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Article

Mechanisms of Social Risk Derivation and Diffusion in Public Health Emergency of International Concern

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Abstract: The risk derivation and diffusion during PHEIC have raised new requirements for national and social governance. This study builds a "Content-Media-Driving Forces" framework and conducts case analysis through theoretical review, which allows the classification of risks derived from PHEIC into two types: tangible risks and public opinion risks. Tangible risks are manifested as structural risks and process risks, while public opinion risks are represented by popular judgments and the moralization of criticism. In the process of risk evolution, tangible risks and public opinion risks form a complex network of interaction and resonance, resulting in a multi-point radiating pattern of risk derivation and diffusion. In social risk management, it is crucial to strictly regulate epidemic prevention measures, focusing on controlling process-based social risks, responding to public demands in a timely manner, and preventing the diffusion of public opinion that could lead to resonance between public opinion risks and other social risks.

Keywords: Public Health Emergency of International Concern; risk deconstruction; derived risk types; diffusion mechanisms

1. Introduction

We are currently in a state of synchronic risk, where multiple risks are intertwined, forming a complex, interconnected, and diverse chain of risks and risk complexes. Risk is a probabilistic description, and its magnitude is related to the nature of the risk source, the vulnerability of the carriers, risk management capabilities, and the probability of risk occurrence [1]. The reason why risks need to be taken seriously is that they have the potential to transform into hazards. If one harbors a sense of complacency and allows risk hazards to spread unchecked, it may lead to actual damage. Therefore, it is not only important to prevent risks but also to guard against the spread, escalation, and mutation of these risks.

The outbreak of the COVID-19 pandemic has led countries to increasingly focus on responding to and managing public health emergencies and the associated risks. In a risk society, potential risks are amplified to an extreme extent. The scope of public health risks from sudden outbreaks has become broader, resulting in deeper secondary crises and risk damages. The impact of such emergencies extends beyond the public health sector and intertwines with political, economic, social, and cultural risks, forming a complex, multifaceted threat. These risks not only endanger the health and safety of the public but also disrupt normal national and social order. Overall, the derivative risks from Public Health Emergency of International Concern (PHEIC) often outweigh the direct risks and damages they cause. These events are increasingly not confined to a single type of risk but evolve into dynamic, interconnected risks. Addressing the risks posed by PHEIC is not

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just a medical issue; it is also a topic that involves the interlinked risks of politics, economics, and society. The various social emergencies that arose during the COVID-19 pandemic—such as hoarding of supplies, rumors, cyberbullying, "hardcore epidemic control," and heavy-handed law enforcement—serve as a reminder that we must reassess how other social risks emerge during major public health crises. What are the characteristics of these risks? What are the mechanisms of their transmission, diffusion, and transformation? This study, through examining the types of derivative risks and their diffusion paths, sheds light on their basic interaction mechanisms, offering more precise recommendations for further risk mitigation and emergency response.

2. The Characteristics and Deconstruction of Social Risks in PHEIC

2.1. Case Selection and Description

This study adopts a multiple-case comparative research approach, as it can effectively avoid the risk of overgeneralization that exists in single-case studies through cross-validation across multiple cases. Multiple-case research allows for a configurational analysis of the cases, from which the paths and mechanisms of risk derivation and diffusion under PHEIC can be extracted.

This study established a "Social Risk Case Database for PHEIC," collecting over 120 cases. The specific collection of cases in this paper mainly follows the principles outlined below: First, the authenticity and availability of the cases. The cases primarily come from government website reports, academic papers, and are supplemented and cross-verified through various platforms such as the internet, Weibo, WeChat, Tiktok, and public opinion monitoring. Based on this criterion, this study excluded cases where it was not possible to form a unified description of the event's facts or verify the authenticity of the event information. Second, the typicality and representativeness of the cases. The selected cases have had a significant social impact across different regions, representing typical social risks arising from PHEIC. The affected populations are large, and the cases have high research value. Based on this criterion, this study excluded cases with smaller impact areas and those that are not representative. Third, the selection of cases mainly focuses on secondary risks caused by public health emergencies. Therefore, cases related to direct risks resulting from public health emergencies were excluded. Based on the needs of typological analysis, this study also excluded some cases with similar nature or type. Finally, through the remaining 44 cases, the study identified the types of social risks arising from the derivation and diffusion of social risks during the COVID-19 pandemic.

Based on the analysis of the cases, the types of social risks under PHEIC can be classified into the following categories: A-type social risks are characterized by the overcrowding of medical resources and shortages of supplies (A6) caused by the occurrence of public health emergencies, and conflicts and confrontations arising from patients being unable to receive timely medical treatment due to epidemic prevention measures (A1, A2, A3, A4). Overall, these risks are still concentrated in the healthcare field. B-type social risks include social conflicts between epidemic prevention workers and the public (B1, B3, B4, B7), between different groups within the public (B6), social conflicts, and mass incidents (B2, B5, B8). These risk types have moved beyond the public health field and spread into the social domain. C-type social risks manifest as public opinion risks, which, on the whole, mainly target the authorities. The "authorities" may refer to the abstract concept of the state, specific public departments, or government personnel associated with public departments. D-type social risks refer to the social risks arising from the layered intensification of epidemic prevention measures, "overly" stringent prevention (D2, D3, D11), "rigid" law enforcement, and violent enforcement (D5, D6, D7), as well as abuse of power (D1) during the epidemic prevention process. These risks may directly manifest as conflicts and confrontations between law enforcement officers and the public, and may also interact with public opinion, triggering negative public opinion directed at government departments. E-type risks refer to the potential impacts and social risks on the public's

production and life due to resource possession (E4) and social distribution disparities (E2) under the influence of the public health emergency itself and epidemic prevention measures.

