J Appl Biotechnol Rep. 2026 September;13(3):2207-2216

Journal of
Applied Biotechnology Reports

doi 10.30491/jabr.2026.590044.2026

Case Series

Attacks on Civilian Scientific and Educational Institutions during the 2026 Iran Airstrikes: A Violation of International Humanitarian Law and a Threat to Regional Health Security

Maryam Navaeian [1], **Hassan Abolghasemi** [2], **Gholamreza Farnoosh** [3*]

[1] Student Research Committee, Baqiyatallah University of Medical Sciences, Tehran, Iran
[2] Department of Pediatrics, Faculty of Medicine, Baqiyatallah University of Medical Sciences, Tehran, Iran
[3] Applied Biotechnology Research Center, New Heath Technologies Institute, Baqiyatallah University of Medical Sciences, Tehran, Iran

Corresponding Author: Gholamreza Farnoosh, PhD, Associate Professor, Applied Biotechnology Research Center, New Heath Technologies Institute, Baqiyatallah University of Medical Sciences, Tehran, Iran. Tel: +98-9155431709, E-mail: rzfarnoosh@yahoo.com

Received July 4, 2026; **Accepted** September 5, 2026; **Online Published** September 30, 2026

Abstract

Introduction: Educational and scientific institutions are critical national infrastructure. Attacks on such facilities can have profound implications for civilian safety, educational continuity, scientific progress, public health, and human capital development during armed conflict. This study aimed to document reported damage to educational, scientific, research, and pharmaceutical establishments in Iran resulting from military attacks between February 28 and April 10, 2026, and to assess their human, educational, scientific, and public health consequences.

Materials and Methods: This descriptive case-series drew upon publicly available records and documented reports concerning damage to the aforementioned civilian infrastructure within the specified period. Data sources included official reports, institutional statements, and publicly accessible records. Information from official sources was cross-referenced, where feasible, with independent reports, international media investigations, and publicly accessible assessments. Data were analyzed descriptively and are presented as aggregated findings alongside individual case descriptions.

Results: As of April 10, 2026, a total of 3,375 fatalities had been reported, including 496 women and 255 children under 12 years of age. Government sources reported 312 fatalities among students and educators, with more than 30,000 civilians sustaining injuries. Approximately 72,000 residential and commercial properties were damaged. Civilian infrastructure losses included over 2,000 affected properties, among which 857 were schools and more than 32 were universities and research institutions. Three notable cases were documented: the reported strike on Shajareh Tayyebeh Elementary School, the destruction of Tofigh Daru Pharmaceutical Company, and damage sustained by the Pasteur Institute of Iran, as one of Iran's major research institutes in the field of biotechnology. These incidents resulted in substantial damage to educational, pharmaceutical, scientific, and research infrastructure.

Conclusions: The documented incidents have potentially significant repercussions for educational delivery, pharmaceutical production, research continuity, and national and regional public health preparedness. They highlight the vulnerability of civilian scientific and educational infrastructure during armed conflict, raise serious concerns regarding protection under international humanitarian law, and underscore the need for independent investigation and sustained international support for restoring essential educational, pharmaceutical, and public health capacities.

Keywords: Armed Conflict, Civilian Infrastructure, Educational Institutions; Pharmaceutical Facilities, Scientific Institutions, Public Health

Citation: Navaeian M, Abolghasemi H, Heydari MR, Farnoosh G. Attacks on Civilian Scientific and Educational Institutions during the 2026 Iran Airstrikes: A Violation of International Humanitarian Law and a Threat to Regional Health Security. J Appl Biotechnol Rep. 2026;13(3):2207-2216. doi:10.30491/jabr.2026.590044.2026

Introduction

Sustainable development in any society is predicated upon fundamental pillars, including education and scientific research. Educational institutions, universities, research establishments, and pharmaceutical companies are indispensable to national development and sustainability. The protection of civilian infrastructure and essential services remains a paramount concern during armed conflicts, as damage to such facilities may entail repercussions extending beyond immediate physical destruction.[1] Under international humanitarian law, educational facilities, along with their associated students and personnel, are recognized as civilian objects and individuals and are therefore entitled to protection.[2]

A series of airstrikes was initiated on the 28th of February 2026 by the United States and Israel against Iran, with hostilities persisting for approximately 40 days. The United Nations Office for the Coordination of Humanitarian Affairs (OCHA) reported cumulative figures of 3,375 deaths, including children, women, teachers, students, and health workers, and 33,000 injuries during this period.[3] Furthermore, 56 emergency stations, 62 ambulances, and 10 support vehicles were affected. A total of 40 hospitals sustained damage, 10 of which were evacuated, with patients transferred to alternative facilities.

