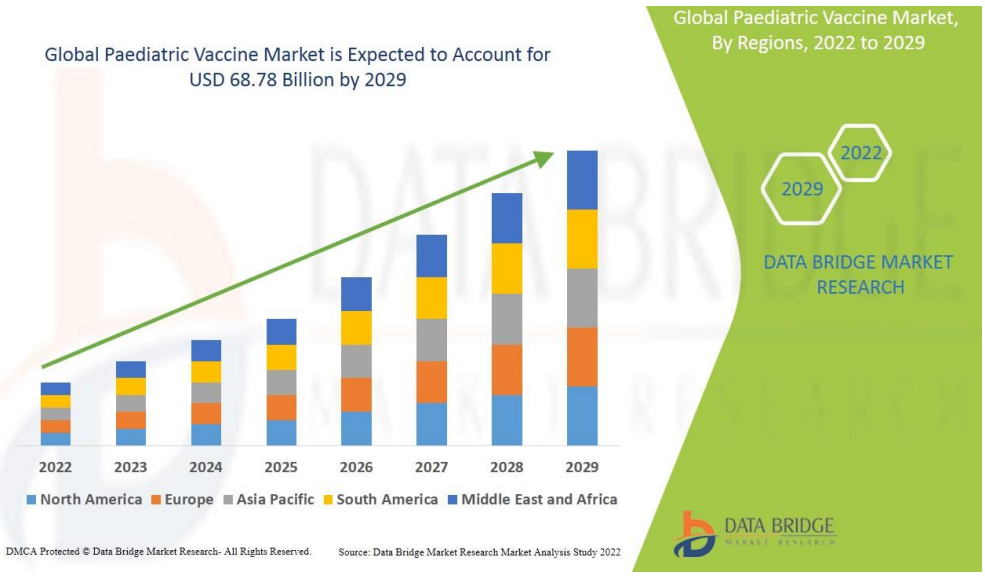

Fig 3.1 Clobal paediatric vaccine market

These context-specific findings must be taken into account for meaningful communication for upcoming vaccination programs. These findings may also be

helpful for developing the seasonal influenza vaccination in the Middle East and North Africa region generally, as cultural and religious values are shared by many Arab countries.

Several COVID-19 vaccines have been made available in the Ukrainian and Moroccan pharmaceutical markets as of September 2021. In Ukraine, Pfizer-BioNTech, Moderna, AstraZeneca, Sinovac, and CoronaVac were among the vaccinations that were offered. In the meantime, Sinopharm, AstraZeneca, and Pfizer-BioNTech were the vaccine manufacturers available in Morocco.

All of these vaccinations have undergone clinical trials to determine their safety and effectiveness, and they have all received regulatory authority approval in their respective nations. However, these vaccines' accessibility, cost, and distribution may differ based on elements like vaccine supply and demand, governmental regulations, and medical infrastructure.

3.2. Level of COVID-19 Vaccination in Ukraine and Morocco

COVID-19 vaccination in Ukraine: An update on the status of vaccination and the challenges at hand [21].

On March 3, 2020, the first case of COVID-19 in Ukraine was determined. In Ukraine, there were 1.4 million COVID-19 cases at the time of this study's completion in March 2021, with a mortality rate estimated at 27 480. Ukraine has been under quarantine and varied degrees of lockdown since March 12, 2020. According to surveys, 90% of Ukrainians believe that the COVID-19 outbreak has affected their way of life. Hope for the return of regular life has been sparked by the approval of COVID-19 vaccinations. However, there are a number of internal and external problems with the COVID-19 vaccination program in Ukraine. Up until the end of January 2021, the Ukrainian parliament intended to pass legislation allowing for quick registration of COVID-19 vaccines.

The Ukrainian Ministry of Health unveiled a SARS-CoV2 immunization schedule for the populace on February 1st, 2021 (Table 1). The immunization program was divided into five stages, starting with the vaccination of Ukrainian

medical personnel and the armed forces. The first vaccine shipments to Ukraine arrived in February 2021. Because Ukraine is a part of the GAVI alliance, a global vaccine alliance involving governments, research institutions, private companies, nonprofit organizations, and civil society, as well as international organizations like the United Nations and the World Health Organization, the European Union has pledged to give Ukraine vaccines. The government of Ukraine will purchase COVID19 vaccines at an exorbitant price, according to Ukrainian media sources, which infuriated the public and sparked protests , which caused vaccine confidence to decline.

