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## **COMPARATIVE STUDY OF NATIONAL BIOLOGICAL SECURITY, WITH A FOCUS ON AZERBAIJAN: STRATEGIES FOR PRESERVING AND CONTROLLING THE TRANSMISSION OF PUBLIC HEALTH THREATS**

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### **Ismayilova P.F. Comparative Study of National Biological Security, with a focus on Azerbaijan: Strategies for Preserving and Controlling the Transmission of Public Health Threats.**

In recent years, the world has witnessed the emergence and rapid spread of socially dangerous diseases, highlighting the critical need for robust ethical and legal frameworks within national biosecurity systems. This article discusses the ethical considerations and legal aspects surrounding the prevention and control of these diseases in order to devise effective strategies for their containment and mitigation.

Drawing on a comprehensive review of literature, this study explores how societal norms, individual rights, and public health imperatives intersect within the context of biosecurity measures. It underscores the significance of ethical considerations to ensure fair and equitable access to preventive measures, diagnostics, treatments, and vaccines. Additionally, legal frameworks play a pivotal role in enabling the implementation of necessary interventions during disease outbreaks, such as quarantine measures, contact tracing, and the establishment of efficient surveillance systems.

This study analyzes the national biological security measures in Azerbaijan and compares them to other countries to identify strategies for preserving and controlling the transmission of public health threats. The research aims to provide insights into the effectiveness of Azerbaijan's current biological security policies and highlight areas for improvement. The study includes a comprehensive review of relevant literature on biosecurity measures of Azerbaijan. The findings of this study will contribute to the global understanding of biological security practices and inform recommendations for enhancing Azerbaijan's preparedness in managing public health threats.

Finally, the article emphasizes the need for international cooperation and harmonization of ethical and legal standards in addressing the global spread of socially dangerous diseases. It highlights the significance of sharing best practices and lessons learned to strengthen preparedness and response capacities across nations, facilitating a more coordinated and effective approach to prevent and control disease outbreaks.

**Key words:** national biosecurity, socially dangerous diseases, epidemic, pandemic, quarantine, biological weapons, legal aspects.

### **Ісмаїлова П.Ф. Порівняльне дослідження національної біологічної безпеки, з акцентом на Азербайджан: стратегії збереження та контролю за передачею загроз громадському здоров'ю.**

Останнім часом світ став свідком появи і швидкого поширення соціально небезпечних захворювань, що наголошує на гострій необхідності створення міцної етичної та правової бази в рамках національних систем біобезпеки. У цій статті обговорюються етичні міркування та правові аспекти, пов'язані з профілактикою цих захворювань та контролем над ними, з метою розробки ефективних стратегій їх стримування та пом'якшення наслідків.

Спираючись на всебічний огляд літератури, це дослідження аналізує, як соціальні норми, права особистості та імперативи охорони здоров'я перетинаються в контексті заходів біобезпеки. Це наголошує на важливості етичних міркувань для забезпечення справедливого та рівноправного доступу до профілактичних заходів, діагностики, лікування та вакцин. Крім того, правова база

відіграє ключову роль у забезпеченні можливості здійснення необхідних заходів під час спалахів захворювань, таких як карантинні заходи, відстеження контактів та створення ефективних систем нагляду.

У цьому дослідженні також аналізуються національні заходи біологічної безпеки в Азербайджані, які порівнюють їх з іншими країнами для визначення стратегій збереження та контролю передачі загроз громадському здоров'ю. Дослідження спрямоване на те, щоб дати уявлення про ефективність нинішньої політики біологічної безпеки Азербайджану та виявити галузі для покращення. Дослідження включає всебічний огляд відповідної літератури в секторі громадської охорони здоров'я Азербайджану. Результати цього дослідження сприятимуть глобальному розумінню методів біологічної безпеки та стануть основою для рекомендацій щодо підвищення готовності Азербайджану до управління загрозами громадському здоров'ю.

У статті наголошується на необхідності міжнародного співробітництва та гармонізації етичних та правових норм у боротьбі з глобальним поширенням соціально небезпечних захворювань. Він наголошує на важливості обміну передовим досвідом та добутими уроками для підвищення готовності та потенціалу реагування між країнами, сприяючи більш скоординованому та ефективному підходу до запобігання та контролю спалахів захворювань.

**Ключові слова:** національна біобезпека, соціально небезпечні захворювання, епідемія, пандемія, карантин, біологічна зброя, правові аспекти.

### **Introduction.**

Throughout history, mankind has been afflicted by various infectious diseases, leading to detrimental economic and social consequences. Consequently, unscrupulous state and government officials exploited the spread of infectious diseases as biological weapons, implementing inhumane policies. When referring to infectious diseases, we are referring to diseases that propagate among large populations through infection and carriers of viruses. These include cholera, plague, tuberculosis, anthrax, Ebola [1], HIV/AIDS, brucellosis, trichinellosis, salmonellosis, and others. Periods of rapid infectious disease transmission are known as epidemics, derived from the Greek words “*epi*,” meaning above or among, and “*demos*” meaning people. In order to prevent an epidemic from becoming a pandemic, timely prevention measures are necessary. A pandemic, deriving from the Greek word “the whole nation,” denotes the highest level of epidemic spread, encompassing a significant portion of the population across multiple countries or even continents. Pandemics pose the gravest threat, affecting the majority of the global population [2].

The article examines the ethical implications associated with restricting personal freedoms in the implementation of preventive measures, particularly in situations involving compulsory isolation or mandatory vaccination. It explores the challenges of balancing individual autonomy and public health, emphasizing the importance of clear communication and active community engagement to foster public trust and participation.

In conclusion, the ethical and legal considerations in national biosecurity are of paramount importance in effectively addressing the spread of socially dangerous diseases. By developing robust frameworks that protect individual rights while prioritizing public health, fostering community engagement, and promoting global collaboration, societies can ensure proactive and ethical responses to future disease outbreaks.

### **The research tasks:**

National biosecurity regulations are meant to protect the general public and the environment from potential harm caused by the spread of socially dangerous diseases. These regulations are often expressed in dogmatic-legal texts, which outline the laws and guidelines that govern biosecurity practices within a particular country. The main regulation act is the International Health Regulations (IHR), adopted by the World Health Assembly in 1969 (revised in 2005) [3].