Copyright © 2026 The Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (http://creativecommons.org/licenses/by/4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Additionally, nine hospitals remained non-operational. During the conflict, 245 health centers, 90 pharmaceutical companies, and four emergency aircraft were also destroyed. The sole marine ambulance stationed on Hormuz Island was targeted and rendered inoperative (Table 1). Regarding civilian casualties, the number of fatalities among students and educational personnel has been reported as 312. This total comprises 253 students (143 boys, 103 girls, 5 preschool boys, and 2 preschool girls) and 59 members of the education workforce, including teachers (11 employed men, 39 employed women, 6 retired men, and 3 retired women). The statistics further indicate that 182 students and 25 education staff members sustained injuries. Significant damage to educational infrastructure was also documented. Overall, 968 administrative, cultural, and educational organizations were affected, encompassing 857 educational institutions, 55 administrative facilities, 16 cultural centers, 32 sports venues, and 8 student camps (summarized in Table 2). The destruction of academic, technological, and medical infrastructure may have far-reaching implications beyond immediate physical damage, potentially undermining scientific development, continuity of knowledge, and public health capacity. Such damage can adversely affect access to scientific resources, the continuity of research activities, the retention of scientific expertise, and long-term technological advancement.[4] Reports of these incidents also indicate substantial human losses within the scientific, educational, and healthcare communities; more than 40 scientists, students, and medical professionals have reportedly lost their lives,[5] including at least 27 young students and scientists reported to have been affected by the attacks.[4]

Table 1. Estimated Damage to Educational, Scientific, Pharmaceutical, and Health Infrastructure During the 2026 Iran Airstrikes (as of 10 April 2026)

No.	Sector	Affected facilities (Number)	Description of impact	Estimated economic Loss (USD) $: IRR 1,779,000 (as of May 10, 2026)
1	Schools Education Infrastructure	146 schools	Total or severe damages done to schools' infrastructure, leading to major disruption in their teaching activities.	$292–584 million
2	Universities and Scientific Institutions	>32 universities and scientific centers	Damage to higher education facilities, research labs, and research tools that lead to disruption of higher education and science-related research.	$640 million–1.6 billion
3	Educational, Administrative, and Cultural Facilities	968 facilities (857 educational units, 55 administrative buildings, 16 cultural centers, 32 sports halls, 8 student camps)	Structural damage to facilities related to educational management, cultural programs, and student facilities within various provinces.	$1.2–2.5 billion
4	Pharmaceutical Production Facilities	90 pharmaceutical plants and related facilities	Damage to pharmaceutical manufacturing and storage facilities leading to disruption in the manufacturing and distribution of vital medications.	$7.2–13.5 billion
5	Hospitals and Health Centers	40 hospitals and 245 health centers	Damage to medical facilities; at least 10 hospitals are vacated owing to their closeness to military zones, with some hospitals out of operation.	$2.2–4.5 billion
6	Emergency and Pre-Hospital Infrastructure	56 emergency stations, 62 ambulances, 10 support vehicles, 4 emergency helicopters	Damage to emergency medical response capacity and disruption of rapid-response healthcare services.	$120–250 million
7	Broader Civilian Infrastructure	>72,000 residential, commercial, and civilian units damaged	Major destruction to civilian infrastructure facilities and urban areas aside from the educational sector and the health sector.	Not included in sector-specific estimate

Table 2. Reported Casualties Among Students and Educational Personnel During the 2026 Iran Airstrikes

Category	Sub-category	Killed	Injured
Students	Boys (school students)	143	–
	Girls (school students)	103	–
	Preschool children (5 boys, 2 girls)	7	–
	Total Students	**253**	**182**
Educational Personnel	Employed staff (11 men, 39 women)	50	25
	Retired staff (6 men, 3 women)	9	–
	Total Educational Personnel	**59**	**25**
Overall Total	—	**312**	**207**

Among the reported incidents, three cases, the strike on Shajareh Tayyebeh Elementary School, the destruction of Tofigh Daru Pharmaceutical Company, and the damage sustained by the Pasteur Institute of Iran, are particularly illustrative. These cases represent three interconnected components of civilian societal capacity: education, pharmaceutical production, and public health research. They have raised serious concerns regarding the protection of civilian infrastructure under international humanitarian law. This descriptive case series aimed to document these three reported incidents and to examine their implications for education, public health, scientific capacity, and regional health security. By focusing on these three cases, the study seeks to highlight the cascading consequences of attacks on civilian scientific and educational infrastructure during armed conflict.[6] has raised significant concerns regarding the protection of civilian infrastructure during armed conflicts. The consequences of such damage extend beyond physical

destruction, encompassing disruptions to education, scientific capacity, medicine production, and public health preparedness. This study aims to document these three reported incidents affecting civilian educational, pharmaceutical, and scientific infrastructure and to examine their implications for education, public health, scientific capacity, and regional health security. The estimated damage to educational, scientific, pharmaceutical, and healthcare infrastructure during the Iran Airstrikes 2026 has been summarized in Table 1.

Materials and Methods

This descriptive case series drew upon publicly available records and documented reports concerning damage to educational, scientific, research, and pharmaceutical infra-structures during the period from 28 February to 10 April 2026. Data sources included official reports, institutional statements, and publicly accessible records detailing casualties, structural damage, and the functional consequences sustained by affected facilities. Records were included if they provided specific information regarding the location, type of affected facility, reported casualties, or documented consequences of infrastructure damage. Reports lacking sufficient verifiable information, or those unrelated to civilian educational, scientific, healthcare, or pharmaceutical facilities, were excluded. To enhance data reliability, information obtained from official sources was cross-referenced, where feasible, with independent reports, international media investigations, and publicly accessible assessments. When discrepancies between sources were identified, the reported figures were compared across available sources, and values corroborated by multiple independent sources were preferentially reported. Where discrepancies could not be resolved, the uncertainty was explicitly retained and interpreted with due caution. All data were analyzed descriptively and are presented as aggregated findings alongside individual case descriptions.