Table 3.2

The Ukrainian vaccination plan per population group

February–April	367 000	Medical workers in hospitals and military personnel
April–June	1.9 million	People aged 80+ and primary medical care providers
June–July	2.9 million	People between 70 and 79 years of age
July–August	640 000	State Security Officers
August–September	2.3 million	People over 65–69 years of age
September–October	1.4 million	Education workers
October–November	2.8 million	People over 60–64 years of age
November–December	1.7 million	Other category

It appears that Ukrainians who want free vaccinations will have to wait for their turn or until the second half of 2021, and those who want vaccinations sooner will have to pay for them out of pocket. According to a survey conducted by the sociological organization "Rating," 55% of Ukrainians are willing to receive a free

SARS-CoV2 vaccine. The percentage of Ukrainians who are prepared for immunization falls to 35% if the vaccine must be purchased out of pocket.

Ukraine is in the beginning stages of SARS CoV2 immunization, hence there is currently a strong push to inform the populace about the safety of vaccines. While some contracts have already been signed, others are still being worked on. There are not many Ukrainians who are prepared for vaccination. The situation is made worse by media misinformation and the support of the anti-vaccine movement. Additionally, issues with vaccine procurement and policy mistrust can be linked to the vaccination problem.

It is also important to note that in 2020, few Ukrainians expressed a desire to have the flu shot. However, not all Ukrainians follow the guidelines for adaptive quarantine, which raises the infection rates. Perhaps the initial vaccination campaign will alter Ukrainians' perceptions when politicians and other public figures also receive vaccinations, demonstrating the vaccine's safety through their own examples. The interaction of the economic and foreign relations has an impact on Ukraine's immunization plans. Only the second half of 2021 will allow for the national execution of a comprehensive pan-Ukrainian immunization program. This is also a good time to consider how unevenly the COVID-19 vaccine has been distributed in the WHO Europe region and to contrast that with what has happened in Africa and the Middle East.

In sharp contrast, major vaccination campaigns started as early as January 2021 in other Eastern European nations. The COVID-19 vaccination can be used as a stopgap to reassess this policy and either completely implement it or abolish it, given the reports of violations of this right in other official and unofficial contexts of health care.

Infections with the coronavirus are very common in Ukraine. The need for vaccinations is essential, especially for healthcare professionals. If vaccines are made promptly and widely available, it is anticipated that at least half of the Ukrainian population will be willing to receive the COVID-19 vaccine (Fig 3.2).

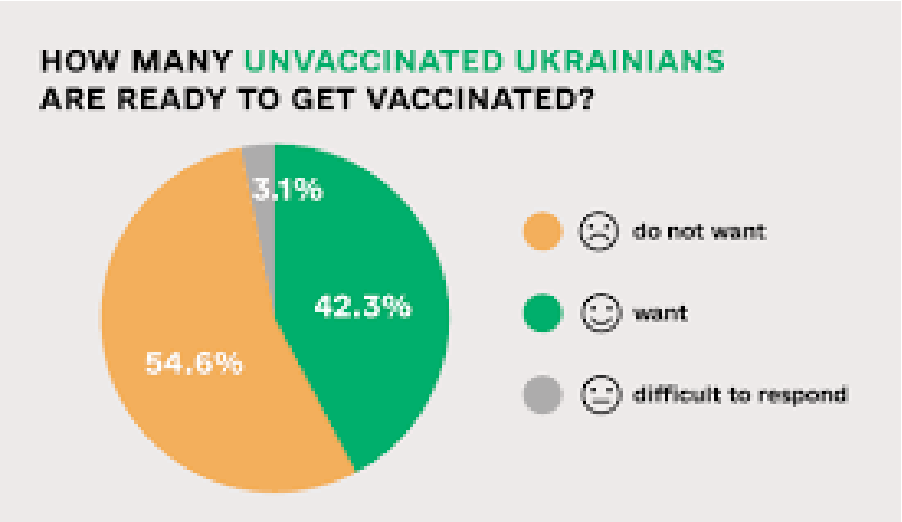

Fig 3.2. Level of readiness for vaccination against COVID-19

COVID-19 Vaccination Acceptance among Health Science Students in Morocco [22]

