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The Impact of the Evolution of Biological Terrorism on National Security

Introduction:

Terrorism is considered one of the most dangerous phenomena threatening international peace and security in the modern era. Terrorism takes various forms and types: traditional terrorism, which relies on conventional weapons such as firearms and explosives, and non traditional terrorism, which involves the use of weapons of mass destruction, including nuclear, chemical, and biological weapons. Biological terrorism is regarded as one of the most dangerous types of non-traditional terrorism, as it depends on the use of biological agents such as bacteria, viruses, and toxins to inflict large scale human losses and destabilize societies⁽¹⁾.

It is noteworthy that biological terrorism is not exclusive to terrorist groups alone; states may also resort to it as a weapon in their wars or conflicts with other states. History has witnessed numerous instances in which states have used biological weapons, as occurred during the First and Second World Wars. However, terrorist groups remain more inclined to use this type of weapon due to its ease of production and the difficulty of its detection compared to nuclear and chemical weapons⁽²⁾. The motives behind the use of biological terrorism vary between states and terrorist groups. States may use it as a tool for political pressure or to achieve strategic superiority, exploiting the powerful impact of biological weapons causing widespread chaos and disorder⁽³⁾. In contrast, terrorist groups seek to use biological terrorism to spread fear and panic among civilians and weaken governments by causing serious health crises, thereby enhancing their influence and capacity to exert pressure. In both cases, biological terrorism poses a significant threat to global security and

requires intensive international cooperation to confront and mitigate its risks⁽⁴⁾.

Study Problem:

The effects of bioterrorism span various aspects of life. Politically, it may lead to the destabilization of political regimes and weaken citizens' trust in their governments' ability to protect them. Economically, it can cause severe losses due to the disruption of economic activities and the rising costs of healthcare. Socially, it may spread fear and panic among the population, negatively affecting social cohesion. Militarily, it presents new challenges for security and military institutions in terms of how to confront and prevent this type of threat. Understanding this complex phenomenon requires an indepth study of its different dimensions and its implications for national security, taking into account the rapid developments in biotechnology and the challenges that states face in combating this type of terrorism. This necessitates the urgent need to propose solutions at national, regional, and international levels to ensure its containment.



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Study Objective:

The aim of this study is to identify the evolution of bioterrorism and its various effects on all aspects of national security, by defining and analyzing the nature and scope of threats posed by bioterrorism. The study seeks to contribute to enhancing the understanding of threats resulting from bioterrorism and to developing effective methods for protecting the security of states against this danger. It also aims to provide a scientific basis for formulating comprehensive national and international policies to confront bioterrorism.

Research Questions:

- 1- How has bioterrorism evolved?
2. What are the political, military/security, economic, and social implications of bioterrorism?
- 3- What are the legal and legislative frameworks required to deter bioterrorism, and how effective are they?
- 4- What national, regional, and international proposals can be adopted to address the losses that may result from biological attacks?

Research Methodology:

The descriptive method is considered the most suitable for studying the topic of "The Impact of the Evolution of Bioterrorism on National Security," as it allows for a comprehensive and in-depth examination of bioterrorism and its effects on national security. Through this method, relevant information and data on the development of bioterrorism can be collected, analyzed, and interpreted to reach an accurate understanding. The descriptive method also helps in portraying the current state of bioterrorism threats and determining the extent of countries' preparedness to confront them.

Research Contents:

- 1- Introduction
- 2- Conceptual Framework of the Study
- 3- The Evolution of Bioterrorism
- 4- The Impact of Bioterrorism on Aspects of National Security
- 5- Study Findings and Proposals
- 6- Conclusion

First: The Conceptual Framework of the Study:

The study distinguishes between several concepts, as follows:

1- Bioterrorism:

Bioterrorism is defined as:

"The deliberate release of biological agents or toxic substances with the aim of harming or killing human, animal, or plant life to achieve political or social goals through the intimidation or coercion of governments or civilian populations."⁽⁵⁾ The primary goal of releasing these toxic substances is to weaken or paralyze the energy and functioning of an infected individual either directly by targeting certain tissues, organs, or vital functions or indirectly, by eliminating their food sources such as plants or animals. Chemical and biological weapons can be identified as toxic weapons, distinct from conventional weapons⁽⁶⁾.

Bioterrorism involves the deliberate dissemination or release of viruses, bacteria, toxins, or other harmful agents that cause disease or death in humans, animals, or plants. Infectious biological agents often spread without prior warning, and the response to biological incidents whether natural or intentional requires coordination across multiple sectors. Hence, it is essential to establish strategies for prevention, preparedness, and response to such threats.