Results

Three distinct cases involving damage to civilian infrastructure, specifically educational, pharmaceutical, and scientific/ research institutions, were identified and documented during the study period. As summarized in Table 1, an estimated 3,375 fatalities and over 30,000 injuries were reported, alongside damage to more than 2,000 civilian infrastructure units, including 857 schools and more than 32 universities and research institutions. (Table 1).

Case Study 1: Bombing of Shajareh Tayyebeh Girls' Elementary School

Minab is located in Hormozgan Province in southeastern Iran, a region of substantial strategic and military significance, as it directly overlooks the Strait of Hormuz and the Persian Gulf. This geographical position renders it a key operational hub for the naval forces of Iran's Islamic Revolutionary Guard Corps (IRGC), specifically the IRGC Navy (NEDSA).[7] The Shajareh Tayyebeh educational complex comprises a network of 32 schools alongside religious and educational organizations under the "Bayt al-Zahra" umbrella, distributed across the southern provinces. The two-story facility in Minab accommodated girl students on the second floor, boy students on the first floor, and kindergarten classes on the ground level. Visual evidence, including wall murals and playground markings clearly identifiable in satellite imagery, corroborates the building's designation as an educational facility.[8] On the 28th of February 2026, a reported strike affected Shajareh Tayyebeh Elementary School. Initial reports documented substantial casualties among students and school personnel.[9] Among those killed were 120 students (73 boys and 47 girls), alongside 26 female teachers (Figure 1). Moreover, seven parents (four men and three women), one school service driver, one pharmacy technician from an adjacent clinic, and

Figure 1. Photographic Compilation of Students Reportedly Affected in the Shajareh Tayyebeh Elementary School Incident, Minab, Iran, 2026. Source: Khabar Online (2026).

Figure 2. Reported Missile Fragments and Debris Recovered from the Site of the Shajareh Tayyebeh Elementary School Incident, Minab, Iran, 2026. Source: Al Jazeera (2026).

Figure 3. Reported Burial Site of those Killed in the Shajareh Tayyebeh Elementary School Incident, Minab, Hormozgan Province, Iran, 2026. Source: Student News Network (SNN, 2026)

a six-month-old fetus were also killed.[7] The force of the explosion was such that many bodies sustained extensive fragmentation, complicating identification efforts. For example, no remains of the seven-year-old student Makan Nasiri have yet been recovered, and he is officially reported as missing. According to published reports, the bombing resulted in the deaths and severe fragmentation of the remains of 156 students, teachers, and family members (Figures 2 and 3).

Case Study 2: Attack on Tofigh Daru Pharmaceutical Company

Tofigh Daru Pharmaceutical Company was founded in Tehran in 1999 and has been described as a significant

manufacturer of pharmaceutical and biotechnology goods in Iran. The company was a knowledge-based enterprise employing approximately 150 specialized staff, engaged in the production of pharmaceutical raw materials used across several therapeutic areas, including cardiology, oncology, anesthesiology, pain management, and diabetes. In 2002, alongside its ongoing research and development activities, Tofigh Daru expanded into the production of Active Pharmaceutical Ingredients (APIs), peptides, and molecular biology products, successfully transitioning numerous research projects into commercial production.[10]

During the conflict, the facility was reportedly subjected to a direct strike. According to media reports, three missiles hit Tofigh Daru directly, rendering the company inoperative.[11] The company produced active ingredients for 60 knowledge-based medicines. Its most recent achievement before the attack was a novel peptide-based anticancer drug-delivery platform which, despite severe sanctions, was reported to reduce reliance on imports in this area. Among the company's most important products were medications used in oncology, diabetes, and anesthesia.[12] Tofigh Daru was also described as the first production site for high-risk medicines and the first manufacturing site for anti-narcotic drugs in Iran. Some of these medicines were reported to have limited domestic or regional production alternatives. The pharmaceutical products manufactured by Tofigh Daru and their main characteristics have been presented in Table 3 (Figure 4). The company reportedly produced glatiramer acetate, a medication used in the treatment of multiple sclerosis.