Another such example of a related to national biosecurity regulations is the United States Public Health Service Act [4]. This act provides the legal framework for the prevention and control of diseases in the United States, including regulations related to biosecurity. Under this act, the Centers for Disease Control and Prevention (CDC) [5] is authorized to regulate the importation and interstate transportation of animals and animal products that may pose a risk to human health.

Another example related to national biosecurity regulations is the European Union's Directive 2000/54/EC on the protection of workers from risks related to exposure to biological agents at work

[6]. This directive establishes minimum health and safety requirements for the protection of workers from the risks related to biological agents, including the prevention of the spread of socially dangerous diseases in the workplace.

An analysis of these abovementioned norms reveals the importance of having clear regulations in place to prevent the spread of socially dangerous diseases. These regulations not only protect the general public and the environment but also ensure the safety of workers who may be at risk of exposure to biological agents in their occupational settings.

Overall, the identification and analysis of dogmatic-legal texts related to national biosecurity regulations and laws concerning the spread of socially dangerous diseases highlight the need for comprehensive and enforceable regulations to mitigate the risks associated with the spread of infectious diseases. By adhering to these regulations, countries can help prevent outbreaks of socially dangerous diseases and protect the health and well-being of their populations.

**Examine case studies of countries that have implemented national biosecurity measures to prevent the spread of socially dangerous diseases.**

1. China: China implemented several national biosecurity measures in response to the outbreak of the severe acute respiratory syndrome (SARS) in 2003. The Chinese government established the National Health Protection Center to coordinate biosecurity efforts and provide timely information about outbreaks. They also enhanced their biosecurity training and infrastructure, including establishing biosecurity level 4 laboratories for handling highly infectious diseases.

2. South Korea: In response to the Middle East Respiratory Syndrome (MERS) outbreak in 2015, South Korea implemented several biosecurity measures to prevent the spread of the disease. They established a national infectious disease control center to coordinate efforts and implemented strict quarantine measures for individuals suspected of having the virus. They also conducted thorough contact tracing to identify and isolate potential cases.

3. United States: The United States has implemented national biosecurity measures to prevent the spread of socially dangerous diseases, such as the Ebola virus. The Centers for Disease Control and Prevention (CDC) leads efforts to control infectious diseases and respond to outbreaks. They provide guidance on biosecurity protocols, conduct surveillance and monitoring of infectious diseases, and collaborate with international partners to prevent the spread of diseases across borders.

Overall, countries that have implemented national biosecurity measures to prevent the spread of socially dangerous diseases have been able to effectively respond to outbreaks and limit their impact on public health. These measures typically include establishing coordinating bodies, enhancing infrastructure and training, implementing strict quarantine measures, conducting contact tracing, and collaborating with international partners.

**Evaluate the effectiveness of existing legal frameworks in addressing the spread of socially dangerous diseases and propose potential improvements or amendments.**

Existing legal frameworks have been moderately effective in addressing the spread of socially dangerous diseases, such as infectious diseases or pandemics. These frameworks typically include public health laws, emergency response plans, quarantine and isolation powers, and reporting requirements for healthcare providers. However, there are several areas in which these frameworks can be improved to better handle the spread of socially dangerous diseases.

One potential improvement is to enhance coordination and communication between local, state, and federal governments, as well as between public health agencies and healthcare providers. This would ensure a more consistent and timely response to outbreaks, reduce confusion and misinformation, and prevent the spread of disease across jurisdictional boundaries.

Another improvement could be to increase funding for public health infrastructure and preparedness, including the development of rapid diagnostic tests, vaccines, and treatments for emerging diseases. This would help to more effectively contain outbreaks and limit their impact on public health.

There should be stricter enforcement of quarantine and isolation measures to prevent individuals who are infected with socially dangerous diseases from spreading the infection to others. This could include penalties for non-compliance and increased surveillance of individuals who have been exposed to the disease.

Additionally, there should be a focus on addressing the underlying social determinants of health that contribute to the spread of socially dangerous diseases, such as poverty, inadequate housing, and lack of access to healthcare. This could involve implementing policies that improve access to affordable healthcare, housing, and social services for vulnerable populations.

**Investigate the ethical considerations and implications of these laws and regulations in addressing the spread of socially dangerous diseases.**

The ethical considerations and implications of laws and regulations addressing the spread of socially dangerous diseases are complex and multifaceted. One major ethical consideration is the balance between protecting public health and respecting individual rights and freedoms. Laws and regulations aimed at controlling the spread of diseases may involve measures such as mandatory vaccinations, quarantine, and contact tracing, which can infringe on individual autonomy and privacy. It is important to ensure that these measures are necessary, proportionate, and based on scientific evidence to minimize harm to individuals while achieving the public health goal of controlling the disease.

Another ethical consideration is ensuring fairness and equity in the implementation of disease control measures. Certain populations may be disproportionately affected by socially dangerous diseases due to factors such as socioeconomic status, race, or access to healthcare. It is important to consider the impact of laws and regulations on vulnerable populations and take steps to address underlying inequalities in health and access to care.

There are also ethical implications related to transparency, trust, and communication. In order for disease control measures to be effective, it is essential to communicate openly and honestly with the public about the reasons for the regulations, their potential impact, and the scientific basis for them. Trust in public health authorities and adherence to regulations depend on clear and accurate information being provided to the public.

In addition, the enforcement of laws and regulations addressing socially dangerous diseases raises ethical questions about the use of coercion and punitive measures. It is important to balance the need for enforcement with respect for individuals' rights and dignity, and to ensure that enforcement measures are fair, non-discriminatory, and proportionate.

**Utilize comparative analysis methods to compare the approaches taken by different countries in addressing the spread of socially dangerous diseases through legal frameworks.**

One way to approach this comparative analysis is to look at the legal frameworks put in place by different countries to address the spread of socially dangerous diseases, such as pandemics. One example would be to compare the responses of countries like the United States, China, and South Korea to the COVID-19 pandemic.

- The United States initially faced challenges in responding to the pandemic due to a lack of centralized coordination and clear guidelines. However, individual states took varying approaches to implement restrictions and regulations to curb the spread of the virus. The US ultimately relied on a combination of federal, state, and local legal frameworks to address the pandemic, with varying levels of success in controlling the spread.

