



HEALTH IMPACT OF PUBLIC HEALTH EMERGENCIES OF INTERNATIONAL CONCERN IN THE CONTEXT OF THE INTERNATIONAL HEALTH REGULATIONS (2005) IN PERU

IMPACTO SANITARIO DE LAS EMERGENCIAS DE SALUD PÚBLICA DE IMPORTANCIA INTERNACIONAL EN EL CONTEXTO DEL REGLAMENTO SANITARIO INTERNACIONAL (2005) EN PERÚ

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ABSTRACT

Introduction: To assess the impact of PHEICs in Peru and the strategies implemented for their containment. **Methods:** A descriptive study was conducted based on secondary sources. All PHEICs declared by WHO since the adoption of the 2005 International Health Regulations (IHR-2005) up to September 2024 were reviewed. Impact was assessed using morbidity, mortality, and case fatality indicators. Epidemiological characteristics and Peru's health response were analyzed. Cumulative incidence rates (CIR), cumulative mortality rates (CMR), and cumulative case fatality rates (CFR) were calculated. **Results:** Since the adoption of IHR-2005, WHO has declared eight PHEICs. Two evolved into pandemics (Influenza A(H1N1)-2009 and COVID-19), two remain ongoing (Poliomyelitis-2014 and Monkeypox-2024), and four have ended (Ebola-2014, Zika-related microcephaly-2015, Ebola-2019, and Monkeypox-2022). In Peru, pandemics arrived 15 to 35 days after declaration, affecting the entire country. COVID-19 had the greatest impact, with a CMR of 6.7 per 1,000 inhabitants, the highest worldwide. Currently, influenza A(H1N1)-2009 and COVID-19 circulate seasonally. Monkeypox has been reported in all regions. All PHEICs required epidemiological surveillance, infection control, mobility restrictions, and vaccination among high-risk groups. **Conclusion:** PHEICs have had economic, social, political, and public health impacts in Peru, increasing morbidity and mortality. Events such as influenza A(H1N1)-2009, COVID-19, and monkeypox have accelerated the implementation of IHR-2005.

Keywords: Communicable disease control; Global health; Public health surveillance; Pandemics; Peru. (Source: MeSH-NLM).

RESUMEN

Introducción: Las emergencias de salud pública de importancia internacional (ESPII), declaradas por la Organización Mundial de la Salud (OMS), representan un riesgo por su propagación internacional. **Objetivo:** Evaluar el impacto de las ESPII en Perú y las estrategias implementadas para su contención. **Métodos:** Se realizó un estudio descriptivo basado en fuentes secundarias. Se revisaron las ESPII declaradas por la OMS desde la adopción del RSI-2005 hasta septiembre de 2024. El impacto se evaluó mediante indicadores de morbilidad, mortalidad y letalidad. Se analizaron las características epidemiológicas y la respuesta sanitaria en el Perú. Se calcularon tasas de incidencia acumulada (TIA), mortalidad acumulada (TMA) y letalidad acumulada (TLA). **Resultados:** Desde la adopción del RSI-2005, la OMS ha declarado ocho ESPII. Dos evolucionaron a pandemias (influenza A(H1N1)-2009 y COVID-19), dos siguen en curso (poliomielitis-2014 y monkeypox-2024) y cuatro han finalizado (ébola-2014, microcefalia por zika-2015, ébola-2019 y monkeypox-2022). En Perú, las pandemias ingresaron entre 15 y 35 días después de la declaratoria, afectando a todo el país. La COVID-19 tuvo el mayor impacto, con una TMA de 6,7x1000 habitantes, la más alta del mundo. Actualmente, influenza A(H1N1)-2009 y COVID-19 circulan de manera estacional. Monkeypox también se reportó en todas las regiones. Todas las ESPII implicaron vigilancia epidemiológica, control de infecciones, restricción de movilidad y vacunación en grupos de riesgo. **Conclusión:** Las ESPII han afectado a Perú en lo económico, social, político y sanitario, aumentando morbilidad y mortalidad. Eventos como la influenza A(H1N1)-2009, COVID-19 y Monkeypox han acelerado la implementación del RSI-2005.