These agents are usually found in nature but can be modified to enhance their disease causing capacity, resistance to current treatments, or environmental persistence. Biological agents can be spread through air, water, or food. Terrorists are inclined to use biological agents because they are relatively easy and inexpensive to obtain and can be disseminated easily, in addition to their wide ranging impact, which military leaders often consider a strategic asset⁽⁷⁾. Accordingly, the following related concepts are distinguished⁽⁸⁾.

2-Biological Warfare: Refers to the use of biological agents as weapons of war, often to cause disease or death.

3-Biological Crimes: Refers to the use of biological agents to commit a crime, such as murder or extortion.

4-Biosecurity: Refers to the protection of humans, animals, and plants from the deliberate release of biological agents.

5-Biosafety: Refers to the protection of humans, animals, and plants from the accidental release of biological agents, such as in laboratory settings.

6-Biodefense: Refers to the development of strategies, policies, and technologies to prevent, prepare for, and respond to bioterrorism threats.

7-Biological Agent: A microorganism, virus, or toxin capable of causing disease or death in humans, animals, or plants.

8-Biological Surveillance: Refers to the monitoring of data and information to detect and track biological threats, such as disease outbreaks or bioterrorist attacks.

9-Biological Security Governance: Refers to the development and implementation of laws, policies, and regulations to prevent the misuse of biological agents and respond to bioterrorism threats.

Biological warfare and bioterrorism are similar in that both involve the use of biological agents as weapons. However, they differ in that biological warfare is an organized military action conducted by states, whereas bioterrorism is often carried out by non state actors or individuals. Both aim to inflict harm on the enemy, but biological warfare is governed by international war laws, while bioterrorism is considered a criminal act under all circumstances⁽⁹⁾.

Biological crimes also share the criminal nature of bioterrorism but may be broader in scope, encompassing activities such as illegal trafficking of biological materials or misuse of scientific research. Bioterrorism is a specific form of biological crime characterized by political or ideological motivations and the goal of instilling widespread fear. Biosecurity involves preventive measures to protect living organisms from biological threats and is an essential component of countering bioterrorism. While bioterrorism focuses on offensive actions, biosecurity focuses on defense and prevention. Biodefense is similar to biosecurity but emphasizes military and civilian responses to biological attacks. It shares the same concern for dangerous biological agents but represents the defensive side of the confrontation with bioterrorism. Biological surveillance is a crucial component of the bioterrorism response system, aiming at the early detection of biological threats. While bioterrorism seeks to conceal its activities, biological surveillance works to uncover and track them. Biological security

governance represents the legal and regulatory framework governing all biosecurity related activities, including countering bioterrorism. Unlike bioterrorism, it represents the organized efforts of states and international organizations to prevent and manage biological attacks⁽¹⁰⁾.

From the above, we conclude that bioterrorism is closely linked to these concepts, as it represents the threat that the other concepts aim to confront and prevent. While bioterrorism focuses on the use of biological agents to spread fear and achieve political or ideological goals, the other concepts work to prevent these threats, respond to them, and manage their consequences together forming an integrated system for addressing biological threats in our contemporary world.

Second: The Evolution of Bioterrorism

The concept of bioterrorism dates back to ancient times, where biological agents were used as weapons of war. One of the earliest recorded examples is the Mongols' use of plague infected corpses in 1346 to infect the city of Caffa in the Crimean Peninsula during the city's siege. This tactic, known as "biological warfare," was used to weaken the enemy and gain a strategic advantage.

1- From the Middle Ages to the Industrial Era:

During the Middle Ages, biological agents were used sporadically in warfare, often through the contamination of water sources or the use of infected animals. In the 18th century, the British army deliberately infected Native Americans with smallpox during the French and Indian War. This is considered one of the earliest recorded instances of biological warfare in the Americas.

In the late 19th and early 20th centuries, the development of modern microbiology and the discovery of pathogens such as anthrax, plague, and tularemia led to a greater understanding of the potential of biological agents as weapons. During World War I, Germany developed a biological warfare program, which included the use of anthrax and glanders against humans and animals⁽¹¹⁾.