There is no evidence on the aspects that affect students' adoption of the COVID-19 vaccine, despite the fact that Moroccan COVID-19 response and vaccination programs actively involve students of the health sciences. This study aimed to determine the willingness of Moroccan health science students to accept the COVID-19 vaccine as well as to identify the attitudes and beliefs that indicate their propensity to do so. Overall, 1272 students participated. Both univariate and multivariate logistic regression models were used to obtain odds ratios and 95% confidence intervals. The majority of participants—26.9%—said they would be willing to get the COVID-19 vaccine. Male students were more inclined to consent to the vaccine than female students. The likelihood of students being amenable to receiving the vaccine increased with their attitudes and beliefs toward COVID-19 infection. These students also perceived infection likelihood and severity as being higher. A cross-sectional, self-administered online survey was conducted in January 2021 among students at the Mohammed VI University of Health Sciences in Morocco. When they perceived the vaccine to be more effective and to cause less harm, students were more open to receiving a COVID-19 vaccination. Future initiatives to improve communication and develop strategies to increase students' adoption of the COVID-19 vaccine might use our findings as a guide.

According to the study's findings, the COVID-19 vaccine is not well received by Moroccan students of health sciences. The following factors were linked to vaccination willingness: gender, trust in the information being communicated about COVID-19, perceived likelihood of COVID-19, perceived severity of COVID-19, perceived harm of a COVID-19 vaccine, and perceived effectiveness of a COVID-19 vaccine.

As recommended by WHO Between 3 January 2020 and 10:11 AM CEST on April 12, 2023, 1 272 733 confirmed COVID-19 cases with 16 296 fatalities were reported from Morocco to WHO. As of April 11th, 2023, 55 387 522 vaccination doses had been given.

Furthermore, as of September 2021, about 26.7% of the population of Morocco had received at least one dose of the COVID-19 vaccine, and about 19.4% had received two doses.The Moroccan government has pushed vaccination heavily and begun a national immunization campaign. Several vaccines, including those made by Johnson & Johnson, Sinopharm, Pfizer-BioNTech, and AstraZeneca, have been used by the country in its campaign.

In addition to the government's efforts, a number of organizations and civil society groups in Morocco have been working to promote vaccination and raise awareness of its significance.

3.3. Comparison of costs for vaccination and immunization in Ukraine and Morocco

In Ukraine, vaccination programs are conducted according to age against 10 infectious diseases, including measles, rubella, mumps, diphtheria, pertussis, tetanus, polio, and Haemophilus influenzae.The Program of immunization and prevention against infectious diseases between 2009-2015 was adopted by the Law of Ukraine from 21.10.2009 N 1658-VI.In the years 2011–2012, the media reported vaccination results incorrectly, and many parents chose not to vaccinate their children. As a result, there were 12,000 cases of measles and rubella, which is 80 times more cases than in previous years. 2010 saw a budget of 237 million UAH (1 USD = 7.99 UAH), 2011 saw a budget of 237 million, and 2012 saw a budget of 302 million UAH.

We calculated the cost per 1,000 0 to 1 year old children. Pentaxim (Sanofi Pasteur), a combination vaccination against hepatitis B (produced by the Ukrainian company "Biolik"), had direct costs that were computed and compared to those of Infanrix hexa (GSK). We took into account the price of the vaccine, any storage losses, and the cost of hiring medical staff to administer the shot. We made use of the prices listed in the "MORION" Ukrainian electronic pricing database as of June 1, 2012. Pentaxim is equally clinically effective as Infanrix hexa, according to analysis of data based on evidence, but it enhances the rate of hepatitis B vaccination coverage.

Pentaxim and the HiB vaccine cost 633 240 UAH, whereas pediatricians and nurses cost 36763 UAH in labor. The cost of the Infanrix hexa vaccination was 803880 UAH, while the cost of the medical staff was 18 381 UAH.

In 2012, the cost of immunization for 385 116 children by Infanrix hexa was 118 307 590 UAH, compared to the cost for 363 000 children by Pentaxim, which was 95 830 447 UAH. The findings indicated a need for an additional 22477143 UAH, which is justified in order to raise the rate of hepatitis B vaccination coverage by 6%.

Evaluation of the Costs of Antirotavirus Vaccination for Children Overall in Ukraine [23] A pharmacoeconomic analysis of the price of the entire child Rotavirus vaccination program in Ukraine in May 2016.

The Ministry of Health (MoH) provided official health data on the general age distribution of the population in Ukraine, which were used in the inquiry. In this study, the basic antirotavirus vaccination schedule recommended by the World Health Organization (WHO) for children was used. Data from the State Formulary List were used to estimate the number of vaccines authorized for the prophylaxis of Rotavirus infection (the MoH of Ukraine approved issue VI of the State Formulary List on March 31, 2015, number 183). Prices of the suitable vaccine on May 2016 from the "Morion" database were examined in calculations of the costs of the coverage.