In summary, the selected cases broadly cover all types of risks arising from the derivation and diffusion of risks under PHEIC, indicating that the research sample is highly representative and can reflect the overall situation. It is worth noting that the cases mentioned above are microcosms of the general phenomena observed during the COVID-19 epidemic control and can illustrate the characteristics of the typology. However, they are not sufficient to provide a comprehensive understanding of the quantity and intensity of these social risks.

Table 1. Social Risk Case Database During the COVID-19 Pandemic.

No.	Case Description
A1	A pregnant woman in Xi'an could not receive medical treatment and miscarried due to a 4-hour delay in her COVID-19 test.
A2	A resident in Zibo, Shandong, clashed with epidemic prevention workers while trying to take his father to a hospital.
A3	A father and daughter, holding yellow Health QR code, were stopped by authorities after attempting to bypass a checkpoint and later assaulted the police.
A4	An incident in Ningxia where "blue vest" epidemic prevention workers physically assaulted people.
A5	Residents in Datong City, fearing that medical staff might bring the virus, violently expelled and assaulted healthcare workers.
A6	Bundled sale of epidemic prevention package medicines.
B1	Epidemic prevention workers in Xindu District, Chengdu, were beaten while persuading an acupuncture and physiotherapy clinic to suspend operations.
B2	Conflict caused by mandatory QR code scanning in a shopping mall.
B3	A man in Changping District drove into epidemic prevention workers after becoming upset about the long registration process.
B4	A conflict in Zhao County where epidemic prevention workers demanded personal information registration, leading to a fatal incident.
B5	A conflict that led to death after a dispute over improper mask wearing reminders.
B6	A Harbin girl was exposed online as the "virus carrier" due to personal information leakage.
B7	A resident in Wuxi could not wash his hands for three days after taking a COVID-19 PCR test and receiving a blue stamp.
B8	A man attempted to bypass a checkpoint with a knife to deliver milk powder to his son.
C1	"Fangfang's Diary" (a record of events during the pandemic).
C2	The Urumqi fire incident in Xinjiang.
C3	A female deputy director reading her speech from a prepared script during a public event.
C4	A woman in Xinguang A9 community, Xincheng District, fell from a building.
C5	The mayor of Dancheng County, Zhoukou City, Henan, stated in a video that those who "return home maliciously" would first be quarantined and then detained.
C6	A female Party Secretary in Zhengzhou cried during a pandemic briefing, lamenting missing her 18-year-old daughter's "coming-of-age ceremony."
C7	During an inspection by the central guidance group in Wuhan's Qing Shan District, residents shouted from their windows, "It's fake! It's all fake..."

No.	Case Description
C8	Shanghai police announced that passengers who resisted the return-to-country policy would be detained for 5-10 days for disturbing public order.
C9	The "whistleblower Li Wenliang" incident.
C10	Dandong City, Liaoning Province mistakenly relocated all residents of an entire building to Shenyang for quarantine.
C11	Renowned economist Lang Xianping's mother died at the hospital gate due to being unable to receive timely medical treatment because of the lack of a nucleic acid report.
C12	Foxconn workers walked hundreds of kilometers home on foot.
D1	The "misassignment of red Health QR code" incident in Henan.
D2	A truck driver was asked for a negative nucleic acid report when exiting a highway.
D3	COVID-19 tests were conducted on fish in Xiamen, Fujian.
D4	A passenger was refused boarding for being 3 minutes late for a COVID-19 test result.
D5	A hotel in Tangshan City forcibly administered Lianhua Qingwen capsule to quarantined individuals.
D6	"Big Whites" (epidemic prevention personnel) used violence to force people into quarantine.
D7	Seven people in Linyi, Shandong, assaulted a "couple."
D8	A bus transporting quarantine individuals overturned in Guizhou.
D9	During the epidemic control in Qianan, Hebei, keys were handed over, and doors were locked with wire.
D10	Roadblocks epidemic prevention measures in rural areas.
D11	Individuals quarantining at home were admonished for playing cards.
D12	Free quarantine became self-funded in Shaanxi Province, with "Health QR code being changed into payment codes".
D13	Homeowners in the Banghua Xingji Community in Guangzhou had their door locks removed and disinfected without permission during quarantine.
D14	A notice issued by Siping City, Jilin Province, stated that individuals who missed COVID-19 tests more than twice would be detained for 10 days and fined 500 RMB.
E1	"Rotating market closures" in Teng County, Guangxi.
E2	The "Penis Defense" at the Sixth People's Hospital in Shanghai Under the Shadow of the COVID-19 Pandemic.
E3	A whistleblower claimed that the Red Cross Society of Hubei province diverted donated medical supplies for personal profit, causing delays in essential supplies reaching hospitals.
E4	A 15-year-old girl, Yang Xiuhua, in Guangyuan, Sichuan, walked 4 kilometers along a mountain road every day to find signal and attend online classes.