- China, on the other hand, implemented strict lockdown measures and mass testing early on in the pandemic, relying on a top-down approach to control the spread of COVID-19. The Chinese government enacted aggressive legal measures, such as imposing quarantine and travel restrictions, to contain the virus. This centralized approach allowed China to quickly curb the spread of the virus and prevent it from overwhelming the healthcare system.

- South Korea also took a proactive approach to addressing the pandemic, implementing widespread testing and contact tracing to identify and isolate cases early on. The South Korean government utilized legal frameworks, such as the Infectious Disease Control and Prevention Act, to enforce quarantine measures and track the spread of the virus. This approach, combined with public health campaigns and technology, helped South Korea effectively control the spread of COVID-19.

By comparing the approaches taken by these countries, we can see how different legal frameworks and strategies can impact the spread of socially dangerous diseases. The US relied on a decentralized approach, China on a centralized approach, and South Korea on a combination of testing, tracing, and legal enforcement. This comparative analysis can help identify best practices and lessons learned for addressing future pandemics effectively.

**Theoretical Framework or Literature Review:**

In the article “Legal and Regulatory Frameworks for Biosecurity and Biosecurity in Africa: A Review” by Oladele Ogunseitan, published in *Global Health Governance* in 2017 explored the current status of biosecurity and biosecurity regulations in Africa. The author highlights the importance of having effective legal frameworks in place to ensure the safe handling and management of biological materials, particularly in the context of emerging infectious diseases and bioterrorism threats. The article provides

an overview of the existing legal and regulatory frameworks in African countries, identifies gaps and challenges, and offers recommendations for strengthening biosecurity and biosecurity measures in the region. Overall, the article emphasizes the need for comprehensive and harmonized regulations to protect public health and the environment in Africa.

The article “The Legal Aspects of Biosecurity in Modern Biotechnology” by Tiina Leino, published in the *Journal of Business and Intellectual Property Law* in 2014, explores the legal framework surrounding biosecurity in modern biotechnology. The main purpose of the article is to analyze the regulations and laws that govern the safe development and use of biotechnological products, with a focus on ensuring the protection of human health and the environment. Leino examines the role of various international agreements, national legislation, and ethical guidelines in shaping biosecurity standards in the biotechnology industry. The article highlights the importance of legal compliance and ethical considerations for biotech companies and researchers to promote responsible and sustainable biotechnological innovation.

The article “National Biosecurity Frameworks: Issues in Policy, Legal, and Institutional Aspects” by Naoko Ohana, published in the *Journal of Environmental Law* in 2011, discusses the challenges and complexities associated with developing and implementing national biosecurity frameworks. The main purpose of the article is to analyze the policy, legal, and institutional aspects that need to be considered in order to ensure effective biosecurity regulation at the national level. By examining these issues, the article aims to provide insights into how countries can better address the potential risks and benefits of biotechnology and genetically modified organisms.

The article “The Legal Framework for Biosecurity in Developing Countries: A Case Study of Nigeria” by Chima Williams Ihueze, published in the *International Journal of Law, Policy and Innovation* in 2016, provides an analysis of the legal framework for biosecurity in Nigeria as a case study for developing countries. The main purpose of the article is to examine the existing legal framework for biosecurity in Nigeria and assess its effectiveness in regulating biotechnology and genetically modified organisms (GMOs) in order to ensure environmental safety and human health. Ihueze also discusses the challenges and opportunities for improving biosecurity regulation in developing countries like Nigeria.

In the article “Legal Aspects of Controlling Agricultural Biotechnology: Biosecurity Legislation in Kenya” by Catherine Wiik, published in the *Georgetown International Environmental Law Review* in 2018, explored the legal aspects of controlling agricultural biotechnology in Kenya, focusing on biosecurity legislation. The main purpose of the article is to examine the regulatory framework in place in Kenya to ensure the safe use of biotechnology in agriculture, discussing the challenges and opportunities for effective governance in this area. The author also analyzes the role of international agreements, such as the Cartagena Protocol on Biosecurity, in shaping Kenya’s approach to regulating agricultural biotechnology.

#### **Methodology:**

This article undertakes a comprehensive examination of the legal framework governing the ethical and legal considerations in national biosecurity in the world as well as in the Republic of Azerbaijan, employing a range of scientific research methods. The primary focus is on evaluating the adequacy of domestic legislation concerning national biosecurity conception, Sanitary and Epidemiological Safety law, Socially Dangerous Diseases law and etc. in comparison to the international standards and juridical norms. The author utilizes analysis and synthesis, formal legal methods, and the comparative legal method to scrutinize existing laws, identify deficiencies, and propose specific amendments to enhance the legal landscape for organ transplantation.

#### **Analysis and synthesis:**

The analysis of the data collected will focus on identifying key ethical and legal challenges in national biosecurity, particularly in relation to addressing the spread of socially dangerous diseases. This will involve examining the alignment of Azerbaijani legislation with international standards and best practices in biosecurity. The synthesis of the findings will provide a comprehensive overview of the ethical and legal aspects of biosecurity in Azerbaijan and highlight areas for improvement.

#### **Formal and legal method:**

The formal and legal method used in this study will involve a detailed analysis of the relevant laws and regulations in Azerbaijan related to biosecurity and the prevention of socially dangerous diseases. This will include a comparison of Azerbaijani legislation with international legal instruments, such as the World Health Organization’s International Health Regulations, to assess compliance with



global standards. Additionally, the study will examine the enforcement mechanisms in place to ensure compliance with biosecurity laws in Azerbaijan.

Comparative legal method:

The comparative legal method in this study will involve comparing the legal framework for biosecurity in Azerbaijan with that of other countries, particularly those with established biosecurity regulations and practices. This comparative analysis will provide insights into how Azerbaijan can improve its biosecurity laws and regulations to better address the spread of socially dangerous diseases. By identifying best practices and areas for improvement in other countries, Azerbaijan can strengthen its legal framework and enhance its biosecurity practices.