According to WHO recommendations, children younger than 24 months old should receive the vaccine for rotavirus infection prophylaxis. The MoH of Ukraine estimates that there are 1 380 000 children under the age of 2 living in the country. It was discovered that a monovalent vaccine used as a preventative measure against rotavirus gastroenteritis was registered in Ukraine at the time of the study. In order to give comprehensive immunization for children under the age of two, it will cost approximately 20 755 trillion U.S. dollars (based on the National Bank's current rate and the vaccine's average wholesale price in Ukraine).

The results of the analysis allowed us to determine that it would cost $20,8 million dollars to immunize all Ukrainian children under the age of two in May 2016.

5 important facts about immunization in Ukraine [24]

The greatest and safest method of defense against numerous diseases that might be fatal is vaccination. In Ukraine, national security is impacted by public vaccination trust. To undermine public confidence in vaccination, healthcare systems, and democratic societies, a number of myths about the safety of vaccines and the significance of immunization are being spread, particularly by Russian bots and trolls. These individuals spread lies and post anti-vaccine messages on social media. The Ukrainian Ministry of Health must make sure that all Ukrainians have

access to reliable and accurate information about vaccines, accept the truth, and do not accept false information.

1: Vaccines purchased using state budget monies that are of high quality and safety: The World Health Organization (WHO) has pre-qualified all of the vaccinations that UNICEF has obtained for Ukraine as being of the highest quality, safety, and efficacy. All vaccinations purchased using state budget dollars have undergone rigorous testing and are proven to be safe and effective through usage in numerous nations across the world.

2: Manufacturers of vaccines (US, RK, Belgium, France, Bulgaria, India)

3. Free vaccinations for both adults and children: All vaccines listed in the National Recommended Immunization Schedule, including those for booster and catch-up immunization, are purchased with money from the state budget and are given to both children and adults without charge. Hepatitis B, TB, diphtheria, pertussis, tetanus, poliomyelitis, Haemophilus influenzae type b (Hib), measles, rubella, and mumps are among the ten diseases for which Ukraine specifically purchases vaccines.

4: Any vaccine must have the pertinent current edition vaccine information materials and detailed instructions in Ukrainian, and patients must be given access to these materials upon request.

5: Unjustified restrictions on the use, distribution, and sale of vaccines: After resolving the issues with vaccine shortages, the Ukrainian Ministry of Health is now making every effort to ensure that Ukrainians believe trustworthy and scientifically-supported facts regarding vaccination, not hoaxes and debunked speculations. Every Ukrainian person should exercise their right to health, which includes receiving vaccinations for serious illnesses and immunizing their children.

Cervical cancer prevention in Morocco: a model-based cost-effectiveness analysis [25]. Cervical cancer, the second most common and lethal malignancy in women, is a major public health concern in Morocco. The HPV vaccine could have a significant positive impact on nations that have not yet implemented it, but prior

to implementation, it is required to conduct country-specific economic studies that take into account current screening procedures.

To determine the long-term health benefits and costs of HPV vaccination and current screening by visual inspection with acetic acid (VIA), a Markov model was created to replicate the natural history of HPV and cervical cancer. The current model was calibrated to cervical cancer incidence from Morocco using a prior transition probability matrix utilized for a model from Spain. The cost of screening and clinical treatments from the standpoint of public healthcare was estimated using cost survey data. Costs and health outcomes were both discounted at 3%, and incremental cost-effectiveness ratios were estimated as 2018 US dollars per additional year of life saved (YLS).

Assuming VIA every three years in women aged 30-49 at 10% coverage, the predicted reduction in lifetime risk of cervical cancer for current screening would be 14% at a cost of US$551/YLS compared with no intervention. When compared to no intervention, HPV vaccination of preadolescent girls at 70% coverage would result in a 62% lifetime risk reduction for cervical cancer. In contrast to screening alone, vaccination would be more effective when paired with current screening, and the combined strategy would result in a 69% reduction at a cost of US$2,843/YLS. When screening coverage is greater than 15%, immunization would predominate, whereas the combination strategy would quickly cost more than US$4,000/YLS.

In Morocco, HPV vaccination may be both extremely efficient and economical. When compared to no intervention, current screening would offer good value for money, but scaling up screening coverage would render it ineffective when compared to vaccination.

Hepatitis B in Moroccan health care workers [26]. To determine Moroccan healthcare workers' (HCWs) knowledge and perception of hepatitis B, including prevention, and to calculate vaccine coverage (VC) and seroprevalence of hepatitis B.