2.2. Characteristics of Social Risks Under PHEIC

Social risks under PHEIC are significantly different from those associated with general public health events in both essence and characteristics. From the perspective of the COVID-19 pandemic, the social risks under PHEIC exhibit the following characteristics: 1) High Uncertainty of Risk: The COVID-19 virus is characterized by its infectiousness, variability, and the uncertainty of its impact. In the early stages of the COVID-19 outbreak, people's understanding of the new virus was insufficient, and the constant mutations of the virus increased public anxiety. Moreover, the ongoing mutations of the virus made existing research and treatment methods less effective, which in turn added a considerable

amount of uncertainty to epidemic prevention and control efforts. 2)Risk diffusion is characterized by its cumulative, interconnected, and rapid expansion. PHEIC lead to contagious diffusion, social diffusion, and systemic diffusion [2]. Social risks under PHEIC are not limited to a single risk but are more often the result of multiple risks overlapping and intergenerating. This is manifested in the interweaving of risk factors, the escalation of risk levels, the broadening of the risk's spread, and the increasing difficulty in managing risks. Any mishandling of a single link can lead to the correlation and transfer of risks. 3)The risk has a cross-boundary nature. The types of social risks under PHEIC are not confined to the direct life, health, and property damage caused by the emergency itself. They also include the secondary risks triggered by the public health event, which act as a mechanism to give rise to other types of risks. 4）The ability of risks to spread across regions has become increasingly stronger. The disaster-inducing factors of social risks are diverse, and due to the uncertainty of these risks, they can easily break through local stability and trigger cross-domain chain reactions. At the same time, the close social interactions and frequent mobility of people today provide favorable conditions for the cross-regional spread of risks. Regional risks can transcend geographical boundaries and become global crises, to the point where it can be said that all of humanity is tied to a shared risk. From a risk prevention perspective, the growing frequency of national and global economic and social exchanges makes it particularly difficult to contain risks within a specific region. 5)The long-term persistence of risk: Generally, a public health emergency may erupt suddenly, reach a peak in a short time, and then quickly subside. However, in the case of COVID-19, the pandemic has been recurring and persistent for a relatively long period. At the same time, the scale of epidemic prevention has been large. Looking back at the control of serious infectious diseases in history, such as the plague and cholera, which were typically managed with regional lockdowns, the outbreak of COVID-19 led some local governments to declare a "wartime" state, promptly taking necessary measures such as restricting movement and traffic control to block the transmission of the virus in physical spaces. As the scale of the public health emergency expanded, the scale of prevention and control also gradually grew.6) the definition of responsibility for social risks in current PHEIC is unclear. Risks inherently have the probability and tendency to cause social harm, and the significant diffusion, spread, and derivation of these risks reduce their controllability, making it impossible to prevent risk damage through the transmission and infinite spread of risks. The complexity of factors leading to risk damage makes defining responsibility difficult, creating a situation of "organized irresponsibility."

2.3. The Three-Dimensional Framework of Social Risk Deconstruction

Social risks under PHEIC differ significantly from traditional social risks. This section deconstructs them from three aspects: risk content, communication media, and driving forces.

Risk is both an objective existence and a reflection of people's perception of social reality under existing cognitive conditions. The social amplification of risk theory suggests that the magnitude of a risk depends on the sensitivity of those affected by objective risks, which is influenced by people's knowledge level, values, and the environment in which they find themselves. The "amplification" of risk includes both the magnification and attenuation of risk signals. The risk perception theory posits that risk information influences people's perception of risk. When numerous small pieces of risk information accumulate, they enhance people's ability to perceive risk, and to some extent, this can transcend the original risk itself, giving rise to new risks. Heinrich's causality chain theory points out that the threats and damages of public emergencies are limited, but under certain conditions, they can trigger a chain reaction of diffusion, leading to more severe social damage [3]. The risks brought about by public health emergencies are not static, but dynamic. Risks can be classified into primary risks and secondary risks, which can also be understood as "preliminary" and "subsequent." "Subsequent crises" are the result of the direct

impact of disasters, where mismatches between the demand for aid and the government's preventive measures trigger the accumulation of public dissatisfaction [4]. Social risks under PHEIC can be classified into five categories: physiological, socio-psychological, social behavior, social response, and social environment. The spread and diffusion of risks can also evolve from a single-point risk to gradually expand into a "line," a "surface," or even a societal "spatial entity" of risk [5].

In summary, the factors driving the derivation and diffusion of risks can be deconstructed from three aspects: the objective facts of the risk, the media through which the risk derives and spreads, and the driving mechanisms that promote the derivation and diffusion of the risk.

2.3.1. Facts: The Components of Risk Derivation and Diffusion

Risks are classified into sudden risks, process risks, and structured risks.