Palabras clave: Control de las enfermedades transmisibles; Salud global; Vigilancia en salud pública; Pandemias; Perú. (Fuente: DeCS- BIREME)

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INTRODUCTION

Throughout history, the world has faced devastating epidemics and pandemics with significant consequences for global health, the economy, and social structures. Various factors have contributed to the rapid spread of infectious diseases, including increased travel, international trade, migration, accelerated urbanization, population growth, and rising population density. Additionally, inadequate or insufficient health infrastructure, along with deficiencies in sanitation and access to safe drinking water in densely populated urban areas, exacerbate these risks.

Other contributing factors include human-animal interaction, invasion of natural habitats, deforestation, and the wildlife trade—all of which are linked to the spread of zoonotic diseases. Some of these diseases have been associated with the emergence of highly lethal pathogens, such as SARS-CoV-2 (the cause of COVID-19) and the Ebola virus, among others⁽¹⁻³⁾.

Climate change also influences the spread of communicable diseases by altering geographic distribution and increasing the prevalence of vector-borne diseases such as malaria and dengue. These diseases have expanded into new regions, posing a growing challenge to global public health⁽⁴⁾. In May 2005, the World Health Organization (WHO), during the 58th World Health Assembly, adopted the International Health Regulations (IHR-2005) in response to increasing international travel and trade, as well as the emergence and re-emergence of diseases and other public health threats with global impact. This legally binding regulation came into force on June 15, 2007, and establishes the criteria and mechanisms for declaring a Public Health Emergency of International Concern (PHEIC)⁽⁵⁾.

A PHEIC is formally declared by the WHO and defined as “an extraordinary event which is determined to constitute a public health risk to other States through the international spread of disease and to potentially

require a coordinated international response.” For such a declaration, the event must meet specific criteria: it must be “serious, sudden, unusual or unexpected,” have “public health implications beyond the affected State’s borders,” and “potentially require immediate international action.” In such cases, States have a legal obligation to respond promptly⁽⁶⁻⁸⁾.

In Peru, following the implementation of IHR-2005, a process began to evaluate core surveillance and response capacities, followed by their implementation. These capacities are periodically assessed using standardized self-assessment tools and annual reports submitted by Member States to the WHO⁽⁹⁾. The goal is to ensure that the country has the necessary means to detect, assess, and report any potential public health event of international concern, and to respond effectively and in a timely manner.

The declaration of a PHEIC by the WHO draws international attention and prompts responses from governments, the media, and the general population. It also acts as a global alert for a potential epidemic or pandemic, mobilizing large-scale public health management strategies. These strategies include quarantines, travel restrictions, and public health education and communication campaigns, aimed at guiding the population to adopt preventive measures against the identified causal agent⁽¹⁰⁾. Since the adoption of IHR-2005, the WHO has declared eight PHEICs, each with varying impacts in Peru, testing the country’s surveillance and response capabilities. This article aims to analyze the health impact of PHEICs and Peru’s response within the IHR-2005 framework.

METHODS

Study Design

This is a descriptive study based on event reports. A documentary analysis was conducted using secondary data sources, including a collection and review of the PHEICs declared by the WHO from the adoption of IHR-2005 to date. The impacts of these emergencies on the

country were analyzed in various aspects, including public health, reflected in indicators such as morbidity, mortality, case fatality, and implementation of response measures.

Variables and Data Sources

The following variables were analyzed: name of the PHEIC, origin, identified causative agent, date of declaration, global evolution, end date, place and date of introduction in Peru, time elapsed between the PHEIC declaration and confirmation of the first case in the country, health impact in terms of incidence, mortality, and case fatality, as well as the main response measures implemented.

The units of analysis were the PHEICs declared by the WHO. The period of analysis ranged from 2005 to September 2024. Data sources included publications from international organizations such as the WHO and the Pan American Health Organization (PAHO), as well as national institutions such as the Centro Nacional de Epidemiología, Prevención y Control de Enfermedades (National Center for Epidemiology, Disease Prevention and Control), the Ministry of Health, and the Government of Peru. Data on cases and deaths from Influenza A(H1N1)-2009 were obtained from the article "Mortality related to Influenza A H1N1 in Peru during the 2009-2010 pandemic"⁽¹¹⁾. COVID-19 death figures were extracted from the Open Data Platform of the Government of Peru⁽¹²⁾, and Monkeypox cases were obtained from the PAHO website "Mpox cases - Americas Region"⁽¹³⁾. Additionally, population estimates for the year each PHEIC was declared were provided by the Instituto Nacional de Estadística e Informática del Perú (National Institute of Statistics and Informatics) of Peru.