2- The Cold War Era:

The Cold War marked a significant escalation in the development of bioterrorism. The United States, the Soviet Union, and other countries heavily invested in biological warfare research and development. The U.S. Army's biological



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warfare laboratories were established at Fort Detrick, Maryland, in 1943, and the Soviet Union launched its Biopreparat program in the 1970s. During this period, the development of new biological agents, such as Ebola and Marburg viruses, accelerated, along with the enhancement of existing agents like anthrax and smallpox. The Soviet Biopreparat program was particularly notorious for its large-scale production and stockpiling of biological agents, including anthrax, plague, and tularemia⁽¹²⁾.

3- The Modern Era:

The collapse of the Soviet Union in 1991 marked a major shift in the bioterrorism landscape. The dissolution of the Soviet biological preparedness program led to the spread of biological agents and expertise, resulting in a new bioterrorism threat.

The 1990s saw a rise in bioterrorism incidents, including the 1995 sarin gas attack in Tokyo by the Aum Shinrikyo cult, which also attempted to develop and use biological agents. Additionally, the 2001 anthrax letter attacks in the United States, which occurred after the events of September 11, resulted in the deaths of five people and the infection of seventeen others. These incidents raised significant concerns about terrorists' use of biological weapons⁽¹³⁾.

Several factors have contributed to the evolution of bioterrorism, making it a significant threat to global security and public health. The following are the key factors that have led to the spread of bioterrorism, along with examples:

A- Advances in Biotechnology and Genetic Engineering:

The rapid advancement in biotechnology has made it easier for individuals or groups to access and manipulate biological agents. The development of genetic engineering, gene editing tools such as CRISPR, and the availability of online educational resources and protocols have increased the risk of bioterrorism. For example, the 2001 anthrax attacks in the U.S. were carried out using a genetically engineered strain of anthrax designed to be more lethal. Advances in genetic engineering have facilitated the development and production of genetically modified microorganisms that are more deadly and less susceptible to treatment. One

example is the increased ability to modify bacterial genes to resist antibiotics, making them more dangerous if used as weapons⁽¹⁴⁾.

B- State Sponsorship: Some countries have been accused of supporting or sponsoring bioterrorism, either directly or indirectly. This may include providing funding, training, or logistical support to terrorist groups. For example: The Soviet Union was allegedly involved in supporting the apartheid regime in South Africa, which developed a biological weapons program in the 1980s.

C- Terrorist Organizations: The emergence of extremist groups and ideologies has created a conducive environment for bioterrorism. There are examples of some terrorist groups employing biological agents, including: In the 1990s, the Japanese religious cult Aum Shinrikyo attempted to develop and use biological agents, including anthrax and Ebola. Al-Qaeda also expressed interest in acquiring and using biological agents, including anthrax and plague. ISIS (the terrorist organization) used chemical weapons, including mustard gas, and showed interest in developing biological weapons⁽¹⁵⁾.

D- Cyber-Biological Convergence: The intersection of cyberattacks and bioterrorism has created new vulnerabilities, as cyberattacks can be used to disrupt critical infrastructure, including those related to public health and biological defense.

E- Lack of International Cooperation and Governance: The absence of effective international agreements and enforcement mechanisms has hindered efforts to prevent bioterrorism. The Biological Weapons Convention, which prohibits the development, production, and stockpiling of biological weapons, lacks a verification mechanism. Example: The international community's failure to prevent the development of biological weapons programs in countries such as Iraq and Libya⁽¹⁶⁾.

F- Dual-Use Research: Scientific research that can be used for both beneficial and harmful purposes has raised concerns about

the potential misuse of biological agents. A notable example is the controversy surrounding the publication of a 2011 study on synthesizing a highly virulent strain of *H₅N₁* influenza, which raised fears about the possible escalation of bioterrorism⁽¹⁷⁾.

G- Lack of Public Awareness and Education:

The general public's lack of understanding of bioterrorism and biological agents has made it easier for bioterrorists to spread fear and misinformation. Example: The initial confusion and misinformation surrounding the 2001 anthrax attacks contributed to widespread fear and panic.

H- Inadequate Funding and Resources: The lack of sufficient funding and resources for biological defense and public health infrastructure has hampered efforts to prevent and respond to bioterrorism. Example: Underfunding of the Centers for Disease Control and Prevention (CDC) and the National Institutes of Health (NIH) in the 1990s and early 2000s limited their ability to respond to emerging threats⁽¹⁸⁾. From the above, it can be concluded that the evolution of bioterrorism is influenced by a range of factors, and understanding these factors is crucial for developing effective strategies to prevent and respond to bioterrorism threats.