A total of 420 HCWs were chosen at random and divided into three groups by location: 120 in Rabat, 140 in Taza, and 160 in Témara-Skhirat. The study includes a serological survey and an anonymous questionnaire about knowledge of hepatitis

B and its prophylaxis. The VC of the HCWs was examined using oral testimonies and vaccination registries. Analysis of VC and serological tests was done based on occupational exposure.

Both the questionnaire and the serological tests had participation rates of 68% (285/420) and 66% (276/420), respectively. 15 (5%) HCWs reported having had hepatitis B in the past. All HCWs believed that exposure to the hepatitis B virus (HBV) could result in infection. 276 (98%) HCWs agreed that vaccination was a crucial defense against HBV transmission. 42 percent of HCWs lacked serological evidence of HBV. Hepatitis B surface antigen was 1% prevalent. The mean prevalence of the hepatitis B core antibody (anti-HBc) was 28%, and among nursing auxiliaries (57%), nurses (30%), medical doctors (31%) and midwives (25%) it was significantly greater (P 0.05) than it was among laboratory technicians (13%). The VC (3 doses) was 55%, as reported by the immunization registers (available at two sites). Midwives had a VC of 75%, nurses had a VC of 61%, nursing assistants had a VC of 53%, and medical staff had a VC of 38%. 51% of the completely immunized HCWs who were negative for anti-HBc exhibited serological proof of protection.

By strengthening current immunization programs, Moroccan HCWs should have easier access to HBV vaccinations.

Several COVID-19 vaccines have been made available in the Ukrainian and Moroccan pharmaceutical markets as of September 2021. In Ukraine, Pfizer-BioNTech, Moderna, AstraZeneca, Sinovac, and CoronaVac were among the vaccinations that were offered. In the meantime, Sinopharm, AstraZeneca, and Pfizer-BioNTech were the vaccine manufacturers available in Morocco.

All of these vaccinations have undergone clinical trials to determine their safety and effectiveness, and they have all received regulatory authority approval in their respective nations. However, these vaccines' accessibility, cost, and distribution may differ based on elements like vaccine supply and demand, governmental regulations, and medical infrastructure.

Conclusion for Chapter 3

The worldwide COVID-19 immunization campaign was still going strong, with different parts of the world experiencing differing degrees of success. However, it was evident from the data available at the time that high-income countries were able to vaccinate a greater percentage of their populations than low- and middle-income countries due to better access to vaccines.

Lower vaccination rates were also being caused in some areas by vaccine reluctance and false information. Concerns regarding the efficacy of current vaccines and the requirement for booster shots were also raised by the appearance of new virus strains. Overall, it was clear that attaining herd immunity and limiting the spread of the virus required international cooperation and equitable vaccination distribution.

In March 2021, about half of the population did not plan to get vaccinated. In an August 2021 poll 56% of Ukrainians did not plan to be vaccinated. After the 24 February 2022 Russian invasion of Ukraine the Ukrainian vaccination program continued, although on a much smaller scale with by late May 2022 50-60 thousand people being vaccinated in a week. By late May 2022 vaccination continued in all regions of Ukraine, except in Luhansk and Donetsk Oblast. In September 2022 a third dose of the vaccine was offered to everyone who had his last vaccination four months ago.

As of March 5, 2023, around 55.4 million doses of coronavirus (COVID-19) vaccines had been administered in Morocco. The number comprised first, second, and third doses. Morocco was one of the leading countries in the COVID-19 vaccination drive on the African continent.

GENERAL CONCLUSIONS

1. The economic, medical, and public health infrastructure in China as well as, to a lesser extent, in other nations, particularly its neighbors, has been put to the test by this virus outbreak. Only time will be able to determine how the virus might affect our life in the future. Furthermore, zoonotic virus and disease outbreaks are expected to persist in the future. Therefore, efforts should be made to develop comprehensive strategies to prevent future outbreaks of zoonotic origin in addition to containing this outbreak.

2. Study demonstrates that the COVID-19 vaccination policy is a complex issue, and there is no one-size-fits-all approach to its implementation. However, the study identifies some best practices that can be adopted by countries to improve their vaccination programs, such as transparent communication, equitable distribution, and collaboration between the public and private sectors. The study provides valuable insights that can inform policymakers and stakeholders in their efforts to combat the COVID-19 pandemic.

3. Globally, on 1 April 2023, there have been 767 364 883 confirmed cases of COVID-19, including 6 938 353 deaths, reported to WHO. 70% of the world population has received at least one dose of a COVID-19 vaccine. 13.39 billion doses have been administered globally, and 66,122 are now administered each day. 30% of people in low-income countries have received at least one dose.