**Research and results.** It is important to acknowledge that throughout history, epidemics caused by the outbreak of infectious diseases have resulted in the sacrifice of millions of lives. In the Middle Ages, devastating epidemics arose due to insufficient medical advancements and inadequate adherence to sanitary and hygiene standards. For instance, in 14th century Italy, the plague originated in Genoa and rapidly spread throughout Europe, causing widespread destruction and loss of life. During this period, lack of medical and technological advancements limited the ability of city leaders to prevent infectious diseases, resulting in devastating consequences. A striking historical case is the plague epidemic in Athens in 430 BC, which claimed the lives of approximately a quarter of the city's population [7]. Other notable pandemics resulting from the rapid spread of infectious diseases include the Plague of Justinian, which decimated 50-60% of the European population in the 6th century, The Black Death that killed 25 million Europeans from 1347 to 1352, and a 16th century pandemic that reduced Mexico's population from 20 million to 3 million [8]. In the 18th century, smallpox took the lives of approximately 60 million Europeans, while tuberculosis claimed a quarter of the adult population in 19th century Europe. The influenza pandemic, also known as the Spanish flu, resulted in the deaths of 25-50 million people in 1918 [9]. The ongoing COVID-19 pandemic, which began in late 2019, has already caused significant loss of life worldwide, with projections estimating a global death toll of 7 million by 2023. In Azerbaijan, the number of COVID-19 related deaths has exceeded 10,000.

Historically, several factors have contributed to the widespread occurrence of dangerous infectious diseases, including unsanitary conditions in cities, inadequate sanitary and hygiene infrastructure, lack of clean water, proliferation of rodents and insects, poor waste management systems, diseases caused by harmful habits such as drug addiction, high-crime societal indicators, lack of border sanitary control, and substandard or contaminated food [10]. It is imperative for the state to undertake critical measures to prevent and mitigate epidemics and pandemics. An examination of the history of health regulations and epidemic control measures reveals that individual states' efforts to safeguard their populations against health risks have necessitated intergovernmental cooperation. This field of cooperation within the realm of epidemic control and health regulations came to be known as international sanitary law. The earliest medical regulations pertaining to the control of infectious diseases, implemented under the order of Justinian in 532 [11], aimed to restrict the movement of individuals coming from epidemiologically hazardous areas. Subsequently, in response to rampant epidemics in Europe, the concept of "*Quarantine*" (from the Italian word "*quarantena*" – meaning forty days) emerged as a means of controlling infectious diseases in Italy [12]. "Quarantine regulations" were also adopted to ensure epidemiological safety in international trade hubs.

Prevention plays a critical role in combatting epidemics. In densely populated areas, it is essential to implement preventive measures to effectively mitigate the spread of infectious diseases. These measures encompass various aspects of anti-epidemic strategies, including emergency prevention, prompt identification, isolation, hospitalization, and treatment of both confirmed patients and suspected cases. Additionally, thorough sanitary cleaning and disinfection of public spaces, territories, transportation systems, objects, and residences are necessary.

During times of quarantine, stringent measures are put in place to prevent the transmission of infectious diseases within the epicenter of the outbreak. All work and educational activities in existing institutions are halted, and gatherings of the general population are prohibited. However, some indispensable facilities related to catering, healthcare, and the economy are allowed to continue functioning under specific regulations. Citizens are advised against leaving their places of residence, and healthcare workers attending to individuals infected with socially dangerous diseases adhere to strict protocols while wearing protective uniforms.

Observation refers to a set of isolation, restriction, and treatment-prophylactic measures enacted within the epidemic center to prevent the spread of infectious diseases. The following actions are

typically undertaken during observation: limiting entry and exit, identifying and isolating infected patients, hospitalizing those in need, conducting sanitary cleaning of the population, implementing urgent prevention measures, and strengthening hygiene and anti-epidemic efforts. Antibiotics and other preventive medications are administered in quarantine and observation zones. Once quarantine and observation are established, thorough disinfection, extermination of pests, and deratization activities are performed in the affected area. It is essential to enforce sanitary-hygienic measures within epidemic centers, including monitoring food quality, ensuring proper storage conditions, maintaining sanitation in water sources, water pipes, food establishments, buildings, equipment, and vehicles, as well as overseeing public catering establishments, shops, and markets. Disinfection, extermination of pests, and deratization of these establishments are carried out using appropriate disinfectants.

For epidemiologists, aside from identifying the sources of infection and potential routes of transmission, the identification of individuals at high risk of infection is of paramount importance during the implementation of sanitary-hygienic and anti-epidemic measures. The epidemiologist should seize the opportunity in an epidemiological setting to engage with individuals at evident risk of infection, aiming to identify existing risk factors and devise strategies to reduce them. Considering the ethical and legal aspects surrounding infectious diseases, it is crucial to prioritize upholding human rights, particularly for individuals residing in particularly hazardous infection centers and the entire population. This entails providing comprehensive and accessible information to the public, respecting the right to protect health, ensuring adequate living conditions, and safeguarding life itself. Ethically, the implementation of sanitary-hygienic and anti-epidemic measures also extends to protecting the environment, implementing restrictive measures such as quarantine, exercising production control, and applying appropriate measures concerning patients with infectious diseases.

## **2. National Biosecurity: Biological Weapons and Infectious Diseases - an Understanding of Scientific, Legal and Ethical Aspects**

Science and ethics have consistently played pivotal roles in the advancement of human society. Scientific discoveries act as the driving force behind progress, while ethical considerations determine how the results of these discoveries are employed. Throughout history, various scientific achievements such as the steam engine, electricity, nuclear reactor, computer, and penicillin have been harnessed for the betterment of mankind. However, science also has the potential to be employed for destructive purposes, as evident in the creation of biological weapons. Biological weapons encompass pathogenic microorganisms, spores, viruses, and bacterial toxins designed to cause mass destruction of enemy personnel, populations, military assets, agricultural resources, and environmental ecosystems. These weapons include delivery systems for harmful pathogens and animal vectors. Serving as weapons of mass destruction, biological weapons are explicitly prohibited under the 1925 Geneva Protocol [13] and the 1972 Convention on the Prohibition of the Development, Production, and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction [14].

An intriguing paradox lies within the fact that the same laboratories and scientists responsible for scientific advancement have also produced weapons, including weapons of mass destruction. Nearly every scientific achievement possesses a dual nature, capable of fostering both good and harm. Consequently, individuals lacking moral integrity can utilize their knowledge to create means of mass destruction, such as biological weapons, and employ them for personal gain.