Third: The Impact of Bioterrorism on National Security Domains

The consequences of any bioterrorist attack cannot be overlooked due to the increasing likelihood of destabilizing governments, disrupting global supply chains, and undermining trust in institutions. As the world becomes more interconnected, the threat of bioterrorism grows. Additionally, bioterrorism can also compromise the safety of a country's critical infrastructure, such as food and water supply systems, and it can even have a devastating impact on the environment. As such, bioterrorism poses a significant threat to national security, and it is essential for countries to take proactive measures to prevent, prepare for, and respond to such attacks.

1. The Impact of Bioterrorism on the Political Domain:

A- Changes in domestic and international policies affect relations between countries

and within societies. On the domestic level, governments may find themselves compelled to implement emergency measures and new laws aimed at strengthening biosecurity and protecting public health. These measures may include travel restrictions, increased border control, and the enforcement of strict quarantine policies. This could lead to the restriction of certain civil liberties and raise public concern over abuse of power⁽¹⁹⁾.

B- Bioterrorism contributes to increased government spending on defense and national security, which may lead to reallocating resources away from other sectors such as education and social welfare. Governments may also be forced to develop and upgrade the health infrastructure to be capable of dealing with biological threats, requiring substantial investments in scientific and technological research⁽²⁰⁾.

C- Bioterrorism also contributes to political instability, as governments may struggle to respond effectively to attacks, resulting in public distrust and unrest. This can create opportunities for extremist groups or political opposition to exploit the situation. Additionally, bioterrorism may raise concerns about civil liberties, as governments may need to balance individual freedoms with the need to protect public health and national security⁽²¹⁾. This can lead to debates over issues such as mandatory vaccination, surveillance, and detention. Furthermore, bioterrorism can contribute to political polarization, as different political groups may have differing views on how to respond to bioterrorist threats. This can result in partisan divisions and political gridlock. On the other hand, bioterrorism has long term consequences for political systems, as governments may need to adapt to the new normal of bioterrorist threats and how to respond to them. This could lead to changes in political culture, institutions, and power dynamics⁽²²⁾.

D- On the international level, bioterrorism may lead to strained relations between countries, especially if there are accusations of a certain country's involvement in supporting



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or carrying out biological attacks. Such tensions may escalate conflicts, result in the imposition of economic or diplomatic sanctions, and increase the race to develop biological weapons and countermeasures. Conversely, bioterrorism could also encourage international cooperation in combating bioterrorism through information and technology exchange and enhancing joint capabilities to counter these threats effectively⁽²³⁾.

From the above, it can be concluded that bioterrorism represents a significant political challenge that requires a comprehensive response involving the strengthening of international cooperation and the development of effective domestic policies for protection and deterrence.

2. The Impact of Bioterrorism on the Military/Security Domain:

The impact of bioterrorism on the military level can be complex and affects various aspects of national defense and security, as follows:

- A- A shift in military strategies by updating and developing military strategies to include biological threats as part of unconventional warfare.
- B- Readiness and preparedness through the development and modernization of detection and early warning systems to identify and track sources of biological threats, and the enhancement of rapid and effective response capabilities in the event of a bioterrorist attack⁽²⁴⁾.
- C- The impact on military resources and tactics includes the need to invest significant resources in research and the development of drugs and vaccines for protection against biological agents, and the development of military tactics that consider bioterrorist attacks and their potential impacts⁽²⁵⁾.
- D- International cooperation in intelligence to exchange information about biological threats and joint efforts in developing policies and protocols to effectively confront biological threats⁽²⁶⁾.
- E- The impact on conventional warfare: the use of biological weapons could change the rules of traditional warfare and introduce new dimensions to conflicts, posing legal

and ethical challenges related to the use of biological weapons⁽²⁷⁾.

3-The Impact of Bioterrorism on the Economic Field:

A biological attack can cause severe damage to both national and international economies due to several factors, including:

- A- There may be significant loss of life, leading to a shortage in the workforce. This shortage can directly affect economic productivity, especially if the affected groups include workers in vital sectors such as healthcare, agriculture, and industry.
- B- Disruptions in supply and distribution chains, resulting in food shortages and price increases. This can also affect industries dependent on agricultural products as raw materials⁽²⁸⁾.
- C- Travel and trade restrictions may be imposed to prevent the spread of biological agents. These restrictions can lead to a decline in tourism and international trade, harming the local economy of the affected state.
- D- Governments may be forced to increase spending on biosecurity and public health to deal with future threats, placing additional financial pressures on government budgets⁽²⁹⁾.
- E- A state of panic and mistrust may arise among the public, negatively affecting consumption and investment. When citizens fear for their health and safety, they may tend to reduce spending on luxuries and save their money for necessities such as food and medical care. Consequently, consumer behavior shifts, slowing the pace of economic growth⁽³⁰⁾.