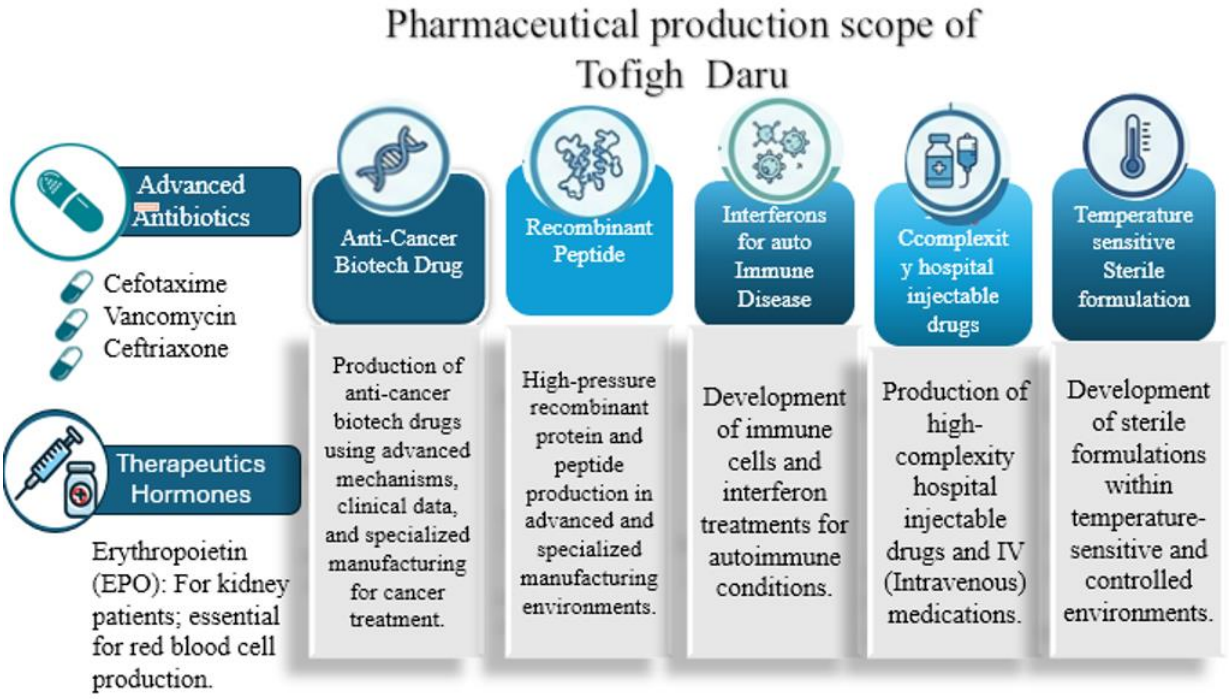

Figure 4. Overview of Pharmaceutical and Biotechnological Products Manufactured by Tofigh Daru Pharmaceutical Company.

Table 3. Pharmaceutical Products Manufactured by Tofigh Daru Pharmaceutical Company

Category of therapeutics/ Class	Product(s)	Medical purpose	Overall significance
Active Pharmaceutical Ingredients (APIs)	Triptorelin, Lisdexamfetamine, Bempedoic acid	Cancer treatment, ADHD, LDL reduction	Very high; reduces dependence on imports
Injectable Products	Aripiprazole lauroxil, Tirofiban, Labetalol	Psychiatric treatments, emergency cardiovascular	Very high; secures supply of critical hospital medicines
Dietary Supplements	Vitamin D3, B12, C	Prevention and treatment of nutritional deficiencies	High; supports growing supplements market
CNS and Psychiatry	Risperidone, Lisdexamfetamine	Schizophrenia, ADHD	High importance; psychiatric medicine supply
Antiviral	Sofosbuvir/Daclatasvir, Oseltamivir	Hepatitis C, Influenza	Very high to important; addresses viral diseases
Cardiovascular	Apixaban, Bempedoic acid, Nicorandil	Chronic heart disease, high blood pressure	Very high; central role in cardiovascular management
Anticancer	Olaparib, Enzalutamide, Ibrutinib	Treatment of malignancies	Very high importance; special anticancer drugs
Immunology and Multiple Sclerosis	Upadacitinib, Baricitinib, Teriflunomide	Autoimmune diseases, multiple sclerosis	Very important; key immune-modulating drugs
Diabetes and Weight Management	Semaglutide, Tirzepatide	ontrol Type 2 diabetes mellitus, weight loss	Very high; meets growing metabolic demands
Dentistry and Veterinary Medicines	Articaine-Epinephrine, Vitamins, Antibiotics	Local anesthesia, immune support in veterinary	High; reduces import dependence in dentistry and veterinary(16)

Figure 5. Reported Damage to the Tofigh Daru Research and Pharmaceutical Complex, Showing Structural Damage, Debris, and Impacts on Specialized Equipment Following the Reported Strike, Iran, 2026. Source: Iranian Students' News Agency (ISNA, 2026).

Case Study 3: The Attack on the Pasteur Institute of Iran

The Pasteur Institute of Iran, founded in 1920 through a bilateral agreement between the Pasteur Institute of Paris and the Iranian government, is recognized as one of the oldest and most prestigious institutions in the fields of science, especially biotechnology, and public health in Iran and the broader Middle East region. The institute has made considerable contributions to scientific advances in microbiology, vaccination, and disease prevention and control through diverse research and biological production activities (Figure 6). The institute is also an active member of the international network of Pasteur Institutes, collaborating across more than 30 countries in public health and epidemiological surveillance.[13] The major roles of the institute, its key pharmaceutical and biological products, and the reported consequences of the damage have been summarized in Table 4.