Health impact indicators included the calculation of the cumulative incidence rate (CIR), cumulative mortality rate (CMR), and cumulative case fatality rate (CFR).

Data Analysis

The data were organized in an Excel spreadsheet.

A univariate descriptive analysis was performed by counting cases by type of event and calculating incidence, mortality, and case fatality rates. Response measures implemented for each event type were also summarized descriptively. Results are presented in tables and figures.

The CIR was calculated as: (Total number of cases during the PHEIC / estimated population in the year the PHEIC was declared) x 1000. The CMR was calculated as: (Total number of deaths during the PHEIC / estimated population in the year the PHEIC was declared) x 1000. The CFR was calculated as: (Total number of deaths during the PHEIC / Total number of cases during the PHEIC) x 100. Crude rates at the national level were calculated without any adjustments.

Ethical Considerations

This study was based on publicly accessible information sources. Since the analysis focused on events and did not involve variables or data that could identify individuals, approval from an institutional ethics committee was not required.

RESULTS

Since the adoption of IHR-2005 until August 2024, the WHO has declared eight PHEICs:

Influenza A(H1N1)-2009 (2009–2010)

This was the first PHEIC declared by the WHO. Initially detected as clusters of respiratory syndrome cases in Mexico and the United States, the causative agent was a new subtype of Influenza A(H1N1), which spread rapidly and led the WHO to declare it a PHEIC on April 25, 2009. In Peru, the first case was confirmed two weeks after the declaration, and the first death occurred a month later. In June 2009, the WHO declared a pandemic, which lasted until August 2010. The country implemented strategies for timely detection and pandemic control (Tables 1 and 2). The disease affected all regions of the country, with confirmed cases and deaths (Figure 1).

Poliomyelitis (2014–present)

In 2014, the spread of wild poliovirus from Pakistan to Afghanistan, from Syria to Iraq, and from Cameroon to Equatorial Guinea, along with outbreaks in Ethiopia, Israel, Somalia, and Nigeria, led the WHO to declare this PHEIC in May 2014. It is the longest-running PHEIC to date. In Peru, response actions focused on strengthening epidemiological surveillance and improving vaccination coverage (Tables 1 and 2).

Ebola (2014–2016)

Ebola virus disease (EVD) emerged in December 2013 in a village in Guinea and was declared a PHEIC eight months later after cross-border spread to three other countries. The WHO declared the end of the emergency in June 2016. No EVD cases were reported in Peru; however, preparedness and response actions were carried out for potential imported cases (Tables 1 and 2).

Zika (2016)

Following reports of microcephaly cases associated with the Zika virus in Brazil, the WHO declared a PHEIC on February 1, 2016. The emergency was declared over in November that same year. No confirmed cases were reported in Peru during the PHEIC period; however, epidemiological surveillance strategies for congenital malformations, prevention, and monitoring of infected pregnant women were implemented, with a focus on areas of previous outbreaks (Tables 1 and 2).

Ebola (2019–2020)

In 2019, the WHO declared a new EVD PHEIC following confirmation of an outbreak in the Democratic Republic of the Congo, which became the second-largest recorded since the virus was identified in 1976. On June 25, 2020, the WHO declared the end of the emergency due to reduced case numbers. No cases were reported in Peru, but preparedness actions were reinforced based on lessons from the 2014–2016 PHEIC (Tables 1 and 2).

COVID-19 (2020–2023)

COVID-19 emerged in December 2019 with the detection of atypical pneumonia cases in Wuhan, China.

The identified causative agent was SARS-CoV-2. The WHO declared it a PHEIC on January 30, 2020, and a pandemic on March 11 of the same year. In Peru, the first case was confirmed on March 6, 2020, and the first death was reported three days later. The pandemic spread across all regions of the country. In response, a national health emergency was declared, and measures such as epidemiological surveillance, contact tracing, lockdowns, infection prevention, and case management according to severity were implemented (Tables 1 and 2, Figure 1). The WHO declared the end of the emergency on May 5, 2023.