The public health emergency itself is the main factor causing the diffusion of its risks [6]. The spread of the virus is based on human connections and interactions [7]. That is, the virus spreads through human-to-human interactions or human-to-object interactions. The transmission of COVID-19 accompanies the process of social interaction, and the virus spreads through the interaction and movement of people. If a public health emergency is not controlled, it will inevitably spread in public spaces [8].

Process risks are social risks that arise during the response to a public health emergency. Some of the derived risks from public health emergencies are not directly related to the event itself, but are latent in social behaviors and related organizational management activities. The escalation of risk occurs because, in the process of risk management, addressing one issue often creates a series of new problems, thereby leading to the derivation of additional risks [9]. For example, the public sector's slow response to emergencies, along with falsifying reports, concealing information, delaying actions, and using repressive and simplistic approaches, has led to the escalation of mass incidents.

Structured risks refer to risk elements that remain dormant under normal social conditions, temporarily existing in a relatively balanced state. However, it is possible for some sudden events, public opinion, and emotions to trigger a transformation of these risks into social harm. China's modernization has been highly compressed, with profound changes in the economic system, social structure, distribution of interests, and social values during the rapid development phase. Meanwhile, risks and contradictions in various fields coexist simultaneously with the long-term risks of the West, creating complex, overlapping, and interconnected structure of risks [10].

2.3.2. Media: The Channels of Risk Derivation and Diffusion

Risks in physical space can be mapped into information space [11]. The internet serves as a risk amplifier, playing the role of a magnifier. Under the medium of "interconnection" in the internet, a "spark" of risk can evolve into a "wildfire." At present, China's information dissemination media has undergone revolutionary changes, with the internet, social media, apps, and information platforms gradually replacing traditional media as the key channels for information sharing and communication. With the rise of the self-media industry, the public's access to information has shifted from traditional media to self-media, and the trend of information decentralization has become increasingly evident. At the same time, the low entry barrier, convenience, and timeliness of information release in self-media can stimulate broad user participation, and discussions promote the spread and sharing of information. In the era of media participation in social governance, administrative resources are easily hijacked by media logic, eroding governance resources and increasing governance costs, raising higher demands on the accuracy and efficiency of public sector responses. Any inappropriate response can become a "flashpoint" for public opinion fermentation. At the same time, the media's intensive coverage of public health emergencies provides more favorable conditions for the spread of online rumors and the

transmission of risks. Sometimes, it can even trigger public panic, leading to a larger and broader scale of online public opinion, which harms social harmony, unity, and stability. This also poses greater uncertainty and challenges for public sectors in guiding online public opinion.

In the entire structured and organized social system, there are two domains for the transmission of risk information: one is the information transmission domain in physical space, and the other is the transmission domain in virtual space. The transmission, interaction, escalation, and evolution of information in both physical and virtual spaces also promote the aggregation, resonance, and superposition of risk information and elements, triggering the emergence of risk transformation phenomena. Some of the risks of public health emergencies are imposed on risk bearers through the information dissemination process. Online communicators may use threatening imagery to attract the public, thereby expanding their risk perception and placing the public in a high-risk situation, stimulating and misleading the public's understanding of public health event risks. Risk forecasting is an anticipatory and speculative concept. The critical point at which risk disasters can be borne is also called the threshold of risk disaster tolerance. When risk information exceeds the threshold of psychological tolerance for risk bearers, it may lead to uncontrolled behavior. In this context, the combination of public health risks and social risks may either generate new risks or exacerbate existing risks, making them harder to control and manage than before. The media plays the role of "amplifying" the risk, so it is important to pay attention to the role of the media in the process of risk derivation and diffusion.

2.3.3. Emotion: The Catalyst for Risk Derivation and Diffusion

The emotions of social groups are an explicit expression of social risk information. Emotion is another important factor driving the continuous accumulation of risk elements. According to risk perception theory, the magnitude of a risk is constructive, and one of the variable factors influencing its magnitude is the emotions of the risk perceiver. In a risk context, sudden risk events can trigger panic emotions within groups, leading to a decline in social psychological safety and trust [12]. The accumulation of negative emotions accelerates not only the expansion and shifting of targets of resentment but also affects the emotions themselves. This emotional buildup, which gradually accumulates in the absence of being addressed, eventually erupts. The accumulation of negative emotions directed at government departments may stem from long-standing and accumulated structural social issues, such as relatively rigid social classes and interest structures, hindrances to upward mobility, insufficient protection of basic rights, and inadequate attention to the expression of opinions and political positions.

At the same time, risk culture theory suggests that the perception of risk within a group is the primary source of risk formation. In the construction of risk, emotions play a crucial role. Emotions can be stimulated, exaggerated, and mobilized, thereby influencing fluctuations in individuals' perception of risk. For example, during the early stages of an epidemic, insufficient understanding of the situation, combined with the spread of rumors, amplified the public's panic and heightened their risk perception. In the early stages of a public event's exposure, negative emotions gradually rise, often accompanied by panic due to the unknown aspects of the event and anger toward the failure of responsible parties. However, as public departments begin to pay attention and take action to address the issue, these negative emotions reach a turning point. As event-related information becomes more transparent and problems are gradually resolved, positive emotions start to increase [13]. However, the arousal of emotions depends on environmental changes and the gap in individual cognition [14].