From the above, we conclude that bioterrorism represents a massive economic challenge that requires a comprehensive and coordinated response by governments and the international community to mitigate its effects and limit its economic damages.

4-The Impact of Bioterrorism on the Social Field:

- A- Citizens may begin to question the government's ability to protect them. The resulting chaos and confusion can lead to social unrest, with people taking to the streets demanding answers and action. Furthermore, the economic burden resulting from a

bioterrorist attack can be crippled, leading to widespread unemployment, business closures, and a decline in economic activity⁽³¹⁾.

B- The social fabric of the nation may erode as the very foundations of society come under threat. The consequences can be catastrophic. The psychological trauma experienced by individuals and communities may be long lasting, leading to loss of trust in institutions and a decline in social cohesion⁽³²⁾.

After reviewing the repercussions of bioterrorism on national security, reference will now be made to its impact on regional and international security. Bioterrorism represents a serious threat to regional security, as it could escalate existing regional conflicts or ignite new ones. States may be forced to divert substantial resources toward biosecurity and emergency preparedness, affecting their ability to address other regional issues. Ultimately, the ongoing threat of bioterrorism may lead to a fundamental shift in regional power dynamics and strategic alliances⁽³³⁾.

At the international level, a successful bioterrorist act could lead to shifts in alliances and partnerships, as countries reassess their security priorities and cooperate in biosecurity measures. This may also lead to tensions between states perceived as responsible for enabling such threats. In short, the consequences of bioterrorism extend far beyond immediate health effects, infiltrating nearly every aspect of international security and stability⁽³⁴⁾.

5- Deficiencies in Legal Frameworks to Confront the Evolution of Bioterrorism:

Many attempts have been made to legislate against the dangers posed by evolving bioterrorism, including international, regional, and national efforts, as follows:

A- Geneva Protocol of 1925:

This protocol prohibits the use of biological and chemical weapons and toxic gases, or in general, biological agents that cause diseases and may be used in warfare. It was signed on 17 June 1925 in Geneva, Switzerland. A total of 108 countries signed the protocol, including the five permanent members of the UN Security Council. Despite its importance, several signatory states went on in the following years to develop their biological

weapons arsenals, including Belgium, France, the United Kingdom, Italy, the Netherlands, and Japan⁽³⁵⁾.

B- Biological Weapons Disarmament Committee of 1972:

An international treaty was signed in 1972 to prohibit the development, production, and stockpiling of any type of biological weapons as a form of weapons of mass destruction. Signed on 10 April 1972, it entered into force on 26 March 1975. The convention aims to prevent or limit the use of biological weapons and encourage the use of biological technologies for peaceful purposes, such as agriculture and medical research. Member states commit to transparency and cooperation regarding their biological programs and must implement strict oversight measures to prevent the spread of biological weapons. The treaty currently binds 165 states to prevent and prohibit the use of biological weapons. Although 12 countries signed the treaty in 2011, they have not yet ratified it⁽³⁶⁾.

C- United Nations Resolutions:

The UN Security Council issues resolutions addressing bioterrorism and international security. For instance, several resolutions (such as Resolution 1540 and Resolution 1887) call for strengthening global efforts to prevent the proliferation of nuclear, chemical, and biological weapons and prevent their delivery to terrorist groups. These resolutions encourage states to take necessary measures to promote international cooperation and stop the distribution, transfer, and possession of illegal biological weapons⁽³⁷⁾.

D- International Convention for the Suppression of Terrorism:

Adopted in 1999 under a resolution of the UN General Assembly, this convention aims to enhance cooperation among states in combating terrorism, including bioterrorism. It encourages collaboration in the exchange of information, provision of legal and technical assistance, development of national laws, and reinforcement of police and judicial cooperation⁽³⁸⁾.

In addition to some other agreements and legislations such as⁽³⁹⁾:

- The Convention on the Prohibition of the Development, Production, Stockpiling, and Use of Chemical Weapons and on their Destruction, adopted in 1993.