Experts widely acknowledge that bio-aggression, bioterrorism, and ecological warfare represent uncontrollable and highly dangerous threats to humanity. For instance, biological terrorism is officially recognized as a potential threat to the national security of the United States. This perception is based on both terrorist incidents within the United States and comprehensive analysis of advancements in biological science and biotechnology.

The biological revolution that unfolded on the threshold of the second and third millennia paved the way for the development of biotechnology and significant breakthroughs in medicine, agriculture, and other sectors of the economy. Simultaneously, it created favorable scientific and technological conditions for the advancement of highly potent biological weapons. Consequently, these advancements have made the utilization of biological weapons more appealing to individuals seeking to achieve their objectives. Regrettably, the failure of national and international efforts to prevent weaponization, banning, and non-proliferation of weapons of mass destruction impedes the establishment of a global coalition against bioterrorism. Presently, the prevailing situation is exploited to fulfill political or technocratic goals.

#### Key Terminology and Definitions:

1. Biological threat refers to the negative impact of biological pathogens, ranging from prions and microorganisms to multicellular parasites, on various realms encompassing medical, social, technological, agricultural, and communal domains.

2. Biological security denotes the state of safeguarding individuals, animals used in agriculture, plants, and the overall environment against biological and societal threats, both current and potential.

3. Biological terrorism denotes the use of hazardous biological agents to inflict harm upon human life and health, with the aim of achieving political and financial objectives.

4. Bioregulators are substances of biological origin that significantly influence natural processes occurring within the body. Examples include physiological regulators such as vasopressin, renin, and insulin.

5. Genetically modified organisms (GMO's) refer to micro- and macro-organisms whose genomes have been artificially altered, resulting in changes to the natural characteristics of the human body.

The following sources serve as the primary origins for the dissemination of natural and human-induced biological factors and dangerous agents that can cause human and animal fatalities, significant health damage, societal collapse, and economic devastation:

1. Ecopathogens encompass the collective impact of natural and human-induced factors that harm environmental entities.

2. Hazardous biological agents pertain to pathogenic microorganisms and parasitic organisms responsible for causing diseases in humans, animals, and plants. Furthermore, these agents cause material destruction and severe disruption to the environment and nature.

3. Toxins consist of toxic products derived from microorganisms, natural poisons originating from animal or plant sources, or their chemically synthesized analogues. These substances possess high biological activity and pose extreme toxicity to higher animals. Examples include ricin, diphtheria toxin, and botulinum toxin.

The primary sources of biological danger encompass:

1. Natural reservoirs of dangerous diseases capable of infecting humans, agricultural animals, and plants.

2. Accidents and sabotage incidents occurring within biologically hazardous facilities.

3. Transboundary transfer of pathogenic microorganisms, representatives of flora and fauna that pose dangers to ecosystems.

4. Biological terrorism.

5. The deployment of biological weapons during times of conflict.

Various factors contribute to the destabilization of the biological landscape, including:

1. Geopolitical circumstances and regional instability.

2. Mass migration processes.

3. Ecological and sanitary-epidemiological conditions, along with a violation of sanitation and hygiene regulations.

4. Disruption in the state structure and administrative disorder.

5. Reduction in scientific and production capabilities.

6. Dependence on other countries for drugs and food.

7. Drug addiction and erosion of moral and ethical values in society.

8. The proliferation of criminogenic situations.

### **3. A Concise History of Biosecurity Problem Formation**

The concept of utilizing disease-causing microorganisms as pesticides on a global scale, along with the impact of infectious diseases causing significant casualties at various points in time, epidemics during wartime resulting in high military losses, and even the potential to predict battle outcomes and entire war campaigns, emerged as noteworthy issues.

A review of history reveals that the earliest instances of using infectious diseases as biological weapons were evident in ancient Rome. During city sieges, the corpses of individuals who died from the plague were thrown over fortress walls with the intention of spreading epidemics among defenders and seizing control of the cities. These tactics proved effective, particularly in confined spaces with dense populations and poor hygiene practices. In the Middle Ages (1346), the bubonic plague originated in Europe, attributed to Khan Janibey [15]. In his efforts to capture the city of Kafa (modern Feodosia), after unsuccessful attempts, he ordered the disposal of plague-stricken bodies from castle walls. Fleeing



merchants from the city inadvertently brought the plague to Europe. The first documented instance of using infectious diseases as bacteriological weapons during war occurred in 1763 when Indians besieging Pitt Harbor deliberately spread smallpox among British soldiers by sending them blankets contaminated with the virus [16].

For example, during the invasion campaigns in Mexico and Peru in 1741, approximately 20,000 out of 27,000 English soldiers perished from yellow fever. From 1733 to 1865, a staggering 8 million individuals lost their lives in European wars, with infectious diseases claiming 6.5 million lives. The significant impact of infectious diseases on battles persists in modern times. In the Vietnam War, the number of soldiers and officers who died from infectious diseases exceeded three times the number of casualties from combat.

The intentional and systematic development of biological weapons primarily commenced in the early 20th century. In World War I, Imperial Germany made several attempts to employ biological agents through acts of sabotage.

During World War II, Japanese militarists carried out the most intensive research and development of biological weapons. Within the occupied territory of Manchuria, they established two prominent scientific research centers (Units 731 and 100). These facilities conducted extensive experiments on biological agents that involved both laboratory animals and Chinese prisoners of war and civilians.

Experts from various nations assign significant importance to the potential use of biological agents for sabotage and terrorism purposes. Notably, these possibilities include the ease of acquisition and utilization of bioagents, cost-effectiveness, covert application, and selective action of bioagents. According to assessments by military experts from NATO countries, the diseases most prone to human transmission include typhoid, paratyphoid, dysentery, cholera, and botulinum toxin. These agents can be dispersed via ventilation systems in factories, public areas, as well as water supplies, food products, and cosmetic items, posing exceptional risks, particularly in subway transportation systems. Alarming information suggests that merely 200 grams of a biological recipe dispersed in subway systems through acts of sabotage could result in the casualties of over 300,000 people. In 1970, two terrorists in the United States faced legal charges for conspiring to poison the water supply of Chicago with typhoid bacteria and other dangerous agents.