Monkeypox (2022–2023)

The Monkeypox virus was first detected in humans in the Democratic Republic of the Congo in 1970 and was considered endemic in some African countries. However, between 2018 and 2021, cases were reported in the United Kingdom, Portugal, and Singapore, associated with travel after a Nigerian outbreak. The WHO declared it a PHEIC on July 23, 2022, after the disease spread to over 100 countries. The emergency ended on May 11, 2023, due to a decline in cases.

In Peru, the first case was confirmed on June 26, 2022, and cases were reported in all regions during the PHEIC period (Figure 1). In response, epidemiological surveillance, case and complication management, infection prevention and control in healthcare settings, and vaccination of at-risk groups were implemented (Tables 1 and 2).

Monkeypox (2024–present)

On August 14, 2024, the WHO once again declared Monkeypox (Mpox) a PHEIC due to rising cases in the Democratic Republic of the Congo and other African countries. The rapid spread of the virus, the identification of a new strain (Clade 1b), and its predominant transmission through sexual networks were key factors in the declaration. In Peru, after the end of the 2022 PHEIC, confirmed cases continued to appear, and surveillance and response measures remain ongoing.

Table 1. Public Health Emergencies of International Concern (PHEICs) and their introduction in Peru.

PHEIC	Origin	Causal agent	PHEIC declaration	Evolution	Termination	Introduction in Peru
Influenza A(H1N1)-2009 (2009-2010) (7,11,14,15)	Cluster of cases in Mexico and the USA	Influenza A(H1N1) 2009 viru	04/25/200	Declared a pandemic on 06/11/2009; extended until 08/10/2010	08/10/201	First case confirmed on 05/09/2009, first death on 06/03/2009
Poliomyelitis (2014–present) (16,18) }	Spread of wild poliovirus from Pakistan to Afghanistan, Syria to Iraq, and Cameroon to Equatorial Guinea	Wild poliovirus type 1	5/05/2014	As of 2024, cases continue to be confirmed in countries like Pakistan and Afghanistan	Still ongoin	No cases reported in the country.
Ébola (2014-2016) (7,18,19)	Emerged in a village in Guinea	Ebola virus	8/08/2014	Spread to Liberia, Sierra Leone, Nigeria, Senegal, and Mali. Imported cases in the USA and some European countries	03/17/2016	No se reportaron casos en el país.
Zika (2016) (7,8,20,21)	Reports of microcephaly cases associated with Zika in Brazil since 2015	Zika virus	02/01/2016	39 confirmed cases of Zika-related microcephaly in Brazil and French Polynesia	11/18/201	No confirmed cases of Zika-related microcephaly in the country
Ebola (2019-2020) (7,8)	Outbreak began on 08/01/2018 in Nord Kivu province, Democratic Republic of the Congo	Ebola virus	07/17/201	Spread to Uganda, with a total of 3,470 cases and 2,287 deaths	06/26/202	No confirmed cases in the country

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COVID-19 (2020-2023) (22,23)	Outbreak in Wuhan, Hubei province, China	SARS-CoV-2	01/30/202	Declared a pandemic on 03/11/2020; extended until 05/05/2023	5/05/2023	First case confirmed on 03/06/2020, first death on 03/09/2020
Monkeypox (2022-2023) (24,25,26,27)	Endemic in African countries; cases reported in the UK, Portugal, and Singapore between 2018 and 2021	Monkeypox virus	07/23/202	Spread to over 100 countries or territories in all WHO regions	05/11/2023	First case confirmed on 06/26/2022
Monkeypox (2024 - presente) (28)	Increased cases in the Democratic Republic of the Congo; new strain (Clade 1b) emerged and spread to neighboring African countries	Monkeypox virus	08/14/202	Still ongoing	Still ongoing	Still ongoing

Table 2. Public Health Emergencies of International Concern (PHEICs), health impact, and Peru's response.