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- UN Security Council Resolution 1540 (2004), which obliges states to take measures to prevent the proliferation of weapons of mass destruction to nonstate actors.
- The International Convention for the Suppression of Acts of Nuclear Terrorism, adopted in 2005.
- The Organisation for the Prohibition of Chemical Weapons (OPCW) Convention of 1997, which prohibits the development, production, stockpiling, and use of chemical weapons.
- The International Health Regulations (IHR) issued by the World Health Organization in 2005, aiming to contain the spread of infectious diseases across borders. In addition, export control laws exist, and many countries enforce strict controls on the export of materials and technologies that could be used to develop biological weapons, to prevent their acquisition by terrorist groups or states seeking to use them for illicit purposes.
- Global health agreements (IHR): Issued by the World Health Organization, these agreements aim to enhance the capacity to respond to public health threats and include measures to prevent the spread of diseases, including those that could be used in bioterrorism.

Despite the existence of these frameworks, they still suffer from shortcomings and require urgent activation through cooperation at international and regional levels and ensuring their practical implementation, not merely their theoretical articulation. There is also a need for development to keep pace with technological advancement, given the emergence of new materials requiring legislative updates and regulatory confrontation.

Fourth: Study Findings and Recommendations

1- Study Findings:

- A- The study revealed that bioterrorism poses a serious threat to national security, as it can lead to the spread of deadly epidemics and viruses, which in turn threatens the public health of citizens. This negatively affects the political and social stability of the targeted countries.

B- The results uncovered a strong correlation between bioterrorism and the economic losses of nations. Biological attacks target vital sectors and infrastructure, leading to the disruption of economic activities and the loss of financial resources. This is linked to the aforementioned impact on political and social stability. The study also indicated that bioterrorism has a significant psychological impact on citizens, as it instills fear and anxiety and weakens morale. This is connected to the effect on public health and social stability, creating a state of insecurity and chaos in society.

C- The results confirmed the importance of international cooperation in confronting bioterrorism. Intelligence sharing between countries assists in the early detection of threats and in countering them. Moreover, coordination among countries in developing early warning systems and rapid response mechanisms enhances the ability to contain biological attacks and mitigate their effects. The study also pointed out that investing in scientific research and the development of modern technologies plays a pivotal role in combating bioterrorism. Advances in detecting biological agents and developing vaccines and medications strengthen the capacity for prevention and treatment, thus limiting the impact of biological attacks on public health and the socio economic stability of nations.

D- The study findings also reveal the close interrelation between the effects of bioterrorism on national security in terms of threats to public health, political and social destabilization, economic losses, and psychological impact on citizens. They also emphasize the importance of international cooperation and investment in scientific research as an effective means of confronting this serious threat.

2. Study Recommendations:

- A- There is a necessity to strengthen mechanisms that ensure the effective confrontation of bioterrorism. This requires a multi-faceted approach that includes preparedness, prevention, detection, and response, as follows:

● **Preparedness:**

This can be achieved through national and international coordination by establishing a national and international framework for preparedness and response to combat bioterrorism, which is of critical importance. This includes developing laws, regulations, and policies to prevent and address bioterrorism threats, along with surveillance and detection by implementing a robust monitoring system to identify and detect bioterrorism agents, such as infectious diseases, toxins, or biological agents. This is essential and includes monitoring disease outbreaks, tracking unusual patterns, using advanced diagnostic tools, and vaccination and immunization by developing and distributing effective vaccines and immunizations against potential bioterrorism agents, which can help prevent or reduce the impact of an attack⁽⁴⁰⁾.

● **Prevention:**

Preventive measures are a vital component in confronting bioterrorism. These measures include monitoring infectious diseases and the ability to quickly diagnose any unusual outbreak. There must be an effective early warning system capable of alerting us to any potential biological threat. For example, modern technologies such as biosensors can be used to detect the presence of biological agents in the air, water, or on surfaces⁽⁴¹⁾.

In addition, control of biological agents can help prevent their misuse by enforcing strict regulations on their production, storage, and transportation. Regarding laboratory security, ensuring that laboratories dealing with biological agents have strong security protocols including access controls, surveillance, and inventory management can help prevent theft or diversion of such agents. Furthermore, border surveillance through effective measures such as the inspection and screening of people and goods can help prevent the illegal importation of biological agents.

● **Detection:**

This is achieved through disease surveillance, where implementing a robust disease monitoring system can help detect unusual patterns or outbreaks that may indicate a bioterrorist attack. In addition, environmental monitoring, such as sampling air and water, can aid in detecting the presence of biological agents. The development

and use of advanced diagnostic tools (clinical diagnostics), such as PCR and ELISA, can also assist in the rapid identification of biological agents⁽⁴²⁾.