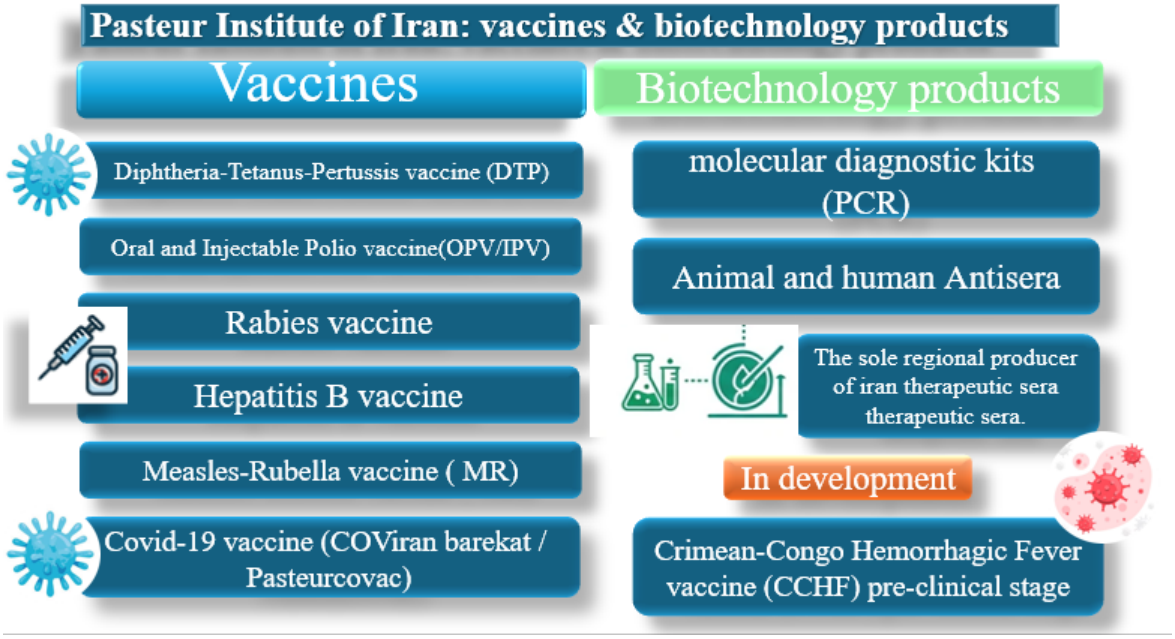

Figure 6. Overview of Vaccines and Biotechnology Products Associated with the Pasteur Institute of Iran, Including Major Vaccine Platforms, Diagnostic Products, Biological Materials, and Ongoing Vaccine Development Activities.

The Pasteur Institute of Iran was reported to be an important regional producer in several key domains, particularly therapeutic antiserum manufacturing (Figure 7). During the conflict, a key facility within the institute sustained severe damage (Figure 9). Such disruption could potentially lead to the loss of critical reference samples for various infectious diseases and the interruption of selected vaccine-related production activities.[14] Furthermore, damage to biosafety containment systems could elevate bio threat risks if laboratory infrastructure were compromised.[15] The severe threat to public health infrastructure caused by this destruction has also prompted urgent calls from the international health community, as highlighted in a recent correspondence in The Lancet.[16]

Comparative Analysis of Documented Incidents

A comparison of the three documented incidents highlights that the three institutions represented distinct yet interconnected components of civilian societal capacity. The impact on the educational institution primarily affected the development of human capital; the pharmaceutical company was impacted in terms of its capacity to produce healthcare-related goods; and the reported impact on the Pasteur Institute was related to scientific infrastructure and

Table 4. Key Functions and Products of the Pasteur Institute of Iran and Reported Consequences of Damage

No.	Category / Functional area	Key product(s) / Focus	Significance	Consequences of disruption
	Key Products			
1	Diagnostic Products	Molecular diagnostic PCR kits	Enables rapid infectious disease detection; reduces import dependence	-
2	Routine Human Vaccine Production	DTP, Polio, MMR/MR, Rabies, Hepatitis B vaccines	Supports national immunization programs, reduces import reliance, prevents infectious diseases	Disrupted vaccine coverage; increased risk of outbreaks and epidemics
3	Therapeutic Serums	Antivenoms, antitoxins (tetanus, diphtheria)	Sole regional supplier of critical emergency therapeutics	Increased mortality; life-saving drug shortages
4	Research & Pandemic Vaccines	COVID-19 vaccine, Crimean–Congo Hemorrhagic Fever (CCHF) vaccine	Expands national capacity for R&D, emergency pandemic response, and emerging disease control	Loss of R&D progress and emergency pandemic response capability
	Critical Infrastructures & Roles			
5	Diagnostic Centers	National reference lab for high-risk pathogens	Central to rapid, accurate diagnostics & surveillance	Delayed outbreak detection; increased disease spread
6	Emerging Disease Surveillance	Genomic surveillance and pathogen monitoring	Enhances biosecurity; preparedness for novel pathogens	Weakened surveillance; silent pathogen spread
7	Genetics and Immunology Research	Genomic studies and immunological analyses	Advances local biotech knowledge and innovation	Loss of research progress; data termination
8	Microbial and Viral Repositories	Biorepositories and reference microbial strains	Essential infrastructure for research and vaccine development	Irreversible loss of biological materials