3. Social Risk Derivation and Transformation under PHEIC

The direct risk damage caused by public health emergencies primarily manifests as harm to the life and health of the public. From the perspective of risk communication, this

can also be referred to as primary risk. The derived social risks in the context of public health emergencies go beyond the direct risk damage caused by the event itself. These risks are known as secondary risks or derived risks. Derived risks can further be divided into "material" risks and "public opinion" risks.

3.1. The Derivation and Types of Social Risks in PHEIC

The formation of risk has both subjective and objective attributes. The uncertainty that objectively exists within a system constitutes the objective aspect of risk, while the subjective aspect of risk is the individual's subjective reaction to the uncertainty and danger in the objective environment, reflecting the individual's perception of the objective environment. Based on these two characteristics, derived risks can generally be divided into two categories: Entity risks and public opinion risks.

3.1.1. Entity Risks: Process Risks and Structural Risks

Entity risks refer to risks that objectively exist in the physical space, resulting from various subjective and objective factors that cause risk to be transmitted and derived across interconnected affairs. Entity risks primarily reflect the contradictions, conflicts, and potential risk damage tendencies that objectively exist in the "physical" space. Entity risks can be broadly divided into two categories. One category is process risks, which arise from various human factors during the emergency response to public health events. For example, during the COVID-19 pandemic, nationwide measures were implemented to block the spread and transmission of the virus, including city lockdowns, traffic control, isolation of epidemic areas, centralized quarantine, and home quarantine, all of which strictly limited the movement of people. However, in some regions, there were issues with rigid policy enforcement during the pandemic, with a tendency to adopt one-size-fits-all management approaches and measures [15]. This led to social psychological tension and emotional suppression caused by prolonged home isolation. In some regions, extreme lockdown measures caused people to be unable to return to their hometowns and face difficulties finding accommodation, leading them to sleep on the streets, thus damaging citizens' freedom, dignity, and livelihood. In other areas, extreme measures such as road blockages, door closures, and arbitrary interference with normal family activities and private lives harmed individuals' personal rights.

Some grassroots officials have a weak awareness of the rule of law, leading to phenomena of over-enforcement and violent enforcement. As a result, some members of the public resisted and refused to cooperate with relevant control measures, causing social disorder. Structural risks exist within the normal state of national and social development and governance. While these risks may remain stable in routine governance, they can evolve from a stable state to an unstable one during a major public health emergency. This is because the prolonged and large-scale nature of epidemic prevention in the face of a major public health crisis has significant negative impacts on society and the economy. In this context, structural wealth disparities highlight the differences in individuals' ability to withstand the risks of sudden events, amplifying the vulnerability of various social groups' livelihoods. Moreover, some existing social risks that have not been fully resolved may be exposed in a concentrated manner under unconventional social conditions. For example, the use of big data tools is an important method for managing the risks of major infectious diseases. During the epidemic control process, the use of Health QR code and travel codes has undoubtedly played a significant role in identifying and tracking risk groups. These tools not only effectively track people's movement patterns but also provide technical convenience for the accurate screening of individuals at risk. However, there is also the risk of the overflow of technological governance. For instance, during epidemic control in Henan Province, the arbitrary assignment of red codes to restrict people's movements was not only a misuse of technology but also reflected a risk of power diffusion by administrators through a concealed technical approach.

3.1.2. Public Opinion Risks: Crisis of Trust in Public Institutions and Over-Moralization Criticism

Public opinion risks refer to the potential for destructive "resonance" to form online or offline when risk-perceiving individuals express their opinions, attitudes, and views regarding a given objective risk event. Due to an enhanced public awareness of risks, people develop a stronger sense of worry, with emotional fluctuations and heightened attention. Discussions around related topics become more intense, creating a certain level of "public opinion." However, the nature of public opinion risks is not merely an exaggerated discussion of objective social risks; rather, it is the emergence of new risk content when these risks resonate in a different domain of public discourse. For example, during the fight against the pandemic, issues such as information opacity, delays in communication, and information concealment led the public to openly question and criticize the transparency of public departments' information, both in offline conversations and on online platforms and social media. This eroded public trust in public institutions, leading to a crisis of social trust. The escalation of public opinion has fueled the arbitration power of the "public tribunal" in cyberspace, where participants wield significant public opinion power to engage in online violence (Case B6), thus forming an intimidating arbitration force. In this process, on the one hand, deep-rooted social contradictions are continuously exposed and amplified, leading to an escalation of risks and the occurrence of derivative group events (Case C7). On the other hand, particularly during emergency responses under unconventional conditions, the emergence of public opinion is accompanied by a force of "denunciation" toward public institutions, manifested as the public's non-cooperation, resistance, and counteraction to pandemic control measures. This, in turn, creates internal friction in the state's and society's emergency response, increasing resistance to the work. Public opinion risks can also carry an over-moralized critique. In Case C3, a female deputy director from Hohhot, after a city-wide pandemic press conference on October 29, 2022, was criticized for her carefully applied makeup, wearing expensive French-brand earrings (priced over 30,000 yuan on the official website), and an Hermes scarf, which starkly contrasted with the severe and distressing nature of the pandemic and the one-month-long lockdown. As a result, she was subjected to online abuse and "doxxing" on social media.