● **Rapid Response:**

This involves strengthening biosecurity systems in sensitive facilities such as laboratories and research centers to prevent the theft or leakage of dangerous agents. Public health and emergency personnel are trained to recognize the symptoms of unusual infectious diseases that may indicate a biological attack. Accordingly, international cooperation plays a pivotal role in combating this type of terrorism through intelligence sharing and monitoring the movement of hazardous materials across borders. On the national level, early warning and surveillance networks are established to detect any abnormal disease outbreak as quickly as possible.

Response plans for biological attacks include procedures for quarantine, and the rapid and wide scale distribution of medicines and vaccines. Specialized teams are trained to handle hazardous materials and conduct decontamination. Effective communication with the public is a critical element in preventing panic and ensuring compliance with public health measures. Public awareness and health education are key components of the overall strategy to confront bioterrorism. The more informed and aware a society is of the risks and preventive measures, the more resilient it becomes in the face of potential threats⁽⁴³⁾.

B- Recommendations at the National, Regional, and International Levels:

● **National-Level Recommendations:**

- 1- Develop a comprehensive national strategy to combat bioterrorism, clearly defining the roles and responsibilities of all concerned entities and ensuring effective coordination among them.
- 2- Strengthen national capacities for early detection of biological threats by establishing a national early warning network and enhancing surveillance and epidemiological monitoring systems⁽⁴⁴⁾.
- 3- Invest in the infrastructure of laboratories and national research institutions and enhance their capabilities in diagnosing and rapidly analyzing dangerous biological agents.



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- 4- Establish national rapid response teams for biological emergencies, comprising experts from various relevant disciplines, and equip them with the necessary training and tools⁽⁴⁵⁾.
- 5- Update national legislation and legal frameworks to criminalize acts associated with bioterrorism and reinforce security measures in critical and sensitive facilities.
- 6- Enhance cooperation and coordination between security, intelligence, health, and research institutions to facilitate information and expertise exchange in combating bioterrorism⁽⁴⁶⁾.
- 7- Promote community awareness about the risks of bioterrorism and educate citizens on the preventive and precautionary measures to be followed during biological emergencies.
- 8- Conduct regular national drills and exercises to ensure the preparedness of all relevant entities in responding to biological attacks and identify weaknesses and opportunities for improvement.
- 9- Allocate adequate financial resources to support national activities and programs in the field of bioterrorism prevention and response and encourage scientific research in this domain⁽⁴⁷⁾.

• Recommendations at the Regional Level:

- 1- Strengthening cooperation and coordination among countries in the region through the establishment of joint mechanisms and protocols for sharing intelligence on biological threats and coordinating efforts in prevention and response to potential biological attacks⁽⁴⁸⁾.
- 2- Establishing regional centers specialized in biological security, tasked with developing research and studies related to biological threats, and providing technical support and training to member states in the field of detecting and responding to dangerous biological agents⁽⁴⁹⁾.
- 3- Adopting unified regional strategies for preparedness and response to biological emergencies, including the development of joint emergency plans, and organizing regular drills and exercises to test the readiness of

countries in dealing with biological attacks.

- 4- Working to develop scientific and technical capabilities at the regional level in the fields of detecting biological agents and developing vaccines and countermeasures, through encouraging joint scientific research and the exchange of expertise and knowledge among countries⁽⁵⁰⁾.
- 5- Enhancing cooperation between security and intelligence agencies in regional countries to prevent the smuggling and use of hazardous biological materials, and to combat terrorist groups that may seek to acquire and use them in biological attacks⁽⁵¹⁾.
- 6- Raising awareness at the regional level about the risks of biological terrorism by organizing joint awareness campaigns and sharing information and experiences in community education on biological security. Encouraging the participation of the private sector and civil society at the regional level in efforts to counter biological terrorism by involving them in the development of regional strategies and plans, and strengthening their role in awareness raising and providing logistical support during emergencies⁽⁵²⁾.

The implementation of these regional level recommendations would enhance the ability of countries to confront biological terrorism threats more effectively through joint efforts, the exchange of expertise and resources, and the adoption of a proactive and cooperative approach to addressing these serious threats.