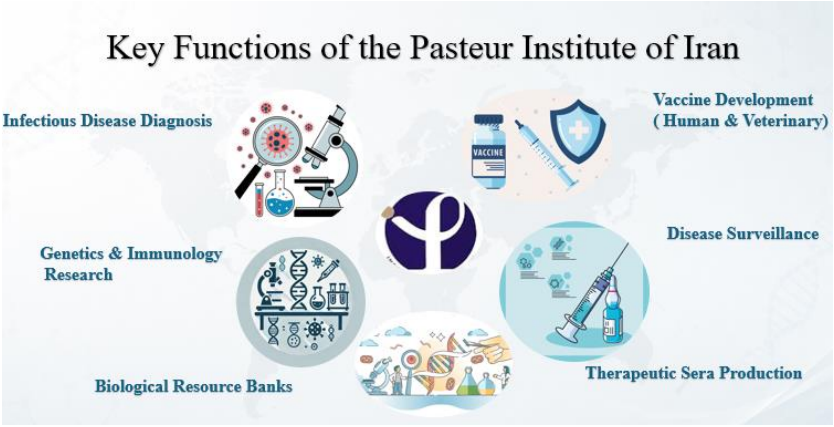

Figure 7. Key Scientific and Public Health Services of the Pasteur Institute of Iran. The figure illustrates the institute's major roles, including infectious disease diagnosis, vaccine production, surveillance of emerging diseases, therapeutic sera production, maintenance of biological banks, and research in the areas of genetics and immunology.

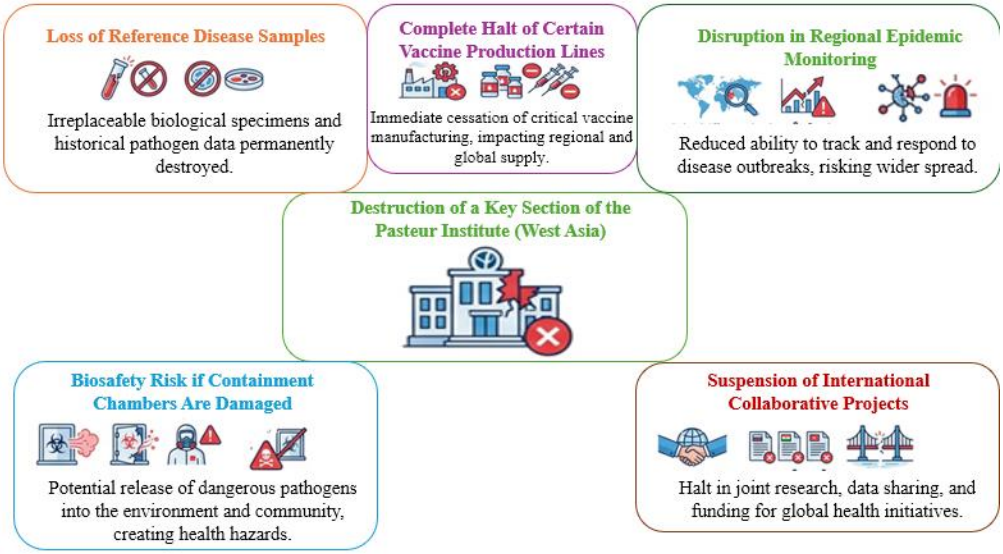

Figure 8. Potential Consequences Associated with Damage to a Pasteur Institute of Iran Facility, including Possible Effects on Research Activities, Laboratory Capacity, and Public Health Functions. Source: Authors' analysis.

Figure 9. Damage to the Pasteur Institute of Iran Following the Reported Strike, Including Structural Damage and Impacts on Research and Laboratory Facilities. Sources: Iranian Students' News Agency (ISNA) and Tabnak, (2026).

Table 5. Comparative Summary of Three Documented Incidents Affecting Civilian Educational, Pharmaceutical, and Scientific Infrastructure

Characteristic	Shajareh Tayyebeh elementary school	Tofigh daru pharmaceutical company	Pasteur institute of Iran
Type of facility	Educational institution	Pharmaceutical manufacturing facility	Scientific and public health research institute
Main function	Primary education and child development	Production of pharmaceutical raw materials and medicines	Disease surveillance, biological research, and vaccine-related activities
Date of reported incident	28 February 2026	2026	2026
Reported nature of incident	Reported damage affecting an educational facility	Reported damage affecting pharmaceutical production infrastructure	Reported damage affecting scientific and public health infrastructure
Immediate impact	Reported fatalities and damage to educational infrastructure	Interruption of pharmaceutical production capacity	Damage to scientific and public health infrastructure
Primary affected domain	Education and human capital development	Medicine supply and pharmaceutical production capacity	Public health security and research capacity
Secondary effects	Potential disruption of educational continuity and educational services	Potential effects on medicine availability and manufacturing continuity	Potential effects on research activities, surveillance, and biological preparedness
Potential long-term consequences	Disruption of education and loss of educational resources	Possible effects on medicine availability and production resilience	Possible effects on surveillance, research capacity, and public health preparedness

disease control. Although they are distinct in functionality, these three cases share common features, which have been summarized in Table 5.