3.2. The Mechanism of Social Risk Derivation and Diffusion in PHEIC

Social risks in PHEIC can be broadly divided into primary and secondary risks. Primary risks refer to those directly related to the public health event itself, while secondary risks emerge alongside the development and response to the emergency. In this process, the generation of risks is based on both subjective and objective reactions to objective risk facts, resulting in two distinct types of social risks: Entity risks and public opinion risks. From the logical perspective of risk occurrence, Entity risks are objectively existing, with the objective risk facts serving as the "raw material" for risk derivation and diffusion. Even "rumors" that may be groundless often capitalize on existing Entity risks, such as wealth disparities, the "government-citizen" divide, urban-rural conflicts, regional development gaps, and irregular daily management. These existing risks are exploited, and under the influence of public opinion, they can lead to offline or online collective "disturbances." In this situation, Entity risks and public opinion risks continuously exchange and resonate through media channels. Occasionally, due to asymmetric risk information and insufficient communication between the government and the public, a growing gap and misunderstanding between the two may emerge, further pushing the situation toward an uncontrollable direction. At the same time, public emotions act as a key catalyst for the diffusion and derivation of risks. The public, feeling tense and emotionally charged, is especially attentive to the development of the public health emergency and the performance of public institutions in responding to the risks. When a triggering event is revealed, it may continue to ferment on the internet, generating a peak in public opinion. Many of the debates focus on whether the public institutions have used the power granted by civil

society in a lawful, appropriate, and standardized manner, questioning the legality, appropriateness, flexibility, and responsiveness of the public health measures, as well as the satisfaction with the epidemic control effectiveness. These discussions form a secondary public opinion risk targeting the government's authority. Additionally, the authenticity of information in cyberspace has long been criticized. The mixing of true and false information reduces the efficiency and likelihood of the public obtaining reliable information, leading to the spread and diffusion of latent risks caused by misinformation. This further exacerbates the creation, diffusion, and reversal of public opinion, intensifying the entanglement and oscillation between Entity risks and public opinion risks. Public opinion carries the attitudes, views, values, and emotions of the participants, creating a powerful force of public discourse. If public opinion risks are not addressed in time, they will further stimulate public emotions, which in turn amplifies the diffusion and escalation of both material and public opinion risks.

The derivation and diffusion of social risks in PHEIC present a radiating pattern. The spread and diffusion of risks generally occur along two pathways. One is the natural transmission and derivation of risks based on the inherent connections and development patterns between events. For example, the outbreak of a public health emergency can lead to panic buying and hoarding by the public, resulting in shortages of supplies and bundled sales (Case A6). The other pathway involves the diffusion and derivation of risks triggered by the role of the media. Risk diffusion involves the continuous expansion of the scope and intensity of risk transmission based on existing risks, creating a trend where a small spark can set the whole prairie on fire. For example, in the case of the Xinjiang fire (Case C2), public opinion on the internet expanded from the fire incident to discussions about whether the epidemic control measures were appropriate and reasonable, and whether there was a direct or indirect connection between the fire's casualties and the pandemic control measures. Derived risks break through the scope of existing risk content and types, creating new risk dimensions. For example, in the cases of the "Exquisite Female Deputy Director Reading Her Speech with Finger Gestures" (Case C3) and the "Zhengzhou Female Secretary Crying at the Epidemic Press Conference Over Missing Her 18-Year-Old Daughter's 'Coming of Age Ceremony'" (Case C6), public opinion shifted to focus on the appearance, income speculations, integrity, and work dedication of public officials. The consumption capabilities and lifestyles of public officials typically do not attract special attention in normal circumstances, but in the context of a crisis, any discrepancies between their image, professional competence, and public expectations can be amplified by the media. This leads to doubts about whether these officials embody the professional image of integrity and competence. In some cases, such doubts evolve into personal attacks on the public servants, driven by unmet expectations and heightened emotions. Overall, in online media, the public becomes more critical than usual, and the phenomenon of over-moralized criticism becomes more prominent.