• Recommendations at the International Level:

- 1- Strengthening international cooperation and intelligence sharing between countries regarding potential biological threats, and working to build a global early warning network to detect and respond to any potential biological attacks quickly and effectively⁽⁵³⁾.
- 2- Encouraging countries to join relevant international agreements and treaties, such as the Biological Weapons Convention, and reinforcing compliance with them to ensure the limitation of the spread and misuse of dangerous biological agents.
- 3- Supporting joint scientific research and the exchange of expertise among countries in the

field of biological security, and developing vaccines and countermeasures against dangerous biological agents to enhance the global capacity for prevention and re-sponse to biological attacks⁽⁵⁴⁾.

- 4- Reinforcing the role of specialized international organizations, such as the World Health Organization, in monitoring biological threats, coordinating international efforts to confront them, and providing technical and material support to countries less capable of addressing these threats.
 - 5- Raising awareness at the international level about the dangers of biological terrorism and the importance of confronting it, through organizing awareness campaigns, training programs, and international workshops
- targeting policymakers and professionals in relevant fields⁽⁵⁵⁾.
 - 6- Encouraging cooperation among countries in securing biological laboratories and research facilities and implementing strict controls on the transfer and handling of hazardous biological agents to prevent them from falling into the hands of terrorist groups.
 - 7- Working to dry up the sources of funding for terrorist groups that may seek to obtain biological weapons by enhancing international cooperation in combating money laundering and terrorism financing, and imposing sanctions on states and entities that provide material or logistical support to such groups⁽⁵⁶⁾.

Conclusion:

The researcher found a significant development in biological terrorism, both in terms of resources and the groups that employ it for their benefit. As demonstrated in the preceding analysis, existing laws are insufficient and inadequately enforced to confront terrorism in its current form. Given the severity of biological terrorism and its grave implications for public health, the economy, and political stability, combating it must receive considerable international attention. There must be dedicated efforts to enhance cooperation in the field of biological security and to prevent hazardous biological agents from falling into the hands of terrorist groups. Biological terrorism remains an ongoing threat that requires constant vigilance and sustained international collaboration to confront it effectively.

It is essential that international efforts be unified, and that partnerships and coordination among states and relevant international organizations be strengthened, to build an effective global system capable of addressing the threats posed by biological terrorism and preserving global security and stability in the face of this dangerous form of terrorism.

Moreover, through addressing the research problem and answering the research questions in this study, the researcher has concluded that, in light of rapid technological developments and the growing global security threats, biological terrorism has become one of the most serious challenges to national security in the modern era. This form of terrorism represents a unique threat due to its potential to cause large scale harm and the difficulty of detecting and combating it, especially with advances in biological sciences and the ease of access to advanced information and technologies.



The Impact of the Evolution of Biological Terrorism on National Security

Dr. Maryam Abdel-Salam Ahmed Moussa

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The Impact of the Evolution of Biological Terrorism on National Security

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Abstract:

The study entitled “The Impact of the Evolution of Biological Terrorism on National Security” explores how biological agents are used as weapons of terrorism and the resulting impact on public health and the economy. The study examines the various methods that terrorists may employ to disseminate biological agents and the catastrophic effects these can have on society and the economy. It also addresses the challenges faced by nation states in detecting and preventing such attacks, and presents effective strategies for confronting them, including enhancing cooperation between security and health authorities, developing early detection technologies, increasing public awareness, and training specialized personnel.

Keywords: Biological terrorism, national security

تأثير تطور الإرهاب البيولوجي على الأمن القومي

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المستخلص:

تناقش الدراسة المعنونة « تأثير تطور الإرهاب البيولوجي على الأمن القومي » تأثير تطور الإرهاب البيولوجي على الأمن القومي. تستعرض كيفية استخدام العوامل البيولوجية كسلاح للإرهاب، وتأثير ذلك على الصحة العامة والاقتصاد. تستعرض الدراسة الطرق المختلفة التي يمكن أن يستخدمها الإرهابيون لنشر العوامل البيولوجية وأثرها الكارثي على المجتمع والاقتصاد. كما تناقش الدراسة التحديات التي تواجهها الدولة القومية في الكشف عن هذه الهجمات ومنعها، وتقديم استراتيجيات فعالة لمواجهتها، بما في ذلك تعزيز التعاون بين الجهات الأمنية والصحية، وتطوير تقنيات الكشف المبكر، وزيادة الوعي المجتمعي وتدريب الكوادر المختصة.

الكلمات المفتاحية: الإرهاب البيولوجي، الأمن القومي.