Discussion

The findings of this study indicate that damage to civilian infrastructure during armed conflicts may have consequences extending well beyond immediate casualties, affecting education, healthcare delivery, and scientific capacity. Available reports indicate that 170 university students, 14 faculty members, and 312 schoolchildren were killed, alongside the widespread destruction of over 2,000 civilian infrastructure units, including 857 schools and more than 32 academic and scientific centers. The three case studies illustrate a pattern of reported impacts across interconnected civilian sectors, education, pharmaceutical production, and public health research, that simultaneously produce serious human, social, public health, and scientific consequences.

Recent scholarly commentary has discussed the reported attacks by the United States and Israel on educational and scientific institutions in Iran within the broader concept of "scholasticide," emphasizing that the destruction of schools, universities, and research facilities may have consequences extending beyond immediate physical damage to knowledge production and the continuity of scientific communities.[17] The targeted destruction of a school represents more than the loss of a physical structure; it constitutes an attack on the future intellectual and human capital of society. Many of the children enrolled in Shajareh Tayyebeh School were at the nascent stage of their developmental and educational trajectories and could have contributed meaningfully to their country and the global community. This incident also prompted calls for independent investigation and renewed attention to the protection of educational facilities during armed conflicts.[18]

Similarly, damage to Tofigh Daru extended beyond the interruption of a single production line. Disruption of pharmaceutical manufacturing may affect the availability of selected medicines and place additional pressure on health-system supply chains, potentially increasing the risk of treatment interruptions and adverse health outcomes. Restoring production lines for biological products is technically complex and highly time-consuming, involving the re-establishment of fermentation units, bioreactors, culture media systems, sterilization processes, and calibrated instrumentation, a process that typically requires several months.[12] The complete destruction of a specialized pharmaceutical manufacturing center, particularly one producing anticancer agents, represents a significant reported incident, even during armed conflicts. This places a substantial burden on the healthcare system and may also contribute to the loss of institutional and technical knowledge.

The extensive impacts resulting from damage to the Pasteur Institute can be considered a serious challenge to

biosecurity and scientific sustainability. Aside from being a source of laboratory tests and vaccines, the institute is a facility dedicated to monitoring emerging infectious diseases, maintaining biological and genetic stockpiles, and coordinating international scientific cooperation. Disruption of laboratory and surveillance capacities during emergencies may compromise disease detection, outbreak response, and broader public health preparedness.[19] Previous global assessments have emphasized that attacks on healthcare facilities can disrupt essential services and produce long-term consequences for population health.[20] The loss of reference materials, unique equipment, and long-term experiments represents a scientific setback that may take considerable time to overcome. The destruction of regional public health infrastructure also causes severe disruption to regional epidemic surveillance and monitoring, leaving populations vulnerable to unchecked outbreaks,[21] and may result in substantial delays to critical international collaborative projects.[22] The death toll at Shajareh Tayyebeh Elementary School, the interruption of medicine production at Tofigh Daru, and the damage to surveillance and vaccine production at the Pasteur Institute collectively represent highly consequential incidents. While the total economic cost of restoring these three facilities has been estimated to exceed 25 million USD, the greatest cost is attributable to the loss of life, the erosion of knowledge capital, and the consequent sense of insecurity among the general public.

Limitations

This study has several limitations. As a descriptive case series based primarily on publicly available records and secondary reports, it was constrained by the availability, completeness, and accuracy of source data. Discrepancies between sources required cautious interpretation, and some casualty, damage, and operational-impact estimates could not be fully corroborated. Reliance on media reports, institutional statements, and international assessments may introduce selection and reporting bias, while the absence of denominator data limits quantitative comparison. In addition, the three documented cases, although illustrative, may not represent the full spectrum of attacks on civilian scientific and educational infrastructure.

Conclusion

The three documented incidents, involving an elementary school, a pharmaceutical manufacturing company, and a premier public health research institute, collectively underscore the vulnerability of critical civilian infrastructure during the recent US-Israeli strikes against Iran. Despite their distinct functional roles, these cases share common features: each targeted infrastructure legally protected under international humanitarian law; each resulted in immediate loss of life and operational capacity; and each poses cascading, long-term risks to human capital development, healthcare delivery, pharmaceutical self-sufficiency, and scientific progress. The findings reinforce the urgent need for enhanced protection of civilian infrastructure in conflict zones, independent investigation of such incidents, and sustained international support for the restoration of essential educational, pharmaceutical, and public health capacities.

Authors' Contributions

MN: Conceived and designed the study, collected and analyzed publicly available data, interpreted the findings, prepared the figures and tables, conducted the literature review, and drafted and revised the manuscript; HA: Supervised the study, provided scientific guidance throughout the study, contributed to the study design and interpretation of the findings, and critically reviewed the manuscript; MRH: Assisted with manuscript editing, language revision, reference management, and formatting of the manuscript; GF: Provided overall supervision, critically reviewed the manuscript, contributed to the interpretation of the results, and approved the final version for publication.

Conflict of Interest Disclosures

The authors declare that they have no conflicts of interest.