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ANNEX

МІНІСТЕРСТВО ОХОРОНИ ЗДОРОВ'Я УКРАЇНИ
НАЦІОНАЛЬНИЙ ФАРМАЦЕВТИЧНИЙ УНІВЕРСИТЕТ

СЕРТИФІКАТ УЧАСНИКА

Цим засвідчується, що

Oufkir Hajar

Scientific supervisor: Surikova I.O.

брав(ла) участь у роботі

XXIX Міжнародної науково-практичної конференції молодих вчених та студентів

«АКТУАЛЬНІ ПИТАННЯ СТВОРЕННЯ НОВИХ ЛІКАРСЬКИХ ЗАСОБІВ»

В.о. ректора
Національного фармацевтичного університету

МІНІСТЕРСТВО ОХОРОНИ ЗДОРОВ'Я УКРАЇНИ Національний фармацевтичний університет №02010936

Алла КОТВІЦЬКА

19-21 квітня 2023 р, м. Харків

Annex A

National University of Pharmacy

Faculty for foreign citizens' education
Department of social pharmacy

Level of higher education master

Specialty 226 Pharmacy, industrial pharmacy
Educational program Pharmacy

APPROVED
The Head of Department
of Social Pharmacy

_____
Alina VOLKOVA
"28" of September 2022

ASSIGNMENT
FOR QUALIFICATION WORK
OF AN APPLICANT FOR HIGHER EDUCATION

Hajar OUFKIR

1. Topic of qualification work: «Analysis of the current state of coronavirus vaccination in the world», supervisors of qualification work: Alla KOTVITSKA, Doctor of Pharmacy, professor; Iryna SURIKOVA, assistant professor, PhD

approved by order of NUPh from "06th" of February 2022 № 35

2. Deadline for submission of qualification work by the applicant for higher education: April 2023.

3. Outgoing data for qualification work: data from scientific and periodical literature in accordance with research objectives; reports of international organizations, statistical data.

4. Contents of the settlement and explanatory note (list of questions that need to be developed): to conduct a review of literary sources on COVID 19 pandemy and vaccination; to investigate the international policy approaches in Coronovirus vaccination; to analyze the prevalence of COVID-19 in the world; to make comparative analysis for available vaccines in the pharmaceutical market of Ukraine and Morocco; to study of level of COVID-19 vaccination in Ukraine and Morocco; to analyse comparison of costs for vaccination and immunization in Ukraine and Morocco.

5. List of graphic material (with exact indication of the required drawings):
Tables – 3, figures – 6

6. Consultants of chapters of qualification work

Chapters	Name, SURNAME, position of consultant	Signature, date	
		assignment was issued	assignment was received
1	Iryna SURIKOVA, assistant professor of higher education institution of department Social Pharmacy Alla KOTVITSKA, professor of higher education institution of department Social Pharmacy, professor	30.09.2022	30.09.2022
2	Iryna SURIKOVA, assistant professor of higher education institution of department Social Pharmacy Alla KOTVITSKA, professor of higher education institution of department Social Pharmacy, professor	15.11.2022	15.11.2022
3	Iryna SURIKOVA, assistant professor of higher education institution of department Social Pharmacy Alla KOTVITSKA, professor of higher education institution of department Social Pharmacy, professor	23.12.2022	23.12.2022

7. Date of issue of the assignment: «28» of September 2022.

CALENDAR PLAN

№	Name of stages of qualification work	Deadline for the stages of qualification work	Notes
1	Analysis of scientific, periodic literature on the topic of qualification work	October 2022	**done**
2	Study of the current state of regulating policy of vaccination	November – December 2022	**done**
3	Modern state of vaccination level in Ukraine and Morocco and costs for them	January-February 2023	**done**
4	Summary of the results of the study	March 2023	**done**
5	Finalizing the work, preparing the report	April 2023	**done**

An applicant of higher education Hajar OUFKIR

Supervisors of qualification work Alla KOTVITSKA
Iryna SURIKOVA

ВИТЯГ З НАКАЗУ № 35
По Національному фармацевтичному університету
від 06 лютого 2023 року

нижченаведеним студентам 5-го курсу 2022-2023 навчального року, навчання за освітнім ступенем «магістр», галузь знань 22 охорона здоров'я, спеціальності 226 – фармація, промислова фармація, освітня програма – фармація, денна форма здобуття освіти (термін навчання 4 роки 10 місяців та 3 роки 10 місяців), які навчаються за контрактом, затвердити теми кваліфікаційних робіт:

• **по кафедрі соціальної фармації**				
Уфкір Хажар	Аналіз поточного стану вакцинації від коронавірусу у світі	Analysis of the current state of Coronavirus Vaccination in the world	професор Котвіцька А.А., ас. Сурікова І.О.	доцент Юрченко Г.М.