PHEIC	Time*	Health impact in Peru	Peru's response
Influenza A(H1N1)-2009 (2009-2010) (11)	15 days	10,112 cases (CIR: 0.35 per 1,000 population) 312 deaths (CMR: 0.01 per 1,000 population) CFR: 3.08 per 100 cases The virus currently circulates seasonally in the country	Intensified epidemiological surveillance, personal protection measures, travel restrictions, social distancing, hospital management, antiviral administration, and vaccination.



Poliomielitis (2014 - presente) (16,18)	N/A	No cases reported in Peru	Epidemiological alert, intensified surveillance, improved vaccination coverage, health personnel training on surveillance and response to acute flaccid paralysis cases, and declaration of a health emergency.
Ébola (2014-2016) (7,18,19)	N/A	No cases reported in Peru	Epidemiological alert due to risk of imported cases, development of a National Preparedness and Response Plan for potential introduction of Ebola virus, training of regional and intersectoral teams, simulation drills, and response to suspected cases.
Zika (2016) (29)	N/A	No cases reported in Peru	Surveillance of congenital malformations, epidemiological alert, promotion of personal protection measures and prevention of sexual transmission, vector control, screening, and follow-up of suspected cases.
Ébola (2019-2020) (7,8)	N/A	No cases reported in Peru	Epidemiological alert due to risk of imported cases and strengthening of surveillance.
COVID-19 (2020-2023) (12,30)	35 days	4,502,921 cases (CIR: 138.0 per 1,000 population) 219,374 deaths (CMR: 6.7 per 1,000 population) CFR: 4.8 per 100 cases The virus continues to circulate in the country	Declaration of national health emergency, epidemiological surveillance, contact tracing, personal protection measures, lockdown, travel restrictions, case isolation, population screening, hospital management, administration of antibiotics and antivirals, vaccination, and risk communication
Monkeypox (2022-2023) (29)	Cases confirmed before PHEIC declaration	3,800 cases (CIR: 0.11 per 1,000 population) 20 deaths (CMR: 0.0006 per 1,000 population) CFR: 0.53 per 100 cases Cases continue to be confirmed in the country.	Implementation of surveillance, case and complication management, infection prevention and control in healthcare facilities, risk communication, and vaccination of at-risk groups
Monkeypox (2024 - presente) (28)	Still ongoing	Still ongoing	Ongoing surveillance and response measures continue to be implemented

* Time between PHEIC declaration and confirmation of the first case in Peru CIR: Cumulative Incidence Rate. CMR: Cumulative Mortality Rate. CFR: Cumulative Case Fatality Rate. NA: Not applicable.

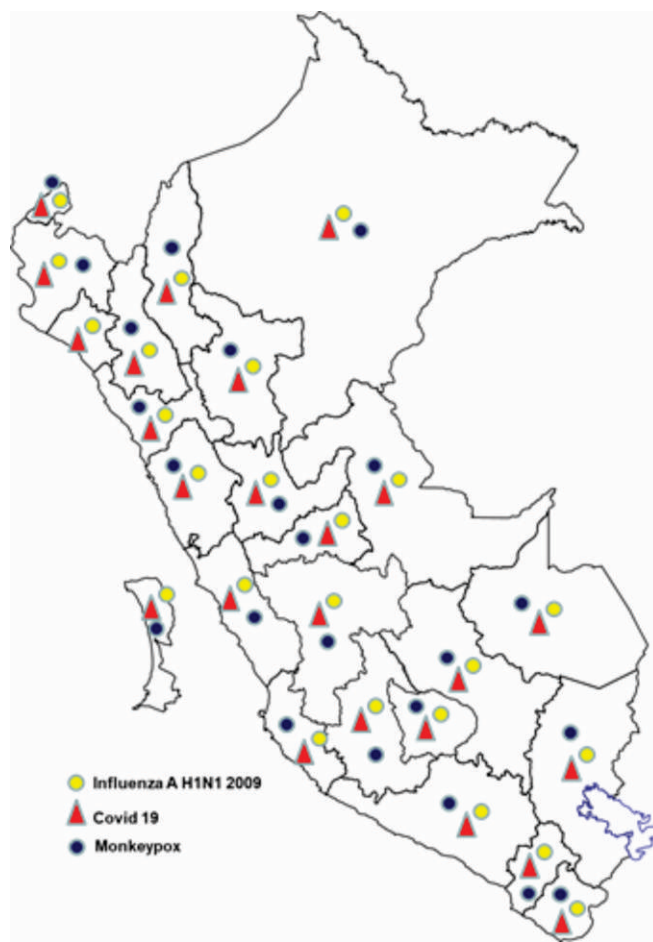


Figure 1. Distribution of Public Health Emergencies of International Concern (PHEICs) by department in Peru.