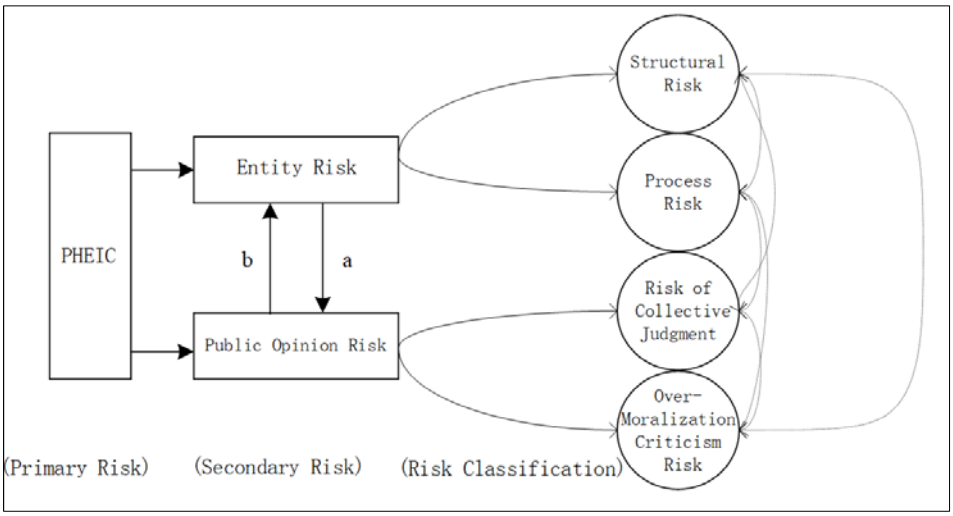

Figure 1. The Mechanism of Social Risk Evolution of PHEIC.

Strictly speaking, social risks do not have clear-cut boundaries, but rather exist in a state of chaos. From the perspective of the path of social risk derivation and transformation in the context of public health emergencies, if the risk damages directly caused by the emergency itself are referred to as primary risks, then the risk damages arising from other layers triggered by the emergency are termed secondary social risks. The most significant difference between primary and secondary risks lies in whether they are directly linked to the public health emergency itself. Generally, while secondary social risks are ignited by the public health emergency, they have moved beyond the scope of the emergency itself. The transformation of social risks in public health emergencies, from primary to secondary risks, is mainly reflected in process risks and structural risks. This process is also accompanied by the emergence of public opinion risks. Public opinion risks interact and resonate with Entity risks in both online and offline, virtual and real, direct and indirect ways. If process or structural risks are not contained, they will further amplify public opinion risks. The development of public opinion risks, in turn, can intensify the severity of process and structural risks. Taking the Xinjiang fire disaster case as an example, the logic of risk derivation and diffusion is as follows: the outbreak of the COVID-19 pandemic—strict epidemic control measures implemented by public departments—sudden fire—overcrowding of rescue channels and many people in home quarantine—high casualties—public opinion explosion—rumors about the government's epidemic control measures. From the entire event, both the outbreak of the pandemic and the sudden fire can be considered as primary risks. However, the congestion of rescue channels, due to irregularities in daily management, increased the risk of rescue vehicles being unable to reach the scene in time to extinguish the fire, leading to a large number of casualties. The fire resulted in 10 deaths and 9 moderate inhalation lung injuries, and the negative emotions among the public began to spread. Public opinion questioning the legitimacy and appropriateness of the public departments' epidemic control measures exploded, and as misinformation and rumors were introduced, a large-scale "counteracting" public opinion trend emerged in society. In this case, public opinion acted as a reproduction of objective risks in the dissemination of public discourse. Public opinion risks are a collection of the public's insecure, dissatisfied opinions, attitudes, and views, with negative emotions driving public opinion tendencies that spread widely through various media, generating broader and more destructive public discourse, forming a tendency toward disorder and counteraction in the form of public opinion risks.

Although the analysis of risk deconstruction presents linear and phased characteristics, from a comprehensive perspective, in a risk society, the greater the number of participants, the more varied the time points of their involvement, and the more elements such

as different objective events, contexts, governance resources, and the relationship between governance subjects and objects are intertwined. This leads to the derivation and diffusion of risks becoming a more complex, dynamic, and interconnected risk composite.

4. Social Risk Mitigation in PHEIC

To effectively mitigate social risks in PHEIC, it is essential to first identify the key areas of risk prevention. Then, based on these key areas, corresponding prevention strategies should be developed from the perspective of risk derivation and diffusion.

4.1. Key Areas of Risk Mitigation

In most cases, sudden risks cannot be accurately predicted. The response to such risks is more often exceptional, testing the country's and society's risk warning and emergency response capabilities. Therefore, it is important to recognize the uncontrollability of risks. The key is effective risk communication, helping people understand how to take appropriate measures to avoid risks in the face of uncontrollable situations and how to reduce secondary risks caused by unreasonable social behaviors, organizational actions, and management practices. Structured social risks exist even before a public health emergency occurs. These risks, under the influence of single or multiple points of a sudden event, can leap over the equilibrium state and cause damage. Structured social risks are related to some historical "chronic problems" formed during the process of national and social development. They have a wide scope and large potential hazards, making it unrealistic to eliminate them in the short term. On the other hand, process risks and public opinion risks emerge during the emergency response to a public health event. Compared to structured social risks, process risks and public opinion risks are immediate and can be mitigated more quickly. Therefore, in the prevention and mitigation of social risks during PHEIC, process risks and public opinion risks should be the focus of risk management. Although structured social risks cannot be eliminated or mitigated in the short term, they still require attention and should not be overlooked.