References

1. Waters H, Garrett B, Burnham G. Rehabilitating health systems in post-conflict situations. Making peace work: the challenges of social and economic reconstruction: Springer; 2009. pp. 200-27.
2. The International Committee of the Red Cross (ICRC). Frequently asked questions: Rules of war. Available from: https://www.icrc.org/en/document/FAQ-rules-of-war-ihl. [accessed 2 July 2023]
3. World Health Organization. Regional Office for the Eastern Mediterranean. WHO situation report: Middle East conflict, Situation Report No. 10, 15 May–2 June 2026. Available from: https://www.emro.who.int/images/stories/eha/ME-Sitrep-15-2-June-26.pdf [accessed 12 September 2026]
4. Akbariqomi M, Abolghasemi H, Farnoosh G. Targeted Assaults on Iran's Scientific Capacities: A Legacy for Global Science. Trauma Monthly. 2025;30(4):1502-3. doi:10.30491/tm.2025.546726.1877
5. Akbariqomi M, Abolghasemi H, Heidari R, Khoshi A, Farnoosh G. Israel's Attack on Iran's Scientific and Academic Community: A Reflection of Scientific Apartheid. Journal of Military Medicine. 2025;27(Special Issue 1):29-36. doi:10.30491/jmm.2025.1006954.1406
6. Pourkarim MR, Barzegar M, Lemey P, Dellicour S, Van Ranst M. Damage to Pasteur Institute of Iran threatens regional health security. The Lancet. 2026;407 (10542):1913. doi:10.1016/s0140-6736(26)00804-4
7. Al Jazeera News.Al Jazeera investigation: Iran girls' school targeting likely 'deliberate'. Available from: https://www.aljazeera.com/news/2026/3/3/questions-over-minab-girls-school-strike-as-israel-us-deny-involvement. [accessed 3 March 2026]
8. Guardian T. Minab school bombing: how the worst mass casualty event of the Iran war unfolded – a visual guide 2026. Available from: https://www.theguardian.com/

global-development
9. Akbariqomi M, Abolghasemi H, Farnoosh G. The Shajareh Tayyebeh Elementary School Crime: Lessons from Infanticide and Scientific Terrorism by the United States and Israel. J Mil Med. 2026;28(Special Issue 1):79-85. doi:10.30491/jmm.2026.1007081.1494
10. Tofiq Daru at a Glance. 2026. Available from: https://todaco.com/aboutus
11. Al Jazeera News. Cancer drug facility, religious site hit in Israeli-US strikes on Iran. Available from: https://www.aljazeera.com/news/2026/3/31/cancer-drug-facility-religious-site-hit-in-israeli-us-strikes-on-iran [accessed 31 March 2026]
12. Ana News Agency (ANA). Tofiq Daru is scheduled to unveil a specialized oncology medication in the second half of the current year. Available from: https://ana.ir/004P5T [accessed 21 April 2026]
13. Enayatrad M, Mostafavi E. Pasteur Institute of Iran: history and services. J Res Hist Med. 2017;6(4).
14. Ciccacci F, Ruggieri E, Scarcella P, Moramarco S, Carestia M, Di Giovanni D, et al. Between war and pestilence: the impact of armed conflicts on vaccination efforts: a review of literature. Front Public Health. 2025; 13:1604288. doi:10.3389/fpubh.2025.1604288
15. Yeh KB, Tabynov K, Parekh FK, Mombo I, Parker K, Tabynov K, Bradrick SS, Tseng AS, Yang JR, Gardiner L, Olinger G. Significance of high-containment biological laboratories performing work during the COVID-19 pandemic: Biosafety level-3 and-4 labs. Fronti Bioeng Biotechnol. 2021;9:720315. doi:10.3389/fbioe.2021.720315
16. Pourkarim MR, Barzegar M, Lemey P, Dellicour S, Van Ranst M. Damage to Pasteur Institute of Iran threatens regional health security. The Lancet. 2026;407(10542): 1913. doi:10.1016/S0140-6736(26)00804-4
17. Thrasher SW. On the US-Israeli Coalition's Continued Acts of Scholasticide in the Middle East. Available from: https://lithub.com/on-the-us-israeli-coalitions-continued-acts-of-scholasticide-in-the-middle-east/ [accessed 10 April 2026]
18. Al Jazeera News. Calls grow for independent probe into deadly Iranian girls' school attack. Available from: https://aje.news/pedki5 [accessed 6 March 2026]
19. World Health Organization. Managing epidemics: Key facts about major deadly diseases. Available from: https://www.who.int/publications/i/item/managing-epidemics-key-facts-about-major-deadly-diseases [accessed 6 September 2018]
20. World Health Organization. Stopping attacks on health care. Bull World Health Organ. 2022;100(8):470-1. doi:10.2471/BLT.22.020822
21. Ugwu OP, Alum EU, Ugwu JN, Eze VH, Ugwu CN, Ogenyi FC, et al. Harnessing technology for infectious disease response in conflict zones: Challenges, innovations, and policy implications. Medicine. 2024; 103(28):e38834. doi:10.1097/MD.0000000000038834
22. Doutchi M, Ghousmane A, Zampaligre F, Moussa B, Ishagh EK, Talatou Marc O, et al. Health transformation toward universal healthcare coverage amidst conflict: examining the impact of international cooperation in Niger. Front Public Health. 2024;12:1303168. doi:10.3389/fpubh.2024.1303168