Another example of “bioagents” exploitation for terrorist purposes revolves around the court case involving the leader of the “Aum-Senrikyo” sect [17]. The sect, founded in 1984 by Japanese citizen Tizuo Machumoto (also known as Syoko Asahara), gained notoriety following a horrifying terrorist attack in the Tokyo subway in 1995. The organization employed drugs, psychotropic substances, and specialized indoctrination methods to manipulate its members and essentially create zealous followers. By the late 1980s, reports began to emerge regarding the deception of society members, their forced retention within the organization against their will, and the extortion of substantial sums of money. In late 1993, the organization clandestinely produced sarin gas, which induces brain paralysis, and initiated terrorist attacks in several cities within the country [18]. During subsequent investigations, laboratories associated with the organization were found to contain sarin gas, botulinum toxin, and anthrax – an acute zoonotic infectious disease characterized by the development of serous-hemorrhagic and necrotic inflammation. The disease occurs with acute noticeable intoxication syndrome in localized (skin) and diffuse (septic) forms. Sometimes this disease is also called “malignant boil”) [19]. Furthermore, chemically based terrorism led to the deaths of seven individuals. The longest trial in Japanese history began in 1995 to address these incidents, ultimately finding Machumoto and his associates personally involved in thirteen out of seventeen terrorist acts committed by the organization. The court issued death sentences for Machumoto and his associates in 2004 [20].

These historical events further underscore the significance of biosecurity as a priority concern in today’s world. Extremist and criminal organizations have demonstrated the ability to plan acts of sabotage aimed at seizing state-owned enterprises and research institutes authorized to handle pathogenic agents for the production and development of immunobiological preparations. In case their terrorist demands are not met, these organizations may intend to steal or destroy bioagents stored within these facilities. Their deliberate use of highly dangerous infectious agents aims to incite panic and chaos within society. Consequently, it is crucial to acknowledge the existence of biological security threats in order to protect the global community effectively. Accordingly, the prevention of biological threats currently assumes top priority for the international community, necessitating the implementation of international measures and the effective utilization of available resources to mitigate the consequences of such threats.

#### **4. Establishment of Biological Security System**

The coexistence of humans and animals with a vast array of microbes on Earth poses a potential threat to human health, as approximately 3.5 thousand of these microbes are pathogenic and capable of causing diseases. In an era marked by political conflicts, ethnic wars, and terrorist attacks, the use of Biological Pathogenic Agents (BPA) for terrorist purposes presents a real danger, along with the resolution of interstate conflicts. Despite the Geneva Protocol of 1925 [21] and the 1972 Convention on the Prohibition of the Development, Production, and Stockpiling of Bacteriological (Biological) and Toxin Weapons, the mass production of biological agents and toxins that can be weaponized remains a concern.

The provisions outlined in the Convention signed in April 10, 1972, “On the prohibition of the development, production, and stockpiling of bacteriological (biological) and toxin weapons and their destruction,” [22] require participating states to refrain from acquiring or stockpiling biological weapons, to destroy or repurpose any materials related to biological weapons for peaceful purposes, and to provide assistance to states that may be endangered by a violation of the Convention. Additionally, the Convention emphasizes the use of scientific developments in bacteriology for peaceful purposes.

The most prominent biological terrorist attack in recent times was the 2001 “anthrax attack” in the United States, which gained significant attention and alarm from the political elite [23]. Consequently, the attack resulted in 22 people contracting anthrax, of whom 5 died [24]. The events of September 2001 added to the fear and panic among the population, leading to a range of reactive measures such as long queues for doctor’s appointments, uncontrolled administration of antibiotics, mass exodus from cities, and a refusal of postal services. This attack greatly destabilized the country and disrupted its state administration[25].

The development and availability of Weapons of Mass Destruction (WMD) to economically developed nations contribute to the increasing risks in today’s world politics. Biological weapons, in particular, differ from other terrorist methods due to their ease of acquisition, versatility in their application, and potential consequences. Therefore, the urgency to develop effective countermeasures against biological terrorism has become paramount in modern times.

The establishment of a Biological Safety System (BSS) requires the creation of various institutions, including a State Commission on Biological Safety Problems, institutions and organizations focused on biotechnology and biosecurity, and central governing bodies such as scientific research organizations, treatment-diagnostic institutions, industrial enterprises, laboratories, and stations. Regional institutions, such as those under local self-government bodies, also play a crucial role in implementing the BSS scheme.

The BSS aims to achieve the following priority tasks:

1. Creation of a Unified State Biosecurity System
2. Defining policies for ensuring biological safety and implementing relevant procedures and mechanisms
3. Protection of human population, animals, plants, and ecosystems
4. Protecting the state territory from dangerous biological security threats
5. Formation and international alignment of the normative-legal framework
6. Maintaining the necessary level of fundamental applied science, education, and development
7. Implementing a multifactor biomonitoring and statistical analysis system
8. Establishing collections of standard microbial and cell cultures, developing genetic resources networks
9. Enhancing information dissemination and public awareness in the field of biosecurity
10. Promoting international cooperation
11. Combating terrorism.

#### **5. Scientific Approaches and Strategies for Controlling the Transmission of Hazardous Infectious Diseases**

Protection from dangerous infectious diseases involves a multifaceted approach comprising special, medical, and veterinary measures aimed at preventing disease occurrence and mitigating the consequences of infections to minimize socio-economic damage. Preemptive measures to prevent the spread of infectious diseases are more effective and less costly than dealing with the aftermath of epidemics or bioterrorism acts.

Specific measures for ensuring biosecurity include monitoring ecosystems, assessing and predicting the biological condition, creating and storing reserves of protective equipment, training specialized institutions and the wider population to handle emergency situations, combating acts of terrorism and sabotage through law enforcement agencies, and implementing quarantine and regime-restrictive measures. Medical measures primarily focus on sanitary-hygienic practices, epidemic control, curative-prophylactic interventions, disinfection, deratization, and disinsection. Veterinary measures involve prevention, food and product quality assessment, disinfection, and surveillance.

Disinfection, deratization, and disinsection are crucial processes in combating the spread of infectious diseases. Disinfection (*fr. désinfections – to destroy infection*) involves the destruction of specific microbes to prevent infections or superinfections of pathogenic microorganisms and viruses [26]. Deratization (*fr. dératisation – to destroy rats*) involves controlling rodents that transmit diseases (plague, tularemia, brucellosis, black sore, leptospirosis) to humans and cause economic damage [27]. Disinsection (*fr. dés – to destroy + lat. insectum*) refers to the removal of unwanted insects flies, mosquitoes, bugs, ants, bedbugs, fleas, etc. that carry infectious diseases and can contaminate water, food, and plants [28].