DISCUSSION

The declaration of the Influenza A(H1N1)-2009 pandemic in 2009 as a PHEIC was the first of its kind under the IHR-2005 framework. Since then, the WHO has declared seven additional PHEICs: poliomyelitis, Ebola (2014), Zika (microcephaly), Ebola (2018–2020), COVID-19, Monkeypox (2022), and Monkeypox (2024)⁽³⁰⁾. Among these, Influenza A(H1N1)-2009 and COVID-19 evolved into pandemics. PHEICs are events that affect public health in their regions of origin and, due to global interconnectivity, can pose risks to populations worldwide, as observed over the past fifteen years.

In Peru, the first case of Influenza A(H1N1)-2009 was identified 15 days after the PHEIC declaration, while the first case of COVID-19 was confirmed 35 days after its declaration. These are relatively short intervals compared to earlier pandemics, such as the 1957

influenza, which reached Peru five months after its onset⁽³¹⁾. This phenomenon can be explained by increased human mobility, facilitated by air travel, which accelerates the spread of emerging and reemerging infectious diseases, increasing their impact on global health security⁽³²⁾. The Influenza A(H1N1)-2009 pandemic posed a challenge for surveillance and response in Peru, as it was the first PHEIC faced after the adoption of IHR-2005, during a period when epidemiological surveillance capacities were still being developed.

According to the Pan American Health Organization (PAHO), by the end of the PHEIC, the pandemic H1N1-2009 virus had spread to all WHO regions and nearly every country, with an official record of approximately 18,500 deaths. Currently, the virus circulates seasonally, and surveillance and vaccination efforts are focused on prioritized population groups⁽¹⁵⁾. However, data from surveillance systems such as Peru's show significant



underreporting compared to global estimates.

Epidemics and pandemics caused by respiratory viruses have a major impact on the social and economic activity of countries, as social distancing is one of the main prevention and control strategies. During the Influenza A(H1N1)-2009 pandemic, schools, sporting events, and cultural activities were suspended, significantly affecting economic productivity.

Poliomyelitis is a highly infectious disease, with one in every 200 cases leading to paralysis. Wild poliovirus type 1 (WPV1) is responsible for poliomyelitis epidemics, while types 2 and 3 have been globally eradicated. In Peru, the last case of wild poliovirus was reported in 1991 in Junín, which was also the last recorded case in the Americas^(33,34). Despite progress, achieving optimal coverage of complete vaccination remains a challenge in the country, posing a potential risk of virus reintroduction as long as global transmission persists⁽³⁵⁾. Since the PHEIC declaration in 2014, the continued occurrence of cases and environmental detection of the virus in Afghanistan and Pakistan remain significant obstacles to WPV1 eradication, requiring strengthened epidemiological surveillance and immunization campaigns under the goal of eradication by 2026^(36,37).

Ebola virus disease (EVD), also known as Ebola hemorrhagic fever, is highly contagious. The first outbreaks occurred in 1976 in Sudan and the Democratic Republic of the Congo, and since then, intermittent outbreaks have been reported in various African countries⁽³⁸⁾. Transmission occurs through direct contact with infected individuals, tissues, bodily fluids, or contaminated fomites⁽³⁹⁾. The West African EVD outbreak (2014–2016) underscored the need to implement effective control and prevention measures to contain its spread. Guinea, Sierra Leone, and Liberia—the most affected countries—lacked sufficient capacity to control the disease, prompting the PHEIC declaration^(39,18). In 2019, the detection of cases in Uganda stemming from the Democratic Republic of

the Congo outbreak demonstrated international spread, leading to a new PHEIC declaration⁽⁸⁾. In Peru, these emergencies spurred preparedness for the detection and response to suspected cases, although no autochthonous or imported cases were reported. Despite the end of the PHEIC, recent outbreaks in Uganda highlight the need for constant surveillance and effective containment strategies⁽⁴⁰⁾.