Ректор

Вірно. Секретар

Ф А2.8-47-110

ВИСНОВОК

Комісії з академічної доброчесності про проведену експертизу

щодо академічного плагіату у кваліфікаційній роботі

здобувача вищої освіти

№ 113292 від « 2 » травня 2023 р.

Проаналізувавши випускну кваліфікаційну роботу за магістерським рівнем здобувача вищої освіти денної форми навчання Уфкір Хажар, 5 курсу, _____ групи, спеціальності 226 Фармація, промислова фармація, на тему: «Аналіз поточного стану вакцинації від коронавірусу у світі / Analysis of the current state of Coronavirus Vaccination in the world», Комісія з академічної доброчесності дійшла висновку, що робота, представлена до Екзаменаційної комісії для захисту, виконана самостійно і не містить елементів академічного плагіату (компіляції).

Голова комісії,

професор **Інна ВЛАДИМИРОВА**

0%

26%

Ф А 2.2.1-32-353

REVIEW

of scientific supervisor for the qualification work of the master's level of higher education of the specialty 226 Pharmacy, industrial pharmacy

Hajar OUFKIR

on the topic: «ANALYSIS OF THE CURRENT STATE OF CORONAVIRUS VACCINATION IN THE WORLD »

Relevance of the topic. This topic is highly relevant in the current global scenario. With the ongoing COVID-19 pandemic, vaccination has become the most crucial tool to combat the virus and its variants. The world is witnessing a race to vaccinate as many people as possible to achieve herd immunity and bring an end to the pandemic. Therefore, analyzing the current state of coronavirus vaccination in the world is essential to understand the progress made so far, identify the challenges faced, and suggest measures to improve the vaccination process. This topic is crucial not only for healthcare professionals and policymakers but also for the general public to make informed decisions about their health and safety.

Practical value of conclusions, recommendations and their validity. The practical significance of the obtained results lies in conducting a review of modern scientific and analytical literature on the COVID-19 vaccination in the world with a detailed study of the structure of prevalence COVID-19, level of vaccination and analys available vaccinas.

Assessment of work. During the research the student showed a creative approach to the solution of the tasks, diligently conducted research work, summarized and presented the results properly, which indicates the awareness of the problem and the proper level of its development. The work is carried out at a sufficient scientific level.

General conclusion and recommendations on admission to defend. In general, the qualification work of Hajar OUFKIR on the topic « Analysis of the current state of coronavirus vaccination in the world » is performed at the proper level, meets the requirements of the "Regulations on the preparation and protection of qualification works at the National University of Pharmacy" and can be recommended for defense in the Examination commission.

Scientific supervisors Professor Alla KOTVITSKA
Iryna SURIKOVA

«6th» of April 2023

Ф А 2.2.1-32-356

REVIEW

for qualification work of the master's level of higher education, specialty 226 Pharmacy, industrial pharmacy

Hajar OUFKIR

on the topic: «ANALYSIS OF THE CURRENT STATE OF CORONAVIRUS VACCINATION IN THE WORLD »

Relevance of the topic. The relevance of the topic is extremely high due to the ongoing global pandemic caused by the COVID-19 virus. With the virus spreading rapidly across the world, vaccination has become the most effective method to control the spread and severity of the disease. The current status of coronavirus vaccination in the world is constantly changing, with new vaccines being developed, approved, and distributed worldwide. Therefore, analyzing the current state of coronavirus vaccination in the world is crucial in understanding the progress made so far, identifying the challenges and opportunities, and developing strategies to accelerate the vaccination process to protect people's health and minimize the negative impact of the pandemic on the global economy and society.

Theoretical level of work. The acquirer conducted an analysis of publications on the subject under study, an analysis of international legal acts regulating the COVID 19 vaccination policy. The generalized results of this analysis are systematized and reflected in the work.

Author's suggestions on the research topic. A comprehensive analysis of the current state of COVID 19 vaccination around the world, their comparison and reflection of best practices is worthy of attention.

Practical value of conclusions, recommendations and their validity. Acquaintance with the qualification work gives reasons to affirm the expediency of the conducted research and the practical value of the recommendations.