Effective implementation of these measures requires various specialized tools, which can be grouped into four categories based on their primary purpose. The first category includes general-purpose tools used for environmental monitoring, assessing and predicting the biological condition, indicating and identifying BPAs, transportation, and providing personal and collective protection. The second category consists of medical devices used for emergency and preventive care, diagnostics, treatment, sterilization, disinfection, and laboratory and treatment facility equipment. The third category encompasses veterinary tools used for animal disease prevention, food and feed product evaluation. The fourth category involves plant protection products.

Medical means aimed at preventing, treating, rehabilitating, and managing human diseases play a crucial role among the various means of protection against infectious diseases. Vaccines and anatoxins have been developed and produced to prevent the most dangerous infectious diseases. Vaccinations are administered according to preventive schedules or when there is an imminent infection threat. Vaccines are categorized into various types based on their composition and development methods.

#### **6. Legal Aspects of Combating Infectious Diseases and Ensuring Sanitary-Epidemiological Health: A Focus on Azerbaijan's Legislation**

The right to health, considered a positive legal obligation of states, is regarded as one of the fundamental rights within the framework of human rights and freedoms. The health of an individual has a direct impact on their life and quality of life. Provisions in the Constitution of the Republic of Azerbaijan (1995, 12 November), such as Articles 17.4, 27.3, 31.2, 39.2, 41, and 59.2, as well as relevant sections of the National Security Concept of the Republic of Azerbaijan (2007), particularly article 8 of paragraph 2, article 5 of paragraph 3, article 4.3.10 of paragraph 4, along with the Law on the Protection of Population Health (1997), and Law of the Republic of Azerbaijan About Environmental Protection (1999) such as Articles 30, 32, 66, all devote attention to the right to health.

The state policy regarding the immunoprophylaxis of infectious diseases is regulated by a number of legislative acts, including the AR Law on Immunoprophylaxis of Infectious Diseases (2000) [29], the Decision of the Cabinet of Ministers of AR on the approval of the “List of Dangerous Infectious Diseases” (2013) [30], “State Strategie for combating non-communicable diseases in the Republic of Azerbaijan for 2015-2020” [31] and the decision of the Cabinet of Ministers of the Republic of Azerbaijan on the “Quarantine organization in the event of the threat of the emergence or spread of infectious, parasitic and mass non-infectious diseases” (2020), which encompasses prevention and other necessary measures [32]. Furthermore, the “Law of the Republic of Azerbaijan on Sanitary and Epidemiological Safety” (1992, amended - 2023) [33] plays a key role in ensuring the necessary legal framework for maintaining public health.

To ensure the rights established by Azerbaijan's legislative norms, both the state and its citizens are bound by specific duties. Failure to fulfill these duties leads to liability, and depending on the degree of public danger, it may amount to a criminal offense. For example, Article 139-1 of the Criminal Code of the Republic of Azerbaijan addresses the “Violation of the anti-epidemic regime, sanitary-hygiene or quarantine regimes”[34]. This article stipulates fines and punishments when the violation of aforementioned regimes leads to the spread of diseases or poses a real threat of their spread. In summary, the legislation of the Republic of Azerbaijan holds those who violate epidemic, sanitary hygiene, and

quarantine regulations accountable. Such violations are classified as crimes against the person, as outlined in the Criminal Code of the Republic of Azerbaijan.

However, it is noteworthy that the legislative framework for preventing and responding to public health emergencies of international concern, including the spread of dangerous infectious diseases, strengthen its laboratory biosecurity and biosecurity measures to ensure the safe handling of dangerous pathogens and minimize the risk of accidental or intentional release is not yet fully established in the country. For instance, the decision by the Cabinet of Ministers of the Republic of Azerbaijan approving the “List of Dangerous Infectious Diseases” only includes two diseases, namely, human immunodeficiency virus infection and hepatitis B and C.

Which legislative acts should be adopted in Azerbaijan?

It is important for Azerbaijan to adopt several legislative acts, referencing existing international agreements. For example:

- Adoption of the International Health Regulations (IHR) - Azerbaijan should adopt the International Health Regulations (IHR) to establish a legal framework for preventing and responding to public health emergencies of international concern, including the spread of dangerous infectious diseases.
- Implementation of the Biological Weapons Convention (BWC) - While Azerbaijan signed and ratified the Biological Weapons Convention in 2004, no concrete actions have been taken in this area.
- Legislation for establishment of a National Biosecurity Strategy - should develop and implement a National Strategy to strengthen the country’s capacity to prevent, detect, and respond to biological threats, including outbreaks of dangerous infectious diseases.
- Legislation to strengthen Laboratory Biosecurity and Genome programs - should strengthen its laboratory biosecurity measures to ensure the safe handling of dangerous pathogens minimize the risk of accidental or intentional release and preserve the gene pool of nation.
- Legislation for establishment of a National Surveillance and Reporting System - should establish a national surveillance and reporting system to monitor the spread of dangerous infectious diseases and facilitate early detection and response to outbreaks.
- The National Security Concept of Azerbaijan was published in 2007 [35], needs to be reviewed and updated to address new security challenges arising from changes in the regional and global security environment.

Legislation plays a key role in setting guidelines and regulations for preserving the gene pool, including measures such as genetic testing, counseling, and education.

Establishing a robust Biological Security System in Azerbaijan and implementing measures to combat the spread of dangerous infectious diseases requires a comprehensive approach involving various strategies. Here are some key steps that can be taken:

#### 1. Legislation and Policies:

- Develop and enforce comprehensive legislation and policies related to biological security and infectious disease prevention.
- Establish an oversight body or agency responsible for coordinating and implementing these policies effectively.
- Ensure that the legislation includes provisions for biosecurity and biosecurity standards, monitoring, reporting, and response mechanisms.

#### 2. Surveillance and Early Warning Systems:

- Strengthen surveillance systems for early detection and monitoring of infectious diseases, including zoonotic diseases.
- Enhance the cooperation and information sharing among relevant national and international agencies, such as the Ministry of Health, veterinary services, and international organizations like WHO and OIE.
- Invest in research and technology for improving surveillance capability, including laboratory diagnostics and genomics.