4.2. Strategies for Risk Mitigation

Due to the suddenness and complexity of pandemics, preventive measures and methods need to be more flexible and adaptable to the changing situation of the epidemic and the needs of epidemic control efforts. This also requires grassroots public health departments to have greater discretionary power to ensure that relevant departments and personnel can make flexible decisions about which control measures to adopt and the scale of those measures based on the development of the epidemic. However, the COVID-19 pandemic highlighted that in the process of delegating authority for epidemic control, there was a lack of constraints on the use of this power. Therefore, the expansion of discretionary power carries the risk of abuse, which may infringe upon citizens' legal rights such as privacy, residential security, personal health, reputation, and property. To maximize the mitigation of process-related social risks in major epidemic control efforts, public departments need to regulate the use of discretionary power, balancing between "delegating power" and "limiting power." On one hand, this can be achieved by improving laws, regulations, and institutional guidelines. In the emergency response to public health events, temporary authorization clauses should be added, emergency measures should be standardized, work processes should be optimized, and the efficiency of emergency management should be improved, all while preventing the derivation and diffusion of process risks. On the other hand, the use of administrative emergency powers is a necessary measure for a state to quickly control the situation and effectively restore normal order in an emergency. Legislation leaves some room for the use of emergency powers. However, there is a certain tension between the use of administrative emergency powers and the protection of citizens' rights. The exercise of emergency powers often implies an expansion of administrative authority, which naturally results in the encroachment of citizens'

rights. From a rule-of-law perspective, the use of national emergency powers must be constrained; otherwise, the expansion of emergency powers may infringe upon citizens' rights. Therefore, it is necessary to define the boundaries for the exercise of administrative emergency powers. Necessary measures should be taken to regulate the subjects, scope, and legal protections during the implementation of these powers. Relevant rules for the exercise of power should also be introduced, requiring public departments to exercise restraint when dealing with conflicting or adversarial public health emergencies. Public officials should seek to soothe the public's emotions through measures such as interest compensation, friendly consultation, and humanized care, thereby avoiding the escalation of conflicts.

Public opinion risks and concrete risks have significant differences. Public opinion is more of a moral and discursive force that supervises, condemns, and criticizes existing management and order. The underlying logic of public opinion risks is that concrete risks manifest as psychological reflections in the public's mind, potentially complicating the resolution of existing problems and conflicts, leading to internal friction. Public opinion governance is a crucial approach to preventing and mitigating the derivation and diffusion of public opinion risks. In practice, some local governments have attempted to control the development and spread of public opinion risks by blocking information, deleting posts, or closing accounts, thereby preventing the multi-point resonance of risks. In this context, the entire social system becomes like a closed container, organized but disordered, and as internal pressure gradually increases, there is a potential for it to explode. This approach does not truly alleviate the concrete social risks or reduce the risk of damage. Instead, it fuels the spread of risk information through social media in a dramatized, visualized, and stereotyped manner, which may amplify the risks rather than resolve them. Even when the government has good intentions, this may not yield positive results. Therefore, it is essential to focus on the methods and approaches used to mitigate public opinion risks. The phenomenon of information concealment or misleading higher authorities must be strictly avoided, with an emphasis on transparency, truthfulness, and accountability. Evidence has shown that blocking or deleting public opinion information only provides temporary social stability. When the truth eventually emerges, it undermines the authority and credibility of public departments and may even become a barrier to further efforts by relevant authorities. In response to this, during the management of PHEIC, it is important to provide avenues and outlets for the public to express their emotions. When encountering false or misleading online public opinion, it is essential to leverage official media to refute rumors and eliminate misinformation from the social discourse. Finally, proactive risk communication is crucial in mitigating public opinion risks. Risk communication helps build trust, reduce misunderstandings, and ease emotions, effectively slowing the accumulation of negative public sentiment. For example, during the pandemic, medical experts, such as Academician Zhong Nanshan, actively explained the severity of the virus and provided guidance on risk prevention. At the same time, local governments at all levels disclosed information on the transmission pathways, scope of infection, mortality rates, diagnostic methods, and preventive measures for COVID-19, which helped alleviate public anxiety and reduce panic.

5. Conclusion

This study analyzes the diffusion and evolution patterns and pathways of social risks arising from the COVID-19 pandemic and finds PHEIC have certain specific characteristics. These include high uncertainty, widespread impacts, prolonged durations, as well as cumulative and cross-border transmission of risks. The social risks generated by PHEIC not only include the direct threats to people's health and lives and economic losses caused by public health emergencies but also a series of other social derivative risks. For example, these events can disrupt existing social orders, lead to distrust and non-cooperation with

government authorities and organizers, and undermine the legitimacy and authority of established rules and management structures.

In practice, the social risks arising from PHEIC tend to diffuse and evolve under specific conditions. Generally, risks spread along two main paths: entity and networked. Under the influence of the media, the resonance between entity risks and public opinion risks can lead to the transformation of public health risks into social and political domains. Therefore, it is essential for national public sectors to adopt a cautious approach and take social risks arising from PHEIC seriously.

This study suggests that public authorities, in responding to social risks from PHEIC, should pay attention to both structural and procedural risks, as well as entity and public opinion risks. It also recommends strengthening risk communication, actively addressing public concerns, and improving governance systems in daily social management to enhance governance effectiveness and increase resilience to respond to emergencies.

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