Disadvantages of work. Minor typos and grammatical errors are present in the text.

General conclusion and assessment of the work. According to the relevance and the results of the research qualification work of Hajar OUFKIR on the topic «Analysis of the current state of coronavirus vaccination in the world» meets the requirements for master's works and can be recommended for official defense in the Examination commission.

Reviewer Associate professor Gennadii IURCHENKO

«13th» of April 2023

Ф А2.5-32-231

ВИТЯГ

з протоколу засідання кафедри соціальної фармації

№ 12 від «20» квітня 2023 року

ПРИСУТНІ: зав. каф. доц. Волкова А. В., доц. Кубарєва І.В., доц. Овакімян О.С., доц. Болдарь Г.Є., доц. Корж Ю.В., доц. Терещенко Л.В., доц.Гавриш Н.Б., доц. Калайчева С.Г., ас. Пилюга Л.В., ас. Сєврюков О.В., ас. Сурікова І.О., ас. Тарасенко Д.Ю., ас. Ноздріна А.А

ПОРЯДОК ДЕННИЙ: Про представлення до захисту в Екзаменаційній комісії кваліфікаційних робіт.

СЛУХАЛИ: завідувачку кафедри доц. Волкову А. В. з рекомендацією представити до захисту в Екзаменаційній комісії кваліфікаційну роботу здобувача вищої освіти спеціальності 226 Фармація, промислова фармація Уфкір Хажар на тему: «Аналіз поточного стану вакцинації від коронавірусу у світі».

Наукові керівники: д. фарм. н., професор кафедри СФ Котвіцька А.А., к. фарм. н., асистент кафедри Сурікова І.О.

Рецензент: Рецензент: к. фарм. н., доцент кафедри ОЕФ Юрченко Г.М.

ВИСТУПИЛИ: доц. Терещенко Л.В., доц. Гавриш Н.Б., доц. Калайчева С.Г. висловили рекомендації до кваліфікаційної роботи Уфкір Хажар

УХВАЛИЛИ: Рекомендувати до захисту в Екзаменаційній комісії кваліфікаційну роботу здобувача вищої освіти Уфкір Хажар на тему: «Аналіз поточного стану вакцинації від коронавірусу у світі».

Завідувачка каф. СФ, доцент _____ Аліна ВОЛКОВА

Секретар, асистент _____ Альміра НОЗДРІНА

Ф А2.2.1-32-042

НАЦІОНАЛЬНИЙ ФАРМАЦЕВТИЧНИЙ УНІВЕРСИТЕТ

ПОДАННЯ
ГОЛОВІ ЕКЗАМЕНАЦІЙНОЇ КОМІСІЇ
ЩОДО ЗАХИСТУ КВАЛІФІКАЦІЙНОЇ РОБОТИ

Направляється здобувач вищої освіти Уфкір ХАЖАР до захисту кваліфікаційної роботи
за галуззю знань 22 Охорона здоров'я
спеціальністю 226 Фармація, промислова фармація
освітньою програмою Фармація
на тему: «Аналіз поточого стану вакцинації від коронавірусу у світі».

Кваліфікаційна робота і рецензія додаються.

Декан факультету _____ / Світлана КАЛАЙЧЕВА /

Висновок керівника кваліфікаційної роботи

Здобувач вищої освіти Уфкір ХАЖАР під час виконання кваліфікаційної роботи продемонстрував уміння працювати з науковими даними, проводити їх узагальнення, аналізувати та узагальнювати результати дослідження. Усі поставлені завдання відповідно до мети роботи було виконано у повному обсязі. Результати дослідження належним чином оброблені і представлені.

Таким чином, кваліфікаційна робота може бути рекомендована до офіційного захисту в Екзаменаційній комісії Національного фармацевтичного університету.

Керівники кваліфікаційної роботи Алла КОТВІЦЬКА
Ірина СУРІКОВА

«06» квітня 2023 р.

Висновок кафедри про кваліфікаційну роботу

Кваліфікаційну роботу розглянуто. Здобувач вищої освіти Уфкір ХАЖАР допускається до захисту даної кваліфікаційної роботи в Екзаменаційній комісії.

Завідувачка кафедри
соціальної фармації Аліна ВОЛКОВА

«20» квітня 2023 р.

Qualification work was defended

of Examination commission on

« ___ » _____ 2023

With the grade _____

Head of the State Examination commission,

DPharmSc, Professor

_____ / Oleh SHPYCHAK /