#### 3. Capacity Building and Training:

- Develop a national training program for healthcare workers, laboratory personnel, and border control staff on biosecurity, biosecurity, disease detection, and response.
- Establish partnerships with international organizations and relevant countries to provide training and knowledge exchange opportunities.

– Invest in the development and enhancement of laboratory capacities, biocontainment facilities, and equipment.

4. Risk Communication and Public Engagement:

– Develop robust risk communication strategies to educate the public about infectious diseases, prevention measures, and the importance of early reporting.

– Collaborate with media outlets, civil society organizations, and community leaders to disseminate accurate and timely information.

– Conduct public awareness campaigns emphasizing individual responsibilities, hygiene practices, and vaccination programs.

5. International Cooperation and Preparedness:

– Participate actively in international initiatives and agreements like the International Health Regulations (IHR) and the Global Health Security Agenda (GHSA).

– Enhance collaboration with neighboring countries, sharing information on disease outbreaks, and coordinating cross-border responses.

– Strengthen partnerships with international organizations such as WHO, OIE, and regional health agencies, benefiting from their expertise and resources.

6. Research and Development:

– Encourage research and development in the field of infectious diseases, including the study of emerging pathogens and drug resistance.

– Allocate funding for research on vaccines, antiviral drugs, and diagnostics to enhance preparedness against potential outbreaks.

– Promote partnerships between National Academia, research institutions, and the private sector to develop innovative solutions for surveillance and control.

7. Strengthening border security:

– Given Azerbaijan's location at the crossroads of Europe and Asia – The Middle Corridor, ensuring the security of its borders is of utmost importance. The concept should include measures to enhance border security and combat illegal migration and smuggling.

In conclusion, establishing a robust Biological Security System in Azerbaijan and implementing measures to combat the spread of dangerous infectious diseases are essential in ensuring global biosecurity. This requires the collaboration of various institutions and the development of appropriate tools and technologies to prevent potential threats to human health, animal health, and ecosystems.

**Discussion and conclusions.**

Addressing the spread of socially dangerous diseases from a legal perspective involves various aspects and considerations. Some of the key legal aspects in national biosecurity include:

1. Legislation and Regulations: Governments as well as in Azerbaijan, enact specific laws and regulations to address biosecurity concerns and mitigate the spread of socially dangerous diseases. These laws may dictate protocols for handling and transporting hazardous biological material, containment measures in laboratories, and regulations on research involving dangerous pathogens.

2. Disease Reporting and Surveillance: National biosecurity frameworks often require mandatory reporting of certain diseases to relevant authorities. This allows for effective disease surveillance, early detection, and response to outbreaks. Legal provisions may outline the obligations of healthcare providers, laboratories, and individuals in reporting suspected cases or outbreaks.

3. Quarantine and Isolation Measures: In situations where contagious diseases pose a significant threat to public health, authorities may have the legal power to enforce quarantine and isolation measures. These measures aim to contain the spread of diseases by isolating infected individuals or populations. Legal frameworks set out the procedures and conditions under which such measures can be imposed.

4. Travel Restrictions and Border Control: Governments may have legal authority to enforce travel restrictions in response to socially dangerous diseases. This can involve screening measures at ports of entry, enforcing mandatory vaccination or testing requirements, and restricting travel to affected areas. Legal provisions guide the implementation and enforcement of these measures, ensuring they are proportionate and effective without violating individual rights.

5. Liability and Compensation: Legal frameworks may address issues of liability and compensation related to the spread of socially dangerous diseases. These provisions ensure that individuals who are harmed due to negligence or wilful misconduct of others can seek legal remedies and claim compensation for damages.



6. Intellectual Property Rights: Legal aspects of biosecurity also include intellectual property rights and access to medical advancements. In the case of vaccines or treatments for socially dangerous diseases, legal frameworks may address issues related to patents, licensing agreements, and the fair distribution of vaccines to ensure global access and availability.

7. Ethics and Human Rights: Biosecurity regulations should also contemplate ethical considerations and respect for human rights. Legal frameworks must strike a balance between protecting public health and individual rights. This includes ensuring informed consent in medical research, privacy protection when handling personal health information, and preventing discrimination based on health status.

Also in the article it was concluded that for the establishment of a Biological Safety System (BSS) in Azerbaijan generally requires several key components:

1. Risk assessment: A thorough evaluation of the potential hazards associated with the biological agents or organisms being handled or studied is crucial. This involves identifying the nature of the microorganisms, their pathogenicity, mode of transmission, and potential risks to human health, animals, and the environment.

2. Biosecurity policies and procedures: Developing and implementing comprehensive biosecurity policies and procedures is essential. This includes protocols for handling, containment, transportation, and disposal of biological materials, as well as guidelines for Personal Protective Equipment (PPE) usage, decontamination procedures, and emergency response plans.

3. Facility design and engineering controls: Adequate physical infrastructure is necessary to minimize the risk of exposure to biological agents. Factors to consider include the layout and design of the facility, use of primary and secondary containment systems, proper ventilation and air filtration systems, and access controls to restrict entry to authorized personnel only.

4. Personnel training and competency: All personnel working with biological agents must be appropriately trained on the safe handling procedures, regulations, and emergency response protocols. This includes understanding the specific risks associated with the agents being utilized and proper use of PPE. Regular training updates and competency assessments are essential to ensure ongoing compliance.

5. Record-keeping and documentation: Maintaining accurate records is crucial for tracking and documenting all activities related to biological agents. This includes inventory records of biological materials, training records, incident reports, risk assessments, and any modifications made to the BSS.

6. Regular inspections and audits: Regular inspections and audits should be conducted to assess the effectiveness of the BSS. These inspections can help identify areas for improvement, ensure compliance with regulations and guidelines, and address any potential issues before they become major problems.

7. Regulatory compliance: Depending on the jurisdiction, there may be specific regulatory requirements that need to be followed for the establishment and operation of a BSS. Understanding and complying with these regulations is critical to ensuring the safety of personnel and the surrounding environment.

These legal aspects in national biosecurity aim to create robust frameworks that prevent and respond to socially dangerous diseases while upholding human rights, promoting global cooperation, and safeguarding public health.

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