The association of Zika virus with microcephaly and other neurological disorders, documented in Brazil and French Polynesia in 2014, prompted the WHO to declare it a PHEIC in 2016⁽²¹⁾. In Peru, epidemiological surveillance of infected pregnant women and their newborns was implemented, though no cases of microcephaly were confirmed. However, the lack of resources during that period may have limited case detection. Currently, the virus continues to circulate in tropical and subtropical regions, including Peru, with the risk of causing epidemics and affecting vulnerable populations, particularly pregnant women⁽⁴¹⁾.

COVID-19 was the first pandemic caused by a coronavirus. SARS-CoV-2, its etiological agent, has shown the ability to infect various mammalian species. Detection of the virus in domestic, wild, and farm animals has led to research on zoonotic transmission (from animals to humans) and reverse zoonosis (from humans to animals), raising the potential for the pandemic to evolve into a panzootic. Monitoring its spread and genomic mutations is crucial to prevent reinfections and develop control strategies based on the One Health approach⁽⁴³⁾. During the pandemic, Peru recorded one of the highest cumulative mortality rates in the world⁽⁴²⁾, influenced by health, demographic, social, and economic factors. The virus continues to circulate in the country, and surveillance and vaccination efforts among high-risk groups remain ongoing. Monkeypox (Mpox) was first identified in humans in the Democratic Republic of the Congo in 1970, and cases have since been reported in at least 11 African countries where it is considered endemic. Two



clades of the virus have been identified: the West African clade, associated with milder disease, and the Congo Basin clade, associated with greater virulence. Transmission can occur through direct contact, secretions, or respiratory routes. Although most recent cases have been detected in men who have sex with men, there is a risk of spread to the general population⁽²⁴⁾. Detection of cases in travelers has been key to monitoring the disease and its transmission patterns⁽²⁴⁾. The two PHEIC declarations by the WHO in 2022 and 2024 reflect that current efforts have not been sufficient to control the disease, with confirmed cases in over 100 countries⁽²⁵⁾. In Peru, since its introduction in 2022, the disease continues to be reported.

The declaration of a PHEIC enables rapid mobilization of resources and international coordination, accelerating the development of vaccines, therapies, and diagnostics under emergency use authorizations. In the current context of globalization and recurring health emergencies, PHEICs have had a significant impact in Peru—especially in terms of morbidity, mortality, and case fatality—posing ongoing challenges for surveillance and response under the IHR-2005 framework⁽⁷⁾.

When the WHO declared a PHEIC, Peru's epidemiological surveillance system issued alerts that prompted the implementation of national surveillance and response actions. Mechanisms were strengthened for early case detection, timely treatment, and death registration. However, in the case of emerging diseases, available resources were insufficient to prevent the introduction and spread of transmission, as observed in the Influenza A(H1N1)-2009 and COVID-19 pandemics. Furthermore, the estimation of the actual number of cases and deaths during a PHEIC is limited by

underreporting in each country. While this study analyzes the health impact of PHEICs in Peru, further research is needed to examine their social and economic repercussions.

This study presents several limitations inherent to its design and data sources. First, as a document-based analysis using secondary data from official sources, the quality and completeness of the results depend on the accuracy of the available records. Underreporting of cases and deaths, especially during rapidly spreading events such as Influenza A(H1N1)-2009 and COVID-19, may have affected the true estimation of health impact. Additionally, no adjustments were made for demographic variables or socioeconomic factors, which may influence the interpretation of incidence, mortality, and case fatality indicators. Despite these limitations, this study provides a comprehensive overview of the health impact of PHEICs in Peru and underscores the importance of strengthening epidemiological surveillance and the health system's response capacity.

CONCLUSION

In the current context of globalization, accelerated population movement, and the emergence and re-emergence of diseases, PHEICs have had a profound impact on Peru from economic, social, political, and health perspectives. The latter is evident in terms of morbidity, mortality, and case fatality—particularly in the cases of Influenza A(H1N1)-2009, COVID-19, and Mpox. At the same time, these emergencies have provided opportunities to accelerate the development and implementation of core capacities established by the IHR-2005, enabling the country to address all declared PHEICs, which continue to present significant challenges for Peru.



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